smart
en
city

TOWARDS SMART ZERO CO$_2$ CITIES ACROSS EUROPE
VITORIA-GASTEIZ ✚ TARTU ✚ SØNDERBORG

Deliverable 8.4: Report on foresight workshops and evaluation of the usage of the methodology in individual cities
WP8, Task 8.3

Date of document
31 January 2020

Deliverable Version:	D8.4, V.1.0
Dissemination Level:	PU
Author(s):	Merit Tatar (IBS)
	Kertu Ling (IBS)
	Richard Henahan (IBS)
	Marek Tiits (IBS)
	Peter Rathje (ZERO)
	Kristina Bozhkova (ZERO)
	Michele Santis (RINA)
	Sara Botto (RINA)
	Ivanka Pandelieva (SEC)
	Koldo Urrutia Azcona (TEC)

Project Acronym	SmartEnCity
Project Title	Towards Smart Zero CO$_2$ Cities across Europe
Project Coordinator	Francisco Rodriguez Tecnalia francisco.rodriguez@tecnalia.com
Project Duration	1st February 2016 - 31st July 2021 (66 months)

Deliverable No.	D8.4. Report on foresight workshops and evaluation of the usage of the methodology in individual cities			
Diss. Level	Public			
Deliverable Lead	IBS			
Status			Working	
			Verified by other WPs	
	X		Final version	
Due date of deliverable	31/01/2020 (M48)			
Actual submission date	31/01/2020			
Work Package	WP 8 - Replication to Followers and Smart Cities Network			
WP Lead	IBS			
Contributing beneficiary(ies)	TEC, MON, ACC, CAR, ZERO, SCL, TREA, UTAR, SEZ			
Date	Version	Person/Partner	Comments	
06/06/2018	0.1	Merit Tatar / IBS	Outline and approach	
30/04/2019	0.2	Merit Tatar / IBS	First draft version (Tartu added)	
18/07/2019	0.3	Merit Tatar / IBS	Second draft version (method, guidelines, Sonderborg, Asenovgrad and Lecce added)	
13/12/19	0.4	Merit Tatar / IBS	Final draft version, review	
31/01/2020	1.0	Merit Tatar / IBS	Final version for submission	

Copyright notice

Table of contents:

Table of tables:

Table of figures:

Abbreviations and acronyms

Abbreviation/Acronym	Explanation
AI	Artificial intelligence
CEO	Chief executive officer
CO_2	Carbon dioxide
D	Deliverable in the project
DIY	Do it yourself
EU	European Union
EV	Electric vehicle
GA	Grant Agreement
HVAC	Heating, ventilation, air conditioning
ICTs	Information and communication technologies
IEP	Integrated Energy Plan
LED	Light-emitting diode
LH(C)	Lighthouse (city) in SEC
M	Month in the project
NGO	Non-profit organization
nZEB	Near zero energy building
PESTLE	Political, economic, social, technological, legal and environmental
RES	Renewable energy sources
SCC	Smart cities and communities
SEAP	Sustainable Energy Action Plan
SECAP	Sustainable Energy and Climate Action Plan
SECN	SmartEnCity Network
SEC	SmartEnCity, Towards Smart Zero CO_2 Cities across Europe
SME	Small and medium sized enterprise
STEEPV	Social, technological, economic, environmental, political and values-based
SWOT	Strengths, weaknesses, opportunities and threats
T	Task in the project
WP	Work package in the project

Table 1: Abbreviations and acronyms

0. Publishable Summary

The SmartEnCity project aims at developing a highly adaptable and replicable approach to **sustainable, smart and resource-efficient urban environments** in Europe. In addition to implementing smart solutions in the three lighthouse cities of the project along with supporting activities (e.g. monitoring, evaluation, exploitation, dissemination), another crucial element of the project is **replication**. Building on the lighthouse city activities, the aim of replication is to extend the experience gained and lessons learned during the project to other cities, be it the official project follower cities, the SmartEnCity network (www.smartencitynetwork.eu) or other cities interested in the smart zero-carbon city concept.

Besides other components, replication activities planned in SmartEnCity project include using **participatory foresight methods** and carrying out **scenario-planning workshops** in each of the three lighthouse and two follower cities. In the project, foresight is seen as a methodology that supports cities' strategic planning processes – in the context of SmartEnCity, using these methods will potentially lead to the preparation of **integrated energy plans (IEPs)** as well as replication roadmaps. Thereby, **foresight methods make a significant contribution to the integrated planning process by bringing together relevant stakeholders, gathering future intelligence and building common vision** for making present-day decisions and mobilizing joint actions.

As indicated by the name of Deliverable 8.4 – *Report on foresight workshops and evaluation of the usage of the methodology in individual cities* – the aim of this report is to give an overview of **how the foresight approach developed for this project was used** in the five partner cities. The report starts by presenting the foresight guidelines developed by the lead partner of this task – the Institute of Baltic Studies – based on various theoretical approaches to foresight. After explaining the role of the developed foresight approach in the context of the SmartEnCity project and its integrated energy planning process, the report continues by giving an overview of how scenario-planning workshops were carried out in each of the partner cities based on the guidelines. The deliverable ends with summarizing the foresight experience of the partner cities and presenting key takeaways, lessons learnt and success factors for further replication. **The reader gets a detailed overview of the:**

- Useful participative methodology for long term strategic planning

- How to create scenarios, examples of SWOTs and scenarios in different cities in Europe tackling with the similar grand challenges

- Detailed process specifics for organizing a scenario development workshop(s)

- Ideas for further replication of the process and this toolbox

This deliverable was prepared with input from all the **five task forces** that were established in the partner cities to lead the local integrated planning activities. This

includes Tartu task force (IBS, TAR, TREA, UTAR, SCL), Sonderborg task force (ZERO, AAU, PLAN), Vitoria-Gasteiz task force (TEC, MON, ACC, CAR, CEA and AVG), Asenovgrad task force (SEC, ASEN) as well as Lecce task force (RINA-C, LECC). Overall communication, dissemination and exploitation support was provided by SEZ.

Having successfully carried out their foresight workshops and having reported their experience in D8.4 (M48), the five partner cities now work towards completing their **integrated energy plans** (M60) and **replication roadmaps** (M66).

1. Introduction

The SmartEnCity (SEC) project involves **participatory foresight methods** to support the partner cities' strategic planning process. As the foresight exercise (T8.3 in the project) is about gathering future intelligence and building common visions for making present-day decisions and mobilizing joint actions, the method will contribute greatly to next steps planned in WP8, i.e. shaping the cities' integrated energy plans (T8.4) and replication roadmaps (T8.5). D8.4 ("Report on foresight workshops and evaluation of the usage of the methodology in individual cities") as the main output of T8.3 ("Smart cities scenarios definition through foresight methodology") thus serves as the concluding report of the foresight exercises organized in each of the partner cities in preparation of the next activities planned in WP8.

1.1.   Purpose and target group

This report is one of the outputs of the **replication work package** (WP8) in the SEC project, which aims at ensuring that the integrated approach together with the foresight component that will be demonstrated in the LH cities will be successfully replicated elsewhere in Europe so to move towards sustainable and resource-efficient urban environments. The report proceeds from the **replication framework presented in D8.2** ("Replication toolkit v1"), especially concerning enabling and supporting foresight-related replication efforts in the SEC Network member cities as well as other cities interested in the experience. Content-wise, the report is also closely related to WP2 and the SEC regeneration strategy that involves participatory foresight methodologies in its process.

The main **target groups** of the deliverable are:

- **SEC Network members** – cities who have committed themselves to follow the SEC learning process and who are encouraged to initiate their own integrated planning processes, using methods like foresight and scenario-building;

- **Other cities and city stakeholders** – cities and stakeholders interested in learning from the SEC foresight experience to potentially adjust and replicate the methodological approach in their own city contexts as part of integrated planning processes.

- **SEC partners** – summarizing the results of the five foresight experiences of the SEC partner cities to carry on using participatory methods like foresight and scenario-planning in their future integrated planning processes and to proceed with tasks 8.4 and 8.5 in the project.

1.2. Relation to other activities in the project

Table 2 presents the **main relationship of this deliverable to other activities and deliverables** developed within the SEC project that should be considered along with this document for further understanding of its contents.

Del. No.	Contributions
D2.4	Strategic input for city information gathering (city needs and baseline definition process and methods)
D2.6	Strategic input for planning the process (citizen engagement strategy and deployment plan)
D2.7	Strategic input for planning the process (integrated SEC strategy)
D2.8	Strategic input for planning the process (integrated SEC strategy – Cities4Zero)
D3.1	Strategic input for city information gathering (Vitoria-Gasteiz diagnosis and baseline)
D4.1	Strategic input for city information gathering (Tartu diagnosis and baseline)
D5.1	Strategic input for city information gathering (Sonderborg diagnosis and baseline)
D8.2	Strategic input for planning the process (replication toolkit 1)
D8.6	Strategic output for IEPs (updated or developed IEP for each LH and follower city)
D8.7	Strategic output for replication (report on widening the scope of replication knowledge through SECN and several European platforms)
D8.9	Strategic output for replication (replication toolkit 2)
D8.10	Strategic output for IEPs (replication roadmap for each LH and follower city)

Table 2: Relation to other activities in the project

1.3. Contributions of partners

Table 3 outlines the **main contributions** of SEC partners in developing this deliverable.

Partner	Contributions
IBS (Institute of Baltic Studies)	Deliverable lead partner, foresight methodology and guidelines, coordinating and reporting the foresight

	exercise in Tartu
TEC (Fundacion Tecnalia Research & Innovation)	Coordinating and reporting the foresight exercise in Vitoria-Gasteiz
MON (Mondragon Corporacion Cooperativa SCoop)	Supporting the preparation of foresight materials in Vitoria - Gasteiz
ACC (Acciona Infraestructuras S.A.)	Specifying and validating the methodology's suitability for replication activities and performing desk research (diagnosis, plans, strategies) before Vitoria-Gasteiz's foresight exercise
CAR (Fundacion Cartif)	Performing desk research (diagnosis, plans, strategies) before Vitoria-Gasteiz's foresight exercise
CEA (Centro de Estudio Ambientales)	Hosting and collaborating in the preparation of the foresight exercise in Vitoria-Gasteiz
AVG (Ayuntamiento de Vitoria-Gasteiz)	Hosting and collaborating in the preparation of the foresight exercise in Vitoria-Gasteiz
ZERO (Project ZERO A/S)	Organizing, coordinating, integrating (into the IEP Roadmap2025 planning process) and reporting the foresight exercise in Sonderborg
SCL (Smart City Lab)	Co-designing and co-organizing the foresight exercise in Tartu
TREA (Tartu Regional Energy Agency)	Co-designing and co-organizing the foresight exercise in Tartu, gathering input for leading the IEP process
UTAR (University of Tartu)	Co-designing and co-organizing the foresight exercise in Tartu
SEZ (Steinbeis Innovation gGmbH)	Communication and dissemination efforts
TAR (City of Tartu)	Co-designing and co-organizing the foresight exercise in Tartu
LECC (Citta di Lecce/Comune di Lecce)	Co-designing and co-organizing the foresight exercise in Lecce
RINA-C (former D'Appolonia SPA)	Coordinating and reporting the foresight exercise in Lecce
ASEN (Obshtini Asenovgrad)	Co-designing and co-organizing the foresight exercise in Asenovgrad
SEC (Sofia Energy Centre Ltd)	Coordinating and reporting the foresight exercise in Asenovgrad

Table 3: Contribution of partners

2. Objectives and expected impact

2.1. Objectives

This report has been compiled for **three main reasons**:

- To introduce the concept of foresight and some of its methods as tools that can be used for participatory planning processes;
- To propose a methodology and guidelines on how to use foresight as a participatory tool in integrated planning processes;
- To give an overview of the foresight experiences of the five SEC partner cities and encourage other cities to test these methods in their own city contexts.

The main objective of the deliverable is to **provide answers** to the following questions that make it possible for replication to take place in the field of foresight and scenario-building:

- What is foresight and what are its main features?
- What are the main foresight methods that cities interesting in learning from the SEC experience should know about?
- How is foresight applied in specific cases?
- What are the smart city trends that should be taken into account in strategic urban planning?
- How can foresight be used as a planning tool?
- Why did the SEC partner cities go through the foresight exercise and how does it fit in with the other SEC project activities?
- How should scenario building workshops be planned and carried out to ensure that the exercise will be beneficial for the cities?
- What could the scenario building workshop look like?

2.2. Expected impact

D8.4 is expected to **lead to**:
- An increased awareness of foresight and scenario-planning methods;
- An increased capacity to use foresight and scenario-planning methods in strategic urban planning with the help of the SEC foresight approach;
- An overview of how the SEC partner cities planned and carried out their foresight exercises and what could be learned from their experience;
- An understanding of how the foresight experience fits into the wider SEC project context along with the next steps planned for the partner cities in their IEP development process.

3. Overall approach

According to the Grant Agreement (GA), SEC "involves foresight methodologies in order to **support the strategic planning process** of the participating lighthouse cities as well as the follower cities and the Smart Cities Network to map and analyze the current smart city and urban development trends and jointly work with the information in order to produce their own smart city roadmap and IEP for the city. /…/ This qualitative and independent methodology for the cities enables to /…/ complete problem-solving workshops and /…/ choose a development path for smart city strategies and initiatives in various fields of the IEP." (p 51)

SEC project leans on a **Smart ZERO Carbon City concept** - "A Smart Zero Carbon City is a resource-efficient urban environment where carbon footprint is nearly eliminated; energy demand is kept to a minimum through the use of demand control technologies that save energy and promote raised awareness; energy supply is entirely renewable and clean; and resources are intelligently managed by aware and efficient citizens, as well as both public and private stakeholders" (SEC consortium Deliverable 2.8; Deliverable 8.2).

The concept is targeting main decarbonisation elements connected to cities' energy systems: energy demand, energy supply, and energy management; all from a participatory and technology-supported perspective. Here, energy elements are at the core, as almost all GHG emissions generated in urban environments come from activities related to cities' energy systems. However, SmartEnCity research and its interventions understand the city from a multi-systemic urban planning perspective and not the energy system as an isolated silo, where all city systems interact with each other and contribute to this transition, thus pushing planners to look at the decarbonisation challenge from an integrated approach, getting all city sectors on board (SEC consortium Deliverable 2.8, p. 8). Even though cities in the framework of SEC project will firstly focus on finalising their IEPs and **including areas of energy and buildings, energy management, transport, ICT for urban data management and participative governance**, it is acknowledged that also urban planning perspectives, climate adaptation measures, waste issues and green areas development etc. are crucial part of the holistic Smart ZERO Carbon City approach and some cities already include the elements of this integrated holistic view as the next steps from IEPs (e.g. Sonderborg, also Tartu by including climate adaptation part into integrated and sustainable energy and climate action plan).

Foresight activities in the SEC project were planned as **part of the wider IEP (integrated energy plan) process** that foresees the development of IEPs and roadmaps for each of the five partner cities in the framework of WP8. In the project, this mainly took the form of preparing and carrying out participatory scenario-planning workshops that were meant to gather all the relevant stakeholders and work towards a consensus of what the cities' preferred future scenarios might be. For this, local task forces were created in each of the partner cities, helping to plan and carry

out the foresight exercises (see Table 3 for specific contributions and respective city chapters for more details):

- **Tartu** – Institute of Baltic Studies (IBS), Tartu Regional Energy Agency (TREA), Tartu City Government (TAR), Smart City Lab (SCL), University of Tartu (UTAR).

- **Sonderborg** – Project Zero (ZERO), PlanEnergi Fond (PLAN), University of Aalborg (AAU), Sonderborg Forsyning (SONF), Sonderborg Municipality.

- **Lecce** – Rina Consulting S.p.A. (RINA-C), City of Lecce.

- **Asenovgrad** – Sofia Energy Centre Ltd (SEC), Asenovgrad Municipality (ASEN).

- **Vitoria-Gasteiz** – TEC (Fundacion Tecnalia Research & Innovation), MON (Mondragon Corporacion Cooperativa SCoop), ACC (Acciona Infraestructuras S.A.), CAR (Fundacion Cartif), AVG (Ayuntamiento de Vitoria-Gasteiz), CEA (Centro de Estudio Ambientales)

In the project, carrying out the foresight exercises mainly concerns tasks 2.6.2 ("Smart City Foresight" under "Integrated Planning") and 8.3 ("Smart City Scenarios Definition through Foresight Methodology"), but also carries on to other tasks of the project (e.g. 8.4.1 "Updating Integrated Urban Plans").

Using foresight methods in the SEC project thus fits into the **overall SEC regeneration strategy** (developed in WP2, see e.g. D2.8) that supports integrated energy planning in three stages – the strategic stage (city level), the design stage (project level) and the intervention and assessment stage (project and city level). The strategic stage is thereby divided into 6 steps that directly involve foresight methods in **step 3 "Diagnose"** and **step 4 "Envision"**:

1. STRATEGIC STAGE_CITY LEVEL_

1 Engage	2 Analyse	3 Diagnose	4 Envision	5 Plan City Level	6 Integrate

Step 1.
Foundation of a **Local Partnership towards the** *Smart Zero Carbon City* (LP towards SZCC)

Step 2.
City information gathering: **City Background Information Package**

Step 3.
Strategic City Diagnosis and visioning taskforces set-up

Step 4.
Strategic planning: **Scenarios generation** and preferred **vision**

Step 5.
Strategic planning: **Integrated Urban Plan (IUP)** & **Action Plan**

Step 6.
Integration of IUP into Municipal Planning

Key stakeholders identification to be involved at city level

- **Quadruple helix principle:** government (including local authority leadership), industry, academia, citizenship
- **Foundation of LP towards the SZCC.** Group set-up & pre-planning tasks.

Governance model definition

- Open innovation
- **Decision-making** procedures
- **Committees**
- **Institutional analysis** and creation (if necessary)
- **Governance activities** (spheres)
  - Strategic, Tactical, Operational, Reflexive

Pre-analysis – Where are we?

- **Literature review at city level;** existing documents & strategies
- In-depth **interviews with experts** (potential working groups representatives)
- **Surveys** on citizen's perception

Analysis – City Characterisation

- Socio-economic
- Business & financial
- Urban environment & quality of life
- Policies and regulations
- **Sectors of the city** - Energy, building stock, mobility, ICTs, engagement, waste, water, etc.
- SZCC Readiness Level

Taskforce set-up for Diagnosis (Step 3) & Vision (Step 4)

- **Key stakeholders & groups** represented and aligned with the Local Partnership towards SZCC (step 1)

Workshop set-up (Step 4)

- Probability and relevance of **critical topics**
- **Input for scenarios generation**

Strategic City Diagnosis development

- *SWOT analysis*
- *City-trends analysis (DELPHI, brainstorm, value trees, etc.)*
- **Connection to national and international targets, policies & institutions**

Workshop - *Visions of the future*
Where do we want to go?

- Establish scenario logics
- **Strategic question & Vision timeframe approach >** How making our city carbon neutral by 2030?
- Development within working groups
- **Scenarios' generation**
- Try to reach consensus
- Develop a **preferred vision**

Refine results towards strategic planning

- Develop and **refine preferred scenarios**
- Follow-up event with stakeholders
- **Share results with cities & experts**, including feedback

---

Develop an **Integrated Urban Plan** (IUP)

- Bear in mind stakeholders, materials and decisions made in *Steps 1,2,3&4*
- **Vision & overall City Objective. Strategic City Goals**
- **Main IUP Axes & Strategic Lines**
- Main funding sources identification

Develop an **Action Plan**

- **Actions & tangible targets**
- Contribution to *Strategic City Goals*
- Roadmap & timeframe (5-year max.)
- Potential **Key Projects identification**, involving working groups (projects' development from *Step7* on)
- **Indicator System** at city level & Impact Analysis

Integrate IUP contents **into Municipal land-use** planning and strategies

- **Update/ modification of Land-use** City Masterplan
  - Ensure **legal viability and land-use provision** for IUP actions.
  - Review and acknowledgement of exiting **local legislation and municipal competences.**
- IUP & Action Plan **acknowledgement by all departments** and strategies of the city
- **Breaking sectorial silos**, fostering **cross-cutting collaboration** among municipal departments

Integration steered by LP towards SZCC (*step 1*), which entails key stakeholders from the municipality

Figure 1: Strategic stage of the SEC regeneration strategy
Source: D2.8

The aim of Step 3 is to **make the necessary preparations** for Step 4 scenario-building activities. This starts with setting up a task force (e.g. Steering Committee) of key partners that will coordinate the IEP development process in the city and help to carry out the foresight exercise. The roles of the members should then be decided, and the main decision-making procedures specified. Hiring external experts for helping to organize the scenario-building phase is also an option.

A good foresight exercise starts from setting the **strategic question** that guides the next activities (e.g. "How can we make our city carbon-neutral by 2030?"). The timeframe of the foresight process should not be more than 10-15 years into the future so to develop good courses of action. The task force should then proceed by going over the current situation of the city and the existing barriers – information gathered in Step 2 will serve as great input for this.

Once the general framework is in place, the task force should complete an **in-depth SWOT analysis** of the city. However, there are several other tools that you may also want to use in this exercise, like PESTLE, STEEPV, Porter' s 5 forces etc. For example, the PESTLE analysis is a very useful tool that helps to make SWOT more comprehensive with in-depth analysis of external factors. For example, while using PESTLE (or STEEPV etc.), this step would ask you to find, for each PESTLE component, 3-5 trends/drivers, keeping in mind the focus of the SEC project (i.e. the zero-carbon city concept, see also D2.4, D2.7, D8.2). Start by identifying the driving forces of change, analyzing today's smart city trends by applying the "external opportunities" and "external threats" logic of a standard SWOT analysis and focusing on the strategic question. This will need some desk research and preliminary analysis. The aspects to mention are global smart city trends that are relevant to any city in the world, yet need to be taken into account in order to be better prepared for future developments. After identifying the most influential trends, the task force should also determine the **city's main strengths and weaknesses** based on relevant background materials. When combined with the external aspects, the SWOT analysis should then provide sufficient input into scenario planning. On figure 2 below one can get some tips for preparing a SWOT in the foresight task and for understanding the linkages between influential fields for a thorough SWOT analysis.
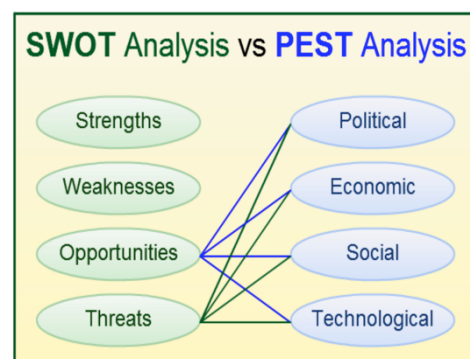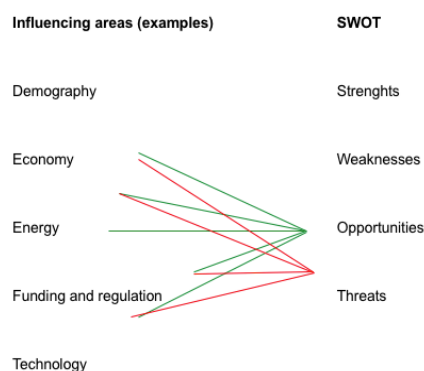
External opportunities and threats
- Mapping of global trends that are relevant to any city anywhere in the world, at least in energy, mobility, ICTs, people and governance.
- Collective identification of a limited number of most influential drivers.
- Opportunities and threats are external to your activity, i.e. you cannot change them efficiently.

Internal strengths and weaknesses
- Identification of main socio-economic strengths and weaknesses that characterize the development of a specific smart city.
- The SWOT analysis should provide sufficient input into scenario planning, based on **highly relevant, but uncertain drivers of change**, that leads to defining the main strategic actions to take.

Figure 2: SWOT preparation for scenario building process
Source: IBS; https://creately.com/blog/diagrams/swot-analysis-vs-pest-analysis/

Step 3 can be finalized by assessing the **probability** (i.e. likelihood that the trend will become a reality) and **relevance** (the importance of the trend for the city's development) of each of the main trends among the task force. The logic is that the highly relevant, but uncertain drivers of change should lead to defining the main strategic actions to be taken.

Step 4 directly follows Step 3 and its outputs. The foresight approach will provide valuable strategic input for the IEPs as it focuses on describing a **variety of potential futures** with relevant stakeholders, agreeing on a shared vision and shaping the outcomes in the preferred direction. This is exactly what happens in Step 4.

Step 4 starts by **attracting the relevant stakeholders** to participate in the scenario building workshop(s). These might include city planners, politicians, businesses, service providers, academia and community representatives. Remember that bringing together various stakeholders and guiding their individual choices towards consensus is one of the main benefits of foresight.

It is advised to organize **at least two scenario building workshops** for maximizing the impact. During the first workshop, the aim is to establish scenario logics – this is a **2x2 matrix** of the most impactful but uncertain trends that the participants have agreed on. Work should continue in groups to develop the 3-4 major scenarios that appear in the matrix. The aim of the group work is to describe a future scenario whereby the city successfully takes advantage of the most important opportunities while avoiding the major threats. In addition, each group will map the main preconditions that are needed for this scenario to become reality. After presenting the group work results, a general discussion of the most attractive and realistic scenarios should end the workshop.

The first workshop should be followed by task force members **developing each of the scenarios** and elaborating them further. This might involve additional desk

research and expert interviews. The aim of the second stakeholder workshop should be to summarize the elaborated scenarios and to reach an agreement, a preferred vision. This can be any of the scenarios or a combination of their elements, a so-called "**master scenario**". Continue discussing specific priorities and steps that should be taken in order to move towards the preferred scenario. What present-day decisions should you make to shape the outcome in the preferred direction, enhancing the desired future of taking actions to prevent non-desirable futures? This is valuable input for starting off the IEP and replication roadmap development process.

Step 4 should be finalized by **sharing the results** of the workshops to all the stakeholders and specifying next steps in the IEP development process.

4. Foresight as an integrated planning method in SmartEnCity

In the SEC project, participatory foresight is seen as an effective method for predicting and **preparing for future urban developments** in an effort to grow into a smarter city. It is about developing a shared vision and/or a set of objectives, engaging key stakeholders (incl. decision- and policy-makers), creating a knowledge network and organizing long-term thinking processes. The project makes use of participatory foresight methodologies for specifying the most likely visions of European smart cities in the long term and for producing high-quality IEPs for the lighthouse and follower cities.

4.1. Overview of foresight as a methodology

Foresight is a part of **future studies** that involves elements like critical thinking towards long-term developments, debate and participation as well as shaping the future by influencing public policy. In the last decades, foresight has been increasingly used in policy-making in European countries and various foresight methods have also gained ground in regional planning and decision-making (i.e. "regional foresight"). Overall, foresight encompasses a range of different approaches (scenario workshops, Delphi surveys etc.), but the main features can be summarized as follows.

FORESIGHT…

… is about gathering future intelligence and building common visions for making present-day decisions and mobilizing joint actions.

… focuses on describing a variety of potential futures in order to allow stakeholders to prepare for the variety and shape the outcomes in the preferred direction.

… translates into choosing the appropriate tools to either enhance a desired future or to take actions to prevent non-desirable futures.

… involves open reflection, network-based contact, deliberation and discussions that lead to shared visions and a joint ownership of the chosen strategies.

… often employs a mix of both evidence (e.g. horizon scanning, research) and creative methods (e.g. scenario fiction).

… can be used in working out regional development strategies as it brings together various stakeholders and guides their individual choices towards consensus.

… enhances and extends traditional policy and strategy planning (see Figure 1)

Figure 3: Main features of foresight
Source: Higdem (2014) and Weigand et al. (2014)

In relation to the position of foresight in various planning and strategy-related concepts, Cuhls (2003) states the following:

The definitions of forecasting vary to a certain extent, but they all have the view into the future in common. The future is unknown, but the broad, general

directions can be guessed at and reasonably dealt with. Foresight goes further than forecasting, including aspects of networking and the preparation of decisions concerning the future. /…/ Foresight is not planning, but foresight results provide 'information' about the future and are therefore one step in the planning and preparation of decisions.

The keywords that characterize foresight thus include **networking, gathering future insights as well as making respective decisions**. More specifically, foresight is a step forward from planning, strategic planning and forward planning as depicted in the following figure:

Planning
- A rational process of decision-making and control focused on the allocation of resources with respect to fixed objectives.

Strategic planning
- A process of managing organizational change focused on the development of an organization and of its human resources, structures and systems, combining top-down and bottom-up emphases.

Forward planning
- The process of exploring the future in all its possible dimensions, with the help of probable scenarios and analyzing the socio-economic impact of decisions and objectives.
- Unlike planning, this approach is directed much more towards strategic questions than towards operational problems.

Foresight
- Has the same orientation as forward planning, but is highly participation-seeking to stimulate networking among key actors and encourages to translate scenarios into impacts and implications for present-day decisions.

Figure 4: Conceptual relationships of foresight
Source: Gavigan and Scapolo

It can thus be said that foresight is different from other strands of future studies exactly because it **seeks the participation of all stakeholders** that are relevant to the topic, making (urban) planning a consensus-seeking process that results in actual decisions about the future. So what, in conclusion, is in it for the cities? Hines (2012) presents the following framework of foresight benefits:

Foresight activity	Benefits
Framing	1. Thinking in a more diverse, open, balanced and non-biased way
	2. Focusing on the right questions and problems more clearly
	3. Being aware of and influencing assumptions and mental models
Scanning	4. Understanding the context through establishing frameworks
	5. Anticipating change and avoiding surprise
Forecasting	6. Producing more creative, broader and deeper insights
	7. Identifying a wider range of opportunities and options
Visioning	8. Prioritizing and making better and more robust decisions
Planning the future	9. Constructing pathways from the present to the future that enable

		rehearsing
Acting		10. Catalyzing action and change
		11. Building alignment, commitment and confidence
		12. Building a learning environment

Table 4: Foresight benefits
Source: Hines (2012)

4.2. Foresight tools

As already stated, there are **many foresight methods** that are used for different purposes and contexts. Popper (2008) has developed a framework for classifying foresight methods – qualitative, quantitative and semi-quantitative alike – and altogether outlines 33 (!) foresight methods, the most important of which, in the context of the SEC project, could be the following[1]:

- **SWOT analysis** – besides specific strengths and weaknesses, examining external factors (broader socio-economic and environmental changes) and presenting them as opportunities and threats.
- **Literature review** – key part of scanning processes. Good reviews are generally structured around themes and related theories. The review may seek to gather the views and future visions of different authors.
- **Surveys** – distributed online and drawing conclusion from the opinions of a large pool of respondents.
- **Workshops** – events lasting from a few hours to a few days, typically combines talks, presentations, discussions and debates on a particular subject. Participants may be assigned specific detailed tasks.
- **Scenario writing** – involves producing accounts of plausible future events based on a creative combination of data, facts and hypotheses.
- **Brainstorming** – a creative and interactive method used in face-to-face and online group working sessions to generate new ideas around a specific area of interest. It allows people to think more freely and to propose new solutions to problems.
- **Polling/voting** – the use of voting methods to gain an assessment of the strength of views about a particular topic among a set of participants. These may be members of a workshop, for example, who e.g. place post-it stickers on one or other category on wall posters to indicate how probable, uncertain or important they consider the events to be, which actions are priorities and how feasible the alternatives are.
- **Back-casting** – an approach that involves working back from an imagined future to establishing what path might take us there from the present. Commonly, back-casting is used in aspirational scenario workshops.

---

[1] Read more at https://rafaelpopper.wordpress.com/foresight-methods/

It could be claimed that the central foresight tool that is directly related to most of the other techniques is **scenario planning**. According to Erdogan et al. (2009), scenario planning is about developing "future models in order to help this process and to develop strategic action plans and policies or to create a vision for the future". Thereby, a scenario could be defined as "an internally consistent view of what the future might turn out to be – not a forecast, but one possible future outcome" (Porter 1985). Despite some variations, scenarios essentially focus on three major issues (O'Brien 2004):

- The synthesis of information about **what is important** for an organization (city), a necessary foundation for future thinking;
- The development of a consistent and plausible set of descriptions of **possible futures**, or scenarios, through the use of a structured methodology; and
- The evaluation of the **implications** of these scenarios for the organization (city) today.

Also relevant to the replication efforts (WP8) in SEC, this **scenario planning logic and its phases** in a specific context can be illustrated in the following manner (Erdogan et al. 2009):
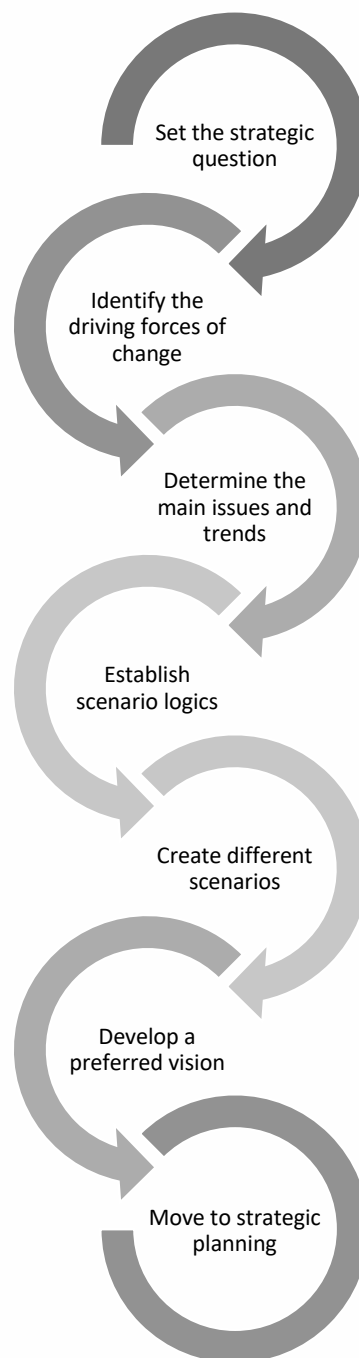
Figure 5: Scenario planning process
Source: Erdogan et al. (2009)

4.3. <u>Smart city trends and challenges</u>

Proceeding from the theoretical framework, it should become clear that a good foresight exercise starts from setting the **strategic question**, followed by identifying the underlying driving forces of change and determining the main issues and trends. For the foresight activities in SEC project, the following strategic questions were formulated:

<u>**General**</u>**: How can we make cities smarter?**

<u>**Specific**</u>**: What are the trends that will potentially have the greatest impact on the development of smart cities in the long run and how should these insights be reflected in today's strategic planning to make our cities smarter?**

In the following, thus, the **general outlooks** in the field of smart cities (with a focus on energy, mobility and ICT as appropriate to SEC actions) are presented in an attempt to describe the context for scenario-planning.

	Innovations and trends	Enabling factors	Global megatrends
Energy	• Smart grids • Smart buildings (incl. HVAC) • Modular construction • Combined heat and power systems	• Sensor technologies • Mainstreaming solar/wind/EV technologies • Internet of Things • Open data (incl. open source apps) • Big data analytics (understanding user needs etc.) • Cloud computing • Policy-making (carbon emission targets, committing to 100% RES etc.) • Citizen participation	• Demographic changes (i.e. global population growth) • Urbanization • Climate change and resource scarcity • Shift in economic power • Digital disruption
Mobility	• User-centered mobility services (on-demand rides, ride sharing etc.) • Integrated and intelligent transport networks (multimodality) • Digitization of tickets and payments • Automation and safety • Smart vehicles and infrastructure • Transportation as a service • Advanced traffic control		
ICT	• Integrated city platforms • Smart building energy management systems (incl. smart homes) • Smart metering • Public safety (crowd management, video security) • Intelligent lighting		

Table 5: Trend drivers for future smart cities

Regarding the **key weaknesses** that cities all over the world face and seek to overcome through smart city planning, the following challenges were identified based on desk research:

- **The need for local adaptation of smart solutions** – we cannot just transplant a given smart city solution from one geographic region to another. The context, culture and economics all play a big role.
- **Skills gap –** for a smart city to be successful in its endeavours, human resource skills need to be available to ensure all the different facets of smart cities are being addressed adequately and efficiently. Key skills include smart

city planning and design skills, smart city implementation and management skills, digital citizenship skills, need for data literacy etc.

- **Lack of finance and well-developed business models –** the government cannot fund the entire infrastructural investments needed for a smart city. Emerging policy instruments include technology driven innovative financing models, crowdfunding platforms, generating finances through smarter use of existing public resources and monetizing smart data.
- **Applying a suitable governance model –** information islands are the biggest barriers preventing resource integration in the course of smart city development, at the technical and management level of smart cities. Effective smart city management needs elements of both top-down and bottom-up governance approaches.
- **Making smart city applications inclusive –** applications should provide opportunities for all and ensure that particular groups are neither left out of its positive impact nor disproportionately affected by any societal costs that it might impose.
- **Getting buy-in from citizens –** citizens need to see the benefits of new technologies. City leaders need to develop and manage partnerships with the private sector and civil society to create and capitalize on smart technologies and innovation.
- **Legacy systems –** the entire evolution of cities relies first and foremost on the efficacy and adaptability of existing IT infrastructure. Governments may find themselves with legacy systems and old applications that force them to abide by obsolete processes and procedures.

So what do the mentioned smart city trend drivers and challenges mean for **strategic urban planning**? Desk research confirmed the key importance of the following aspects that should be kept in mind:

- **People-centred and inclusive infrastructure –** technology is only an enabler to meet the needs of the people;
- **Resilience and sustainability** – capacity of cities to survive, adapt and thrive in the face of stress and shocks;
- **Interoperability and flexibility** – infrastructure components need to be interoperable and should be designed so they are flexible towards modifications in the future;
- **Managing risks and ensuring safety** – as smart infrastructure is prone to hacking and illegal access, safety and the privacy of citizens should be promoted;
- **Collaborating across sectors and disciplines –** developing expertise and partnerships in various smart city areas;
- **Demonstrating the power of collective action –** citizen engagement, partnerships with stakeholders, participatory planning methods etc.;
- **Promoting storytelling –** people connect through stories that unite them.

4.4. <u>Foresight in SmartEnCity</u>

SEC "involves foresight methodologies in order to support the strategic planning process of the participating lighthouse cities as well as the follower cities and the Smart Cities Network to map and analyze the current smart city and urban development trends and jointly work with the information in order to produce their own smart city roadmap and IEP for the city. /…/ Foresight for global trends and smart city developments starts in WP2. Following the framework developed in WP2, participative foresight serves as a tool for successful replication (in WP8) and longer-term integrated planning in each partner city /…/. This qualitative and independent methodology for the cities enables to /…/ complete problem-solving workshops and /…/ choose a development path for smart city strategies and initiatives in various fields of the IEP." (SmartEnCity Grant Agreement GA p 51)

More specifically, in the context of SEC, the foresight process can be illustrated as follows:

STEP 1
Status and challenges
- Developing the framework (opportunities and threats)
- Setting up the IUP taskforce
- Practical preparations (e.g. conducting a survey)

STEP 2
Visions of the future
- Attracting various stakeholders
- Carrying out scenario workshops
- Analyzing the results

STEP 3
Strategies and decisions
- Discussing the results at stakeholder/consortium meetings
- Specifying the next steps for updating/ creating IUPs

Figure 6: Foresight process in SmartEnCity

As such, the **SEC partner cities are doing the foresight exercise because**:

- Foresight will help to **shape the integrated energy plan (IEP) priorities for each city** – the GA foresees that by M60, all the 5 SEC cities will deliver an updated IEP (T8.4, D8.6). As the foresight exercise focuses on describing a variety of potential futures with relevant stakeholders, agreeing on a shared vision and shaping the outcomes in the preferred direction, the method will provide valuable strategic input for the IEPs.

