BALREPA Manual

On sustainable energy planning

Prepared by Ea Energy Analyses
For Baltic Sea Region Energy Cooperation and Nordic Council of Ministers

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Ministry of Energy of the Republic of Lithuania

Ea Energy Analyses

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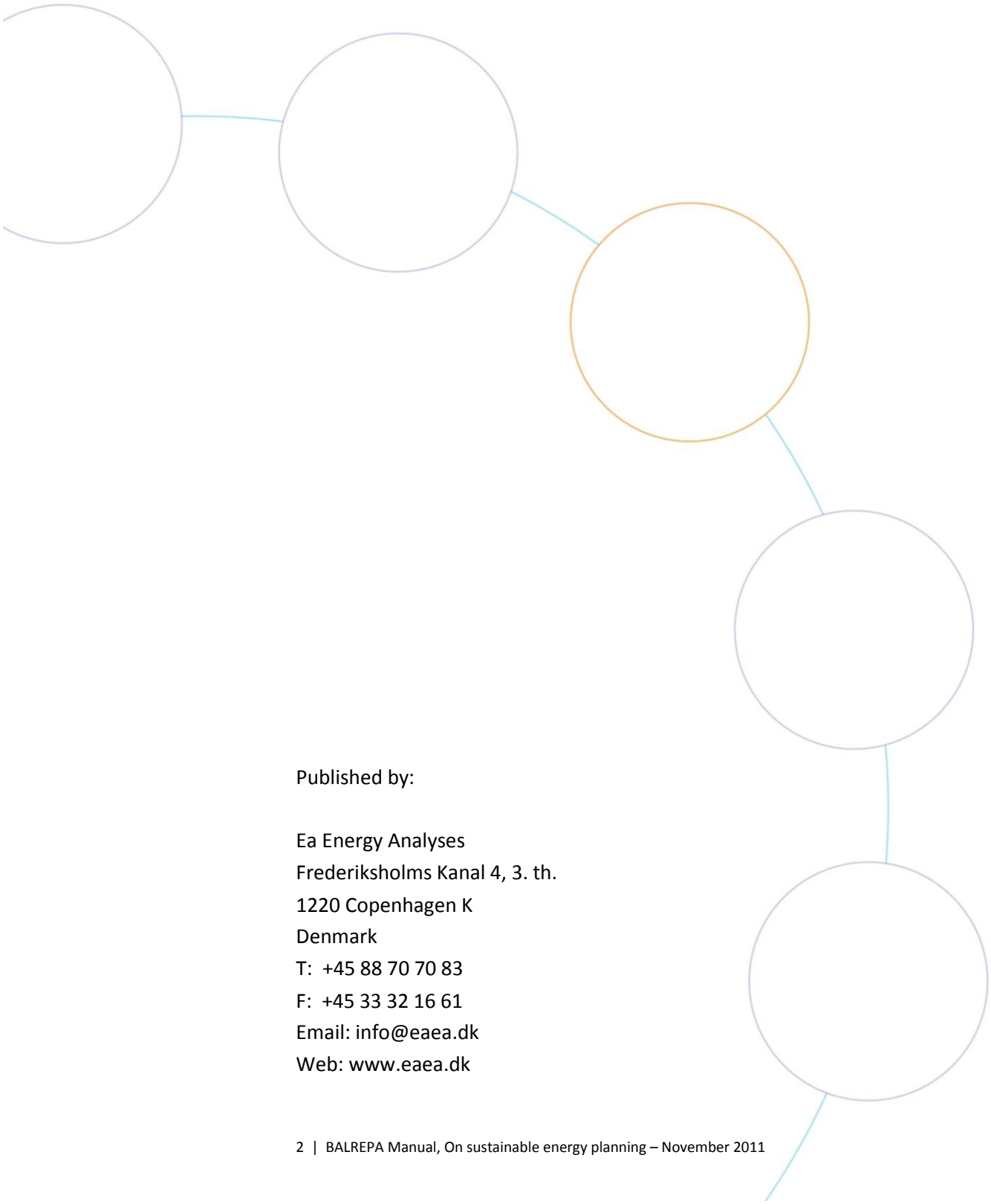

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1 Introduction

The role of the Baltic Sea Region – as a political level for cooperation – has a huge and unexploited potential, just as the region has potential to become a frontrunner in ensuring a low carbon sustainable development.

This was demonstrated in study on 'Energy perspectives for the Baltic Sea region'. The study was conducted in close dialogue with various stakeholders and politicians among others Baltic Sea Region Energy Cooperation (BASREC), Union of Baltic Cities (UBC) and Baltic Sea States Sub-regional Co-operation (BSSSC). One of the recommendations from the stakeholder discussion was to "establish a common regional training programme to strengthen the capacities in energy planning".

As a consequence BASREC and the Nordic Council of Ministers (NCM) in 2010 decided to launch the pilot project Baltic Rotating Energy Planning Academy, BALREPA.

Baltic Rotating Energy Planning Academy

BALREPA aims to further a macro-regional approach to energy planning in the Baltic Sea Region through joint training activities, exchange of experiences and formulation of concrete projects. The idea is that each year a new country/region will host an international academy, where authorities, energy companies, universities and NGOs engage in common training and exchange of expertise, which address topical energy planning issues. Key to the academy idea is local involvement and cooperation. The results of the group work are at the end of the training presented to e.g. peers, political decision-makers or the public.

BALREPA is focused on the link between the international, regional and national levels and the local level. This is reflected both in the structure of the actual academies and in this manual. The academy includes two different educational modules; Track A and B. Track A is targeted at municipal and local authorities, and focus on municipal energy planning aspects. Track B is targeted at energy agencies and universities, and focuses on energy scenario modelling.

The structure of the academy is illustrated in the figure below.

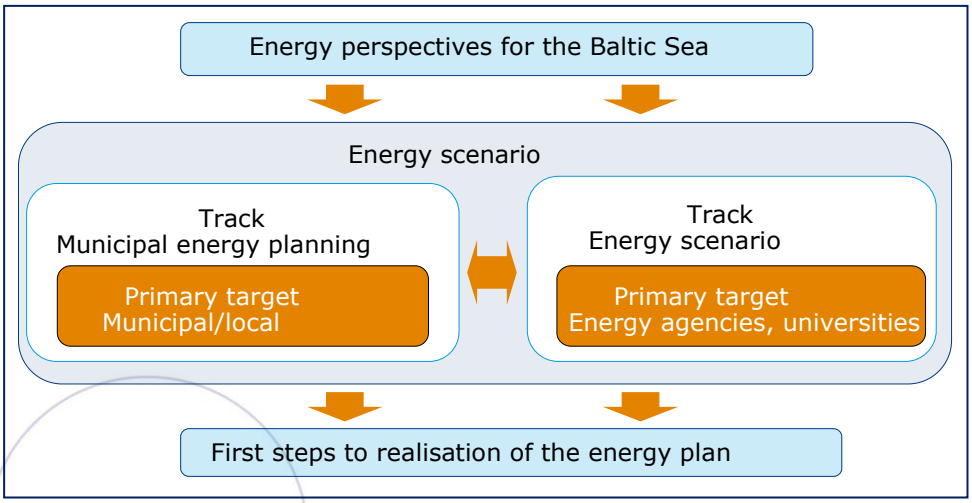


Figure 1 Structure of the BALREPA programme.

In important part of the BALREPA concept is to create cooperation between local and international participants as well as between municipalities and universities, through joint group work and discussions between the two tracks. The shared discussion and cooperation give the students a change to engage in real life problems at the local level, while it give the municipalities a possibility to get qualified input to the problems they are facing in the energy planning process.

At the project webpage – www.balrepa.org – background materials, presentations from passed academies and other relevant training materials can be downloaded as well as the most up to date version of this manual. The BALREPA website currently exists in three languages (English, Russian and Lithuanian). For each future BALREPA session the site should be presented in the host language.

The BALREPA pilot project is organised by the Information Office of the Nordic Council of Ministers in Kaliningrad and the consulting company Ea Energy Analyses, Denmark. The first two academies in Kaliningrad (Russia) and Vilnius (Lithuania) constitute the pilot project, after which a decision will be made as to whether or not BALREPA should be a permanent training course, and in that case, what the organisational structure of BALREPA should look like.

This manual

An integral part of the BALREPA concept is a manual on energy planning elaborated during the first two academies. The manual build on lectures and discussions from earlier BALREPAs and thus reflect key questions and problems addressed during the academies. The aim of this manual is to qualify the individual municipalities with respect to both technical and process aspects of energy planning, in order to assist the municipalities in reaching their targets for exploitation of renewable energy sources and energy

efficiency, including energy savings. The contents of this manual, is closely related to the topics addressed during the annual summer schools. It presents case examples primarily based on examples from the academies.

Supplement to existing manuals and guidebooks

The aim of the manual is not to cover the whole process of local energy planning, as this has already been done by others, but to focus on areas of the planning process with special relevance for the cooperation within the Baltic Sea Region. This manual should thus be seen as a supplement to existing manuals on energy planning. It builds on existing experiences and points out areas of improvement with relevance for the region. For municipalities interested in more detailed guidelines we suggest to read the Covenant of Mayors guidebook on how to develop a sustainable energy action plan.

The manual is structured so as to highlight and strengthen the link between the overall development goals for the region and the concrete challenges and obligations on the local level, describing the different steps from vision to praxis. The purpose is to highlight the municipalities' role in reaching the common goals for a sustainable development and encourage and inspire to actions.

Two main drivers can be identified for why municipalities engage in energy planning. It can be due to international or national targets and obligations, which the national authorities fulfil through demands for local initiatives or new local legislation. This can be seen as a top down approach to local energy planning. Or it can be due to local energy or resource challenges or out from a local interest in ensuring local sustainable development, which can be seen as a bottom up approach.

The relation between the different levels of targets and actions is illustrated in figure 2.

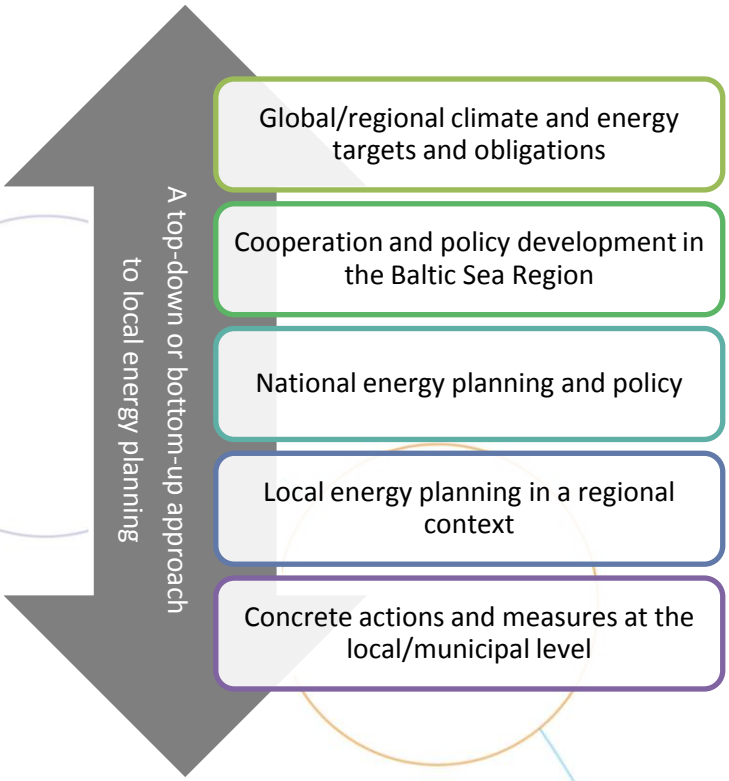


Figure 2 Illustration of the relation between the different decision making levels, and the two approaches to local energy planning.

Through BALREPA the hope is to create a clear linkage between the different levels to ensure both local and regional development.

Status – future development of the manual

The thought behind the manual is that it should be continuously developed, reflecting the focus areas of future BALREPA and the general development within the field of energy planning. Our hope is to continuously update the contents of the chapters, add new case examples and include new themes in future versions.

Especially chapter 4.6 regarding municipal measures should be developed to include a deeper discussion of relevant measures, based on participant inputs at future BALREPAs. Implementing concrete activities in order to reach defined energy targets is a crucial part of the energy planning process. A further development of this chapter could therefore provide useful guidance to municipal planners. It is also suggested to add several good-practice examples in order to concretise the suggested initiatives.

