



TOWARDS SMART ZERO CO₂ CITIES ACROSS EUROPE
VITORIA-GASTEIZ + TARTU + SØNDERBORG



SmartEnKIT

SmartEnCity Replication Toolkit

March 2022



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Welcome to SmartEnCity!

Use the interactive city map as a table of contents that enables you to jump to the respective tool description.

We advise you to start from the basics at the „Welcome to SmartEnCity“ sign, coffee shop and tourist information centre.

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"Welcome to SmartEnCity" sign:

SmartEnKIT tutorial

How can I use SmartEnKIT and where should I start? Before you get going, you might want to take with you some considerations for approaching SmartEnKIT.

SmartEnKIT is the official SmartEnCity replication toolkit that gathers all the main project outcomes, activities and methods into one repository. It is meant to share insights, encapsulate the entire project in a compact format, spark interest and inspire replication.

Altogether, the SmartEnCity project team identified and mapped **20 tools** that we're particularly proud of and believe can inspire others too. These tools provide information and further resources about crucial components of the SmartEnCity project can be divided into five main areas:

- **Lighthouse City solutions** – answers the question “which smart city solutions did the Lighthouse Cities demonstrate?” and gathers tools that showcase all the main demonstration activities of the project in the three Lighthouse Cities of Vitoria-Gasteiz, Sonderborg and Tartu.
- **Cities4ZERO framework** – answers the question “how can my city move towards becoming a Smart Zero Carbon City?” and gathers tools that surround the biggest methodological outcome of the project, providing a step-by-step guide on how cities can shape their path to zero emissions.
- **Energy planning tools** – answers the question “how can my city redesign its energy systems?” and gathers hardcore tools that support the integrated energy planning (IEP) process and inform the development of zero carbon strategies for cities.
- **SmartEnCity Network** – answers the question “what have the SmartEnCity Network and smart cities community been up to?” and gathers tools related to the main replication platform of the project – a strong community that has throughout the years been providing advice and support for cities to start their own transformations.
- **Dissemination tools** – answers the question “What is SmartEnCity about?” and gathers all the supporting materials, papers and resources that offer an additional opportunity to learn what the project was all about.

What is SmartEnKIT?

- **SmartEnKIT** is a comprehensive toolkit and a repository of useful materials that allows the user to learn from and replicate the results of the SmartEnCity project in their city.

Who is SmartEnKIT for?

- **SmartEnKIT** is designed as a source of inspiration and learning for small and medium-sized cities with a zero carbon vision across Europe, but specifically for the SmartEnCity Network community.

How do I use the SmartEnKIT?

- In short, you can use **SmartEnKIT** however you like. Some might want to explore freely and window shop through the tools. Some might prefer some guidance and advice through the process. Whatever your preferences are, **SmartEnKIT** has something specifically for you.

Figure 1 - SmartEnKIT in a nutshell

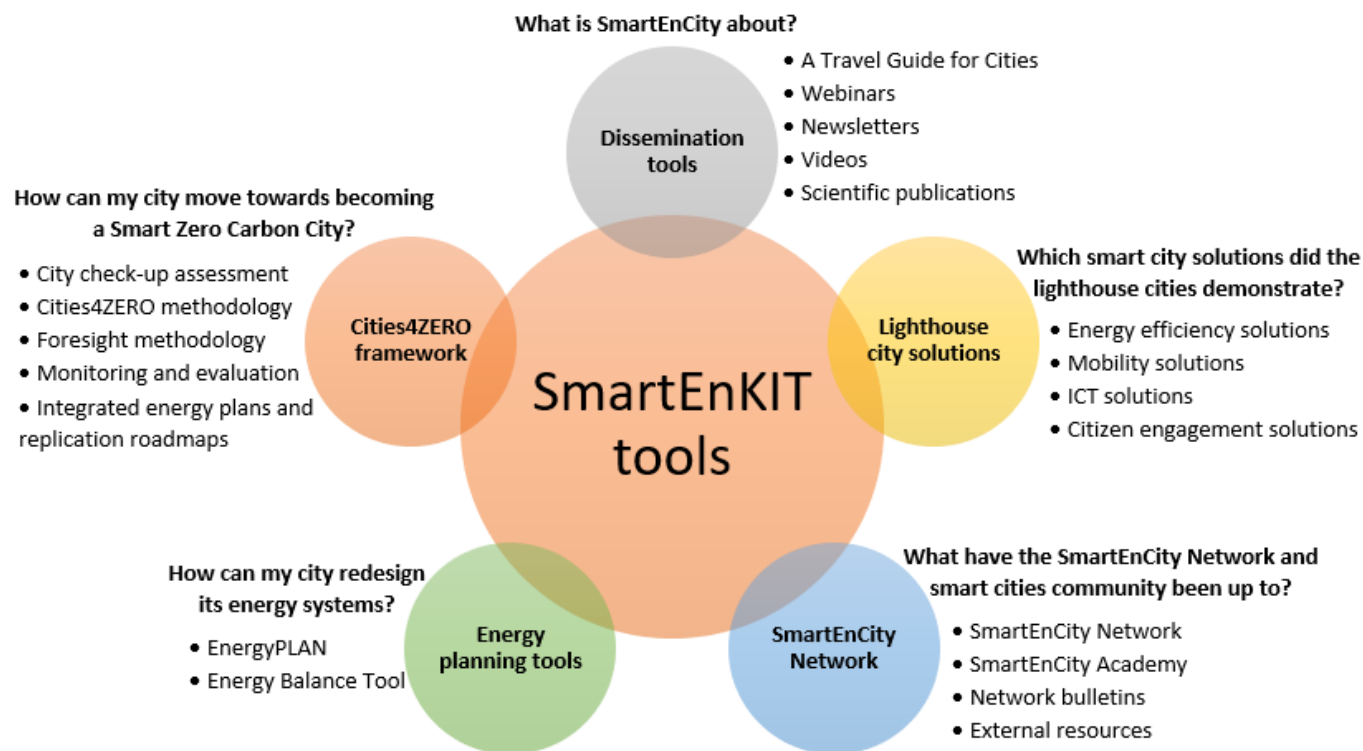


Figure 2 - SmartEnKIT tools

We're not imposing any strict rules for navigating the SmartEnKIT – remember, this is your experience and however you prefer to tackle the toolkit is very much allowed and welcomed. Here are just some options for you to consider:

A. You know what, I prefer it my way.

Yes, free will! Just go, ignore whatever comes next and enjoy your time exploring the map!

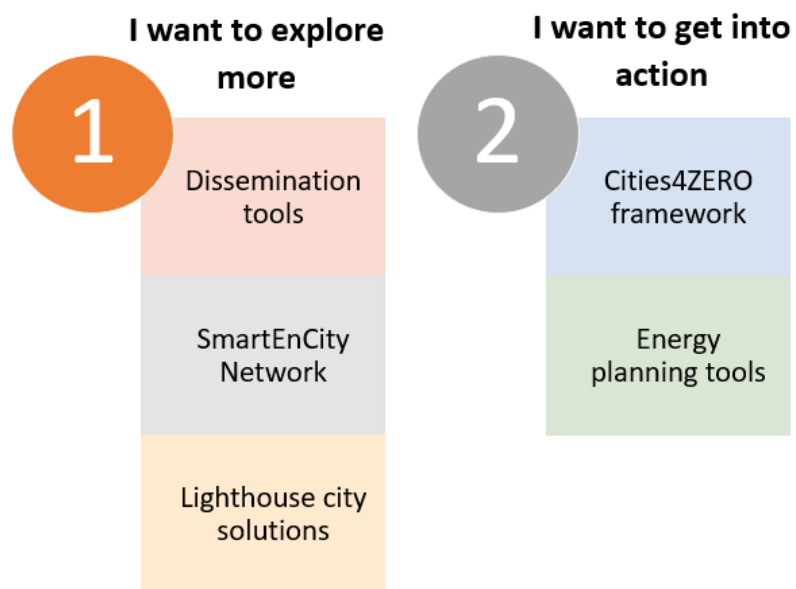


Figure 3 - SmartEnKIT main tracks

B. Hmmmm, I could use some tips.

Sure thing! We designed SmartEnKIT in a way that supports two main tracks. Think of what you would like to do today – (1) to explore and learn more about what SmartEnCity has been up to, hopefully getting a good dose of inspiration; or (2) to get into action right away and start using some of the tools that could help to make the Smart Zero Carbon City vision a reality in your city.

Depending on your mood, you could take a stroll on either of the SmartEnKIT's **two main streets**. After hearing all about the SmartEnCity story at the [coffee shop](#), we advise you to start from the [tourist information office](#) though – that symbolizes SmartEnCity's final publication called "The Journey Towards Zero Carbon Emissions – A Travel Guide for Cities". We feel that this publication covers the main outcomes of the project well and could spark your interest towards one or the other street. Or one street today, the other tomorrow? Whatever your path is going to look like, be sure to meet us again at the [train station](#) on your way back home so we could say farewell!

C. Just give me structure!

Don't worry, we're here for you. Take a deep breath and off we go on the **SmartEnCity replication tour!**

1. If you haven't heard about the [SmartEnCity story](#) yet, stop by the **coffee shop** and let us tell you all about our cities' journeys so far.
2. Start from the **tourist information office** in the upper lefthand corner of the map and browse the [Travel Guide](#). If any of the chapters stand out for you, just explore the respective tool on the map:
 - "Smart Solutions & Worst Practices" = **Lighthouse City solutions**, including [energy efficiency solutions](#) (symbol – renovated apartments), [mobility solutions](#) (symbol – bus station), [ICT solutions](#) (symbol – communication tower) and [citizen engagement solutions](#) (symbol – innovation lab).
 - "The Strategy – Cities4ZERO" = **Cities4ZERO framework**, including [City Check-up Assessment](#) (symbol - hospital), [Cities4ZERO methodology](#) (symbol – town hall), [Foresight methodology](#) (symbol - lighthouse), [monitoring and evaluation](#) (symbol – observation wheel), [IEPs and replication roadmaps](#) (symbol - bridge).

- “The Community – SmartEnCity Network” = **SmartEnCity Network tools**, including [SmartEnCity Network](#) (symbol - expo), [SmartEnCity Academy](#) (symbol - university), [Network bulletins](#) (symbol – post office) and [external resources](#) (symbol - marketplace).

3. Find the “**I want to explore more**” street. On this street, the order of the tools is not that important, but here’s a suggestion anyways:

- Start with the **dissemination tools** neighbourhood in the bottom left corner of the map – this is great for a general introduction to the SmartEnCity project and its activities and has several good resources to browse, including [videos](#) (symbol - cinema), [newsletters](#) (symbol – news kiosk) and [webinars](#) (symbol - school). We’ve also thrown in some [scientific publications](#) (symbol - library) – some of these are more general in addressing smart city topics and are good for getting to know the underlying concepts, some are more hardcore and should probably be tackled after/together with taking a look at the “I want to get into action” street.
- Continue with the **Lighthouse City solutions** neighbourhood in the centre of the map – this is a deep-dive into the specifics of the smart city solutions that the three Lighthouse Cities demonstrated, including [energy efficiency solutions](#) (symbol – renovated apartments), [mobility solutions](#) (symbol – bus station), [ICT solutions](#) (symbol – communication tower) and [citizen engagement solutions](#) (symbol – innovation lab).
- Go to the **SmartEnCity Network** neighbourhood in the centre of the map – this one’s dedicated to the awesome [SmartEnCity Network](#) (symbol - expo) community that surrounds the project and provides access to a wealth of information that the Network cities have been up to. For even more learning, there’s the opportunity to take a look at the [SmartEnCity Academy](#) (symbol - university), [Network bulletins](#) (symbol – post office) and [external resources](#) (symbol - marketplace).

4. Find the “**I want to get into action**” street. You’ve now entered the integrated energy planning territory! Here, it makes sense to follow this logic:

- Go to the **Cities4ZERO** neighbourhood in the upper right corner of the map – the main methodological framework of the SmartEnCity project can be tackled as follows:
 - Start with the [City Check-up Assessment](#) (symbol - hospital) - this questionnaire is a great way to understand the Cities4ZERO process better, helps cities to understand exactly where they fall in the framework and guides the next steps that can be taken towards a smart zero carbon future. Hard to explain, easy to fill out – just take the 10 minutes to complete the questionnaire and you’ll know exactly what we’re talking about.
 - Go on by exploring the [Cities4ZERO methodology](#) (symbol – town hall) in more detail. As the key outcome of the SmartEnCity project, the Cities4ZERO methodology offers a step-by-step strategy for smart urban decarbonization. As such, once you have the results from your check-up assessment, you’ll understand how the framework can work for you and which steps to take next. As you will discover, Cities4ZERO also involves the next three tools in this neighbourhood that we think are particularly relevant to explore.

- Look into the [Foresight methodology](#) (symbol - lighthouse) that the SmartEnCity project used. We think this is especially relevant for co-creating and/or reviewing the zero-carbon vision for your city. Whether you're looking to draft or update an Integrated Energy Plan (IEP), a Sustainable Energy and Climate Action Plan (SECAP) or a replication roadmap for your city, Foresight is a great tool that can help cities in setting their course and mobilizing quadruple helix stakeholders at scenario and vision-building workshops.
 - Continue with [monitoring and evaluation](#) (symbol – observation wheel). We're sure we don't really have to explain why monitoring and evaluation are crucial in integrated energy planning processes. After all, we can't really improve what we don't measure! Learning from the SmartEnCity monitoring framework will help you fix appropriate indicators, measure performance, track progress and assess outcomes.
 - As the last step, focus on [IEPs and replication roadmaps](#) (symbol - bridge). The IEPs and replication roadmaps delivered in the SmartEnCity are a testament to the relevance and applicability of the Cities4ZERO methodology to various city contexts. However much influenced by local factors, the environment, the technical, legal and social aspects, cities can still get valuable results from following the same methodology. That's the key to benefitting from Cities4ZERO – you have to make it your own!
 - Stop by the **Energy Planning tools** neighbourhood next to the train station – in whichever order you decide to explore these, both [EnergyPLAN](#) (symbol – green factory) and the [Energy Balance Tool](#) (symbol – green plant) are valuable planning exercises for cities to go through in order to inform their zero-carbon strategy development and boost their Cities4ZERO experience. These are the energy planning tools that will be there to help you, once you've identified your status in the Cities4ZERO framework and decide how to move on.
5. You've made it to the end of our city tour! Here we are at the **train station**, waving you goodbye. What will you be taking with you from the SmartEnCity replication tour? What are the things that clicked with you? What are the steps that you can take today to move towards a zero-carbon future in your city? This is a good time for [reflection](#) before leaving SmartEnCity.