- Foresight will help to **specify interventions in replication roadmaps** – the GA foresees that by M66, all the 5 SEC cities will deliver replication roadmaps (T8.5, D8.10). As the foresight exercise is about gathering future intelligence

and building common visions for making present-day decisions and mobilizing joint actions, the method will contribute greatly to actual replication efforts and roadmap/action plan development.

- Foresight will **contribute to further replication efforts** – the GA foresees that by M66, an updated replication toolkit will be delivered (T8.2, D8.9) in addition to a report on foresight workshops and evaluation of using the methodology in individual cities (T8.2, D8.4) that will be delivered by M48. The foresight workshops will benefit both IEP and replication roadmap development, which in turn will provide the context, contents and specific actions for the second version of the replication toolkit. At the same time, several dissemination events are designed for introducing the SEC foresight approach also to the SEC Network members.

In SEC, foresight and scenario planning has been divided in between two work packages and tasks: 1) in **WP2 T2.6.2,** the foresight methodology was specified, a preliminary training for project partners was organized and the foresight methodology report was developed by M6; 2) **in WP8 T8.3,** lighthouse and follower cities use the developed methodology in preparing their integrated energy plans and replication roadmaps.

5. Replicating SmartEnCity's foresight approach – guidelines

In order to help any city with planning and carrying out the local scenario building workshops, the SEC project team has prepared a **list of actions**[2] to complete before, during and after the event. These actions are a part of a common approach to foresight in the SEC project and will ensure that the end result will be comparable to certain extent between cities. The most crucial aspect, however, is the city context, so any city can feel free to modify the specific instructions to best suit the city needs.

It is advised to plan **at least two workshops** for completing the scenario development process for IEP and replication roadmap.

FORESIGHT WORKSHOP ACTION PLAN
PHASE 1 – BEFORE THE WORKSHOP – STATUS AND CHALLENGES
1. Set up the IEP/replication roadmap task force – create a task force (e.g. Steering Committee) that will coordinate the IEP/replication roadmap development process in your city and help to carry out the foresight exercise. Who are the **key SEC partners** in your city besides the city administration itself? Decide on the roles of the members and the main decision-making procedures. For the foresight exercise, you can also hire external experts specifically for helping you to carry out the scenario building workshop.
2. Set the strategic question – a good foresight exercise starts from setting the strategic question that guides the next activities. For instance, your strategic question could be "How can we make our city carbon-neutral by 2030?" According to the SEC logic, the topic of the question should revolve around **energy, mobility, ICT and citizen involvement.** The timeframe of the foresight process should not be more than 10-15 years into the future, otherwise the "predictions" get more and more general and obscure and this prevents any good courses of action from being developed.
3. Analyze the current situation, existing barriers and the strategic lines of action in the short, medium and long term. Lighthouse cities in the SEC project have analyzed their baseline situation in deliverables 3.1-5.1. WP2 and WP7 have developed a range of methodological materials for analyzing the city barriers and for preparing for the carbon neutral transition. Please review and use these and other useful sources for setting and validating the baseline of your city in light of the strategic question (step 2). This step requires desk research and validation within the main IEP taskforce. It also prepares for further preparatory desk research in step 4.
4. Identify the driving forces of change – analyze today's **smart city trends**[3] and issues by applying the **"external opportunities" and "external threats"** logic of a standard SWOT analysis and focusing on your strategic question. This will need some desk research and preliminary analysis beforehand. The aspects to mention are global smart city trends in the project's main fields (energy, mobility, ICT and smart people) that

---

[2] Most of the actions adapted from Erdogan et al. 2009.
[3] Some beneficial background materials can be found here: European Parliament "Global Trends to 2035" http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_STU(2017)603263 and National Intelligence Council https://www.dni.gov/index.php/global-trends-home

are relevant to any city in the world, yet need to be taken into account in order to be better prepared for future developments. In case of opportunities, you might need to include aspects like economic growth, increasing citizen awareness or supportive national policy measures in the field, and in terms of threats, aspects like decreasing population, limited business development or unfavorable changes in national/EU legislation.

Identify the most influential trends and/or drivers, e.g. globalization, urbanization, technological breakthroughs, resource scarcity, oil price change or digitization. The aim is that, for each threat and opportunity, it should be possible to name the underlying societal/economic trend or change that cause it to become observable. Assess and rank the trends according to how relevant the trend is for the overall strategic question, how big is its impact for the city and relevant domains (we are seeking big impact) and how likely/unlikely is its occurrence[4].

Note that opportunities and threats are **external to your activity**, i.e. you cannot change them efficiently, and one aspect might be an opportunity and a threat at the same time (e.g. changes in national/EU legislation). Do not mix trends with internal factors (e.g. strength with an opportunity, weakness with a threat; e.g. "if we do that, this would be our opportunity; if we do this, this will be our threat"). Opportunities and threats are not direct consequences of your actions, but are rather beyond your control. SCC1 projects pay attention to Social, Economic and Legal factors/barriers. These are minimum broad set of influential areas while working with opportunities and threats.[5]

In SEC, we suggest using **SWOT analysis** as the basis for outlining the scenario axes (see step 10). However, there are several other tools that you may also want to use in this exercise, like PESTLE, STEEPV, Porter' s 5 forces etc. We especially advise you to use the PESTLE analysis as it is a very useful tool that helps to make SWOT more comprehensive with in-depth analysis of external factors.[6] For example, while using PESTLE (or STEEPV etc.), this step would ask you to find, for each PESTLE component, 3-5 trends/drivers, keeping in mind the focus of the SEC project (i.e. the zero-carbon city concept, see also D2.4, D2.7, D8.2).

5. Determine main strengths and weaknesses – the smart city trends and challenges reflect the opportunities and threats of a SWOT analysis, but in order to complete the picture, the city should also take into account its own specific strengths and weaknesses. As such, you will need to identify specific socio-economic positive and negative aspects that characterize your development as a smart city. When combined with the findings of step 4, the SWOT analysis should then provide sufficient input into scenario planning, based on **highly relevant, but uncertain drivers of change**, that leads to defining the main strategic actions to take. Combining information from step 4 and step 5, assess the **probability** (i.e. likelihood that the trend will become a reality in the time period) and **relevance** (the importance of the trend for your city's development in the time period) of each of the main trends among the task force.

---

[4] This will be done in detail during the (first) workshop, see step 10

[5] For background information, see the barriers that were collected from the SCC1 projects: https://docs.google.com/spreadsheets/d/1GqAHjgK15wNlv8JNIQRLNpC1lgqDNiV4tBTC6YDbdps/edit#gid=67062 121

[6] A good background material for identifying influential areas for descriptors with the greatest impact is for example Berghäuzer et. Al (2016) „Scenario planning: How is big data going to influence the future of smart mobility in Germany?"

Lighthouse cities in the SEC project have finalized D3.1, D4.1 and D5.1 **baseline analysis,** where they also developed SWOT analyses. Use this as a basis to follow steps 4 and 5, however, this needs to be supported by fresh analysis and desk research, additional methods and validation.

6. Attract relevant stakeholders – identify the key players related to your strategic question (step 2) and involve them in the foresight/scenario planning exercise. These might include city planners, politicians, businesses, service providers, academia and community representatives. Make sure that you get a variety of insights from various fields of expertise, from "big topics" in integrated energy planning (energy supply and demand, efficiency in houses, mobility, ICT, community engagement) and from various interest groups. Remember that bringing together various stakeholders and guiding their individual choices towards consensus is one of the main benefits of foresight. It is highly advised that the main task force members of the whole IEP process would be heavily involved in the scenario building task.

7. Prepare for the workshop – as an additional preparatory step, you might want to validate the findings of steps 4 and 5 (i.e. SWOT for your IEP) among the involved stakeholders, e.g. by **conducting a survey or using the Delphi method** for assessing the quality of the listed opportunities and threats and evaluating the probability and relevance/impact of each of the trends. This will provide good input for speculating on the most likely visions of the future in the scenario planning workshop. It is crucial that, if used, the preparatory survey should be circulated among as many relevant stakeholders as possible and that representatives of these stakeholders would also be represented in the workshop.

PHASE 2 – DURING THE FIRST WORKSHOP – VISIONS OF THE FUTURE

8. Introduce the purpose – specify the aim and the expected results of the workshop and present an overview of how a mutual vision of city energy planning will be formed during the exercise.

9. Get the stakeholders on the same page – present the overall context, focusing on the threats and opportunities that were identified in steps 4-5 and possibly validated in step 7. Plan some brainstorming time during which the participants could add post-its to the "opportunities" and "threats" sections (as external factors) on the wall to complement the existing aspects. The aim is to ensure that everyone is on the same page in terms of future challenges and growth potentials. The threats and opportunities should not sound slogan-like. At this point, they should not reflect the preferred courses of action either (e.g. developing electromobility of diversifying the energy mix).

10. Establish scenario logics – based on the previous steps, you should agree on 2 of the most impactful but uncertain trends that will be used for the **2x2 matrix** to create scenarios.

The task that already started before the workshop in step 4 should be continued in step 10. Place the elements of the previous discussion into a 2x2 matrix with "probability" and "impact" axes. The aim is to specify the threats and opportunities that are uncertain to occur and have the highest impact to your city's developments. The elements that have a great impact, but are unlikely to occur, for instance, should be removed. In the end, you should have **3-4 major scenarios** to develop further. This is the most challenging and time-consuming part of the workshop.

Positive/high

Low

High

Negative/low
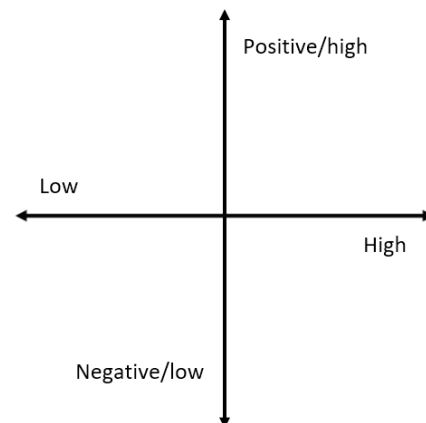
Figure 7: Example of setting the matrix for the selected trends

Source: IBS

11. Create groups – divide the participants into groups, taking into account their competences and, if possible, making sure that each group has the main stakeholder groups represented. **Assign leaders for each group.** The leaders of the working groups should be the most active participants of the workshop. One option for filtering these people out is to let the participants briefly introduce their vision at the beginning of the session if they wish and group the supporters of the idea together. If feasible, the leaders could be members of the IEP task force as it is advised that after the workshop, each group leader will summarize their group work in a scenario description.

12. Create different scenarios – each group will work with one specific scenario based on the 2x2 matrix. However, depending on the group and availability of time, you may choose the format where all groups discuss all the scenarios and you can later integrate the results. Alternatively, you may choose the format where the whole group discusses the scenarios/axes together or single participants focus on those axes in the matrix that they have strong opinions about.

The aim of the group work is to describe a future scenario whereby the city successfully takes advantage of the most important opportunities while avoiding the major threats. In addition, the group will map the main preconditions that are needed for this scenario to become reality (investments, political decisions, technology improvements etc.). The key questions for each group to describe a scenario include:

- How will developments along the scenario axes influence your city (cluster along different areas using suitable tools as in step 4 and 10)?
- What will be the response of your city?
- How can developments in energy, mobility and ICT domains help?
- What will happen to real income, social cohesion and happiness of citizens in your city[7]?

---

[7] For example, if not using any specific tool (e.g. PESTLE), areas of influence can also be: Society, Urbanization, Innovativeness, Politics, Industry and Infrastructure.

- How does the scenario respond to your main strategic question (step 2)?
- Is it a scenario that should be prevented or strived for in urban planning today?
- How can we prepare for the scenario in the city's IEP?

The goal is to offer a variety of scenarios describing your city in the future and specify the criteria for getting there. For group work, the following tips could be used:

- Name each scenario
- Name 2-3 magazine headlines from the future for each scenario
- Propose timeline, legend or story for each scenario
- Extra effort will be needed after the workshop to write up the scenarios! (see chapter 5)

13. Conclusions – the leaders of the working groups will introduce their best scenarios and their preconditions (ca. 15 minutes each). This will be followed by a discussion of the most attractive and realistic scenarios.

PHASE 3 – AFTER THE FIRST WORKSHOP – SCENARIO DEVELOPMENT

14. Develop the scenarios – translating scenarios into implications for present-day decisions takes more time and effort than just one workshop. As such, it is important that you develop the preferred scenarios further within your task force while continuing to involve stakeholders, creating a ca. **4-page summary for each scenario** that will feed into the next steps. Conduct additional desk research and expert interviews, if needed; complete and elaborate the selected scenarios by describing them in detail; developing further keywords identified during the workshop, adding numbers for trends etc.

PHASE 4 – DURING THE SECOND WORKSHOP – MASTER SCENARIO

15. Develop a preferred vision – summarize the scenarios identified (e.g. during the first workshop, see "notes on planning the workshops" below). The goal is to reach an agreement, a common vision – is there any scenario that is clearly preferred among others or if there are good elements in several of the scenarios, is it possible to integrate the scenarios into one comprehensive "master" scenario?

16. Move to strategic planning (and roadmapping)[8] – continue discussing concrete priorities and steps that should be taken in order to move towards the preferred or integrated "master" scenario. What present-day decisions should we make to shape the outcome in the preferred direction, enhancing the desired future or taking actions to prevent non-desirable futures? What are the most important milestones (in each domain: energy, mobility, ICT, governance and citizen engagement)? **This is valuable input for starting off the IEP and replication roadmap development process.** Draw conclusions on the main results of the (previous) workshop, once again emphasizing the way in which the information will be used in integrated strategic energy planning and describing the next steps that will be taken in the project.

PHASE 5 – AFTER THE WORKSHOPS – STRATEGIES AND DECISIONS

17. Organize a follow-up event – another important aspect of foresight is to create and maintain the feeling of joint ownership of the chosen strategies and to sustain the network of relevant stakeholders. If possible, organize a follow-up meeting to present the

---

[8] In case you plan to use one scenario building workshop, include this step for concluding the first seminar.

advanced scenario(s) specified in steps 14-15 to your stakeholders, asking them for feedback and gathering more in-depth ideas for strategic planning as input for your IEP and replication roadmap.

18. Specify next steps – agree on how to move on with developing the IEP and replication roadmap. Do you need complementary activities to support the IEP development process, e.g. more participative planning events, additional surveys or qualitative research to plan actions? What kind of documents will the IEP and replication roadmap be, how will they fit in with the other urban plans/strategies (e.g. is it an updated version of an earlier strategy), who will be the main stakeholders implementing it and what will the political commitment to these documents be like?

Notes on planning the workshops:

- We suggest planning at least one full working day with decent pauses for completing steps 8-13.

- The results of steps 8-13 are general descriptions of 3-4 scenarios (see also step 14), keywords for each scenario in each area of influence, preferably an initial agreement on the preferred scenario.

- We suggest covering step 15-16 with the second workshop (2 weeks – 1 month later) if possible – see also step 17.

We suggest planning at least half a working day (4 hours) for steps 15-16.

6. Foresight experience – Tartu

In Tartu, the foresight exercise was organized as part of a wider energy planning process that was called **"Tartu Energy 2030+".** The Tartu Energy 2030+ strategy was developed in the framework of 3 different initiatives: compiling the interim report for the city's already existing SEAP (Sustainable Energy Action Plan), renewing the SEAP into a SECAP (Sustainable Energy and Climate Action Plan) and creating an IEP (Integrated Energy Plan) in the SmartEnCity (SEC) project. The aim was to put Tartu in the context of global developments and devise an action plan for reducing CO_2 emissions at least by 40% by the year 2030.

As the first step in the process of developing the Tartu Energy 2030+ plan, **two foresight workshops** were organized for developing various visions of the future of Tartu with the help of stakeholders. Once elaborated, these scenarios provided input for the new development plan, especially in terms of the present-day decisions that should be made in order to shape the development of Tartu in the preferred direction, enhancing the desired future and taking actions to prevent non-desirable futures.

6.1. <u>Phase 1 – status and challenges</u>

For planning the foresight exercise in Tartu, the following **action plan** was agreed on:

Activity	Deadline	Responsibility
Tartu Energy 2030+ kick-off meeting and appointing the task force	12 Sept 2018	IBS, TREA, TAR, UTAR
Mapping the stakeholders to be involved throughout the foresight exercise	Sept 2018	IBS, help from TAR
Validating and editing the list of stakeholders at a task force meeting	26 Sept 2018	Task force
Desk research – reviewing baseline documents (D4.1, D4.2), Tartu's existing strategies and action plans (incl. the SEAP); preparing the SWOT analysis and mapping relevant trends	Sept 2018, sent to the task force by 1 Oct 2018	IBS
Validating the SWOT analysis and relevant trends in the task force	4 Oct 2018	Task force, modifications by IBS
Organizing the first scenario-building workshop (incl. specifying the location, time, participants, presenters, catering, moderator)	Sept-Oct 2018	IBS, help from task force
Officially launching the Tartu Energy 2030+ strategy in Tartu City Government	11 Oct 2018	TAR, TREA
The first scenario-building workshop (full day, incl. getting on the same page, validating trends and developing scenarios)	15 Oct 2018	IBS, external moderator, task force members assisting group work

Follow-up of the first scenario-building workshop, developing and improving the created scenarios	29 Oct	Group leaders (task force members), IBS
Validating the improved scenarios in the task force	1 Nov 2018	Task force, modifications by IBS
Organizing the second scenario-building workshop (incl. specifying the location, time, participants, presenters, catering, moderator)	Oct-Nov 2018	IBS, help from task force
The second scenario-building workshop (half a day, incl. validating the improved scenarios and agreeing on the vision of "Tartu Energy 2030+")	19 Nov 2018	IBS, external moderator, task force members assisting group work
Follow-up of the second scenario-building workshop, summarizing the experience and communicating the next steps	30 Nov 2018	IBS
TREA taking over the planning process (incl. launching thematic expert groups)	Dec 2018	TREA

Table 6: Tartu foresight action plan

6.1.1. Foresight task force

For the purpose of planning and implementing the foresight, integrated energy planning and replication roadmap tasks in Tartu, one **task force** was set up for the whole process. The task force was set up based on responsibilities assigned in the SEC Grant Agreement (GA) and the aim was to ensure that all phases of the IEP process would be well covered by the Estonian consortium partners. As such, the task force included:

- **Tartu City Government (TAR)** – responsible for overall coordination and ensuring city commitment. The main representatives included 4 city government members (deputy mayor, analyst, engineer and project manager).

- **The Institute of Baltic Studies (IBS)** – responsible for foresight workshops and overall communication. The main representatives included 3 analysts.

- **Tartu Regional Energy Agency (TREA)** – responsible for integrated energy planning and replication roadmap planning, including leading the 6 thematic expert groups. The main representatives included 3 energy experts.

- **The University of Tartu (UTAR)** – helping in the entire planning and implementation process. The main representatives included 2 researchers.

The task force was created in September 2018 and **met regularly** (usually every two weeks) until the IEP was finalized and approved by the city government in the end of 2019. Physical meetings were used progress monitoring and the strategic planning of the next steps, whereas e-mails were used for everyday communication and specifying relevant details.

During the foresight exercise, the task force worked through the following **phases, steps and activitie**s:

Phase	Steps	Activities
Phase 1. Before the workshop – status and challenges.	1. Set up the IEP/replication roadmap task force 2. Set the strategic question 3. Analyse/review the base situation, city characterization 4. Identify the driving forces of change 5. Determine main strengths and weaknesses 6. Attract relevant stakeholders 7. Prepare for the workshop	1. Task force for Tartu Energy 2030+ set up in September 2018, includes IBS, TREA, TAR, UTAR (ca. 12 people). 2. Ambition: Tartu has the ambition to reduce its ecological footprint through energy efficiency, renewable energy, modern technology and citizen awareness. 3. City characterization documents reviewed (D4.1, D4.2). 4. Global smart city trends in energy, mobility, ICT and governance mapped, a list of trends developed and validated in the task force. 5. Various strategies, development plans, programs etc. for Tartu reviewed, developing a SWOT analysis with input from steps 3-4. SWOT analysis validated in the task force. 6. Relevant stakeholders mapped, invitation sent to ca. 130 people from the public sector, companies, non-profits, research organizations and other partners. 7. Various preparations made, including hiring a moderator, booking a conference room, arranging catering, preparing materials and assignments for group work etc.
Phase 2. During the workshop – visions of the future.	8. Introduce the purpose 9. Get the stakeholders on the same page 10. Establish scenario logics 11. Create groups 12. Create different scenarios 13. Conclusions	8. Introductions by TAR and TREA, overview of the planned process of developing the Tartu Energy 2030+ strategy. 9. Discussing the prepared list of trends, rephrasing and adding new aspects. 10. Voting, creating axes of the two most important trends (attainability of CO_2 goals, consumer awareness). 11. 4 groups were pre-defined, all sectors represented in each, 4 tables were arranged respectively with lists of group members. 12. Each group was assigned one scenario (low-high consumer awareness, achieving-not achieving CO_2 goals) for developing it further, presentations and general discussion after group work. 13. Information about how the scenarios will be developed after the workshop and introduction to the next workshop, voting on the date.
Phase 3. After the workshops – strategies and decisions.	14. Develop the scenarios	14. All the 4 scenarios further developed by the task force members who participated in the respective group's discussions, creating 2-page descriptions of each scenario and summarizing the scenarios using a table template (aspects like the global context, legislation, society, economy, planning, mobility, systems and services). The scenarios were made available online and all the

		stakeholders had a chance to review and modify the descriptions. After modifications, a scenario report was put together and shared as input material for the next workshop.
Phase 4. During the second workshop – master scenario.	15. Develop a preferred vision 16. Move to strategic planning	15. Creating more-or-less the same groups, presenting all the scenarios from last time and validating them through group work and general discussion, making them more coherent. 16. Deciding on the preferred scenario as the basis for the Tartu Energy 2030+ vision, brainstorming individually and in groups to come up with vision statements, integrating these into one master vision. Introducing next steps in the planning process (TREA) and concluding the workshop.
Phase 5. After the workshops – strategies and decisions.	17. Organize a follow-up event 18. Share results 19. Specify next steps	17. Work with the strategy will continue in 6 thematic expert groups and their regular meetings under the lead of TREA, the next bigger citizen engagement event will take place in June 2019 (presenting the draft strategy). 18. The draft will be shared with the public and will be open to comments and modifications. 19. Once the action plan is in place, TREA will start to collect „voluntary commitments" from organizations who are willing to contribute to the goals of the strategy. The city government will approve the strategy by the end of 2019.

Table 7: Tartu foresight phases

6.1.2. Stakeholder involvement

As the first step in stakeholder involvement, a recently prepared **"Smart Tartu" stakeholder database** was used. These stakeholders had been mapped as part of developing a new brand for Tartu as "Smart Tartu" that was done separately from the SmartEnCity project, but matched the needs of preparing for the foresight workshops very well. The "Smart Tartu" stakeholder database included representatives of the following categories:

- **Environment**
  - Smart buildings
  - Resource management
  - Sustainable urban planning
- **Mobility**
  - Efficient transport
  - Multimodal access
  - Technology infrastructure
  - Safety and traffic management
- **Government**

- o Online services
- o Infrastructure
- o Open government
- o Multi-level governance
- o Participation
- o Living space
- **Economy**
    - o Entrepreneurship and innovation
    - o Productivity and employment
    - o Local and global connection
- **People**
    - o Education
    - o Creativity (music, visual arts, design etc.)
    - o Community building
- **Living**
    - o Culture and well-being
    - o Safety
    - o Health
    - o Tourism
    - o Technology accessibility

The "Smart Tartu" database included a total of 174 stakeholders along with the representatives' names, positions, organizations, e-mails and phone numbers. Based on this database, the "Tartu Energy 2030+" task force created a **modified database** with additional stakeholder mapping that was relevant to the IEP process. As a result, a database with 130 stakeholders was created, grouped in the following categories: Tartu City Government, Tartu Energy 2030+ task force, companies, partners and umbrella organizations, citizen initiatives and other stakeholders. The representatives included deputy mayors, department managers, specialists, CEOs, project managers and others. In addition to the stakeholders' contact information, the database included information on whether the stakeholders would attend either of the scenario-building workshops after the e-mail invitations had been sent out.

The **e-mail invitations** were addressed at each of the invited stakeholders personally and included the main information (name of the event, location, time), the background of the event (Tartu Energy 2030+ initiative, aim of either of the workshops), the agenda and contact information. In addition, the invitation included a link for online registration, which enabled easy access to the status of registrations and planning the next steps (catering, size of room, sending out reminders if the invited stakeholders were not registering as actively as expected etc.). In order to demonstrate that the Tartu Energy 2030+ initiative is high in the city's priorities, one of the deputy mayors of Tartu was involved as the keynote speaker in both of the events – this was expected to raise the interest of the invited stakeholders to participate in the workshops.

One of the **greatest challenges** in the stakeholder involvement phase was to make sure that a critical mass of stakeholders from the private and third sectors would be represented besides public sector stakeholders. Striking a balance between the sectors was very much prioritized, which meant targeted messages regarding why e.g. companies and NGOs should participate in such an exercise and why it is important for Tartu to get their input in developing a new energy strategy and action plan. Whereas SMEs were easier to approach, tailored messages were especially needed in case of large enterprises. Getting large enterprises on board was thus especially tricky, but a couple of them agreed to join the workshops after all.

6.1.3. Preparing for the workshop

For preparing for the workshops, **two main documents** were developed: Tartu SWOT analysis and a list of global trends that should be taken into account in urban planning. Whereas the trends were modified and updated during the first workshop to get all the participants on the same page, the SWOT analysis was used as background information in both of the workshops' group work sessions.

Putting together the **SWOT analysis** mainly involved desk research by the analyst team at IBS. Tartu City Government provided all the relevant strategies and action plans related to energy, mobility, ICT and governance; additional information was found in the SmartEnCity diagnosis and baseline documents. Materials available on the web were also explored for adding any aspects that were still not covered. Once the SWOT analysis was ready, it was validated in the task force and modified accordingly before the workshops. The SWOT analysis served as background material for the foresight workshops so that the stakeholders would be on the same page concerning the specific strengths and weaknesses of Tartu as well as the external opportunities and threats as the driving forces of change that need to be taken into account in city planning.

Besides the SWOT analysis, a list of **relevant global trends** was also compiled. This was mainly done based on a global smart city trend survey that was conducted among the SEC partners in 2016, complemented with web research. The survey was carried out to map the global trends that will potentially have the greatest impact on the development of smart cities in the coming decade. Out of the trends that were identified through literature review, the ones that referred to external factors, i.e. the overall opportunities and threats that a city should keep in mind, were included and validated in the survey. In the end, uncertain trends with a high impact were included in the list as aspects that should be analyzed as background information in scenario-building workshops to agree on the best course of action in urban planning. For the purposes of Tartu Energy 2030+, the list was updated, complemented with online literature review results, validated and improved in the task force before the first workshop. It was made sure that each of the trends would express change in some direction (e.g. an increase or decrease), not a static situation.

The **final list of global smart city trends**, categorized by the main areas of SEC interventions, was the following:

ENERGY
1. **Oil and gas prices increasing –** the cost of oil and gas will increase (thus e.g. boosting cleaner energy production technologies).
2. **Renewable energy prices decreasing –** the costs of renewable energy (solar, wind etc.) will decline remarkably, making it competitive with conventional energy.
3. **Failing to meet CO$_2$ targets –** the global CO$_2$ emission targets will not be met as the energy sector will not experience drastic changes in e.g. consumption.
4. **City governments active in the energy market –** cities will become active players in their local energy markets (e.g. city-owned energy companies).
5. **Citizens active in the energy market –** citizens (incl. housing associations) will become active players in their local energy market (e.g. selling to the grid).
6. **Political effort before technology –** improvements in energy trends will rather come from constant political effort than advances in technology.
7. **Energy intensity gradually reduced –** the energy intensity of the economy will be gradually reduced through smart solutions in construction, street lights, energy management etc.
8. **Continued importance of recycling –** ways of recycling and reusing products and materials as well as reducing waste as an indispensable part of meeting energy goals.
9. **Resource competition –** as the consequences of climate change become increasingly apparent, the world is likely to see resource-related political disputes on the (inter)national level.
10. **Diversity of energy sources** (added during the first workshop)
11. **Fall of thermal energy and rise of electric energy** (added during the first workshop)
12. **Stricter environmental laws** (added during the first workshop)
MOBILITY
13. **Continued dependence on fossil fuels –** global transport will remain heavily dependent on fossil fuels with a strong rise in demand for diesel, fuel oil and jet fuel.
14. **Fuel consumption has peaked –** contrary to developing countries, the transport fuel demand for developed countries will remain at current levels or even drop.
15. **Car and ride sharing on the rise –** car and ride sharing will become increasingly popular, hindering growth in the number of personal cars.
16. **Electric cars replacing conventional cars –** electric cars will be more and more affordable, gradually replacing conventional cars.
17. **Government regulation crucial –** transport volumes, fuel demand and CO$_2$ emission rates from the transport sector will mainly depend on the degree of government intervention.
18. **Self-driving cars –** advances in developing and adopting self-driving cars will change the current transport systems.
19. **Increased multimodality –** integrating various modes or transport and ticketing systems, more seamless systems.
20. **Renaissance of active transport modes –** people are ready to walk and use bicycles if it is convenient and safe.
21. **Increasing need to be mobile** (added during the first workshop)
22. **(Sub)urbanization on the rise** (added during the first workshop)
23. **Number of vehicles on the rise** (added during the first workshop)
24. **Increasing population** (added during the first workshop)

25. **Increasing traffic safety** (added during the first workshop)

ICT
26. **Smart grids on the rise – t**he trend towards smart grids, which allow communication between power producers and consumers, will increase remarkably.
27. **Big data gains popularity –** big data (e.g. from sensors) will become increasingly popular in optimizing transportation and energy systems and supporting a better management of resources.
28. **Open data gains popularity –** ICTs will lead to further access to and use of urban data, e.g. by the private sector to develop new solutions.
29. **ICTs supporting citizen engagement –** ICTs will gain importance in ensuring citizen participation in planning decisions, contributing to social inclusion.
30. **Growing inequalities –** ICT products and services will still be inaccessible to some segments of the population due to a lack of affordability, training and education, contributing to urban inequality.
31. **Safety issues gaining ground –** smart cities will be hindered by privacy and safety issues (e.g. data extraction, frauds, identity thefts, cyber attacks) and the resulting low acceptance of new solutions.
32. **Rise of AI –** city governments will gather more real-time data and combine it with the capabilities of artificial intelligence to run the city more effectively and efficiently.
33. **'Anywhere access'** – access to information through smartphones and mobile infrastructure will transform the way people use the city, supporting the development of new products and services.
34. **Increased dependence on technology** (added during the first workshop)
35. **Rise of remote work thanks to ICT** (added during the first workshop)
36. **Rise of electricity consumption owing to ICT** (added during the first workshop)

GOVERNANCE
37. **Co-creation driving smart cities –** co-creation with citizens, partnerships with the private sector and civil society increasingly important in smart urban planning and public service provision.
38. **Political effort and regulations crucial –** smart cities will be driven by political effort and sufficient regulations.
39. **Key skills gaps –** smart cities will be hindered by key skills gaps (e.g. smart city planning, procurement, digital citizenship, data literacy).
40. **Insufficient consumer awareness –** smart cities will be hindered by insufficient awareness and changes in consumer behavior.
41. **Legacy systems as a barrier –** smart cities will be hindered by their legacy systems (lack of adaptability of existing IT infrastructures) and difficulties in integration.
42. **Lack of finance –** smart cities will be hindered by lack of finance and well-developed business models.
43. **Lack of common vision –** smart cities will be hindered by the lack of a common vision and action.
44. **Smart procurement on the rise –** city governments are big consumers that will increasingly affect the energy behavior of citizens and companies.
45. **Increased funding for climate actions** (added during the first workshop)

Table 8: Tartu smart city trends

6.1.4. SWOT analysis

Instead of a question, a strategic mission statement was developed to guide work throughout the two foresight workshops: "**Tartu has the ambition to reduce its ecological footprint through energy efficiency, renewable energy consumption, modern technology applications and environmentally aware citizens**".

The final SWOT analysis included the following **strengths and weaknesses**:

AREA	STRENGTHS	WEAKNESSES
Energy	• 90% of apartment buildings integrated in the district heating network. • Share of renewables in energy consumption higher than Estonia's average. • Progress in energy retrofitting (e.g. SmartEnCity pilot). • Progress in district cooling and using residual heat in district heating. • Increased use of LED lamps and sensors in street lighting.	• High energy intensity of housing, economy and living environment. • Low quality of housing in some places, poor energy efficiency and indoor climate. • Low air quality, high CO_2 levels. • Private houses poorly connected to the district heating network. • High share of electricity in CO_2 emissions (peculiarity of national electricity production). • Outdated production methods and insufficient use of new economic models (e.g. energy cooperation).
Transport	• Tartu is compact and getting around is easy. • High share of using public transport and walking. • Progress in promoting cycling (e.g. bike share to be launched, bike paths developed). • Progress in promoting public transport (e.g. environmentally friendly buses, good bus line coverage, bus stops nearby). • Increased access (e.g. new cycle and pedestrian tracks, better quality of roads).	• Poor (inter)national access to the city. • Increase in car use, transport planning favors car traffic. • Low integration/multimodality between modes of transport and ticket systems. • Shortcomings in public transport (slow bus lines, crowded buses, compatibility issues between schedules). • Heavy traffic in the city center in peak hours, lack of supporting roads. • In some places, low quality of roads and lack of parking space. • Low use of bike paths, paths not well integrated. • Lack of bridges, untapped potential in water transport.
ICT	• Strong ICT infrastructure, new ICT solutions being developed. • Innovation and willingness to learn, using new ICT solutions. • Developing smart home solutions (e.g. SmartEnCity pilot). • Access to internet throughout the city.	• Lack of consumption data and access to it, insufficient cooperation with service providers. • Low integration of public services, insufficient data monitoring. • Digital divide between generations, shaping services for certain target groups. • Low awareness of ICT risks and ways of building resilience.

	Strengths	Weaknesses
Governance	• Ability to develop and implement green procurements. • Progress in citizen engagement (e.g. participatory budgeting). • The city is actively shaping its smart city brand. • Transparent and open governance. • High level of education and skills, lifelong learning. • High quality of life and safety, fast development. • Tartu as the tourism hub of South Estonia.	• Citizens' low level of trust towards new initiatives. • Limited acceptance of principles of energy transition and sustainability. • Limited capabilities of the city government (e.g. to change energy consumption, renovating private property). • Lack of cooperation between the city government and service providers. • Modest economic growth, lack of investment power and jobs in South Estonia. • Low competence in developing sustainable technologies and smart solutions.

Table 9: Tartu strengths and weaknesses

Besides these strengths and weaknesses, the final SWOT analysis included the following **opportunities and threats**:

AREA	OPPORTUNITIES	THREATS
Energy	• Developing sustainable local energy production, reducing dependence on imported resources and national electricity production. • Expanding the district heating network for energy efficiency. • Promoting distributed and integrated energy production. • Connecting loans and financial instruments to the energy indicators of buildings. • Implementing nearly zero-energy regulations before the deadline and supporting nZEB construction. • Reducing the energy intensity of the economy and increasing the quality of housing, promoting efficient solutions. • Promoting renewable energy, including wind and solar energy. • Reducing waste and promoting the reuse of products and materials.	• Energy security risks – Estonia is dependent on imports like oil and gas, electricity production mostly based on oil shale (dependency and unsustainability). • Increased use of wood in energy production. • Additional costs for balancing the power network due to using solar and wind energy. • Inability to stop the growth of energy consumption. • Carbon leaks, importing energy products from areas with lower regulations.

Transport	• Improving access to the city (e.g. train and plane transport). • Promoting multimodality and integration of transport modes and ticket systems. • Increasing the attractiveness of public transport (e.g. optimizing the lines, better connecting various areas). • Promoting resource-efficient transport modes (e.g. walking, cycling, public transport, ride sharing, emission-free vehicles). • Developing incentives for promoting resource-efficient transport. • Reducing the use of cars (e.g. city center for pedestrians, less streets for car traffic).	• Competition with county bus lines when city lines are extended. • A better public transport system leading to less walking and cycling, not less cars – using a personal car is too convenient to consider public transport. • Dependence on the instabilities of the fuel market. • Rise of door-to-door private transport and private cars.
ICT	• Collecting and enabling access to consumption data, cooperation with service providers. • Integrating public services and monitoring data, using the potential of digital identity. • Raising awareness of and resilience to ICT risks. • Adopting ICT solutions that promote access, productivity and engagement.	• Global threats and instabilities in the ICT sector, data and privacy concerns, cyber attacks. • People might not trust new technology – low public acceptance of new solutions.
Governance	• Implementing development projects to brand Tartu as a smart city. • Raising citizens' awareness of energy consumption and resource-efficient transport. • Developing symbiotic relations with bigger cities like Tallinn, Riga, Vilnius or St. Petersburg. • Scaling up SmartEnCity pilot solutions. • Increasing the role of companies and NGOs in offering public services, working with the universities to improve public services. • More and more people prefer environmentally friendly solutions and follow sustainable practices. • Administrative reform – opportunity to increase cooperation with other local governments, better provision of public services. • Engaging the younger generation through social media. • Wider strategies – European sustainable development policies as a guide, Sustainable Development Goals as the global aims, voluntarily adopting new EU energy and climate policies.	• (Better educated and more active) people leaving Tartu. • Ageing and decreasing population, less tax payers. • Right to consume and overconsumption. • Increased use of imported products instead of locally produced goods – dependence on international trade (and its disruptions). • Extreme weather conditions on the rise, e.g. floods. • Lower air and water quality, more health issues. • Risk of international conflicts and security threats, terrorism. • Inability to meet increasingly strict regulations and goals. • Insufficient change in people's behavior.

Table 10: Tartu opportunities and threats

6.2. <u>Phase 2 – visions of the future</u>

6.2.1. Scenario workshops

IBS together with the main partners TAR, TREA and UTAR completed the foresight exercise with **two scenario-building workshops** in Tartu from September to December 2018. The first scenario-building workshop on 15 October 2018 brought together more than 50 stakeholders. The aim was to list the most important smart city trends, vote on the most relevant and uncertain trends and develop the four resulting scenarios in detail, followed by presentations. The second scenario-building workshop took place on 19 November 2018 with more than 40 stakeholders. The aim was to improve the four scenarios that had been meanwhile developed by task force members, to decide on the most desirable scenario for Tartu and to come up with a vision for Tartu Energy 2030+.

Figure 8: Images of the first and second foresight workshop in Tartu

The **agendas and materials** of both of the workshops are presented in the following table:

	First workshop – trends and scenarios (15 October 2018)	Second workshop – scenarios and vision (19 November 2018)
Agenda	**10:30** – Gathering, coffee and snacks **11:00-11:30** – Introductions and workshop aims (deputy mayor from TAR, energy specialist from TREA, external moderator from Tallinn University of Technology) **11:30-12:30** – Trends that affect smart city development, discussion **12:30** – Lunch **13:15-14:30** – Validating the scenario matrix and introducing group work **14:30-15:00** – Coffee break **15:00-16:00** – Presenting and assessing scenarios, discussion **16:00-16:30** – Conclusions and introduction of the next workshop	**11:00** – Introductions and workshop aims (board member from IBS, deputy mayor from TAR, external moderator from Tallinn University of Technology) **11:15-11:30** – Presenting the updated scenarios (task force members) **11:30-12:30** – Analyzing and validating the scenarios in groups **12:30** – Lunch **13:00-13:15** – Selecting the master scenario for Tartu Energy 2030+, discussion **13:15-14:30** – Selecting and shaping the vision, discussion **14:30-15:00** – Conclusions and introducing the next steps in planning Tartu Energy 2030+ (specialist from TREA)
Materials used	• Agenda • Registration sheets • Table/group numbers • Group work guidelines • SWOT analysis • List of smart city trends (both printed out for each group and presented on wall posters) • Stickers for voting for trends • Powerpoint template and/or flip charts to present group work results (scenarios) • Extra paper, pens and markers • Voice recorders (for task force representatives to record group discussions for later analysis) • Memo of the workshop (later via e-mail along with a thank-you note)	• Agenda • Registration sheets • Table/group numbers • Group work guidelines • SWOT analysis • List of smart city trends • 4 elaborated scenario descriptions (also distributed before the workshop via e-mail) • Table of 4 scenarios summarized with keywords • Powerpoint template and/or flip charts to present group work results (vision) • Extra paper, pens and markers • Voice recorders (for task force representatives to record group discussions for later analysis) • Memo of the workshop (later via e-mail along with a thank-you note)

Table 11: Tartu workshop agendas

The **four groups** were pre-defined based on registration information so that all sectors would be represented in each of the groups. This meant representatives of

NGOs and citizen initiatives in addition to entrepreneurs and public sector stakeholders (both local government and ministry level).