Suggestions for future themes includes, a discussion on gas networks and infrastructure, an analysis of biomass and waste as a scarce resource and a discussion on how to best include the transport sector in the different aspects of municipal energy planning.

Interview: BALREPA - sharing experience in energy planning, inspiring regional cooperation, promoting renewables and energy efficiency

An interview with Daumantas Kerežis, Chief officer Ministry of Energy of the Republic of Lithuania, host of the second BALREPA in Vilnius, Lithuania, November 2011

The Baltic Sea Region Energy Cooperation (BASREC) and the Nordic Council of Ministers decided in 2010 to launch the pilot project Baltic Rotating Energy Planning Academy – BALREPA. BALREPA aims at furthering a macro-regional approach to energy planning in the Baltic Sea Region through joint training activities and formulation of concrete projects involving renewables and energy efficiency.

The initial two BALREPA should form the basis for future BALREPAs

The initial two BALREPA trainings, the first one held in Kaliningrad, May 2011, and the second one in Vilnius, Lithuania, Nobember 2011, were truly successful, pierced with academic feel, where ideas were discussed, good practice was spread and theoretical analysis was applied and tested in practice at once. To be actively engaged in the group discussions – both in local Track A for municipalities of the host country and international Track B for university students and energy experts – was very useful for obtaining a clear picture of the Academy's content and format at the same time. They should form the basis for the development of future BALREPAs around the Baltic Sea.
An outstanding feature of this academy is not only to obtain better knowledge of applied energy scenario analyses in the fields of renewables and energy efficiency, but also to try to create cooperation between local and international participants as well as between municipalities and universities. This was emphasized by all participants of the trainings, and it motivates to continue promoting such cooperation.

A goal of the academy is to strengthen international cooperation

One of the main goals of the Academy – to develop international cooperation of experts in the Baltic Sea region – could be more successfully achieved by engaging both trainees and lecturers from all the countries of this region. Furthermore, some theoretical topics could be analysed deeper and applied more productively to keep the balance between theory and practice.

Keeping the above mentioned in mind, BALREPA, which proved to be a well-functioning and relevant concept for learning and exchange of experience, should continue in an ongoingly refined version. Future BALREPAs should be build on the knowledge and experience from previous academies, at the same time being adapted to the needs of a country/region hosting the Academy.

Source: Daumantas Kerežis was interviewed during BALREPA in Vilnius, November 2011

2 Visions for a sustainable development

Climate change is a global challenge not restricted by national or political borders. In order to mitigate and halt climate change, our common efforts must be global, with regional agreements and cooperation and concrete actions and initiatives on the local and individual level. The Baltic Sea Region joins countries with very different economies and energy resources. The diversity of fuels and energy production should be seen as an advantage rather than an obstacle, as it has created a wide range of practices and know-how in the fields of energy production and sustainable use. Thus it has made it possible for the region to be a frontrunner in a sustainable low carbon development.

2.1 International targets and obligations

The UNFCCC

In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted at the "Rio Earth Summit". The UNFCCC sets general targets and rules for confronting climate change. So far 192 countries around the world have joined the international treaty including the European Union, Norway and Russia. New additions to the UNFCCC have continuously been added, such as the Kyoto Protocol, which has more powerful (and legally binding) measures. To this day no successor to the Kyoto Protocol has been agreed upon within the UNFCCC process.

Parallel to the UNFCCC process the countries involved have set up national and regional development targets defining emission reduction targets and plausible paths to get there.

The EU climate and energy package

In March 2007 the EU's leaders endorsed an integrated approach to climate and energy policy that aims to combat climate change and increase the EU's energy security while strengthening its competitiveness. They committed Europe to transform itself into a highly energy-efficient, low carbon economy. The 'climate and energy package' became law in June 2009.

The package includes a series of demanding climate and energy targets to be met by 2020, known as the "20-20-20" targets. These are:

- A reduction in EU greenhouse gas emissions of at least 20% below 1990 levels.
- 20% of EU energy consumption to come from renewable resources.
- A 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.

The package comprises four pieces of complementary legislation including an 'Effort Sharing Decision' and a renewable energy directive. The climate and energy package also creates pressure to improve energy efficiency but does not address it directly. This is being done through the EU's energy efficiency action plan.

The EU directive on renewable energy

The Directive on Renewable Energy is an integral part of the 'climate and energy package'`. The directive sets renewable energy targets for all Member States, to ensure that the EU will reach its goal of 20% share of energy from renewable sources by 2020, and a 10% share of renewable energy specifically in the transport sector. The directive improves the legal framework for promoting renewable electricity and requires national action plans that establish pathways for the development of renewable energy sources including bio energy. The National Renewable Energy Action Plans (NREAP's) for the EU Member states were handed in by mid 2010[a].

EU directive on energy efficiency

A new ambitious EU directive on energy efficiency is in the pipeline. The directive is expected to contribute significantly to the EU target of 20% energy savings in 2020. The directive propose measures such as an obligatory energy saving scheme, energy efficiency standards for public buildings, boosting of the market for energy services, deployment of electric meters, national heating and cooling plans and efficient energy transmission and distribution. The directive is expected to be adopted during 2012.

EU Roadmap for moving to a low-carbon economy in 2050

In order to keep climate change below 2^0C, the European Council reconfirmed in February 2011 the EU objective of a 80 to 95% greenhouse gas emission reduction by 2050 compared to 1990. The agreement include the commitment to deliver long-term low carbon development strategies. A key delivery to reach the goal is a roadmap for possible action up to 2050[b] which could enable the EU to deliver the agreed greenhouse gas reductions. The roadmap outlines milestones which will show whether the EU is on course for reaching its target, policy challenges, investment needs and opportunities in different sectors, bearing in mind that the 80 to 95% reduction objective in the EU will largely need to be met internally.

The pathway towards an 80% domestic reduction by 2050 (100% - 1990) is illustrated in the figure below. It shows how overall and sectoral emissions could evolve, if additional policies are put in place, taking into account technological options available over time.

[aa] The different NREAPs can be found on http://ec.europa.eu/energy/renewables/transparency_platform/action_plan_en.htm

[b] "A Roadmap for moving to a competitive low carbon economy in 2050", COM(2011) 112 final

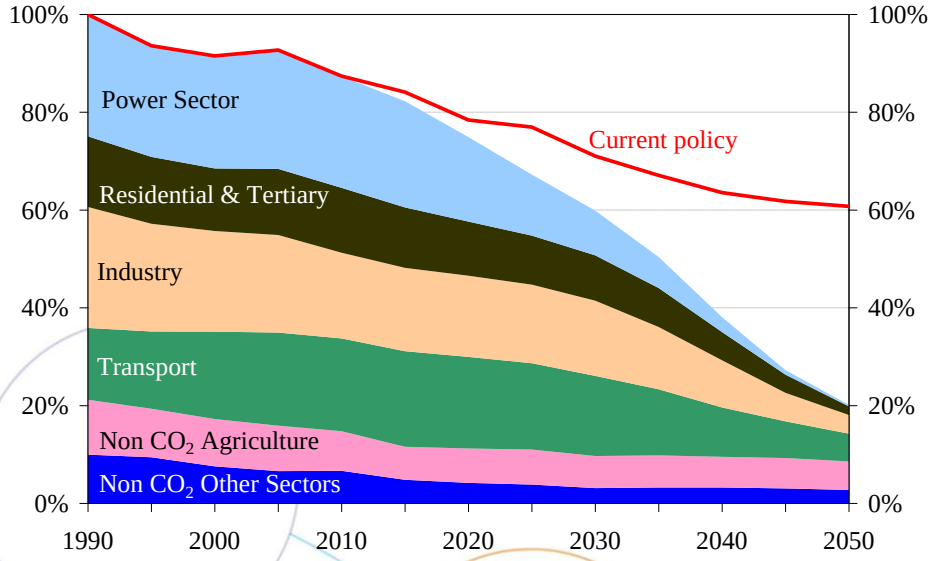


Figure 3 Illustration of a pathway towards an 80% domestic reduction by 2050 (100% - 1990) within the EU (EU "roadmap for moving to a competitive low carbon economy in 2050").

As the figure shows emission reductions in the power sector will play a central role in reaching the reduction target. Analysis shows that the sector can almost totally eliminate CO_2 emissions by 2050, and offers the prospect of partially replacing fossil fuels in transport and heating.

Norway energy and climate plan

Norway has parallel to the EU process developed a national energy and climate plan for the period up to 2020[c]. The Norwegian plan aims at fulfilling the requirements within the EU climate and energy package which are expected to be implemented in Norwegian law. The plan include measures such as a complete phase out of oil-heating, electrification of 20% of the car park, intensifying of work on energy efficiency within specified areas and increased electricity and heat production from renewable.

Russian energy policies

The "Energy Strategy of Russia till 2030" includes a target to reduce greenhouse gas emissions by 2030 below the level of 1990. Russia has also submitted a conditional target of 15-25% reduction in 2020 compared to 1990, which is subject to allowance for carbon sinks from the Russian forests. In addition, Russia has a target to increase the share of electricity produced from renewable energy sources to 4.5% by 2020 and to significantly improve the energy efficiency. The Russian energy strategy originates from Russia's commitment under the Kyoto protocol and the UNFCCC where Russia commits to keeping its emission level of greenhouse gases in the period of 2008-2012 as low as 1990 level. Most recently the Russian climate doctrine

[c] "*ENKL-planen: En energy og klimaplan for Norge til 2020*", Center for climate strategy, SINTEF and EBL, 2009

from December 2009 and the Russian climate action plan from April 2011 both focus on mitigation measures to reduce Russia's greenhouse gas emissions.

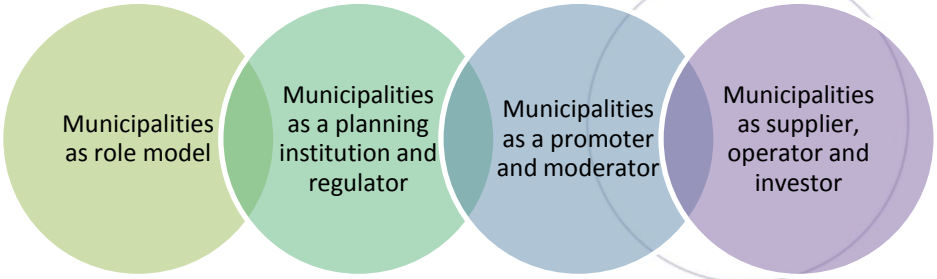
In Russia, the individual Russian oblasts adopt their own laws in the sphere of the public utilities sector. A wide range of targeted regional programmes for increasing efficiency in the distribution and consumption of electricity already exist, although these projects are mainly aimed at the reconstruction of power supply and power networks, and the installation of electricity meters[d].

Local Energy policies in Kaliningrad

In Kaliningrad a long-term target programme on "Energy saving and enhancement of energy efficiency in Kaliningrad for 2010-2014" was adopted in August 2010. Among the objectives of the programme are 3% annual reduction of consumption of specific quantities of fuel and energy resources and water in the housing, municipal services and budgetary sectors, improvement of environmental situation in Kaliningrad through the reduction of pollutant emissions from fuel combustion, and informational support to government policy on improving energy efficiency.

2.2 Role of municipalities

Municipalities are an important actor in reaching the overall climate and energy goals and ensuring a sustainable development. The municipalities can play different roles in relation to the development which is illustrated in figure 4.



Figur 4 Roles of municipalities in energy and climate policy (presentation by Steven März on low Carbon Initiatives in German Municipalities, at BALREPA in Vilnius 2011).

In reality a municipality will most often choose to fill out a combination of the different roles when carrying out energy planning.

Looking at different initiatives and measures in order to reach the common global, regional or national goals, they respond to different levels. The figure

[d] "*The summary of the energy strategy of Russia for the period of up to 2020*", Ministry of Energy of the Russian Federation, Moscow 2003. http://ec.europa.eu/energy/russia/events/doc/2003_strategy_2020_en.pdf

below illustrates examples of measures and which level they respond to. As it can be seen, many areas of responsibility are placed on the local level including several planning responsibilities.