Tutorial takeaways

So how do you start or boost the process of transitioning to a **Smart Zero Carbon City**? We believe the key is in **learning** and **taking action**. We truly hope you can both learn something from the SmartEnCity experience as well as put it into action. When it comes to actual planning processes, we acknowledge that depending on the current status of each city, the point of departure can vary as some methodological steps might already be fulfilled. That's the beauty of Cities4ZERO – once you know how to position yourself in the framework, support and advice is offered to take that next step. The tools and methodologies that the SmartEnKIT presents are widely applicable, but they can also serve specific purposes, supporting policy-makers and other relevant stakeholders in developing Integrated Energy Plans (IEPs) or Sustainable Energy and Climate Action Plans (SECAPs) for their cities.

Go on then, we believe in you!

How to use & tips

Here's the **toolkit menu** for you once again:

1. Coffee shop – [SmartEnCity story](#)
2. Tourist information centre – [A Travel Guide for Cities – SmartEnCity final publication](#)
3. School – [Webinars](#)
4. News kiosk – [Newsletters](#)
5. Cinema – [Videos](#)
6. Library – [Scientific publications](#)
7. Renovated apartments – [Energy efficiency solutions](#)
8. Bus station – [Mobility solutions](#)
9. Communication tower – [ICT solutions](#)
10. Innovation lab – [Citizen engagement solutions](#)
11. Expo – [SmartEnCity Network](#)
12. University – [SmartEnCity Academy](#)
13. Post office – [Network bulletins](#)
14. Marketplace – [External resources](#)
15. Hospital – [City Check-up Assessment](#)
16. Town hall – [Cities4ZERO methodology](#)
17. Lighthouse – [Foresight methodology](#)
18. Observation wheel – [Monitoring and evaluation](#)
19. Bridge – [IEPs and replication roadmaps](#)
20. Green plant – [Energy Balance Tool](#)
21. Green factory – [EnergyPLAN](#)
22. Train station – [Replication takeaways](#)



Figure 4 - SmartEnKIT suggested replication tour

Now that you might know how you want to approach the SmartEnKIT, we advise you to get the SmartEnCity basics right before really starting to explore the tools – for this, stop by the [SmartEnCity story](#) and the [Travel Guide for Cities](#)!

Coffee shop: SmartEnCity story



Intro

When a positive decision was made back in 2015 to fund the **SmartEnCity project from the H2020 framework**, we didn't really know what to expect or how exactly the process was going to look like. Such a huge project – 5 cities and 38 partners involved, more than 6 years of activities ahead of us worth 28 MEUR – all with the aim of moving towards Smart Zero Carbon Cities. After celebrating the not so small feat of being able to start the project at all, realization quickly dawned on us that now, it's time to actually make it happen.

But how to start a journey towards carbon neutrality together with **3 Lighthouse Cities and 2 Follower Cities** that are so different from each other? How to get on the same page in the first place when the cities all have their specific strengths and weaknesses, their cultural, economic, legal etc. specifics? Vitoria-Gasteiz joined the Covenant of Mayors in 2008, Sonderborg in 2012 and Tartu in 2014. Whereas Vitoria-Gasteiz has a population of ca. 250,000, Sonderborg has ca. 75,000 and Tartu 95,000 people. Not to mention the fact that, together with the Follower Cities from Asenovgrad and Lecce, the cities seem to be located as far apart from each other as possible in the EU context, implying different weather conditions, different energy needs, different solutions that can be applied... Each city basically needs to follow the path to carbon neutrality on their own, right? Well, turns out, this is not entirely the case.

Conceptual framework

Aligning cities' decarbonization goals and smart city approaches needs an overarching concept that helps to shape visions, objectives, plans and interventions – all that is needed for such an ambitious urban transition. In the case of SmartEnCity, the concept of **Smart Zero Carbon Cities** was developed. Together, it was stated that “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”. Be sustainable, be smart, be resource-efficient, be inclusive – a piece of cake, really, isn't it?

Turns out being a smart city is hard. You need to come up with **elaborate plans** for drastically reducing energy demand and maximizing renewable energy supply, covering **all sectors** from the built environment and mobility to ICTs and more. You have to find the **right people** to involve in the process right from the start so you have a team to make plans with in the first place, hoping they'll stay for the ride. You have to think of **financing schemes** and **business models** for actually making it happen. You actually have to make it happen, **implementing** smart city solutions and **monitoring** the impact they bring about in order to decide on the scaling up of solutions. Of course, don't forget to **involve the citizens** in every step of the way! You have to **inspire** a change in people's mindsets, encouraging them to act more environmentally friendly, and understand what kind of a city they want to live in. Smart cities really are superhero cities.

Luckily enough, the masterminds of the SmartEnCity project came up with a few useful tools to help cities along the way. The most important one of these is the [Cities4ZERO methodology](#) or “the urban transformation strategy for cities’ decarbonisation”. Basically, it reflects how the Smart Zero Carbon City concept was implemented in the Lighthouse and Follower Cities in the SmartEnCity project and **puts this experience into a framework that other cities can use** as well in their transformation processes towards becoming carbon neutral. The main input for coming up with the Cities4ZERO methodology came from the planning, implementation, monitoring and replication activities of the SmartEnCity project, so let’s take a moment to briefly look back at what happened in the first years.

SmartEnCity recap

With the official start of the SmartEnCity project in February 2016, the work really began. The three Lighthouse City teams together with the two Follower Cities worked together to define a shared **SmartEnCity regeneration strategy**, which later became **the Cities4ZERO methodology**. This **common framework was adopted** by the Lighthouse City teams based on the local contexts and demo site specifics and was used for implementing the smart city solutions that were promised to be demonstrated. You can read all about the Lighthouse City solutions in the SmartEnKIT, covering [energy efficiency](#), [mobility](#), [ICT](#) and [citizen engagement](#) solutions. The common methodology that was collaboratively developed came into play again when it was time to [monitor and evaluate](#) the solutions that were implemented in the demo sites. This helped to exploit synergies among the three Lighthouse City projects and harmonize assessment processes.

This brings us to the last, but one might say the most important phase – encouraging the **replication and scale up** of the SmartEnCity transformation processes. This is why you’re probably reading this recap of the SmartEnCity project in the first place – because **we can now share all the tools and resources that might interest other cities and city stakeholders through our SmartEnKIT!** We have established the [SmartEnCity Network](#) that now brings together more than 60 ambitious small and medium-sized cities across Europe who are proud to say: “You really don’t have to be a capital city to make a major difference!” We have prepared dozens of informative [newsletters](#), [bulletins](#), [scientific articles](#), [webinars](#), [academies](#) and [videos](#) that are now a testament to how the project has unfolded over the years. We have developed various strategies and planning tools that helped us (and now hopefully, others too) along the way.

Integrated energy planning

Replication efforts in SmartEnCity were not only aimed at other cities – we don’t only want the others to learn from and be inspired by the SmartEnCity transformation processes, we ourselves want to learn from them too! As such, the three Lighthouse Cities and the two Follower Cities of SmartEnCity set out to prepare [IEPs and replication roadmaps](#) for themselves, building on the project experience, extending it to other districts and planning further actions in the cities as a whole. All this for the sake of moving closer and closer towards becoming Smart Zero Carbon Cities.

By now, you probably have a good idea of the kind of methodology the cities used for preparing these replication plans – **Cities4ZERO was now put into action.** The Cities4ZERO framework **has altogether 3 phases and 16 steps.** For completing their integrated energy plans and replication roadmaps, the SmartEnCity partners went through the first phase – **the strategic phase** – along with the first six steps, i.e. **engage, analyse, diagnose, envision, plan and integrate** (see Figure 2). Here’s what the Lighthouse and Follower Cities did while taking each of these steps, after which we’ll come back to the replicability potential of the whole process. For more information about Cities4ZERO phases and steps, you are welcome to start [here](#).

1. Engage

We started off by creating local partnerships in each of the Lighthouse and Follower Cities to lead the replication roadmap planning process. These steering groups were mostly led by municipalities and involved partners from the industry, academia and NGOs, so that all relevant local stakeholders were engaged right from the start.

For example, in Lecce, **the initial working group was formed by Lecce Municipality** with support from RINA, a consultancy company that acted as an industry partner for Lecce. The technical team that was put together for the project included experts on urban and energy planning as well as in-house consultants for managing, planning and monitoring activities. Since then, the working group that includes key stakeholders from several public and private bodies has grown thanks to direct contacts as well as a formal expression of interest published on the website of Lecce Municipality. *“It is important to have a specific office and technical group of the Public Administration that can be transversal and collaborate with all the departments involved in the energy plan development and that can constantly support the governance,”* Serena Pagliula from Lecce municipality said.

A similar approach was also used by Tartu city, who formed a mixed task group of partners from the municipality, energy agency, academic and research institutions to steer the whole process of integrated energy planning and further engagement of external experts and citizens. **In Asenovgrad,**

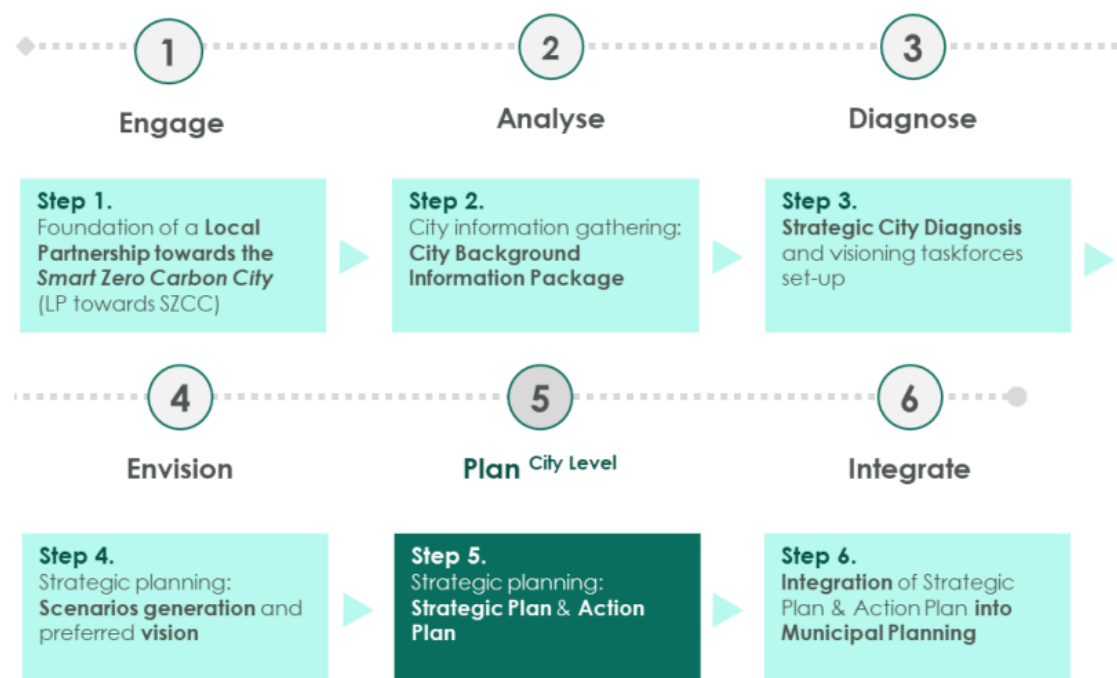


Figure 5 - Strategic phase of the Cities4ZERO methodology

a special task force was created as well, led by the Municipality who coordinated efforts with the major local stakeholders – local businesses, agricultural cooperatives, citizens – in order to start shaping the vision of Asenovgrad’s carbon neutral future.

The municipality also took the lead in **Vitoria-Gasteiz**. Here, **the municipality created a new energy and climate department**, managed by the former environment department director. This required a reallocation of former municipal workers and the recruitment of two new profiles for the staff. The role of the new department includes strategic development and coordination of climate action agenda, including tendering, and ensuring that energy and climate-neutrality regulation is fulfilled; coordinating the cooperation of interdepartmental and internal agencies as well as key external (private, academic, citizenship) stakeholders on climate action and managing key climate-related competences. This will facilitate a more suitable climate action ecosystem that supports the journey of Vitoria-Gasteiz towards climate neutrality. The created steering group, comprising the main stakeholders involved in all demonstration actions, met regularly to closely oversee the process, informing and calling also for timely political decision-making in key milestones of the process (both foreseen and unforeseen) and putting a lot of attention to keeping the residents informed and engaged through a combination of means (neighbourhood office, media presence, surveys, leaflets etc.).

However, the local context largely dictated the set-up of the steering group so the processes would be coordinated in the best possible way. For instance, **in Sonderborg**, a public-private partnership called ProjectZero led the strategic process as this partnership combines the public sector, industry and academia and was best suited to ensure the involvement of the local community as well.

2. Analyse

By now, we knew who we’re going to tackle the process with, but where were we in the first place? Well, someone had to do it – we went through all the existing literature, documents, policies, regulations and strategies at our cities’ level to collect as much background information as possible. The focus was on the most relevant systems of the cities in the context of decarbonization – local conditions, energy supply and consuming patterns, building stock and retrofitting needs, urban mobility, ICT infrastructures and services, citizen and stakeholder engagement.

Vitoria-Gasteiz, for instance, developed a city background information package for the analysis step, consisting of a repository of strategic municipal documents (both general and sectoral) that are relevant for the decarbonization strategy, an urban energy model portraying the energy system of the city (including emissions from the baseline year) and a set of indicators related to decarbonization, which could be integrated into a management dashboard in the future for the follow-up process.

In Lecce, an in-depth analysis was also performed based on materials that helped to define the baseline of the city, considering especially the socio-economic local conditions, the energy supply and consuming patterns, the building stock and retrofitting needs, the urban mobility, the ICT infrastructures and services and the citizens’ and stakeholders’ engagement. The documents that were thoroughly analysed included:

- Existing SEAP (2012) with an energy baseline referred to 2007
- PUMS (Urban Plan of Sustainable Urban Mobility)
- Municipal building regulation

- Energy Balances
- Open Data included on Lecce Municipal website
- Results of other projects, such as EU HORIZON 2020 Planheat project results
- Direct information from the Municipal Public Works Office

In Asenovgrad, the baseline for the energy consumption of the municipality was elaborated in cooperation with SmartEnCity project partners, ProjectZero and PlanEnergi. For this, the Energy Balance Tool was used – the exercise outlined the baseline and pointed to the most promising sectors and measures to reduce Asenovgrad’s carbon footprint.