The **group work guidelines** for the first workshop involved the following tasks:

- Describe your group's scenario, using the background material provided (trends, SWOT analysis) and taking into account developments in energy, transport, ICT/data and open governance/engagement in this scenario.
- Answer all the questions, describing the scenario with keywords and phrases. Try to create a short timeline, legend or story for your scenario.
- Select a spokesperson to present your group work to others later on.
- A representative of the Tartu Energy 2030+ task force will help you take notes and will later elaborate the scenario into a coherent description based on your discussion.
- Use the following questions to guide your discussion:
    - What are the main characteristics that describe this scenario based on the axes (i.e. the extremes)?
    - How do developments in this scenario affect Tartu in energy, transport, ICT and open governance?
    - How should Tartu respond to these developments (i.e. responding to external factors by using internal strengths and avoiding weaknesses)?
    - How will this scenario affect Tartu's ecological footprint? Will it be increased or decreased and in which way?
    - According to this scenario, what happens with Tartu's competitiveness, social cohesion, social welfare and life quality?
    - Give the scenario a short descriptive title and think of 2-3 newspaper headlines from the future.

After the first workshop, members of the task force that had been assigned to each group were asked to **elaborate on respective scenarios** based on their notes and voice recordings. The aim was to describe each scenario as a coherent narrative in about 2 pages and to put together a summary table that would allow comparing the scenarios (aspects like the global context, legislation, society, planning, mobility, systems and services). After that, the partner responsible for the foresight exercise, IBS, edited the descriptions and summaries, compiled a summary report and uploaded it online. All the participants were given access to the report and were asked to edit the document and add their comments. This report was then used for validation at the second workshop.

The **group work guidelines** for the second workshop involved the following tasks:

- Validate your group's scenario that was drafted at the first workshop:
    - Is your scenario coherent? Please take into account all the important and likely trends that have been listed. Look at all the 4 main categories – energy, transport, ICT/data and governance/citizen engagement. Should something be added, removed?

- o If the scenario is not coherent, think of ways of improving it and overcome the contradictions.
  - o Make sure that the strengths/benefits and weaknesses/drawbacks of your scenario are in balance.
- Describe the vision for Tartu Energy 2030+:
  - o Think of a vision for Tartu 2030, work individually and write down some the keywords and expectations that are important to you.
  - o Share your thoughts with the group and write down one short and catchy vision statement for Tartu Energy 2030+.
  - o Present your vision to the other groups and try to come to a consensus – what should be the master scenario and common vision?

6.2.2. Scenario development

As part of the first scenario-building workshop, the participants were asked to improve and modify the pre-listed **global smart city trends** that should be taken into account in urban planning. In an open discussion, the initial list of 33 trends was complemented with another 12 trends that the participants thought were important. Out of these trends, four scenarios were created in the following manner:

1. The additional trends were added to the previously prepared wall posters (one poster for each main topic, i.e. energy, transport, ICT and governance) so that the final list of trends could be visible to the participants. In addition to the short name of the trend itself, the poster included additional boxes titled "this trend is relevant" and "this trend is uncertain" that were meant for voting.
2. Each participant was allocated 10 green stickers and 10 orange stickers for voting. The participants were asked to vote for a maximum of 10 most relevant trends (orange stickers) and 10 most uncertain trends (green stickers) based on their personal opinion.
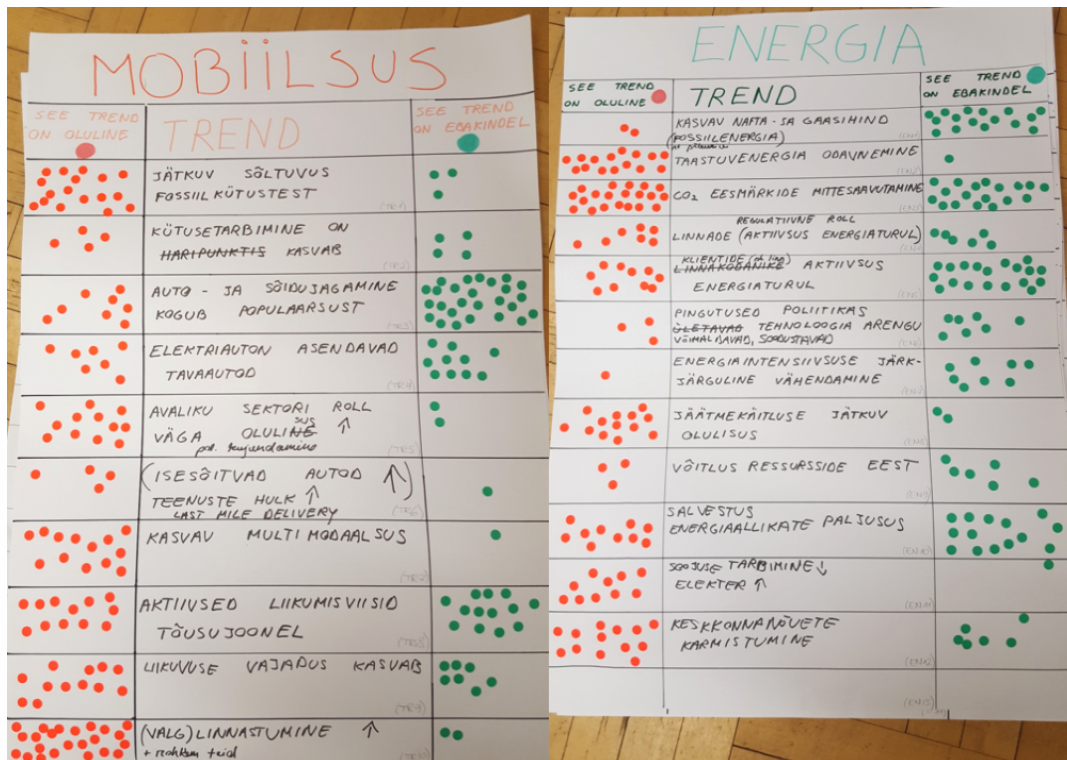
Figure 9: Examples of wall posters with (modified) trends and votes for "relevance" and "uncertainty".

3. After voting, the participants went for a lunch break. At the same time, the task force counted the votes and used a pre-made Excel template for inserting the scores and generating a summary graph. Each trend was coded (first trend in the category "energy" was coded as EN1, the second trend in "transport" was TR2 etc.) for visual purposes. The graph showed where each of the trends was positioned based on relevance and uncertainty.

Kõige olulisemad trendid	Trendi nimi	Kõige ebakindlamad trendid	Kood
2	Kasvavad nafta- ja gaasihinnad	16	EN1
15	Taastuvenergia odavnemine	1	EN2
20	CO₂ eesmärkide mittesaavutamine	18	EN3
7	Linnavalitsuste aktiivsus energiaturul	6	EN4
8	Linnakodanike aktiivsus energiaturul	18	EN5
3	Pingutused poliitikas ületavad tehnoloogia arengu	7	EN6
1	Energiaintensiivsuse järkjärguline vähendamine	8	EN7
12	Jäätmekäitluse jätkuv olulisus	2	EN8
3	Võitlus ressursside eest	5	EN9
10	Energiaallikate paljusus	14	EN10
10	Soojusenergia langus ja elektrienergia kasv	1	EN11
11	Keskkonnanõuete karmistumine	6	EN12
16	Jätkuv sõltuvus fossiilkütustest	2	TR1
4	Kütusetarbimine kasvab	4	TR2
8	Auto- ja sõidujagamine kogub populaarsust	23	TR3
6	Elektriautod asendavad tavaautod	10	TR4
12	Avaliku sektori roll poliitikakujundajana kasvab	2	TR5
4	Isesõitvad autod / last mile delivery	1	TR6
10	Kasvav multimodaalsus	1	TR7
7	Aktiivsed liikumisviisid tõusujoonel	12	TR8
11	Liikuvusvajadus kasvab	6	TR9
21	(Valg)linnastumine	2	TR10
0	Autode arvu kasv	7	TR11
4	Rahvastiku arvu kasv	17	TR12
1	Liiklusohutuse kasv	7	TR13
8	Targad elektrivõrgud tõusujoonel	2	IT1
8	Suurandmete kasutus kogub populaarsust	3	IT2
4	Avaandmete kasutus kogub populaarsust	1	IT3
4	Kodanike kaasamine IKT abil	5	IT4
8	Kasvav ebavõrdsus /digilõhe	16	IT5
15	Turvariskide kasv	4	IT6
3	AI ehk tehisintellekti olulisus	5	IT7
2	Pidev juurdepääs infole	8	IT8
13	Sõltuvus tehnoloogiast kasvab	1	IT9
3	Kaugtöö kasv IKT-st tulenevalt	5	IT10
6	IKT-st tulenev energiatarbimise kasv	6	IT11
7	Koosloome kasvab	16	VA1
5	Poliitilised pingutused ja regulatsioonid väga olulised	1	VA2
8	Lüngad olulistes oskustes	3	VA3
15	Tarbijate vähene teadlikkus	18	VA4
6	Vanad süsteemid kui barjäär	1	VA5
3	Uute rahastus/ärimudelite tekkimine	5	VA6
2	Globaalse ja regionaalse visiooni jagamine	4	VA7
1	Targad hanked tõusujoonel	16	VA8
13	Kasvav rahastus kliimategevuseks	8	VA9

Trendide olulisus ja ebakindlus
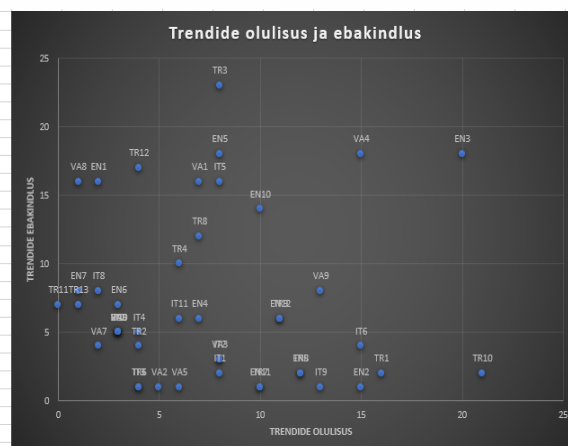
Oluline + ebakindel	VA4 - tarbijate vähene teadlikkus
	EN3 - CO2 eesmärkide mittesaavutamine
Oluline, aga mitte ebakindel	TR10 - (valg)linnastumine
	TR1 - jätkuv sõltuvus fossiilkütustest
	IT6 - turvariskide kasv
	EN2 - taastuvenergia odavnemine
	VA9 - kasvav rahastus kliimategevuseks
	IT9 - sõltuvus tehnoloogiast kasvab
	EN8 - jäätmekäitluse jätkuv olulisus
	TR5 - avaliku sektori roll poliitikakujundana kasvab
	EN12 - keskkonnanõuete karmistumine
	TR9 - liikuvusvajadus kasvab
	EN11 - soojusenergia langus ja elektrienergia kasv
	TR7 - kasvav multimodaalsus

Figure 10: Excel template with short names and codes of the trends

Explanation: Excel template with short names and codes of the trends (red ones marking trends added during the workshop), voting results, a summary graph and a list of relevant and certain trends that needed to be taken into account when describing the scenarios that were made up of relevant and uncertain trends.

4. Based on the voting results, two trends were clearly singled out as the most relevant and uncertain ones. These were **"insufficient consumer awareness" and "failing to meet CO₂ targets".** As such, the matrix axes were formulated as the extremities of these trends, i.e. "high consumer awareness" vs "low consumer awareness" and "CO₂ aims will be achieved" vs "CO₂ aims will not be achieved". Each of the created four scenarios were then assigned to the four groups for elaborating the content of the scenarios.

Scenario matrix

Following the scenario development exercise, the **scenario matrix** turned out to be the following:
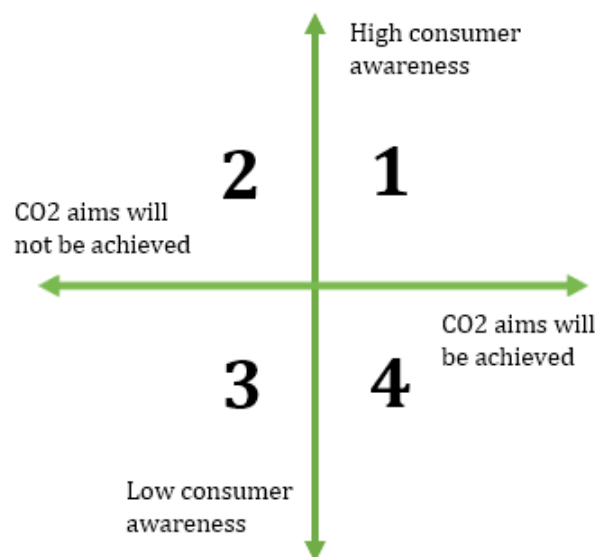
Figure 11: Tartu scenario matrix

In the sections below, **each of the four scenarios are presented in more detail** as they appeared after group work, task force improvements and stakeholder modifications.

Scenario 1 – Tartu lost its footprint!

Highlights:

- High consumer awareness, CO_2 aims achieved.
- Both the administration and citizens understand the need to act quickly.
- People optimize their (energy) consumption.
- The administration supports the use of smart solutions, pilots them.
- Repair economy – repairing and reusing instead of throwing things away.

Headlines from the future:

- It's nice to live in Tartu.
- Everybody wants to come to Tartu.
- Tartu is emission-free.

Description:

This scenario is largely affected by major relevant global trends like increasing oil and gas prices, continued dependence on fossil fuels and the danger of not achieving the set CO_2 aims. As the consequences of climate warming are becoming increasingly clear and start affecting our lives, **people's awareness of environmental problems increases sharply**. In this scenario, both the public sector and citizens understand the need to act promptly and thus start solving problems and reshaping society with high awareness and enthusiasm.

As Estonia and especially Tartu is already known for its smart and digital solutions, this mentality will also be adopted in resource efficiency and green thinking – **Tartu will become Smart Tartu,** home to smart people. The city's efforts to become smart are supported by smart and active citizens, who among other things optimize their own (energy) consumption and are open to new environmentally aware patterns of behavior.

Changes are very much visible in the energy sector: Tartu is using **green and smart procurement** that promotes the wider adoption of renewable energy solutions, the modernization of Tartu's low energy efficiency housing stock and the implementation of **zero-energy standards**. Unutilized areas like the roofs of industrial buildings will be covered with solar panels. Smart sensors both in the city as well as at homes help to optimize consumption and the consumers themselves prefer greener and renewable energy based solutions, products and services, thus shaping the kind of services that are offered. Awareness will also increase regarding consumer goods and food products – **people consume less and more sensibly**, preferring local and plant-based foods. Devices and things are rather repaired and reused than replaced or thrown away.

The high share of renewable energy is also visible in the field of transport and mobility. **Public transport is emission-free and only uses renewable energy**. The trend of owning personal cars is declining as transport planning favors cyclists and pedestrians, motivating people to go for alternative transport options like using personal bikes or the city's bike sharing system. People's expectations of the city administration are high, pushing the public sector to spend increasingly more on developing new solutions and infrastructure. This might temporarily increase the city's loan burden. People are **increasingly multimodal** and choose their mode of transport according to the present situation and context. Ride sharing and environmentally friendly last mile solutions also gain popularity, helping to keep the city center relatively car-free and thus increasing Tartu's air quality thanks to less waste gas.

Integrated and smart services and city platforms with open data help to optimize the governing of the city and increase service quality. Trust towards reliable ICT solutions increases and the overall rise of trust in society reduces bureaucracy and mitigates safety concerns. Thanks to this openness, the spread of technology and the rising awareness of consumers, new business and financing models emerge. Tartu will become a hub and the number of tourists increases. Thanks to the increasing importance of the tourism sector, Tartu's connectedness with the rest of Estonia and its neighboring countries increases. Tartu gains ground on the international arena as a smart and innovative city.

The aim is to live in harmony with nature. The city's green areas are protected and expanded, the share of public space increases. **New community initiatives emerge and society's cohesion increases**. People actively contribute to discussions of the city's development and climate issues. An effort is made to engage all social groups,

include those who might find it difficult to adjust to the changing world. The local politicians act as role models as their re-election depends on their personal environmental behavior and level of activeness. Tartu concludes the **Tartu City Covenant** with its local companies and organizations, which similarly to the Covenant of Mayors prescribes environmental goals that will also be strived for on the company level.

Environmentally friendly thinking and lifestyle becomes increasingly popular and the city's ecological footprint decreases. **People's wellbeing in the city and satisfaction with the city are on the rise**, green thinking and behavior is a part of everyday life and an indispensable part of consuming products and services. City governing is transparent and participatory and new goals are set together with the citizens. Tartu as a city becomes more and more attractive and the city is talked about as a good example and a best practice. The number of citizens increases, but the ecological footprint decreases. The people of Tartu feel that it truly is good to live in Tartu.

Scenario 2 – As much as beneficial, as little as possible

Highlights:
- High consumer awareness, CO_2 aims not achieved.
- Citizens make individualistic and pragmatic choices.
- Quality of life is high, but climate changes will progress as no-one takes responsibility without economic benefit.
- Cost-effectiveness comes before the common good.
- Policy-making leans towards populism, radical trends as climate aims will not be achieved.

Headlines from the future:

- Tartu – still the city of good thoughts (not actions).
- They meant well, but the outcome was the same as usual.
- Every step takes us closer to the goal.
- The fifth season arrived in Tartu.
- Tartu considered the world capital of energy software.
- Tartu exposed its underwater world.

Description:

Smart and individualistic Tartu is a city with highly aware citizens who prioritize their own interests over shared interests. People are well aware of the goals related to climate warning and ways of stopping the process. People's awareness of their consumption is also high and they know what to do to be even more energy efficient and climate friendly. Although people are smart, they do not feel climate change and its consequences drastically on a personal level, so they rather act in a way that is convenient and profitable for them. This **individual-centered pragmatic approach**

and not seeing the bigger picture means that wider goals are not followed and the city will ultimately not achieve its CO_2 goals on time.

In the **field of energy**, the biggest progress is made in personal consumption. Many buildings (especially apartment buildings) are renovated. Several example solutions on implementing zero energy standards are available. Many solar energy stations are established. Smart sensors in the city as well as at homes help to optimize consumption. Awareness is also increasing regarding consumer goods and food products – people consume less and more sensibly, preferring local and plant-based food on the condition that the prices are competitive compared to regular food products. Consumers prefer green and renewable energy based solutions, products and services to the extent that this is economically reasonable. Although awareness is high, people are not ready to change their behavior as fast as it takes to achieve climate goals. Also, as people are smart, a lot of new businesses and technologies emerge that cancel out all the progress owing to increased consumption, hindering the attainment of CO_2 goals.

The high share of renewable energy is also visible in the field of **transport and mobility**. Public transport is emission-free and only uses renewable energy. Alternative modes of transport have also grown to some extent, e.g. using personal bicycles or the bike share system. People are increasingly multimodal and choose their mode of transport according to the present situation and context. However, because of (sub)urbanization and increased need of mobility, the most preferred transport mode is still personal cars. This makes traffic even more intense, increases traffic density and hinders progress. In general, habits related to mobility do not change and dependence on fossil fuels decreases slowly.

In the field of **ICT and data,** integrated and smart services and city platforms with open data help to optimize the governing of the city and increase service quality. In parallel with a sharp rise in awareness, the volume of data has increased remarkably. Trust towards reliable ICT solutions increases and the overall rise of trust in society reduces bureaucracy and mitigates safety concerns. Thanks to this openness, the spread of technology and the rising awareness of consumers, new business and financing models emerge. Tartu will become a hub for new IT companies who can develop and test their solutions here. Tartu gains ground on the international arena as a smart and innovative city. At the same time, the image of being a hub means that increased consumption cancels out the energy saving that has been achieved thanks to ICT solutions. In exploiting the know-how that has been gathered in Tartu, the city remains modest and cannot compete with the more successful cities. This ultimately lessens the image of Tartu as an ICT and smart city.

In **governance**, both the city and citizens acknowledge the need for acting. In the public sector, green and smart procurement is the new standard. This promotes the wider adoption of renewable energy solutions. The main challenges have been identified and in response, national/local programs and plans have been devised. Engaging citizens in governance and decision-making is the norm. However,

implementing programs and activities is hindered. Only the activities that are cost efficient, economically profitable or necessary to maintain the usual level of comfort are carried out. People contribute to discussions on city development, but do not take responsibility or act unless its economically beneficial or there is a respective support program. Politicians talk about the necessity of climate policies, leaning towards populism. As the fixed (climate) goals have not been achieved, policy-makers are on the verge of radical decisions.

In conclusion, Tartu is a city that **seemingly moves in the right direction** – people optimize their consumption, new energy efficient solutions are being developed and adopted, new business and financing models emerge, sustainable development plans are in place etc. However, climate-related goals are not achieved. This is mainly due to the circumstance that consumers are not capable of and do not wish to change their behavior as quickly and as drastically as it is necessary to meet (CO_2 related) climate goals despite their high awareness. Awareness, knowledge, skills and technology are in place, but not enough is done as fast as necessary. As the environmental regulations get more and more strict and important goals are not achieved, the motivation to contribute to the environment soon starts to fade.

In this scenario, people aim to do as much as necessary to maintain their usual comfort, **taking responsibility as little as possible**. The city's ecological footprint is not reduced because the reductions and savings are cancelled out by increased consumption. Social cohesion is low owing to the individualistic approach. Competitiveness increases thanks to new business opportunities, but this growth comes on account of long-term sustainability. The citizens of Tartu feel it is good to live in Tartu and the life quality is high, but the city fails to slow down climate change.

Scenario 3 – Business as usual

Highlights:

- Low consumer awareness, CO_2 aims not achieved.
- Progress in economy, technology and wellbeing increases consumerism and convenience.
- Difficult to meet the increasingly strict environmental regulations, skepticism and finding ways to avoid them.
- Everyone does their own thing, stakeholder cooperation insufficient.

Headlines from the future:

- The city of bad practice.
- Tartu demands a bigger pulp mill.
- Tartu accepted a third car grant scheme.

Description:

The most important global trends affecting the development of this scenario include volatile and raising oil and gas prices and the continued dependence on traditional

fuels despite the circumstance that renewable energy becomes more affordable. Trends such as suburbanization and a rise in the number of cars also affects this scenario in city development.

Efforts are made to find suitable alternatives to fossil fuels among local renewable energy sources with more stable prices. At the same time, many private consumers and companies tend to prefer the existing, tested and somewhat cheaper fossil fuels (fossil electricity from the power network, gas). The citizens, companies and public sector use renewable energy solutions quite modestly. It is thought that energy companies should deal with energy production and energy is bought for the supplier that offers the best service package. **Climate warming is acknowledged, but the respective measures are treated with caution and distrust**. This mindset is prevalent both among end consumers and companies as well as the public sector. Continued economic and technological growth and national wealth **increase comfort and consumption**.

The increasingly ambitious climate, environment and energy goals on the UN, EU and national level result in **various national requirements and regulations becoming systematically stricter**. The stricter regulations are at times difficult to meet for the end consumers, companies as well as for the public sector. Skepticism towards the requirements increases and ways of not adhering to the regulations are sought for.

Individuals and organizations (including the public sector) do acknowledge the general climate goals and the necessity of environmentally friendly behavior, but in making purchase and consumption decisions, they rather take into account arguments related to technological novelty, convenience and value for money. As the end consumers focus on individual comfort and experiencing new solutions (and excitement), the energy saving achieved through various energy efficiency measures (including building near zero energy houses) is cancelled out by additional convenience solutions. As a result, **the consumption intensity of electric energy increases**.

 Gathering and processing big data and developing various services based on the data emerges as a thriving and energy intensive "industry". Cooperation between various players (public sector, infrastructure companies as "data owners", ICT companies, universities etc.) is episodic and chaotic, which means that the **stakeholders develop their own ICT platforms and data collection and processing systems that tend to be incompatible**. As such, using the existing data is ineffective and developing data-based services is problematic.

Various services are only developed based on developments on the market. Services that can be commercialized quickly and profitably dominate. Progress in developing social and community services is modest. In cooperation with the ICT sector and the "big data industry", Tartu becomes an **internationally acknowledged startup hub**. Because of the startup community and the circumstance that universities are

increasingly internationalizing, new services and business models are developed and adopted.

Governing the city is decentralized and liberal, intervening as little as possible. **Planning (both strategic as well as spatial) and actual developments are two separate things**. Exchanging information between the city government's various departments and other organizations and partners relevant to the development of Tartu is fragmented and chaotic, everyone is "doing their own thing". Strategic cooperation between various stakeholders is insufficient. The main factor shaping the city's spatial development is capital (business). Planning is chaotic as it aims to solve challenges that have resulted from the capital-based development activities retrospectively. Citizens and various active groups do not launch concrete initiatives nor take responsibility for actually doing something. In taking initiative, the focus is on the narrow interests of specific groups or on the available funding opportunities.

Traditional industry, commerce, storage and transport (i.e. the main employers) move outside the city to suburbs, whereas ICT and data processing companies gather in the central areas. Owing to **suburbanization**, more and more people move to new suburban areas. This challenges the networks of roads and streets, traffic management as well as the development of public transport.

As people like convenience and the economic growth enables it, **using individual transport still increases**. This trend is enhanced by the increased need for mobility resulting from suburbanization, by the lack of multimodality and people's unwillingness to use active modes of transport. As more and more big employers move out of the city and educational and recreational facilities are developing in the city center and other "older" areas of the city, unreasonable logistics trajectories are created. This, in turn, causes more and more congestions and parking issues with worsening air quality.

In this scenario, **people aim to do as little as possible and as much as necessary to maintain their usual level of comfort**. People might be somewhat contributing to discussions on city development, but they do not want to take responsibility or act unless it is economically beneficial or there is a respective support program. Politicians talk about the necessity of climate policies, leaning towards populism. Air pollution in the city increases, the state of the living environment worsens and the ecological footprint continues to grow. In the longer perspective, the reputation of Tartu starts to decline.

Scenario 4 – Athens of the *Emajõgi* 2.0

Highlights:

- Low consumer awareness, CO_2 aims achieved.
- The climate policies of the administration dominate over community needs, people not willing to give up unsustainable behavior.
- Energy transition successful on paper, not in real life.

- The administration implements smart/green solutions, people do not understand the need to change.
- The administration and people are moving in different directions.

Headlines from the future:

- Empty parking lots on the outskirts!
- Tax payers' money wasted on bicycle tracks.
- Empty buses getting in the way of peak hour traffic.

Description:

This scenario describes a situation where **the local government's climate politics dominates over the community's perceived needs**. For instance, this scenario could materialize if the energy transition is not planned together with the community and community initiatives are excluded, meaning that although CO_2 emissions are under control, people's awareness is low. It is difficult to foresee implementing climate politics in this extreme form, but in a softer version, elements of this scenario can be seen all around us and elsewhere. Especially when keeping in mind that this scenario could also take the form of wealthy industrial countries implementing a somewhat **two-faced climate politics** where communities take on long-term ambitious goals, but where the citizens are not ready to give up wasteful convenience services (overconsumption, flight tourism, powerful urban SUVs). This scenario definitely rings a bell for those who are familiar with carbon leakage. On paper, Europe's industry has become more effective, but emission-intensive branches of production in developing countries still provide us with products and services that the wealthier part of the world consumes at an ever-increasing pace. Implementing energy transition on paper and in real life are two separate things and this scenario illustrates this difference well.

In this scenario, climate goals can be achieved by **exploiting the local government's dominating position as a consumer of energy services and provider of public transport services**. Using green procurement and green investments, the local government can reduce its emissions and increase the effectiveness of consumption, thus achieving all the goals set for the area. For this, using energy services needs to be shifted to using renewable resources, energy saving LED lamps need to be adopted in street lighting, green electricity needs to be used and electric buses together with biogas buses needs to be used in public transport. District heating and electricity can be produced from local renewable fuelwood using cogeneration. The local government can create a **massive solar power plant** that is placed of the roofs of local government buildings all over the city, advising citizens and companies to follow the example. In order to reduce consumption, the local government can renovate the building stock according to A+ standards and offer advice to citizens on renovating apartment buildings, private houses, commercial infrastructure and office buildings. In planning energy (and other) services, extensive consumption data can be gathered and analyzed and all

the big data can be made publicly available on a safe platform that enables to use open data for developing new services, including by civil society organizations and the private sector. An **extensive network of bicycle tracks can be established in the city and its surrounding areas and the use of cars can be restricted** in the city. The public transport network can be improved, making it fast and flexible, and new buses can be introduced that correspond to high environmental standards and are comfortable and attractive.

Despite the local government's innovation and efforts, citizens do not adopt energy saving measures in this scenario. **Citizens do not understand the need of what is being done** nor do they support it with their own initiatives as these would contradict their established habits and mindset. Using cars increases despite developing cycle tracks. Bus transport may be organized very well, but there are not enough users. Full renovations into energy efficient buildings are not undertaken, only the facades are fixed and profitable extensions are built. The level of emissions decreases, but this does not reduce the amount of waste and air pollution in the city. Internet tools for energy saving and transport planning are not used. **Citizens and the administration are not on the same page** and are rather moving in different directions.

As there is no wider interest in energy saving measures, entrepreneurship that is targeted at saving resources cannot find its market position and **no green jobs are created**. The labor market is dominated by classical jobs. Innovation is not required for creating these jobs and the area falls behind technologically speaking. Production is still inefficient and emission-intensive and cannot compete internationally nor create advantages for entrepreneurs. Innovative companies prefer to leave the area. Considerable **brain drain** can be noticed in the area. Progressive citizens cannot find like-minded people to support their ideas and thus, they prefer to move elsewhere.

The practical value of this scenario lies in an important lesson – that energy transition cannot be only materialized by the authorities, but needs support throughout the community. **Technological innovation does not ensure that citizens are successfully engaged** in the energy transition process. In addition to direct barriers that prevent fundamental changes in people's consumption habits (e.g. barriers from the lack of infrastructure that citizens have perceived in implementing energy saving solutions), specific obstacles proceeding from the level of engagement reduce the efficiency of saving measures. Some of the most important ones include:

1. Contradictory public messages. Messages directed at energy saving do not add up to consumption-promoting direct (paid advertising space), indirect (the charm of wastefulness in media) and hidden (lifestyle media) advertisements.

2. The vocal minority. Entrepreneurs and service providers perceive savings-related plans as a threat to their strategic interests and thus use direct (media coverage) and indirect (political parties) ways of getting their message across.

3. Ill-inspiring example. The local government's leaders and specialists in charge clearly do not use energy saving practices (e.g. using public transport/bicycles on a daily basis) as much as needed.

4. Needs-based engagement. So far, citizen engagement has rather been an optional practice, having on some occasions even been avoided, so this experience is difficult to turn around.

6.2.3. "Master" scenario

After validating and improving the four scenarios, the second workshop ended with a general discussion on the **preferred "master" scenario**. It was agreed that scenario number 2 is the most realistic one, but this should not be set as the goal. It was thus decided that even if 100% of the goals and elements related to the first scenario (Tartu lost its footprint!) will not be achieved by 2030, Tartu should still aim for this scenario. The most important goal for 2030 is a 40% drop in CO_2 levels. As such, the common decision was to make a concerted effort towards the first and most ambitious scenario.

Based on this decision, a **vision statement** was developed – first individually, then in the scenario groups and finally in the whole audience. The aim was to state the stakeholders' expectations of Tartu and its situation in the year 2030. After group presentations and general discussion, the following vision was fixed:

> **"In 2030, Tartu will be a green forerunner with a smart developing community and good energy."**

Green forerunner = emission free future, energy transition, smart/green solutions, future city, example for others.

Smart developing community = co-creation, citizen engagement, environmentally friendly behavior, smart consumption, highly aware and happy citizens.

Good energy = healthy people, environmentally friendly living environment, clean/alternative energy.

6.3.   Phase 3 – strategies and decisions

6.3.1. Input for IEP planning

The two foresight workshops that were organized in Tartu ended with **thorough descriptions of four possible future scenarios along with a vision statement** that directly fed into next steps in the IEP planning process that then focused on launching expert groups to cover the main topics of Tartu's IEP. Once the foresight exercise was complete, the partner in charge, IBS, handed over the process to the energy expert partner TREA.

More specifically, the **foresight exercise made up the two first steps** of the Tartu Energy 2030+ strategy process as communicated on the website of Tartu City Government:

1. **Scenarios** – November 2018
2. **Vision** – December 2018
3. **Expert groups** – June 2019
4. **Data collection** – June 2019
5. **Strategy** – September 2019
6. **Action plan** – October 2019
7. **Voluntary agreements** – November 2019
8. **Making the action plan public** – November 2019
9. **Approval by the City Government** – December 2019 or January 2020

6.3.2. Next steps

Tartu is now **generating their IEP** (called "Tartu Energy 2030+"). Six thematic expert groups consisting of voluntary experts and representatives of organizations have been set up (first meeting took place in February 2019) to develop various aspects of the plan. The IEP is expected to be approved by the City Government by the end of 2019 or at the beginning of 2020 after public consultations. The first bigger public event for introducing the draft strategy will take place in June 2019, whereas the concrete action plan will be introduced in another public meeting in September 2019. A website (https://www.tartu.ee/et/saastev-tartu) is being developed for communicating the process by the local task force.

The created **expert groups** and the main topics they address are the following:

Thematic expert group	Main topics covered	Explanation
1. Data	Data management	Monitoring energy consumption, gathering data, remote support
2. Climate	Waste management	Avoiding and reducing waste, impact of waste
	Climate change adaptation	Climate risks, assessment and adaptation
3. Energy	Energy production	Using local energy sources and its impact, resource analysis
	Energy services	District heating and cooling network and its impact, power network and its impact, gas, water supply and sewerage
4. Transport	Public transport, service vehicles, private vehicles	Energy consumption in transport and its impact
5. Buildings	(Residential) buildings	Energy consumption of buildings, construction quality, indoor climate, impact of buildings

	Municipal buildings and street lighting	The efficiency and consumption impact of energy consumers belonging to Tartu City Government and its budget
6. Governance	Procurement and governance	Organizing procurements with increased efficiency and environmental requirements, changes in managing the work of the local government
	Open governance	Continued engagement of citizens and interest groups in decision-making processes, awareness-raising among citizens

Table 12: Tartu IEP expert groups

Anyone interested in joining one of the expert groups can apply through the website of Tartu City Government.

Another interesting component of the Tartu Energy 2030+ strategy is the collection of **voluntary agreements**. More specifically, once the strategy and action plan are finalized in autumn 2019, all for-profit and non-profit organizations and institutions based in Tartu are invited to demonstrate their commitment to the Tartu Energy 2030+ strategy by signing voluntary agreements. The agreements will specify the organizations' contribution to achieving Tartu's climate goals – stakeholders can just declare their support or take it a step further, proposing specific indicators they will set for themselves in support of the strategy. This is expected to mobilize the local stakeholders even more and create a feeling of ownership towards Tartu Energy 2030+ with its priorities and goals.

Foresight experience in Tartu – Q&A

Q: Are you satisfied with the engagement?

A: *Tartu scenario planning process was very successful. Two workshops were carried out, one of them lasting the whole working day. This was seen as risky at first as people who we targeted were high level officials in the city, also politicians and entrepreneurs and it is difficult to keep them engaged for the whole day. A thorough mapping of all possible contacts were made and several inviting rounds from the Vice Mayor were sent out, some people were invited to the workshops personally. In the end almost 70 different people participated in both workshops, a lot of them were attending both. This was even more positive result than anticipated at first.*

Q: Please name some stakeholder groups that were not included but are important/appeared to be important in the process?

A: *We have realised that some key target groups were still missing from the planning process. These are one of the main energy consumers in Tartu, which are still operating*

---

independently – Tartu University Hospital, University of Tartu as one of the biggest employer (although some representatives were there, they were not part of the management), biggest retailers, financial institutions, schools. The group was discussing about their involvement, but eventually no specific and extra attention was given to get them into the planning process, although they have received all general information and invites to the process. This has caused the situation where now, almost at the end of the process, the steering group is actively seeking possibilities to engage in even bilateral talks with the university, hospital and biggest retailers. Educational sector and the third sector have been also more actively involved through the engagement roundtable which was established by the steering group almost half year further from the initial planning process.

Q: Do you feel more analysis would have been beneficial in the stakeholder identification part – e.g. identify/conduct a matrix about the importance of the stakeholders and their potential role?

A: *Even though the whole key group jointly worked with the stakeholder identification, we now feel that even more time should have been dedicated to select so to say forerunners in the city who can have a key role in achieving the effects from reducing energy consumption. Therefore, indeed, even more thorough analysis at this stage would have avoided the situation where the group is doing this at the moment, when the plan is almost ready and working groups have delivered their results. Currently the group is working towards the greater involvement of "forerunners" (biggest energy consumers) to validate the action plan with them also.*

Q: Please describe the positive and negative sides of organizing the scenario development workshop.

How did you benefit from the exercise?
Did you have any issues or challenges when carrying out the workshop?
Would you repeat that methodology again in the similar planning process?
What would you suggest to other cities?

A: *To speak in open cards the group admits that the whole task was quite frightening at the beginning, especially for the team members who were not used to such participative planning methods and working with scenario creation. A lot of desk research was done beforehand in order to get a clear picture about global trends as well as the current situation in Tartu regarding CO2 reduction possibilities. As the process guidelines were very detailed and as a lot of good material was there to be used in selecting trends (from the SmartEnCity project) it was possible to reduce the amount of anxiety associated with the participative workshops. It was decided to document every step in the process as detailed way as possible and to make all materials public. Open communication had a very important part of the process. As the preparation phase of the process was very detailed and thorough, we actually did not face any major challenges. Also the feedback from the participants was positive. In both workshops almost everybody stayed until the end of the workshop and had sparkle in their eyes. Probably, the greater challenge is to guarantee, that collective decisions really find their way to the action plan as further smaller working groups had not so many participants as was seen in the scenario planning workshops.*

The greatest benefit of such an exercise is probably building the community feeling, and showing that every opinion counts. The challenges are similar to the engagement processes – one can try hard, make it really easy for the target groups to get accurate, timely, compact information (e.g. Tartu has a certain web-page for the whole process: https://www.tartu.ee/et/saastev-tartu#tartu-energia-2030+ and social media channels, cooperation with third sector organisations to spread the information) but there are still groups who remain passive. Sometimes, only intensive personal contact helps to get some important parties on board.

Tartu believes that following the participative foresight has been a successful and really necessary to reach to a relevant and good commonly created vision for Tartu until 2030+. Detailed step-by-step methodology was easy to follow and it pointed out details which required more attention (e.g. selecting trends for the workshops beforehand as it helped to target the thinking, however, new trends were also brought out during the discussions; preparing a SWOT to be used in roundtables and in working with scenarios etc). The value is exactly in much broadened thinking which comes out from different scenarios and from collective thinking. If to use it again (and Tartu is sure it is worth using) we would suggest to really be prepared for the workshop – think all possible ways of discussions beforehand and make it effective, as high level people need to stay focused for a long time during the day and they need to feel inspired; use a good moderator; don´t leave too much time between the workshops, if you plan several; be open in compiling and sharing results of the workshops so that it is clear also for those, who were not able to participate.

