



Investment needs for the local energy transition

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Energy Cities – April 2019

Executive summary

Cities' actions for the energy transition are essential to achieve the Paris Agreement's objectives by 2050. Responsible for 80% of energy use and CO₂ emissions, local governments understand that they need to invest for a sustainable future on a liveable and healthy planet.

The European Commission has estimated that it would require EUR 175 to 290 billion per year more to turn the EU into a net-zero greenhouse gas economy in 2050. For example, the EU would need to invest an estimated EUR 8.5 trillion for implementing sustainable heating systems for the period 2012-2050. To decarbonise the building stock by 2050, a staggering EUR 4.25 trillion more than normal investments would be necessary.

At the local level, such estimations are more difficult to establish. This publication is therefore relying on five examples of European cities, that are frontrunners in the local energy transition and which have put a number on their investment needs by 2050 in order to succeed in their transition. Through our case studies of the cities Ghent (Belgium), Frederikshavn (Denmark), Bordeaux-Métropole (France), Sevilla (Spain) and Tallinn (Estonia), all signatories of the Covenant of Mayors - Europe initiative, we have identified the local investment needs for the energy transition in different geographical, socio-economic and sectorial circumstances. Moreover, this selection of a wide range of cities of different sizes, territorial characteristics and resources will enable national governments to make the right funding and investment choices for the future, thereby allowing local authorities to thrive and play their key role to the fullest in supporting the EU and its Member States to achieve the Paris Agreement's objectives.

The city of Ghent in Belgium is implementing inclusive energy policies to allow everyone to have access to cleaner energy and innovative technologies. Its flagship project "Neighbourhood Power" (*Buurzame Strom*) supports the installation of solar panels in a low-income district. The participation of citizens is a key priority in their strategy, as they are included in the city's projects and have also the opportunity to express what kind of energy transition they want during the so-called Climate Arena, a citizen forum put in place

by Ghent. In order to deliver its energy transition to a carbon neutral city by 2050, the investment needs are estimated at EUR 750 million for Ghent.

The city of Frederikshavn in Denmark has the ambitious objective to achieve 100% of renewable energy by 2030. Frederikshavn would need EUR 1 billion to achieve this target. The main challenge for Frederikshavn is to encourage all citizens and private actors to join in the transition. The city has opted to lead by example through ambitious building retrofit and sustainable mobility actions. Furthermore, this Danish city seeks to attract funds from sustainable companies and renewable energy producers, by providing a favourable investment environment, while at the same time proposing policies to incentivize more citizens to invest in the transition as well.

In France, the city of Bordeaux-Métropole is paving the way for the energy transition by seeking to become an energy-plus metropole by 2050 through, in particular, the collaboration between its urban and rural areas. In the period 2017-2022, investments are planned worth EUR 535 million, which if maintained, would result in investment needs of EUR 2.7 billion by 2050. The city focuses on acting as coordinator and facilitator by supporting successful projects, such as the project of its flagship industrial cluster, the ecoparc of Blanquefort. There, Bordeaux-Métropole mobilises sustainable companies to follow the principle of industrial ecology, and share resources and expenses.

In Southern Europe, the Spanish city of Sevilla is also leading an ambitious energy transition to become a role model for sustainable mobility. The city has planned to invest EUR 264 million for the period 2012-2020, and up to EUR 1 billion by 2050. Sevilla is focusing in particular on sustainable mobility in its energy transition, by establishing notably a large cycling network and pedestrian zones to reduce air pollution and incentivize citizens to move away from using their cars to commute.

Finally, the example of the Estonian capital of Tallinn highlights how the heating and cooling sector also plays a critical role in the long-term investments for the energy transition. Tallinn is currently mobilizing some EUR 300 million in energy and climate actions, and is aspiring to become one of the first low-carbon cities in Eastern Europe with

its ambitions on smart buildings and smart mobility. The city has estimated its investment needs at EUR 900 million by 2050.

The European Commission has recently published its assessment of progress on structural reforms in 2019 and its in-depth macroeconomic review for the EU Member States (country reports), and linked it for the first time with investment recommendations for the next European Structural and Investment Funds (ESIF) program (2021-2027). The 5 new priority objectives of ESIF are: Smarter Europe, Greener Europe, Connected Europe, Social Europe and Europe closer to its citizens. In its recommendations, the European Commission has identified similar areas as the ones defined by the cities analysed in this study, on which Member States need to focus their investments. All actors must accelerate the energy transition through innovative approaches on energy efficiency and renewable technologies. The European Commission has also acknowledged in its recent assessment the necessity to involve all stakeholders, especially municipalities, to lead a fair energy transition. However, it has not estimated in its recommendations what amounts Member States would need to meet their objectives, and what investments they should provide to local authorities under the next ESIF program. The city examples of this publication have shown that local investment needs by 2050 oscillate between EUR 1 and 3 billion, illustrating the significant investments at local level that need to be leveraged for the energy transition. It becomes evident hence that EU and national funds need to be rechannelled in the next ESIF to meet these concrete and tangible local investment needs for the transition, not only in these cities, but across all European cities taking action to fulfil the objectives of the Paris Agreement.

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Introduction

More and more cities are mobilizing to tackle climate change and catalyse the clean energy transition, in line with the Paris Agreement. But having only limited resources at their disposal, local authorities won't be able to leverage the necessary investments for the transformations to come on their own. European cities need the broad support from their national governments and the EU; so they can unlock their full potential in driving investments for the energy transition. But how much investment will be needed?

Several studies have pointed out investment needs at different scales so far. According to the International Energy Agency (IEA) and the International Renewable Energy Agency (IRENA), the countries from **the G20 should invest an additional EUR 25 trillion** in order to achieve an ambitious energy transition. At the **EU level**, the European Commission has estimated that average investments in the range of **EUR 175 to 290 billion** per year are required to enable the EU to become a net-zero greenhouse gas economy in 2050. These investment volumes represent 2.8% of the European gross domestic product (GDP). In comparison, the European Commission unlocked EUR 4,588.9 billion of aid to save the financial institutions between 2008 and 2010 (the amount of public support actually used in 2009 stood at EUR 1,106.6 billion and EUR 957 billion in 2008), which represents around a quarter of the GDP of 2017.

The cost of inaction would be even more significant. The NGO Climate Action Network Europe (CAN) has estimated that in 2017, **extreme weather conditions already cost Europe EUR 14 billion**. And these estimates predict that this cost would rise significantly over the years to come. For example, inaction would lead to skyrocketing health costs due to pollution. According to the long-term decarbonisation strategy 2050 proposed by the EU Commission, a carbon neutral society will reduce premature deaths caused by air pollution by more than 40% and health damage by around EUR 200 billion per year. Not acting is therefore not an option, and deep transformations are now necessary to ensure the achievement of the energy transition.

Some countries have slowly woken up to these risks and are taking actions, driven also by the youth climate protests that have swept across the European continent in the past weeks. For instance, **Spain seeks to mobilize more than EUR 200 billion of investments** to move towards climate neutrality by 2050. While **France has increased by EUR 10.4 billion the budget for the ecological transition** for 2018, a recent report by the French Parliament has underlined that actually France would **need more than 3 times this amount** each year to stay on track in its energy transition¹. The energy transition will entail a great number of transformations: boosting renewables while moving away from fossil fuels, improving energy efficiency and sufficiency, decarbonising transport, heating and cooling and the building sectors. The investment needs at the EU level for each of these sectors are significant: some EUR 8.5 trillion are needed for achieving a sustainable heating system for the period 2012-2050, and decarbonizing the EU buildings stock would require an additional EUR 4.25 trillion by 2050.

While the issue of achieving the Paris-proof energy transition is global, the answer needs to be first and foremost local. Local governments have a key role to initiate and lead the energy transition. The Covenant of Mayors – Europe initiative has shown that European local authorities are keen to take ambitious energy and climate action to support national governments and the EU in meeting its national, European and international commitments. The European Commission is aware of these challenges, as illustrated by its recent 2019 European Semester, where it assesses progress on structural reforms, prevention and correction of macroeconomic imbalances, and results of in-depth reviews in the EU Member States. For the first time, this regular exercise of the EU Commission was linked with investment recommendations for the **next European Structural and Investment Funds (ESIF) program (2021-2027)**. Through the five new priority objectives (Smarter Europe, Greener Europe, Connected Europe, Social Europe and Europe closer to its citizens), the European Commission seeks to accelerate an **energy transition that tries to better reflect the needs of cities**. Member States have to tackle key issues of energy efficiency in the residential sector, providing sustainable mobility and renewable energies or supporting more initiatives for a circular economy under the next ESIF program. However, the

¹ Information [report](#) by the finance commission presented at the French l'Assemblée Nationale on 30/01/2019

European Commission did not estimate how much Member States should invest under the next ESIF to meet the 5 priority objectives, nor what part of these investments should be channeled to cities.

Yet, many cities have already underpinned their ambitions and concrete and tangible investment needs in tackling climate change and catalysing the clean energy transition with clear long-term strategies and investment plans. In this publication, we will present examples from 5 pioneering European cities, all Covenant signatories, and their investment needs for the energy transition by 2050. Ghent in Belgium is on its way to become a climate neutral and inclusive city by 2050; Frederikshavn in Denmark aims to achieve 100% renewable energy by 2030, while Bordeaux-Métropole in France wants to become an energy plus city by 2050; Sevilla in Spain is aspiring to act as a role model for sustainable mobility, and finally Tallinn in Estonia seeks to become one of the first low-carbon cities in Eastern Europe. The challenges they face are different, and so are their budgets. But this exercise provides a critical avenue for examining the resources that would need to be channelled for the local energy transition by the EU Commission and Member States through the next ESIF program – not only to these cities, but to all cities across Europe keen to fulfil the Paris Agreement objectives.

What are the investment needs for a local energy transition?