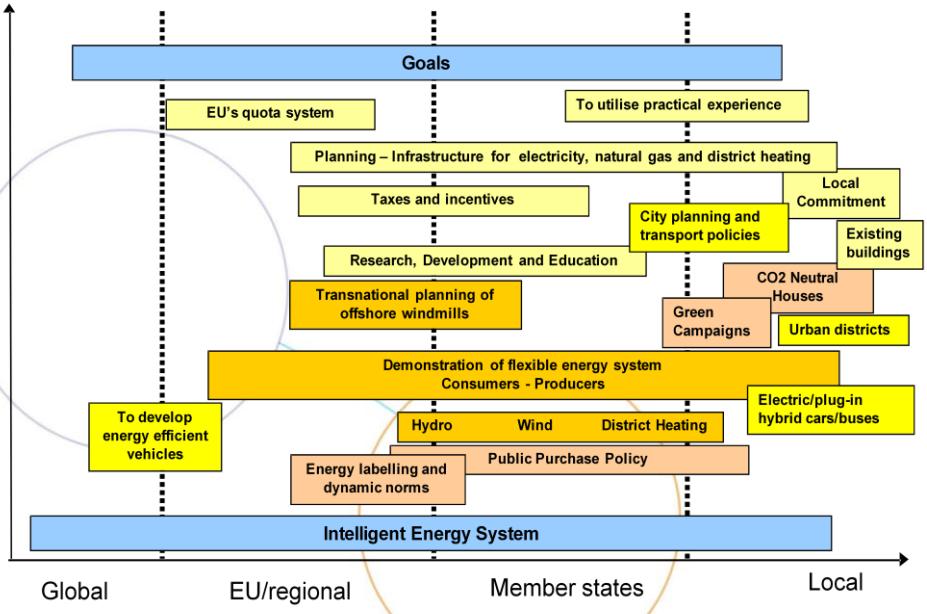


Figure 5 Examples of energy measures and initiatives and which level they respond to.

Different initiatives are already in place to engage and support the local level in a sustainable development. In the Baltic Sea Region two important initiatives/networks are the Union of the Baltic Cities and the Covenant of Mayors. Similar national initiatives or networks might exist in the different nations in the Baltic Sea Region.

Union of the Baltic Cities

Union of the Baltic Cities (UBC) is a voluntary network, including over 100 member cities, who are working towards a democratic, economic, social, cultural and environmentally sustainable development of the Baltic Sea Region. The UBC consist of several commissions including an energy commission. Much of the work of the UBC takes place within these commissions, and the individual commissions have numerous activities in their respective fields. The aim of the commissions is to promote cooperation between the UBC member cities within the focus area.

UBC Commission on Energy

The UBC Commission on Energy was established in 2006. The commission focuses on energy system issue rather than individual sources. They raise awareness about projects and take practical use from experience exchanges in projects within the UBC network and promote municipalities to use good examples to get more energy efficient. The commission has close contact with

universities and focus on bringing science and university knowledge closer to the municipal/local level. The focus areas of the commission are:

- Reduction of greenhouse gases,
- Energy efficiency programmes,
- Higher self sufficiency and local energy production,
- (Dematerialisation of public sector).

Covenant of Mayors

After the adoption of the EU Climate and Energy Package, the European Commission launched Covenant Of Mayors to endorse and support the efforts deployed by local authorities in the implementation of sustainable energy policies. The Covenant of Mayors is involving local and regional authorities, who are voluntarily committing to increasing energy efficiency and use of renewable energy sources on their territories.

Within the Covenant Of Mayors commitment is an obligation to develop a sustainable energy action plan (SEAP), to prepare a baseline emissions inventory and to continuously monitor and report the development and degree of implementation. In an EU context Covenant Of Mayors can be seen as an important tool to address the EU reduction targets at the local level. The Covenant Of Mayors office has developed a range of freely available publications to support cities and municipalities wishing to develop an energy action plan, including a guidebook on "How to develop a Sustainable Energy Action Plan"[e].

Cities in the region who have submitted a SEAP

Even though the Covenant Of Mayors is an EU initiative different measures have been taken to include a larger share of countries. In July 2010, the European Commission launched a project to support cities from countries of the European Neighbourhood region and Central Asia who are interested in joining Covenant Of Mayors. The project included a call for proposals for innovative approaches towards sustainable energy and city networks in the European Neighbourhood region and Central Asia[f].

The role of the local level in NREAPs

Within the EU Directive on Renewable Energy, there is no direct requirement on how to involve the local level. Even though several states have incorporated measures in their National Renewable Energy Action Plans (NREAP) which commit the municipal level and highlight the importance of their engagement.

[e] The different COM publications on how to develop a SEAP etc. can be found in the library on the COM webpage www.borgmesterpagten.eu

[f] To read more visit: www.enpi-info.eu/maineast.php?id=24889&id_type=1

An example is the Lithuanian NREAP where several measures deal with the municipal level. For example measure 8 in the plan is: "*To prepare and approve municipal action plans for renewable energy sources for 2011 to 2020 establishing objectives of the use of renewable energy sources and measures for achieving these objectives*"[g].

[g] The english version of Lithuanias national renewable energy action plan can be found at: http://ec.europa.eu/energy/renewables/transparency_platform/doc/national_renewable_energy_action_plan_lithuania_en.pdf

3 Energy scenarios for the Baltic Sea Region

Characteristics of the region

The Baltic Sea Region has a strong potential to develop a low-carbon energy economy. The region is endowed with vast natural resources in terms of biomass, wind and hydro power potential, and through its industrial and administrative capacities it holds the technology and knowledge base needed for a low-carbon transformation. Looking at biomass, the region as a whole have a significant higher share of biomass resources than EU as a whole, mainly due to its large forest cover.At the same time both Norway and Russia possess large resources of both gas and oil. The tradition for regional development across borders is another characteristic of the region which can prove to be a strength en ensuring a sustainable development. Looking at the distribution of energy sources used for electricity production (see map below) many of the countries are still relying on fossil fuel and nuclear power.

Figure 6 Key energy sources for electricity and heat production in the Baltic Sea Region.

This manual focuses on the potential for use of local renewable energy sources, particularly the potential for wind energy and biomass and the perspectives in increased heat planning and in enhanced cooperation between municipalities in the region.

Study: Energy Perspectives for the Baltic Sea Region

In 2009 a study was carried out with focus on energy perspectives for the Baltic Sea Region[h]. The study discloses some of the advantages of enhanced energy cooperation in the Baltic Sea Region. It illustrates that there is a huge

[h] "Energy Perspectives for the Baltic Sea Region", Ea Energy Analyses, 2009

potential for cost-efficient energy savings and energy efficiency measures through a stronger coordination of the energy policies across the region.

Two scenarios for 2030

In order to shed light on different pathways towards achieving the long-term strategic goals of the region two essentially different developments were explored in the study through a so-called "Small-Tech Scenario" and a "Big-Tech Scenario". Both scenarios aim at achieving two concrete goals for 2030: Reducing CO_2 emissions by 50% compared to the 1990 level and reducing oil consumption by 50% compared to the present level.

	Small-Tech	Big-Tech
Energy	Energy savings District heating (combined heat and power) Biomass Wind, wave, solar	Carbon capture & storage Nuclear power Biomass
Transport	Improved fuel economy Electric vehicles Modal-change Information and communication technologies	Improved fuel economy Electric vehicles Biofuels

Figure 7 Initiatives to reach the goal of a 50% CO_2 emission reduction and a 50% reduction in oil consumption in the two scenarios.

Local authorities' role in the two scenarios

The role of local authorities in the two scenarios is markedly different. In the Big-Tech Scenario, the existing structure of the energy supply system remains essentially unchanged, and the large suppliers of electricity become the main actors. Hence, the implementation of the Big-tech Scenario depends on relatively few decision-makers. In the Small-Tech Scenario local authorities and cities are crucial for the facilitation of district heating grids and sustainable transport systems, while the need for more efficient supply and demand technologies provides business opportunities in many industry branches.

The consequences of the two scenarios are also different in relation to expected gross energy consumption and future CO_2 emissions. To illustrate the expected development, the two scenarios are compared with historic data as well as with a reference for 2030 resembling the most recent projection from the European Commission.

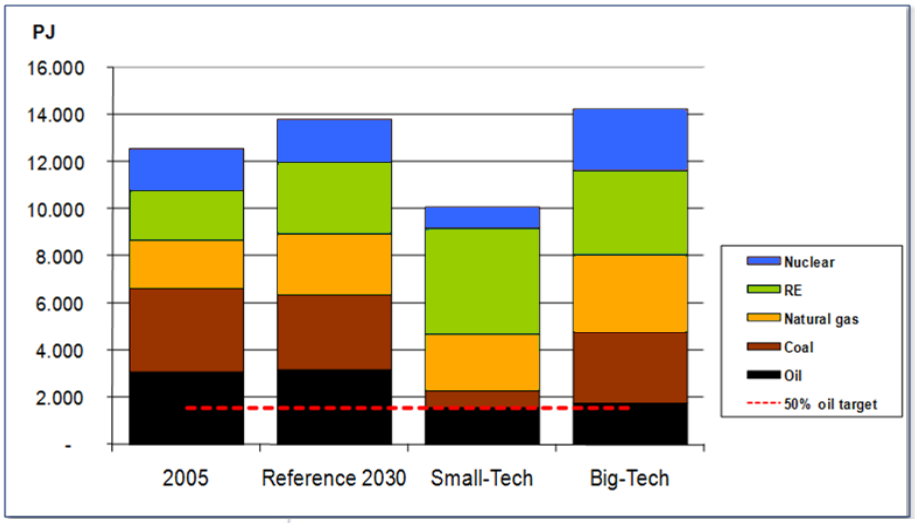


Figure 8 Gross energy consumption in 2030 in the Small-Tech and Big-Tech scenario, compared to 2005 and a reference scenario.

The key findings of the study were, that there is a potential for more efficient generation and consumption, that the targets can be met at reasonable costs, and that stronger targets are possible. Another important conclusion coming out of the study, is that the development would benefit from regional cooperation especially when it come to interconnectors, electricity markets and renewable energy and climate policies and projects.

New study: Energy policy strategies of the Baltic Sea Region for the post-Kyoto period

The recent challenges in reaching a common global climate agreement have increased the importance of regional energy and climate policy initiatives and the demand to develop strategies also at this level. Therefore BASREC commissioned a new study on "Energy policy strategies of the Baltic Sea Region for the post-Kyoto period", which will be presented at COP17 in South Africa in December 2011[i]. The strategies in the study will focus on coherence of climate policy and energy security objectives. The study includes both supply and demand side policy options, including energy savings and energy efficiency, increased use of renewable energy, development of district heating and combined heat and power, as well as carbon capture and storage technologies.

Three scenarios

The study includes three different development scenarios, two core policy scenarios and a reference scenario. The policy scenarios are exploring different CO_2 reduction pathways up until 2050, and are set up to show the economic consequences of different policy options and their implications for the energy systems, the environment and security of supply. The key difference between the two policy studies relate to the future role of carbon

[i] For updates on the study see the project webpage at: www.ea-energianalyse.dk/projects-english/1112_energy_policy_strategies_bsr_post_kyoto_period.html

capture and storage, which depend on different factors such as availability of sufficient funding and support to establish the demonstration facilities required to “commercialize” the technology and the sustainability and local acceptance of the technology.

The study shall lead to the formulation of specific policy recommendations focusing on the next 10-year period until 2020, as well as a series of perspectives on development up until the year 2050.

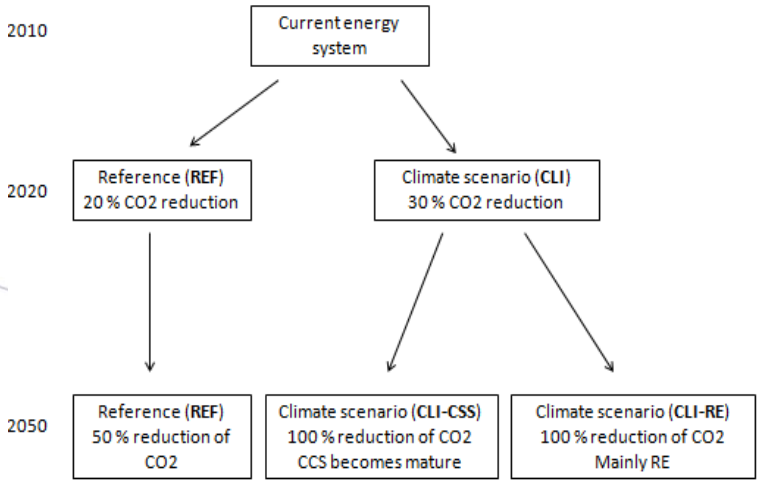


Figure 9 methodology in the Post Kyoto study.