The resulting city characterization in each setting gave us a better idea about the socio-economic and sectorial features and status of the cities along with city indicators and carbon emissions baselines. After all, “data is king – without it, you can achieve less, whereas once you have it, you can use data for various purposes starting from communication and ending with decision-making.” (Peter Rathje, ProjectZero). If all of this background analysis sounds very time-consuming and difficult, you’re in luck – our [City Check-up Assessment](#) will help you to understand exactly where you are with your city’s progress.

3. Diagnose

To support the cities’ strategic planning processes, the Cities4ZERO methodology foresees participatory [Foresight methods](#). As such, once the stakeholders were engaged and city information was gathered, we asked ourselves: “What do we want to achieve?”. This strategic question differed in each of Lighthouse and Follower Cities based on the local city context and needs combined with regional, national and EU priorities and directives.

For instance, **in case of Tartu, the aim was to find out how to reduce CO₂ emissions by 40% by 2030** as part of the objective to renew the existing SEAP into a SECAP (Sustainable Energy and Climate Action Plan). This was done as part of a wider energy planning process that was called “Tartu Energy 2030+”. **Lecce also set a 40% CO₂ reduction goal by 2030** in line with the objectives of the Integrated National Plan for Energy and Climate, paying attention to aligning the energy targets with regional, national and European priorities and directives. **Sonderborg had defined their ambitious zero-carbon goal by 2029** already back in 2007, working towards it with 5-year milestones and aiming at 25% of CO₂ reductions per each milestone. Combined with in-depth SWOT analyses of the cities together with their specific strengths and weaknesses as well as external opportunities and threats, the input was then in place for the next step – organizing scenario workshops.

4. Envision

Proceeding from the previously defined strategic question within the agreed timeframe, the aim was **now to co-create a preferred vision for the cities**. This was done by organizing local scenario workshops in each of the cities that brought together city planners, politicians, businesses, service providers, academia and community representatives. Working in groups, the stakeholders applied their expertise and points of view to describe various future scenarios of the city and to work towards consensus in finding the preferred scenario and course of action that the city should take

(read the [Foresight report](#) for more information on how the cities organized these workshops). **By the end of the scenario development processes, the cities had managed to define agreed city visions and increase a sense of ownership among its stakeholders.**

In Lecce, for instance, a workshop on Future Energy Strategies of the Municipality was organized, gathering more than 40 stakeholders from all the quadruple helix stakeholders. Local stakeholders were involved through an Expression of Interest published on the Lecce Municipality website. The stakeholders were selected considering the expertise and needs to cover all the strategic areas of the IEP: energy, urban lighting, mobility, ICT and new technologies, natural resources, waste management, government, people. More than 100 invitations were sent out. As a preparatory step, a questionnaire was circulated among all the participants, asking them to assess the probability and occurrence of a list of smart city trends for the next 10 years. Combining the results of this questionnaire with the strategic interests and needs of Lecce Municipality, four scenarios were identified and elaborated, leading to voting on the most desirable scenario for Lecce and discussing the first actionable steps towards that scenario.

In Tartu, two foresight workshops were organized for developing various visions of the future of Tartu with the help of stakeholders. Altogether, the workshops saw around 90 participants. Once elaborated, the 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. The resulting vision statement was the following: “In 2030, Tartu will be a green frontrunner with a smart developing community and good energy”.

In Sonderborg, the scenario workshop with 40 local expert participants helped to create a shared picture of the local IEP challenges, but also provided a robust platform for further discussions and the creation of the Sonderborg IEP (Sonderborg2025) during 2018. **In Asenovgrad**, three scenarios were elaborated, pointing to the most promising measures to contribute to carbon neutrality. The preferred scenario was selected during a stakeholder workshop that saw the development of different options for the city’s journey.

5. Plan

All the background work had now been done and it was time to develop the cities’ plans that would pave the way towards making the preferred visions a reality. More specifically, the visions fed into specific goals in strategic plans, which in turn translated into action plans with specific actions, key projects, responsibilities, budgets and timeframes for development. In the case of SmartEnCity, the emphasis of these actions was on the energy sector, **so we called the resulting plans Integrated Energy Plans (IEPs)**. For quantifying energy systems for different ambitions and timeframes in the IEP process, **two tools were of particular help for the cities** – the [energyPLAN](#) and the [Energy Balance Tool](#). Using these tools, the cities learned which project proposals were most relevant for the cities decarbonization goals.

For instance, **in Lecce, the IEP was developed starting from a list of actions per sector**, tailored based on the interests of the Municipality, identified by the project taskforce after several meetings, considering all the outcomes and ideas developed by every group during the Future Visions workshop. The Energy Balance Tool was first and foremost used for baseline calculations, but as the Municipality is now moving on with the detailed descriptions of the IEP actions, the tool will be used for the assessment of CO₂ reduction in order to define the activities to reach the goal.

Vitoria-Gasteiz published its APIET 2030 (the Action Plan for an Integrated Energy Transition in Vitoria-Gasteiz 2030), achieving an unprecedented level of agreement among the local community. The plan consists of a 2030 vision, a 2030 master scenario, and 9 key objectives (2 general, 7 specific), which are intended to be achieved through 40 actions within 5 strategic areas. Regarding key actions, each of them was defined according to a systematized layout, enabling to perform a joint analysis through a digital dashboard, visualizing overall APIET 2030 figures and interconnections. Furthermore, the potential impact of each key action was introduced into the urban energy model, quantifying the impacts of its implementation on a yearly basis, setting evolution rates, and calibrating overall consumption and emissions goals. Using the mentioned energy planning tools – and further work in visualizing and presenting this to the stakeholder groups – resulted in a very effective facilitation tool for fact-based and data-driven discussion with the stakeholder groups both during the goal-setting phase as well as in the project definition and prioritization stage.

The EnergyPLAN and Energy Balance tools were also successfully used **in Sonderborg, where more than 100 engaged local experts designed and developed more than 50 different energy actions** in the Sonderborg Roadmap2025 via ongoing working groups that were launched with the visioning workshop and continued to work on the IEP.

In order to reach the goals set for the **Tartu Energy 2030 plan, it is interesting to note that a lot of emphasis was put on the community aspect**, i.e. securing community agreements among Tartu's stakeholders. All residents of Tartu, organizations that operate in or are connected to Tartu, as well as apartment associations can join the agreement, stating their contribution to achieving the fixed goals.

6. Integrate

At the end of the day, it's the local authority's task to guarantee the legal, administrative and physical conditions to deploy the IEP and ensure it is fully integrated in the municipal planning instruments. This was the focus of this step – gaining City Governments' approval and securing commitment. For instance, **in case of Sonderborg, ProjectZero presented as a result of steps 1-5, 50 key projects to the municipality as part of its Roadmap2025**. After analysing all the proposals, Sonderborg Municipality released a booklet, stating all the agreements and commitments. As such, the Sonderborg IEP helped the Municipality in strengthening and integrating the energy and climate actions related to the use of land in the municipal integrated urban plan for 2019+. After developing their IEP, **Asenovgrad also made the effort to integrate this plan into their wider urban regeneration strategy** (the Plan for Integrated Development of the Municipality together with the respective implementation roadmap).

It's also good to know that the Cities4ZERO and the Covenant of Mayors frameworks are mutually supportive – **several of the SmartEnCity partner cities have already or are in the process of combining the methodologies and adapting their IEPs into SECAPs**. For Tartu, their IEP was also a SECAP right from the start, whereas **Lecce is now updating its IEP to become a SECAP**, starting from the common energy baseline fixed within the already submitted SEAP and updating the energy targets with the most recent targets. **Vitoria-Gasteiz also intends to give continuity to the strategic process** that started with the development of their SEAP 2030, that will now evolve into the SECAP 2030, where their APIET 2030 contributes to the whole climate mitigation part. The cities felt that the process of developing the IEPs into SECAPs was simple and straightforward exactly because all the engagement and co-creation efforts that had been done in devising the IEPs, facilitating a broader adoption of the vision into

SECAP ambitions. **All partner cities used the hard work they have done on their IEPs also as one of the main strategies to apply for the 100 Climate-neutral Cities by 2030 mission.**

Cities4ZERO replication potential

There we have it – all the partner cities with their specific context, conditions, expectations and ambitions followed these six steps to draft their integrated energy plans and replication roadmaps. All tweaked the process based on their needs, **all arrived at different results** – e.g. it was a Sustainable Energy and Climate Action Plan 2030 for Tartu; Integrated Energy Transition Action Plan 2030 for Vitoria-Gasteiz and the Integrated Energy Plan, i.e. Roadmap 2025 for Sonderborg. This only goes to prove that however much influenced by local factors and the environment, the technical, legal and social barriers and opportunities, cities can still follow the same methodology and arrive at somewhat different, but still comparable results. That's the key to benefitting from the Cities4ZERO methodology – you have to make it your own!

Of course, this is not to say all the work has now been done – demo site interventions completed, replication tools prepared, plans drafted for the post-project phase. As already mentioned, Cities4ZERO consists of 16 steps, not just the 6 steps completed by the SmartEnCity partners so far. As such, it is a work in progress for us too! The cities will now go on with the **design stage**, framing and designing the future key projects in detail, and the **intervention and assessment stage**, implementing and evaluating all the foreseen interventions.

To be honest, the work is not done even once all the 16 steps have been completed. The Cities4ZERO methodology can be followed step-by-step, but it should definitely not be seen as a linear process that comes to an end. Instead, it's a **circular process** that iterates in cycles. Some objectives become partially obsolete. Some key projects need to be readjusted to better contribute to the objectives. Some interventions turn out to be a great success, some not so much. As such, cities can work through the 3 phases and 16 steps over and over again, readjusting their strategy to move closer to the co-formulated city vision. Ultimately, to move closer to becoming a Smart Zero Carbon City. We're quite sure the work doesn't end there either. That's the thing with smart city ambitions – you can never be smart enough, can you?

One thing is for sure, though – **we really believe Cities4ZERO can help others too**. The framework is suitable for any kind of city, regardless of its diverse local needs. At the end of the day, all municipalities are facing common challenges in their urban transformation processes. Of course, city context matters, and Cities4ZERO allows for that flexibility, making sure that the cities take into account their specific context when designing strategies and tailoring them to local city needs. Moreover, methodologies are there to help us, but naturally, it is really up to people to actually make it happen. **It is thus crucial that each local steering group with representatives from all relevant stakeholders takes responsibility and ownership of the decarbonization process.** Once you have the right people and the right tools, realizing the vision (co-created, of course!) is not that far away anymore.

How to use & tips

Where to go from here? We advise you to check out the [Travel Guide for Cities](#) – the SmartEnCity story, the [SmartEnKIT tutorial](#) and the Travel Guide give you all the basics you need to start exploring the SmartEnKIT tools!

Tourist information centre:

A Travel Guide for Cities – SmartEnCity final publication



This interesting and appealing booklet tells you more about the SmartEnCity essentials. Get some basics sorted out before setting out to explore the streets of SmartEnKIT!

In 2016, the SmartEnCity project, one of the most ambitious and far-reaching smart city initiatives at the time in the EU, was launched. Over the course of the project, our three Lighthouse Cities Vitoria-Gasteiz (Spain), Tartu (Estonia) and Sonderborg (Denmark) have worked towards reducing their energy consumption through cost-effective retrofitting actions, increasing the use of renewable energy sources, and enhancing smart green mobility in their cities. All these smart, innovative best practice solutions to problems that most cities in the world share are collected in the booklet “The Journey towards Zero Carbon Emissions – A Travel Guide for Cities”: tried and tested, they are suitable for replication by every interested city!

The booklet also features the [Cities4ZERO](#) strategy that the project cities used to shape their path to zero emissions. The project’s Follower Cities Lecce (Italy) and Asenovgrad (Bulgaria) also share practical insights into their experiences about applying Cities4ZERO. The [SmartEnCity Network](#), which has grown to more than 60 cities, is also introduced – even though the value and support of a strong community is indescribable.

How to use & tips

- The booklet is short and concise with a table of contents at the start, making it easy to find the parts that interest you the most.
- Each chapter is equipped with a QR code that links to the project’s website that has more in-depth information on that particular topic.
- Each topic features quotes from actual implementers – their advice and tips are there to provide guidance and inspiration.
- As mistakes are a part of any process, we have also recorded our most outstanding blunders for your reading pleasure. Have a look so you do not repeat the same mistakes!
- Once you have had a look at the [SmartEnKIT tutorial](#) (“Welcome to SmartEnCity” sign), heard the [SmartEnCity story](#) at the coffee shop and now also got the basics of SmartEnCity through the Travel Guide, you are ready to explore what the SmartEnKIT has to offer you! Remember, the tools are divided into two main tracks – the “Explore more” track will tell you more about what has happened throughout the project as a source of inspiration, whereas the “Get into action” track will give you tools to boost your own zero carbon journey.
- In terms of replication, the most important SmartEnCity deliverables that you might want to look into are [Cities4ZERO: The Urban Transformation Strategy for Cities’ Decarbonisation](#) and [Report on widening the scope of replication knowledge through Smart Cities Network and several European platforms](#).

Links to more information

Download the guide here - [The Travel Guide](#)

Find a collection of our blunders and lessons learned here - [Worst practices and lessons learned](#)

School:

Webinars



Who better to learn from than the people who applied SmartEnCity concepts in practice? The webinars offer another opportunity to learn from the experts who implemented SmartEnCity in their cities.

The SmartEnCity webinars present practical experiences, challenges and learnings from actual city transition processes and provide tangible knowledge and ideas for how to approach the zero-carbon transition of cities. In total, there are 6 webinars (#6 is a bonus webinar) covering various topics to help municipal planners or other key stakeholders in the transition to a zero-carbon community. The goal for the webinars is to give you a better understanding of the methodologies, tools, and solutions used in SmartEnCity to address the common challenges of a transition to a zero-carbon city through the lens of those who applied them in their communities.

The theme for each lesson is outlined below:

- Webinar 1: Strategic Energy Planning in countries and cities.
- Webinar 2: Facilitating energy transition at city level.
- Webinar 3: Empower your city transition – Citizen engagement learnings from European municipalities.
- Webinar 4: Energy Retrofitting of Buildings – Cost effective energy transition and learnings from European municipalities.
- Webinar 5: Low Carbon Mobility.
- Additional webinar: Creation of Energy Efficient Buildings Renovation Action Plans for cities: guideline and application cases.

How to use & tips

- The webinars are a learning tool for you, so there is not a right or wrong way to go through each webinar. Simply go to the webinar link, click on a video link for the topic you are most interested in, sit back, and enjoy! If you prefer watching things in order, feel free to watch each webinar from start to finish. Webinars 1-5 are accompanied by a presentation that you can download for more information while you are watching the webinars.
- Tip - if you are learning to use the [Energy Balance Tool](#), Webinar 2 is particularly useful to look into!
- Want some more lessons about the [Cities4ZERO](#) framework? Be sure to check out the [SmartEnCity Academy](#) too.
- This might be a good moment to also take a closer look at the solutions that SmartEnCity Lighthouse Cities demonstrated throughout the project – these are grouped into [energy efficiency](#), [mobility](#), [ICT](#) and [citizen engagement](#) solutions.