City	Ghent	Frederikshavn	Bordeaux	Sevilla	Tallinn
Population	260.467 in 2018	61,576 in 2011	787,107 in 2018	688,711 in 2018	430,805 in 2018
Area	156.18 km ²	648.6 km ²	579,27 km ²	140.8 km ²	159.2 km ²
Carbon footprint	1,443 kton of CO ₂ in 2011	Total CO ₂ -emissions in the municipality (2010): approx. 554,660 tons peryear (8.8 ton per citizen	Trajectory estimated on the basis of its objectives: a carbon budget of approx.134 MtgCO ₂ towards 2050	Carbon footprint 2007: 3,523,185 CO ₂ ton per year	3,523,185 CO ₂ ton per year (2007)
Covenant of Mayors signatory	Since 2009	Since 2011	Since 2009	Since 2009	Since 2009
Short term climate commitments	-20% CO ₂ emissions and -20% energy consumption by 2020 +15% local renewable energy production by 2020	Promote sustainable business development in the municipality	-20% CO ₂ emissions and -20% energy consumption by 2020+ 20% renewable energy by 2020	- 40% carbon emissions by 2020	-20% CO ₂ emissions and -20% energy consumption by 2020 +20% local renewable energy production by 2020

Long term climate commitments	Become a climate neutral city by 2050	100% of renewable energy by 2030	Becoming an energy-plus metropole by 2050	Becoming a role model for sustainable mobility	Becoming one of the first low-carbon cities in Eastern Europe
City's budget	EUR 811 million in 2018	DKK 3.9 billion (=EUR 522 million) in 2017	EUR 1.2 billion in 2016	EUR 852 million in 2019	EUR 761 million in 2019
Action plan	Ghent Climate Action plan 2014-2019	Master Plan for Renewable Energy 2030	Plan d'action pour un territoire durable à haute qualité de vie 2017-2022	Plan de Acción por el Clima y la Energía Sostenibles 2012-2020	Tallinn Sustainable Energy Action Plan 2011-2021
Current climate budget	EUR 150 million	DKK 7.5 - EUR 1 billion	EUR 535 million	EUR 264 million	EUR 300 million
Long term investment needs	EUR 750 million	EUR 1 billion	EUR 2.7 billion	EUR 1 billion	EUR 900 million

City of Ghent

260,467 inhabitants in 2018

156.18 km²

Carbon footprint:
1,443 ktonne of CO₂ in 2011

City budget 2018:
EUR 811 million

Joined the
Covenant of
Mayors in 2009

Main successes: very advanced on renewable energy (the largest number of solar panels in Flanders) and on projects of commons

Main challenge: expand the pilot projects to a larger scale

-20% CO₂ emissions and -20% energy consumption by 2020
+15% local renewable energy production by 2020

Budget 2014-2019: EUR 150 million

Become a climate neutral city by 2050

Investments needs 2020-2050: EUR 750 million

WHAT ARE THE AMBITIONS OF GHENT FOR ITS ENERGY TRANSITION?

Ghent is a municipality in Belgium, and is the capital and largest city of the East Flanders province with 260.467 inhabitants in 2018. It is a pioneer in taking both action on climate mitigation and adaptation, as exemplified through their climate adaptation plan 2016-2019 and their global climate plan 2014-2019. The Ghent Multi-Annual plan 2014-2019 states: *“Ghent is a city of openness, solidarity, wisdom, and child-friendliness. It pools all its powers to develop the city into a continuously liveable whole, further shaping the future. Ghent wishes to be a creative forerunner in the transition towards a climate neutral city. We continue to build an environmentally friendly and diversified economy to bring prosperity to all. This is how we develop into a society of responsible citizens who can thrive freely and count on the necessary support.”*²

Ghent was one of the first European cities to join the Covenant of Mayors - Europe in 2009. The city is committed to reduce local CO₂ emissions by at least 20% by 2020 compared to 2007, to lower their energy consumption by 20% compared to reference year 2007, to produce local renewable energy production for 15% of domestic energy demand by 2019 and to save 15% of energy consumption in city buildings and public lighting during the period 2014-2019. Ghent wants to become a climate neutral city by 2050. To do so, the city mainly seeks to develop the local production of renewable energy, in particular wind and solar. Furthermore, the city of Ghent seeks to make sure that their energy transition is social as well, with affordability being a key priority in their actions. This key priority is reflected in their label; the municipality has changed its name from “Smart city” to “City of People”³. Its ambitions concur on many aspects with the European Commission’s recent investment recommendations for Belgium, as Belgium has to focus more on supporting small scale renewable electricity production or on enabling disadvantaged households to get easier access to renovation services.

“Climate is a priority, and along with all of the citizens and companies of Ghent we will leave no stone unturned” City of Ghent, 2014.

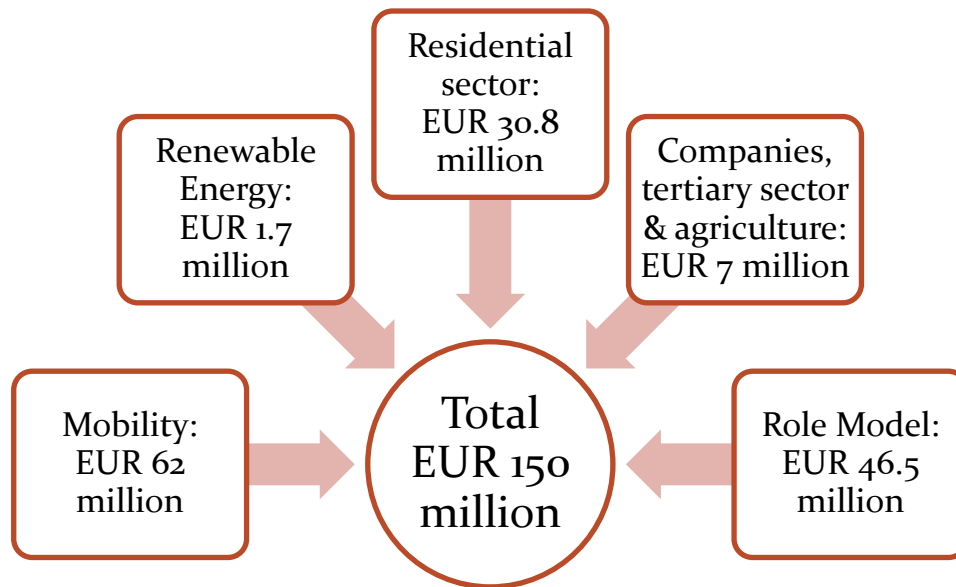
² Quote from *Ghent climate plan 2014-2019*, p5.

³ More details in this [article](#) on their website.

HOW DOES GHENT COVER ALL SECTORS WITH ITS INVESTMENT PLAN?

What is Ghent's current climate budget?

Ghent has devised a major investment plan for the period 2014-2019 to underpin its efforts:



This budget is for the period 2014-2019; if it is maintained to become a climate neutral city by 2050, it would represent **investment needs of EUR 750 million toward 2050**. The municipality is currently in political transition after the recent local elections in Belgium, and will soon discuss an updated plan with a better indication of their future investment needs. For their previous budget, the city made a distinction between 100% climate actions (from different sectors), about EUR 105 million, and partial climate actions, representing around EUR 45 million, that is to say policies with a positive impact on the energy transition without it being the main goal. For instance, the municipality is providing housing premiums for vulnerable people to improve their housing standard, also by making them more energy efficient. The city can only cover a small part of investment from its own budget, but will need co-financing for most projects, through e.g. European funding programs such as LIFE or Horizon 2020. Ghent also uses alternative financing instruments such as crowdfunding and a citizen's budget to channel investments for its transition. EUR 1.35 million was allocated in 2016 in this way for projects which were led by the population.

What is the role of the municipality to implement the climate action plan?

The municipality of Ghent is the leader and initiator for some projects, but steps down for others and plays the role of facilitator. For instance, for its actions towards SMEs, Ghent mainly plans to encourage the uptake of a greener economy by coaching industries to reduce their CO² emissions. For the actions classified as “role model”, the city is promoting energy efficiency by leading by example. This includes the renovation of the city’s fleet or purchasing 100% green energy for city buildings and public lighting. But as the energy transition is still an ongoing process, Ghent is experimenting with several options which could be expanded afterwards. This is the case for the project Neighbourhood Power (Buurzame Stroom).

“Subnational governments are the best places to explore the different local scenarios towards 2050 and its consequences, therefore an early involvement in the process will pay back in the future.” Daniël Termont, former Mayor of Ghent.

THE NEIGHBOURHOOD POWER (BUURZAME STROOM) PROJECT

How to reconcile affordability and innovative sustainable technology?

The Neighbourhood Power project was launched in 2014 during a Climate Arena, a citizen forum where the municipality asked the citizens what project they would like to initiate for the energy transition. Citizens suggested to set up solar panels on the Ghent neighbourhood of St. Amandsberg, which should be affordable for all. The city administration of Ghent sought to involve citizens for the construction of the future of their city, and thus supported several projects led by citizens, civil society organisations and local energy cooperatives. Many projects were launched during the Climate Arena, where the city played a role of facilitator, and provided technical support. The Neighbourhood Power project is part of a larger program from the city called “sustainable neighbourhoods”, which is aiming to experiment with new ways of building the city with citizens’ initiatives. In this regard, Ghent offers a subsidy of EUR 12.000 as a starting point to citizens to support them in their initiatives.

Neighbourhood Power was set up to produce local renewable energy for an entire neighbourhood, focusing in particular on involving vulnerable people in the project. It has an ecological and a social perspective, with the ambition to reduce energy poverty. It encourages inhabitants to invest in solar panels, or in solar panels for schools or companies, if one's own roof is not suitable for this technology. Another perspective of the project is to align consumption and production of energy, by realising energy savings, but also by using more energy when the solar panels are at their highest capacity. The project is associated with tools developed in the European Horizon 2020 WiseGRID-project⁴. WiseGRID aims at providing tools and business models to create an open market and enable energy stakeholders to participate fully in the democratic energy transition by financing batteries, heat pumps or charging station for instance. The project is tested in four countries: Belgium, Spain, Greece and Italy.

Does the city work alone?