The reductions in the study are relative to 2005 and concern the EU countries and Norway. For Russia the reference assumes stable CO2-emissions in 2020 and 25% reduction in 2050 compared to 2010 emissions. The climate scenarios assume 15% reduction in 2020 and 50% reduction in 2050 compared to 2010 emissions.

Preliminary conclusions

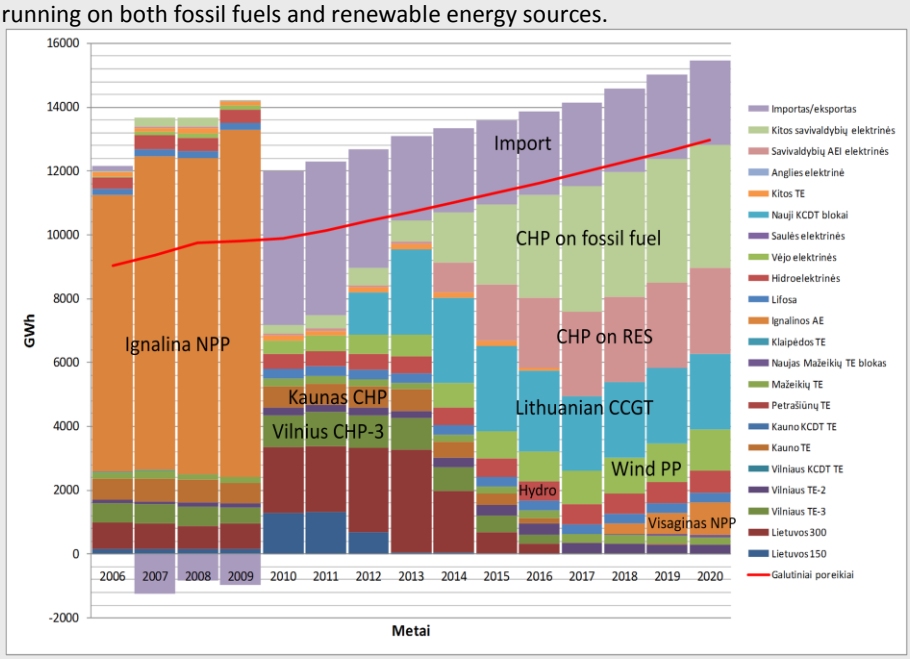
One of the key conclusions already available from the study is that it is possible to meet the targets at a reasonable cost, and thus that stronger targets are possible in the region. The targets should be meet through a variety of measures, including using district heating to integrate wind power using electric heat pumps and through exploiting the potential for more efficient generation and consumption. In the overall frame supplying southern and central Germany and Poland is the greatest challenge. Another important conclusion is that the projected transformation of the energy systems will benefit from cooperation. This will ensure optimal location of renewable energy technologies, coordinated decisions in new generation facilities and dissemination of best practice solutions (including at the local level), while the integration of renewables (and nuclear) will benefit from large interconnected electricity markets. In this context BALREPA can be a strong tool for improving the cooperation in the region.

Case (Lithuania): Defining optimal use of RES in through energy modelling

A study on future RE in Lithuania. The analysis in the study is made at municipality level looking to the entire chain from energy resources until final demand. The Effectiveness of utilisation of each type of RES is analysed in parallel with possible utilisation options of other energy sources. The level of RES utilisation should meet requirements of EU Directive 2009/28/EC and should be in correspondence with the rational objective of the country for energy security and commitments of the country in the field of environmental protection, etc., Broader utilisation of RES should be reached on the least cost basis,

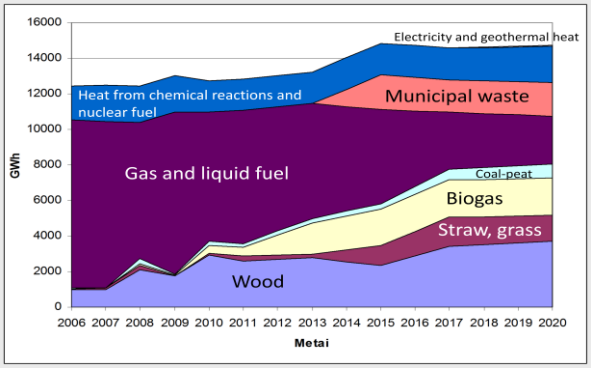
Electricity production in Lithuania and expected import

After the closure of the nuclear power plant Ignalina in 2009, Lithuania is now a net importer of electricity. The study explores how the future electricity generation could be structured, and which new generation plants are needed. The findings are illustrated in the figure below. The figure shows that Lithuania will keep being a net importer of electricity. It also suggest construction of new combined heat and power plants (CHP) running on both fossil fuels and renewable energy sources.



Future district heat generation

The figure below illustrates the expected production of district heat according to fuel type in the period 2006-2020. The share of district heat from power production through combined heat and power is expected to double in the period, from less than 6.000 MWh in 2006 till just under 12.000 MWh in 2020. The rest of the production is mainly supplied by boiler houses, which in 2006 supplied approx. 6.000 MWh and in 2020 is expected to produce around 3.000 MWh.



Conclusions in the study

Quantity of RES is sufficient in Lithuania, but it is necessary to use them rationally. The utilisation rate of RES in Lithuania is still not sufficient. The rational share of RES in the gross final energy demand can reach 21% in 2020 even without taking into account requirements of EU Directive 2009/28/EC. This can be achieved by removing distortions from the market. CO2 tax is the main factor forcing to increase further share of RES. Under the influence of CO2 tax, the rational share of RES increases until 26-29% by the year 2020. The share of RES in various sectors in 2020 is as follows in the study:

- District heating sector 53-62%,
- Electricity sector 27-31%,
- Sector of decentralised heat supply 37-42%,
- Transport sector (taking into account not only motor fuels) 8%,
- Final fuel and energy demand 24%.

One of the main economically attractive and technically viable options, leading to higher share of RES in Lithuania, is broader use of straw and grass in CHP and after their conversion into pellets – in decentralized heating sector. Rational installed capacity of CHP running on solid bio fuel is 185 – 255 MWe in 2020. Capacity of boilers using RES is expected to reach 725 - 850 MW. Solving environmental problems it is expedient to produce biogas from stock-rising waste, industrial and sewerage waste and sludge. Quantity of biogas produced is expected to reach 124 – 135 ktoe. Installed capacity of small CHP running on biogas can reach 100 MWe by 2020.

Utilisation of solid municipal waste is based on environmental issues. Total installed capacity of CHP burning municipal waste is expected to reach 66 MWe by 2020.
It is expedient to increase capacity of wind power plants until its technical limit (500 MW) currently set by Lithuanian regulation. Capacity of new small hydro power plants is evaluated in a range of 50MW due to strict regulations on preserved territories nearby rivers. Solar power plants are still not economically justified in order to reach appointed targets on broader use of RES in
Lithuania. The ability to invest will be one of the main challenges for energy companies in the way of broader utilisation of RES in Lithuania. Current annual investments (depending on sector) make only 20 – 60% from expected annual average investments in 2011-2020.

Source: presentation by A. Galinis, "Application of MESSAGE model for analysis of rational use of RES in order to satisfy EU requirements", BALREPA in Vilnius, 2011

4 Developing a local energy action plan

Many national targets and decisions are being implemented at the local level. Here municipalities have an important role in ensuring that the measures and initiatives are being carried out. At the same time municipalities and cities can be important frontrunners and pushing the development forward, by setting ambitious local targets, starting pilot projects or carrying out sustainable initiatives locally. Energy planning is an important tool in structuring the implementation of the targets and visions.

The responsibilities of the municipalities differ from country to country but some areas are typically always placed at the local level, such as heat planning, resource planning, physical planning (including sites for wind turbines within the area of the municipality) and handling of waste. Often the municipalities are also responsible for energy efficiency measures, interaction with stakeholders e.g. utilities and approval of private investor projects.

One of the focus areas of BALREPA is to support municipalities in carrying out local energy planning. The process of local energy planning depends on local conditions, national targets, and chosen priority areas. This chapter focuses on key measures particularly relevant for the Baltic Sea Region and areas identified as not being comprehensively explained in existing guidebooks and manuals.

4.1 Developing an energy action plan step by step

In order to understand the focus areas of this manual within the frame of the complete process of local energy planning, this section gives a short introduction to the process. The introduction is inspired by frontrunners within the field and the structures from the Covenant of Mayor's guidebook on how to develop a sustainable energy action plan. The Covenant Of Mayors guidebook is seen as a valid tool for municipalities wanting to develop an energy action plan, and can be used just as well without commitment to the Covenant of Mayors. Other guidebooks and manuals could fulfil the same purpose.

The process of developing an action plan can be divided into different phases, where the main phases are:

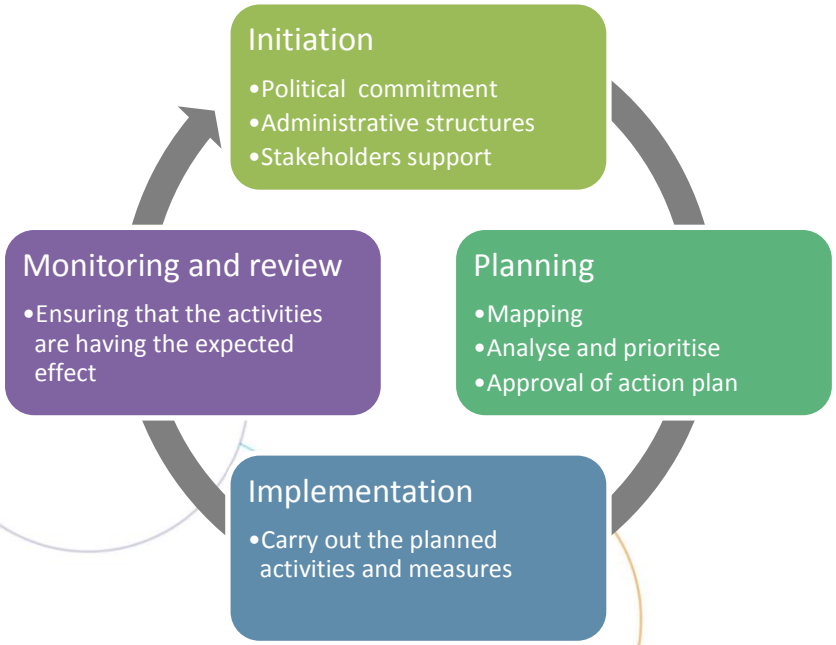


Figure 10 The different phases when developing and implementing an energy action plan.

It is important to note that the process of developing an action plan is not linear. Some phases overlap others, some actions may have started before the planning process is started and the monitoring and reporting phase might lead back to a new planning phase. For municipalities already engaged in energy planning this section may serve as an inspiration for the ongoing process. During the whole process communication to stakeholders, politicians and the public is important to ensure commitment and acceptance during all phases.

Initiation phase

Activities within the initiation phase are key to a successful process. The activities include ensuring political involvement and commitment, building support from stakeholders and adapting administrative structures within the municipality.

Planning phase

The planning phase can be subdivided into several planning steps from the first mapping of the current situation to approval of the final action plan. First step in the planning phase is focused on assessing the existing framework and mapping the energy infrastructure. It includes an analysis of relevant regulation, policies and procedures and mapping of the physical and technical conditions. It is suggested to develop a baseline review and a baseline emission inventory to establish a clear picture of the current situation. A baseline review should include mapping of energy consumption and production, and mapping of available local renewable energy sources.

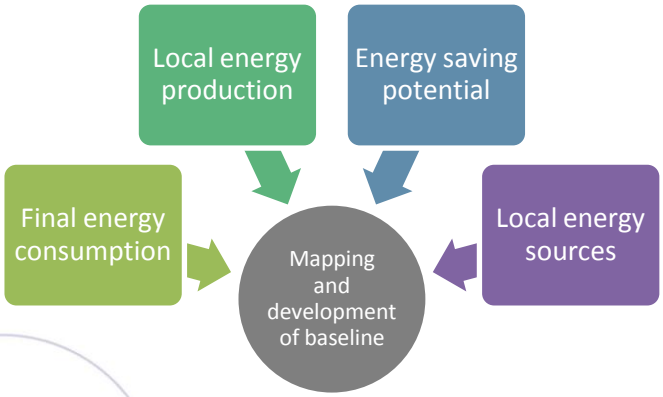


Figure 11 Data collection when mapping the local energy situation.