Q: If you did not follow the methodology (e.g. having one workshop instead of two; not preparing SWOT behore the meeting etc.) – did it affect your result?

A: *Tartu followed the methodology step by step and this was a very useful tool to steer the process. Such kind of involvement process (in such a volume) was quite extraordinary as besides ordinary partners for the City government a huge attempt was made to attract representatives from a wide range of organisations from different sectors. Therefore, this very thorough work done for preparing the steps was really helpful once the partner gathered together. This guaranteed a really smooth process during the workshops. Even collectively defining the vision was not as difficult as can be anticipated from the theory. The process was clear to the participants also.*

"The main value for Tartu in participative foresight has been in creating a community of similarly motivated stakeholders. The process demands a lot of effort and communication and may prolong the planning process. But at the same time it creates an emotionally and intellectually invested group of stakeholders. It will eventually give a planning document the stakeholder support it needs to succeed." Kaspar Alev, Tartu city government

 "Executing a participative foresight can be a challenge and seem extremely complicated process, however, it is actually very logical process to start with the massive planning and organise already in the beginning the relevant information. Collective decision making can bring a lot of benefits especially at later stages of the

planning process, but more importantly, in implementing the plan as target groups have generated this plan by themselves." Merit Tatar, IBS

Table 13. Foresight exercise in Tartu – Q&A

7. Foresight experience – Sonderborg

The foresight experience (i.e. the scenario-building process) for Sonderborg was a part of the creation of the Integrated Energy Plan (IEP) for Sonderborg, named **ProjectZero Roadmap2025**. Roadmap2025 identified 52 specific energy/climate actions to be implemented to reach 75% CO_2 emission reduction in Sonderborg by 2025 compared to the 2007 baseline. Both Roadmap2025 and the scenario process are focused on Sonderborg's main future goal: to become CO_2 neutral by 2029. Therefore, the scenario process was developed considering the goal of carbon neutrality by 2029 and became an integrated part of the Roadmap2025 process.

The first step of the IEP process for Sonderborg (after the approval of the process by the city council) was the **Sonderborg scenario workshop** which was held in mid-May 2018.

7.1. Phase 1 – status and challenges

The table below outlines the **action plan** of the IEP process for Sonderborg:

Activity	Deadline	Responsibility
Creating the ProjectZero roadmap process	March 2018	ProjectZero
Identifying stakeholders	March 2018	ProjectZero
Approval from the city council	April 2018	Mayor
Appointing the task force	April 2018	ProjectZero
Appointing a moderator for the scenario workshop	March 2018	ProjectZero
Engaging stakeholders before the workshop (setting the scene by mailing questions to think about, preliminary agenda, aim of the workshop etc.)	April 2018	ProjectZero
Scenario workshop	May 2018	ProjectZero
Scenario workshop follow-up and documentation	May 2018	ProjectZero
Monitoring the Roadmap2025 process and progress	2018	ProjectZero
Creating project initiatives based on the defined targets and created scenarios	June – September 2018	ProjectZero
Simulation of carbon impact using the EnergyPlan tool developed by Aalborg University (AAU)	September 2018	PlanEnergi and AAU
Testing the four scenarios against the specific projects developed	October 2018	ProjectZero
Documenting and reporting the outcome and process	November 2018	ProjectZero
City council approval of the ProjectZero Roadmap2025 for Sonderborg	December 2018	Mayor

7.1.1. Foresight task force

A **foresight task force** was set up with the aim to inspire, coordinate and support the Integrated Energy Planning process in Sonderborg (Roadmap2025), to ensure a smooth planning, diagnosis, analysis and development process of the plan as well as ensuring a strong and robust stakeholder engagement throughout the process.

The outcome (scenarios) were used to test the **50 project descriptions** to secure that they were all robust to meet the expected future – the four scenarios.

The task force included:

- **ProjectZero (ZERO)** – responsible for overall coordination, communication and promotion of the IEP, scenario and all other processes and workshops regarding the IEP. The main representatives included the CEO of ProjectZero along with 3 project managers.
- **Sonderborg municipality** represented by the technical committee chairman and a representative from the planning department (responsible for the municipal IUP process)
- **PlanEnergi (PLAN)** – responsible for creating an Energy Balance of Sonderborg, accounting for the CO_2 emissions of the municipality. There were 2 main experts involved in this process.
- **Aalborg University (AAU)** – responsible for modelling Sonderborg's energy supply, demand etc. in the EnergyPLAN software that could also calculate the CO_2 emissions from the different scenarios. 1 PhD researcher was included in this process along with one of PlanEnergi's experts.

7.1.2. Stakeholder involvement

Sonderborg's scenario workshop involved nearly **40 participants**. They were introduced to an exciting process created by ProjectZero and the external facilitator, Peter Hesseldahl[9]. Peter Hesseldahl facilitated a similar (early) ProjectZero scenario process and stakeholder discussion in 2007/2008. He is now part of the editor team of the national Danish MandagMorgen news, tech and political media. In the past he was also as journalist researching "the future and technologies - globally", the outcome was during several years broadcasted in weekly radio programs.

The participants were all challenged on the **most important uncertainties** surrounding the future development of Sonderborg. The main uncertainties created the axes in the scenario matrix which have subsequently formed the basis for developing and describing the 4 scenarios substantially in relation to a number of (later) selected criteria.

The uncertainties involved answering the **following questions:**

---

[9]See also: http://peterhesseldahl.dk/in-english/index.html

- Are we looking into a "WE" society based on the community fixing the big challenges or a society where the individual citizen is on their own?
- How will the technologies emerge and thus affect the accessibility of, among other things, cheap solutions for renewable energy?

The main stakeholders involved in this process included representatives from the following **8 segments** including university, business and public participants:

1. Homeowners
2. Housing companies
3. Private rental homes
4. Private transportation
5. Companies
6. Farmers
7. Heavy transport
8. Energy

7.1.3. Preparing for the workshop

The preparation process followed the **foresight methodology** and included:

- A review of the outcome of a similar process conducted in 2007 with the same facilitator, Peter Hesseldahl;
- Introductory talks about trends and tendencies in climate actions and political frame-setting;
- Preparing inspiring talks by external presenters – University of Southern Denmark, NGOs, other first mover Danish municipalities;
- Preparing a detailed plan for the workshop process.

7.1.4. SWOT analysis

The **strategic questions** raised focused on key uncertainties looking ahead towards 2029.

The participants worked with **post-its and in 6 working groups**, filtered the results before they were consolidated by the workshop facilitator.

SWOT analyses were created for Sonderborg for **each of the four scenarios**.

7.2. Phase 2 – visions of the future

7.2.1. Scenario workshop

In Sonderborg, the scenario-building workshop took place during one full day, focused on describing different future developments for the region and discussing them together with necessary actions.

The 40 participants all represented the **local and regional society, business communities, the city council and the 8 working group** themes mentioned above. As the scenario process was an integrated part of the ProjectZero Roadmap2025 process for Sonderborg, much attention was paid to balance the participation of the identified 100 stakeholder participants through the entire process and not only facilitate a successful scenario workshop. It was however very beneficial for the entire process that there was strong overlap between the people participating in the scenario workshop and in the 8 working groups. This also secured a strong link between the knowledge created through the scenario workshop and the later working group discussions.

Figure 12: Images of the foresight workshop in Sonderborg

After a recap of the findings of 2007/2008, the participants were inspired with **short presentation talks** by external participants – either physically attending the workshop or participating via Skype. The external participants represented NGOs, municipalities and the (tech) university world. Having external views was very inspiring for the participants and the reflection discussions.

After the discussions, the stakeholders participating in the process chose **which future scenario** they would like to work with (and engage deeper in). The created scenario also led to a discussion about the related necessary actions.

The representatives from the ProjectZero Company participated in all the working groups during the scenario workshop day and **took responsibility** for updating,

consolidating and completing the four scenarios after the workshop day in close cooperation with the facilitator.
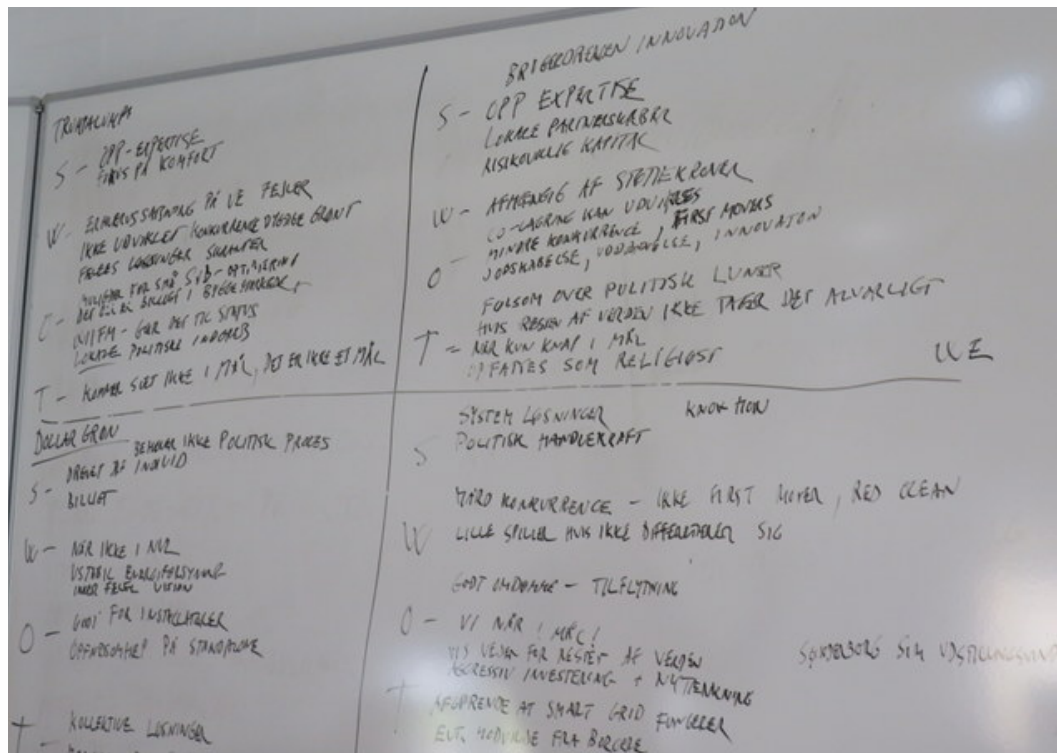
Figure 13: Four scenarios developed in Sonderborg

Socially, the scenario workshop day also allowed the participants to **network** during the day, both inside and outside the workshop facility. There was also a local television station interviewing some of the participants for a series of movies focused on the ProjectZero project.

Figure 14: Workshop day in Sonderborg

The **agenda** of the scenario workshop in Sonderborg is presented in the following table:

AGENDA of the scenario workshop day, 23 May 2018

08:30	Welcome, the programme of the day, purpose and goal. External facilitator Peter Hesseldahl, MandagMorgen.
08:35	Status of ProjectZero implementation after 10 years of operation. Peter Rathje, ProjectZero Company.
08:45	What does it mean to be CO_2 neutral? Nicolas Bernhardi, ProjectZero Company.
09:00	Overall scenario method. Peter Hesseldahl.
09:05	Scenarios from 2007. Peter Hesseldahl.
09:25	What did we ignore and learn from the last 10 years? Discussion.
09:40	Trends – climate change, smart cities, cars, renewable energy, etc. Peter Hesseldahl.
10:00	Climate Truth witness. Soren Hermansen, the Samsoe Energy Academy.
10:10	Truth witness. Henning Donslund, Municipality of Ringkobing-Skjern.
10:20	Break
10:40	Trend lecture. Peter Hesseldahl.
11:05	Discussion of trends.
11:20	Summary of the discussions. Peter Hesseldahl.
11.35	Truth witness. Henrik Bindslev, Dean for Technology at Southern Denmark University.
12:30	Lunch
13:15	Consolidation of uncertainties and setting up the axes of the scenarios. Peter Hesseldahl and participants.
13:25	Scenario creation in working groups – each group works with the selected scenario.
13:55	Summary of discussions.
14:15	SWOT analysis with stakeholders by each group.
14:40	Summary of the SWOT analysis inputs.
15:00	Action points from the stakeholders.
15:10	Summary by Peter Hesseldahl.
15:30	Steps forward. Peter Rathje, ProjectZero.
16:00	End of workshop, socializing and networking outside.

Table 15: Sonderborg workshop agenda

7.2.2. Scenario development

In Sonderborg, the workshop concluded **four scenarios**. The scenarios were used to create and share a common picture of challenges related to the Roadmap2025 business-driven initiatives and actions, securing a robust Roadmap2025 in relation to the discussed uncertainties mentioned before. The scenario matrix is illustrated below.

Cheap fossil based energy
Weak regulation
Low CO_2 taxation
Disappointing new technologies

Scenario 1	**Scenario 2**

"Myself" thinking
Resistance,
Indifference,
War, Zero-score game

"We" thinking
Support, engagement,
Cooperation

Scenario 4	**Scenario 3**

Cheap renewable energy
Strict regulation
High CO_2 taxation
Technological breakthroughs
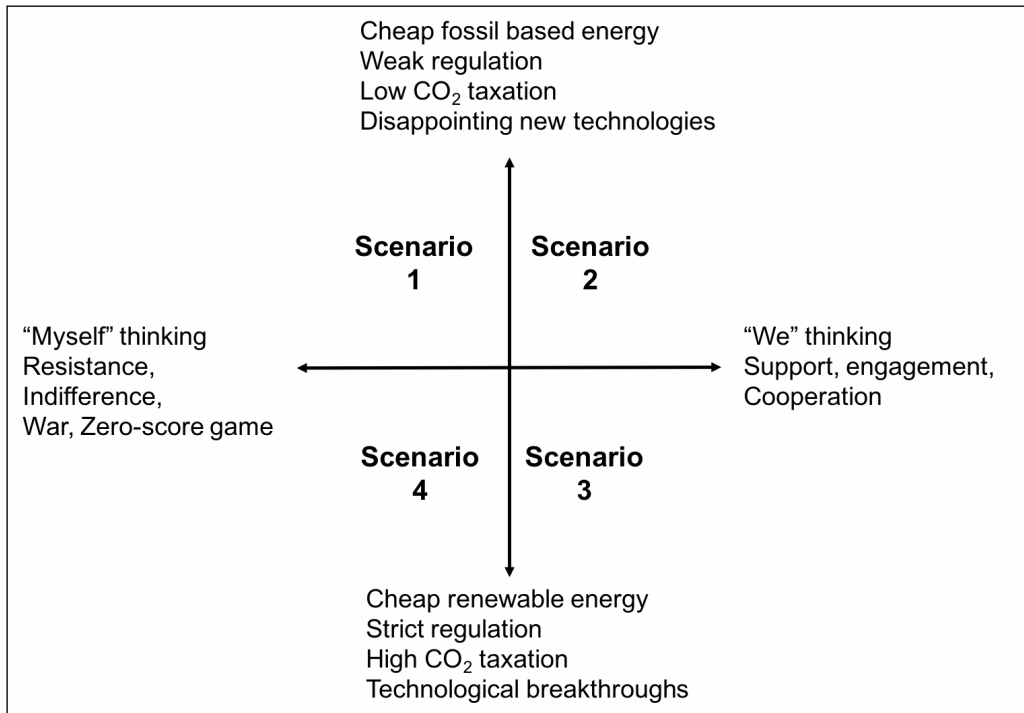
Figure 15: Sonderborg scenario matrix

The 4 scenarios have been given the **following names** and described in detail below:

- Scenario 1: Trumpa Loompa land (carbon growth)
- Scenario 2: The long expensive focus on the small green island
- Scenario 3: Turbo transition: Smart, circular and shared
- Scenario 4: Green dollar transition - Green, like in $

Each scenario revolves around and follows the **following structure:**

- what the situation of the society will be if this scenario was the reality;
- what will be the citizen mindset;
- how will the transport sector look like;
- how will the utility companies and private companies work or what will they strive for;
- how will research and education be affected by this scenario;
- and finally, how will the goal of Sonderborg becoming CO_2 neutral by 2029 develop in this scenario.

Scenario 1: Trumpa Loompa land (carbon development)

The situation

The scenario is characterized by **individualism**. There is no great desire for common solutions, even if it involves being restricted or renouncing something for the benefit of the community.

After a few years of rapid development and solid price decline on renewable energy, **growth has stagnated**. The next large wind farms, solar cell promotion campaigns and the installation of smart grid technologies were hampered by a lack of political willingness to invest while new oil discoveries in the North Sea and Greenland made oil far cheaper.

Stories about **climate change** still fill up the media, but there is so much else to take care of here and now. It is a difficult time. There are many threats and disagreements. Around the planet, small wars blow up regularly and it seems as if the "great powers" will intervene any moment. The EU is in practice divided into 3-4 regions, and integration and cooperation are moving backwards.

In the **energy field**, individual countries, including Denmark, have a focus on security of supply and on keeping the energy prices low for competitiveness reasons. There is more focus on making energy cheap and free to use rather than to use it more efficient and to save energy. Why should you save energy when no one else does?

Citizens

Most have a **short-term, local and personal focus**. You manage yourself and do not care much about others. In the communities you are part of - *the family, the club, the company, the party* – it is about claiming the rights of your group, acquiring better relationships and protecting yourself from interference.

There is a strong focus on creating **growth and consumption**. However, the irony is that many consumers feel unsafe and under pressure because the economy is changing and social security is not on the same level as before.

In general, there is **low support** for major investments or long-term restructuring, either politically or in the business sector. What is being done is what will immediately pay off for those involved.

If you choose to drive electric cars, install solar cells, eat less meat or fly less, it is a matter of personal style. There are **no economic, legislative or ethical reasons** for choosing energy-saving products and solutions.

Transportation

It is still primarily **fossil fuel cars** that are being used. Electric cars are only chosen if you prefer the high acceleration. Citizens have to work longer because big companies have moved from Sonderborg and stores, offices and institutions have been gathered in the major Danish cities. The collective transport solutions have been reduced so rural area citizens must fix their transport needs by themselves.

There is still **lively traffic** across the border to buy cheap fuel, even though it takes more time than before due to border passport control.

There is **no political desire** for new major infrastructure investments, including the Als-Fyn visionary bridge project.

Common utilities / large renewable plants

CO₂ reductions are not something that is particularly important. Therefore, plans for large wind turbines, solar cell parks and biogas plants also disappeared. The many neighbours who felt embarrassed and disturbed by the major RE-plant welcomed this new development.

Oil, gas and woodchips burners are increasing as heating solutions and heat pumps are taken down when they become outdated. There is **no interest in energy efficiency**, oil and gas is cheap to produce and it is as easy to continue as you are used to do. District heating is under pressure because people choose their own heating solutions. For those citizens who are still connected to district heating, it has gradually become an expensive solution because there are less district heating customers to share the costs with. The same applies to the electricity grid, where private electricity networks at households or business level begin to widen.

Companies

Sonderborg's companies zigzag in their search for **short-term gains and business opportunities**. There is no overall strategy or serious attempt to create synergies between companies or with the municipality or the education sector.

As the focus on **climate and environmental change** disappeared, Sonderborg slowly loses its dynamic business and climate profile. Demand for energy efficiency solutions has been drastically reduced. Danfoss and other companies move to more dynamic cities and adapt to a fossil-based reality, focusing on (non-green) products that are affordable and convenient.

Companies are not particularly tech-based. Sonderborg is characterized by **industrial production and agriculture**. Despite growing custom barriers and the protection of Danish companies against foreign competitors, it is difficult to make the economy grow. It also means that the attractiveness of young entrepreneurs stagnates. The more knowledgeable employees have moved away from Sonderborg.

Research and education

SDU has downgraded its **technology focus** in Sonderborg. SDU Campus Alsion is under settlement, half of the premises are empty, and SDU consolidates their activities at the SDU HQ in Odense.

Sonderborg is an **aging city** and it is hard to see what should be the "young powers" - unless they are refugees from the Middle East and Africa.

Achieving Sonderborg's ZERO ambition by 2029

Sonderborg's ProjectZero is closed down due to **lack of support and results**. The international "Me first" agenda suppressed Sonderborg's climate efforts.

Scenario 2: The long expensive focus on the small green island

The situation

Everything is going well - and yet there is some **frustration** in this scenario. Climate change is becoming increasingly threatening, but it is not really possible to break the increasing trends of the world's CO_2 emissions. It is a big and difficult transition, politically, economically and technologically, and it has unfortunately proved to take much longer than expected. Sonderborg realised early that the world must become CO_2-neutral and the area has maintained its efforts through ProjectZero - but it is still a strange fight. In many ways, it becomes harder and harder as the obvious and simple measures for savings and efficiency have been realised.

During the years, Sonderborg has been a frontrunner and therefore **prioritized climate friendly solutions**, even though it was not always the most economically viable solution. The effort has been largely driven by ideology and there has been a strong common understanding among local politicians, business and the citizens that it is beneficial in the long run for Sonderborg to create solutions that can ensure a better (and more climate friendly) world in the future.

However, the fact that this process takes *so long* and is *so difficult* has nevertheless been a surprise. One cannot say that it is Sonderborg's fault, it is more of the rest of the world that acts too slowly. The new energy/carbon technologies have matured very slow, mainly because big investments and interests globally are still focused on old fossil energy solutions. Financial state support is still provided to old-fashioned industries and there is a lack of government support for international research projects and scaling. Above all, no serious global taxes and restrictions have been introduced to cut CO_2 emissions.

This is affecting Sonderborg because there is **no huge global market** for the climate solutions created and demonstrated by Sonderborg's companies and the municipality - yet.

Although RE (renewable) technologies are still awaiting their crucial breakthrough, **local awareness and the desire for green transition** have never been stronger. Community-driven solutions are accepted, including the acceptance that it requires an investment to achieve the zero-carbon goal.

Citizens

Sonderborg is still in the forefront among cities driving the **green transition**.

There is **local political pressure** to continue the transition of Sonderborg even though we did not meet the 2029 target. The citizens are conscious and aware of the situation, but hardly anyone can financially afford to choose green solutions.

Collective solutions are supported, recognising the need to solve the climate challenge in cooperation. Sharing economy is popular, there are lots of schemes that help save energy in the transport sector, reduce food waste, make better use of buildings, increase recycling - in addition to making it easier for people to help each

other. Some schemes are purely economical, others are so much about the social community and the desire to do something good for the environment and the climate.

There is an element of **austerity** – you hold back, leverage what you have, afford by saving.

Transportation

New **electric cars** have become the cheapest solutions, but there are still many old gasoline and diesel cars on the roads. Collective transport solutions have become significantly better and more flexible and this has attracted many new passengers, also among tourists. Electric bicycles and electric scooters have become state of art and together with car-sharing and carpooling have become a natural part of everyday life.

Common utilities / large renewable plants

It took a long time to get the **coastal wind turbine** project established, but when they started spinning, it was a huge step towards CO_2 neutrality.

There is still good support for the **district heating network** and the establishment of new RE production plants. However, the challenges are now incorporating citizens' lifestyles and the way in which companies operate. Sensors in all devices, on premises, on roads, in cars and in everyone's mobile phones are key to monitoring, coordinating and helping people solve everyday needs for a more precise and minimal use of physical resources.

Local green transition is still dependent on EU funding and support from **project funds** in order to be realised. Sonderborg's transition is largely interconnected with the global (transition) agenda – and the global transition lacks ambition and drivers.

Companies

The local common understanding of the climate challenge has created **new and strong collaborations** between companies, authorities, knowledge institutions and citizens. This has resulted in new green innovations and entrepreneurship. The market for green affordable products and solutions is increasing, so it also creates new jobs.

Local businesses are focused on becoming **energy efficient** (in their own operations) and the area's energy and climate-focused companies have good opportunities to test and market new solutions in Sonderborg, but they lack opportunities to boost sales internationally - the huge global demand boom is still lacking. Some cities e.g. in China follow Sonderborg's example and thereby open new large-scale markets for enterprise solutions from Sonderborg.

Research and education

SDU Campus Alsion has strengthened its research focus on **energy technologies**. Both research and education attract enthusiastic students from all over the world, who aim to leave their mark on the ambitious green Sonderborg.

Achieving Sonderborg's ZERO ambition by 2029

Is ProjectZero on target? Well, if you massage the numbers a bit, **it is close**. Sonderborg's transition is taking more time, but on the other hand, the whole understanding of what it means to become CO_2-neutral has also changed over the years. There are several factors to be counted like: What is the load of the products people use, what role does agriculture play etc. The situation is complicated, but moving forward.

Scenario 3: Turbo transition: Smart, circular and shared

The situation

In this scenario, the **world has taken strong steps** to reduce CO_2 emissions. Political fluctuations could not prevent the underlying impetus of transition: renewable energy is rapidly evolving to become the cheapest solution. Energy efficiency, smart grid and effective resource coordination through platforms based on lots of data provide better and more flexible solutions. Creating a safer world as demand for oil declines improves the climate and creates less conflicts.

The world reached a turning point when the world community in 2028 adopted a **global tax on all CO_2 emissions**. It showed that state-level politicians stood together to further boost the phasing out of fossil power plants and devices.

Citizens

Citizens are **very aware** of climate change and agree that the best climate solutions are developed and implemented in cooperation. Sonderborg city council and citizens support the ProjectZero vision as the lighthouse for the Sonderborg area. A united Danish parliament is backing this effort nationally with ambitious framework, research, education and incentives. Denmark has become a green pioneer country and it attracts many guests from all over the world.

There is a focus on **community solutions**, but some citizens have taken additional steps to energy-optimize their own homes, so they actually produce more energy than they consume. It increases the need for new smart grid solutions that can optimize the energy system both locally and nationally.

Ultra-smart phones and computing power and communication is integrated in glasses, bracelets or just available in the environment. This means that an increasing proportion of all actions are **recorded and analysed**. They form a part of a wide range of services that can be formulated on the basis of data adapted to the needs of the home and the individual family member with a minimum environmental impact.

"**Energy optimization**" is so much about the intense use of data, networks, artificial intelligence and "smart" coordination of needs and resources in the smallest detail. The type of intervention in people's lifestyle can only happen because the citizens understand the positive impact of close engagement with the community system.

Transportation

Collective solutions are gaining momentum. The first driverless cars and buses operate on some routes. It is cool to say that you no longer have your own car. Shared cars and "subscription cars" are the preferred solutions. Thanks to advanced digital mobility services, transport is faster, cheaper and more convenient.

Almost all citizens have an **electric bicycle** and there is congestion on cycling paths. Also, heavy transport is phasing out fossil fuels. Environmental zones have been introduced in Sonderborg city centre and the tolerance for CO_2 emissions is extremely low.

Common utilities / large renewable plants

The obstacles and resistance to utilities were overcome and the local citizens and politicians appreciate the support, which means that there is **plenty of renewable energy** to live a comfortable and modern life.

Onshore wind turbines and the coastal wind turbines at Lillegrund, together with biogas and solar cells, produces the municipality's **primary energy**. Respect for landscape values and neighbours are important elements in the local transition.

Companies

The transition has taken place in the affected industries around the world and Sonderborg benefits from its **companies supplying transition projects**. Very frequently, a local company or university researchers talk about new (won) international agreements on infrastructure projects. The city's businesses are busy because there is an increasing demand for energy-efficient solutions from Danfoss, OJ, Nico etc. Energy efficiency is still cheaper than renewable energy and it minimizes the need for energy storage.

Of course, it is about constructing machines and products to make them **as effective as possible**, but compared to before, there is greater focus on continuous improvement of the entire systems through intensive use of data. It requires new types of competencies and creates new concepts for employment.

Bright green businesses in Sonderborg are growing, as is the number of local green entrepreneurs, but there is an increasing challenge of recruiting qualified engineers. Global demand has also led to tough global competition. Sonderborg's companies are opposed to large and highly innovative competitors like for example Germany and China. Although Sonderborg was a pioneer, there are now many other areas in the world where companies, politicians, universities and citizens also work together to develop and test effective green urban solutions.

Climate change solutions have become a "Red Ocean" market with hard competition and lots of suppliers and one can be concerned about whether Sonderborg has the size to create new solutions that are favoured on the global scale or not. This is particularly important because Sonderborg has focused the entire area's future success on Bright Green Business solutions.

However, there is no space for pseudo solutions. The world has realised that it is a **final call for carbon reductions** and the market is focused on the most cost-effective solutions, which also engage and motivate citizens and businesses to behave in an appropriate way. Being bright green is also about circular economy systems, share economy, smart cities, engagement and cooperation.

Research and education

SDU expands its operations on the SDU Campus Alsion to meet the ever-increasing demand of companies - not only for classical energy engineers, but also software and system experts and humanists who understand the social aspects of living CO_2 neutrally. The municipality is busy attracting labour.

Achieving Sonderborg' s ZERO ambition by 2029

The ZERO mindset has become the Sonderborg's **new DNA**. ProjectZero has achieved its defined goal, now Sonderborg is committed to becoming a leader in newly defined ambitious UN sustainability goals.

Scenario 4: Green dollar transition - Green, like in $

The situation

The **transition to climate-friendly solutions** has been going very well. Who would have believed it, as politicians all over the world during the past ten years have ignored or directly denied the size of the problem? Politics, both nationally and locally, has been characterized by the fact that old businesses and NGO organizations have been trying to maintain the old fossil infrastructure.

Instead, it became the businesses', the cities' and the citizens' **own common sense** that created the change. Not for ideological reasons, but because they could see the business opportunities and realised that they had to transition if they did not want to fall behind in technological development.

There is **money in climate-friendly solutions** and anyone can see that. If you create a business or build your house without thinking about resource consumption, it will be expensive in the longer run. Unfortunately, it also leads to a comprehensive patchwork of solutions, because everyone chooses what is immediately the cheapest and suits them best. There are very few standards, general guidelines, no consistent policies for support or taxation and very little coordination, even between big players and heavy projects like new industrial plants or data centres.

The result is **sub-optimisation**. It could be cheaper and more effective for all and it would be better to ensure that everyone in society benefited from the transition. On the other hand, it has gone fast and there is incredible flexibility due to the market free forces.

For Sonderborg's companies, however, it means that it is **difficult to develop and market solutions** that have sufficient power and impact to be exported. It is the

major global business leaders that develop the solutions. Sonderborg's companies have a minor role as subcontractors of components and software. Many of the solutions installed by Sonderborg's citizens and companies have been imported – as these solutions were cheaper.

Once upon a time, Sonderborg was able to prove itself by showing solutions that intervened and coordinated all parties - but that kind of Sonderborg's **local community and interaction** has largely fallen apart. This became clear when ProjectZero could not find funds to continue in 2022.

Citizens

There is a growing focus on installing **energy supply solutions** than giving priority to energy savings. Many citizens and businesses install their own solar systems, household wind turbines, heat pumps, and battery solutions, which they determine by 100% economic considerations – it is cheaper than (common) district heating and the power from major utilities. You can find a lot of very cheap individual energy products in the DIY market or IKEA. Most are developed/manufactured in China. Local craftsmen are busy selling, installing and repairing various individual household products.

Transportation

As the price of **electric cars** was less expensive than fossil fuel cars, a rapid replacement took place. Today, most households have an electric car or two, or they have electric bikes or electric scooters. This is also necessary because public transport is not very attractive. After a period of different half-hearted attempts to use car-sharing or carpooling, people found it preferable to have their own car.

Common utilities / large renewable plants

The municipality's **green district heating networks** were abandoned with major financial losses for the municipality, which had provided guarantees for the billion-euro loan investments taken. Sonderborg' s plans for new large renewable power production plants were not realised because the citizens did not support community solutions. This created distorted development where some areas of the municipality have become fully self-sufficient, on the other hand, it is relatively expensive for those who cannot afford to install household products other than the increasingly expensive common utilities.

The **coastal wind turbine park** near Lillebælt did not only meet resistance on Fyn, but also in Sonderborg, and the plans for it have long been abandoned.

In the meantime, a new generation of **nuclear reactors** have emerged. Atomic power does not emit CO_2 and it is considered a stable way to produce large amounts of power. The new thorium reactor at Nordfyn, which will supply the AI- and robot cluster around Odense, seems to be working well and now the European utility giant EON plans a similar plant in Aabenraa. Danfoss's nuclear technology department

extends regularly, but instead, SDU has chosen to focus on fuel cells and hydrogen technologies.

Companies

Local businesses that focused on energy efficiency had a difficult time as **demand failed**. Danfoss and other companies focused on energy efficiency and had to implement dramatic staff and development cost-cutting.

However, Sonderborg still benefits from the production of a wide range of **components related to energy**. Unfortunately, it is not very lucrative. There is tough competition, because Sonderborg produces parts that many others in the world can also manufacture. The big profits go to the big global business leaders and therefore, most people expect that it is only a matter of time before Danfoss is being taken over.

However, **new start-ups** have specialised in financing, compiling and operating small local energy plants. It is exciting to see what they can develop into.

Research and education

Entrepreneurs have learned to develop new affordable (household) products at the EUC Syd and SDU Campus Alsion. The university has reduced its technical staff at Alsion and strengthened social science education at Alsion. There is more focus on short-term, competency-giving technical courses. The SDU research activity has been moved to SDU in Odense.

Achieving Sonderborg's ZERO ambition by 2029

ProjectZero was closed in 2022. There was **no interest in common solutions** and ideological campaigns for a better environment. But the ambition to stop CO_2 emissions is almost realised - unfortunately, without leading to an economic venture for Sonderborg.

7.2.3. "Master" scenario

No single master scenario was selected, but some of the created scenarios will comply with and support the Roadmap2025 implementation better and more strongly than others.

7.3. **Phase 3 – strategies and decisions**

7.3.1. Input for IEP planning

The scenario workshop (foresight workshop) in Sonderborg ended with a **detailed description of the four possible future scenarios** for Sonderborg. After the workshop day, the ProjectZero team updated, merged and consolidated the scenario discussion outcomes into four robust descriptions that provided input for the Integrated Energy Planning process kick-off day in late June 2018. Peter Hesseldahl,

the facilitator of the scenario workshop day, presented the four scenarios to the kick-off day participants, where also the Mayor of Sonderborg participated.

Figure 16: Presentations of the scenarios in Sonderborg

The scenario workshop was one of the first events/milestones that **paved the way toward** the development of the IEP for Sonderborg (Roadmap2025). The IEP process development of the Roadmap2025 was carried out in the following 8 steps:

1. The City Council's approval of the Roadmap2025 development process
2. Scenario workshop
3. Kick-off workshop
4. Segment-focused working groups
5. Evaluation and calculation
6. Midway workshop and discussions
7. Reporting
8. City Council's approval of Roadmap2025

The **timeline** of the process is illustrated in the following figure:
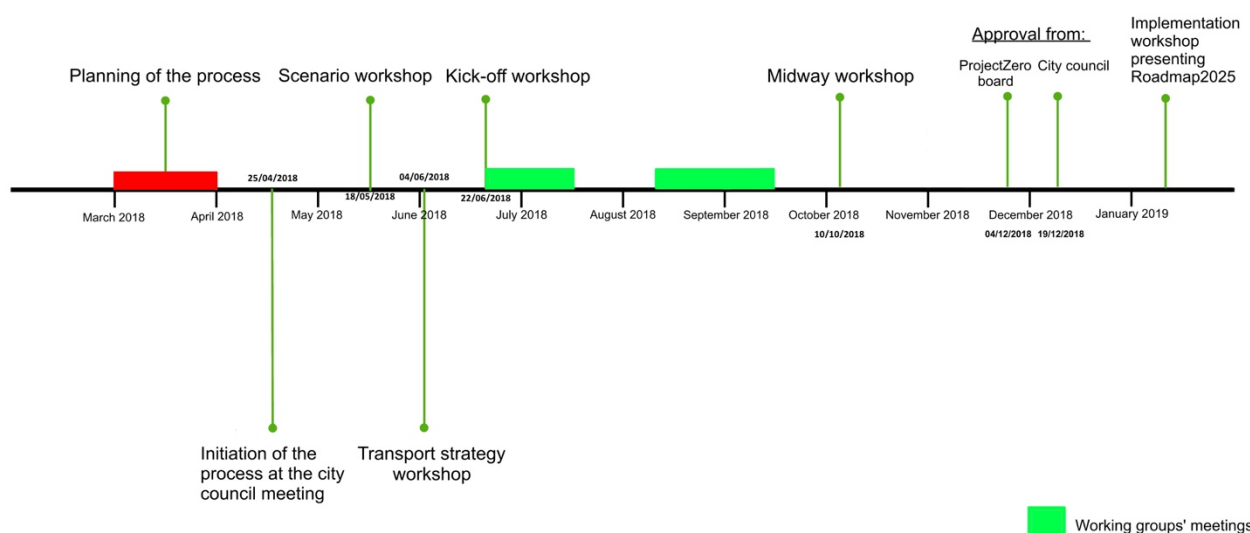
Timeline of the Roadmap2025

7.3.2. Additional (next) steps

The IEP of Sonderborg was completed in 2018, using the following 8-step model:

Step 1:   The City Council's approval of the Roadmap2025 development process

Sonderborg's ProjectZero is in a public-private partnership and it supports and coordinates Sonderborg's vision of becoming a CO_2 neutral society by 2029. ProjectZero is one of the city's three lighthouse projects and as such an integral part of the City Council Vision and Strategy Plan 2018-21, which impacts the development of the municipality. That is why in April 2018, Sonderborg City Council approved the launch of the Roadmap2025 creation process, i.e. the IEP process. The results from the Roadmap2025 will subsequently be integrated into the municipal planning process in order to contribute to the good quality of life, sustainability and green growth of Sonderborg.

Step 2:   Scenario workshop

Nearly 40 local stakeholders and experts attended the scenario workshop in May 2018 in order to create a common view on future visions as well as the uncertainties associated with them, having in mind the common end goal of CO_2 neutrality by 2029. The participants, together with the external facilitator, developed 4 scenarios, which subsequently have been used to test the developed project proposals from the developed working groups (see below). The four scenarios are:

- Scenario 1: Trumpa Loompa land (carbon growth)
- Scenario 2: The long expensive focus on the small green island
- Scenario 3: Turbo conversion - Smart, circular and shared
- Scenario 4: Green dollar transition - Green, like in $

Step 3:   Kick-off workshop

Nearly 90 local stakeholders and experts attended the kick-off workshop at the end of June 2018, which initiated the actual Roadmap2025 development process. The mayor of Sonderborg - Erik Lauritzen, welcomed the workshop participants. They also received a presentation of the four scenarios and an introduction to Sonderborg's energy balance (as developed by PlanEnergi in 2015) before the 8 working groups began their discussions to develop the Roadmap2025 projects. The workshop also presented a template that would ensure a holistic drafting of the project proposals.

Step 4:   Segment-focused working groups

The working groups consisted of key stakeholders from 8 sectors of the municipality of Sonderborg. These included housing association representatives, transport sector representatives, municipal administration, farmers' representatives, representatives

from the business sectors including industries, banks, educational institutions and other stakeholders. The working groups were not focused on having the "broader public" i.e. citizens in the process, however, they were not rejected from participating. The working groups consisted of more than 100 participants who met with each other and worked together over the summer of 2018 on each of the segments. The goal was to be able to propose different projects and initiatives in each segment that later on can be integrated in the Roadmap2025 and will enable the municipality of Sonderborg to deliver their zero-carbon goal. The 8 segments were:

- Homeowners
- Housing companies
- Private rental homes
- Private transportation
- Companies
- Farmers
- Heavy transport
- Energy

The working group participants were appointed in such a way that they represented both the segment and the segment-related stakeholders who had insights and were motivated business-wise to join the working group. Several of the working groups used external consultants to clarify themes or consequences of the project proposals they came up with.