Ghent built up a consortium to manage the project involving a large number of partners: the city of Ghent, the local renewable energy cooperative EnerGent, the social neighbourhood-based organisation Samenlevingsopbouw, the University of Ghent and the distribution grid operator EANDIS. Energent is executing the project, while Samenlevingsopbouw works with the inhabitants participating voluntarily and the University of Ghent monitors the project's progress. The city of Ghent is at the same time a partner and a facilitator for the project. Neighbourhood Power became operational on the



Figure 1 The aim is to produce and consume collectively solar energy. From [the City of Ghent Website](#)

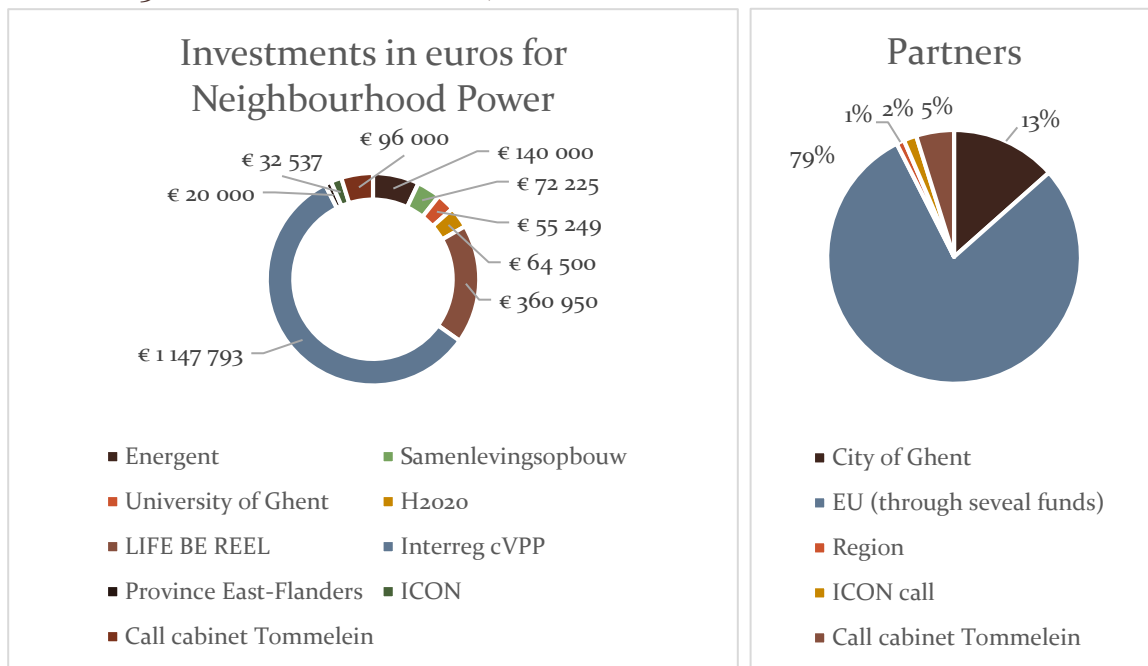


Figure 2 Solar panel installation in Ghent. Photo courtesy of Johan Eyckens. From [Resilience website](#).

⁴ More information about this project on their [website](#).

11th of March 2018, and its first results are expected for the end of 2019. More than 200 inhabitants are participating in this experimental project. Sofia Verhoeven from the climate service of Ghent, explains that the municipality would like to expand the project to a larger scale if the results are good. The neighbourhood of St. Amandsberg is a difficult first location for the project, due to its vulnerability and its cloudy weather, but it allows organisers to find out about any shortcomings of the tools and then improve them for their next application.

The total investment for the project was significant: about EUR 2 million was allocated to finance the different components of Neighbourhood Power. The City of Ghent allocated 13% of the total investments, as can be seen below⁵:



The municipality is mainly the local initiator, by funding the renewable cooperative Energent, the social neighbourhood-based organisation Samenlevingsopbouw and the University of Ghent. The EU is involved in many aspects, but mostly through its cVPP funding program. CVPP stands for “Community-based Virtual Power Plant”, which finances decarbonisation projects based on the empowerment of low-carbon community driven

⁵ The budget was detailed by Sofie Verhoeven, working in the service of environment and climate at the city of Ghent.

energy initiatives⁶. It has to involve individual consumers, local energy companies or SMEs, as figures 3 shows:

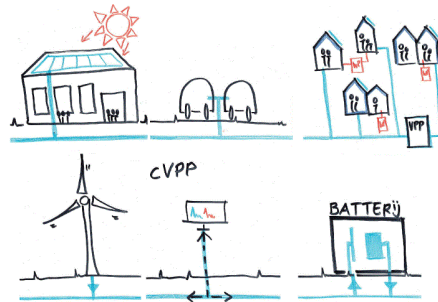


Figure 3 How cVPP works? From the [program website](#)

CONCLUSION

The city of Ghent leads pilot projects to increase the share of renewable energy, while at the same time involving its vulnerable citizens. In the period 2014-2019, Ghent's climate actions will cost EUR 150 million. Ghent's actions have illustrated the possibilities for a city to spearhead the energy transition. The period 2020-2050 needs to be as or even more ambitious, in order to enable Ghent to achieve its long-term objective of becoming climate-neutral by 2050. It will require significant investment needs of at least EUR 750 million, and also will have to take into account the following considerations:

- The energy transition must involve vulnerable people in order to be perceived as fair and just.
- A long term goal is necessary, alongside with a clear budget per sector.
- Collaboration is key: between investors, companies, citizens and public authorities.
- A key challenge is to scale up pilot projects to the entire city.
- Investment needs: EUR 750 million.

⁶ All the information about the program [here](#).

Frederikshavn Municipality

61,576 inhabitants in
2011

648.6
km²

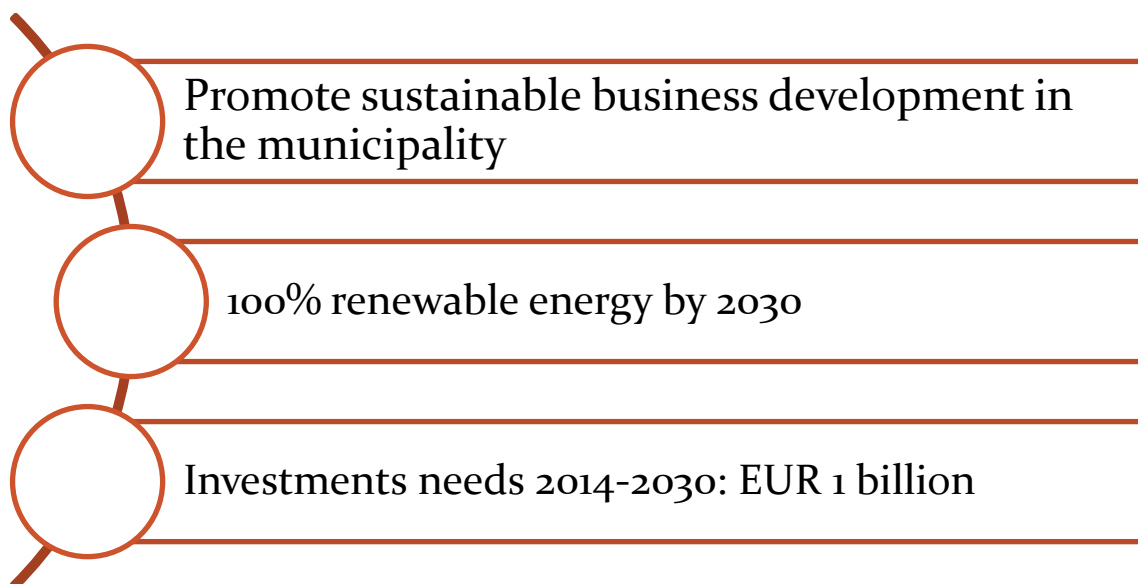
Carbon footprint:
total CO₂-
emissions in the
municipality
(2010): approx.
554,660 ton per
year (8.8 ton per
citizen)

City budget 2017:
DKK 3.9 billion
(=EUR 522
million)

Joined the
Covenant of
Mayors in 2011

Main successes: on
track to achieve its
renewable energy
target

Main challenge:
convince the
entire private
sector to join in
the energy
transition



HOW CAN FREDERIKSHAVN ACHIEVE 100% RENEWABLE ENERGY BY 2030?

The city at the forefront of Danish climate policy

Located in the north of Denmark, the municipality of Frederikshavn is known for its ambitious commitment to the energy transition. Initially, the city of Frederikshavn aspired to achieve 100% renewable energy by 2015, but due to the merger in 2013 of the three previous communities Skagen, Sæby and Frederikshavn, the city adapted its strategy with 2030 as the new target year. At the same time, this allows for the target to be more viable, by increasing the possibilities of renewable energy supply. Frederikshavn joined the Covenant of Mayors in 2011, with the aim to reduce 97% of its CO₂ emissions by 2030 compared to 2010.

Frederikshavn may not be as famous as Copenhagen, but it is still at the forefront to support Denmark's ambition to become energy self-sufficient by 2050. Frederikshavn is a pioneer city for the energy transition. It started with the creation of "Energy City Frederikshavn", which was established in order to lead by example in the implementation of the Danish environmental policies, especially the 2012 energy agreement and its three main goals: "Denmark will be a green and sustainable society, will be among the three countries in the world which lifts its sustainable energy share the most towards 2030 and in 2030, Denmark will be among the three most energy efficient countries in the OECD". For Frederikshavn, the main obstacle to the energy transition stems from the politicians' will: *"the big challenge is not the technology itself. It is the political process"*.

"The strategy plan leads the road to making the citizens and businesses of the Municipality making the growth track "Energy" their new way of living." Birgit Stenbak Hansen, Mayor of Frederikshavn

So far, Frederikshavn's annual evaluation indicates positive results and underlines that the city can reach its ambitious goal by 2030, as figure 4 shows.