The baseline review form the foundation for an analysis of which actions and measures should be prioritized. An important part of this step is formulating the overall vision for the development, and from there setting objectives and targets. Here projections and scenario analyses can be important tools. The activities and measures that are relevant in a local context depends on several factors such as national and regional legislations and policy; available energy sources; existing energy infrastructure; actions taken in neighbouring municipalities and towns, etc. Following the prioritisation the different initiatives chosen should be concretised, to outline timing of the activity, distribution of responsibilities and budget and financing sources.

Implementation phase

After approval of the action plan the actual implementation of the different actions and measures are carried out. In this phase good communication both internal and external is essential to both ensure continuous support and to raise awareness.

Monitoring and review phase

The last phase in the process is monitoring, reporting and review. The monitoring is a key to continuously be able to review the development. Are the activities having the expected effect, or are additional activities and measures needed? The review might make it necessary to develop a new improved action plan after a time period.

Some actions are difficult or too time consuming to measure. Thus it might be valuable already in the energy action plan to evaluate which actions are measurable and how, setting up parameters for measuring and describing alternative ways of evaluating non measurable actions.

Additional information and materials

- *"How to develop a Sustainable Energy Action Plan (SEAP) - guidebook",* Covenant of Mayors, 2010. Can be found on www.eumayors.eu/support/library_en.html

- "*Tools and methods for integrated resource planning – Improving Energy Efficiency and Protecting the Environment*", Joel N. Swisher, Gilberto de Martino Jannuzzi and Robert Y. Redlinger, November 1997. Can be found at www.uneprisoe.org/IRPManual/IRPmanual.pdf

CASE (Latvia): Jēkabpils City Sustainable Energy Action Plan

Background

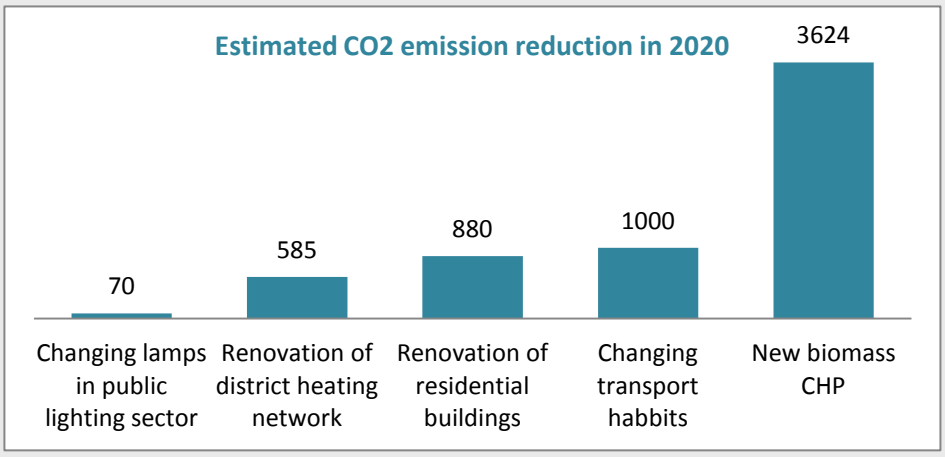
Jekabpils is with its 26.468 inhabitants the eight biggest city in Latvia. It is located in south-east of Latvia. On the 18th of March, 2009 the mayor of Jekabpils municipality, Leonīds Salcevičs, signed the Covenant of Mayors and committed Jekabpils municipality to reduce its CO2 emissions by at least 20% in 2020 compared to 1995 level (the municipality emitted 66.576 tonnes of CO2 in 1995). The municipality is working towards a 13.315 tones CO2 emission reduction in 2020.

Vision

- Renovation of residential buildings
- Building a new biomass combined heat and power plant
- Promoting of renewable energy usage for space heating and hot water preparation
- Reduction of usage of transport fuel.

CO_2 reduction activities and measures

- Changing old mercury lamps to sodium lamps in public lighting sector.
- Renovation of district heating network, replacing old pipes to new, reducing heating losses, from 26,1% to 10%.
- Renovation of 50% of all residential buildings, which are connected to district heating, reducing heat energy consumption by 40-45%.
- Promotion of efficient driving, travel by foot and bicycle (also laying new bicycle and foot ways), promoting "car pooling", public transport etc., reducing energy consumption and CO2 emissions by at least by 5%.
- It is planned to build new biomass CHP in Jekabpils municipality in 2011.



Source: Jēkabpils City Sustainable Energy Action Plan For years 2010–2020

4.2 The initiation phase

Build support from stakeholders

One of the most important factors to guarantee that the different initiatives within the action plan will be implemented is to build support from stakeholders both from the political level, but just as important from citizen's and private actors. Looking at the political level it is important to secure a long-term political commitment. Implementing an energy plan is a long process that does not necessarily show any immediate results which can be used to promote and brand the project and secure wide support. Therefore it is important to engage the political level and create a feeling of fellow ownership of the different initiatives.

Ensure adequate resources

This is both important in relation to ensuring adequate financial resources but also making sure that the involved staff has the skills needed and otherwise have access to training education or finances to hire in external experts when needed. An important factor in this is to ensure proper management during the whole process.

Do a thorough mapping of existing condition

The initial mapping of the existing energy consumption and production and available local resources is important to further the process. To measure the actual effect of the implemented activities you need to know the situation before the action plan. The mapping process will also give an important overview of areas of particular interest in the individual municipality. Increasing the share of renewable in the district heat production could be relevant in many municipalities, but if your municipality has a very small share of district heat you might choose to either focus on other heat sources (for example replacing oil heating with heat pumps) or expanding the district heat system.

Integrate the process with the rest of the work and functions within the municipality

It is important that the process is not happening separated from the rest of the work carried out within the municipality but is integrated with the other functions and areas of responsibility that lay within the municipality. If not, your energy plan risks ending up as just another visionary document that never gets implemented. Many of the actions in the plan will overlap functions that are already placed within the municipality's different departments and it is thus of key importance to involve the different departments in the process to ensure support and shared ownership. Much of the data needed for the initial mapping might also already lie within the municipality. Using internal sources for access to data will both increase the knowledge and focus on the energy planning process within the municipality.

Experiences and lessons learned by others

Many other municipalities have already developed energy plans and have collected good and bad experiences and lessons learned. Learning from

municipalities with similar challenges might help you to not do the same mistakes and thus improve the planning process in your municipality[j].

Interview: Using the experiences and knowledge from BALREPA

An interview with Anna Skopenko - Energy manager in Pionersky municipality and head of the supply department unit within the municipal district heating company. Anna both participated at BALREPA in Kaliningrad and Vilnius.

My expectation before participating at BALREPA in Kaliningrad was both to get new knowledge and second to network with other municipalities in the Kaliningrad region and in the Baltic Sea Region. Before the academy in Kaliningrad our municipality just implemented the new law on energy efficiency, which acquired a program on energy efficiency on the municipal level. Our program was approved in September 2010. The program included a list of activity to be implemented, but the activities were mostly centred on information campaigns.

BALREPA can create knowledge on energy planning

What I think BALREPA can bring to municipalities? Most importantly BALREPA can create knowledge on how to carry out energy planning. Earlier in Russia we did not have such a term as energy planning. During BALREPA I understood what energy planning mean, how it can help to review what have already been done by the municipalities, and how to improve the planning in the future. Basically BALREPA taught me how to carry out real energy planning. Earlier planning was a bit chaotic. BALREPA helped to create structure and gave an understanding of how to make energy programs in a more structured way.

Increased focus on combined heat and power in Pionersky

Being at the academy I realized the need to campaign about energy efficiency. The campaign should not just be focused on adults but children as well. I also understood that the plans for combined heat and power should be updated and reflected in the energy efficiency program. After BALREPA we therefore decided to restructure and change part of the energy efficiency program. I tried to reflect the experiences from BALREPA in the energy efficiency program and in the actions carried out in the municipality. In previous energy program heat campaigns have not been included. After BALREPA we have prepared a visibility study to highlight what is being done. We also now want to apply to the EU Cross Border Cooperation (CBC) to get support for the information campaign about combined heat and power[k].

Cooperation with the other participating municipalities

There is no cooperation around concrete projects between the municipalities who participated at BALREPA in Kaliningrad, but the networking during BALREPA has helped a lot in our work. Today we exchange more knowledge and experiences between each other, which help in the day to day work.

Source: Anna Skopenko was interviewed during BALREPA in Vilnius, November 2011

[j] For more advices see the COM guidebook on how to develop a SEAP

[k] To read more about the programme visit: http://ec.europa.eu/europeaid/where/neighbourhood/regional-cooperation/enpi-cross-border/index_en.htm

4.3 The planning phase - Mapping of local resources

Not all local energy plans include mapping of local renewable energy sources. Getting an overview of energy sources available can be an important tool in prioritising activities while also providing an understanding of whether the resources available are already used for other things or not used optimally. Here it is also worth noting that cooperation with neighbouring municipalities, both in relation to data collection and usage of the energy sources, might prove to be beneficial as to avoid sub-optimising.

The level of detail in the data collection and mapping of local energy sources might differ between the different sources and should depend on the expected potential and contribution from the single source. Where thorough analysis of the solar energy potential might make sense in South Europe it does not have the same potential in the Baltic Sea Region. The Baltic Sea Region instead has a large potential for wind energy while also having a considerable amount of biomass available.

Wind power

Mapping the wind energy potential

Increasing the wind power capacity is a national objective in many countries in the region. Often municipalities are obliged to find suitable sites for a given number of wind turbines. However municipalities might also choose to make it a priority area within their local energy planning in order to increase the share of locally produced renewable electricity.

Wind turbines on land are installed either as single turbines, in small clusters or in wind farms with a large number of turbines. When planning the sites for the wind turbines several different factors have to be taken into consideration. Some of the considerations are linked to national legislation such as regulation of the distance between a wind turbine site and built-up areas. Generally the areas in the municipality can be divided into different categories: “Red areas” where it is not possible or permitted to place sites, “Yellow areas” where it might depend on other authorities if a site is possible or where there might be local considerations to be taken, and last “Green areas” which are areas with no direct restrictions.

- Red areas: Housing areas, nature reserves, airport zones, etc.
- Yellow areas: Cultural heritage, power lines, gas lines, main roads, Coast line, near forests, landscape protection, etc.

- Green areas: Other areas (there might be other possible conflicts, such as noise impact which make specific areas not suitable)[l]

For the yellow area there might be different national legislations in place regarding the permitted size of the wind turbine and the distance to a given facility.

Beyond considerations regarding possible sites, the municipality also need to take other consideration when planning new wind turbine sites. Both economical and technological considerations need to be discussed along with general estimations of advantages and disadvantages with every particular site assessment. In the table below is listed some of the general advantages and disadvantages with the technology.

Advantages	Disadvantages
• No emissions. • Stable and predictable costs; in particular due to no fuel costs and low operating costs. • Modular technology - capacity can be expanded according to demand. This prevents overinvestments and stranded assets.	• High initial investment costs. • Generation dependent of the wind (however, there is some correlation between electricity demand and wind energy generation). • Aspects of visual impact. • Noise.

Biomass and waste

Mapping the biomass potential

Biomass including bio-waste is an important renewable energy source as it can be utilised for both electricity and heat production and production of biofuel for transport. Biomass can be divided into different fractions such as straws from farmland and wood waste from either forest or from hedges, parks and gardens. Also bio material for biogas/biomethane (organic material from waste, waste water sludge, animal manure and grass from wetland) is an increasingly important source of energy which can replace the use of natural gas in electricity and heat production. The technologies used for the conversion depend on the type of biomass, which will not be described further within this manual.

[l] Presentation by Kåre Albrechtsen, "wind turbine and biogas planning in Denmark – Municipal energy planning, pooling the efforts", at the BALREPA in Kaliningrad 24th May 2011

When considering how to utilize the local energy sources it is important to consider whether the resource needs to be utilized locally or whether it can be transported outside the municipal, national or regional borders, as this influence which marked the resource can be traded at. Where wood waste (either as wood chips or pellets) can be transported at relatively low cost and thus traded on international markets, resources such as waste water sludge and animal manure need to be utilized locally if not gasified and shipped by gas pipeline.