Step 5: Evaluation and calculation

The working groups came up with 56 project proposals, each documented in the draft Roadmap2025 template, which were then consolidated into 40 integrated draft ideas. These ideas were transformed and used in the EnergyPLAN tool[10] (energy planning tool from Aalborg University) which can calculate and show the impact these proposals will have for the renewable energy creation of the municipality and see what the CO_2 footprint of the city will be after the proposals' implementation.

Step 6: Midway workshop discussions[11]

In the beginning of October 2018, 35 working group representatives, including external experts, met in a Midway workshop for both qualitative and quantitative testing of the scenarios and to discuss the draft project proposals, their impact and implementation. The workshop also included an opportunity for the participants to propose their vision for 2025. The mayor and a representative of the youth (21-year-old Kasper) shared their dreams and visions about the future of their Sonderborg with the other participants.

During the Midway workshop, the participants (pressure) tested the selected projects against the four scenarios developed at the beginning of the process.

---

[10] See also: https://www.energyplan.eu/
[11] See also: http://smartencitynetwork.eu/City.aspx?id=a12ae90e-c27e-4f54-9a49-78f6163e9fe0&tags=

As an appendix course, a series of workshops were organized focusing on the future "dynamic energy system". The participants included representatives of regional electricity utilities, local companies and external experts. The purpose was to highlight challenges and potentials in the future dynamic and market-driven energy system.

Step 7: Reporting

Already during the summer of 2018, the target groups, messages and format of the report were chosen for targeted production of content over the autumn. The report should reflect the conclusions of the 8 working groups, the Sonderborg mindset, how the outcome of the process will be integrated into the municipal planning and the SEC/SECN tools used.

Step 8: City Council's approval of Roadmap2025

Roadmap2025 was approved by the ProjectZero board members early December 2018 as an action plan for segmented efforts until 2025. The City Council approved the ProjectZero Roadmap2025 mid-December 2018. The City Council's approval is important to ensure the roadmap's integration into the municipal urban planning (IUP) process and to emphasize the City Council's various roles in the execution of Sonderborg's Roadmap2025.

Figure 18: Roadmap2025 goals in Sonderborg
Explanation: on the Roadmap2025 timeline scheme above, a Transport strategy workshop is shown, even it was not part of the main 8 steps for developing the Roadmap2025 process.

However, it was deemed necessary to have a full-day workshop as this sector is seen as one of the most problematic and difficult to change in a city of the size of Sonderborg. The transport workshop was timed right before the kick-off workshop. 60 participants listened to expert presentations and key challenges and discussed potential solutions and specific initiatives for green transportation in Sonderborg. The participants were divided in four groups:

- Sustainable transport
- Collective transport
- Private transport
- Heavy transport

The outcome of the workshop provided important input for the Roadmap2025 process, where transport was consolidated into two working groups: personal transportation and heavy transportation.
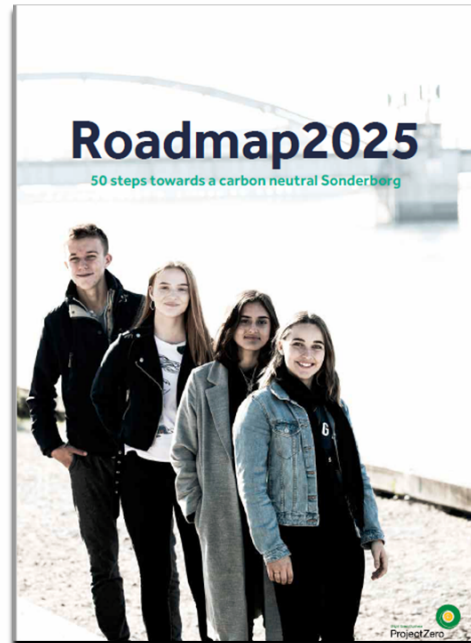
Foresight Experience in Sonderborg - Q&A

Q: Are you satisfied with the engagement?

A: *Sonderborg managed to have 40 stakeholders participating in the Scenario-discussion/creation day in May 2018. They all participated actively, and a common picture of the future challenges and opportunities was created.*

Q: Please name some stakeholder groups that were not included but are important/appeared to be important in the process?

A: *Sonderborg had representatives from all society stakeholders engaged in Sonderborg's energy transition and a few consultants from outside. We did not miss any stakeholder representatives. But stronger participation from the city council would have been nice.*

Q: Do you feel more analysis would have been beneficial in the stakeholder identification part – e.g. identify/conduct a matrix about the importance of the stakeholders and their potential role?

A: *For Sonderborg, the stakeholders are already aware of roles and responsibilities.*

Please describe the positive and negative sides of organizing the scenario development workshop. **How did you benefit from the exercise?**

A: *The scenario-creation process helped ProjectZero and partners identify strengths and weaknesses looking towards 2029, create and integrate the four different scenarios into the Roadmap2025-process. During the process, the scenarios were used to communicate potential shared pictures of a future Sonderborg (2029) and they were also used for testing the 50+ enabler projects generated during the IEP/Roadmap2025 process.*

Q: Did you have any issues or challenges when carrying out the workshop?

A: *The process is painful and need a strong and sharp workshop-leader with knowledge about the subjects and the process. Painful because you as an organizer, will not know where the (sometimes frustration) process will end and how the participants will respond to it during the process. Dividing the process into two separate workshops might help you overcome this challenge.*

Q: Would you repeat that methodology again in the similar planning process?

A: *The 2018 foresight/scenario-process was a repletion of a similar process implemented in the autumn of 2007 with the same workshop-leader.*

Q: What would you suggest to other cities?

A: *To integrate the foresight/scenario process in their IEP-process and secure a broad participation of local and national stakeholders. Publish/communicate the outcome to all*

future participants as part of creating a common shared picture of the future.

"In Sonderborg, we have so far implemented the foresight process (methodology) twice during the ProjectZero lifetime. First time in 2007 when ProjectZero was started and second time in 2018 at the beginning of our IEP/Roadmap2025 creation process. In both cases the workshop and the foresight methodology have created a strong common platform for understanding and assessing the future uncertainties." Peter Rathje, Managing Director (CEO) for the ProjectZero

Table 16. Foresight experience in Sonderborg – Q&A

8. Foresight experience – Vitoria-Gasteiz

Vitoria-Gasteiz is developing the foresight exercise as a part of their Integrated Energy Transition Action Plan 2030 (PATEI 2030 in Spanish), as a mid-way checkpoint towards their carbon neutrality strategy to be achieved in 2050.

This document is continuing the SEAP of the city (Plan de Lucha contra el Cambio Climático 2010-2020), and the Energy Transition Diagnosis released in November 2018. Finally, this PATEI 2030 is meant to cover the mitigation section of the future SECAP of Vitoria-Gasteiz, intended to be released in 2021.

After the mentioned Diagnosis, this foresight exercise is the second step in the process of developing the PATEI 2030, consisting of two foresight workshops to develop the various visions of the future Vitoria-Gasteiz, engaging the key stakeholders of the city. All the input generated in these scenarios will support the development of the final PATEI 2030, intending to make present-day decisions that steer the city towards the fulfilment of the desired scenario in 2030.
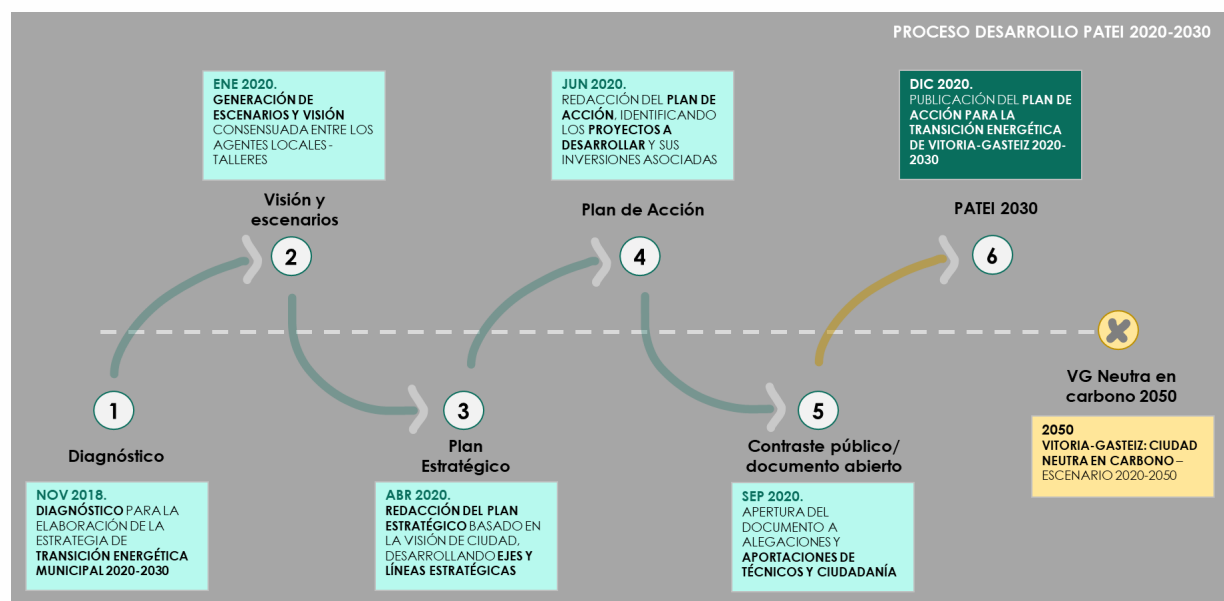
Figure 19: Vitoria-Gasteiz roadmap towards PATEI 2030

As the diagram shows, after the presentation of the *1. Diagnosis for the Energy Transition 2020-2030 presented in 2018*, the process jumps to the strategic planning phase, to be developed throughout the year 2020:

2. Generation of scenarios and city vision (co-visioning workshops)

3. Strategic Plan development (city vision / objectives / axes and strategic lines)

4. Action Plan development (project identification)

5. Public contrast of the document

6. PATEI 2030 publication

8.1. <u>Phase 1 – status and challenges</u>

The steering group (presented in 8.1.1) agreed in the following planning towards the celebration of both workshops:

Activity	Deadline	Responsibility
Diagnosis for Energy Transition in V-G	November 2018	AVG/ CEA
Coordination meeting – main contents and objectives	29th October 2019	AVG/CEA/TEC
Steering group kick off meeting	3rd December 2019	AVG/CEA/TEC/ACC/CAR/MON
Mapping the stakeholders to be involved throughout the foresight exercise	9th December	AVG/CEA/TEC
Validating and editing the list of stakeholders at a task force meeting	19th December 2019	AVG/CEA
Desk research – reviewing baseline documents; preparing the SWOT analysis and mapping relevant trends	16th January 2020	CAR/ACC/MON/TEC
Validating the SWOT analysis and relevant trends in the task force	20th January 2020	AVG/CEA/TEC
Organizing the first scenario-building workshop (incl. specifying the location, time, participants, presenters, catering, moderator)	January 2020	AVG/CEA/TEC/MON
Energy calculations and modelling for the 1st workshop	20th January 2020	TEC/AVG/CEA
1st workshop simulacrum	21st January 2020	AVG/CEA/TEC/ACC/CAR/MON
The first scenario-building workshop (full day, incl. getting on the same page, validating trends and developing scenarios)	29th January 2020	AVG/CEA/TEC/ACC/CAR/MON
Follow-up of the first scenario-building workshop, developing and improving the created scenarios	30th January 2020	TEC/CAR/MON/ACC
Validating the improved scenarios in the task force	3rd February 2020	AVG/CEA/TEC/ACC/CAR/MON
Organizing the second scenario-building workshop (incl. specifying the location, time, participants, presenters, catering, moderator)	4th February 2020	AVG/CEA/TEC/ACC/CAR/MON
The second scenario-building workshop (half a day, incl. validating	12th February 2020	AVG/CEA/TEC/ACC/CAR/MON

the improved scenarios and agreeing on the vision of "PATEI 2030")		
Follow-up of the second scenario-building workshop, summarizing the experience and communicating the next steps	19th February 2020	AVG/CEA/TEC/ACC/CAR/MON
Steering group taking over the planning process	24th February	TEC/MON/AVG/CEA

Table 17: Vitoria-Gasteiz foresight action plan

8.1.1. Foresight task force

For planning the foresight exercise in Vitoria-Gasteiz, a local steering group was created among SmartEnCity Spanish partners, covering all expertise needed to develop PATEI 2030:

- **Vitoria-Gasteiz Municipality (AVG/CEA)** – Andrés Alonso, Paloma Zorraquino, Juan Carlos Escudero, Aitor Albaina, Isabel Garnika – Involved and contrasting all tasks as main targeted institution of PATEI 2030. Logistic organisation of workshops.

- **TECNALIA (TEC)** – (coordination, workshops, energy modelling and planning, strategic planning, city trends, projects' identification, climate proofing) – Koldo Urrutia, Oihana Jauregui, Patxi Hernández, Francisco Rodríguez.

- **MONDRAGON (MON)** – Carolina Mejía – (workshops, city trends, strategic planning).

- **CARTIF (CAR)** - Julia Vicente (KPIs, workshops and diagnosis).

- **ACCIONA (ACC)** – Magdalena Rozanska, Ana Contreras (projects' identification, workshops and diagnosis).

As it is described in the table above, the process of PATEI 2030 is now starting with the foresight workshops, and this task forece will take care of the process until the release of final PATEI 2030 document, meeting regularly to contrast the approach to each of the tasks planned.
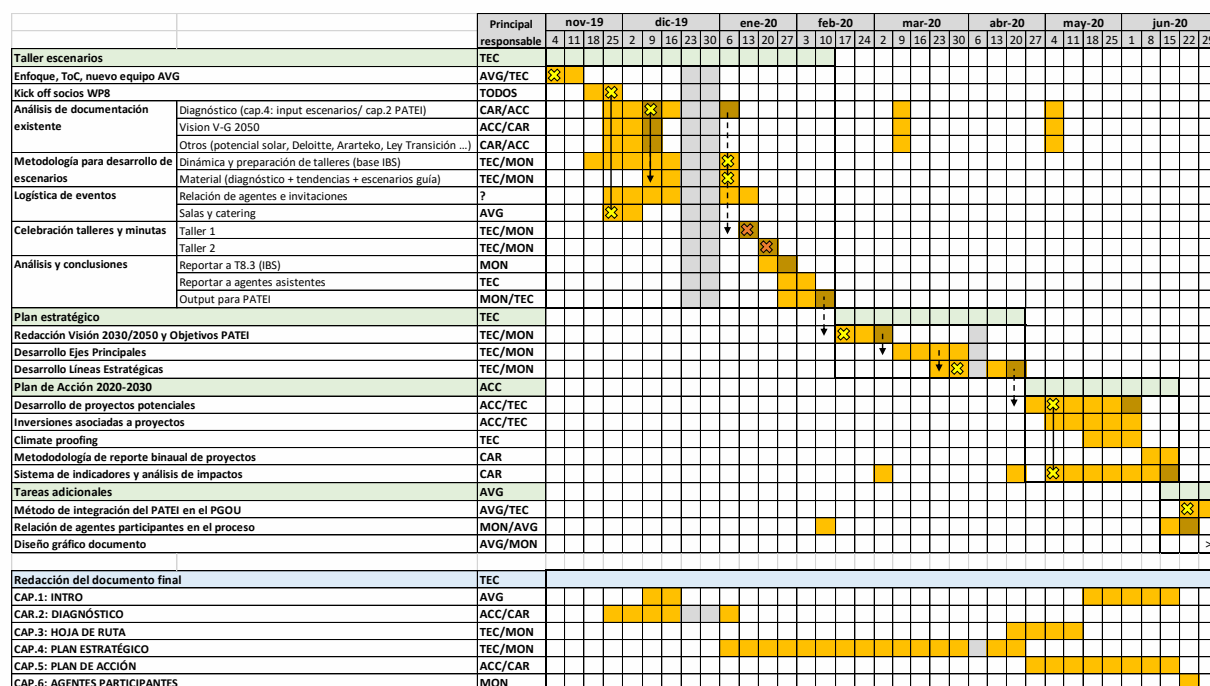
Task	Subtask	Principal responsable
Taller escenarios		TEC
Enfoque, ToC, nuevo equipo AVG		AVG/TEC
Kick off socios WP8		TODOS
Análisis de documentación existente	Diagnóstico (cap.4: input escenarios/ cap.2 PATEI)	CAR/ACC
	Vision V-G 2050	ACC/CAR
	Otros (potencial solar, Deloitte, Ararteko, Ley Transición …)	CAR/ACC
Metodología para desarrollo de escenarios	Dinámica y preparación de talleres (base IBS)	TEC/MON
	Material (diagnóstico + tendencias + escenarios guía)	TEC/MON
Logística de eventos	Relación de agentes e invitaciones	?
	Salas y catering	AVG
Celebración talleres y minutas	Taller 1	TEC/MON
	Taller 2	TEC/MON
Análisis y conclusiones	Reportar a T8.3 (IBS)	MON
	Reportar a agentes asistentes	TEC
	Output para PATEI	MON/TEC
Plan estratégico		TEC
Redacción Visión 2030/2050 y Objetivos PATEI		TEC/MON
Desarrollo Ejes Principales		TEC/MON
Desarrollo Líneas Estratégicas		TEC/MON
Plan de Acción 2020-2030		ACC
Desarrollo de proyectos potenciales		ACC/TEC
Inversiones asociadas a proyectos		ACC/TEC
Climate proofing		TEC
Metododología de reporte binaual de proyectos		CAR
Sistema de indicadores y análisis de impactos		CAR
Tareas adicionales		AVG
Método de integración del PATEI en el PGOU		AVG/TEC
Relación de agentes participantes en el proceso		MON/AVG
Diseño gráfico documento		AVG/MON
Redacción del documento final		TEC
CAP.1: INTRO		AVG
CAR.2: DIAGNÓSTICO		ACC/CAR
CAP.3: HOJA DE RUTA		TEC/MON
CAP.4: PLAN ESTRATÉGICO		TEC/MON
CAP.5: PLAN DE ACCIÓN		ACC/CAR
CAP.6: AGENTES PARTICIPANTES		MON

Figure 20: Vitoria-Gasteiz's PATEI 2030; tasks and timeline 2019/2020

8.1.2. Stakeholder involvement

Regarding stakeholder involvement, the stakeholder database developed for the Energy Transition Diagnosis in Vitoria-Gasteiz was examined to identify the potential gaps for this foresight workshop. That database was completed, regarding the local and regional groups that have a say in this energy transition, creating a comprehensive map of stakeholders. Those stakeholders belong to the following categories:

- **Energy**
- **Environment**
- **Urban planning**
- **Public buildings management and promotion**
- **Mobility**
- **Water**
- **Government** (deputy mayors)
- **Economy** (companies)
- **People** (associations)

The invitations were addressed personally to each of the potential participants, signed by the deputy major of Vitoria-Gasteiz, explaining the process of PATEI 2030 in general terms and the foresight workshops to be celebrated in January and February 2020. The involvement of politicians provided a great support in stressing the importance of this events among the potential audience. Once the final

participants of the workshop accepted the invitation, an informative email was sent, including the following information for the first workshop (29th January):

- Main purpose of the workshop

- Detailed agenda, slots and speakers

- Background materials to be used in the workshop:

    o Global Smart City Trends

    o SWOT analysis of Vitoria Gasteiz

Finally, 42 attendants came to the first workshop, which worked as a perfect number to divide them in 4 tables of 10 people, and having 2 extra moderators for all tables, besides the moderators and experts appointed to each table. The audience reached the critical mass needed to keep good flow and contents in the workshop.

8.1.3. Preparing for the workshop

Two main documents were developed to support and enrich the exercise leading to the generation of the scenarios during the workshop. First, the **global Smart City trends**, informing on which are the main global impacts that can affect the city of Vitoria-Gasteiz from an external point of view. For this identification, the following reports were consulted:

- Global Trends 2030: Alternative Worlds (Nacional Intelligence Council USA)

- Global Trends to 2035. Geo-politics and international power (European Commission)

- Global Trends to 2030 (EU Strategy and Policy Analysis System)

Secondly, after that identification, a **SWOT analysis** of the city of Vitoria-Gasteiz was performed. To do that, the group transformed the global Smart City trends identified into **Opportunities and Threats**, complementing those with an additional research on the Energy Transition topic.

Having all the external factors, it was the time to identify which were the internal ones to Vitoria-Gasteiz; its **Strengths and Weaknesses**. A thorough sectorial review was developed to find those with in all the city sectors; energy, mobility, ICTs, governance and others.

The **final list of global smart city trends**, categorized by the main areas of SEC interventions, was the following:

ENERGY
1. **Distributed Energy Resources (DER) –** Energies continues to change, and new technologies bring exiting growth in many industries, but these changes can affect the delicate balance of energy supply and demand. Today´s grid increasing need for electrical energy problems arise, putting a huge amount of pressure in the grid stability. The Distributed Energy resources (DER) creating an on-site and storing the energy for peak on operating times. Such an alternative system consists in alternative renewable

sources, carrying activities for a while in the event of a grid power outage. Consumers are putting pressure on energy suppliers for them to have more control over their energy.

2. **Renewable energies –** Continuing reduction on the costs of renewables and other technologies such as energy storage, would increment the supply of renewable energies.

3. **Smart Energy Communities -** Green Energy Organisation brings into focus how an intelligent integration of the electricity, heat, gas and transport sectors can create a robust energy supply for Smart Energy Communities in the future based on renewable energy.

4. **Electrification of heating and cooling systems -** Substantial share of final end usage.

5. **Sensorification of the energy efficiency system –** The energy system can be controlled and analysed remotely by a diversity of devices, proving possibilities to predict the energy demand and supply, as well providing energy consumption to citizens and city management. Optimization of energy systems with sector coupling switching energy into the heating, cooling, mobility sector with wider coordination of the overall system and data analytics to support the grid.

6. **Failing to meet CO2 targets –** the global CO_2 emission targets will not be met as the energy sector will not experience drastic changes in the energy supply sources (coal, gas, etc).

MOBILITY

7. **Electric mobility** - Low-emission electric vehicles (EVs) are crucial to locking in the benefits of enhanced mobility, and consumers are switching from internal-combustion engines to cleaner battery power at an accelerating pace. As production ramps up, automakers are churning out some 120 new models annually, and more than 20 percent of all potential buyers now say they would consider an EV for their next purchase. As batteries become more cost effective, mileage capabilities increase, and charging stations multiply, sales of pure-play battery electric vehicles (BEVs) are now surpassing those of earlier plug-in hybrid-electric vehicles (PHEVs). The electrification gains are becoming more sustainable as well, which measures both consumer demand and production capabilities across nations.

8. **Connectivity –** Connectivity with the surrounding area and other road user (Car2X) for the realization of autonomous driving functions will be further expanded and spread in the future.

9. **Autonomous driving -** By 2030, 25% of all new vehicles will be at automation level 4 or 5; meaning a significant increase in market share. Autonomy takes shared mobility to a new level, as vehicles can pick people up on their own, extending their reach and target group.

10. **Car subscription -** The influence of car sharing, and other sharing services is already noticeable. Younger generations are finding the pay-per-use offers appealing. Expensive acquisition, maintenance costs and the associated long-term commitment reduce the attractiveness of buying a car.

11. **Micro-mobility -** The resulting traffic jams, noise and air pollution are highly problematic and trigger a paradigm shift in favour of car-less mobility solutions. Especially for the First and Last Mile Micro Mobility solutions such as e-scooters, e-skateboards, hoverboards etc. are well-suited.

12. **On-demand mobility –** The concept where several people with similar routes are picked up from a single vehicle and an algorithm calculates the most efficient route, is already being tested and implemented. Usage of sharing models is already spreading, on-demand ride pooling services are becoming more present on the market.

13. **Complete trip** - It is defined as having a number of components or trip stages that begin with trip planning and end with the traveller's arrival at their destination combining multimodal mobility technologies (bus, train, taxi, bike-share, car-share location, etc).

ICT

14. **Energetic blockchain** - ICT has an important impact on energy systems. With the correct applications of ICT, the devices could have an absolute autonomy to identify the appropriate moments of purchase and sale of energy, as well as, optimize energy systems in real time, analyse and monitor energy efficiency.

15. **Access to data –** big data will become increasingly popular to optimise the city services by data virtualisation, data integration and real-time data.

16. **Machine learning and artificial intelligence -** act as the brains of a smart city while simultaneously considering how a smart city experience can become more personalized without compromising the privacy of its residents.

17. **Employment –** Jobs will become vulnerable to computerisation, eliminating some of them as a direct consequence if the artificial intelligence. Particularly at risk are jobs that consist of a set of tasks following procedures, such as data entry**.**

18. **Growing inequalities –** ICT products and services will still be inaccessible to some segments of the population due to a lack of affordability, training and education, contributing to urban inequality.

19. **Safety issues gaining ground –** smart cities will be hindered by privacy and safety issues (e.g. data extraction, frauds, identity thefts, cyber-attacks) and the resulting low acceptance of new solutions**.**

20. **Virtual reality, augmented reality and digital twin for construction- t**hese technologies are helping architects and construction teams improve designs and detect design errors, as well as improve the buildings´ comfort.

21. **3D printing for construction -** the ability to either prefabricate offsite or directly on-site has obvious labour and material cost benefits over more traditional building methods. It also reduces waste and being automated is not restricted by construction worker shift patterns.

GOVERNANCE

22. **Long-term planning as opposed to traditionally near-sighted infrastructure planning –** 40% of the cities had already adopted basic infrastructure to support all smart city applications, complementing the siloed applications like surveillance cameras,

smart lighting or traffic sensors. Installing basic infrastructure without connecting them would result a painful and costly process of upgrading the connectivity network.

23. **Co-creation driving smart cities –** co-creation with citizens, partnerships with the private sector and civil society increasingly important in smart urban planning and public service provision.

24. **Creative financing that combines government funding with public/private partnerships –** public governments are adopting financial plans to support cities transformation encouraging private entities to collaborate gaining new infrastructures for their business and having future profits.

25. **Legacy systems as a barrier –** smart cities will be hindered by their legacy systems (lack of adaptability of existing IT infrastructures) and difficulties in integration.

26. **Lack of common vision –** smart cities will be hindered by the lack of a common vision and action.

27. **The rise of 5G and smart city applications -** 5G will not only bring faster speeds, but also much denser small cell deployments due to distance limitations with millimetre wave technology and ultra-low latency applications at the edge. 5G will foster new smart city applications like parking, smart meters, public safety (surveillance cameras), traffic management, 5G small cell densification, waste management, and coordination of departments for emergency services.

28. **Sustainability –** energy efficiency regulations drive for low to zero carbon emissions driving innovations in building and city services. The European Commission will adopt the Green Deal creating the "Climate Law" by March 2020 and revising the energy taxation directives of each of the European countries.

29. **Smart regions –** broad array of places and services coordinating across governments. mart multicity regions should transcend city boundaries to drive more inclusive and expansive innovation. Moreover, cities also realize the benefits of pooling resources and are able to tap into economies of scale as they seek to use seamless physical-digital experiences to deliver traditional city services to citizens in entirely new ways.

30. **Inclusive urban development –** the income gap between the richest and poorest of the population has increased in the last 25 years, from 10% to 30%. In both settings, historically marginalized communities, including low-income, elderly, immigrant, and disabled residents, have not always shared in the prosperity of urban revitalization. These widening inequalities have brought the concept of inclusion to the forefront of urban development: providing all residents with equal access to city services and allowing them to participate in municipal decision-making and benefit from the city's economic growth.

Table 18: Vitoria-Gasteiz global Smart City trends used in the workshop

8.1.4. SWOT analysis

Instead of a question, a strategic mission statement was developed to guide work throughout the two foresight workshops: "**Vitoria-Gasteiz has the ambition of**

reducing its GHG emissions by 40% by 2030; becoming more resilient against the impacts of Climate Change; fostering a modern and competitive economy; providing universal, sustainable, affordable and safe access to energy."

The final SWOT analysis included the following **strengths and weaknesses**:

AREA	STRENGTHS	WEAKNESSES
Energy	• Diagnosis for the updated energy transition • Existence of local alternatives to address the problem of the energy sector • Map of developed solar potential and forecast of increase of solar installations (solar parks, roofs and industrial facilities) • Local companies specializing in renewable energy and energy efficiency with increasingly efficient technologies • Pilot projects for the installation of new heat networks in the built environment. • Good general level of habitability of the built park • The *Coronación* case generates a new way of facing retrofitting • The buildings on City Hall property as an example of good practice • Pilot projects for energy retrofitting at building and neighborhood level	• Very high dependence on fossil fuels • Maximum dependence on external energy supplies (99%) • Low use of renewable energy • Non-coincident demand and energy production peaks occur • High consumption of street lighting • Lack of bioclimatic adaptation of the inherited residential buildings and insufficient energy rehabilitation actions • High cost of housing and insufficient supply of rental housing • In existing buildings, thermal self-sufficiency requires a significant economic investment, in addition to high technical complexity • Insufficient improvements in energy efficiency associated with production and consumption and increase in energy consumption associated with real estate expansion and the rise of low-density residential typologies • Offset between urban growth and population growth: oversizing of the new real estate

	Strengths	Weaknesses
Mobility	- Strategic position as a territorial communications hub - Compactness of the urban center and absence of significant slopes - High participation of active mobility in the modal cast (67% on foot or by bicycle) - National reference of mobility by bicycle - Progress of urban restructuring, implementing the "super block" model - Good reception of the tram by citizens as an alternative means of transport - Progressive electrification of public transport: Intelligent Electric Bus Irruption	- High energy consumption associated with transport and mobility - High greenhouse gas emissions associated with transport and mobility - Energy inefficiency in the transport of people, with very low ratios of people per vehicle - Currently poor alternatives for decarbonization of mobility; low penetration of the electric vehicle - Discontinuity and urban voids that discourage active mobility in some areas of the city - Convenience of the private vehicle for work and school trips - High consumption of public space due to motorization and high noise level
Governance & others	- Objective of being carbon neutral and energy self-sufficient by 2050 - Institutional awareness for environmental conservation and quality urban planning, including planning tools to reduce energy consumption and emissions - Increasing environmental awareness of citizens - International recognition of work in the city in environmental matters: European Green Capital 2012 - The Green Ring highlighted by the EC as an example of Green Infrastructure for the improvement of ecosystem services in peri-urban areas	- The industrial sector is not contemplated within any of the municipal climate action strategies - Citizen perception of lack of information regarding energy transition measures - Lack of measures and promotion of digitalization in the energy field from the institutions - Low level of use of waste generated - Increasing aging rate - Unemployment rate still high - Lack of job opportunities among young people

Table 19: Vitoria-Gasteiz strengths and weaknesses

Besides these strengths and weaknesses, the final SWOT analysis included the following **opportunities and threats**:

AREA	OPPORTUNITIES	THREATS
Energy	• The energy sector needs to evolve towards a cleaner, more decentralized and increasingly digital future. • Spain needs to build an integrated, agile and resilient operating model with renewable energies. • New energy supply-demand models. • Citizens connected and informed of their energy consumption, supply and demand. • Personalisation of energy services • Become independent of the energy networks with a Distributed Energy Resources. • VR, AR and 3D printing can boost the energetic rehabilitation process of buildings.	• Global energy demand will grow +/- 30% by 2040, which implies a strategic analysis of future energy sources. • Spain depends on 72.9% of energy imports to meet demand. • Cyberattacks to energy companies. • Spanish energy changing regulations regarding renewable energy usage and ownership • Actual Spanish regulation contemplates the compensation for the partial use of the networks made by the owners of distributed generation sources. • Drastic climate change. • Citizens reluctant to energetic change.
Mobility	• Accelerated implementation of low carbon transport and electric vehicles. • Connected mobility to all users, offering personalised alternatives of transportation • Increase the attractiveness of public transport offering new mobility services. • Create a car-sharing regional platform • Reduce the use of particular cars promoting alternative resource-efficient transportation.	• Non-low charging infrastructure of electric vehicles. • . The use of the personal car is too convenient to consider public transport for long distances. • Dependence on fuel mobility market. • Accelerated mobility shift from fuel transportation to clean energy transport.
ICT	• IoT and ML machinery can collect data from various points of the city and send to central servers to improve city services. • AI systems improve, and they can offer better products, they will attract more customers.	• Citizens´ data privacy can be compromised using IoT and ML/AI. • AI must be trained on vast amounts of data, and only a few companies in the world have this supply. • Low acceptance of new solutions from behalf of the municipality and citizens. Lack of trust in new technologies.

Governance & others	• Co-creation with citizens´ the future of the city. • Create smart regions initiatives with other cities • New regulatory framework that enables the irruption of solar energy. • Use of social media to involve citizens in energy transition • Reactivation of economy after economic crisis	• Lack of common vision on what to implement and how to act with the smart cities´ technologies. • Increment the inequalities between citizens not allowing all citizens to participate in the new decision-making. • Increasing ageing population. • Lack of financing for replicating pilot experiences • Lack of institutional awareness from governments coming in next periods

Table 20: Vitoria-Gasteiz opportunities and threats

8.2. Phase 2 – visions of the future

8.2.1. Scenario workshops

The Spanish partners of SmartEnCity are collaborating in the task group to develop both foresight workshops. The first one has been celebrated on 29th January 2019, while the next workshop is planned to happen 14 days after; on the 12th of February. The first scenario-building workshop brought together 42 stakeholders. The aim was to list the most important smart city trends, vote on the most relevant and uncertain trends and develop the four resulting scenarios in detail, followed by presentations. The second scenario-building workshop has already 41 confirmed participants, most of them already present in the first workshop, ensuring the continuity of the task. The aim is to improve the four scenarios that are currently being developed by task force members, to decide on the most desirable scenario for Vitoria-Gasteiz and to come up with a vision for PATEI 2030.

Figure 21: Image of SWOT and trends presentation in the 1st workshop in Vitoria-Gasteiz

The **agendas and materials** of both of the workshops are presented in the following table:

	First workshop – trends and scenarios (29th January 2020)	**Second workshop – scenarios and vision (12th February 2020)**
Agenda	**9.15-9.30h** – Registration of participants **9.30-10.30h** – Welcoming speech by deputy major from AVG – Context, Objectives and Methodology (TEC) – Vitoria Gasteiz Diagnosis (CAR – TEC – ACC) – Institutional declaration (AVG) **10.30-11.15h** – 1st group dynamic. Presentation of trends (TEC – MON), group debate and voting. **11.15-11.40** – Coffee breake and processing of votes (TEC – MON) **11.40-12.45h** – 2nd group dynamic. Scenarios generation. Group work in tables (All partners) **12.45-13.25h** – Presentation of each scenario – (Group representatives) **13.25-13.30** – Next steps (TEC)	**9.15-9.30h** – Registration of participants **9.30-9.45h** – Welcoming speech by deputy major from AVG – Context and Objectives **9.45-10.15h** – Presentation of updated 4 scenarios **10.15-11.00** – Scenarios validation. Group dynamic in tables. **11.00-11.30h** – Coffee break **11.30-12.00h** – Selection of master scenario V-G 2030 **12.00-13.15h** – City vision setup **13.15-13.30** – Conclusions and introduction to next steps within PATEI 2030

Materials used	- Agenda (for each participant) - Registration sheets - Table/group colours - Group work guidelines ("Guía para los dinamizadores") - SWOT analysis (printed for each participant - List of smart city trends (for each participant) - Stickers for voting for trends - Poster for voting "relevance" and "uncertainty" of trends - Powerpoint template and/or flip charts to present group work results (scenarios) - Extra paper, pens, markers and post-its - Voice recorders (for task force representatives to record group discussions for later analysis) - Memo of the workshop (later via e-mail along with a thank-you note)	- Agenda (for each participant) - Registration sheets - Table/group colours - Group work guidelines ("Guía para los dinamizadores 2.0") - Scenarios updated and printed - Powerpoint template and/or flip charts to present group work results (scenarios) - Extra paper, pens, markers and post-its - Memo of the workshop (later via e-mail along with a thank-you note)

Table 21: Vitoria-Gasteiz workshop agendas

The first workshop started with a welcoming speech by the deputy mayor. After that, the facilitator explained the objectives, method and rules of the session, and the experts presented the diagnosis, the energy modelling of the city, and the SWOT analysis.
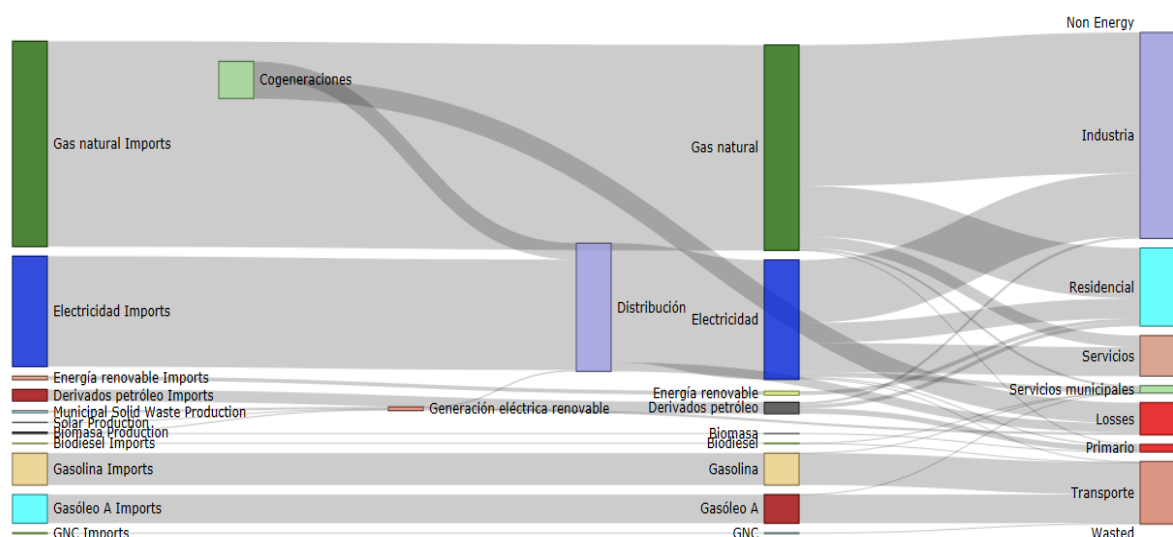

Figure 22: Sankey diagram of Business as Usual 2030 energy scenario in Vitoria-Gasteiz

The **four groups** were pre-defined based on registration information so that all sectors would be represented in each of the groups. In each of those groups, a moderator and an expert were appointed, all part from the SEC task force, so both could keep a good timing during the exercise, intending to extract the most of all conversations and debates among the participants.

Moderators:

- Oihana Jauregui (Main; TEC)

- Koldo Urrutia (TEC)

- Carolina Mejía (MON)

- Julia Vicente (CAR)

- Magdalena Rozanska (ACC)

SmartEnCity representatives in each table:

- Andrés Alonso (Main; AVG)

- Juan Carlos Escudero (CEA)

- Aitor Albaina (CEA)

- Patxi Hernández (TEC)

- Paloma Zorraquino (AVG)

The main guidelines for moderators, entailing 2 main exercises, are described below:

Group work; exercise 1: <u>**Selection of most relevant and uncertain city trends for Vitoria-Gasteiz, identifying the axes for the 2x2 matrix.**</u>

Once the description of the Global City Trends is finished, the exercise begins at each table.

- **Round of presentations** by people who share a table: name, organization, main activity (5 min. Maximum)

- The **moderator recalls the objective of the exercise**: select the most relevant and uncertain trends for the city of Vitoria-Gasteiz. To do this, we will conduct a vote, but first, there is a brief discussion at the table about the trends presented. Which are relevant and which are uncertain.