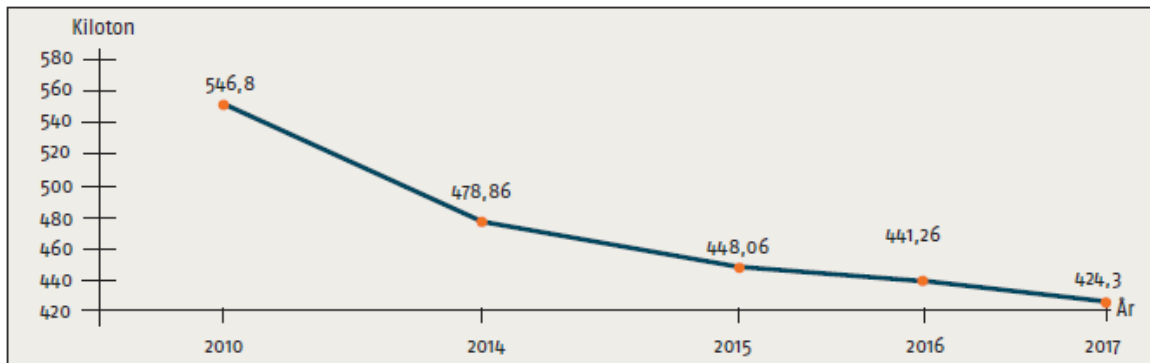
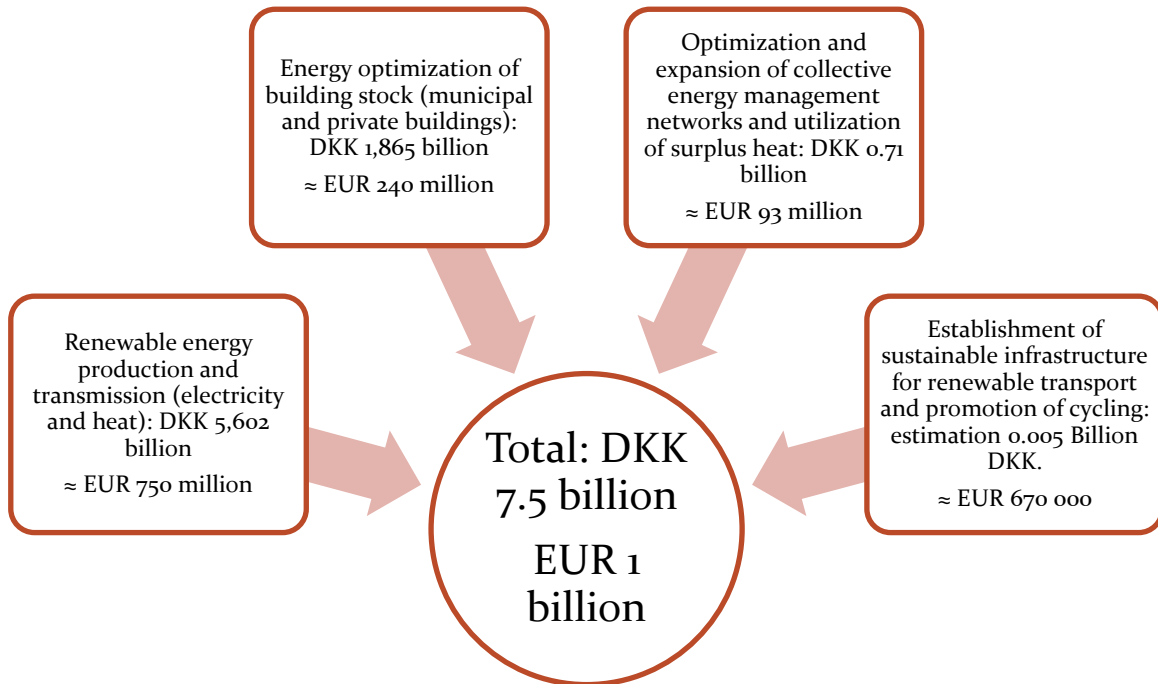


Figure 4 Illustration of the reduction of CO₂ of Frederikshavn by year from their auto evaluation of 2017

WHAT ARE THE CONCRETE ACTIONS NEEDED TO ACHIEVE THE GOALS?

What are the challenges of long-term planning?

After a deep analysis of its carbon emissions and the evaluation of the needed reforms, the city of Frederikshavn presented 32 actions to reach 100% of renewable energy. Overall, **the city planned a budget of DKK 7.5 billion, that is to say EUR 1 billion for the period.** But, as alternative renewable energy technologies are in constant evolution, the annual investment plan is evolving as well. New technologies can affect both the environmental impact and the required investment needs. Moreover, Frederikshavn's situation is different from other cities due to the 2030 target. The investments needs are equivalent between different municipalities for the energy transition, with about EUR 1 billion being necessary by 2050, but Frederikshavn's ambition requires to gather this sum by 2030. It entails acting fast already with innovative and available technologies, especially for renewables. The cost by sector reveals where Frederikshavn decided to invest the most – in particular renewable energy to comply with the 2030 objective - and where the city would need to invest in the future (mostly sustainable transportation).



Frederikshavn's investment needs hence don't correlate fully with the latest European Commission's investment recommendations to Denmark, which mainly insist on innovation.

Is Frederikshavn on its own in delivering its projects?

Many stakeholders are involved to implement the strategy and to participate in the funding. The municipality finances in particular its public projects, specifically the energy optimization of the building stock. General housing organizations are taking care of the energy renovation of the general housing, where the municipality provides guarantees for loans. The largest general housing association is affiliated with the European Local Energy Assistance (ELENA) scheme⁷. ELENA is a European fund by the European Investment Bank (EIB) and the Commission under the Horizon 2020 programme. ELENA provides technical assistance for the implementation of energy efficiency, the distribution of renewable energy and urban transport programmes. In general, projects supported by ELENA have a budget above EUR 30 million, with a 3-year implementation period for energy efficiency, and a 4-year period for urban transport and mobility. The largest housing association in

⁷ More information about ELENA [here](#).

Frederikshavn is planning to boost investments in energy renovation, with the expected help of ELENA fund corresponding to DKK 450 million (about EUR 60 million). The rest of the foreseen renewable energy projects are financed directly by the private organisations and private energy companies. Hence, this becomes an asset for the city, in order to attract green industries.

HOW TO INITIATE THE ENERGY TRANSITION?

How did Frederikshavn become a role model?

As a pioneer of the energy transition, the city of Frederikshavn has proven itself as a role model for the renovation of public buildings. Since 2014, the city has reduced the energy consumption of municipal buildings by 3% annually. The municipality as a company has a fixed amount of DKK 45 million (\approx EUR 60 000) for the energy renovation of its buildings. The total amount of the investments in 2017 in the energy supply for housing in the municipality is about DKK 651 million, i.e. EUR 87 million. The focus lies now on promoting more energy renovations in the private sector.



Figure 5 picture of a public building of Frederikshavn equipped with solar panels, photo on the [Energy City Frederikshavn website](#)



Figure 6 The city has replaced some of its fleet with biogas cars, such as this one, photo by Tom Jensen on [Energy City Frederikshavn website](#)

To do so, the city has established a partnership with local banks to encourage low-interest loans for the renovation of private housing⁸. Those loans are between EUR 1,350 and EUR 40,300 to assist private owners in their own energy transition. This initiative was made possible thanks to the project Infinite Solutions⁹, co-financed by the Intelligent Energy Europe programme of the EU and which aimed at finding concrete solutions (such as soft loans) to finance the energy transition in cities¹⁰.

What technologies does Frederikshavn rely on in its transition?

The city of Frederikshavn also participates in the development of innovative smart grids to support its strategy to become 100% renewable by 2030¹¹. A smart grid is an electrical grid which allows the measurement of a diversity of factors, such as smart meters, smart appliances, renewable energy resources and energy efficient resources. The aim is to control and share more information about the production and the consumption of energy. Hence, it is a useful tool for the energy transition, which requires the cooperation of industries, universities and public authorities. Frederikshavn's Master Plan 2030 also mentions the initiation of a broader smart grid. The cost is estimated at DKK 10 billion, EUR 1.3 billion, and is not included in the final investment needs due to the fact that it would be a sharing investment (between local companies, Aalborg University and the Institute for Energy Technology). It would be in the form of a EUDP: Energy Technological Development and Demonstration Program¹², a public subsidy scheme supporting new technology in the energy field. Leading this project would be a step further for the municipality in the sustainable transformation of its buildings.

⁸ Details of their actions on an [article](#) by Energy Cities from January 2016

⁹ More information about Infinite Solutions [here](#).

¹⁰ Two guide books by Energy Cities are available for more explanations: [here](#) and [here](#).

¹¹ Map of European smart grid projects gathered by the Commission [here](#).

¹² More information available [here](#).

CONCLUSION

The specificity of Frederikshavn is to aim for long-term goals (e.g. by 2050) already by 2030, therefore their vision is actually much more short-term. Its strategy is to go deeper in the objective of achieving 100% fossil-free energy supply by 2050, which is particularly tricky in the transport sector. The evaluation report 2017 also calls for more direct participation from citizens, as up to now the municipality has struggled to mobilize them. Their reports are essential to know how to conduct and better finance the transition, as moreover the European Commission has not provided detailed investment recommendations for Denmark in its latest progress report.

Frederikshavn has proven to be at the forefront of the energy transition, and is taking its energy and climate responsibilities seriously. Its investments have fostered growth and employment, and have attracted green industries to its territory. Frederikshavn needs **EUR 1 billion by 2030 to become 100% renewable.**

“Our sustainable energy agenda makes our municipality an attractive place to live in and attracts new knowledge and qualified workforce to our municipality!” Bahram Dehghan, Senior Project Manager at Energy City Frederikshavn.

- Frederikshavn shows that it is possible to do an ambitious energy transition by 2030.
- Municipalities can lead by example and thereby mobilize companies and citizens to join in the transition.
- The energy transition has multiple co-benefits, such as boosting local economic development and growth.
- Ambitious policies require significant investment needs even in the short-term, as Frederikshavn needs EUR 1 billion by 2030 to meet its renewable energy ambition.

Bordeaux-Métropole

787,107 inhabitants in
2018

579,27
km²

Carbon footprint: The trajectory estimated on the basis of its objectives represents a carbon budget of approximately 134 MtgCO₂ towards 2050

City budget 2016:
EUR 1.2 billion

Joined the
Covenant of
Mayors in 2009

Main successes:
since 2015,
greenhouse gas
emissions have been
reduced by 4% per
inhabitant and
successful public-
private cooperation

Main challenges:
the city
continues to
grow and
become more
and more
congested

-20% CO₂ emissions and -20% energy consumption by 2020
+ 20% renewable energy by 2020

Investment needs 2017-2022: EUR 535 million

Becoming an energy-plus metropole by 2050

Investment needs 2022-2050: EUR 2.7 billion

IS BORDEAUX-MÉTROPOLE AN EXAMPLE FOR THE ENERGY TRANSITION IN FRANCE?

What climate strategy has Bordeaux-Métropole adopted?

The municipality of Bordeaux became a metropole in 2015 and now gathers 28 towns from both sides of the river Garonne. Overall, it counts 787,107 inhabitants, of which a third are living in the main city Bordeaux. Bordeaux joined the Covenant of Mayors - Europe in 2009, and has since then remained at the forefront in promoting the energy transition. For instance, Bordeaux-Métropole has been a co-organiser of the European Energy Transition Conference since 2015. It was also in 2015 that the metropole initiated the process of elaborating an ambitious climate plan. Its “Plan d’action pour un territoire durable à haute qualité de vie”, focuses on a clear goal: becoming an energy-plus metropole by 2050, which means that Bordeaux-Métropole aims at producing more energy than it consumes. The agglomeration has many assets to produce more renewable energy, mainly thanks to the solar energy potential on its territory. At the same time, Bordeaux has set up a large energy efficiency plan to reduce private and public consumption. This also entails cooperation between the different territories that make up Bordeaux-Métropole. Bordeaux, as the economic centre, consumes more than the smaller towns, which in return could produce renewable energy, such as sustainable biomass through agriculture. However, this should not be at the expense of the consumption of these neighbours. Therefore, there are ongoing discussions about the collaboration that is needed between Bordeaux-Métropole and its neighbouring territories, as can be seen on figure 7 for the estimations of flows between Bordeaux and its neighbours. In its climate plan, the Bordeaux-Métropole puts forward its role of coordinator and initiator of projects between all the relevant stakeholders.