Links to more information

Visit the website here - [SmartEnCity Webinars](#)

Further links for Webinar 2 - [Trial version of a tool \(excel file\) presented in the webinar](#) and [Guideline on how to use the tool](#)

News kiosk:

Newsletters

The project newsletters provide a good overview of what has happened in the project over its course: from progress in the Lighthouse and Follower Cities to events and network activities, the newsletter covers it all comprehensively.

Each newsletter includes sections on all Lighthouse and Follower Cities – recent news, activities, and upcoming plans – in addition to news from the [SmartEnCity Network](#), and past and upcoming events. As part of a larger Lighthouse Cities community in the EU, newsletters often feature news from sister projects as well, making them a valuable resource for receiving all your Lighthouse project news in one place. For your convenience, here are the newsletters from each year of the project:

- The first newsletter in 2016 introduces the project and the plans of the Lighthouse Cities ([09/2016](#)).
- In 2017, we took a closer look at our Follower Cities' plans ([01/2017](#)) and introduced the first concrete solutions our Lighthouse Cities decided on once the theoretical frameworks were in place ([09/2017](#)).
- By 2018, the implementation phase was in full swing with the first solutions already realized ([02/2018](#)) and the SmartEnCity Network continuing to expand ([09/2018](#)).
- In 2019, retrofitting took central stage in Tartu and Vitoria-Gasteiz ([02/2019](#)) while Sonderborg launched their innovative city ICT platform ([10/2019](#)).
- In 2020, the SmartEnCity Academy kicked off with their first lesson ([04/2020](#)) as the implementation phase was slowly drawing to a close with partners doing their best despite the global pandemic ([10/2020](#)).
- By 2021, the project successfully applied for an extension to finish the last of its activities and monitor the performance of the already implemented solutions ([06/2021](#)).

How to use & tips

- As newsletters are published twice a year, there are not an overwhelming amount of them. The dates in the name of each archived newsletter help you with getting your bearings: time travel to any year in the project and see how the SmartEnCity project was developing!
- If you're already in the spirit of exploring the SmartEnCity journey, be sure to also check out the [SmartEnCity Academy](#), [videos](#), [webinars](#) and [Network bulletins](#).

Links to more information

Read the newsletters here – [Newsletter archive](#)

Cinema: Videos



A picture is worth a thousand words: see our videos and pictures for stories on our cities and their solutions.

One of the aspects about SmartEnCity that makes it so special is that the solutions are tangible; thousands of people living in the SmartEnCity cities can see, feel, hear, interact with, and experience the solutions implemented in this project. Of course, there are pages upon pages of text that describe the solutions, but sometimes it is better to see those solutions in action. To this end, we have developed several videos which provide an overview of SmartEnCity, detail the methodologies used, and showcase the solutions implemented in each city. These videos are for anyone, so please, sit back, select a video, and get inspired.

How to use & tips

- Simply go to the [SmartEnCity videos page](#), explore the videos, and select the one you want to watch first! Take a stroll in the Tartu pilot area to look at murals, travel to Sonderborg to see EV charging stations or visit sunny Vitoria-Gasteiz to tour their biomass district heating station. Don't forget to check out our Follower Cities as well and watch the videos of Lecce and Asenovgrad too!
- The city of Tartu also has an entire SmartEnCity playlist with videos specific to Tartu! To view the videos, select the following link: [Tartu SmartEnCity playlist](#)
- Sonderborg has also shared several videos of how they have done things in their city. To view the videos, go to the [ProjectZero YouTube channel](#) or watch a video of the citizen engagement process in Sonderborg here: [Sonderborg Forsyning YouTube video](#).
- Tartu and Sonderborg also created videos with support of SCIS, showcasing the journeys of their cities: [Tartu video](#) and [Sonderborg video](#).
- Feel inspired and what to get into action? We advise you to start from the [City Check-up Assessment](#) and [Cities4ZERO methodology](#).
- Want to learn more about the Lighthouse City solutions? We have plenty to share from [energy efficiency](#) and [mobility](#) to [ICT](#) and [citizen engagement](#)

Links to more information

Find all videos here - [SmartEnCity videos](#)

Find SmartEnCity Lighthouse videos here – [SmartEnCity Lighthouse videos](#)

Find videos of Tartu in SmartEnCity here - [Tartu SmartEnCity playlist](#)

Find videos of Sonderborg in SmartEnCity here – [ProjectZero Sonderborg](#)

Find the video of the 100% Climate Neutrality Conference in Sonderborg here – [Seeing is believing virtual tour](#)

Find SmartEnCity videos on other channels here – [SmartEnCity in other channels](#)

Library:

Scientific publications

From foresight and retrofitting to spatial planning and energy system analysis – see what the SmartEnCity researchers have to say about decarbonization from a scientific point of view!

The SmartEnCity project has accumulated a thorough understanding of urban decarbonization processes, both from theoretical approaches and demonstration actions. In this sense, the knowledge developed in this set of scientific publications provides a solid background for all SmartEnCity solutions and achievements, covering a wide range of topics, solutions, methods, tools and reflections around the smart zero carbon cities of the future.

So far, the following publications have been prepared as part of the SmartEnCity project:

- Towards an Integrated Approach to Urban Decarbonisation in Practice: The Case of Vitoria-Gasteiz
- ENER-BI: Integrating Energy and Spatial Data for Cities' Decarbonisation Planning
- Energy Vision Strategies for the EU Green New Deal: A Case Study of European Cities
- Cities4ZERO Approach to Foresight for Fostering Smart Energy Transition on Municipal Level
- Cities4ZERO: Overcoming Carbon Lock-in in Municipalities through Smart Urban Transformation Processes
- Smart Zero Carbon City: Key factors towards smart urban decarbonization
- Retrofitting Soviet-Era Apartment Buildings with 'Smart City' Features: The H2020 SmartEnCity Project in Tartu, Estonia
- From Carbon Calculators to Energy System Analysis in Cities
- European Union Horizon 2020 Smart City Approach and Its Application in the Bulgarian Context
- Smart Zero Carbon City Readiness Level: Indicators System for City Diagnosis Towards Decarbonisation and Its Application in the Basque Country
- How does the environmental load of household consumption depend on residential location?

How to use & tips

- Proceeding from the [Cities4ZERO](#) methodology that was created in the SmartEnCity project, the newest publications suggest that in order to accelerate urban decarbonisation, it is critical to: promote a deeper integration between energy and urban planning disciplines, foster interdepartmental collaboration, allow for flexibility on the land-use planning regulations, back decisions with detailed urban energy models, and truly engage key local stakeholders in the planning and implementation processes.
- The articles are mostly related to two main components of the SmartEnCity project that you can explore more – the [Cities4ZERO methodology](#) and the Lighthouse City solutions, covering the fields of [energy efficiency](#), [mobility](#), [ICT](#) and [citizen engagement](#).

Links to more information

Read the publications here – [scientific publications](#)

Renovated apartments: Energy efficiency solutions

Read about which energy efficiency solutions our Lighthouse Cities Vitoria-Gasteiz, Sonderborg and Tartu implemented and how it all turned out.

All three Lighthouse Cities have made great strides towards becoming more energy efficient. To this end, the cities have built new infrastructure and upgraded existing solutions – each more impressive than the next!



Figure 6 - Renovations in Tartu (left), Sonderborg (middle) and Vitoria-Gasteiz (right)

Vitoria-Gasteiz:

- [Retrofitting](#) – 26 buildings (including 302 dwellings) in the Coronación neighbourhood, the city's most vulnerable neighbourhood, were retrofitted to become energy-efficient. This included the insulation of façades and roofs as well as installing double windows or replacing the existing ones. The district was connected to the new biomass-based district heating system. Overcoming considerable barriers in citizen engagement and community involvement, the retrofitting was a success, reducing not only energy consumption (up to 50% kWh/year, leading to 20% savings in household energy bills) but providing residents with modern, heated, and smart homes.
- [The biomass district heating system](#) – this novel heating system in Vitoria-Gasteiz services around 300 dwellings in the Coronación demo district with the opportunity to extend it to other neighbourhoods. As homes generally tend to have individual boilers based on natural gas, this solution was crucial in terms of promoting district heating culture in Vitoria-Gasteiz. The estimated installed power is 3,200 kW – all generated from biomass! The system has many benefits, such as reduced consumption, maintenance and operation costs, less carbon emissions, and reduced energy bills for the consumers.

Tartu:

- [Retrofitting](#) – 18 Soviet era apartment buildings in the downtown area of Tartu were renovated into smart, energy-efficient dwellings. During the project, the buildings (incl. roofs and basements) were completely renovated and insulated, new triple-glazed windows installed, central heating systems reconstructed, PV panels installed and all apartments were equipped with smart sensors and meters and a smart home system for monitoring energy consumption and controlling the indoor climate. So far, this retrofitting package has resulted in a ca. 60% reduction in energy consumption! All buildings, with the help of art curators, also chose an [original artwork](#) to decorate the dwelling (either a mural or sculpture).
- [District cooling station](#) – a whole new district cooling station was constructed in Tartu in 2016 by [Gren](#) that uses residual heat for producing water, which is supplied through the existing district heating network. More specifically, this system is based on a heat pump that, installed to return the flow of the district cooling system, produces heat for the district heating system by using residual heat from cooling. The district cooling station also uses free solar energy from PV panels to cover a part of the cooling system's energy demand.
- [LED lights with smart controllers](#) – the pilot area of Tartu received new LED street lighting with smart controllers. The new lights are equipped with various sensors and can analyse traffic volumes and flows, road conditions, noise levels and various environmental data such as pollution, temperature, humidity, etc. The new lights save up to 80% more energy!

Sonderborg:

- [Retrofitting](#) – 7 different social housing departments with 51 buildings (including 815 apartments) were retrofitted with different measures, which include insulation, new ventilation with heat recovery, new LED lighting both indoors and on the street, automatic heating control systems in the district heating supply of buildings, improvements to indoor climate and PV panel installation. The retrofitting achieved energy savings of up to 47%!
- [Solar cells with battery storage](#) – 1,639 apartments were connected to PVs with battery systems on the rooftops of the housing association buildings in Sonderborg. As the price for selling solar electricity to the public grid is low, it made more sense to help the residents use the generated electricity directly in their homes. For this, solar cells with batteries were installed, enabling energy savings for the residents and for them to use the energy stored during the day even at night, which helps reduce the peak load demand on the public grid.

How to use & tips

- We have more solutions for you to explore – why not check out what the SmartEnCity partners did in the fields of [mobility](#), [ICT](#) and [citizen engagement](#) too!
- If you want to see the deployed solutions in more context and visuals, why not explore the [SmartEnCity Academy](#), [videos](#), [webinars](#), [newsletters](#) and [Network bulletins](#).

- Want a more scientific approach instead? Check out the SmartEnCity [scientific publications](#) that elaborate more on the theory behind the practice.

Don'ts

Read our [Travel Guide for Cities](#) to see what worked and what did not with these solutions, or go directly to our [worst practices](#) to see our most important learning points.

Links to more information

Find the city solutions here – [City Solutions / SmartEnCity.eu](#)

Read the Vitoria-Gasteiz reports here – [Vitoria-Gasteiz demo intervention summary report](#), [Building retrofitting interventions completed](#) and [District heating network deployed and in use](#)

Read the Tartu reports here – [Building retrofitting completed](#), [District heating and district cooling system is commissioned and deployed](#) and [Street lighting](#)

Read the Sonderborg reports here – [Sonderborg demo intervention summary report](#) and [Sonderborg building retrofitting complete](#)

Bus station:

Mobility solutions

Read about which mobility solutions our Lighthouse Cities Vitoria-Gasteiz, Sonderborg and Tartu implemented and how it all turned out.

From biogas-fuelled buses to electric bikes – the range of mobility actions in SmartEnCity is far and wide. Offering sustainable and environmentally conscious mobility options is key to building clean and healthy cities.



Figure 7 - Mobility solutions in Sonderborg (left), Tartu (middle) and Vitoria-Gasteiz (right)

Vitoria-Gasteiz:

- [Electrification of public transport](#) – the city transformed its busiest bus line into a modern and clean electric bus rapid transit line with 48 bus stops, 4 ultra-fast inverted pantographs, 7 articulated e-buses and 6 conventional-size e-buses. The new facilities that host the smart electric buses mark the dawn of a new era of green electric public transport in Vitoria. Replacing conventional diesel buses means an annual CO₂ savings of more than 1,300 tons! In addition to this, the Vitoria-Gasteiz City Council deployed an e-bike sharing station to foster sustainable mobility among its employees – in just ca. 10 months, 8,150 kilometres were covered using electric bicycles, equivalent to saving about 1 ton of CO₂ emissions!

Tartu:

- [Public bike sharing system](#) – Estonia's first public bike sharing system was launched in Tartu in 2019. Originally consisting of 750 bikes (about 2/3 of which are e-bikes) and 69 bike share stations (the locations chosen together with the citizens), the system has expanded yearly (also to other nearby municipalities) and proven to be an overwhelming success. What is more, if you have a valid bus period ticket, the first hour of bike sharing is free of charge!

- [Biogas buses in public transport](#) – the city of Tartu replaced its entire old bus fleet with 64 brand new biogas buses to serve the public transportation network. The old route map was reworked together with the citizens and the newly launched bike sharing system connected to the public transport system – the bus card can be used both for buses and renting bikes, making it a convenient single system for the user. Since 2020, Tartu is proud to say that its public transport system is 100% carbon neutral!
- [Public EV rapid chargers](#) – five electric car rapid chargers were installed in the city centre of Tartu to ensure the charging infrastructure of the city is diverse and accommodates all EVs.
- [Reusing old EV batteries for solar energy storage](#) – EV batteries that currently have limited lifespans are a drain on resources and the environment. To test if the batteries could be repurposed as storage units, a 300 m² solar panel park with a recharging point using old EV batteries was constructed. The first results are promising!

Sonderborg:

- [New biogas buses and a biogas filling station](#) – the city constructed a new biogas filling station (the biogas used is produced in the municipality itself!) and replaced its old diesel-fuelled buses with 44 brand new biogas buses. Not only can you bring your bike with you on the buses now but improved digital services will always notify you of departures and arrivals, any delays, etc.
- [Public EV chargers](#) – 31 EV charging points were installed in the Sonderborg area – and not only near car parks, but as a test, also at company car parking lots in the industrial area, and tourism and sport centres. As of 2022, Sonderborg is now in top 5 Danish municipalities by charging capacity per citizen with its more than 200 public charging points!