    - **Relevant**: those that we believe will have a greater impact on the city of Vitoria-Gasteiz

    - **Uncertain**: those that we find most difficult to determine if they will happen or not

- Thought out loud about which ones may be the most relevant and uncertain. Are you missing any trend? Which one should we add to the list?

- In case you want to add one, it is written (the moderator) in a yellow post-it with a clear letter, to be able to incorporate it into the voting poster. (Debate: 20 min. Maximum)

- Once the time is up, the moderator delivers the stickers for the vote to each participant. 3 green stickers (relevant) and 3 blue stickers (uncertain). Voting according to your personal opinion. All people get up from the table and go through the poster, to vote their options.

    - Relevant: the 3 trends that are considered most relevant are voted

    - Uncertain: the 3 trends that are considered most relevant are voted (they could coincide with the relevant ones)

Group work; exercise 2: <u>Generation of a scenario -in each table- taking into account the appointed quadrant of the 2x2 matrix. Vision 2030</u>

• The moderator explains in detail what the exercise consists of, before starting:

- Description of the scenario based on the reference material (SWOT analysis, list of trends, poster with the most voted trends). The description includes aspects related to the general context, with mobility, with energy (generation and renewable), urban equipment and services, residential and tertiary building, governance and ICTs.

- To facilitate the exercise, he anticipates that he will launch specific questions that help define that scenario.

- After a few minutes of individual reflection will be shared among the participants of the table.

- A spokesperson is selected to present the work of your group to others later.

• The exercise begins:

- The moderator reads all the questions that will facilitate the description of the scenario and gives 10-15 min. for each person, on the one hand, to read and review the reference material, and on the other, to reflect individually and write their ideas / answers in the post-it, with short sentences.

- Once the time has elapsed, it is put in common: round, the moderator is grouping those that are similar and / or refer to the same area, trying to agree if the opinions are very divergent and paste them into the POSTER. (40 minutes)

- Among all participants, they imagine a title that defines the stage (5 min)

Questions to guide the scenario development:

- General context: What is the general situation? What are the main features that describe this scenario (the extremes)? What do you pay more attention to? What is the highlight? What are the global trends that most affect this scenario?

- How does Vitoria-Gasteiz respond to these external factors using internal strengths and avoiding weaknesses?

- Energy and renewable generation: What is the energy model? What is the degree of use of renewable energy? How do they occur? What technologies exist / are used?

- Residential and tertiary building: How would you describe the sector? What actions are being carried out?

- Mobility: What is the transport situation (public / private)? What are the habits in mobility?

  - Governance and society: How is governance in this scenario? What is the political commitment (strategy, objectives, budgets, etc.) What is the attitude / sensitivity of society in relation to energy, mobility, climate change, housing rehabilitation, etc.

Table 22: Group work guidelines in Vitoria-Gasteiz 1st workshop

8.2.2. Scenario development

As part of the first scenario-building workshop, the participants were asked to improve and modify the pre-listed **global smart city trends** that should be taken into account in urban planning. The previously described first exercise was developed, discussing those trends, adding the ones that were missing in the opinion of the participants, and finally voting the most "relevant" and "uncertain" ones in a A1 poster. After the debate, each participant had 3 green / 3 blue stickers to vote depending on their personal opinion.
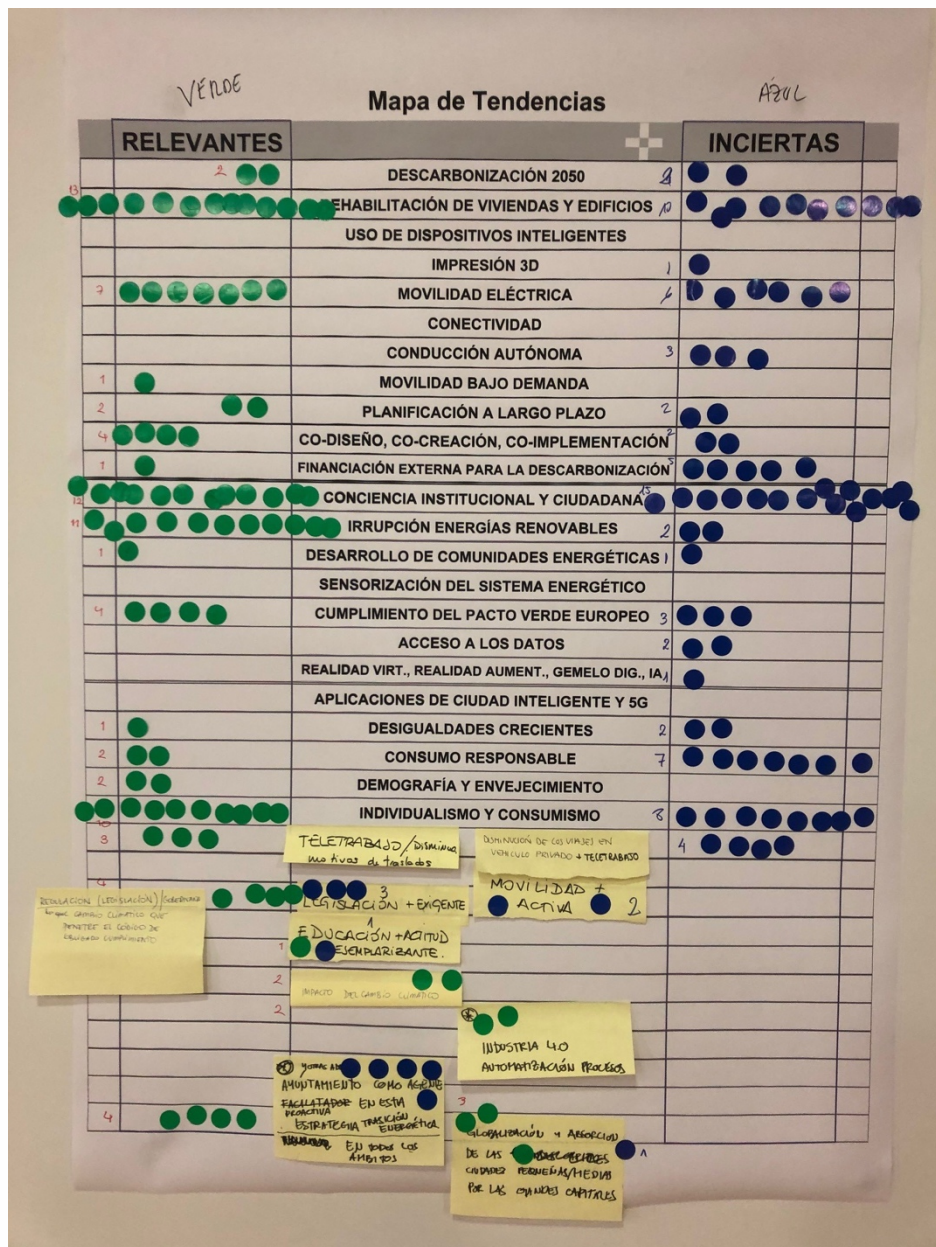

Figure 23: Wall posters with (modified) trends and votes for "relevance" and "uncertainty".

After voting, the participants went for a coffee break. At the same time, the task force counted the votes and used a pre-made Excel template for inserting the scores and generating a summary graph. Each trend was coded, so it could be tracked on the

graph. The graph showed where each of the trends was positioned based on relevance and uncertainty.

| Tendencia	Código	Votos Relevante	Votos incertidumbre
Descarbonización 2050	Ed1	2	2
Rehabilitación de viviendas y edificios	Ed2	13	10
Uso de dispositivos inteligentes	Ed3	0	0
Impresión 3D	Ed4	0	1
Movilidad eléctrica	Mo1	7	6
Conectividad	Mo2	0	0
Conducción Autónoma	Mo3	0	3
Movilidad bajo demanda	Mo4	1	0
Planificación a largo plazo	Go1	2	2
Codiseño, cocreación, coimplementación	Go2	4	2
Financiación externa para la descarbonización	Go3	1	5
Conciencia institucional y ciudadana (+ Administración tractor del proceso)	Go4	16	20
Energía renovables	En1	11	2
Comunidades energéticas	En2	1	1
Sensorización del sistema energético	En3	0	0
Pacto Verde Europeo	En4	4	3
Acceso a los datos	TIC1	0	2
Realidad virtual, aumentada, gemelo digital e inteligencia digital	TIC2	0	1
Aplicaciones de ciudad inteligente y 5G	TIC3	0	0
Desigualdades crecientes	TIC4	1	2
Consumo responsable	So1	2	7
Demografía y envejecimiento	So2	2	0
Individualismo y consumismo	So3	10	8
Teletrabajo, disminución de desplazamientos	Otro1	3	4
Movilidad activa	Otro2	0	2
Legislación más exigente	Otro3	4	3
Eduación, actitud ejemplarizante	Otro4	1	1
Impacto cambio climático	Otro5	2	0
Industria 4.0	Otro6	2	0
Globalización + absorción de las ciudades pequeñas/medias por las grandes capitales	Otro7	3	1
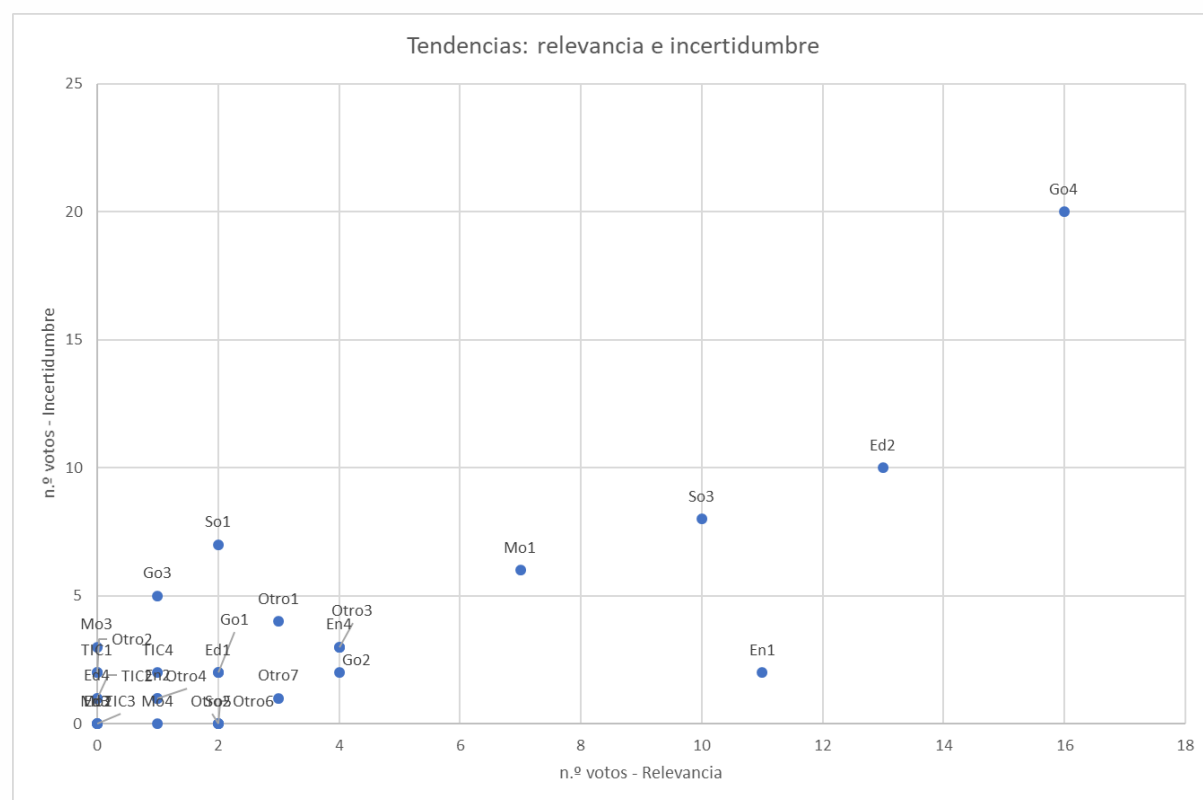
Figure 24: Excel template with short names and codes of the trends

Explanation: Excel template with short names and codes of the voting results, a summary graph and a list of relevant and certain trends that needed to be taken into account when describing the scenarios that were made up of relevant and uncertain trends.

Based on the voting results, two trends were clearly singled out as the most relevant and uncertain ones. These were **"institutional and citizens awareness and drivers of change" and "meeting CO$_2$ targets and becoming more resilient".** As such, the matrix axes were formulated as the extremities of these trends, i.e. "high awareness" vs "low awareness" and "CO$_2$ aims and higher resilience will be achieved" vs "CO$_2$ aims and higher resilience will not be achieved". Each of the created four scenarios were then assigned to the four groups for elaborating the content of the scenarios.

Scenario matrix

In the sections below, **each of the four scenarios are presented in more detail** as they appeared after group work, task force improvements and stakeholder modifications.
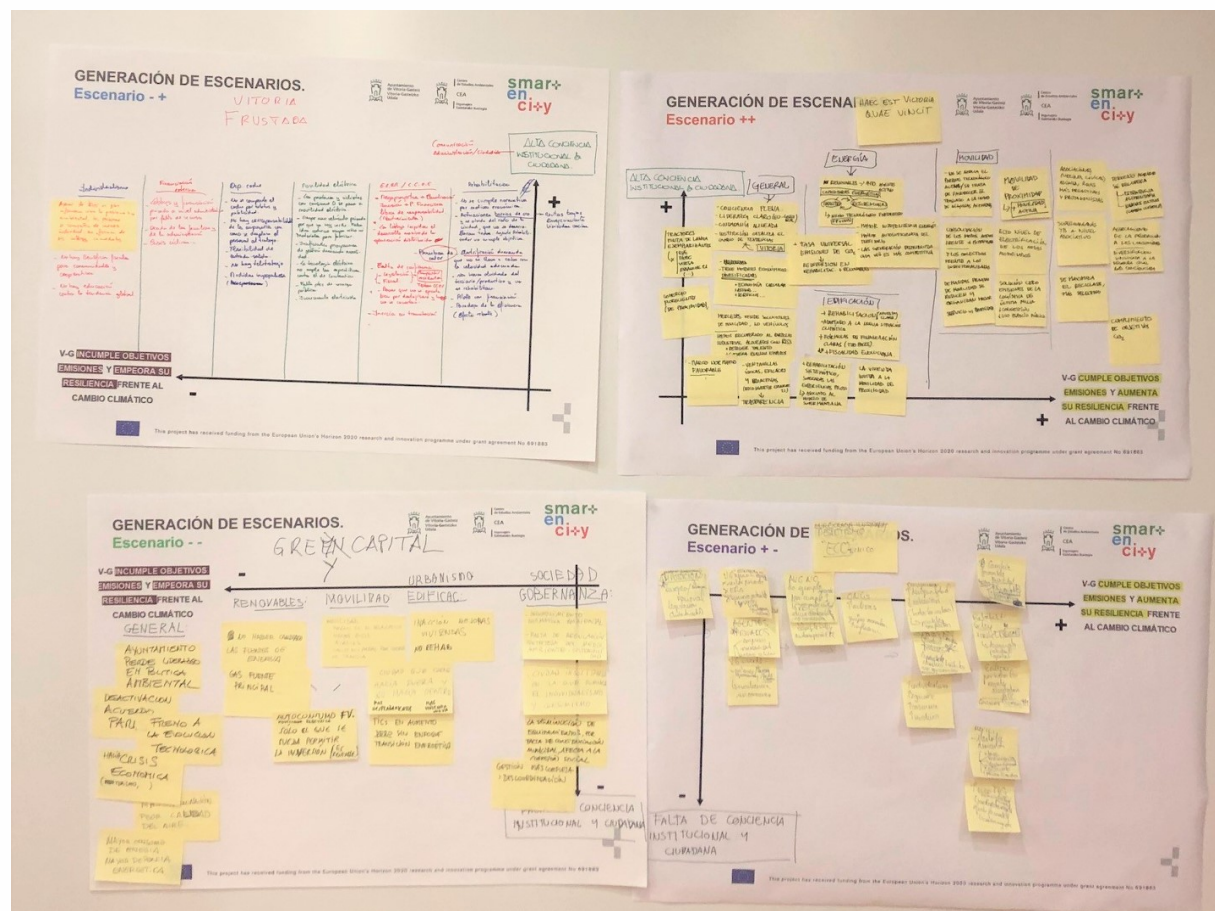

Figure 25: Image of the scenarios developed in the 1st workshop in Vitoria-Gasteiz

Scenario 1 – Vitoria, "Vitoria revincit" (+/+)

We are in Vitoria-Gasteiz in the year 2030. The context considered in the scenario is the fulfilment of the emission objectives and increases its resilience of the city against climate change on the horizontal axis, and high institutional and citizenship awareness in the vertical axis.

It is a positive scenario in many contexts, which could be a utopian scenario in some parts.

As for the general context, we have the full awareness of citizenship, promoted by the institutions. The administration has a clear leadership, there is a clear transcription of the European strategies (Green build), towards the regional and municipal entities with leadership. Exemplary institutions. The city has diversified economic engines, based on the circular economy, the model based on high added value, for example, the Mercedes factory develops mobility solutions instead of selling only vehicles. Industrial parks have been recovered, aligned with RIS3, all with the objective of retaining talent and generating good employment. The favourable regulatory framework, taxation.

As energy generation and renewable, the great use of renewable energy is appreciated. The energy communities (industrial, residential) have been created, the support of the training units (universities, FP) is observed. Reuse of excess for residential use. There is a CO_2 emission rate and corresponding policies. Vitoria more energy independent, more self-sufficient in general (energy, food sector). Power generation is becoming more competitive, more efficient, and more distributed.

As for residential and tertiary building, it is clearly committed to building adapted to climate change. There are clear financing formulas, the evolution of taxation is observed. Pilot projects already passed and integrated in the new constructions. New developments based on the concept of super-urban block integrating the uses to favour the proximity of the services (pedestrian access or bike). Regeneration of downtown neighbourhoods.

As for mobility, the restructured city, close to the citizen. The consolidation of motorized active displacements is promoted. Integrated technology park in the city: reduced demand for mobility. Transportation adapted to a neighbourhood super-urban block organization. Zero emissions solutions and logistics are proposed for this.

As for governance and society, neighbourhood and civic associations assume roles that are more preponderant. The recycling is promoted, which is increasingly selective. The agricultural production is promoted, close to the municipality. Local demand more aware. Agricultural land recovery.

Scenario 2 – ECO-nomic Despotism (+/ -)

The key element for the group that has developed this scenario is the legislative imposition either at European, national or Basque Government level, in all sectors, towards the decarbonisation. And in this context of great imposition to meet the objectives based on laws, this Vitoria in 2030 has a high appeal for a "green tourism" or clean air tourism thanks to its general context of sustainability over the past years, which is also favourable in circumstances of climate change, being also a compact city without major flood problems. In the city there would have been a commitment within the private sector for this type of sustainable tourism activities linked to wine, gastronomy, ecology (green) or culture but not linked to awareness but to the pure sale of image. It would be weekend tourism of the inner population itself or a green tourism of people who came to visit the city. Relevant agents and private companies and industries in the city such as Michelin or Mercedes could make a firm commitment to this type of "greenwashing" to obtain a good image that at the same time produces economic profitability. In short, it would be resilience without awareness.

Vitoria has a fairly flat terrain and surrounding mountains with the possibility of installing wind and solar. In this scenario there would also be a commitment to the production of energy through renewable sources, which would have been made from an economic point of view, not of awareness, with the possibility of having external investors who would have wanted to enter this type of business. Wind farms could have been developed in all the mountains surrounding the city to produce as much energy as possible, although without having any ecological awareness of the impact of these facilities. Similarly, the biomass would have a great boom, but not restricting its use to the remains of cleared vegetation, but by shearing the mountains. There is no awareness of natural reserves and their protection.

In order to achieve this scenario and meet the decarbonisation objectives energetically, a favourable change in the electric mix is also necessary. It could be due to a disruptive energy such as hydrogen, nuclear fusion or another that suddenly appeared on the market and generated a change that reduced the impact without any change in energy consumption schemes. Or it could have been achieved with less sustainable energy options, such as nuclear, but that complies with the decrease in emissions, or fracking by outsourcing CO_2 (such as the Norwegian oil export scheme for consumption in other countries and with the domestic market only with EV).

In the social and governance aspects, the City Council as an institution would not give any example. It would comply with current regulations, but restricting itself only to that, compliance with taxation and fundamentally to avoid fines. There would be little citizen participation and engagement, little environmental education, and coming to an end part of the citizenship and institutions could even speak of denial, something that we do not believe could be reached but that at some point could occur. To counteract this lack of institutional and citizen awareness, there would be

active NGOs and minority movements that would counterbalance and help boost climate change. They would be small groups but with high influence.

Buildings refurbishment would be forced by law, which would oblige to have the housing stock rehabilitated on a certain date (prior to 2030) which would create many problems of inequality, energy poverty and gentrification. The regulations would also require the installation of photovoltaic roofs.

As for mobility, we see an electrification of the demand with the electric vehicle as main technology imposed from Europe. The entry of the private non-electric vehicle into the city centre is prevented. The motorization rate would have increased, because the population is more selfish and their individual needs premium. Part of the population, the wealthiest class, could afford it and will buy more cars. In fact, part of the public space would have been transferred to cars, which would be sustainable because they are electric. There is much more consumption also because of the existence of much more last-mile transport. Public transport or bicycles are only used by the most disadvantaged sectors, as in other countries of the world.

This would lead us to a society, with the tendency to high aging and high economic inequality, increasing the social gap because there are citizens who cannot afford to rehabilitate their homes or buy electric vehicles, despite of the existence of some European aids, but they are obliged to do so. There would be a low social cohesion due to these inequalities and it would increase the climate of distrust, which can lead to conflicts or possible revolts. It would be an individualistic, uninformed, more consumerist society and generator of more waste. A possible economic crisis, which could be repeated, or a health crisis or "posing" attitudes would be the cause of a change in habits that favoured the achievement of objectives against climate change but would be changes not due to consciousness but to the modification of habits due to these economic or health crises.

There will be a greater use of ICTs, with widespread access to smartphones and IoT applications that indirectly favour this scenario through car sharing initiatives or other forms of resources optimization.

Scenario 3 – VITORIA FEELS FRUSTRATED (- /+)

We´re picturing a Vitoria in which all citizens are convinced of the need to take action against the risks of climate change, but do not achieve the objectives of reducing CO2 emissions and resilience proposed by the City of Vitoria-Gasteiz, being a FRUSTRATED VITORIA.

In a frustrated Vitoria, there is a high awareness about housing rehabilitation, but the regulations on rehabilitation for economic reasons are not met. In this scenario, the city council proposes the rehabilitation actions only in the "Gold Neighbourhoods". The "Gold Neighbourhoods" are those identified by the city council for having low incomes, constructions mostly prior to 1980, little or no isolation and aging of the

population. The rehabilitation in the "Gold Neighbourhoods" would not be fulfilled in its entirety either because of the low incomes of its population, that people are older and don´t want to rehabilitate, or because the houses are empty. The city council in this scenario would forget to encourage and support financially the rehabilitation of other houses in the rest of the city, leaving the adequacy of homes in the hands of citizens, having a low percentage of rehabilitation in the city as a whole.

In this scenario, the city focuses on housing rehabilitation, forgetting to promote rehabilitation in tertiary and industrial uses, without having rehabilitation financing policies for shops and stores having an intensive use and high consumption. Additionally, the city has abused in this scenario from new rehabilitation pilot projects being actions with high funding and high demand for resources at administrative and economic level, without adopting standard measures to cover the maximum housing possible, translating to a low percentage of total savings.

Frustrated Vitoria is committed to renewable energy megaprojects. With a high awareness, financing tools are generated by instrumentalizing investment funds with bank agents that can create a solar garden on the outskirts of the city, having renewable energy without citizen participation. In this Frustrated Vitoria, the energy communities are hindered by lobbies, preventing the communities themselves from managing a distributed energy generation.

Although there is a high institutional awareness, the installation of renewable energy is frustrated by the administrative burden inside the city council, having long paperwork and slowing down the procedures. Institutionally, the means to process all the new petitions will require to implement renewable energy and distributed generation are not provided.

As for electric mobility, pedestrians and cyclists who performed active mobility are transferred to electric modes of transport since the citizens´ awareness is linked to the electric vehicle, generating low CO_2 emissions and consuming more electricity. In this scenario, the population acquires more electric cars, using them more often because they have the perception of no contaminating with the electric car, consuming more energy. It is a city that, when the electric vehicle is enhanced, mobility demand management programs are set aside. At the same time, having more electric vehicles, there is more demand for public charging points, which is not satisfied in this scenario. In turn, large companies have seen the growing population change due to electric mobility and energy prices increase.

Regarding social aspects, citizens are very aware of climate change, but individualism and status weighs more than conscience. In that scenario, citizens do not share private cars, maintaining the use of the individual car. In Frustrated Vitoria there is no teleworking, and there is still the flexibility of entry and exit of working hours making it impossible to share a car or to establish new public transport routes. There is no corporate responsibility for their own workers´ mobility.

In this scenario, citizens at a collective level have a high environmental awareness, but they behave in an individualistic manner based on immediate interests. A high citizen consciousness does not translate into a high personal conscience. The Frustrated Vitoria needs an education that fights against the global tendency of individualism.

Scenario 4 – Vitoria, Grey Capital (- / -)

We are in Vitoria-Gasteiz in the year 2030. The context considered in the scenario are the non-compliance of the emission objectives and the deterioration of the city's resilience in sense of climate change on the horizontal axis, and lack of institutional and citizen awareness in the vertical axis.

In the general context, the city council loses leadership regarding environmental policy. There is a deactivation of previous climate agreements (Paris Agreement). There is a setback in technological evolution. The situation leads to a possible economic crisis in some sectors, possibly not all, but some such as the tourism sector are clearly affected. The lack of awareness leads to greater individualism, greater energy consumption and greater energy dependence. The city looks less attractive, worse air quality and, ultimately, worse quality of life.

In the context of energy generation and renewables, energy consumption and dependence increases, there is no clear commitment to integrated renewables, or there is an excessive commitment to some type of large-scale renewables without planning. Society accommodated to gas. Side effects are not measured. The use of renewables is reduced to self-consumption in photovoltaics, in addition to being able to simply invest in certain social groups.

In the context of mobility, there is a break in the mobility plans and the car is given more space, disuse of the infrastructure created for the bikes. There are more and more traffic jams, less understanding between car-pedestrians, the quality of life worsens. The electric car becomes an exclusive product, without a clear strategic direction for its implementation, lack of organization and forecasting in the infrastructure.

In the context of urban planning and the residential sector, the energy improvement actions of the existing real estate park are paralyzed, ignorance as to the advantages of the responsible use of energy. The aids stop. The city that grows out instead of growing in.

In the context of governance, there is a breach of environmental regulations, progressive lack of updating and creation of regulations, own initiatives to promote a more sustainable society. The city becomes unsupportive, on the stage individualism and consumerism predominate. Management becomes chaotic, more complex, difficulties in coordinating different departments. Lack of equipment or excess of them (civic centers). Next, a serious effect on social cohesion is observed.

8.2.3. "Master" scenario

In the second foresight workshop, Vitoria-Gasteiz stakeholders will have to reach a consensus on the preferred scenario, coming from the 4 scenario developed in the first workshop. From that "master" scenario, they will develop a city vision, which will guide the development of PATEI 2030 objectives, strategic axes and line, and final projects identified. This 2nd workshop will be held on February 12th.

8.3. <u>Phase 3 – strategies and decisions</u>

8.3.1. Input for IEP planning

The two foresight workshops will provide the input for the PATEI 2030. The expected timeline of the following events can be found in the Figure at the beginning of section 8 of this document.

8.3.2. Next steps

Regarding next steps after the workshops, the participants will be now grouped into thematic expert groups, so they can contrast the following steps of defining the PATEI 2030, contributing on the definition of specific projects.

After setting up the vision after the 2nd foresight workshop, the strategic objectives of the plan will be created. Following those objectives, several main axes and strategic lines will propose sectorial groups of actions, to fulfil the city vision chosen by 2030, which is intended to be achieved by the identification of specific projects under each of those strategic lines. Each of those projects will present an estimation of budget, a description, key responsible of development, and a *climate proofing* contrast. Moreover, an indicator system will be developed in order to monitor the fulfilment of the contents of the plan, according to the requirement of the *Law of energy and sustainability of the Basque Country*, recently approved in 2019.

Foresight Experience in Vitoria Gasteiz - Q&A

Q: Are you satisfied with the engagement?

A: *Vitoria-Gasteiz managed to have over 40 stakeholders participating in the Scenario-discussion/creation day, in January 2020, with the representatives from public, private, local civic sector. They all participated actively, and a common picture of the future city trends was created. The local scenario was created, in the context of possible imaginary situation of both, compliance and non-compliance of the emission objectives and the deterioration of the city´s resilience in sense of climate change. The exercise was linked moreover to the trend voted as a more relevant considered for the city.*

Q: Please name some stakeholder groups that were not included but are important/appeared to be important in the process?

A: *Vitoria-Gasteiz had representatives from all society stakeholders engaged in city energy transition, and a few consultants from outside, in representation of the different sectors (energy generation and removable, mobility, urban planning and residential sector, and governance). A very strong participation from the city council noticed, from different climate change related departments. But stronger participation from the citizens and local communities leaders would have been nice.*

Q: Do you feel more analysis would have been beneficial in the stakeholder identification part – e.g. identify/conduct a matrix about the importance of the stakeholders and their potential role?

A: *For Vitoria-Gasteiz, the stakeholders are already aware of the importance of their role in the whole transition process, in continuation the clear roles and responsibilities will be established.*

Please describe the positive and negative sides of organizing the scenario development workshop. **How did you benefit from the exercise?**

A: *The scenario-creation process helped Vitoria-Gasteiz and partners to learn about the actual city trends and to propose the missing one, as well as to evaluate their possible impact in global energy transition process. They were familiarized with the actual city analysis to the local strengths and weaknesses, its opportunities and threads, and gave the valuable feedback in reference to the sector they are expert in, but also their vision as the citizens. The scenario was created collaboratively, looking towards 2030 and to complete the Roadmap2030-process. During the process, the scenarios were used to communicate potential shared pictures of a future Vitoria-Gasteiz (2030) and they will be also used for testing the projects generated during the IEP/Roadmap2030 process.*
The scenario development workshop was maintained at strategy level, as due to reduced time, and to maintain the interest of the stakeholders in the future steps.

Q: Did you have any issues or challenges when carrying out the workshop?

A: *The process is complex, should count a strong and sharp workshop-leader, but more than that the local expert groups by different sector, with knowledge about the subjects and the process, and willed to guide the initiative. Maintaining the stakeholders informed about the results, the progress after the workshop, might help to maintain the interest of the stakeholders in the future, and to possible associate the future roles.*

Q: Would you repeat that methodology again in the similar planning process?

A: *Yes, we would recommend the methodology to be replicated.*

Q: What would you suggest to other cities?

A: *To try to attract the interest of the citizens in the process from the early beginning, informing in every moment about the progress made and the results. To maintain the city council participants informed about the process, disseminate their results, to create the local experts-interest group channel. Koldo Urrutia, Tecnalia*

Table 23. Foresight experience in Vitoria Gasteiz – Q&A

9. Foresight experience – Lecce

Lecce developed and implemented the SEAP in 2014. The document includes important priorities in different sectors (energy, mobility, ICT, citizen involvement) and measures to support their implementation. Some measures have successfully been realised, some have been financed and ready to be realised and others are planned, but not yet implemented for various reasons. The document needs a process of reconsideration and rethinking, due to the need to arrive at a SECAP. The current priorities should be prolonged, modified and updated with the same and new measures, depending on the assessments of the present situation, following also the experience of the lighthouse cities and their successful results.

The **foresight exercise** (based on a single workshop) was organized as a part of the Energy Planning Process described above, in order to provide input for the IEP. The main goal of Lecce is to implement the IEP, which defines the energy strategies of the City across different areas. The final output will be the IEP of Lecce Municipality, targeting a CO_2 reduction of at least 40% by 2030, compared to 2007.

9.1. Phase 1 – status and challenges

For planning the foresight exercise in Lecce, the following **action plan** was agreed on:

Activity	Deadline	Responsibility
Task force definition	November 2018	RINA & LECCE
Review project documentation (WP8), lighthouse cities experiences, Lecce's SEAP and related documents	November 2018 – January 2019	RINA
Stakeholder mapping and validation	February 2019	LECCE with RINA support
SWOT analysis and validation	March – April 2019	RINA
Mapping relevant trends	May 2019	RINA & LECCE
Questionnaire preparation and submission to stakeholder	June 2019	RINA
Foresight scenario workshop: scenario development, validation and selection	9 July 2019	RINA & LECCE
Follow-up of the scenarios and preparation of next steps towards the IEP	July – September 2019	RINA

Table 24: Lecce's foresight action plan

9.1.1. Foresight task force

The main objective for Lecce Municipality is the implementation of foresight, the development of the IEP and the creation of replication roadmaps: to perform this set

of activities, LECCE is supported by RINA based on the responsibilities assigned in the SEC GA. So, the two entities, RINA and LECCE, constitute the **Task Force**:

- **LECCE Municipality**: recipient of project activities, whose main representatives are 4 members (deputy mayor, two project managers and a consultant).
- **RINA Consulting**: responsible for the foresight workshop and integrated energy planning (roadmap included), whose main representative are 3 members (one project manager and two analysts).

The task force, created in fall 2018, meets periodically (generally every 2-3 weeks) until the IEP will be finalised and approved. According to the steps of the project, the discussions focus on different topics and moreover, a daily e-mail exchange is active for a continuous alignment.

During the foresight exercise, the task force worked according to several **steps and activities**.

Phase	Steps	Activities
Phase 1 – Before the workshop: status and challenge	1. Set up the task force 2. Define strategic questions 3. Baseline study 4. Study of city's status 5. SWOT analysis 6. Stakeholders selection 7. Workshop preparation	1. Task force created in November 2018 with RINA & LECCE (7 people) 2. Lecce would like to reduce its footprint through the development of actions in different areas: energy efficiency, renewables, mobility, ICT and citizen involvement. 3. Several documents have been reviewed in preparation: SEAP, City energy balance and WP8. 4. Identification of a series of trends and their customisation in the context of Lecce in the following areas: energy, mobility, ICT and governance. 5. Development of a SWOT analysis according to previous results and following validation by Task Force. 6. Mapping the stakeholders: over 50 people identified, belonging to Associations, Private Companies, Public Sector, ESCO, etc. 7. Technical preparation that includes questionnaire submission to the stakeholders. Logistic preparation includes selecting the conference room, preparing the moderators, arranging catering.
Phase 2 – During the workshop: visions of the future	8. Workshop purposes 9. Collecting questionnaire feedback 10. Stakeholder groups 11. Scenario	8. Deputy Mayor introduced Lecce's energy objectives for the future and the need to mobilize all the interested stakeholders. 9. Beyond the data collection completed before the meeting in the form of a questionnaire, the results were elaborated in order to collect further feedback. 10. Four groups were created in order to ensure that all sectors were represented in all the tables.

	developments 12. Selection of main scenario 13. Conclusions	11. Each table discussed the 4 identified scenarios, based on the main selected trends (collaboration between stakeholders, city carbon footprint). 12. The scenarios were developed following some guidelines and questions by moderators and briefly presented to the audience, who selected the most interesting for Lecce's IEP. 13. Discussion on the main outcomes of this event and next steps.
Phase 3 – After the workshop: strategies and decisions	14. Organisation of follow-up events 15. Share results 16. Specify next steps	14. According to the IEP steps, several specific working groups could be created in order to proceed with the specific actions. 15. The workshop results will be shared among stakeholders and public for comments and modifications. 16. Feedback will be collected and implemented (if feasible) in the plan.

Table 25: Lecce's foresight phases

9.1.2. Stakeholder involvement

Firstly, to involve stakeholders, a contact list owned by Lecce was used. The stakeholders were selected to make sure that the expertise covers all the strategic areas and needs of the IEP. The following categories were identified:

- Energy
- Urban Lighting
- Mobility
- ICT and new technologies
- Natural resources
- Waste management
- Government
- People

More than **100 invitations** were sent out. The representatives included a deputy mayor, municipal department managers, technical advisors, project managers, company representatives and other stakeholders.

In order to have a wider participation and not to exclude anyone, Lecce Municipality also announced the event on its website in order to collect feedback from anyone interested (the so-called "*Manifestazione di Interesse* – **Expression of Interest**" where anyone could subscribe to the event and be included in the database that Lecce will use for any future urban planning related initiatives).

The combination of invitations and news on the website was useful to involve different people and provide feedback according to their availability. This process was useful in order to better prepare the meeting day and facilitate the registration

procedures. In order to show the Municipality's high commitment and increase the interest, even if the political situation was not stable in that period (until the election of May 2019 that fixed the political framework), the **participation of Deputy Mayor of Lecce as keynote speaker** was included in the agenda.

Lecce Municipality worked a lot in the second phase to assure the participation of not only municipality employees and managers from various technical departments (Public Works, Planning, Environment, Digitalisation, Mobility, etc.) but also of stakeholders from the private sector. Everyone's input is needed for developing good ideas that are useful for the future energy strategies.

9.1.3. Preparing for the workshop

The main activities before the workshop included the preparation of the SWOT analysis and the identification of a list of smart city trends that could affect Lecce in the next ten years. The **SWOT analysis**, inspired by the Lighthouse Cities' work, was developed starting from the information collected in the Lecce baseline document that includes all the data currently available on the city, concerning energy, mobility, ICT and governance. The strengths, weaknesses, opportunities and threats identified were evaluated by the task force and tailored according to the needs and aims of the Municipality before the workshop. The produced tables, subdivided per sectors, were circulated among the participants during the workshop to help them focus on the real strengths and weaknesses of the Municipality and discuss the driving forces of change (threats and opportunities): in particular on how the external threats could be overcome using the opportunities in each specific scenario.

Together with the SWOT analysis, a **list of smart city trends** was also prepared before the workshop, based on the outcome of a global smart city trends survey conducted among SEC partners in 2016. The list of trends was then specified based on the interests and objectives of Lecce Municipality according to the local situation.

The final list of trends was circulated before the workshop via Google Forms among all the stakeholders, asking them to fill in the questionnaire. All the trends had to be voted considering the probability of occurrence in the next ten years and their relevance for the development of Lecce's IEP.

More than 50 answers were collected and used for the selection of the most uncertain and relevant scenarios. Taking Lecce's needs and interests also into account, the following two were selected:

- **City decarbonisation**
- **Strong collaboration between stakeholders (Municipality, Citizens, Public and Private companies)**

Consequently, the opposite scenario axes were the following:

- **City carbonisation**;
- **Weak collaboration between stakeholders**.

The final list of trends used for the online survey is presented below.