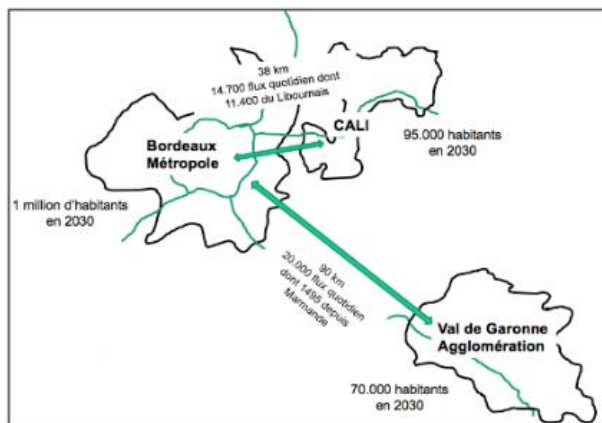


Figure 7 Bordeaux and its neighborhood territories. From a seminar "[Séminaire interterritorialité et transition énergétique 2018](#)"

HOW DOES BORDEAUX-METROPOLE INTEND TO IMPLEMENT ITS GOAL?

What is their energy-plus metropole strategy?

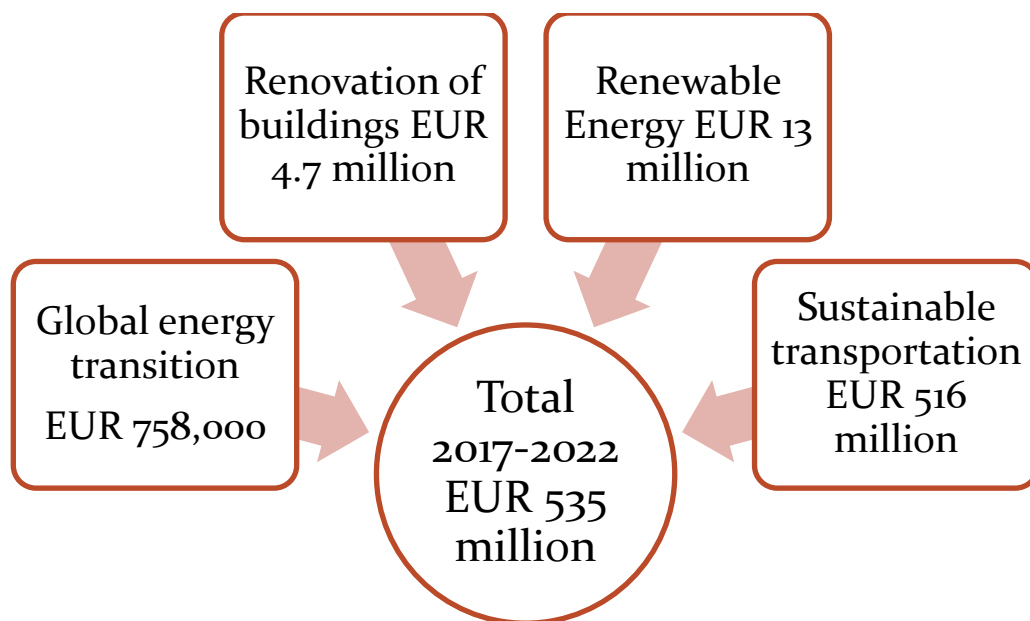
Becoming an energy-plus metropole by 2050 requires several action plans in order to achieve this ambitious objective. Its strategy follows the European Commission's recommendations with the focus on energy efficiency, renewables and connection with rural areas. Bordeaux's 2017-2022 action plan is divided in 3 parts: speeding up the energy transition, preserving and enhancing half of its natural spaces and assisting all relevant actors to be engaged in favour of the ecological and energy transition. Here, the analysis is only on the first part, which in itself is divided in four goals: strengthen the authority of the energy organisation, master the energy consumption of buildings, increase to 32% in 2030 the share of renewable energy and promote sustainable transportation. It gathers at the same time mitigation and adaptation actions. Instead of just focusing on the cost, the plan also puts forward some of the benefits of the transition. For instance, producing 3% of local renewable energy would generate a gain worth EUR 32 million. Building on the same idea, reducing energy consumption by 40% by 2050 would save the territory EUR 600 million per year. The metropolitan administration is currently leading a public consultation to ask how Bordeaux should look in 2050¹³. So far, 12,500 answers have been gathered, which will all feed into a new plan to be presented in spring 2019.

"Fighting global warming is a vital necessity" Alain Juppé in 2016, former President of Bordeaux-Métropole.

How does Bordeaux-Métropole plan its energy and climate budget?

For the period 2017-2022, Bordeaux-Métropole has already foreseen significant investment needs:

¹³ More information about the public concertation [here](#).



The budget for sustainable transportation is rather important, due to major construction works that are needed. This includes the extension of the tramway and the bus service, with an objective of achieving 415,000 trips per day in 2020, compared to 250,000 trips per day in 2009. This entails significant investments, shared between Bordeaux-Metropole and its towns. For the first operational period, Bordeaux-Metropole decided to focus on sustainable transportation for its energy transition. Bordeaux's priority slightly differs from the European Commission's investment recommendations for France, which are more focused on renewables and energy efficiency rather than mobility. So, if the same budget is kept, even though funds are allocated on another priority, **this would entail an investment need of EUR 2.7 billion for Bordeaux-Métropole for the period 2022-2050.**

The role of Bordeaux-Métropole is central to lead a coherent transition within the metropolitan area, rather than just to focus on city level. At the same time, the aim is to be a role model for the citizens and the private partners, by leading by example on specific actions, such as retrofitting public lighting, improving energy efficiency within the municipal buildings and implementing a sustainable mobility program within the administration (e.g. by buying an electric fleet or by choosing the train over plane whenever it is possible).

HOW DOES THE PROJECT ZIRI IN THE ECOPARC OF BLANQUEFORT EMBODY BORDEAUX-METROPOLE'S STRATEGY?

What is the project ZIRI?

The project ZIRI (zone d'intégration des réseaux intelligents – zone of integration of smart networks) within the industrial cluster of the ecoparc of Blanquefort aims at implementing smart technologies in the business park of 350 hectares intended for green companies. Initiated in 2014 by Bordeaux Technowest, it gathers more than 200 companies and supports about 5,200 jobs. Bordeaux Technowest is an association guiding innovative green companies. Most companies in the park are committed to respecting the environmental management system, sometimes labelled by the norm ISO 14001. The project has created a positive dynamic for the sustainable economy and has enabled the establishment of green companies within the territories of Bordeaux-Métropole. Pushing for a circular economy through a cluster of green SMEs is in complete alignment with the latest European Commission's recommendations for France.

“We encountered difficulties in starting the process of mobilizing companies, gathering actors who knew little and who lacked resources and / or availability. But resistance has fallen over time and today we are seeing a growing interest in the proposed actions. Savings and environmental gains are demonstrated and shared, which creates trust and stimulation. And the actors are fully aware of participating in a pilot operation that also gives them added value in terms of skills and image”.

Jean-François Nothias, Director of the Blanquefort Ecopark.

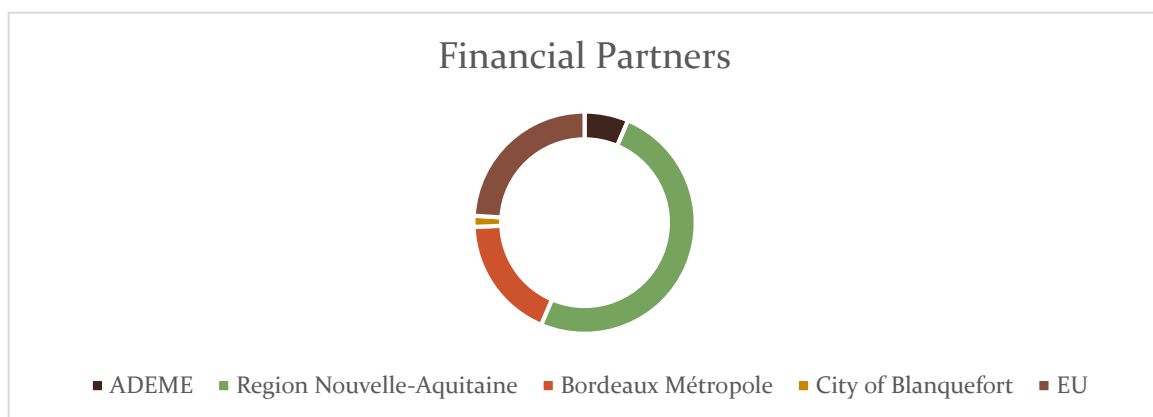


Figure 8 picture of the ecopark by Fabien Cottereau, from an [article](#) Nicolas César on SudOuest

The park follows the principle of industrial ecology. The aim is to optimize the energy and waste flows by connecting several companies. Concretely, it means buying electricity together, reusing water for different purposes, reusing waste in different ways or simply organising common transportation to the workplace. It also entails the use of innovative energy saving technologies. In 2017, it was estimated that this approach enabled the companies to save EUR 130,000.

How is it financed?

Bordeaux-Métropole is financing Bordeaux Technowest, alongside with the region of Nouvelle-Aquitaine, other cities, and the EU. For the ecoparc ZIRI project, Bordeaux Technowest has several partners: the region of Nouvelle-Aquitaine, Bordeaux-Métropole, the city of Blanquefort and the ADEME Nouvelle-Aquitaine (French agency for the environment and energy). Overall, it cost EUR 268,000, split between the partners¹⁴, as the figure below illustrates.



Industrial ecology is a critical part of Bordeaux-Métropole's strategy. For Yves Miaux, director of economic development at Bordeaux-Métropole, "*industrial ecology creates employment. The metropole has an ambition of creating 100,000 jobs by 2030*"¹⁵. This project is a success meant to be reproduced, perhaps at a national level, but first within the

¹⁴ All these information comes from this [report](#) and from [recita website](#).