How to use & tips

- We have more solutions for you to explore – why not check out what the SmartEnCity partners did in the fields of [energy efficiency](#), [ICT](#) and [citizen engagement](#) too!
- If you want to see the deployed solutions in more context and visuals, why not explore the [SmartEnCity Academy](#), [videos](#), [webinars](#), [newsletters](#) and [Network bulletins](#).
- Want a more scientific approach instead? Check out the SmartEnCity [scientific publications](#) that elaborate more on the theory behind the practice.

Don'ts

Read our [Travel Guide for Cities](#) to see what worked and what did not with these solutions, or go directly to our [worst practices](#) to see our most important learning points.

Links to more information

Find the city solutions here – [City Solutions / SmartEnCity.eu](#)

Read the Vitoria-Gasteiz reports here – [Vitoria-Gasteiz Demo Intervention Summary Report, Electric vehicle fleet and charging infrastructure](#) and [Last mile logistic electric infrastructure deployed and in operation](#)

Read the Tartu reports here – [Bike sharing and electric bike rental system purchased and in operation](#), [Mobility infrastructure set up and in operation](#) and [Gas buses purchased and in operation](#)

Read the Sonderborg reports here – [Sonderborg demo intervention summary report](#), [38 biogas buses in operation](#) and [Report on electric vehicle chargers in operation](#)

Communication tower:

ICT solutions

Read about which ICT solutions our Lighthouse Cities Vitoria-Gasteiz, Sonderborg and Tartu implemented and how it all turned out.

ICT solutions not only help make life easier by providing simple, helpful data but they also play a crucial part in integrating all the smart systems of a city into a comprehensive whole.



Figure 8 - ICT solutions in Tartu (left and right) and Sonderborg (middle)

Vitoria-Gasteiz:

- [Urban management system](#) – the platform aims to supply the city with a solution where all existing ICT systems will be integrated and provide a solution for the systematic migration of sectorial legacy systems into the new city platform. The platform is used to monitor the performance of all the project's interventions, i.e. energy use in the retrofitted neighbourhood, mobility (EVs, route optimization etc.), and to connect with citizens.

Tartu:

- [Smart home solution](#) – one of the additional measures besides fully retrofitting Tartu's pilot area apartment buildings is installing smart home systems in each of the apartments. In essence, this is a tablet computer near the front door of each apartment (and an app) that enables the residents to monitor their energy consumption and control their indoor climate. In the future, the consumption data will be accessible to third parties such as SMEs and startups for building up innovative services!
- [Tartu ICT platform](#) – the aim of the platform is to collect and analyse city-wide data, both public and private, and to provide a user-friendly interface for any regular user who wishes to see real-time information about their city. The platform is also used to monitor the retrofitted pilot area, buses and bike sharing bikes, and much more. Initially designed for Tartu, the ICT platform was then also adapted for Sonderborg's case!

Sonderborg:

- [Sonderborg ICT platform](#) – the city’s long-term vision is to build a Digital Ecosystem for city data and services by integrating various data inputs and sensor systems together into one city ICT platform, where anyone could add their own Value Services on top of the provided city platform. The city portal has both an Open Data portal and a My Data portal reserved for citizens’ private data. Sonderborg’s ICT platform is a replication of Tartu’s ICT platform and since its deployment, 966 data devices have been connected and more than 110 GB of data has been generated!

How to use & tips

- We have more solutions for you to explore – why not check out what the SmartEnCity partners did in the fields of [mobility](#), [energy efficiency](#) and [citizen engagement](#) too!
- If you want to see the deployed solutions in more context and visuals, why not explore the [SmartEnCity Academy](#), [videos](#), [webinars](#), [newsletters](#) and [Network bulletins](#).
- Want a more scientific approach instead? Check out the SmartEnCity [scientific publications](#) that elaborate more on the theory behind the practice.

Don’ts

Read our [Travel Guide for Cities](#) to see what worked and what did not with these solutions, or go directly to our [worst practices](#) to see our most important learning points.

Links to more information

Find the city solutions here – [City Solutions / SmartEnCity.eu](#)

Read the Vitoria-Gasteiz report here – [Vitoria-Gasteiz Demo Intervention Summary Report](#)

Read the Tartu report here – [ICT infrastructure commissioned and deployed](#)

Read the Sonderborg report here – [Sonderborg demo intervention summary report](#)

Read the full report here – [CIOP Functional and Non-Functional Specifications](#)

Read the full report here – [Data Model Architecture Implementation](#)

Read the full report here – [Interoperability Mechanisms](#)

Read the full report here – [Designing guide and tool catalogue](#)

Read the full report here – [Integration and Validation report](#)

Read the full report here – [Data Model Architecture Implementation](#)

Read the full report here – [Strategies for added value services and tool catalogue](#)

Innovation lab:

Citizen engagement solutions

Read about which citizen engagement and participation solutions our Lighthouse Cities Vitoria-Gasteiz, Sonderborg and Tartu implemented and how it all turned out.

Considering the ambition and scope of the SmartEnCity project, citizen engagement and good, honest communication has been crucial from the get-go.



Figure 9 - Citizen engagement in Vitoria-Gasteiz (left), Tartu (middle) and Sonderborg (right)

Vitoria-Gasteiz:

- [Citizen engagement in retrofitting](#) – the novelty and ambition of retrofitting in the district that needed support the most was no easy undertaking as the decision to retrofit must come from the residents. As there are no housing associations in the Vitoria-Gasteiz demo area, it thus took a lot of effort to engage each homeowner to participate in the project. The strategy that was adopted was as follows:
 - Disseminating the SmartEnCity project at events where the neighbourhood is invited.
 - Contacting the pilot area residents to explain the value offer.
 - Setting up an information office in the neighbourhood to keep close to the citizens was a key success factor.
 - Attracting a small number of early adopters and organizing co-creating sessions on how to engage more people in the neighbourhood.
 - Spreading the experience of the early adopters in the neighbourhood.

The approach proved successful and clear, well-defined messages hit home with the residents. The support of a dedicated project partner was also crucial as they provided technical, legal and administrative support to the residents. Post-retrofitting engagement activities included public information events for raising energy efficiency awareness, meetings with homeowners, a phone campaign to gather citizens' questions

and concerns and a citizen satisfaction survey before the project ending. Although the solutions have now been deployed, communication will have to stay until the end of the project and beyond!

Tartu:

- [Citizen engagement in retrofitting](#) – as the decision to retrofit must come from the apartment owners, technical support and frequent meetings were very important from the start. The local partners visited internal housing association meetings to explain and promote the upcoming retrofitting measures, answering the residents' questions, explaining the value offer as well as the benefits and risks of the actions. Once the decision to retrofit was made by the housing association, technical, legal, and administrative support was also provided.
- [Social innovation](#) – a series of innovative engagement experiments expected to affect the consumption behaviour of people were conducted in the pilot area. Essentially, this means experimenting with social innovation models to facilitate behavioural change and mutual learning among pilot area and Tartu residents. For this, a [public lecture series "Planning an energy-efficient city"](#) was launched at the beginning of the project with expert speakers from both Estonia and abroad. Secondly, a training program was launched: awareness-raising through training active ambassadors (the so-called Smart House Training Program) among pilot area residents. The aim was to encourage pilot area residents to learn from each other by training so-called Ambassadors in every pilot area building who would be able to help and support their neighbours in various aspects of smart house and smart city living. Thirdly, a [study on attitudes towards technologies and the environment](#) was conducted in two parts – before and after the renovation – to understand the value, beliefs and behaviours of the pilot area citizen, what supports or hinders their behaviour change, and how to best engage them.
- [Artworks in the pilot area](#) – in addition to retrofitting the pilot area buildings, each housing association could choose an original artwork to be painted on their retrofitted house or installed nearby. 15 murals and 2 sculptures have been created in the pilot area, creating a unique public art gallery that draws both locals and visitors. Each housing association was supported by expert art curators and each artwork was created through co-creation. This one-of-a-kind art project was also replicated in the demonstration area of Vitoria-Gasteiz.

Sonderborg:

- [Citizen engagement program](#) – the program was focused on housing associations and carried out in four steps:
 1. Establishing good cooperation and communication.
 2. Compiling a team to keep in contact with the tenants, preparing the program, ensuring communication with the tenants.
 3. Involving 30 families in the program so they would be aware of their energy consumption patterns, using the experience of the families to prepare a program to be replicated in other departments.
 4. Launching citizen engagement in the rest of the departments of the involved housing associations, scaling up the citizen engagement activities in small groups of departments by segmenting all the tenants and making targeted communications.

How to use & tips

- We have more solutions for you to explore – why not check out what the SmartEnCity partners did in the fields of [mobility](#), [ICT](#) and [energy efficiency](#) too!
- If you want to see the deployed solutions in more context and visuals, why not explore the [SmartEnCity Academy](#), [videos](#), [webinars](#), [newsletters](#) and [Network bulletins](#).
- Want a more scientific approach instead? Check out the SmartEnCity [scientific publications](#) that elaborate more on the theory behind the practice.

Don'ts

Read our [Travel Guide for Cities](#) to see what worked and what did not with these solutions, or go directly to our [worst practices](#) to see our most important learning points.

Links to more information

Find the city solutions here – [City Solutions / SmartEnCity.eu](#)

Read the Sonderborg report here – [Sonderborg SmartEnCity Stakeholder Platform Report in citizen and stakeholder involvement strategy](#)

Read the general citizen engagement strategy here – [Citizen engagement strategy and deployment plan](#)

Expo:

SmartEnCity Network

The SmartEnCity Network is a community of more than 60 small to medium-sized cities across Europe, all connected by the aim of moving towards carbon neutrality. As the Network states, you do not have to be a capital city to make a major difference!

Establishing the SmartEnCity Network has been an important and integrated part of SmartEnCity, especially for the large-scale replication of the systemic approaches demonstrated throughout the project. It is integrated in the sense that the SmartEnCity Network connects and replicates the findings of the SmartEnCity Lighthouse and Follower Cities with the ambitions and needs for similar systemic transitions in small and medium-sized cities across Europe, which is the main target group of the SmartEnCity Network.

The SmartEnCity Network invites cities, urban planners and associated experts across Europe to join the SmartEnCity effort to co-create Smart Zero Carbon Cities. The Network members commit themselves to sharing their ambitions, results and best practice learnings based on an integrated action-oriented approach with strong citizen participation. The vision is to enable Europe's small and medium-sized cities to become fast economically growing Smart Zero Carbon Cities. The SmartEnCity team offers the Network honest proven experiences, inspirational cases, integrated approach insights, knowledge sharing, tools and learnings from the three SmartEnCity Lighthouse projects including utilities and industrial partners, our two Followers and our numerous Network cities. You do not have to be a capital city to make a major difference! The following five-step model has been created to secure a dynamic and robust process for how network cities can be exposed, engaged, committed, trained and awarded, as participants of the SmartEnCity Network: 1) Create Awareness 2) Create Engagement 3) Create Attitude 4) Replicate Approach 5) Award.

The SmartEnCity Network enables cities across Europe to become Smart Zero Carbon City frontrunners

We invite cities, urban planners and associated experts across Europe to join our effort to co-create Smart Zero Carbon Cities. We commit ourselves to share our ambitions, results and best practice learnings based on an integrated action-oriented approach with strong citizen participation.

Our vision is to enable Europe's small and medium-sized cities to become fast economically growing Smart Zero Carbon Cities.

We offer the network honest proven experiences, inspirational cases, integrated approach insights, knowledge sharing, tools and learnings from the three SmartEnCity Lighthouse projects including utilities and industrial partners, our two followers and our Network cities.

You don't have to be a Capital City to do a major difference.

Join the SmartEnCity Network and become a Smart Zero Carbon City frontrunner

Figure 10 - SmartEnCity Network value proposition

This strategy has been further developed and now also includes the establishment and operation of the national city networks in the five focus countries of the SmartEnCity project (Estonia, Denmark, Spain, Bulgaria and Italy), based on experience gained from the Energibyerne.dk network in Denmark, which is the outcome of SmartEnCity network activities in Denmark. The development of the national based networks is considered one of the most crucial parts that will allow for wide replication of the SmartEnCity outcomes, solutions, methods the updated strategy of the SmartEnCity Network with the aim of reaching 15+ cities that will be willing to replicate the integrated energy planning method. This model has also been a communication strategy which has allowed the Network to grow and reach its goal of 60 city members.

The SmartEnCity Network offers the following value to its network members:

- Already tested smart energy (Lighthouse City) solutions;
- Learning experiences from all SmartEnCity Network members across Europe;
- News from the Network members;
- Newsletters about the SmartEnCity (twice a year);
- SmartEnCity Network Bulletins (6 times a year);
- Invitations to SmartEnCity Network meetings and capacity-building workshops;
- The opportunity/invitation to start a national SmartEnCity Network in your country (beyond the five Lighthouse and Follower Cities' countries);
- Introduction to the integrated energy planning concept and [Cities4ZERO methodology](#);
- Assessment of cities according to the integrated energy planning process and providing personal feedback based on cities' answers (see also [City Check-up Assessment](#));
- Two series of webinars in the form of online training courses for cities;
- Opportunity to be visible on the SmartEnCity Network platform, learn about and share your best practices;
- A national/regional platform for the most ambitious cities/municipalities where they can exchange ideas, develop common procedures and methodologies for smart integrated energy planning and possibility to influence their own national framework conditions.

How to use & tips

- The Network platform is designed to provide smart city solutions and initiatives by topic. Simply use the “filter” option below the Network map to browse for the solutions of interest to you. You have the opportunity to also click on the pins on the Network map – this way, you will be able to see all the smart city solutions that a certain city has. If you are interested in finding out what the national Networks are doing and how they are collaborating, click on the yellow pins and be inspired. Scroll down to the news section and browse the archive to read about progress regarding various solutions that the Lighthouse and Follower Cities have been implementing.
- Want to learn more about what the Network has been up to? Why not explore the [SmartEnCity Academy](#) and the [Network bulletins](#).
- What about the wider smart city community that the SmartEnCity Network is positioned in? Find out more in the [External resources](#) section.

Don'ts

Don't worry about whether or not your city might be "eligible" for the SmartEnCity Network. Indeed, the Network has been focusing on engaging the most ambitious cities that want to replicate the smart zero carbon city strategy, but the Network is really for every city. You can learn and be inspired even if you are only now starting.