ENERGY
• Oil and gas prices increasing
• Higher oil and gas prices will result in extensive fuel poverty
• Higher oil and gas prices will result in developing renewable technologies for energy production
• Countries' efforts to reduce reliance on fossil fuel energy will lower oil and gas prices significantly
• The EU will remain heavily dependent on Russian oil and gas supplies
• The costs of renewable energy will decline remarkably, making it competitive with conventional energy
• The global CO_2 emission targets will not be met as the energy sector will not experience drastic changes
• Improvements in energy trends will rather come from constant political effort than advances in technology
• Growth in global energy demand will slow down markedly because of the solar panels' price reduction
• Solar will account for a third of new power generation infrastructure built over the next decade
• Wind energy production will steadily increase
• Biomass energy production will steadily increase
• Thanks to the shrinking costs of lithium-ion batteries, they will be increasingly used to help manage the power grid and store energy for buildings
• Cities will become active players in their local energy markets (e.g. city-owned energy companies)
• Citizens will become active players in their local energy market (e.g. selling to the grid)
• Energy consumption management will be increasingly important in flattening the peaks
• The diffusion of smart solutions for the energy monitoring will facilitate the energy consumption management and will reduce the energy demand
MOBILITY
• Global transport will remain heavily dependent on fossil fuels with a strong rise in demand for diesel and fuel oil
• In heavy transport, conventional fuels will not be replaced with new types of fuel technologies
• Fuel consumption levels in the EU will remain almost at current levels
• 25% of cars sold will have electric engines (up from 5% today, incl. hybrids)
• Electric cars will be cheaper to own than conventional cars
• Thanks to the shrinking costs of lithium-ion batteries, they will be increasingly used to power electric cars
• Car/ride sharing will become increasingly popular, keeping down the growth of personal cars
• CO_2 emissions from the transport sector will mainly depend on the degree of government intervention and new low carbon fuel systems
• Transport volumes and fuel demand will largely depend on government policies over the next decade

- Open data and big data will become increasingly important in optimizing transportation
- The improvement of public transportation will result in private cars decrease and in the traffic decongesting
- With the implementation of the cycle paths the use of bikes will increase
- The development of multimodal solutions in transportation will facilitate the green mobility

ICT

- The appetite for large-scale Digital Government types of project will reduce due to concerns of increasing mass surveillance and privacy data retention
- New regulatory frameworks to improve transparency and to open communication channels between government and public will restore trust in ICT
- The streams of sensor data and its analysis will support better management of resources and contribute to sustainability
- The trend towards smart grids, which allow communication between power producers and consumers, will increase remarkably
- Innovative and less regulated services will engage people to collect and share data and knowledge
- Delivering ICT visions will still be hampered by the cities' lack of capacity and resources to effectively make use of ICTs
- ICTs will lead to further access to and use of urban data
- ICT products and services will still be inaccessible to some segments of the population due to a lack of affordability, training and education, contributing to urban inequality
- ICTs will gain importance in ensuring citizen participation in planning decisions, contributing to social inclusion

GOVERNANCE

- Smart cities will be hindered by key skills gaps (e.g. smart city planning, procurement, digital citizenship)
- Smart cities will be hindered by lack of finance and well-developed business models
- Smart cities will be hindered by lack of information exchange among local authorities and citizens
- Smart cities will be hindered by lack of private-public partnership
- Smart cities will be hindered by lack of adaptability of existing IT infrastructure
- Smart cities will be hindered by privacy and safety issues and insufficient data openness
- Smart cities will be hindered by a lack of collaboration across sectors, disciplines and other cities
- Smart cities will be hindered by the lack of a common vision and action
- Smart cities will be hindered by insufficient political effort
- Smart cities will be hindered by overregulation that prevents innovation
- Smart cities will be hindered by insufficient adoption of new technologies
- Smart cities will be hindered by insufficient awareness and changes in consumer behaviour

Table 26: Lecce's list of smart city trends

9.1.4. SWOT analysis

To facilitate the discussions and identify the main actions for scenario development, RINA performed a SWOT analysis which was used both in the preparatory phase and during the workshop itself.

The final SWOT analysis includes the following **strengths and weaknesses**:

Sector	STRENGHTS	WEAKNESSES
ENERGY	• Use of technologies for energy production from renewable sources (solar thermal / photovoltaic interventions in schools and kindergartens) • Progress in the energy retrofitting interventions of public buildings • Use of LED lights in public lighting (street lights / traffic lights etc.) • Increase in energy efficiency measures for private buildings through incentives (ITACA Protocol - House Plan) • Door-to-door waste collection within the entire municipal area • Greater awareness of the Public Administration on the subject of energy: green purchases / adhesion to Green Public Procurement	• Low use of renewable sources for energy production: less than 20% of the electricity produced comes from photovoltaics and the percentages for heating and cooling are even lower • Poor exploitation of wind energy: failure to build micro-wind power plants in municipal buildings (schools) • Lack of energy efficiency measures in private building • Lack of solutions for the production of energy from renewable sources in the private sector • Lack of integrated and innovative solutions related to energy savings (e.g. energy districts) • High levels of CO_2 emitted annually • High energy consumption resulting from non-renewable sources • Lack of guidelines and integrated actions in the field of sustainability and energy saving

TRANSPORT	• Encouraging the use of electric vehicles (e.g. construction of charging stations) • Increase in public electric and low CO_2 emissions vehicles (e.g. Euro VI bus) • Promotion of cycle-pedestrian mobility (e.g. construction of pedestrian and cycle track; bike-sharing system) • Interest in improving the connection between cycle paths and public transport (e.g. *velostazione* – station for bicycles) • Plan to construct new parking lots in public-private partnership	• Low use of electric vehicles / natural gas vehicles • High dependence on private cars rather than public transport • Suspension of the "Obike" - bike sharing service • Shortage of bike-sharing and car-sharing services • Long timescales for the construction of new parking areas • Low number of interchange stations for public bicycles • Lack of promotion and information campaigns to encourage the use of public transport • Shortage of measures to create an interconnected network involving various public transport and cycle-pedestrian networks (e.g. integrated tickets for different vehicles, cycle-pedestrian routes, etc.)
ICT	• Data open and accessible to all citizens through the Open Data portal • Enhanced free Wi-Fi network distributed throughout the territory • Development of ICT tools to support urban planning (e.g. European Planheat project – www.planheat.eu)	• Lack of updated energy data (consumption, production, use of renewable energy and CO_2 emissions) • Shortage of ICT platforms that offer services to citizens • Lack of consolidated ICT tools to support cross-sectoral urban planning (e.g. Planheat project still under development) • Shortage of ICT solutions for data collection in energy and environmental monitoring • Shortage of smart technologies installed in buildings (e.g. sensors for energy consumption monitoring)

GOVERNANCE	• Subscription and participation in smart city initiatives / projects (Covenant of Mayors, European projects SmartEnCity and Planheat) • Use of tools to implement sustainable development strategies (e.g. Green Public Procurement) • Open and transparent administration • Administration careful of energy policies • Renewing the municipal technical staff to benefit young and highly specialized resources	• Shortage of actions aimed at involving and sensitizing citizens on issues related to energy / environmental sustainability • Lack of strategic integrated actions between various areas of intervention (energy, mobility, etc.) aimed at sustainable development of the city • Low consolidated collaboration between the administration and the stakeholders • Shortage of specific skills related to the development of innovative technologies and solutions to achieve goals in the smart city environment

Table 27: Lecce's strengths and weaknesses

Besides these strengths and weaknesses, the final SWOT analysis included the following **opportunities and threats**.

Sector	OPPORTUNITIES	THREATS
ENERGY	• Development of a local energy market less dependent on imported resources and on the national energy system • Promotion and exploitation of energy from renewable sources (solar / wind / biomass) • Innovative solutions with high efficiency and integrated at territorial level (e.g. energy districts) • Enhancement and development of local entrepreneurship operating in energy-related sectors • Raising awareness and citizen involvement campaigns to reduce energy consumption • Financing network aimed at encouraging sustainable building interventions and energy saving in buildings (e.g. linking financial incentives to certain energy performance indexes) • Strengthening of actions aimed at reducing the waste produced / increasing the recycling / reuse of	• Increasing demand and energy consumption • Vulnerability and difficulty in supporting a local and independent energy market (Italy currently imports most of the fossil fuel resources from abroad) • Inadequate support to the legislative system in the development of innovative solutions from the energy point of view • Poor interest of citizens and stakeholders in new energy initiatives • Political and administrative actions that are not constant and are not aimed at producing changes in the energy efficiency sector

Sector	OPPORTUNITIES	THREATS
	materials • Even more specific training in the energy field	
TRANSPORT	• Optimization and enhancement of the increasingly interconnected public transport network with cycle-pedestrian routes and vehicle rental systems • Incentives for sustainable mobility (e.g. replacement of traditional cars with hybrid / electric cars) • Development and sponsorship of a solid bike-sharing and car-sharing network • Improvement of (inter) national connections with the city • Integration of renewable resources' electricity production systems with the public and private transport system (e.g. photovoltaic and electric vehicle charging technologies) • Reduction in the use of private cars (e.g. public transport, pedestrian routes, limited traffic areas in the city centre) • Participatory initiatives and plans aimed at raising awareness and directing citizens towards sustainable mobility	• Fossil fuels will continue to be the most used fuels in transport • Norms and political / administrative actions with inadequate or insufficient effort on sustainable mobility • The improvement of the public transport system could simultaneously lead to a high increase in the prices of tickets and season tickets • Lack of economic resources to create a system of incentives to be used for the development of sustainable mobility • Constant and massive use of private transport (greater convenience / high cost of public transport)
ICT	• Open data related to the energy, environmental and transport areas (consumption / production / use of renewable energy / CO_2 emissions) • Strengthening and consolidation of ICT tools for urban planning across sectors and for data collection and environmental monitoring • Strengthening and consolidation of ICT tools for citizen services for the execution of municipal practices • Buildings equipped with smart systems to reduce consumption and improve energy efficiency (e.g. sensors) • Incentives for the development of ICT applications and tools to improve the	• Lack of economic resources for the development and use of ICT technologies • Inaccessibility of ICT tools to some areas of the population due to costs and lack of adequate information • Risks connected to the security and instability of ICT systems (cyber attacks, privacy and data protection) • Excessive regulation and restrictions in ICT services

Sector	OPPORTUNITIES	THREATS
	life quality of citizens (e.g. sites and applications dedicated to services and information)	
GOVERNANCE	• Investments in initiatives / actions aimed at raising awareness and training citizens on issues related to energy and environmental sustainability • Actions to promote economic growth, especially concerning youth employment • Greater collaboration between the administration and stakeholders (service providers, etc.) • Creation of skills related to the development of innovative technologies and solutions to achieve goals in the smart city environment • Cooperation with other local authorities (Province, Region, neighbouring Municipalities) to share energy policies and strengthen transport services and network • Technical training increasingly focused on sustainability issues within administrative bodies • Growing public interest in sustainable choices	• Aging of the population because of displacement of young people due to unemployment • Lack of changes on the governmental level (little-targeted political actions with little support for sustainable development) • Risk of international conflicts / terrorist actions • Increasing environmental problems due to the increase in waste produced and its disposal (e.g. management of electrical and electronic equipment/ photovoltaic panels disposal) • Risks associated with the actions of criminal organizations in the area

Table 28: Lecce's opportunities and threats

9.2. <u>Phase 2 – visions of the future</u>

9.2.1. Scenario workshop

RINA and Lecce Municipality, in the framework SEC, organized a foresight workshop on the **future energy strategies of the municipality**. The workshop was held in Lecce in July 2019 and involved more than 40 stakeholders coming from Public Institutions, University, Public and Private Companies and Associations. During the event, the four scenarios that were developed starting from the questionnaire previously circulated among the stakeholders, were presented to the participants and after a round-table discussion, the stakeholders were asked to vote on the most desirable scenario for Lecce in 2030.

Figure 26: Foresight workshop in Lecce

The following table summarizes the workshop agenda and the materials used and made available to the participants during the event.

Agenda – scenarios and future vision
15.00–15.20 Gathering, registration of participants, coffee and snacks
15.20-15.30 Welcome Alessandro Delli Noci, Deputy Mayor of Lecce Municipality
15.30-15.40 Workshop introduction Giovanni Puce, Director of the Public Works Office of Lecce Municipality
15.40-16.00 SmartEnCity project: description Michele De Santis, RINA Consulting SpA
16.00-16.30 Workshop: IEP, objectives, preliminary work, questionnaire results, round-tables structure Sara Botto, RINA Consulting SpA
16.30-18.00 Round-table discussions Analyzing and validating the scenarios in groups guided by task force members (RINA-C and Lecce Municipality)
18.00-18.30 Scenario presentations Moderators of each round-table (RINA-C and Lecce Municipality)
18.30-19.00 Selection of the master scenario for Lecce in 2030 and conclusions
Materials used
• Agenda • Registration sheets • Table/group numbers • Participants list • Powerpoints on the SEC project and workshop presentation

- Group work/scenario guidelines
- SWOT analysis tables
- Scenarios outlined both printed out for each group and presented on wall posters
- Table of all 4 scenarios
- Extra paper, pens, markers and post-its
- SEC brochures

Table 29: Lecce's workshop agenda and materials

Considering the outcomes of the online questionnaire submitted to all the participants, four scenarios were outlined, following the interests and objectives of Lecce Municipality. Every roundtable was in charge of developing one of the scenarios that were previously prepared for the four work/discussion groups. Every group was previously put together with the aim of having at the same table **a representative of each of the main sectors** (Energy, Mobility, ICT and Governance), so during the initial registration, every participant was directed to one of the tables (A, B, C and D, marking the scenarios).

Group work and discussions were carried out using the following **guidelines** inspired by Tartu's workshops and revisited based on Lecce's local situation and needs:

- Roundtable presentation to help the actors around the table get to know each other.
- Describe your group's scenario, using the background material provided (SWOT analysis) and taking into account developments in energy, transport, ICT/data and governance in this scenario.
- Answer all the questions having set the main features of the considered scenario.
- Follow the suggestions and the directions of the group leaders from RINA-C and Lecce Municipality to help you stay focused on the workshop purposes. The mediators will help you take notes and will later elaborate the scenario.
- Use the following questions to develop the discussion:
  o What are the main characteristics that describe this scenario considering the matrix axes?
  o What are the conditions that led to this scenario considering the energy, mobility, ICT and governance sectors and what are the developments in these sectors?
  o How should Lecce respond to the scenario's developments (i.e. responding to external factors by using internal strengths and avoiding weaknesses)?
  o What are the main positive aspects and barriers identified in this scenario?
  o How will this scenario affect Lecce's ecological footprint (i.e. how Lecce achieves decarbonisation)?

- o According to this scenario, what happens with Lecce social welfare and life quality?
  - o Give the scenario a short descriptive title and think of 2-3 newspapers headlines from the future.
- Consider the coherence of this scenario, making sure that the strengths/benefits and weaknesses/drawbacks are in balance.
- Identify keywords, ideas and concepts related to the vision of Lecce in 2030.
- Choose the features that outline the master scenario, achieving a common vision, after presenting your future vision to the other groups.

9.2.2. Scenario development

Once the most interesting trends for the Future Energy Strategies of Lecce Municipality were defined, a matrix was prepared as the next step.

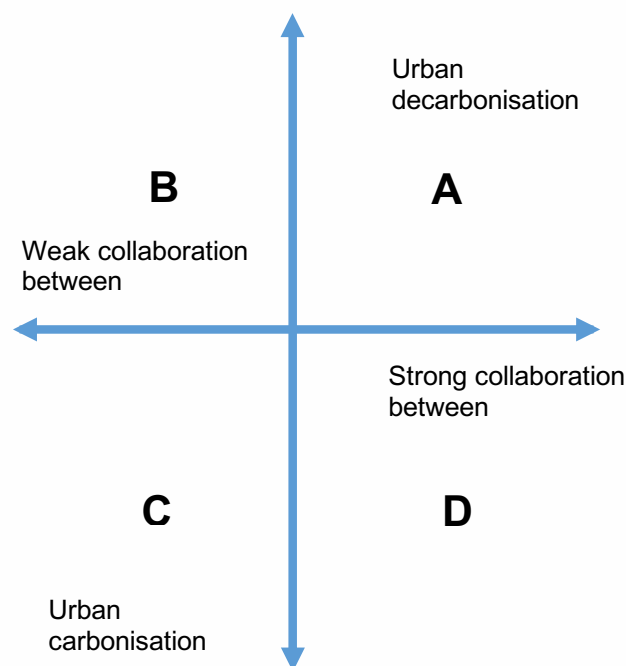The 2x2 matrix was built considering the main trends and their opposite as follows:

Urban
decarbonisation

B   **A**

Weak collaboration
between

Strong collaboration
between

C   **D**

Urban
carbonisation

Figure 27: Lecce's scenario matrix

The four scenarios were developed during the roundtable discussions, evaluating and merging all the inputs and ideas that came out as a result of the brainstorming. It was not always easy to maintain the focus of the table discussions on the main topic, because the participants got often lost in conversations related to Lecce's present issues and problems, more than thinking about the future scenario. The main features of the scenarios are described in the following summaries.

Scenario A: In Lecce you can breathe fresh air (happy decarbonisation)!

Highlights:

- City decarbonisation: the city has become a sustainable, smart and resource-efficient urban environment.
- Closer and stronger cooperation and coordination among public and private stakeholders: citizens and public administration are strictly involved in city transformation.
- Integrated mix of legislative and economic interventions ensured that the main barriers have been overcome.
- Energy supply is entirely renewable, sustainable and clean.

Headlines from the future:

- Smart Zero Carbon City dream finally came true.
- Lecce reduces pollution levels, becoming a green city.
- Citizens are happier in a city with a better quality of life.
- Congratulations to Lecce: a green energy heaven in the south of Apulia.

Description:

The increase in demand and energy consumption in addition to the simultaneous increase in fossil fuel costs and the negative impact on the environment and on the quality of life pushed the sectors of Lecce Municipality to establish a **solid collaboration with stakeholders** interested in the areas involved.

In the energy sector, it has been possible to best promote renewable and sustainable energies, as well as promoting the efficiency not only of public buildings, but also of private ones through forms of **financing and volumetric incentives for energy saving**. The control and optimization of consumption is also favored by the installation of sensors along with the use of management systems.

Public water transport and supply agencies have installed photovoltaic systems for the operation of water lifting systems. Furthermore, **systems for controlling and limiting plant losses** have enabled a reduction in costs and energy consumption.

To reduce the use of fossil fuels in private transport, political and administrative actions have been adopted to encourage sustainable mobility.

Collaboration with stakeholders has allowed the development of adequate awareness campaigns to encourage the use of shared vehicles (**bikes and electric car sharing**) and to obtain a good costs reduction for the use of public transport and shared services.

The number of charging stations for electric vehicles has been significantly increased, made available by companies, and shared to recharge vehicles owned by the municipal administration.

Diesel public buses have been replaced with methane or **electric vehicles**.

All of the above has led to a considerable improvement in the quality of life, both thanks to the achievement of the desired decarbonisation levels, and thanks to the decongestion of city car traffic. Furthermore, the reduction in the demand for parking has allowed these spaces to be used for public parks and soft mobility (pedestrian areas and bicycle lanes for greater safety for cyclists).

In the suburban areas (i.e. the 12 km Lecce - San Cataldo cycleway), **intelligent automatic illumination** systems are used to light the cycleways.

In the open data sector, Lecce was already an exemplary city thanks to the politics of past years, with a website containing almost 600 datasets, including energy and environmental data.

Also, collaboration between the Municipality and the operators of the sector has allowed the production of further **open data based on external requests** favoring their reuse.

New data is also collected through technologies installed for environmental monitoring, for the purpose of better urban planning.

Finally, the platforms available to the citizen were improved in order to provide information and telematic services in favor of **reducing bureaucracy related to the Municipality**.

After several years spent on the decarbonization of the city, Lecce has become a really good place: a smart and sustainable city with reduced CO_2 emissions.

This is a really good goal for the city, especially for citizens and for all the public and private stakeholders that have worked hard towards the use of more renewable resources.

First of all, citizens now live in a city with a very good quality of life. The reset of CO_2 emissions means a **reduction in the levels of pollution and a cleaner environment**.

Secondly, the development of green economy increased the number of companies that have started to work with renewable energies and energy saving; this has improved job placement, especially for younger people addicted to new technologies with a very positive look at the future.

Scenario B: Break up the public-private boundaries to decrease urban carbonization

Highlights:

- Urban decarbonisation: the city has become a sustainable, smart and resource-efficient urban environment.
- Weak collaboration and coordination among public and private stakeholders: citizens
  and public administration are poorly involved in the city transformation.

- Private and public stakeholders have independently worked to implement energy efficiency projects.
- Too much bureaucracy and slow municipal processes and communication: barriers still to be overcome.

Headlines from the future

- Lecce City reaches the foreseen target of CO$_2$ emissions' reduction.
- Weak collaboration between private and public stakeholders, not yet in the right Direction.
- Citizens are not aware of the urban energy consumption and energy savings' opportunities.
- Are citizens really interested in Lecce's environmental future?

Description:

Lecce reaches the decarbonization target thanks to implementing public energy efficiency projects and independent private investments within the energy efficiency, renewable energy and sustainable mobility sectors. The **urban environment's health has generally improved**. The use of new technologies for renewable energy production, such as solar panels and wind turbines, is increased in both private and public areas. There is weak collaboration between public and private stakeholders, generating **uncoordinated actions and poor information campaigns** among citizens.

Private energy companies keep investing in technologies for producing renewable energy sources, but the bureaucracy and poor collaboration of the Municipality slow down the process, bringing the private companies to explore other markets and territories. The Municipality is not aware of the total energy consumption and does not have a complete view of the energy produced from RES; consequently, **communication to the citizens** about the urban energy situation is **weak and incomplete**. The Municipality has difficulties in implementing the planned energy actions owing to the lack of public funding and incoordination with private companies.

The citizens are not adequately informed and sensitized, so they make **individual investments in energy efficiency** based on private energy market offers and incentives, according to their economic convenience.

The urban waste door-to-door collection system is managed by private companies, lacking collaboration between the citizens and Municipality. This situation, without an adequate support from citizens and Municipality, brings about an **increase in the cost of the urban waste door-to-door collection system**, since the impurity rates in the collected waste are still very high. That also means that taxes related to urban waste are high and they are increasing. Moreover, this brings citizens to acts of vandalism, throwing garbage in the courtyard close to the City.

Public transportation is still poorly exploited by the citizens, who continue using private cars, although there is an increase of investments in individual electric

vehicles thanks to more available private incentives. On the one side, the increase in using private electric cars allows to reduce CO_2 emissions, but on the other hand, this does not resolve the city's traffic and parking problems. There are **not enough parking areas** and parking costs are still very high. Furthermore, there is poor collaboration also among public entities and the Municipality, which do not support initiatives of sustainable mobility and investment on the province/regional levels. Difficulties in the collaboration between stakeholders brings to a **lower promotion of incentives and solutions in green mobility** like bike-sharing or improving the public transportation fleet.

Scenario C: Lecce goes back in time: individualism prevails in the community

Highlights:

- City carbonisation
- Poor collaboration between stakeholders and lack of coordination
- Use of fossil sources increases steadily
- Economic interests dominate over environmental ones

Headlines from the future

- Lecce likes electricity… consumption increases
- More asphalt, more private cars
- Each citizen looks only in their own courtyard
- What are ICT technologies? Are they really useful?

Description:

Lecce increases CO_2 production due to different reasons, mainly low prices of fossil fuels, **low investments in renewables** and new technologies, weak policies on mobility and poor exploitation of ICT solutions. Collaboration between public and private stakeholder is weak, generating a vicious circle where the city moves towards increasing its footprint.

Fossil sources, despite of forecasts, are still the most used due to a wide availability at good prices: **standard technologies** using fossil fuels (carbon, oil, gas) remain preferred by the community, and consequently also by industries which invest mainly in the research of linked solutions.

Renewable sources are well known but considering the **wide availability of fossil** ones, neither citizens, the municipality nor stakeholders are willing to dedicate time, effort and money on something which is expensive, requires a change of habits and time to be really implemented, also due to difficulties in collaborating between themselves.

Citizens are generally aware that they are contributing to pollution and to a wrong societal development, but they are more attracted to easy, well-known, low-cost

solutions. Buildings are managed as usual, **no retrofitting intervention is promoted** by the Municipality or requested by householders.

Companies and the Municipality, beyond some preliminary attempts to provide greener solutions, decided to align themselves to this situation, due to their **failed and chaotic attempts to cooperate** (they have difficulty collaborating). So as a result, the production of CO$_2$ increases, leading to a reduction in life quality and economic wellness in the long term.

The increase of fossil fuels also influences the mobility sector: **private transportation prevails over public transportation** not only in the city centre, but also in connections with neighbourhoods. No multimodal solutions are promoted due to the lack of interest among the stakeholders in something that is not really requested by citizens or the municipality, with a related **impact on parking areas** and the old city centre, where access to cars is forbidden in order to keep the historical buildings and the touristic area safe.

Difficulties in collaborating between stakeholders leads to a **lower promotion of incentives and solutions in green mobility** like bike-sharing or improvement of public transportation fleet.

ICT solutions appear like cathedrals in a desert: solutions for smart monitoring of energy consumption and traffic management could be effectively used due to the **high level of technology development** reached by digital solutions, but the lack of collaboration and connections between the actors from ICT and the other sectors makes it a failure. The municipality has several difficulties starting from the management of public building and consequent control of energy bills, due to also possible **network leakages**. These difficulties are reflected also in the promotion of collaborations and campaigns aimed to pursue sustainability objectives. Although knowledge of environmentally friendly approaches is well known by everyone, the main objectives of tenders issued by the Municipality is **not to support Green Public Procurement**, but only to obtain the maximum discount: so the economic aspects and the aim to provide standard services is the main objective of the Municipality, which misses completely the vision.

Moreover, available funds and incentives are addressed at solving short-term problems like youth unemployment or specific emergencies.

Therefore, awareness campaigns, agreements with other neighbouring municipalities and involvement of industries and other stakeholders in the decision process **are not actions promoted by the Municipality**, as they are not seen as effective measures to decarbonise the city.

In this scenario, even if the environmental sustainability principles are known by stakeholders and citizens, **the main goal is to preserve the reached comfort level** or improve it, mainly giving attention to economic issues. Each action is driven by this reason and the sustainability goals are really seen as obstacles, mainly by populist political forces. The final consequence is that Lecce **increases the production of**

greenhouse gases and it is more and more excluded from national/international networks due to missed compliance to European climate / environmental / energy goals.

Scenario D: Collaboration and information: the first steps towards change

Highlights:

- City carbonisation
- Strong collaboration and coordination among stakeholders
- Citizen information and awareness considered as a valuable resource
- Strict legislation and too much bureaucracy: barriers still to be overcome

Headlines from the future

- Lecce invests in education and information
- Keep collaborating to reach the CO_2 goal!
- Good collaboration, but not yet in the right direction
- Lecce still has to take some steps to become decarbonised
- Are citizens really interested in Lecce's environmental future?

Description:

Lecce is a city with a good quality of life, improved during the years thanks to a **profitable collaboration among stakeholders** operating in different fields. Despite the positive results related to the initiatives and the actions promoted by the fruitful coordination among sectors, Lecce has not yet fulfilled the decarbonisation objectives. **CO$_2$ levels have decreased compared to ten years ago**, but they are not yet compliant with the emissions targets. Strong collaboration among stakeholders focuses especially on the socio-economic growth of the city, in particular **decreasing youth unemployment**, enhancing the labour supply, offering improved services to the citizens and giving a boost to touristic activities.

In this context, environmental issues are not set aside, but there are still some **barriers that slow down the achievement of CO$_2$ goals**. One of the biggest problems is related to the legislation and the bureaucracy is in many cases obsolete and too complicated to allow for streamlined procedures. Changes in citizen behaviour and mentality is another difficult challenge, due to the fact that **deep-rooted habits do not change easily**, in particular when people do not feel directly responsible for the consequences of CO$_2$ emissions and climate change.

In the field of energy, the general willingness to use greener solutions, combined with the aim to enhance the labour supply, brought as a result of a series of actions, agreed among stakeholders and the Public Administration, to **promote and finance the use of renewable solutions and technologies**: in particular in the industrial sector, more and more energy is now produced by solar installations and wind turbines. Despite this positive wind of change, **fossil fuels are still very popula**r and

because of their low prices that are cheaper than renewable energy, traditional equipment using oil, gas and carbon are still the main technologies used for energy production, especially in private buildings.

The lack of incentives focused on the private owners, the complicated regulatory systems and the confusion generated by a lack of straightforward procedures **discourage the citizens to invest in new and greener technologies**. For the same reasons, retrofitting interventions in the private and public buildings are not as many as they could be with a different normative approach and ad hoc procedures.

Mobility in Lecce has improved thanks to **cooperation in planning among the Region, Province and Municipality**, especially considering the (inter)national connections and public transport from the outskirts to the city centre. Cycle-pedestrian lanes have been enhanced too and there is an efficient bike sharing service all over the city, but nevertheless, traditional cars are still the most used means of transportation. The citizens are aware of the consequences related to the use of fossil fuels, but **the mentality has not completely changed** and the old habits still prevail over the new and more environmentally friendly ones, in particular among the older generations.

In the field of ICT, more and more new solutions are being developed, especially to enhance the citizens' quality of life and to improve the governing of the city. There are **services and mobile applications dedicated to the citizens** (e.g. mobile apps to monitor public transportation and free access to a wide variety of open data related to all the sectors), but in general, digital solutions are still not very much used as a way to save energy, due to the fact that most of the people do not see the need to install quite expensive and sophisticated devices that could lead to spending more money on renovating the older systems.

The Municipality is one of the actors that **strongly promotes and actively helps to create profitable collaboration** among sectors, benefiting from this situation in all the governmental aspects related to the city planning and to the creation and the implementation of new solutions and services to improve the quality of life and the socio-economic environment of the city. **The decarbonisation of Lecce is seen as one of the priorities and a big challenge**, so the government adopts more and more green public procurement rules and environmentally friendly policies. Considering information and instruction as great valuable resources to really make a change in the reduction of CO_2 emissions, the Municipality invests in the **promotion of professional training courses** to train expert technicians that could share their expertise in their different areas of responsibility. Public financing activities and workshops to increase citizens' awareness of environmental issues is another action strongly promoted by the Public Administration, starting from children's education in kindergartens and schools.

Lecce is now a **really well managed and wealthy city to live in**, with services dedicated to improving the quality of life in every sector. Collaboration among stakeholders that also involves the active participation of the Municipality leads to a

well-structured organization of the city with focused investments and more public money saved. Carbon footprint goals have not yet been achieved, but the city is going in the right direction to achieve its environmental aims, increasing people's awareness by changing some old bad habits and **focusing on cutting red tape** to increase private investments in new and more renewable solutions.

9.2.3. "Master" scenario

The final step of Lecce's workshop focused on the Master scenario selection as a preferred **common future vision agreed among all the participants**. When the roundtable discussions and process of exchanging ideas was concluded, the moderator of every group briefly prepared a summary of each of the scenario and presented it to the participants. The main features of each scenario were outlined, emphasizing the positive and negative aspects and showing the most significative ideas shared during the brainstorming process.
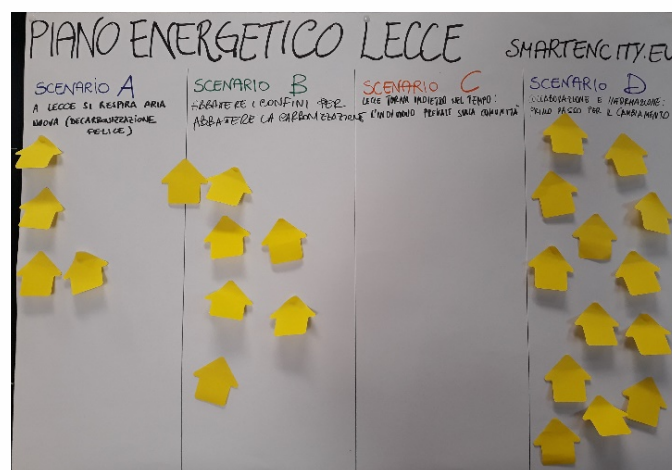

Figure 28: Voting on the master scenario in Lecce

After the presentations, every participant was asked to think about the **preferred scenario** as the most feasible and desirable for Lecce for the next ten years. Everyone voted on the scenarios, using a previously prepared poster that clearly showed all the scenarios.

At the end of the voting, the scenario that was agreed to be the most desirable was **D: Collaboration and information: the first steps towards change**.

The great value of this scenario for all the participants was the **successful collaboration between stakeholders**, seen as a massive and fundamental change in Lecce's situation. Achieving the city's decarbonisation goals concurrently with a strong cooperation among sectors was evaluated as a too optimistic vision.

Of course, the aim to obtain a 40% reduction in CO_2 levels by 2030 remains as the main purpose of Lecce's IEP, so the goal, enriched by this foresight workshop experience, will be to:

- **perfect the Master scenario starting from information and collaboration between different actors, enhanced and focused to overcome the barriers in reducing CO$_2$ levels.**

9.3.   Phase 3 – strategies and decisions

9.3.1. Input for IEP planning

Although the D scenario was voted as the "master scenario", all the information gathered during the workshop and the outcomes of the four scenarios will be used for the next IEP steps, with the collaboration of selected groups of stakeholders. The foresight workshop defines the conclusion of the first set of activities in the IEP process.

Led by RINA and LECCE, work is now going to proceed with new steps:
- **Scenario follow-up and Strategic Planning** - September 2019-April 2020
- **Replication Roadmaps / Action Plans** – March 2020-September 2020
- **Municipal Council Approval** – December 2020

9.3.2. Next steps

At the moment, the task force is still active and continues the work done so far. Stakeholder groups selected for specific themes could be invited to contribute to specific parts of the IEP, which is expected to be approved by the end of 2020 by the Municipal City Council.

Foresight experience in Lecce – Q&A

Q: Are you satisfied with the engagement?

A: *The workshop Lecce had in July 2019 was a satisfying event and there was a good response from the stakeholders invited. The decision to organize a single, more focused, workshop had the aim to speed up the process that faced some slowdowns at the beginning of the year, due to some political and governance problems. Even though the results obtained were satisfying, the possibility to organize two workshops could had been useful to create a more participative collaboration with the stakeholders involved, as there could had been more time to make them part of the process (e.g. discuss and select with their help the trends to be voted during a preliminary event, as Tartu did). The engagement phase gave good results, but an activity of "stakeholder by stakeholder" personal contacting could have been boosted, to increase the participation (approximately half of the stakeholders invited didn't participate).*

Q: Please name some stakeholder groups that were not included but are important/appeared to be important in the process?

A: *The stakeholder groups involved in the workshop were selected with the aim to have representatives for every sector to be developed in the IEP (Energy, Mobility, ICT and*

Governance), and this purpose was achieved. Considering the outcome of the discussions and the big value that the education will have for Lecce future scenarios (the master scenario voted was "collaboration and information: the first steps towards change"), more representatives of schools and educational establishments should had been invited. The Unisalento University attended the round-table discussion and that was great, but the contribution of institution at a different educational level could had been useful and constructive. Furthermore, the presence of some representatives of the neighbour Municipalities and regional institutions could have been constructive to create a collaborative work at a wider level.

Q: Do you feel more analysis would have been beneficial in the stakeholder identification part – e.g. identify/conduct a matrix about the importance of the stakeholders and their potential role?

A: *A selection of stakeholders had been prepared, using a preliminary contact list owned by Lecce Municipality and considering the expertise and the needs to cover all the strategic areas of the IEP. Having had a preliminary list was very useful as a starting base and, even though this work was accurately conducted, more time could had been spent analysing the actors involved and what contributions they could bring to the discussion, considering also the possibility to contact and involve some stakeholders not part of a preliminary list.*

Please describe the positive and negative sides of organizing the scenario development workshop.

Q: How did you benefit from the exercise?
Q: Did you have any issues or challenges when carrying out the workshop?
Q: Would you repeat that methodology again in the similar planning process?
Q: What would you suggest to other cities?

A: *The workshop and its preparation were useful to have a more focused and channelled perspective on the ideas that some different groups of stakeholders, representatives of the Energy, Mobility, ICT and Governance sectors, have according to Lecce future.*

At the beginning the process could had seemed not easy to be explained and developed during a single event, but the more the foresight methodology was studied and deepened, also thanks to the frontrunners experiences, the clearer it became how to organize an effective workshop. The biggest challenge was to capture and keep the attention of all the participants during the duration of all the event.

For Lecce experience the methodology followed step by step was very effective and it surely should be used to develop another similar planning process. The future scenario development workshop, structured on previous focused studies, as the SWOT analysis, forces the participants to channel their thoughts and ideas, resulting less dispersive and more useful for the later refinement work.

The cities who want to approach the scenario development workshop should learn as much as possible from the cities that had already implemented it, asking as many questions as

possible, especially concerning the stakeholders involvement strategy. The workshop has to be very well prepared to keep the attention of the participants and make the discussion more effective (know who are the participants at every table, so every moderator could prepare questions, inputs and hints to carry on the discussion, making it interesting for the participants). Share the results of the discussion after the workshop is another suggestion to keep the stakeholders involved and make them feel that their work was useful and used.

"Clarify the purposes of the participative foresight process and make them as simple as possible, enlightening all the benefits that this work could bring for the first and following stages of the planning process. Create a network of stakeholders participative and motivated to be part of the work, making them feel their work count." Sara Botto, RINA

Table 30. Foresight experience in Lecce – Q&A

10.Foresight experience – Asenovgrad

10.1. Phase 1 – Status and Challenges

The foresight experience in Asenovgrad is based on the existing Integrated Plan for Urban Development and Regeneration (IPUDR) with the main aim to update and enrich it according to the results of scenario formulation process, with priority areas and concrete projects that help to reach the foreseen targets by the year 2027 and to formulate a long term vision of the municipality till 2050. As a result of the process four main priority areas have been identified, namely biomass utilisation, wind and solar utilisation, building energy refurbishment and financing mechanisms, and concrete projects will be formulated to help deliver results and reach targets.

10.1.1. Foresight Task force

A foresight task force was created to coordinate the efforts of the foresight process in Asenovgrad, to perform the tasks set up in the Acton plan, to ensure proper stakeholders involvement and to deliver the updated version of the IPURD.

The task force included:

Sofia Energy Centre – responsible for overall coordination and execution of scenario process and workshop, for formulation of proposals in collaboration with Asenovgrad Municipality for concrete projects in the identified priority areas and for update of the IPURD;

Asenovgrad Municipality – responsible for promotion of the process, workshop organisation and attendance, for the final decision about concrete projects in the identified priority areas and for the update of the IPURD as well as for the final approval of the updated Plan in the Municipal Council

10.1.2 Stakeholder Involvement

The stakeholder involvement process was done through a scenario workshop held on 16 May 2019 as part of the core activities of Asenovgrad IPUDR update. The main aim of the workshop was to bring together local stakeholders and discuss with them the current status and future priorities of the "Integrated Plan for Urban Regeneration and Development" of Asenovgrad in order to formulate different scenarios for its update.

10.1.3. Preparing for the workshop

The preparation included:

- Public announcement and local stakeholders invitation through the website of Asenovgrad Municipality;

- Preparing a presentation introducing the context of SmartEnCity Project and the role and aims of Asenovgrad Municipality in the project activities;

- Preparing a presentation of the Asenovgrad Integrated Planning process and its current status and perspectives;

The above preparatory talks aimed at getting the audience acquainted with the context of the planning process activities and inspiring them to express their views on the future energy related priorities of the municipality.

10.1.4 SWOT Analysis

SWOT analysis was done based on the current status, available potential and future priorities related to sustainable energy in Asenovgrad Municipality and on the basis of its results the three main scenarios were formulated (described in 10.2.2).

Area	Strength	Weaknesses
Energy	Significant local RES potential Share of renewables in energy consumption higher than Bulgarian average. Significant progress in energy retrofitting of buildings Availability of local funding schemes	Lack of district heating network High share of space heating based on electricity High energy intensity of housing, economy and living environment; Poor energy efficiency and indoor climate in housing and in public buildings
Transport	Asenovgrad in a compact city and getting around is easy; Efforts to promote public transport and walking	Lack of bicycle infrastructure; Preferred transport means is car; Transport planning favours cars.
ICT	Availability of providers and technical expertise	No ICT based solutions in buildings or transport
Governance	Municipality open to sustainability Experience in sustainable local planning and realisation of concrete sustainable energy projects	Limited own funding in municipality for sustainability actions Citizens' low level of trust towards new initiatives Lack of cooperation between the city government and service providers

Table 31. Asenovgrad's strengths and weaknesses

Area	Opportunities	Threats
Energy	Higher RES share in local energy mix	Increased use of conventional fuels (natural gas) in energy production.