¹⁵ Quote from an [article](#) of Nicolas César, in SudOuest published on 23/12/2017. Original quote: "L'écologie industrielle est créatrice d'emplois. Et, la métropole s'est fixée l'ambition de créer 100 000 emplois d'ici 2030" Yves Miaud.

metropole at Artigues-près-Bordeaux and at OIM Bordeaux Aéroparc¹⁶ (a business park for innovative aeronautic and defence companies). But for François Baffou, general director of Bordeaux Technowest¹⁷, it will not be that easy to implement this principle elsewhere, as it requires the commitment of local companies and financial support from local authorities.

CONCLUSION

Bordeaux-Métropole is engaged in the pathway to become an energy-plus metropole by 2050. Their operational project for the period 2017-2022 is ambitious and is based on cooperation between all the stakeholders. Overall, it appears that the needs of the city and the EU Commission's investment recommendations for France for the energy transition are closely linked. **The investment needs toward 2050 for Bordeaux-Métropole are significant, estimated at EUR 2.7 billion** if it is decided to keep the same investment pattern. Nevertheless, it will allow Bordeaux-Métropole to continue to grow in a sustainable manner, in accordance with the Paris Agreement's goals.

- The energy transition requires transversal policies across all sectors: economy, mobility, governance, employment etc.
- Collaboration between different cities, from urban centres to rural towns, is a must for developing a sustainable and inclusive transition.
- Long-term ambitions have to take into account the projected growth of a city.
- Significant socio-economic benefits can be derived from the energy transition.
- To become an energy-plus metropole, Bordeaux would need EUR 2.7 billion.

¹⁶ More information about this project [here](#).

¹⁷ From an [article](#) of Nicolas César, in SudOuest published on 23/12/2017.

City of Seville

688,711 inhabitants in
2018

140.8 km²

Carbon
footprint
2012:
2,061,592 CO₂
ton per year

City budget for
2019: EUR 852
million

Joined the
Covenant of
Mayors in 2009

Main success:
impressive
increase of
cycling in
mobility

Main challenges:
establish a clearer
path to 2050 and
broaden its
climate policy to
all sectors

- 40% carbon emissions by 2020

Budget 2012-2020: EUR 264 million

Becoming a role model for sustainable mobility

Investment needs 2020-2050: EUR 1 billion

HOW DOES SEVILLA PLAN TO TACKLE CLIMATE CHANGE?

Seville, the capital of the autonomous community of Andalusia, is a major city in Southern Europe. With 688,711 inhabitants, it is the fourth biggest city in Spain. Seville is a tourist magnet and also attracts people and investments, thanks to its good economic situation. Seville joined the Covenant of Mayors – Europe in 2009, but has been taking energy and climate action plans since the 2000s. In 2016, the municipality adopted an action plan for climate and renewable energy, with the ambition to reduce by 40% its carbon emissions by 2020. The city of Seville is aware of the risks of non-action, and is already suffering from the rise of temperature fuelled by climate change. As the Climate Data Factory¹⁸ has calculated, the average annual temperature could rise to 32-33° by 2100 without mitigation action, or be limited to 29-30° with an ambitious energy and climate policy. Currently, the average annual temperature is 25-26°. Seville is therefore implementing mitigation and adaption actions, such as increasing the green areas of the city to maintain a cooler urban climate. Many citizens are putting pressure on the city to enact an even more ambitious policy, and are also actively participating in the greening of their city. Volunteers created the association “Red Sevilla por el clima”¹⁹ (meaning “Seville network for climate”), which is leading its own projects, such as the creation of shared gardens or educating about climate change in schools.

¹⁸ Data available on the climate data factory [website](#).

¹⁹ Link to their [website](#).

“The success of the measures against climate change are going to depend largely on their implementation and on the level of involvement of every inhabitant of our villages and cities”. Red Sevilla Por el Clima

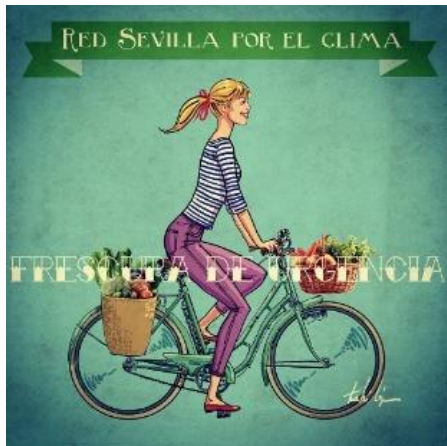


Figure 9 Communication picture by Red Sevilla for el clima, from their [website](http://www.redsevillaforelclima.org)



Figure 10 the logo of Red Sevilla for el clima

HOW MUCH HAS SEVILLA PLANNED TO INVEST IN ENERGY AND CLIMATE ACTION?

The city leads ambitious actions to reduce its carbon emissions by 40% by 2020. In its latest action plan for climate and renewable energy of 2016, Seville has presented a **budget of about EUR 264 million for the period 2012-2020**. It includes some projects co-financed by the EU through the Cohesion funds. It follows the action plan for renewable energy of 2009, which was revised in 2013 and which covered the period 2007-2020 and had a budget of EUR 402 million. Many actions are common between the two plans and are complementary to each other. However, the superposition of action plans creates confusion about the vision for the future of the city. Seville's strategy towards 2030 and 2050 is not clear yet. Based on its latest plan, **the investment needs can be estimated at EUR 1 billion for the period 2020-2050**.

The latest plan focuses on four main priorities: the improvement of energy efficiency in municipal buildings, the development of a sustainable mobility model (representing almost half of the measures presented, illustrating how sustainable mobility is a key priority for the city), the promotion of renewable energies and energy saving and raising awareness

and promoting responsible consumption. Seville's priorities are also identified by the European Commission as an investment priority for Spain in its latest recommendations. But the EU executive has also emphasized in addition to this the challenges of smart technologies and the renovation of heating and cooling systems in its investment recommendations for Spain, which are not explicitly addressed by Seville in its plan.

HOW DID SEVILLA BECOME THE CYCLING CAPITAL OF SOUTHERN EUROPE?

Is building cycling paths enough to increase the number of cyclists?

Sustainable mobility is a key sector in Seville's strategy towards sustainability. In four years, from 2005 and 2009, the city has built a large bike network, that now totals an impressive 120 kilometres. By 2018, the network was extended to 180 kilometres. It is not traditional in Southern Europe to use bikes, and there were nearly 0% of bikers in 2006 in Seville. Nowadays in 2018, 1 out of 10 citizens commutes by bike. Now, the aim is to improve the current network even more and to also connect the suburbs to the network.

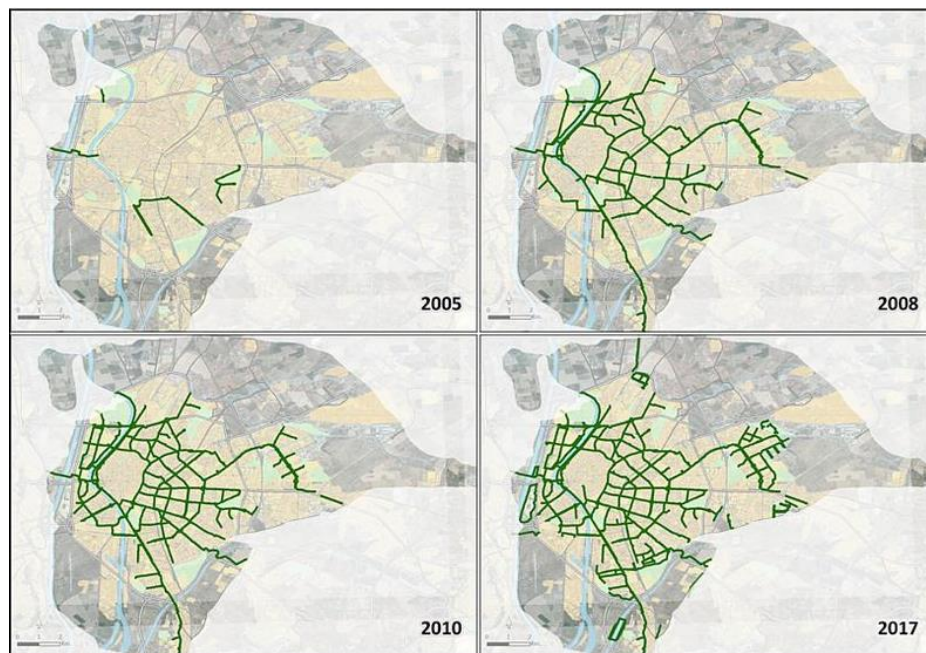


Figure 11 Evolution of the network of cycle paths in Seville. Source: Municipality of Seville.

Following the pioneering Dutch cycling model with cycle paths separated from motorised traffic, most of them being bidirectional and replacing former parking lanes,

Seville has built a large and compact network. In order to include as many people as possible, even those who do not have the space for parking a bike at home, or cannot buy one, the city introduced a bike-sharing system in 2007. It encompasses 2,500 bicycles in 250 docking stations. Over time, the number of women cycling has risen to 36% in 2017, which is a positive result, as the more cyclists there are, the higher the percentage of women among them. Biking also motivates elderly people, as cyclists over 64 years of age is growing as well. The policy is linked to a wider goal of promoting sustainable and active mobility, with the creation of several pedestrian zones, mainly in the historical centre (for instance, the Plaza Nueva, Avenida de la Constitución, Puerta de Jerez, San Fernando street etc.). About EUR 37 million in investments are planned for these pedestrian zones in Seville.

“As soon as the building work was finishing and the fences were removed, the cyclists just came. The head of the building team, who’d been very skeptical about the process, called me and said, ‘Where have all those cyclists come from?’ That’s when I knew for sure it was going to work. They came from all over the city.” José García Cebrián, Seville’s Head of urban planning.

What is the role of the citizens in Seville’s mobility policy?

This mobility policy was initiated by the city council, after a long mobilisation of some citizens. The association “A Contramano: Asamblea de Ciclistas de Sevilla” (assembly of cyclists of Seville) was founded in 1987, with the aim to lobby for a network of cycling paths in the city. They organised several demonstrations to call for political action. The



Figure 122 Press clipping showing a bike demonstration in Seville in demand of cycle paths organised by "A Contramano" (1993). Photograph: Miguel Mesa ("El Correo de Andalucía"). From an [Euronews article](#)

largest one took place in 1993 and gathered 10,000 people, as figure 12 illustrates. Some members of the association actually have participated in the creation of Seville's cycle network.