Links to more information

Visit the website here – [SmartEnCity Network](#)

Read the 1st activity report – [Smart Cities Network Activities Report v1](#)

Read the 2nd activity report – [Smart Cities Network Activities Report v2](#)

Read the 3rd activity report – [Smart Cities Network Activities Report v3](#)

Read the 4th activity report – [Smart Cities Network Activities Report v4](#)

Read the bulletins here – [Network bulletins](#)

See the sessions here – [SmartEnCity Academy](#)

See the webinars here – [Network webinars](#)

Read the full report here – [Report on widening the scope of replication knowledge through Smart Cities Network and several European Platforms](#)

Read more about the Danish SmartEnCity Network here - [Energibyerne](#)

Read more about the Estonian SmartEnCity Network here – [SmartEnCity Network Estonia](#)

University:

SmartEnCity Academy

Drawing from the expertise of both SmartEnCity partners and external experts, this online training course brings together theory and practice and opens up the background of Cities4ZERO in an interactive way.

The SmartEnCity Academy is an online training course that will teach you how to put the Cities4ZERO methodology into practice. The Academy follows the steps outlined in the [Cities4ZERO framework](#) and was designed to qualify city and municipal representatives, planners, and developers as ambassadors for a carbon free future and to provide them with the tools to help their cities reach their decarbonisation goals. The lessons offer clear explanations and practical examples from real life cases. If you are interested in using the Cities4ZERO approach in your city, then this is a great place to start!

The SmartEnCity Academy consists of four online webinars and slide decks that will guide you through the tools and methodologies used in SmartEnCity and teach you to use those tools to start or boost your own zero carbon emission journey. The webinars also include expert speakers from the smart city community and related initiatives such as the [Smart Cities Marketplace](#).



The theme for each webinar is outlined below:

- Lesson 1: The SmartEnCity Way towards Zero Carbon City: The Cities4ZERO Strategy and Integrated Energy Planning. Lesson 1 is a panel discussion with different SmartEnCity experts who introduce the main Cities4ZERO concepts – Urban Transformation Strategy for Cities and Integrated Energy Planning (IEP).
- Lesson 2: Mastering Governance & Political Barriers: Engage and Integrate. Panel discussion with political representatives from the SmartEnCity Lighthouse Cities Sonderborg, Tartu, and Vitoria-Gasteiz. The discussion focuses on how governance can be secured through organizational structures.
- Lesson 3: Where Are We Now? City Analysis and Diagnosis. The third training course is moderated by Michele de Santis from RINA Consulting S.p.A. The course focuses on the needs to be included in a city description according to the Paris Agreement, SmartEnCity, Covenant of Mayors, etc. and according to the visions of the cities.

Figure 11 - SmartEnCity Academy

- Lesson 4: Envision and Planning: The SmartEnCity Planning Process. The final training course illustrates how the planning process has been used in practice in two of the SmartEnCity Lighthouse Cities, Tartu and Vitoria-Gasteiz.

How to use & tips

- SmartEnCity Academy is simple – just click on the [SmartEnCity Academy](#) link to get started! Once on the page, you will see a brief overview of the SmartEnCity Academy and what to expect from the training. In each lesson, there is a link to watch a video of the lesson and a link for a presentation of the main concepts. All you need to do is click the video link and/or the presentation link and start learning!
- To learn more about the community that organized the Academy sessions and see what else they've been up to, go to [SmartEnCity Network](#). For instance, the Network has been publishing their [Network bulletins](#) covering the SmartEnCity journey along with the progress made among cities in the national Networks in Denmark, Estonia, Italy, Bulgaria and Spain.
- Want some more lessons specifically about integrated energy planning? Be sure to check out our series of [webinars](#) too.
- Want to get back to the basics? The [Cities4ZERO methodology](#) is the way to go.

Links to more information

Visit the website here - [SmartEnCity Academy](#)

Post office:

Network bulletins



If you are interested in what the SmartEnCity Lighthouse and Follower Cities are doing, but want to take your first steps on the same journey yourself, the SmartEnCity Network bulletins are the place to get inspiration and guidance!

[The SmartEnCity Network bulletins](#) are regularly published every eight weeks. As a regular newsletter, it informs about SmartEnCity network activities and focuses on topics related to replication. In each bulletin, the latest news from each Lighthouse City is introduced, along with useful references. The newsletter also includes “the EU corner”, which provides interesting information on the activities of the project that are open to other followers, replicators and partners, such as news on the latest webinars, publications, and so on.

How to use & tips

- The Network bulletins are a great source for learning about what the Lighthouse, Follower, and Network cities have accomplished and finding inspiration for your city’s path of replication.
- If you are not already a subscriber, the SmartEnCity project webpage has a complete list of all the published bulletins which can be browsed in whichever order. Each bulletin has a short description of its content so you can easily find the topics that interest you the most.
- To learn more about the community that the bulletins talk about and see what else they’ve been up to, go to [SmartEnCity Network](#).

Links to more information

Find the bulletins here – [Network bulletins](#)

Marketplace: External resources



Visit the Smart Cities Marketplace, explore the possibilities, shape your project ideas, and close a deal for launching your smart city solution!

The Smart Cities Marketplace was created by merging the two former European Commission projects “Marketplace of the European Innovation Partnership on Smart Cities and Communities” (EIP-SCC) and the “Smart Cities Information System” (SCIS) into one single platform. It is a major market-changing undertaking that aims to bring cities, industries, SMEs, investors, researchers, and other smart city actors together.

The Smart Cities Marketplace has thousands of followers from all over Europe and beyond, many of which have signed up as a member. Their common aims are to improve citizens’ quality of life, increase the competitiveness of European cities and industry as well as to reach European energy and climate targets.

The Smart Cities Marketplace is a resource for those who wish to learn more about smart cities and to take an active part in their development around Europe. The four main services provided include:

1. **Matchmaking:** Allows users to explore and participate in services and events for cities and investors on creating and finding bankable smart city proposals by using the Investor Network and publishing calls for projects.
2. **Community:** Consists of several Action Clusters and Initiatives with a variety of activities to help shape the market for Smart Cities in Europe
3. **SCALABLE cities:** Scalable Cities Secretariat is a city-led initiative created under the umbrella of the European Commission and CINEA, with the aim to create large-scale, long-term support for the cities and projects in the Scalable Cities group. It will provide large-scale, long-term support for the cities and projects involved in the H2020 Smart Cities and Communities Lighthouse Group with 18 projects and 128 cities participating.
4. **EU Initiatives:** Allows the user to explore other EU initiatives focusing on making EU cities better places to live and work.

How to use & tips

- The Smart Cities Marketplace provides you with vital knowledge to support you in moving your smart city ambitions forward. Here you will find use cases from more than 80 successful European projects, including over 18 Lighthouse projects, sharing solutions implemented in both small and medium-sized towns and in metropolises such as London, Barcelona and Vienna.
- To get more context with the SmartEnCity project, also see what the [SmartEnCity Academy](#) has said about the Smart Cities Marketplace.

Links to more information

Visit the Marketplace here - [Smart Cities Marketplace](#)

Find the Marketplace brochure here - [Smart Cities Marketplace Brochure](#)

Hospital:

City Check-up Assessment



Take this short assessment questionnaire to find out how far you are in the decarbonization process – is the necessary prep work done or are there steps you missed? Where does your city fit in regarding the Cities4ZERO methodology?

As a starting point for using the Cities4ZERO methodology, the SmartEnCity team developed the City Check-up Assessment tool. By filling in the questionnaire, cities can “test” themselves and see where their city is in the urban transformation process. The questionnaire covers various strategic questions related to the integrated energy planning concept, indicating where the city fits in regarding the Cities4ZERO methodological framework and what the city can do as the next steps to continue or start their transformation process. Taking ca. 10 minutes to complete, the Check-up Assessment is an easy way to start your city journey within the Cities4ZERO framework towards a smart zero carbon future.

Based on the cities’ responses received in the testing phase of the assessment tool, some of the findings among cities include:

- Almost 86% of the respondents have a coordination group in place for dealing with energy and decarbonization topics. These groups mostly include local authorities, technicians and politicians, they are mostly constant, not temporary, mostly fully financed by the municipality and they tend to focus on topics like the built environment, energy supply, mobility and citizen engagement.
- More than 95% of the respondents have already completed the city analysis and diagnosis phase regarding energy and decarbonization topics. The respective data mostly came from reports, but also indicators/KPIs. The sectors that were most likely included in this phase were energy, mobility and the built environment. The most popular methods were SWOT and brainstorming.
- Ca. 43% of the respondents already have a long-term vision for energy and decarbonization in place, whereas another 43% are currently developing one. Ca. 67% used a participatory process for that, involving stakeholders like politicians, public administration technicians, industrial partners, experts/researchers, citizens and NGOs.
- Ca. 52% of the respondents already have an action plan in place for energy and decarbonization topics with another ca. 43% currently developing one. Only ca. 29% have resources allocated for the respective actions, though, with ca. 47% saying resources are allocated partly and ca. 24% saying that no resources have been allocated yet.
- In developing their energy plans and/or actions, 75% of the respondents say they got inspiration from the [SmartEnCity Network](#) resources, 70% from the [SmartEnCity website](#) materials and 60% from the SmartEnCity project workshops.

How to use & tips

- Filling in the City Check-up Assessment questionnaire is a great way to understand the Cities4ZERO process better in the context of your own city. Be sure to check out the [Cities4ZERO](#) tool and process afterwards, though – this way, you will know exactly where your city falls in this framework, giving you an idea about the steps you have already completed and the actions to plan next!

- When filling in the questionnaire, be honest and self-critical. Do not just try to get a “good grade” – in order for the tool and the Cities4ZERO methodology to really work for you, try to find honest answers when contrasting your city’s situation to some of those uncomfortable questions.
- “A really useful tool. It was very interesting to fill it in as it makes you analyse and think of the procedures that are in place in your municipality. These questions are very good guidelines, indeed.” (representative of the City of Rakvere (Estonia), a member of the Estonian SmartEnCity Network).

Don'ts

We do not advise you to fill in the questionnaire without having a comprehensive knowledge of all the areas, teams and strategies of your municipality. If this is the case, we suggest that you just team up – involve other key people that complement each other’s expertise and tackle the questionnaire together to get the processes going!

Links to more information

Find the full questionnaire here – [City Check-up Assessment](#)

Town hall:

Cities4ZERO methodology



For those interested in learning from the SmartEnCity journey from a methodological point of view, the Cities4ZERO offers a great step-by-step strategy for smart urban decarbonization.

How can local authorities effectively address the decarbonization of urban environments in the long and short run? How can their interests and expertise be aligned with an integrated approach towards decarbonization? Cities4ZERO is a methodology that seeks to guide cities in their ambitious urban transformation processes, helping them to find the answers and to develop appropriate strategies while ensuring stakeholder commitment, all from an integrated energy planning approach.

Developed in close collaboration with the five partner cities of the SmartEnCity project, the Cities4ZERO methodological framework reflects the actual strategic energy planning processes that were ongoing in the partner cities. Based on this experience, Cities4ZERO was designed to enable effective action in other small and mid-sized European municipalities as well, both in terms of planning and implementation. Cities4ZERO takes an integrated approach to decarbonizing cities while focusing on the systems that have the highest impact on decarbonization processes, e.g. energy and integrated infrastructures, the built environment and green infrastructures, mobility and logistics, governance and engagement, ICTs and enabling technologies.

Cities4ZERO consists of 16 steps, structured in three stages. The process starts with the strategic stage, which helps a city administration to define the strategic planning framework that enables an effective transition to zero carbon cities. This is followed by the design stage, which guides the city through the development of key projects defined in the first phase, paving the way for actual interventions. The last stage thus focuses on intervention and assessment, including the deployment, monitoring, impact assessment and upscaling of the selected smart city solutions.

Do not let the concept of a “process” mislead you, though. The Cities4ZERO methodology can be followed step-by-step, but should not be seen as a linear process that comes to an end once the defined projects have been implemented and assessed. It is rather a circular process that is cyclically iterated, readjusting the focus of the strategies, leaving out parts that have become obsolete, redefining plans and key projects etc. All this in an attempt to reach the final decarbonization goal, according to how the vision was co-formulated for a specific city.