First step is to map the utilisation of the geographical area

When mapping the biomass potential the first step is to map the utilisation of land within the municipality, to get an overview of how many hectares or square kilometres are used for different purposes. This could be a rough division of the area into four different categories:

1. Built-up and urban areas,
2. Farm land (areas with food crops, energy crops and husbandry),
3. Forest (pine forest and hardwood forest),
4. Wetland/grassland.

From here it is possible to map or estimate the potential resource output from the different areas.

Built-up and urban areas

Built-up and urban areas can potentially yield a considerable amount of biomass. This is both linked to the size of area, the number of people within the area and the amount of waste and sewage water they produce. There is also a potential in using biomass from maintenance of green recreational areas, hedge, parks and gardens. Waste and sewage might be an energy source for biogas or as a heat source for heat pumps in district heating.

Farm land area

For areas with food crops there will typically be a straw by-product, which can be utilised for electricity and for heat production. Presumably only a fraction of the straw will be accessible for energy production. Some of the straw is left in the fields to cultivate the soil and some is utilized for animal feed and bedding. When knowing the farm land area it is possible to either collect data about the specific output of straw or these values can be estimated based on regional or national statistics. If there is an unused straw potential in the municipality, which potentially could be used for electricity and for heat production, it might be valuable to also consider available straw resources in neighbouring municipalities and in case of new production facilities ensure cooperation to avoid sub-optimisation.

The cultivated crops can also in some cases be utilised for energy instead of food. For instance crops such as corn or grain can be used to produce bio fuels for the transport sector. Utilizing food crops for energy could have very negative implications for food prices, which should be taken into consideration.

Forest area

Forest area can be sub divided in pine forest and hardwood forest. The main output of lumber from the forest is generally not used for energy production as it is a high value product. Instead the mapping should be focused on the potential and available by-products. When mapping the total amount of potential by-product which could be used for either electricity or heat production the data can either be collected through the forest administration or be based on existing statistics on output. As mentioned there is also a share of wood waste from non-forest areas, which it is suggested to map under build-up areas. Often the by-product is a result of the further processing of wood. The availability of by-product which can be utilized for energy production is therefore primarily linked to the processing site rather than the actual forest.

Wetland/grassland area

Some wetland/grassland areas can yield grass or hay which can be utilised for biogas production, and which might not be harnessed today.

Biogas

The biogas potential consists of different energy fractions including organic material from waste, waste water sludge, animal manure and grass from wetland. Some of the fractions can both be used for biogas and electricity and heat production. The option to utilise the listed resources for biogas depends on the technology available. Since waste and waste water are areas that typically are already administrated within the municipality the data needed for the mapping should be available in the municipal administration. The available organic material in waste is depending on whether the municipality have a system in place for sorting waste in different fractions.

Animal manure can be mapped based on data on the number of farms within the municipality and the number and types of animal on the different farms. From here it is necessary to assess whether the manure from the individual farms could potentially be utilised for biogas, depending on the number of animals and the distances between the farms and the possible biogas plant site.

CASE (Finland): Jomala Energy Ab – District Heating and Biogas

In Åland the district heating system of the Jomala municipality, which has 4100 inhabitants, caters for the heat delivery to 11 public and private sector buildings, among them the local co-operative dairy. In 2005-2010 a project was carried out to replace many old boilers in individual buildings by building a local district heating network. Simultaneously the dairy built a gasification plant to utilize its process waste in gas production. In 2010 the district heating system, operated by the municipality owned company Jomala Energi Ab, was in operation.

Biogas from Whey

The main product utilized in the gasification is whey. Whey is a byproduct of the manufacturing of cheese. The gas is fed to the district heating boiler and also used for heating in the dairy process.

Project benefits

- Lower district heat energy costs
- Independence of fossil fuels
- Utilizing waste of the dairy process
- Pre-cleaning of the drained liquids of the process
- Eliminating road transportation of the waste
- Reinforcing the relationship between the municipality and the business community.

The produced biogas now replaces 200 m3 of fuel oil per year in heating also to the dairy premises. In addition, using woodchips in the district heating substitutes 600 m3 of fuel oil per year. The majority of the funding, 81%, to the district heating investment came from the municipality and the rest as investment subsidies from the county government and the EU. The investment to the gasification plant was made by the dairy co-operative.

Source: Factsheet on the project from the Nordic Energy Municipality webpage. Can be found at: http://nordicenergymunicipality.org/projects/jomala_energy_AB.html

4.4 The planning phase - Heat planning

Local heat planning is a valuable tool for municipalities wanting to carry out sustainable energy and climate planning. Expansion of district heating, not only in urban areas but also in rural districts, and increased use of renewable

energy sources can reduce CO_2 emissions. Both elements depend on planning. The heat supply can be divided into collective supply systems, including district heating and natural gas, and individual supply based on oil, wood, electricity etc. Compared to individual supply there are several advantages with district heating.

Advantages	Disadvantages
• Production of combined heat and power increase the total efficiency of the conversion. • Economy of scale • It is possible to utilize surplus heat from the industry. • Improved security of supply due to diversion of fuels used. • It is possible to utilize "difficult" fuels and waste. • Inexpensive energy storages are available.	• High investment costs in distribution networks. • Scattered built-up areas increase the costs. • Distribution losses. • Necessitates high degree of connectivity.

The basis of heat planning is setting guidelines for the collective and the individual heat supply. Depending on national legislation it might be possible for municipalities to select whether a given area should be supplied with district heating, just as the municipality can propose concrete projects to promote certain type of energy sources. Whether it is worth investing in district heating in a specific town or village depend on several factors, such as locale sources of energy including renewable sources, if there is a power plant or industry that can deliver surplus heat and energy density in building mass due to urban planning and existing energy infrastructure

District heating system is common within the countries in the Baltic Sea Region. The table below show the share of citizens served by district heating in 2009.

Share of citizens served by district heating in 2009

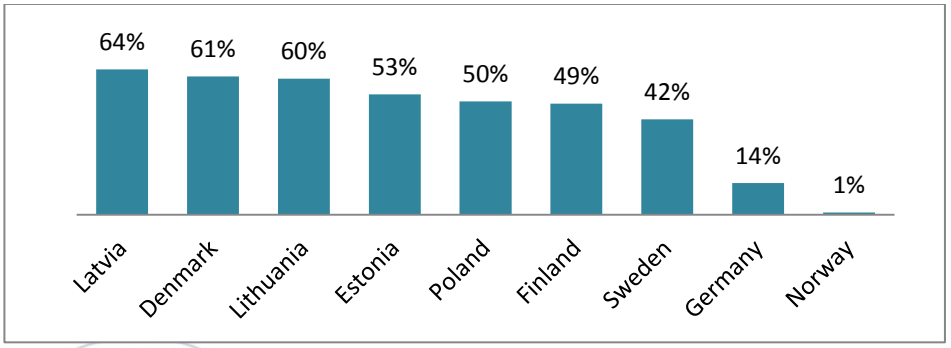


Figure 12 Share of citizens served by district heating in the countries in the region ("District heating and cooling – country by country/2011 survey", Euroheat & Power).

Additionally district heating can efficiently service space heating or other heating requirements of commercial offices and industrial premises.

Additional information and materials

- "*District heating distribution in areas with low heat demand density*" published by the International Energy Agency. The report describes measures for improving the economy of heat distribution in areas with low heat demand density. It can be found at: www.iea-dhc.org/reports/pdf/Energiteknik_IEA-Final-report-5.pdf
- "*Long-term Views of District Heating and CHP in the Nordic and Baltic Countries*", published by the Nordic Council of Ministers in 2011. The study offers a review of the DH and CHP strategies of the region and extend the strategic view to long-term, until year 2050. Can be downloaded at: www.epha.ee/File/BASREC_AGEE_Future_of_Nordic_DH_Report_Final_3_30.8.2011.pdf
- Each year the Danish Energy Authorities publish a booklet on "*Heat supply in Denmark*". The first chapters give a general introduction to the history of heat supply in Denmark and the current status and can be used as inspiration for municipalities working with heat planning. The publication can be found on www.ens.dk or directly at http://193.88.185.141/Graphics/Publikationer/Forsyning_UK/Heat_supply_in_Denmark/index.htm

4.5 The planning phase - Projections and scenario analyses

Projections of energy consumption and production are an integrated part of developing an energy action plan. It gives an overview of the expected development, and highlight different opportunities, threats and points of action. Usually projections both include factors that can be changed and external factors.

The projections can be used for different aspects in the planning process. The municipalities might use it as a modelling tool to deal with uncertainty and to look at a range of possibilities, or it might have the purpose of strengthening the internal and external means of communication by creating a common point of reference. In general working with projections help to frame thinking about the long-term, while providing tools and confidence to take action in the short term, and assist in developing strategic direction in the face of uncertainty.

Scenario approach

One way of working with projections is developing scenario analyses. Scenarios can best be described as stories about how the future might unfold. They are not predictions or forecasts, but plausible accounts of how external forces bring challenges and opportunities. Scenarios can be divided up into three types: Predictive scenarios, explorative scenarios and anticipative scenarios. Predictive scenarios show the predicted future, and aim at illustrating what future seems most likely given the continuation of current trends. Explorative scenarios show several plausible futures and can be used to discuss which futures are possible and how to prepare for sets of equally plausible futures. Anticipative scenarios are used to show the desirable future and how to get there.

Developing robust scenarios often require a good deal of resources, and are therefore somewhat more relevant on the national or regional level, especially when it comes to explorative scenarios. Using the concept of anticipative scenarios on the other hand could be relevant for municipalities as an overall frame for the projections.

Baseline

When developing projections you usually first establish a baseline where the development of chosen factors is projected to the chosen target year, following the principle of business-as-usual. As an example you might choose to use 2010 as your reference year and from here project the business as usual development until a given target year which depend on the actions included in the action plan. Projection factors for the baseline statistics can be found in national statistics or in the national renewable action plans and should be analysed against local data. The projection values are based on a number of assumptions such as expected fuel prices and economic growth, which it is relevant to be aware of as they might chance during the action plan period. Also local conditions and development factors might differ from the national average. If your municipality for example expect a larger population growth than the national development this should be taken into account

when developing the baseline. Local factors might also play an important role in choosing which actions should be implemented.

Reaching action plan targets

After developing a baseline it is possible to make projections towards a set target, such as an increase in the use of renewable energy up to 20% in 2020 compared to your reference year, to show the difference between the business-as-usual development and the desirable development. The gap between the two projections show the extent of actions needed. If your action plan do not contain concrete targets, but instead a number of actions you can instead choose to estimate the different actions in your action plan to show their effect on the expected development and what targets can be defined out from the effect of the actions.

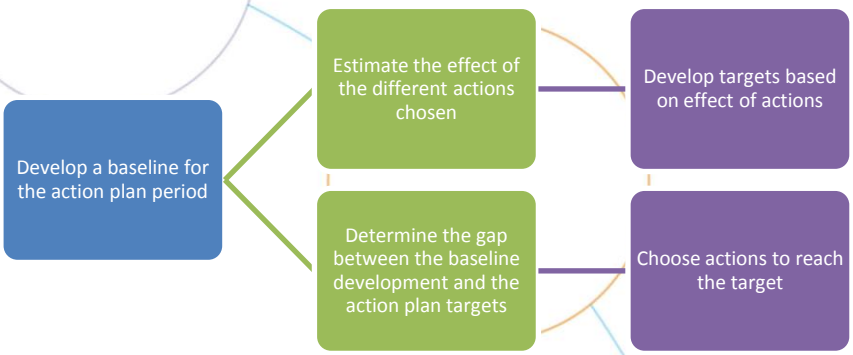


Figure 13 Two different approaches to projections of energy consumption and production.

An alternative approach which is often used when developing anticipatory scenarios is to start by defining what the energy system should look like in given target year in order to meet the targets, and then working backwards from there.