Seville is leading by example in its successful mobility policy: by building the right infrastructure for bikes, it has resulted in increasing the number of cyclists dramatically, as figure 14 shows. In Seville, cycling has become a daily routine, and not only just a leisure-activity. Seville's ambitious cycling policy requires significant investments. We can see on figure 13 that from 2006 to 2011, it cost about EUR 32 million to create the network. These investments aimed at encouraging biking by making it simple, safe and comfortable for all. The local authorities are continuing this policy with, for instance, the cycling plan of

Period	Action	Budget
2004-2006	Elaboraton of the projects for basic the cycle network	
Aug. 2006 – Dec. 2007	Public works for the basic cycle network (77 km)	18 Million €
July – Nov. 2008	Elaboration of the projects for the complementary cycle network	
June 2009 – June 2010	Public works for the complementary cycle network (up to 120 km)	12 Million €
Oct. 2009 - Feb. 2010	Elaboration of a project for the improvement of the cycle network at some conflictive points	
Sept. 2010 – June 2011	Public works for the improvement of the cycle network	2 Million €

Figure 13 Chronology and budget of the different phases of the development of the cycle network from 2006 to 2011. Source: (Muñoz, 2010), from this [article](#).

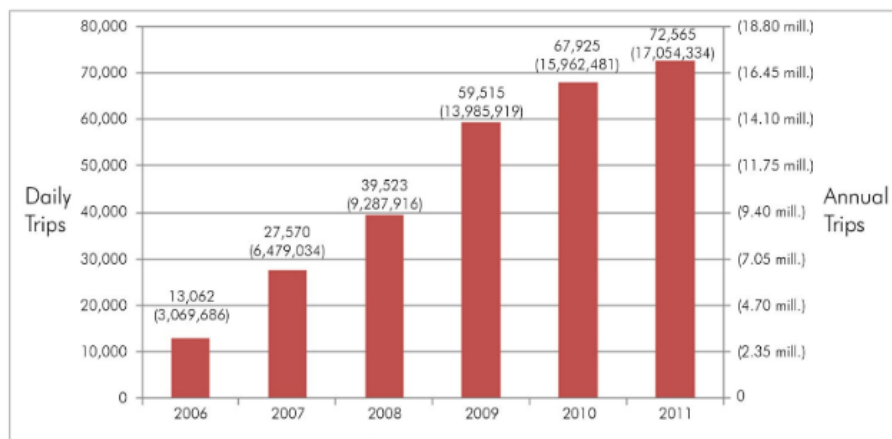


Figure 14 Estimations for the total number of bicycle trips in a typical business day of November, and for the total number of bicycle trips per year. Source: Compiled by Marqués, R., Hernández-Herrador, V., Calvo, M. and García-Cebrián, J.A from data of (Ayuntamiento de Sevilla 2006, 2007, 2008, 2010) and (SIBUS, 2012)

Andalusia 2014-2020, which has a budget of EUR 69 million to build a regional network of 3,080 kilometres²⁰.

CONCLUSION

Thus, Seville's future climate policy entails significant investment needs to carry on its efforts, in particular in terms of sustainable urban mobility. **The current estimations foresee investment needs of EUR 1 billion for the period 2020-2050.** The city of Seville is seeking to keep promoting and improving its sustainable mobility policy, and will now seek to establish a clear vision towards 2050. Several plans have been made for the current period, and the next one is likely to feature a single, coherent and transversal strategy. Even if Seville's cycling policy is impressive, cars still remain at the centre of the city.

- Cycling can be boosted with a dense and favourable network.
- Focusing funds on one sector can be effective, but the energy transition requires actions in all sectors at the same time in order to be thorough enough.
- Local and regional climate plans complement each other.
- By 2050, investment needs are estimated at EUR 1 billion.

²⁰ The Andalusia cycle plan 2014-2020 is available [here](#).

Tallinn: On its way to becoming one of the first low-carbon cities
in Eastern Europe

City of Tallinn

430,805 inhabitants in
2018

159.2 km²

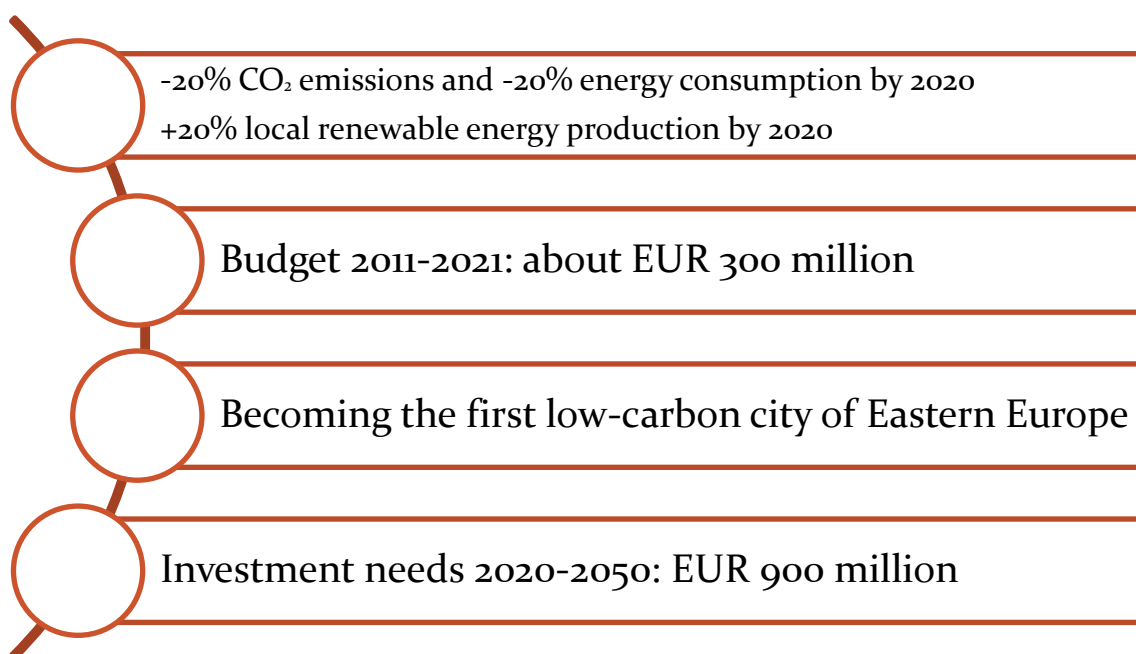
Carbon
footprint
2007: 3,523,185
CO₂ tons per
year

City budget for
2019: EUR 761
million

Joined the
Covenant of
Mayors in 2009

Main successes:
large improvement
of the heating and
cooling systems
and the renovation
of buildings

Main challenges:
find enough
investments to
reach its 2050
ambitions



IS TALLINN COMMITTED TO THE ENERGY TRANSITION?

A city historically committed

Capital city of Estonia with 430,805 inhabitants, Tallinn is the economical lung of the country. Known for the impressive digitalisation of its public services²¹, the country is seeking to achieve its energy transition, especially with the support of new technologies. Tallinn joined the Covenant of Mayors –Europe in 2009 and has since then presented several action plans, such as its energy efficiency action plan for the period 2011-2021. Already between 2011- and 2013, EUR 347.7 million in total was invested by the city for all activities related to reducing CO₂ emissions: reconstruction of buildings in municipal ownership, construction of bikeways, purchase of public transport vehicles and reconstruction of tram tracks, and for covering expenses related to land-use planning. These examples of actions are set to fulfil Tallinn's goals of reducing its energy consumption and its CO₂ emissions by 20%, and to increase by 20% the share of renewable energy in its energy mix. All these goals have risen to 40% by 2030.

What is Tallinn's vision for 2050?

In the meantime, Tallinn is currently planning its roadmap for 2050, thanks to its involvement in the EU Horizon 2020 project Roadmaps for Energy (R4E)²². R4E allowed ten European cities to imagine and define their sustainable future towards 2050 during several workshop sessions in 2018. Each city focused on two out of three areas: smart buildings, smart mobility and smart urban spaces in the planning of its roadmap. Tallinn's representatives and experts involved in the project worked on the two first areas. While no action plan has been released yet by Tallinn, the outcomes of the project reveal where the city is seeking to go. For instance, Tallinn's buildings will be adaptable and energy efficient, while high speed transportation would link Tallinn and Helsinki to form an integrated metropole²³. These are very ambitious projects and will entail large investments. As it has not been planned yet, it is possible that our investment needs estimations are far inferior to

²¹ For instance, see an [article](#) published in *Marianne* by Laurence Dequay: "Estonie, le nirvana digital de l'Europe" on 21/07/2018

²² More information about the R4E project [here](#).

²³ All the plan and the proceedings of the project are available [here](#) and [here](#).

the actual ones. Tallinn's 2050 strategy illustrates how cities are now aware that sustainability is a lever for economic and social development, and facilitates cities becoming fossil-fuel free as soon as possible.

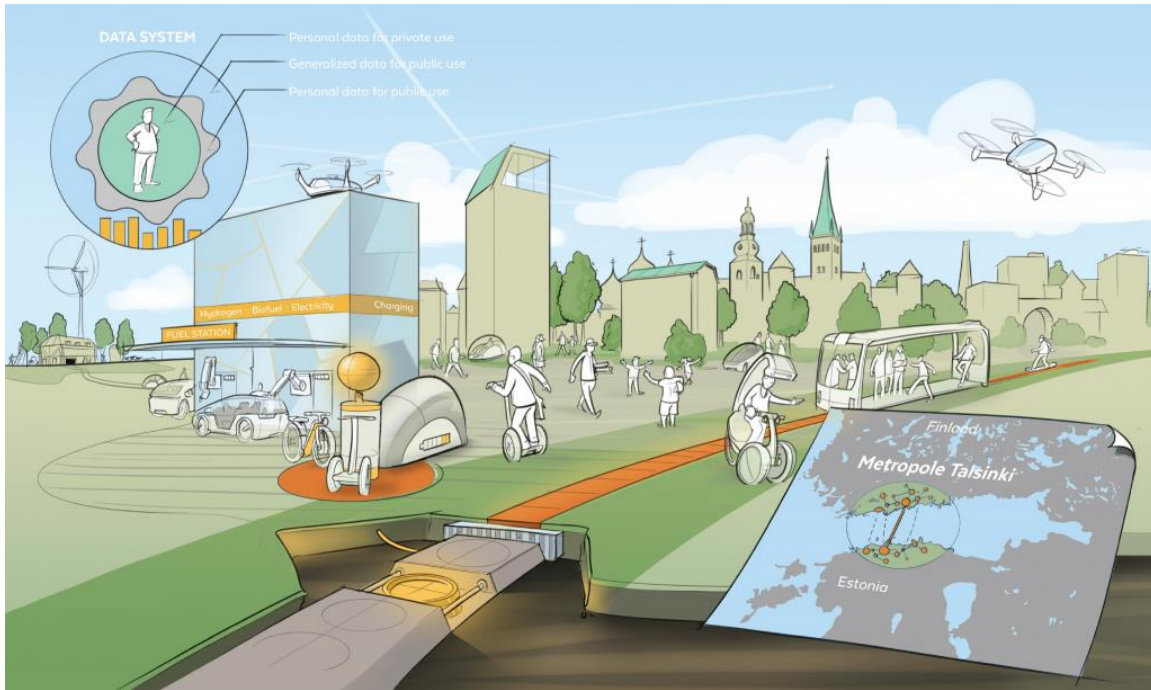


Figure 15 Illustration of Tallinn's 2050 roadmap by R4E

WHAT ARE THE PRIORITIES FOR TALLINN?