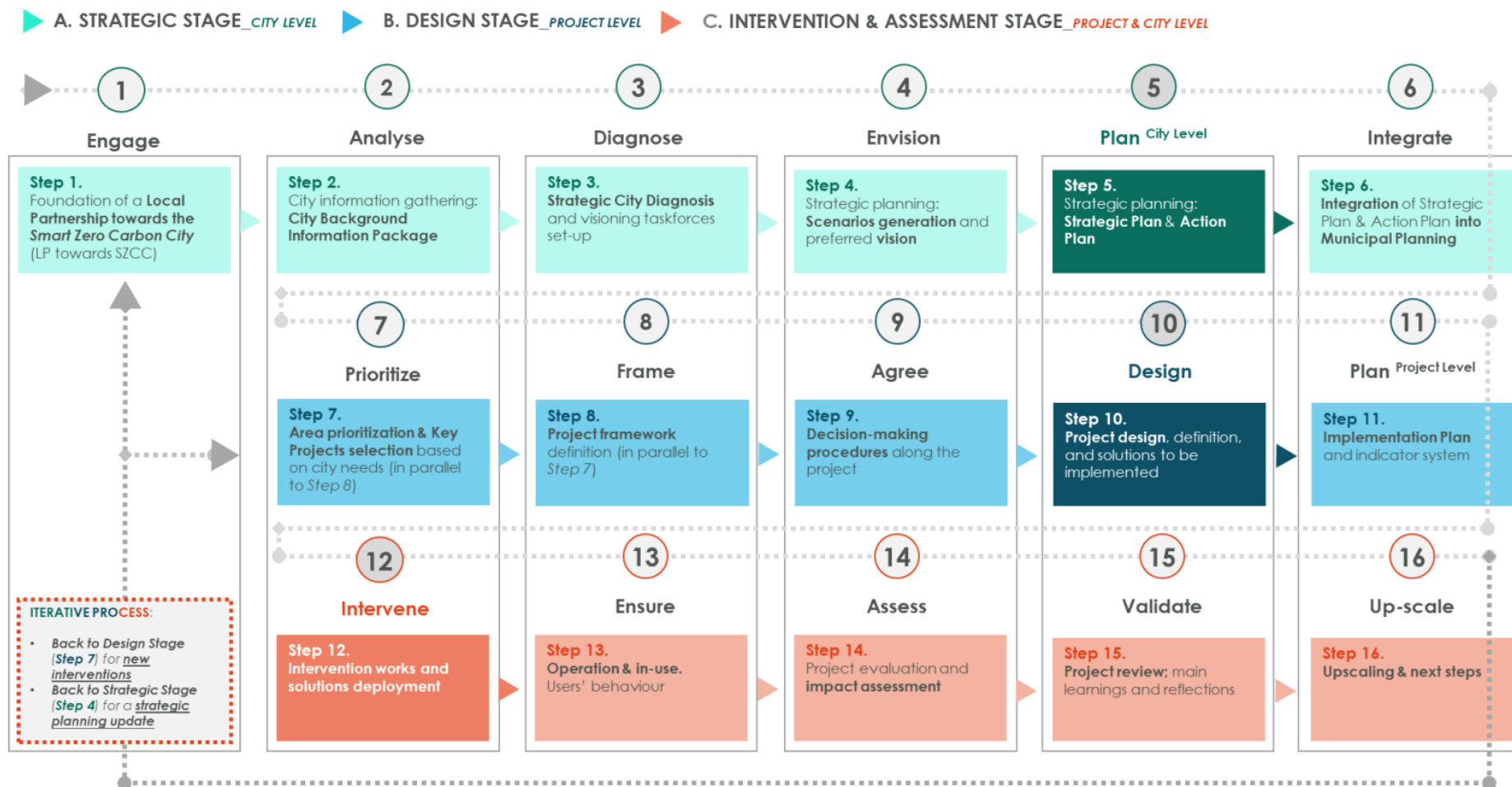


Figure 12 - Cities4ZERO methodology

How to use & tips

- Integrated planning means securing the commitment of various stakeholders and considering all dimensions of a problem (social, environmental, technological and economic parameters), in order to determine the most appropriate solutions. Integrated planning also addresses the need for coordination with other local strategies, initiatives, projects, departments etc. to avoid barriers and to leverage potential synergies in the local context.
- Local stakeholders and collaborative networks are key in the process. As they will be the ones who are going to implement the initiatives leading towards decarbonisation, they need to be engaged from the beginning to ensure that the chosen projects are implemented successfully and that the interventions have the desired impact on emissions.
- A rigorous assessment process is key to measuring progress towards city goals. We cannot improve what we don't measure! Measuring progress and reformulating the goals respectively is the basis of a circular process that will bring decarbonization closer and closer.
- The main principles of this strategy have been built upon the experiences of small and mid-sized cities, far from the scale, visibility and the available resources of large EU capitals. As the slogan of the SmartEnCity project indicates, "you don't have to be a capital city to make a major difference". We are seeking to involve a wide range of European cities on the path to decarbonization.
- If you are unsure about where to start in the Cities4ZERO framework or how it can work for you, take a look at the [City Check-up Assessment](#) tool as the first step. Once you fill in the check-up questionnaire, you will have a better idea of where your city fits in regarding the Cities4ZERO process and can start planning the next steps.
- If you want to learn more about some of the key components of the Cities4ZERO process, feel free to explore the [Foresight methodology](#), [IEPs and replication roadmaps](#) as well as [monitoring and evaluation](#).
- If you feel like you're ready for hardcore energy planning exercises, go straight to the [Energy Balance Tool](#) or [EnergyPLAN](#) tools.
- If you think now is the time for something lighter, why not explore the [SmartEnCity Academy](#), [videos](#), [webinars](#), [newsletters](#) and [Network bulletins](#) to see how SmartEnCity has used the Cities4ZERO methodology throughout its journey.
- Want a more scientific approach instead? Check out the SmartEnCity [scientific publications](#) that elaborate more on the theory behind the practice.

Don'ts

- The Cities4ZERO methodology will not give you the answers, it will help you find them! The Cities4ZERO approach is based on identifying common barriers and success factors in cities' urban transformations. Local context matters, however – an effective urban transformation towards decarbonization requires a thorough analysis of the local context to propose the most suitable plans and interventions for each specific environment. In addition to the commitment of the local government, it takes a strong collaborative network to increase the chances of success. After all, each city has unique features, culture, geography, goals, etc., which set the context to designing a strategy tailored to the local city needs. These local conditions influence the design and development of projects and therefore, it is crucial to consider differences and explore commonalities in this transition.

- Try to overcome the traditional planning procedures that still tend to be siloed. Take it from the SmartEnCity cities' experience – it really makes a difference in urban planning when you involve all the relevant stakeholders and potential implementers right from the start. Next time, give participatory practices like [Foresight](#) a chance!

Links to more information

Read the Cities4ZERO full report with guidelines for each step here - [Cities4ZERO: The Urban Transformation Strategy for Cities' Decarbonisation](#)

Read the scientific publication here – [Cities4ZERO: Overcoming Carbon Lock-in in Municipalities through Smart Urban Transformation Processes](#)

Read the scientific publication here - [Towards an Integrated Approach to Urban Decarbonisation in Practice: The Case of Vitoria-Gasteiz](#)

Read the scientific publication here - [ENER-BI: Integrating Energy and Spatial Data for Cities' Decarbonisation Planning](#)

Read the scientific publication here – [Smart Zero Carbon City Readiness Level: Indicators System for City Diagnosis Towards Decarbonisation and its Application in the Basque Country](#)

Read the scientific publication here – [Smart Zero Carbon City: Key Factors Towards Smart Urban Decarbonization](#)

Lighthouse:

Foresight methodology

Once you know your city's baseline situation, you can plan your first foresight workshop. Do you want to be carbon neutral by 2040? What are the current trends affecting your city's future? Foresight helps you set the course!

The SmartEnCity project sees foresight as a methodology that supports cities' strategic planning processes, especially in the context of zero CO₂ transition. In SmartEnCity, using foresight in the five project cities was an essential step leading to the preparation of [IEPs as well as replication roadmaps](#). The project team believes that the foresight methodology, however, is highly replicable and beneficial in any kind of strategic planning and decision-making process, especially as it focuses on bringing together relevant stakeholders, gathering future intelligence and building a common vision for making present-day decisions and mobilizing joint actions.

In its essence, foresight is an action-oriented instrument for policy-making that promotes structured anticipation, considers alternative futures in a multi-disciplinary context, and enables collective learning in a proactive, path-breaking, interactive and participatory way. Foresight differs from other strands of future studies and planning exercises as it addresses the implications of long-term strategic actions and 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.

In the SmartEnCity project, foresight is embedded into the broader [Cities4ZERO](#) strategic planning context (Step 3 "Diagnose" and Step 4 "Envision") and is structured into four main phases. Phase 1 of the Cities4ZERO foresight exercise is about setting up the scene for the whole foresight exercise, starting with creating a dedicated steering group for coordinating the process and preparing a comprehensive SWOT analysis.

In Phase 2, two highly influential external drivers which are uncertain to materialize are selected as axes for scenario analyses. Local working groups will then participate in a city visioning workshop, generating different future scenarios for the city based on the SWOT analysis, while addressing the strategic question within the agreed timeframe, e.g. "How will we transform our city to become carbon neutral by 2040?" "What can we do by 2030 as a mid-way milestone?"

Once the inputs are gathered, the final scenarios are presented in Phase 3, starting a discussion to select the preferred "master scenario". According to that master scenario, the group will develop a city vision, seeking consensus among all stakeholders. This scenario will then be the basis for developing a strategic plan, transforming the city vision into specific goals and actions (Phase 4 and beyond).

How to use & tips

- Make sure to dedicate time to thoroughly prepare for the participative envision phase! Scenario building techniques stress the importance of identifying key drivers, stakeholders, trends, constraints, and other important issues in a systematic way and ranking these items by importance and uncertainty. Highly relevant, but uncertain drivers of change should lead to defining the main strategic actions to be taken.

- SWOT and PESTLE analyses are valuable tools and even pre-conditions to provide input into city visioning and can be prepared together with the stakeholders or before the scenario-building and visioning workshops and then be validated with the stakeholders.
- Visioning workshop(s) are for establishing jointly scenario logics – this is a 2x2 matrix of the most impactful but uncertain trends that the participants have agreed on. The aim is to describe a future scenario whereby the city successfully takes advantage of the most important opportunities while avoiding the major threats. Finally, and through the discussions, the most attractive and realistic scenarios will be picked and guide the vision development further on.
- Organizing at least two scenario building workshops is recommended, but other arrangements are possible as well, e.g. organizing one intensive workshop that starts with scenario development and ends with agreeing on the preferred vision and steps to be taken towards that vision.
- When inviting stakeholders to participate in scenario building workshop(s), make sure you get a variety of insights from various fields of expertise from “big topics” in integrated energy planning (energy supply and demand, efficiency in buildings, mobility, ICT, community engagement) and from various interest groups.
- The key questions to describe a scenario include: “How will developments along the scenario axes influence your city?”, “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?”, “How does the scenario respond to your main strategic question?”, “Is it a scenario that should be prevented or strived for in today’s urban planning?”, “How can we influence the scenario through city’s Integrated Energy Plan”?
- After the workshops, it is important to keep on engaging the stakeholders. Agree on how to move on, developing the Integrated Energy Plan and action plan. Do you need complementary activities to support the Integrated Energy Plan development process? What kind of documents will the strategic plan and action plan be? How will they fit in with the other urban plans/ strategies? Who will be the main stakeholders implementing it?
- Want more context and guidance for using foresight in your planning processes? We advise you to start from the [Cities4ZERO](#) framework to get going! For more information on the kind of strategies that foresight can very nicely feed into, check out the section on [IEPs and replication roadmaps](#).

Don'ts

- 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; such as “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.
- It does not make sense to see foresight as a rigid and strict methodology that has to be followed perfectly. The SmartEnCity project as a whole sees adaptability as a prerequisite for replicability. Given that each city has its own identity, strengths and weaknesses, the foresight methodology should also be adjusted to fit the needs of the city. When looking into the full report on foresight in SmartEnCity, you can see that the foresight

experience was a bit different for all the five project cities too. The point is that the method can be modified while still achieving the overall goal of the process – unifying stakeholders to create a common vision.

Links to more information

Read the full report here – [Report on foresight workshops and evaluation of the usage of the methodology in individual cities](#)

Read the scientific publication here – [Cities4ZERO Approach to Foresight for Fostering Smart Energy Transition on Municipal Level](#)

Read the scientific publication here – [Energy Vision Strategies for the EU Green New Deal: A Case Study of European Cities](#)

Observation wheel:

Monitoring and evaluation

In the Cities4ZERO framework, measuring progress and reformulating city goals respectively is the basis of a circular process that will bring decarbonization closer and closer. After all, we can't improve what we don't measure!

Monitoring and evaluation are indispensable parts of planning and implementing smart city interventions. The [Cities4ZERO](#) methodology recommends developing an indicator system of Key Performance Indicators (KPIs) at the project level tailored to fit the project objectives, together with an evaluation plan, a data collection plan and a monitoring program, defining a baseline for the interventions as well as the expected performance, thus being able to assess the results after processing all the data. This data will also be valuable if the city has or decides to develop a City Information Open Platform to analyse and visualize all the data for better decision-making.

Right after implementing the interventions, it's important to run performance tests and start the monitoring period, which ensures data availability for assessment. Once the monitoring period has ended and data has been collected for a significant period of time, all data and performance results are gathered and analysed – it's now time to assess the project and its impacts according to the performance indicators fixed before. In the SmartEnCity project, for instance, seven categories are used to assess the project: energy, mobility, life cycle assessment (LCA), ICTs, social acceptance, citizen engagement and economic performance.

The process of assessing the implemented actions needs the involvement of various experts from different fields of evaluation for a correct reporting and comparison. The results then feed into an evaluation report, focusing on all the key aspects, comparing the KPIs values before and after the intervention. At the city level, we can also make a comparison between the current data and the indicators at the city level. The main challenge at this step is to have complete and good quality sets of data. And this means a lot of work in the previous stages.

After the project has come to an end and the results have been evaluated, it's time to reflect and complete a project review, checking if the project objectives have been fulfilled. In SmartEnCity, the project objectives were split into four categories: technical, environmental, social and economic objectives. Through gathering feedback from the key stakeholders, the local partnership can then validate if the interventions were aligned with the Strategic Plan and Action plan at the city level, and to what extent they are successful, exploitable and replicable. What was successful? What might have been done better? Why did some indicators differ from what was expected? From this reflection, key barriers, success factors, regulatory input and potential exploitable results can be extracted for future projects in the city.

How to use & tips

- Enable monitoring and tracking project deployment performance. Through indicators at district/city scales, you will be able to track to what extent your goals have been achieved.

- It's not the same to assess mobility actions, district level actions or building renovation actions. The set of KPIs defined for the intervention assessment must focus on the objectives set for this intervention as well as take into account the specificities of this particular intervention.
- Check what you want to calculate and what you need for this. In some cases, the calculation of a set of KPIs means that monitoring devices need to be installed. These needs have to be identified in advance to include their installation and verification as one of the subtasks in the schedule, through a specific monitoring plan. In parallel, a plan for data management must also be generated.
- It is important to stress that not all indicators are based on data gathered from equipment, but also from the citizens, tenants and service users. Data can be collected, for example, through surveys and needs to be analysed accordingly. Make measurable what cannot be measured!
- It is useful that, for some calculations, the experts involved are certified on an evaluation methodology (as the International Performance Measurement and Verification Protocol IPMVP, for example) to assure the quality of the work and the precision of the results.
- If you are overwhelmed by the number of technical deliverables on monitoring and evaluation that SmartEnCity has produced (see below), just start by following the general [Cities4ZERO](#) methodology (focus especially on Steps 11, 13, 14 and 15) and then see what kind of information and guidance you need for continuing your learning process.

Don'ts

Don't be afraid of unexpected results from monitoring and evaluation. It's clear that a positive assessment supports the interventions developed in case they have been correctly finished and good evaluation results obtained. But even if the results are not as expected, a correct assessment is still valuable as it is the way to ensure better results in future interventions. We can only improve what we know!

Links to more information

Read the full report here - [Cities4ZERO: The Urban Transformation Strategy for Cities' Decarbonisation](#)

Read the full report here - [KPIs definition for pre-intervention data collection](#)

Read the full report here - [KPIs definition](#)

Read the full report here - [Evaluation protocols](#)

Read the full report here - [City impact evaluation procedure](#)

Read the full report here - [District retrofitting monitoring program](#)

Read the full report here - [Mobility action monitoring program](#)

Read the full report here - [Integrated Infrastructures action monitoring program](#)

Read the full report here - [Data Collection Approach](#)

Read the scientific publication here - [Smart Zero Carbon City Readiness Level: Indicators System for City Diagnosis Towards Decarbonisation and its Application in the Basque Country](#)

Bridge: IEPs and replication roadmaps



Following the Cities4ZERO methodology, the five SmartEnCity partner cities completed their Integrated Energy Plans (IEPs) that will guide further activities as the project draws to a close. Take a look at what they're up to in the coming years!