4.6 The implementation phase - Municipal measures

The list of actions that a municipality might take is long and includes very different types of initiatives from information campaigns on energy saving to increased utilisation of industrial by-products. The different relevant initiatives will not be thoroughly discussed in this version of the manual. Instead the following chapter will provide a quick overview of a limited number of different types of measures divided into different sectors. It is our hope that future versions of the manual will include more in depth discussions of the different measures, based on future BALREPAs.

The different initiatives can generally be split into four different types:

1. Legal requirements and regulations,
2. Planning,
3. Information,
4. Financial instruments including subsidies.

Knowledge of the current situation and specific characteristics in the municipality will help the municipality to define priorities and select the relevant measures.
Some activities can solely be carried out by the municipality itself, such as energy renovation of the buildings owned by the municipality. Other activities can be carried out by a number of actors, but the municipality might be able to hinder or slow down the development and by that act as a barrier, or they might choose to speed up the process and act as a driver for change. The activities are organised according to sectors (Heat, electricity, waste, industry, buildings and transport).

Heat

Measures in the heat sector are depending on ownership of the production facilities. If the heat production facilities are owned by the municipalities, different measures can be taken, than if it is privately owned. It is also depending on geographical conditions and existing heating infrastructure.
Following the division into types of initiatives the list of legal requirements and regulation initiatives include policies to promote the use of renewable energy for heat generation. There is a range of possible policy options which can be implemented. However, depending on existing national legislations some of them might be under national or regional competences.
Planning initiatives include measures targeted at the municipals own generation facilities, such as changing fuels at boilers owned by the municipalities. Other relevant planning initiatives could be, planning for and developing district heating system, natural gas system and individual heating, or establishing and authorising infrastructure to make it possible to use surplus heat from industry.
Depending on the heat supply options used in the municipality, it is possible to convert from individual heat supply options, such as oil burners or wood burners, to district heating.
Information initiatives include campaigns to gain public support for fuel conversion to renewable energy.

Electricity

As for heat generation, the initiatives relevant for municipalities in relation to electricity are somewhat depending on ownership of generation facilities.
Several initiatives can be taken at facilities owned by the municipality, which

	can not in the same way be implemented at nationally or privately owned facilities. For facilities owned by the municipality the list of initiatives include fuel conversion of energy supply on energy facilities or investment and engagement in land or coastal wind parks. Planning initiatives not related to the question of ownership include planning and authorising of sites for wind farms, solar installation and biogas production facilities and combined heat and power plants. Information initiatives could be promoting and encouraging flexible energy consumption, for example through ownership of local distribution companies. As many of the countries in the Baltic Sea Region have a high share of district heat, initiatives converting production facilities to combined heat and power production, or construction of new combined heat and power plants are highly relevant.
Waste (solid waste, sewage)	Initiatives in the waste sector are mainly relating to the municipal planning. Often collection, treatment and utilisation of waste is under the responsibility of the municipality. Here different initiatives could be taken. The waste collected could be utilized for energy purposes either through waste-to-energy or through utilizing the organic waste components for biogas production. Increased waste separation and recycling can also be an important initiatives in order to reduce the energy consumption in waste treatment. Often initiatives in the waste sector can benefit from coordination and cooperation with neighbouring municipalities as investment in shared treatment facilities often lead to reduced costs.
Industry	In the industrial sector the physical planning in the municipality can include several relevant initiatives. One of the most important being approval of new industrial plants and agricultural facilities, and legal requirements related to the process. Different energy efficiency measures are also highly relevant in the industrial sector, such as legal requirement regarding emissions, energy consumption and energy performance, or information initiatives highlighting the benefits of energy efficiency.
Buildings	Initiatives within the building sector both include energy efficiency measures in order to reduce electricity and heat consumption, as well as measures targeted at new buildings. In general there is a huge potential for energy savings in energy refurbishment of existing buildings, which are often less expensive and easier to implement than measures in other sectors. The list of relevant initiatives in the building sector is long and will not be thoroughly discussed in this manual. For a longer description it is suggested to read chapter 8 in the Covenant of Mayors SEAP guidebook, describing policies and measures applicable to a SEAP.

Generally the initiatives can be divided as to whether they are targeted at the municipalities own buildings, private households or the service sector.

First looking at the municipalities own buildings, many initiatives can be taken to reduce energy consumption. As an example the municipality can initiate refurbishment of the public building stock, or they can develop public procurement policies, appliances and installation. Large reductions in the municipalities own building can reduce public expences while also setting an example and building local knowledge and experiences.

Measures targeted at private buildings (both households and buildings used for the service sector) include:

1. Legal requirements and regulations - Administration of building regulation,
2. Planning - Develop new residential areas for low energy consumption standards,
3. Information - Information campaigns directed at the citizens on energy efficient solutions,
4. Financial instruments – support schemes for refurbishment or new appliances,

Transport

Cities and municipalities have several opportunities to reduce energy consumption in the transport sector, both in regard to fostering public transport or in the physical planning. Many of the initiatives are related to planning, such as urban planning (location of new urban zones), traffic planning (strengthening the public transport system, implementing environmental zoning, new bus and cycle lanes, closing of roads and creating pedestrian areas) and infrastructure planning of new loading station for electric vehicles.

Additional information and materials

- Part III of the SEAP guidebook, "*Technical measures for energy efficiency and renewable energy*" offer a thorough list of measures which can be applied to the building, public services and the industry sectors. The descriptions include a collection of references and links to more specific documents.
- "*Best Practices Guide: Economic & Financial Evaluation of Renewable Energy Projects*", AED, 2002. The report provides the analytic tools and technical understanding of RE projects necessary to evaluate their economic and financial viability and to effectively structure such projects to meet requirements for project finance and market support. Can be found at: http://pdf.usaid.gov/pdf_docs/PNADB613.pdf

CASE (Finland): Skaftkärr – an energy-efficient residential area in Porvoo

Porvoo is Finland's second oldest town, a beautiful city full of history, located on the coast of the Gulf of Finland, ca 50 km east of Helsinki.

In search of innovative and sustainable solutions for energy-efficient construction, energy supply, traffic arrangements and intelligent performance steering systems, the City of Porvoo has begun the spatial planning of Skaftkärr, a new residential area for 6,000 people. The Skaftkärr cooperation and experimentation project (2008–2012) was launched by the City of Porvoo, The Finnish Innovation Fund Sitra, the municipal energy company Porvoon Energia Oy and the regional business development company Posintra Oy to promote energy-efficient construction and to integrate it in the planning of the area. The project intends to improve energy-efficiency in the built environment and in people's everyday lives. The aim is to develop an energy-efficient residential area, to integrate the aspect of energy efficiency in all phases of spatial planning, to create new solutions and new ways of working, and to steer and monitor the use of energy. The findings of this pilot project are intended to be applied on a larger scale elsewhere in Finland.

Involvement of local actors

Local actors, inhabitants and businesses are actively involved in the project. The planning and innovation of the Skaftkärr area is done in broad cooperation between the municipality, other authorities, energy producers, developers of the use of energy, construction clients, equipment manufacturers and other enterprises, and future inhabitants. Authorities, energy producers, construction clients, equipment manufacturers, other enterprises, and future residents will continue to cooperate on planning and innovation in the future.

Spatial planning can lead to improved energy efficiency

In the planning of Skaftkärr, choices have been made that reduce the area's energy consumption and emissions. The consumption of primary energy is cut by 38 % and the CO_2 emissions by 30 % in comparison with old planning principles. Also, there are plans for a solar district heating plant. If built, the plant will further reduce the CO2 emissions from Skaftkärr. The Skaftkärr project has already produced completely new information about how municipalities, through spatial planning, can influence the energy efficiency of their areas. The project has also presented new means and calculation models that can be used for improving the decision-making process and energy awareness in spatial planning. Research done within the project has demonstrated that it is possible through energy conscious planning to considerably cut energy consumption and costs and reduce emissions.

With the Skaftkärr project, Porvoo will be the top place in Finland for energy-efficient living. The project inspired the City of Porvoo to launch a versatile action programme that will take the city systematically toward carbon-free housing.

Source: Presentation by Eero Löytönen, Head of city planning department in Porvo, at BALREPA in Vilnius 2011

5 Support to the energy planning process

How to structure the process depends on many factors such as size of municipality and available resources. This chapter focuses on capacity building including advising on how to structure the process. It also describes concrete supporting structures to help the municipalities and financing possibilities in the region.

5.1 Capacity building

The energy planning process requires both human and financial resources and requires collaboration and coordination between various departments in the local administration. It is a time-consuming process that has to be planned systematically and managed continuously. Support from the different departments and a clear organizational structure which outlines the responsibilities for the different phases and tasks in the process is a necessity. Ensuring transparent procedures are as important as financial subsidies when organising the planning process.

Structuring the process

The structure of the process differs from municipality to municipality and should be organised to best suit the existing administrative structure of the municipality. The municipality might choose to integrate the work into an existing department or they might choose to set up a separate administrative organisation unit within the local administration depending on the size of the municipality. For municipalities without the required expertise one way is to hire external experts such as consultants or experts from universities. It can be valuable to cooperate with neighbouring municipalities to ensure more efficient coordination. One option is to set up a inter-municipal coordination unit or retain a joint coordinator.

Ensuring ownership and support

When choosing how to organise the process it is important to keep in mind that using internal resources secure a higher intrinsic ownership and support within the municipality, which is crucial for the implementation of the energy plan.

The process may include setting up both a steering committee and a working group consisting of key persons from relevant departments of the local authority, public agencies, etc.

To establish a clear structure and overview one can create a flow chart, indicating the structure of the process and the various interactions between departments and actors.[m]

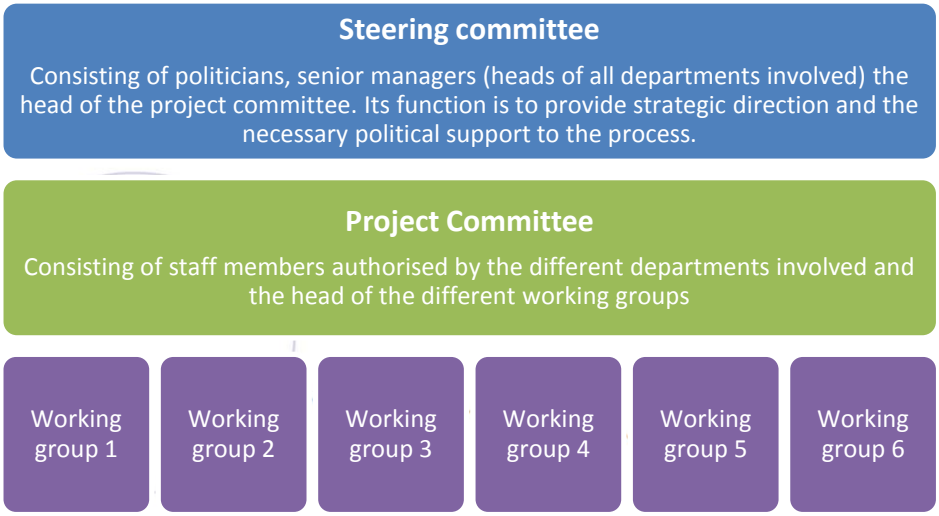


Figure 14 Example of what the municipal structure could look like.

CASE (Denmark): planning of wind turbines in Hagesholm

Example of a planning process in Eastern part of Denmark initially covering 22 large wind turbines of 2,3 MW each. The original project proposal included 8 windmills in one municipality and 14 in another municipality.

Time line and project description:

2007: Vattenfall (Large Swedish utility company) approach two municipalities for permission to establish the wind turbines

2008: First public hearing by municipalities – public meeting and more than 100 written proposals or complaints

2009: Municipalities published draft legal plan document – project reduced to 15 turbines → Second hearing – public meeting and written complaints → Plan documents approved in one municipality for 10 turbines (23 MW) → Complaints about municipalities processes submitted to standing committee

2010: Complaint rejected in August by standing committee → Politicians in the second municipality rejected the approval

2011: Construction of 10 new turbines started January → Financial compensation scheme being processed January-May → Obligation to sell up to 20% in the project to neighbours (4,5 km limit) → Commissioning expected September 2011

The political process

There was a strong local opposition to the project, which was reflected in the political process. Among the politicians involved there was also a strong disagreement about the

[m] "How to develop a Sustainable Energy Action Plan (SEAP) - guidebook", Covenant of Mayors, 2010. Can be found on http://www.eumayors.eu/support/library_en.html

project. The municipality with 8 turbines originally, reduced their part to three due to conflicting interest of land. Two of the three turbines required exception from existing planning regime. A marginal majority of politicians rejected approval of those two sites reducing this part of the project to only one turbine. The other municipality reduced their part from 14 to 10 turbines, which in the end turned out to be the result 3-4 years after submission of application.