What is the content of its action plan?

The municipality of Tallinn is leading several actions for its transition, with several budgets. Its most-detailed planning concerns energy efficiency and renewable energy actions, for which Tallinn has **estimated a budget of around EUR 300 million for the period 2011-2021**. Thus, if the city maintains the same budget, it would **need EUR 900 million for the period 2020-2050**. Tallinn covers ten main actions in its planning: the organisation of energy efficient days, the energy audit and energy passport issuing for city-owned buildings, the renovation and heat-insulation of city-owned buildings, further improvement of outdoor lighting control systems, the use of energy-saving lamps in outdoor lighting, the use of energy-saving lamps in the city's organisations, the change of energy consumption habits in the city's organisations, the use of sustainable biofuel in the

urban transport sector, the use of fuel-efficient official cars and the construction of the tram line in the Lasnamäe district. Tallinn's priorities are similar to those that the EU Commission is calling on Estonia to focus on in its investment recommendations, with the difference that the Commission is also demanding stronger efforts by Estonia to support circular economy initiatives.

It is also estimated that the expenses related to Tallinn's Covenant of Mayors Sustainable Energy Action Plan would reach EUR 135 million from 2015-2020, out of which EUR 54 million would be financed by the Estonian state.

What has Tallinn accomplished so far?

Tallinn's policy is ambitious in several aspects. For instance, public transportation is free of charge for residents since 2013. Citizens only have to pay a 2-euro green card, and finance transportation through their local taxes. And while EUR 475.3 million have been spent for the period 2013-2020, the city claims it has turned a EUR 20 million profit each year. The use of public transport has indeed increased after it became free (+14% in 2014), however, the large part of this increase has stemmed from more pedestrians taking the bus. It remains difficult to convince car users to make the transition to public transport. Free transportation policy is easier in a medium-scale city, where transport congestion is not such a critical issue.

"There's no doubt that we not only cover the costs, but we also come out with a surplus," Allan Alaküla, Head of Tallinn's European Union Office.²⁴

²⁴ Quote from an [article](#) "Estonia is making public transport free" by Alex Gray published on the World Economic Forum website on the 01/06/2018



Figure 16 Residents only need a EUR 2 green card to use public transportation in Tallinn. Picture by STRINGER/EPA

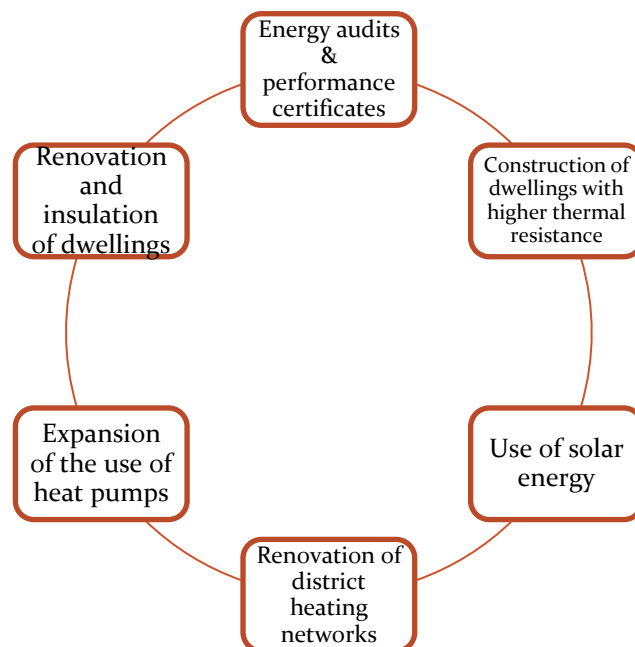


Figure 17 Reconstructed facade financed by Tallinn

In the housing sector, Tallinn has carried out its project “Fix the Facades” since 2010 to support residential renovation, illustrated on figure 17. It encourages renovation loans by granting 10% of the amount needed for the renovation. 123 apartment associations received support from 2010–2014, which amounts to a support worth EUR 1.7 million from the city. The project was renewed in 2015. Furthermore, as regards the public sector, EUR 37.5 million from sales of CO₂ quotas was invested in the reconstruction of municipal buildings in Tallinn from 2011–2013, which allowed the saving of 3,370 MWh of energy per year. Tallinn’s ambitious renovation program could be used as a reference for supporting similar initiatives in cities under the next ESIF program 2021-2027.

What are Tallinn's actions for renovating its heating and cooling systems?

Estonia is leading an important policy to renovate the heating and cooling system and make it more sustainable. For instance, in 2017 at the national level, 44% of the district heating sales are biomass supply, against 33% of gas²⁵. At the local level, the share of renewable and local sustainable biofuel in heat generation in 2014 was 42%; the plan is now to increase it to 80% by 2017. The sector still needs improvement, specifically when it comes to limiting energy losses. Tallinn has taken up the challenge and has proposed several measures in that direction. The current renovation and heat-insulation of the buildings enabled the city to save up to 30% in energy. Tallinn's main goal is to reduce the share of natural gas in its energy supplies, thereby also decreasing its energy dependence. As of now, this policy has been a success: from 80% in 2007, the share of natural gas has decreased to 58% in 2015. Tallinn has also tried to increase the share of sustainable local fuels, such as wood chip and peat. Most of the local small boiler houses have been closed, in order to implement a renewable energy system. This is also linked with the grants for residents to improve the energy consumption in their homes.



²⁵ Data from a presentation by the Estonian government, available [here](#).

The city supports the expansion of its district heating and cooling system. It is a centralized heating and cooling production system, which is then distributed between buildings, as illustrated in figure 18. With this system, it is easier to use renewable supply and it also increases energy efficiency. District heating is mainly provided by the energy utility group Utilitas, which constructed a new sustainable biomass power plant in Vão in 2016²⁶, as figure 19 shows. It will use Estonian wood chip and peat, for a total investment of EUR 65 million. The municipality is counting on this power plant (along with Tallinn Power Plant, the waste-to-energy unit of Iru thermal power plant and Mustamäe boiler house) to achieve its policy of using more sustainable biomass and reduce the biomass energy price.

“Such heating solution for a home or office is efficient and meets environmental requirements today as well as in decades to come” Priit Koit, Head of the Utilitas group²⁷.



Figure 18 illustration of the functioning of district heating systems by power solutions France



Figure 19 Picture of power plant in Vão from [Utilitas' website](#)

CONCLUSION

Tallinn is preparing its sustainable future, with key investments needed in public transport, renovation and sustainable heating and cooling systems - key investment areas that have been also identified by the EU Commission for Estonia. For now, **Tallinn's investment needs require EUR 900 million towards 2050**, but as Tallinn targets

²⁶ Presentation in Estonian of the project [here](#).

²⁷ Quote from the Utilitas [website](#).

innovative solutions for smart mobility and smart buildings, this might be an underestimation. The municipality is aware of the challenges that await, and requires significant and necessary investments to face them.

- Free public transportation is a strong action to foster sustainable mobility, but it is still difficult to make car users switch to public transportation.
- Sustainable heating and cooling systems is a top priority for cities, as it allows for significant energy savings and the potential for renewable energy is important.
- 2050 vision is a necessity; however, it also requires a concrete translation through a detailed action plan.
- Current estimation of the investment needs: EUR 900 million.

Main findings

Thus, these five examples illustrate how cities are acting to limit climate change and catalyse the clean energy transition, and what investments they would need to achieve the objectives of the Paris Agreement. Even though Frederikshavn is the smallest city of our case studies, its investment needs of EUR 1 billion are nearly equivalent to those of Ghent, Tallinn and Seville by 2050, while Bordeaux-Métropole would need more (almost EUR 3 billion) due to its larger population. These five cities have also shown that the energy transition is a multi-sector issue, which needs to be included in all policies.

The estimation of these cities' investment needs presented here remains theoretical, but still shows that many cities are already planning their investments till 2050. Long-term planning requires a clear direction and while cities are taking action to mobilize private and public investments, it is clear that they will need critical support from the EU and its Member States under the next ESIF program in order to meet all their investment needs for their Paris-proof energy transition.

The Commission shares its recommendations for each EU Member State at the beginning of the year, and in 2019, it has linked this exercise for the first time with the next ESIF program (2021-2027). The EU Commission is aware of the necessity of the energy transition, and recommends Member States to go further in supporting the renovation of buildings, sustainable heating and cooling systems, renewable energy and sustainable mobility – all key sectors in which European cities are taking action and want to go further. The investment needs of the five cities presented here concur with the European Commission's investment recommendations for EU Member States, and therefore constitute a call for action: by channeling the necessary investments under the next ESIF program to support their cities, Member States will also be able to go further in their energy transition and take action to comply with the Paris Agreement's objectives. While the EU Commission's investment recommendations lack precise figures, the 5 city examples analyzed here provide clear direction and guidance to Member States on where, when and how funding and investments need to be redirected to the local energy transition. This

publication has provided a clear picture of the investments needed for the transition at local level, for cities of different sizes, characteristics and socio-economic status: between EUR 1 million and EUR 3 billion until 2050 are necessary according to our estimations. The EU and its Member States must now unlock enough funds to support cities' energy transition under the next ESIF program 2021-2027, and couple this investment with critical technical support to cities so they are empowered to fully implement their ambitious actions.

Investment needs toward 2050 from the smallest to the largest city:



Main conclusions:



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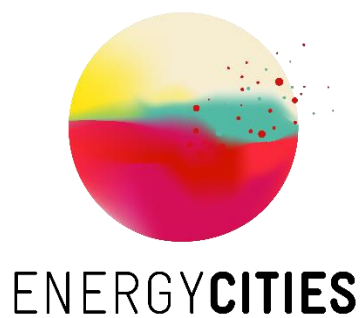
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