Having successfully carried out their foresight workshops as part of the wider [Cities4ZERO](#) framework, the five SmartEnCity partner cities worked towards completing their Integrated Energy Plans and replication roadmaps. The main aim of these plans is to support the future replication of the project activities and learnings on a wider scale, addressing specific areas of the city government and investments.

The five partner cities were involved in the development process of the Cities4ZERO methodology, following its strategic stage to develop their integrated energy planning processes. In practical terms, the final reports as the main outputs of those processes have adopted different formats depending on the strategic interests of the city (e.g. Sustainable Energy and Climate Action Plan 2030 for Tartu; Integrated Energy Transition Action Plan 2030 for Vitoria-Gasteiz, Climate Neutrality Roadmap 2025 for Sonderborg). However, regardless of the final format that was adopted, the five cities all followed the Cities4ZERO methodology, showing its capability to guide cities in their path towards decarbonisation while departing from different contexts and transitioning levels.

Each partner city, either Lighthouse or Follower, thus went through the following activities, depending on the scale of the needed and desired replication:

- Analysing and evaluating the local conditions as well as potential obstacles to replication.
- Defining the requirements needed to ensure proper replication and adjusting their organisation and strategies accordingly.
- Presenting an inventory of deployable solutions to be focused on the rest of the city.
- Delivering a replication roadmap, i.e. designing specific solutions in each city, including the objectives and areas targeted, local regulations and planning documents, engagement of citizens and stakeholders.
- Adding an agenda and milestones as well as a proper financial plan to ensure the replication of the solutions.
- Using participative methods in developing the roadmaps. Information was exchanged and the replication process planned in common decision-maker workshops, including the [SmartEnCity Network](#).
- Setting up monitoring instruments for the replication roadmaps and supporting the management of further replication.

How to use & tips

- The fact that all the five SmartEnCity partners successfully completed their Integrated Energy Plans and replication roadmaps goes to prove that however much influenced by local factors and the environment, the technical, legal and social barriers and opportunities, cities can still follow the

same methodology and arrive at somewhat different, but still comparable results. That's the key to benefitting from the Cities4ZERO methodology – you have to make it your own!

- Several of the SmartEnCity partner cities successfully combined the Cities4ZERO framework with the methodology proposed by the [Covenant of Mayors](#) and updated their IEPs into Sustainable Energy and Climate Action Plans (SECAPs). Here's another tip then – when planning your own smart city journey, you can mix and match methodologies to arrive at the best framework for your city to plan its next steps!
- Be ambitious! Create a short, but well-defined process with concrete milestones.
- Engaging local companies is very important. As they are one of the largest consumers and emitters, reducing CO₂ emissions and adopting environmentally friendly solutions together is crucial.
- Citizens should also be engaged from the very beginning of the planning phase. Their engagement and commitment to the process is extremely important and more effort is needed to ensure it, e.g. through more innovative and playful approaches, online events, use of social media etc.
- Want more context and guidance for drawing up Integrated Energy Plans and replication roadmaps? We advise you to start from the [Cities4ZERO](#) framework to get things going! For using participative methods in your planning processes, be sure to check out the [Foresight methodology](#). For setting up monitoring instruments, refer to [monitoring and evaluation](#).

Links to more information

Read Sonderborg's plan here – [Roadmap2025 – 50 steps towards a carbon neutral Sonderborg](#)

Read Tartu's plan here – [Energy and Climate Action Plan of Tartu City \(Tartu Energy 2030\)](#)

Read the Vitoria-Gasteiz baseline report here – [Vitoria-Gasteiz diagnosis and baseline](#)

Read the Tartu baseline report here – [Tartu diagnosis and baseline](#)

Read the Sonderborg baseline report here – [Sonderborg diagnosis and baseline](#)

Read the scientific publication here - [Towards an Integrated Approach to Urban Decarbonisation in Practice: The Case of Vitoria-Gasteiz](#)

Read the scientific publication here - [ENER-BI: Integrating Energy and Spatial Data for Cities' Decarbonisation Planning](#)

Read the scientific publication here – [Smart Zero Carbon City: Key Factors Towards Smart Urban Decarbonization](#)

Read the scientific publication here – [Retrofitting Soviet-Era Apartment Buildings with 'Smart City' Features: The H2020 SmartEnCity Project in Tartu, Estonia](#)

Green plant:

Energy Balance Tool

For those more technically minded, the Energy Balance Tool can help you both assess your current course of action and take your next step in planning a renewable energy system.

The Energy Balance Tool is a freeware tool that can be used to analyse the energy and environmental impacts of your city's energy system on a yearly basis, including the possibility of forecasting impacts of various energy strategies. The Energy Balance Tool is widely used for baseline studies and making energy strategies for municipalities in Denmark. In Denmark, the tool was used to:

- Map energy balance progress every second year (2007, 2009, 2011, 2013, 2015, 2017 and 2019) in 30+ Danish municipalities.
- Making baseline emission inventories in the Global Covenant of Mayors for Climate & Energy template.
- Make local future scenarios and action plans.

In SmartEnCity, the tool was used to set up energy balances for the Lighthouse and Follower Cities where the platform helped measure, present, and compare energy performances across the Lighthouse Cities. For any city wishing to use this tool, it will help you understand what your current energy expenditure is, share of renewable energy sources, share of non-renewable energy sources, GHG emissions, and other important indicators. In SmartEnCity, the three main uses for the Energy Balance Tool were defined and are explained below:

1. Baseline and monitoring: Map the baseline energy metrics in your city and monitor your transition progress from fossil fuels to renewable energy.
2. Reference forecast: Make a reference forecast to show how the energy supply will be in the future if no actions are applied.
3. Future plan scenario: The future plan spreadsheet presents policy options that may come true only if the prescribed number of actions are carried out.

While this tool can certainly be used by anyone interested in assessing the energy balance in their city, city officials and energy experts are especially encouraged to use this tool as it will help them understand the current energy balance in their city, forecast changes to their energy supply in the future, and plan policy actions accordingly. Thus, the Energy Balance Tool is a powerful tool that can be used by policymakers to provide them with accurate, up to date information and make educated decisions to achieve their carbon neutral goals. Access to measured data about all sectors of the energy system can be a challenge when working with the energy balance. If data access is a challenge, users are encouraged to use best available data or best available estimate.

How to use & tips

- The Energy Balance Tool itself is an integrated and technical tool. However, we have provided a thorough guideline document that explains the concept, methodology, and how to use the tool in practice, including examples from Sonderborg. To get started, we recommend following these steps:
 1. Go to the “Tools” section on the SmartEnCity website: [SmartEnCity Tools](#)
 2. Select and read through the “[Guideline on how to use the “Energy Balance Tool”](#)”
 3. Download the “[Energy Balance Tool](#)”.
 4. Start using the tool! Reference the guideline as needed.
- If you’re already in the hardcore energy planning state of mind, why not check out the [EnergyPLAN](#) tools as well!

Don’ts

The Energy planning tool utilizes data from multiple sources, which requires patience, due diligence, and careful analysis. This tool is not a quick fix to assessing your cities energy needs, but rather a tool to be developed over time. Therefore, this tool is certainly suited for analysing the energy balance of your city and developing long-term strategies towards a zero-carbon city.

Links to more information

Find the guideline here - [Guideline on how to use the Energy Balance Tool](#)

Download the tool here - [Energy Balance Tool](#)

Read the full paper on Sonderborg’s experience here - [Sonderborg Diagnosis and Baseline](#)

Green factory: EnergyPLAN



The EnergyPLAN tool is another helpful resource that can be used to inform the development of zero carbon transition frameworks and strategies for cities.

The purpose of the EnergyPLAN model is to analyse the energy, environmental, and economic impact of various energy strategies. The key objective is to model a variety of options so that they can be compared with one another, rather than model one “optimum” solution based on defined pre-conditions. Using this methodology, it is possible to illustrate a palette of options for the energy system, rather than one core solution. This could classify EnergyPLAN as a “simulation” tool rather than an optimisation tool, even though there is some optimisation within the model.

Furthermore, the aim of EnergyPLAN is to model the “finishing point” of the energy system rather than the starting point. The focus is placed on the future energy system and how that will operate, rather than on today’s energy system. Therefore, EnergyPLAN includes relatively detailed modelling of future technologies such as biomass gasification and synthetic fuels, but relatively aggregated modelling of today’s technologies such as power plants. The focus is on the future rather than the present.

In short, this tool is designed to assist policy-makers in designing national/regional energy planning strategies. In SmartEnCity, the tool was introduced to accomplish this goal and includes a detailed training plan to utilize it. As a “freeware”, the tool will not cost you anything, and the training tools, exercises, guide documents, and forum are available to help you.

How to use & tips

- The tool simulates the operation of national energy systems on an hourly basis, including the electricity, heating, cooling, industry, and transport centres. In the hands of researchers and policymakers, this can be a powerful tool to drive the transition towards a zero-carbon city.
- The EnergyPLAN tool itself requires about 2 weeks to learn the basic functions. But to help you get started, we have outlined a few steps that will help you on your way to using this powerful tool!
 1. Go to the [SmartEnCity tools section](#)
 2. Find “Energyplan.eu”, select: [Visit the website](#).
 3. Select “[Get started](#)” in the menu and follow the step-by-step instructions for downloading the model and learning to use it (training).
- Disclaimer for first time users: the EnergyPLAN website includes a lot of information and tools to get you started. We have also included several helpful links below that will support you on your way to a carbon neutral strategy.
- Too much hardcore energy planning? If you think now is the time for something lighter, why not explore the [SmartEnCity Academy](#), [videos](#), [webinars](#), [newsletters](#) and [Network bulletins](#) for a change.

Don'ts

Like the [Energy Balance Tool](#), the EnergyPLAN is not a quick solution to understanding your city's current energy balance and future energy balance. According to the site, it will take about 2 weeks to understand the basic functions of the model. Therefore, patience and careful practice is required to learn the tool. Don't worry though! The EnergyPLAN site includes all sorts of helpful information, training, exercises, guide documents, and much more to assist you.

Links to more information

Find guidelines here - [Get Started with EnergyPLAN](#)

Find the introduction here - [Introduction to EnergyPLAN](#)

Download the tool here - [Download the model](#)

Read the scientific publication here – [From Carbon Calculators to Energy System Analysis in Cities](#)

Train station:

Replication takeaways



We hope that the SmartEnCity replication tour has inspired you to take action and that the SmartEnKIT has given you some practical tools to boost your own zero carbon journey. So **what are the steps that you can take today** to move towards a zero carbon future in your city? Here's a wrap-up of some of the **key tips** that you might take with you from the SmartEnKIT.

- **SHAPE the story of your city's decarbonization journey.** What is your city's story, the one that creates a sense of commitment among its stakeholders? Who are the actors and how can they pitch in, co-creating your city vision and its actionable steps? Who are the champions, the early adopter, the financiers, the influencers? Every city needs a solid narrative to bring together its community and effectively work towards its zero-carbon future. For instance, Sonderborg and ProjectZero have been engaging citizens and stakeholders since 2009, paving the way for the residents' acceptance and commitment towards smart city investments.
- **INITIATE a stable local working group.** The working group should be underpinned by a strong quadruple helix partnership that is headed by the local authority to steer the urban transformation process as well as to decide and develop the governance and coordination approach that will guide activities throughout your journey. For this, it's important to designate a specific office that can collaborate and coordinate actions across the working group and various departments involved in the planning process. Securing the commitment of the local working group maximizes the success potential of the project.
- **PLAN your smart city projects in an integrated way.** Smart city projects tend to be very complex and multi-layered, so they need systemic and integrated approaches that break silos. If you're wondering what the purpose of an Integrated Energy Plan is at the end of the day, you can take our word for it – the IEP is like a compass for the municipality to not lose focus regarding the energy targets, something to always come back to, develop, apply and update throughout the energy transformation process. Several cities beyond the SmartEnCity consortium itself have already adopted the Cities4ZERO methodology and use it as a step-by-step guide to shaping their path to zero emissions. This includes our [ATELIER](#) sister SCC1 project partners Bilbao, Amsterdam, Copenhagen, Riga, Bratislava, Budapest, Krakow and Matosinhos. Are you going to be the next one?
- **ADJUST everything to your city context and needs.** Even if smart city and energy planning methodologies look like rigid systems that need to be followed 100%, there's no reason why you can't make them your own. In the SmartEnCity project, some of the partner cities, for instance, decided to do a bit of mixing and matching with the methodologies, combining the Cities4ZERO and Covenant of Mayors methods to come up with even better SECAPs. Be the author of your own methods and solutions!
- **READJUST strategies to move closer to the end goal.** Some solutions don't work out as expected, some solutions can be scaled up to other districts, some strategies become obsolete, some key projects need tweaking, e.g. because the market situation changes. The Cities4ZERO

framework is a process, but not in the sense that the journey comes to an end once the defined projects have been implemented and assessed. It is a circular process that needs to be iterated again and again, all in the effort to reach your decarbonization goals!

- **INVOLVE stakeholders right from the start.** As the Deputy Mayor of the City of Tartu, Raimond Tamm said: *“It is cooperation between sectors and different stakeholders that really makes a city smart”*. Be aware, however, that strong engagement requires much more than just sharing information and presenting the business case – it’s also about creating commitment, developing the timeline and being flexible to changes (as the Covid-19 situation clearly demonstrated). In the SmartEnCity project, the cities benefitted from scenario and vision-building workshops with all the relevant stakeholders in drafting their IEPs. Lecce, for instance, successfully used a mixed approach for involving its key stakeholders, including a direct contact list and an official call for the expression of interest on the Municipality website. Next time, give participatory practices like foresight a try when planning smart city projects!
- **MONITOR performance to make a difference.** Fixing and monitoring indicators at district/city scales will enable to track to which extent your goals have been achieved and to adjust course for maximizing impact. The SmartEnCity partner cities used a set of KPIs to evaluate the Lighthouse City interventions, including energy, mobility, life cycle assessment, ICTs, social acceptance, citizen engagement and economic performance. Take it from us – we can’t improve what we don’t measure!
- **ENGAGE with other cities and city networks.** See what others have been up to, what progress and mistakes they have made and which solutions could potentially be adapted to your city context. Based on the SmartEnCity Network experience, we can definitely say that smaller regional/national networks that promote personal contacts and knowledge exchange work best, especially the ones that enable to regularly meet and discuss smart city topics with each other. Find the best support network for you or initiate one on your own! Getting into dialogue with other cities is not always easy, but with some dedication, you’ll see that facing similar issues and working together on one common goal is a powerful incentive to sustain smart city networks. Hopefully, our SmartEnCity Network experience and value proposition help you on this road.