		Promoting distributed and integrated energy production Further implementation of energy retrofitting of buildings Promoting renewable energy, including wind and solar energy	Additional costs for balancing the power network due to using solar and wind energy. Poor quality of retrofitting works Inability to stop the growth of energy consumption.
	Transport	Increasing the attractiveness of public transport (e.g. optimizing the lines, better connecting various areas). Promoting resource-efficient transport modes like walking and cycling Enlarging of pedestrian areas in the city	Continuously increasing number of private cars Using a personal car is too convenient to consider public transport.
	ICT	Introduction of ICT solutions in buildings and transport Introduction of municipal e-services	Global threats and instabilities in the ICT sector, data and privacy concerns, cyber attacks. People don't trust new technology – low public acceptance of new solutions
	Governance	Municipality labelled as a smart city More efforts in sustainability leading to carbon neutrality in the long run Raising citizens' awareness of energy consumption and resource-efficient transport	Young people leaving Asenovgrad. Ageing and decreasing population, less tax payers Rise in consumption Insufficient change in people's behavior

Table 32. Asenovgrad's opportunities and threats

10.2. Phase 2 – visions of the future

10.2.1. Scenario Workshop

The event started with a presentation of the SmartEnCity Project, the role of Asenovgrad and the necessity to update with new priorities and projects, and prolong the existing IPURD up to 2027, followed by a discussion. The workshop was attended by ten participants among which representatives of local industrial stakeholders and citizens of Asenovgrad Municipality and neighbouring Kuklen Municipality.

Figure 29: Scenario building workshop in Asenovgrad

The discussed priorities in the energy part of IPUDR were as follows:

- Utilisation of local biomass potential especially in view of availability of agricultural biomass and biogas as one of the participants was an agricultural cooperative growing cereal crops and breeding pigs.

- Utilisation of PV and wind potential;

- What projects and financing mechanisms are best fitted to utilize the local biomass potential;

- Continuation of efforts for refurbishment of remaining public building stock and private residential buildings and coping with the backlog of applications;

- Financing mechanisms available for above priorities - operational programmes providing funding for agricultural cooperatives; and available funding for energy refurbishment and RES utilisation in private residential buildings.

After the vivid discussion the workshop ended with the agreement that if there were more considerations on the topics they would be sent via e-mail to the SmartEnCity contact person in Asenovgrad Municipality.

The agenda of the Scenario Formulation Workshop is presented below:

Figure 30. Asenovgrad's foresight workshop agenda

10.2.2. Scenario Development

Within SmartEnCity activities several scenarios for the energy balance of the Municipality have been prepared by PlanEnergie showing how different priorities and measures affect the energy related data of the municipality. Based on that and on the foreseen future priorities and goals, the workshop concluded three main scenarios. Following is the scenario matrix as a result of workshop.
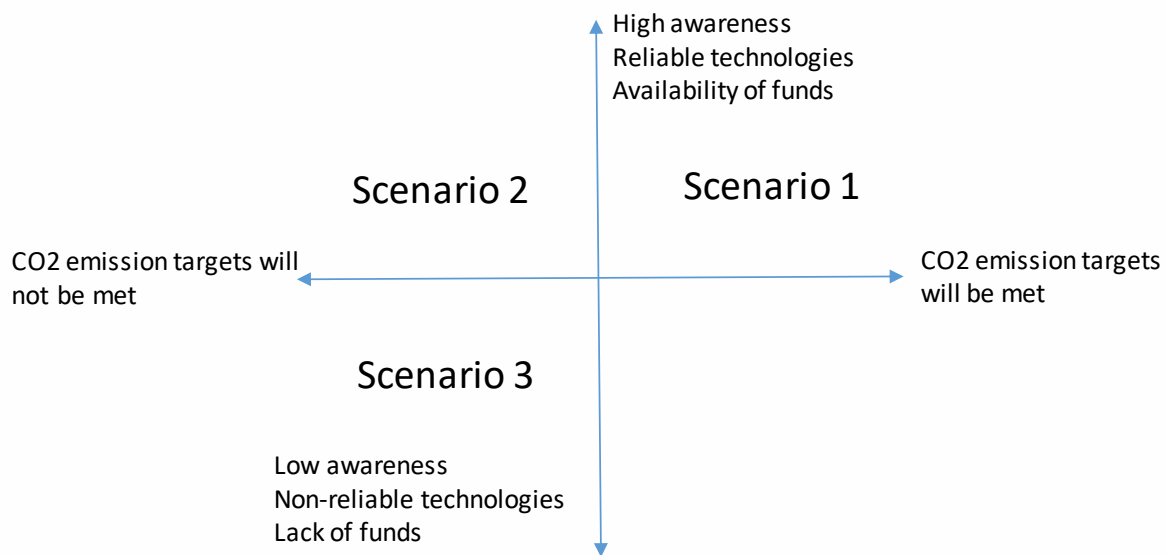
High awareness
Reliable technologies
Availability of funds

Scenario 2

Scenario 1

CO2 emission targets will
not be met

CO2 emission targets
will be met

Scenario 3

Low awareness
Non-reliable technologies
Lack of funds

Figure 31. Asenovgrad scenario matrix

Scenario 1: Optimistic scenario.

The available local biomass RES potential is utilized to the maximum extent which combined with the refurbishment of local building stock (both public and private residential) will lead to reduction of CO2 emissions resulting in carbon neutrality of the municipality. Given the size of the private residential building stock (2 344 thousand square meters as per data from the last census) it has been calculated that over 234 MEuro are needed to achieve 45 % of energy savings or 185 GWh/annum only in the private residential sector. For this scenario to materialize, it is needed to work much harder to increase awareness of local stakeholders about climate change and the way it is affected by development and consumption, to try to make a good business case of sustainable energy projects and/or secure funding to utilize all available RES and energy saving potential. Given the amount of time and resources needed it is viewed as a long-term vision till 2050 rather than a realistic development up to 2027.

Scenario 2: Municipality preferred scenario till 2027

Reduction of current CO2 emissions by 28 % (compared to baseline year 2007) which involves 30 % increase of energy efficiency, 20 % decrease of energy consumption and 25 % of RES share in the energy mix of the municipality (according to the SEAP) combined with 16,7 % utilization of local biomass potential. This will lead to 4,3 t/inhabitant of annual CO2 emissions and energy consumption of 664.17 GWh/annum which represents 26 % and 22,4 % reduction respectively. This is the preferred scenario for the short-to-midterm actions as it reflects the current level of awareness of local stakeholders, the priority areas for sustainable development of the municipality and the availability of funds to finance concrete projects and actions which is viewed as a main challenge both by the municipality itself and by the local

stakeholders – businesses and citizens. A major challenge will be to prove energy efficiency as good business case especially when it comes to deep renovation of buildings where paybacks can go to 15-18 years.

Scenario 3: Business as usual scenario

If no additional efforts are put in sustainable energy actions, the energy data of Asenovgrad Municipality will float around its current level: 5.8 t/inhabitant CO2 emissions, total energy consumption of 3078 TJ or 855 GWh per annum and 13,2 % utilisation of local biomass potential. This is viewed as the least preferred option as the municipality have always been aware of the need for actions to reduce energy consumption and mitigate climate change, and has been proactive in sustainable energy planning and implementation. However, given the rise of consumption due to the economic development and the fact that young people who are much more aware of the climate change challenge, tend to leave Asenovgrad, this scenario cannot be excluded as an option for the future development of Asenovgrad Municipality in spite of the efforts taken by the local authorities.

10.2.3 "Master" scenario

No single master scenario has been chosen although the second scenario is viewed as preferred but will but it will need further discussions with local stakeholders and approval by the municipal authorities.

10.3. Phase 3 – strategies and decisions

10.3.1. Input for IEP planning process

The scenario formulation workshop was one of the first actions foreseen in the specific Action plan developed outlining the core activities and the time-line of Asenovgrad IUPDR update. According to it the scenario process in Asenovgrad is carried out with the following process steps:

1. City information update - May 2019;

2. Strategic stakeholders' involvement through a Workshop on the visions and future scenarios – 16 May 2019

3 Strategic planning – update on priorities and focus areas of the current IPURD – September 2019

4. Project selection based on city needs - December 2019

5. Update of existing IPURD with selected project – May 2020

6. Municipal Council's approval of the updated IPURD – mid 2020

The timeline of the planning process is as follows:
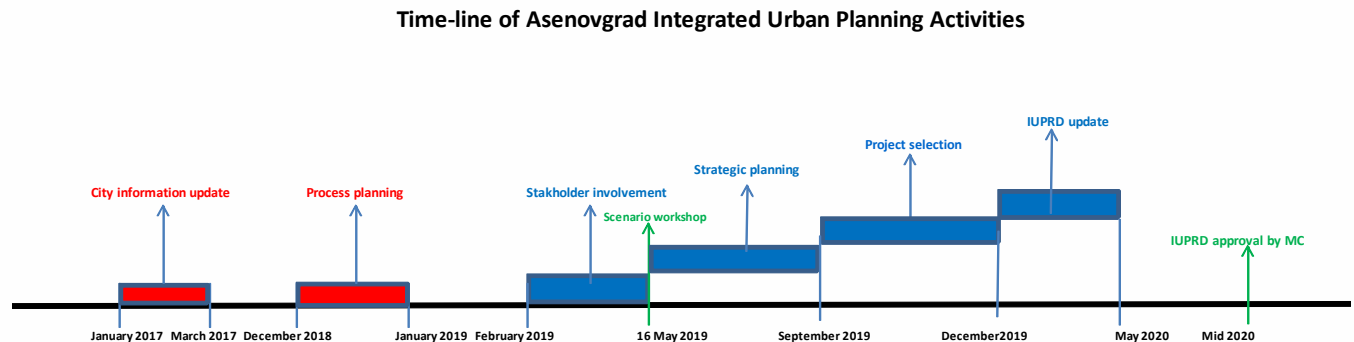
Figure 32. Timeline of Asenovgrad's IEP activities

10.3.2. Additional (Next) steps

Step 4:   Strategic planning - update on priorities and focus areas of the current IPURD

Based on the outcomes of stakeholder involvement workshop and scenarios formulated, and after the consultations within different departments in Asenovgrad Municipality, the priorities on the current version of UPURD will be updated, including setting a CO_2 emission reduction targets.

Step 5:   Project selection based on city needs

Project selection will be performed, including technical solutions and designs, and financial framework/selection of financing sources will be prepared (December 2019)

Step 6: Update of existing IPURD with selected project

The outcomes of the previous step will be incorporated in the IPURD including financial parameters, potential financial sources and implementation roadmap (May 2020)

Step 7: City Council's approval of the updated IPURD

It is expected to vote the updated IPURD by mid 2020.

Foresight experience in Asenovgrad – Q&A

Q: Are you satisfied with the engagement?

A: *The planning process in Asenovgrad is based on already existing documents – Integrated Plan for Urban Development and Regeneration and Sustainable Energy Action*

Plan. Stakeholder engagement was needed in order to confirm or rethink (where necessary) the future priorities and actions and to update the existing documents and merge them in one comprehensive municipal plan. The involvement of local stakeholders was successful, one scenario formulation workshop was held with the participation of the local industry, officials from the municipality of Asenovgrad and of the neighbouring municipality of Kuklen. However, it has been assessed that additional efforts are needed in this respect, and therefore it is planned to hold another workshop in the beginning of 2020.

Q: Please name some stakeholder groups that were not included but are important/appeared to be important in the process?

A: *It has been assessed that citizens were missing to a large extent from the discussions as there is no citizen-representation body in the municipality to be involved and on the other hand, involving individual citizens is time and effort consuming for which resources at the municipality are insufficient. In order to cope with these constrains, it is planned to put the draft of the newly created integrated municipal document for public discussion.*

Q: Do you feel more analysis would have been beneficial in the stakeholder identification part – e.g. identify/conduct a matrix about the importance of the stakeholders and their potential role?

A: *Even though stakeholder involvement process was a major part of the efforts of the Asenovgrad working group, it is assessed that more work is needed in the identification part, especially for evaluating the potential role of specific stakeholder groups for identification of concrete actions and their implementation in practice.*

Please describe the positive and negative sides of organizing the scenario development workshop

Q: How did you benefit from the exercise?

A: *It was beneficial for the working group to meet and discuss with the important local players who shared their visions and ideas about the future perspective of the energy aspects and how they should be integrated in the overall municipal planning framework. Ideas for sectors to be taken into account as well as of concrete project and actions were collected and fed into the planning process. It also helped in building trust among local stakeholders in municipality that their opinion matters and will be taken into account when developing and implementing local community development plans.*

Q: Would you repeat that methodology again in the similar planning process?

A: *Yes, Asenovgrad believe that the participative foresight approach has been beneficial to come up with up-to-date and inclusive planning document matching the local potential and at the same time reflecting different aspects of local community vision and understanding about how the municipality should be developed in the future. It will be used in the future planning exercises of the municipality and will be promoted and transferred as experience to other municipalities as well.*

Q: What would you suggest to other cities?

A: *To follow the approach of including as many local stakeholder groups as possible, to take their opinion and visions into account and to put more efforts in private citizens engagement which proved a major obstacle in Asenovgrad panning process so far.*

Q: If you did not follow the methodology did it affect your result?

A: *Asenovgrad had one workshop and feel that although it was very beneficial, more efforts are needed and for this reason it is planned to have a second workshop, to use it as a fine-tuning tool before update and enrichment with energy and sustainability actions of the integrated planning document.*

Table 33. Foresight experience in Asenovgrad – Q&A

11. Takeaways – using foresight in SEC

Using the foresight methodology in SEC is summarized with the following **key takeaways**:

- The foresight methodology introduced in this report and used by all the five SEC partner cities is **one possible framework** developed by the Institute of Baltic Studies for the purpose of this project. It is suitable for any city seeking to make their strategic planning processes more participatory and it can be complemented with other foresight tools (see Chapter 4) depending on specific city needs and preferences.

- Foresight is a **valuable methodology to be used in strategic urban planning processes**, especially as it enables to:
    - gather future intelligence;
    - bring together relevant stakeholders;
    - describe a variety of potential futures;
    - work towards consensus;
    - build common visions;
    - mobilize joint actions;
    - shape the city's development path;
    - make present-day decisions towards the preferred path;
    - create a sense of ownership among the involved stakeholders;
    - provide input for actual strategies and initiatives.

- Out of all the foresight methods, one of the most beneficial tools for smart cities is **scenario-planning**. Scenario-planning helps to create future models of the city and its development in order to figure out the preferred vision of the future and think of what needs to be done today in order to move towards that vision, thereby avoiding the unfavourable scenarios.

- In short, a **foresight exercise based on the SEC approach** should involve:
    - Setting up a local task force of key partners that will coordinate the whole process – ideally, not only the foresight process, but the wider strategic urban planning process as well (be it an IEP, a SECAP or any other end result).
    - Setting the strategic question that guides the whole planning process and looks 10-15 years into the future.
    - Completing an in-depth SWOT analysis as background material of the city's current state of the art and future outlooks.
    - Attracting the relevant stakeholders to participate in the scenario-planning workshop(s).
    - Assessing the probability and relevance of the main trends based on the background analysis.
    - Developing the highly relevant, but uncertain drivers of change into coherent scenarios based on a scenario matrix.

- o Working towards a consensus on the master scenario and action needed to move in the preferred direction.
- o Sharing the results of the workshop(s) and specifying next steps in the planning process.

- It is highly recommended to plan **more than one scenario-planning workshop** with the stakeholders. This will allow the stakeholders to get to know each other, building openness and trust in the local planning processes. For instance, the first workshop could focus on exploring trends and developing scenarios, while the second workshop could concentrate on vision-building and planning the next steps. At the same time, both models – having just one full day for the whole foresight exercise and having more workshops to complete the exercise step-by-step – were successfully used in the SEC partner cities following the presented guidelines.

- Besides the presented guidelines (see Chapter 5), the way in which the partner cities' foresight experience is presented in this deliverable (see Chapters 6-10) serves as a **great example of how other cities could plan and document the process** in their cities as well. This means going through and reporting all the three phases (status and challenges, visions of the future, strategies and decisions), thereby compiling the necessary action plans, planning the phases in detail, summarizing the developed scenarios etc. This will serve as good input into the next steps of the strategic planning process.

- In making the foresight workshop(s) a success, the SEC experience has proven the **usefulness of involving external experts** to moderate the events. Hiring these professionals helps to mobilize stakeholders, increase the efficiency of groupwork and encourage participants to speak their mind.

- As the SEC foresight approach very much focuses on participation-seeking, networking, common vision-building and a feeling of ownership, **stakeholder involvement** is one of the most crucial phases to ensure the success of the whole foresight exercise. Much effort needs to be put into mapping the relevant stakeholders and bringing various players to the table, both in terms of organization types (city government, companies, universities, umbrella organizations, citizen initiatives etc.) as well as smart city areas (energy, transport, ICTs etc.).

- The background work done before the workshops (desk research and analysis of existing strategies/plans for developing the SWOT and a list of major smart city trends) **needs to be validated at the (first) workshop** to ensure that all the relevant aspects are mentioned and that the stakeholders are all on the same page when starting to develop scenarios.

- While **some of the scenarios developed are clearly more unfavorable**, it still makes sense to put effort into elaborating and exploring these development paths. On the one hand, the consensus-seeking "master scenario" might not be based on the most positive scenario alone, but rather includes elements of various scenarios that together make up the most

favorable future. On the other hand, in order to choose the most desired development path and to shape the respective action plan, a city also needs to know the undesired future scenarios that it will try to avoid with its next steps.

• While all the five SEC partner cities developed their scenarios independently based on the provided guidelines, it can be seen that the **main themes of the scenario matrices are recurring**. While one of the axes mostly explored relations between CO2 levels, regulation and new technologies, the other seemed to focus on a more societal dimension, e.g. consumer awareness, cooperation, individualism vs collectivism etc. This can be explained by how the cities formulated their strategic questions – more specifically, these revolved around reducing CO2 emissions and moving towards carbon neutrality.

In the following table, the **foresight experience and process** of all the five SEC partner cities has been summarized:

CITY	Time of workshop(s)	Foresight process duration	Task force partners	Task force size	Stakeholder categories	No. of stakeholders involved	External moderator used	Scenario axes	Master scenario developed	Process specifics
Tartu	Oct 2018 Nov 2018 (2)	Sept-Dec 2018	IBS, TAR, TREA, UTAR, SCL	12 people	Environment, mobility, government, economy, people, living	90*	Yes	Low/high consumer awareness, CO2 goals will/will not be achieved	Yes	Scenarios could be edited by stakeholders in between workshops
Sonderborg	May 2018 (1)	March-May 2018	ZERO, Sonderborg municipality, PLAN, AAU	10 people	Homeowners, housing companies, private rental homes, private transportation, companies, farmers, heavy transport, energy	40	Yes	"We"/"I" thinking/mindset, cheap fossil/ renewable energy (+weak/ strict regulation)	No	SWOT created for each 4 scenarios
Vitoria-Gasteiz	January 2020 February 2020 (2)	Nov 2019 – Feb 2020	TEC, AVG, CEA, MON, ACC, CAR	10 people	energy generation and removable, mobility, urban planning and residential sector, and governance	40	No	Low/high compliance of the emission objectives and the deterioration of the city´s resilience in sense of climate change	Yes	SWOT and trends based, scenarios created and edited by stakeholders
Asenovgrad	May 2019 (1)	May – September 2019	Sofia Energy Centre, Asenovgrad Municipality	N/A	Local Industry, Asenovgrad and Kuklen Municipalities	10	No	Low/high consumer awareness, Co2 emission targets will/will not be	No	Four main priority areas have been identified for the existing

							achieved	IUPRD
Lecce	July 2019 (1)	Nov 2018-Sept 2019	RINA-C, Lecce Municipality	7 people	Energy, urban lighting, mobility, ICT and new technologies, natural resources, waste management, government, people	40	No	City (de)carbonisation, weak/strong stakeholder collaboration	Yes	Scenario axes defined before the workshop through an online questionnaire

Table 34: SEC foresight experience summary

*Two workshops combined

In the following table, the **contribution of the foresight exercise to the IEP process and next steps planned** in the partner cities has been summarized:

CITY	Name of IEP	IEP process duration	Main aim of IEP	Task force partners	Foresight main contribution	IEP activities after the workshop	Specifics of the IEP
Tartu	Tartu Energy 2030+	Sept 2018 – Dec 2019	Reducing CO2 emissions by 40% by 2030 (baseline 2007)	IBS, TAR, TREA, UTAR	Creating a master scenario and vision statement for Tartu Energy 2030+	Creating 6 thematic expert groups, data collection	Voluntary agreements from organizations towards achieving IEP goals
Sonderborg	Roadmap2025	March 2018 – Dec 2018	Reducing CO2 emissions by 75% by 2025 (baseline 2007) CO2 neutrality by 2029	ZERO, Sonderborg municipality, PLAN, AAU	Creation of a common shared picture of the future Sonderborg and the associated uncertainties. Testing 52 specific enabler actions/project initiatives based on created scenarios	Creating 8 working groups, developing specific project initiatives, simulation of carbon impact	EnergyPlan tool developed by AAU used to demonstrate the impact of the proposed actions
Vitoria-Gasteiz	PATEI 2020-2030	January – Dec 2020	Reducing CO2 and energy demand by 2030	TEC, AVG, CEA, MON, ACC, CAR	Creating a master scenario and vision statement for Vitoria Gasteiz 2030	Creating 4 working groups with representatives from all sectors each, brainstorming, decision on possible scenario using more relevant trend for the city	Update to the previous agreements and city plans, extension with the relevant trends 2030
Asenovgrad	Asenovgrad IUPRD	January 2017 – May 2020	There are two specific goals under consideration for the update of IPUDR – long term vision until 2050 which is carbon neutrality, and short to	Sofia Energy Centre, Asenovgrad Municipality	Decided to update priorities for current IPURD and set new CO2 reduction targets based off workshops	Strategic planning, select project, update existing IPURD targets, and waiting for municipal council's approval of the updated IPURD	Updating CO2 targets and project goals based off feedback from stakeholders and task force

			mid-term until 2027 which is 28% reduction of the current CO2 emissions. As a result of the process four main priority areas have been identified, namely biomass utilisation, wind and solar utilisation, building energy refurbishment and financing mechanisms.				
Lecce	Lecce IEP	Nov 2018 – Dec 2020	Reducing CO2 emissions by 40% by 2030 (baseline 2007)	RINA-C, Lecce Municipality	Creating a master scenario and defining the purpose of Lecce's IEP	Scenario follow-up and strategic planning, replication roadmap and action plan, municipal council approval	IEP as part of updating the city's SEAP into a SECAP

Table 35: SEC foresight contribution summary

12. Foresight in SEC – Final thoughts and success factors

The aim of the SEC project is to develop a highly **adaptable and replicable** planning process for European cities in pursuit of **sustainable, smart, and resource efficient urban environments.** Central to this aim is the concept of participatory urban planning, which is a consensus-seeking process that brings stakeholders together to develop a shared vision of their community. To achieve this, a process is needed which is accessible, promotes participation, and is replicable. Therefore, participatory foresight was selected as the optimal choice as it is seen as an effective methodology for organizing stakeholders to predict and prepare for future urban developments.

As explained in section 4.1, the foresight method helps stakeholders formulate long-term, strategic development through debate and participation. In this report, foresight was carried out by the partner cities in three phases; (1) Status and challenges; (2) Visions of the future; (3) Strategies and decisions. To provide support for each city, a comprehensive list of phase by phase guidelines were listed in section 5. The guidelines ensure that all participants will take a common approach that can be compared and evaluated; Providing additional value as the replicability of the foresight method can be determined by these experiences.

To this end, this section will unpack the experiences for each city who participated in the foresight method, highlighting trends and their potential impact on replication, and determine whether the foresight method, as applied, was successful. The input for these conclusions is based on the experiences of each city which is recorded in chapters 6-10 as well as key takeaways from chapter 11.

12.1. <u>Key observations and their impact on replication</u>

12.1.1 Taskforce and stakeholder methodologies can strengthen replication

Creating a participatory process is one of the aims of foresight; The taskforce and stakeholders are crucial elements to that process. Given that the report serves the dual purpose of being an internal and external reference guide for cities, more information should be given about the how the taskforce was assembled and what the methodology was for performing a stakeholder analysis.

The foresight taskforce is the organizational apparatus responsible for coordinating the IEP roadmap process. Each city described their task force and the responsibilities for each organization. However, there was no detailed explanation of how the task force members had originally been formed. It would be beneficial to further investigate "best practices" how to match SEC project needs with taskforce member capabilities.

It can be seen in Table 34 that each city had a different number of taskforce members. While this can be attributed to the individual needs for each city, it is

possible the inconsistencies may be derived from not having clear guidance for forming a task force, leaving out potential members. At the same time it is difficult to suggest a preferred number of task force partners and roles to have more consistency between cities in the composition of their taskforce since each city context is different. Chapter 11 identifies stakeholder involvement as a crucial element to the foresight process because much effort is needed to conduct a stakeholder analysis and ultimately bring everyone to the table. While each partner city generally referred to the stakeholder categories, they were not explicit with who the key stakeholders were and why they were important to the study. It is possible that a stakeholder analysis was completed in a different document and was not included in D 8.4. E.g., in the case of Tartu, they used a "Smart Tartu" database to identify stakeholders but no key stakeholders were identified in the report. Further, if you compare city stakeholder groups in Table 34, you can observe differences in the amount of stakeholder categories and participants in the workshops. Most of the cities faced challenges in involving citizen groups into this specific tasks and also considered the participation of politicians as a crucial element.

Having an understanding of the methodology used for the stakeholder analysis would be helpful for a city who may not be experienced on this topic. Further, a more thorough stakeholder analysis might identify additional community members and organizations that can add input, therefore increasing the overall quality of the foresight process. In Q&A sessions almost all cities admitted that a more thorough stakeholder analysis would have been beneficial to the process. For example, it may be beneficial to include an additional stakeholder matrix in Phase 1 similar to the SWOT analysis. For example, rating the importance and influence of each stakeholder may lead to better networking opportunities amongst stakeholders and more effective workshops.

12.1.2. Modifying the process can yield the same results

Having a detailed framework for the foresight process is undoubtedly a benefit for the replication of foresight, giving clear steps for cities pursuing this methodology. However, changing the rules to fit the needs of the individual city can still achieve the same result.

In the partner city experiences the consensus results were split, with only Tartu and Lecce identifying clearly a master scenario. While the foresight method identifies the master scenario as a critical part of the exercise, it does not mean that not doing so should be considered a negative outcome. For example, Sonderborg developed 4 scenarios and consolidated those scenarios to provide input for their IEP process kick-off meeting. So, while no Master scenario was selected, the discussion helped support the development of a long-term strategy to achieve their goals.

The same can be said for the number of workshops held by each city. Where Tartu and Vitoria-Gasteiz hosted the recommended number of two workshops, the other cities hosted one. Despite the deviation from this recommendation, the partner cities

were able to achieve the desired outcome, which is the IEP plan. Further, Chapter 5 outlines the foresight workshop action plan into five phases with recommended steps for each phase. However, each city appeared to have accomplished the same outcome in only three phases, combining the steps in a way that suited their needs. For instance, Chapter 5 lists developing a preferred vision (master scenario) in Phase 4 where in the city experiences (Chapters 6-10), this task was completed in Phase 3. As recording the experiences of the partner cities serves as an example of how other cities could plan and document the foresight process improving this method's replicability, hopefully a thorough overview of the foresight process in cities is beneficial for other cities who are stepping into the integrated energy planning process.

12.2. <u>Success indicators</u>

Success factors for the foresight process can be sorted into two categories, SEC project objectives and foresight goals. First, the SEC project identifies the main aim of the project is to create a process that is adaptable and replicable. Second, the purpose of foresight is to create a participatory process that unifies stakeholders to create a common vision for the future. Therefore, the success indicators are identified as whether the foresight process is adaptable, replicable, unifies stakeholders, and creates a common vision.

Adaptability can be seen as a prerequisite for replicability; Given that each city has its own identity, strengths, and weaknesses, a rigid methodology may not be effective for everyone, hence making the adaptability of foresight necessary for its replication. Proven in the previous section, it has been shown that foresight can be slightly modified to fit the needs of the city while still achieving the overall goal for the process. Therefore, adaptability can be confirmed as successful.

Replicability can be confirmed by simply comparing the intended outcomes for each city. Comparing the results of Table 35, one can see that each city has developed an IEP which was the intended outcome of the foresight method. Given that the goal of foresight is to develop a common vision, this can be considered a success. Further, the report itself serves as a guide for other cities to use by outlining the foresight process and the experiences of each city. Taken from the perspective of a policy maker wishing to implement this study in their city, having this report as a framework will only support its replication, therefore adding to its success.

The success of foresight can be measured by if it achieved it's intended purpose; i.e. did it unify stakeholders and was a common vision achieved? On both accounts, the foresight experience for each city can be considered a success. First, it can be observed in Table 34 that each city was successful in organizing stakeholders and bringing them together at the workshop. Second, we can see from the individual experiences of each city that the stakeholders were able to complete a SWOT analysis, scenario matrix, and identify an IEP and follow-up steps with a set timeline.

The city experiences provide a unique opportunity to test whether or not participatory foresight was the correct methodology. Based on the city experiences, we can see that not only does it achieve the SEC project goals, but the foresight method was successful in unifying stakeholders to create a common vision. Therefore, we can conclude that the foresight method outlined in this report was successful.

13.Deviations to the plan

No major deviations to the plan have occurred within the task.

14. Outputs for other Work Packages

D8.4 mainly contributes to **other tasks in WP8**, "Replication to Followers and Smart Cities Network". Based on the SEC regeneration strategy delivered in WP2 (see e.g. D2.8), the LH and follower cities will develop their IEPs and replication roadmaps, whereas foresight together with its scenario-building workshops is one crucial step in this process (see more in Chapter 3 "General approach"). As the main result of WP8 is the development of high-quality and future-oriented IEPs (task 8.4) for each partner city, either LH or follower, the implementation of which is backed up by realistic replication roadmaps (task 8.5), D8.4 will offer input to these tasks by guiding the cities through a participatory foresight approach before developing the IEPs (D8.6) and roadmaps (D8.10). In more general terms, D8.4 will also feed into D8.9 (replication toolkit 2) as the LH and follower city foresight experience together with the guidelines serve as a good practice to be replicated in other cities and contexts.

The **main inputs and outputs** related to D8.4 are summarized in the following figure:
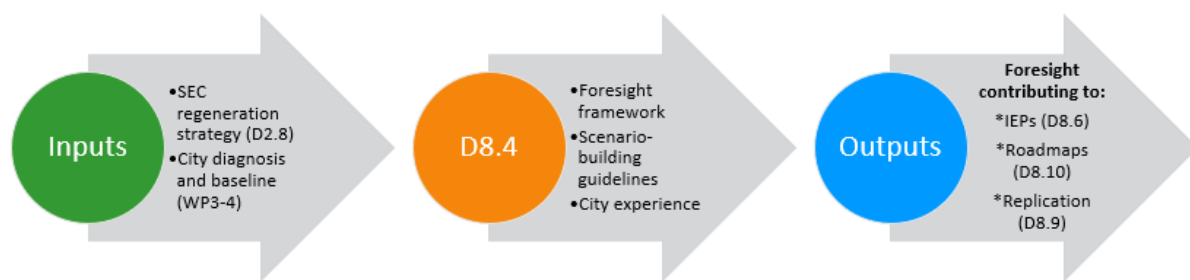

Figure 33: D8.4 inputs and outputs in relation to other WPs

References

Cuhls, K. (2003). From Forecasting to Foresight Processes – New Participative Foresight Activities in Germany. – Journal of Forecasting 22, pp. 93-111.

D2.8. "Cities4ZERO: The Urban Transformation Strategy for Cities' Decarbonisation. A journey towards the Smart Zero Carbon City" (2019). – SmartEnCity.

D 8.2. "Replication toolkit v.1" (2017). – SmartEnCity.

Erdogan, B.; Abbott, C.; Aouad, G. and Kazi, A. S. (2009). Construction IT in 2030: a scenario planning approach. – Journal of Information Technology in Construction (ITcon), Vol. 14, pp. 540-555.

Gavigan, J. P and Scapolo, F. (n.d.) Foresight and the Long-Term View for Regional Development. – IPTS.

Grant Agreement No. 691883, SmartEnCity (2015). – European Commission.

Hines, A. (2012). Why Foresight? I Can Think of 316 Reasons. – The Futurist's Toolbox. Available at [http://www.andyhinesight.com/wp-content/uploads/2012/10/Why-Foresight-Changewaves-Sept-2007.pdf].

Higdem, U. (2014). The co-creation of regional futures: Facilitating action research in regional foresight. – Lillehammer University College, Department of Economy and Organizational Science, Centre of Innovation in Services.

O'Brien, F. (2004). Scenario Planning – lessons for practice for teaching and learning – European Journal of Operational Research, 152; 709:722.

Popper, R. (2008). Foresight Methodology, in Georghiou, L., Cassingena, J., Keenan, M., Miles, I. and Popper, R. (eds.), The Handbook of Technology Foresight, Edward Elgar, Cheltenham, pp. 44-88.

Porter, M. E. (1985). Competitive Advantage. – New York: Free Press.

Roadmap 2025. 50 steps towards a carbon neutral Sonderborg. (2018). – ProjectZero.

Weigand, K.; Flanagan, T.; Dye, K. and Jones, P. (2014). Collaborative foresight: Complementing long-horizon strategic planning. – Technological Forecasting & Social Change 85, pp. 134-152.

Annex 1. Sample workshop agenda

The following table outlines a **sample agenda** for planning the scenario building workshop in case you decide to conduct one workshop only. However, as referred above, we advise to plan at least two foresight and scenario planning workshops in each city. In that case, plan 8h until introducing rough scenarios and have a separate meeting for starting the strategic planning process.

Timeframe	Workshop activity	Reference to chapter 5 steps	Responsible person
9:00-9:15	**Introducing the workshop approach**	Step No. 8	Task group leader
9:15-10:45	**Analyzing the current state of smart cities and the related challenges/opportunities for a specific city based on Phase 1 preparations**	Step No. 9	Task group leader All contribute (adding post-its, discussing etc.)
10:45-11:45	**Focusing on the most important growth opportunities**	Step No. 10	Task group leader All contribute (adding post-its, discussing etc.)
11:45-12:00	**Creating groups**	Step No. 11	Task group leader
Break			
13:00-14:30	**Brainstorming and scenario development in groups, focus on key success factors**	Step No. 12	Smaller groups for each scenario
14:30-16:00	**Presenting results and identifying the preferred or integrated "master" scenario**	Steps No. 13 and 15	Each group leader
16:00-16:30	**Implications for strategic planning and next steps**	Step No. 16	Task group leader. All contribute.

Table 36: Sample scenario-building workshop agenda

Annex 2. Smart City Foresight questionnaire for trend analysis (used in SEC project)

Part I: ENERGY OUTLOOK

Statement	How likely is this statement to become reality in the next decade?			How relevant is this statement for smart city development in the next decade?			
	unlikely	likely	not sure	not relevant	somewhat relevant	very relevant	not sure
The cost of oil and gas will increase							
Higher oil and gas prices will result in extensive fuel poverty							
Higher oil and gas prices will result in developing cleaner and more affordable energy production technologies							
Countries' efforts to reduce reliance on fossil fuel energy will lower oil and gas prices significantly							
The EU will remain heavily dependent on Russian oil and gas supplies							
The costs of renewable energy will decline remarkably, making it competitive with conventional energy							
The global CO2 emission targets will not be met as the energy sector will not experience drastic changes							
Improvements in energy trends will rather come from constant political effort than advances in technology							
Growth in global energy demand will slow down markedly because of price/policy effects and a							

shift towards lighter industrial sectors						
The solar industry will grow remarkably thanks to cheaper solar panel prices						
Solar will account for a third of new power generation infrastructure built over the next decade						
Wind energy production will steadily increase						
Nuclear energy will become more popular again as high-tech companies address the issue of nuclear waste						
Thanks to the shrinking costs of lithium-ion batteries, they will be increasingly used to help manage the power grid and store energy for buildings						
Battery technologies will be advanced much further than lithium-ion						
Cities will become active players in their local energy markets (e.g. city-owned energy companies)						
Citizens (incl. housing associations) will become active players in their local energy market (e.g. selling to the grid)						
Energy consumption management will be increasingly important in flattening the peaks						

Statement	How likely is this statement to become reality in the next decade?			How relevant is this statement for smart city development in the next decade?			
	unlikely	likely	not sure	not relevant	somewhat relevant	very relevant	not sure
Global transport will remain heavily dependent on fossil fuels with a strong rise in demand for diesel, fuel oil and jet fuel							
In heavy transport, conventional fuels will not be replaced with new types of fuel technologies							
Fuel consumption levels in the EU will remain almost at current levels							
Contrary to developing countries, the transport fuel demand for developed countries will drop							
25% of cars sold will have electric engines (up from 5% today, incl. hybrids)							
Hybrid and hydrogen technologies are only relevant until the next generation of batteries							
Electric cars will be cheaper to own than conventional cars							
Thanks to the shrinking costs of lithium-ion batteries, they will be increasingly used to power electric cars							
Car/ride sharing will become increasingly popular, keeping down the growth of personal cars							
CO2 emissions from the transport sector will mainly depend on the degree of							

government intervention and new low carbon fuel systems							
Transport volumes and fuel demand will largely depend on government policies over the next decade							
Open data and big data will become increasingly important in optimizing transportation							

Part III: ICT OUTLOOK

Statement	How likely is this statement to become reality in the next decade?			How relevant is this statement for smart city development in the next decade?			
	unlikely	likely	not sure	not relevant	somewhat relevant	very relevant	not sure
The appetite for large-scale Government 2.0 types of project will reduce due to concerns of increasing mass surveillance and privacy data retention							
New regulatory frameworks to improve transparency and to open communication channels between government and public will restore trust in ICT							
Strict regulations on data collection and management will restore public trust in ICT							
Sensors will remain a key enabling technology for detection, measurement, computation and communication							
The streams of sensor data and its analysis will support better management of resources and contribute to sustainability							

The trend towards smart grids, which allow communication between power producers and consumers, will increase remarkably							
Innovative and less regulated services will engage people to collect and share data and knowledge							
Delivering ICT visions will still be hampered by the cities' lack of capacity and resources to effectively make use of ICTs							
ICTs will lead to further access to and use of urban data							
ICT products and services will still be inaccessible to some segments of the population due to a lack of affordability, training and education, contributing to urban inequality							
ICTs will gain importance in ensuring citizen participation in planning decisions, contributing to social inclusion							

Part IV: SMART CITY OUTLOOK

Statement	How likely is this statement to become reality in the next decade?			How relevant is this statement for smart city development in the next decade?			
	unlikely	likely	not sure	not relevant	somewhat relevant	very relevant	not sure
Smart cities will be hindered by key skills gaps (e.g. smart city planning, procurement, digital citizenship, data literacy)							
Smart cities will be hindered							

by lack of finance and well-developed business models						
Smart cities will be hindered by information islands (lack of both top-down and bottom-up governance approaches)						
Smart cities will be hindered by lack of co-creation with citizens (incl. partnerships with the private sector and civil society)						
Smart cities will be hindered by their legacy systems (lack of adaptability of existing IT infrastructure) and difficulties in integration						
Smart cities will be hindered by privacy and safety issues and insufficient data openness						
Smart cities will be hindered by a lack of collaboration across sectors, disciplines and other cities						
Smart cities will be hindered by the lack of a common vision and action						
Smart cities will be hindered by insufficient regulations and political effort						
Smart cities will be hindered by overregulation that prevents innovation						
Smart cities will be hindered by insufficient adoption of new technologies						
Smart cities will be hindered by insufficient awareness and changes in consumer behaviour						