Lessons learned

- Transparent legislation and decision procedures does not guarantee for a smooth decision – political process can change a lot
- Involvement of affected individuals is important but does not make the process simpler
- The case shows that it is possible to 'muddle through'
- The municipality plays the key role – The state is not involved in this part of the game

Source: Presentation by Anders Højgaard Kristensen, Energy policy adviser, on "The role of local authorities" at BALREPA in Vilnius 2011

5.2 Supporting structures

Often municipalities can benefit from drawing on supporting structures. These may include both national secretariats focused on specific topics or element, energy agencies or consultants who can provide strategic guidance and financial and technical support, or available knowledge platforms that the municipality can draw on. An example of a national secretariat that function as a supporting structure, is the Danish Wind Turbine Secretariat and Biogas Secretariat, which is assisting local authorities with the planning process. The secretariats assist in locating potential areas, and in establishing dialog with government authorities, politicians and citizens. They also provide advice on the planning process, examples from other municipalities, overviews and tools[n]. Similar support might be available nationally in other countries in the region.

Networks such as UBC or CoM can also be seen as supporting structures as they create platforms for knowledge and skill share and in the case of CoM also offer concrete procedural guidance. For municipalities engaging in energy planning it is worth examining existing supporting structures nationally or locally.

If there are no supporting structures available, another option is to establish cross-municipal secretariat, in order to pool the effort. This can either be initiated by the municipalities themselves or by national interest organisations representing the municipalities.

[n] Presentation by Kåre Albrechtsen, secretariat leader, on "*Wind turbine and biogas planning in Denmark*" at the BALREPA in Kaliningrad 2011.

In the following are a few examples of knowledge platforms which the municipalities can draw on:

RETScreen

The RETScreen Clean Energy Project Analysis Software is a free-of-charge clean energy decision-making software. RETScreen allow engineers, architects, and financial planners to model and analyse any clean energy project. Decision-makers can use the software to conduct a five step standard analysis, including energy analysis, cost analysis, emission analysis, financial analysis, and sensitivity/risk analysis. The technologies included in RETScreen's project models include both traditional and non-traditional sources of clean energy as well as conventional energy sources and technologies. Integrated into these analytical tools are product, project, hydrology and climate databases, links to worldwide energy resource maps, as well as access to an extensive database of generic clean energy project templates. The software can be downloaded at www.RETScreen.net

Technology catalogue

The technology catalogue is published with regular intervals by the Danish energy agency and the Danish transmission system operator, Energinet.dk, the most resent being from 2010. The catalogue provides an overview of energy production technologies to enable generic comparisons of e.g. thermal gasification versus combustion of biomass and electricity storage in batteries versus hydro-pumped storage.

The primary objective of the technology catalogue is to establish a uniform, commonly accepted and up-to-date basis for energy planning activities, such as future outlooks, evaluations of security of supply and environmental impacts, climate change evaluations, and technical and economic analyses, e.g. on the framework conditions for the development and deployment of certain classes of technologies.

For municipalities the catalogue can be used when analysing the options of building new electricity production capacity locally such as new wind turbines or small biomass combined heat and power plants. The most recent catalogue can be downloaded from the Danish Energy Agency webpage (www.ens.dk)

EurObserv'ER

Is a project supported by the European commission which measures the progress made by renewable energies in each sector and in each Member State of the European Union and publish barometers containing the collected data. The figures are less than 12 months old. EurObserv'ER produces a series of indicators covering energy, technological and economic dimensions as well as socio-economic indicators. The main objective of the barometers is to monitor and analyse the development of renewable energy sectors in the

European Union and evaluate this progression in comparison of the White Paper objectives for 2010. For municipalities the EurObserv'ER can be used to get an easy accessible overview of national RE data and the expected development. Can be found at www.eurobserv-er.org

RECaBS

RECaBS (Renewable Energy Costs and Benefits for Society) is a project under the International Energy Agency's Implementing Agreement on Renewable Energy Technology Deployment (RETD)[o]. The aim of RECaBS is to estimate the costs and benefits of electricity from renewable energy sources compared to conventional technologies in a fully documented and transparent way. The main tool is the *RECalculator* which is an interactive web-based calculation tool that allows the user to carry out their own comparative analyses of renewable energy technologies and conventional electricity generating technologies. The calculator has default values which can easily be replaced by the users own assessments to improve account for local discrepancy or make sensitivity analyses. The calculator allows the user to include the economic costs of various externalities - air emissions, system integration, security of supply, employment - in the calculations. Can be found at www.recabs.org

WB RE toolkit

The REToolKit is designed to assist World Bank staff and countries. It consists of a set of downloadable documents describing the application of renewable energy technologies for grid-connected, mini-grid, and stand-alone projects. The documents include: Reports on best practices and lessons learned, case study descriptions, technical standards documents, procurement specifications and bidding documents, terms of reference documents covering a range of topics, from business development, financing, assessments, regulatory topics, monitoring and evaluation, etc. and an annotated list of other websites with relevant information[p].

5.3 Financing of projects

There are several important financing programmes which are relevant for municipalities within the Baltic Sea Region. Among these are the Nordic Investment Bank, the Nordic Environment Finance Corporation and different EU financing options.

[o] www.recabs.org
[p] Can be found at http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTENERGY2/EXTRENENERGYTK/0,,menuPK:5138378~pagePK:149018~piPK:149093~theSitePK:5138247,00.html

Nordic Investment Bank

The Nordic Investment Bank (NIB) provides long-term financing to projects that strengthen competitiveness and enhance the environment. NIB finances projects in many sectors in member and non-member countries. In particular, NIB aims at providing added value in energy, transport and environmental improvements.

NIB loans are granted for specific projects. Normally, the total project value exceeds EUR 50 million. NIB also channels financing to projects of small and medium-sized enterprises through intermediaries. A project might, for instance, concern investments in infrastructure, such as energy and transport, improvement of the environment, research and development, improvement of manufacturing processes or the internationalisation of businesses.

Nordic Environment Finance Corporation

The Nordic Environment Finance Corporation (NEFCO) is an international financial institution, established 1990 by the Nordic governments. They provide loans and capital investments for environmental projects of interest to the Nordic countries with a geographic mandate covering Russia, Ukraine, Belarus, Estonia, Latvia and Lithuania. Climate issues are one of their key priority area.

NEFCO offers several different forms of financial instruments:

- Investment fund
- Micro credits funds
  - Cleaner production fund
  - Energy saving loan facility
- Carbon funds
- Projects support funds

The key criteria for receiving funding for projects are the financial viability of the project, that measurable data on the emission reductions of the project can be provided and that the project only use tried and tested technology.

Geographic distribution of NEFCO-financial energy saving projects in Russia

The benefits of co-operating with NEFCO is among other things reduced financial exposure and access to a large and useful networks of environmental players in the Nordic region and Russia. NEFCO has long experience of financing projects in Russia and a local presence.

NEFCO - Energy Saving Loan Facility

The NEFCO Energy Saving Loan Facility is a financial instrument directed at Russian municipalities or municipal companies. The instrument support investments in activities such as energy saving measures in public

infrastructure such as schools, nurseries and hospitals, street lights and boiler fuel conversion to biofuel.

The maximum loan given amount RUB 9,500,000 (approximately EUR 220,000) where NEFCO can finance up to 90% of total project cost. The repayment start after project completion and can be tied to the savings generated by the project.

NEFCO - Cleaner Production Fund

NEFCOs Cleaner Production fund is directed at private or municipal companies with existing production. The fund promotes technological investments in industrial projects by simultaneously reducing emissions of harmful substances into the environment, and increasing production profitability through efficient resource and energy utilization. The fund supports the realization of projects that otherwise would not materialize or could be realized only later. The maximum loan given amount EUR 350,000 (approximately RUB 15,000,000), where NEFCO can finance up to 90% of total project cost. As for the energy saving loan facility the repayment starts after project completion and can be tied to the savings generated by the project[q].

Northern Dimension Environmental Partnership

The purpose of the Northern Dimension Environmental Partnership (NDEP) is to mobilise grant funding for environmental and nuclear safety investments in the Northern Dimension Area for concrete projects prepared by IFIs. The grants are allocated from the NDEP Support Fund which pools significant contributions from partner governments. For environmental projects, NDEP grants are meant to complement the loan funding from IFIs and help to leverage extra local and international resources. The grants offer an incentive for environmental projects that may not otherwise be financially viable or unable to achieve satisfactory environmental targets without additional help.

The NDEP projects aim to improve the ecology of the Baltic, White and Barents Seas region. So far the NDEP has been focused on projects in north-west Russia but in 2009 it welcomed Belarus to the Fund and a new project pipeline is now under development[r].

As an example NDEP granted euro 7.3 millions to a project in Kaliningrad focused on rehabilitating Kaliningrad's district heating system in order to reduce emissions and energy losses.

EU financing options

Within the EU there are different financing options available. Among these are EU's Seventh Framework Programme for Research and Technological

[q] Presentation by Boldyrev at the BALREPA in Kaliningrad 2011
[r] For more information visit the NDEP website: www.ndep.org

Development (FP7), NER300, European Local Energy Assistance Facility (ELENA), European Energy Efficiency Fund (EEE-F) and EU structural funds/ERDF including JESSICA. Within the frame of Intelligent Energy Europe other relevant financing options are also available such as SAVE (energy efficiency), ALTENER (renewable energy) and STEER (transport)[s].

FP7

FP7[t] is the EU's main instrument for funding research in Europe, running from 2007-2013. The programme supports research in selected priority areas and is made up of four main blocks of activities forming four specific programmes plus a fifth specific programme on nuclear research. In relation to local energy planning the programme on cooperation and collaborative research has energy as a key focus area with a separate budget of EUR 2.3 billion for the period 2007-2013.
Activities in the energy area include:

- Hydrogen and fuel cells
- Renewable electricity generation
- Renewable fuel production
- Renewables for heating and cooling
- CO_2 capture and storage
- Clean coal technologies
- Smart energy networks
- Energy efficiency and savings
- Knowledge for energy policy making.

Smart Cities and Communities

In order to reflect the high priority of energy efficiency in the European energy and climate policy, the profile of energy efficiency research has been strengthened in the work programme for 2012, and a new area on 'Smart Cities and Communities' has been created within the 'Energy Efficiency and Savings' area. Topics within this area address the challenge of smart cities and communities in a holistic way that cuts across many technology areas.

Cities are expected to devise innovative measures to accelerate the deployment of low carbon technologies. The initiative encompasses a broad range of energy related topics such as energy efficiency, energy networks and renewable energy production as well as other urban issues in the area of electricity, heating and cooling, transport, waste and water management. Focus in the Smart Cities and Communities Initiative is to promote and replicate successful solutions through clustering of cities with similar

[s] Additional information on these projects can be found at the Intelligent Energy Europe webpage
[t] See the EU Research & Innovation – Participants portal: http://ec.europa.eu/research/participants/portal

framework conditions and similar ambitions. In order to enhance the replication potential cities from at least three Member States are expected to team up for project proposal under the call "FP7-ENERGYSMARTCITIES-2012". Financial support is given to measures which help cities to substantially reduce greenhouse gas emissions in an innovative and integrative manner and represent a high replication potential. For 2012 three calls exist within the area:

1. Strategic sustainable planning and screening of city plans
2. Large scale systems for urban area heating and/or cooling supply
3. Demonstration of nearly Zero Energy Building Renovation for cities and districts

NER300

"NER300" is the name of a financing instrument managed jointly by the European Commission, European Investment Bank and Member States. It originate from the EU revised Emissions Trading Directive 2009/29/EC which contains the provision to set aside 300 million emission allowances to be traded on the carbon market. The money raised is dedicated to subsidising installations of innovative renewable energy technology and carbon capture and storage (CCS) and will be made available to projects within this scope. The NER300 funding is thus intended to accelerate the deployment of low carbon energy across Europe and support the EU's medium and long-term climate goals. Detailed information about the criteria and rules for application is provided in the Call for Proposals. The calls, application forms, and all relevant documents are sorted according to technology categories[u].

European Local ENergy Assistance

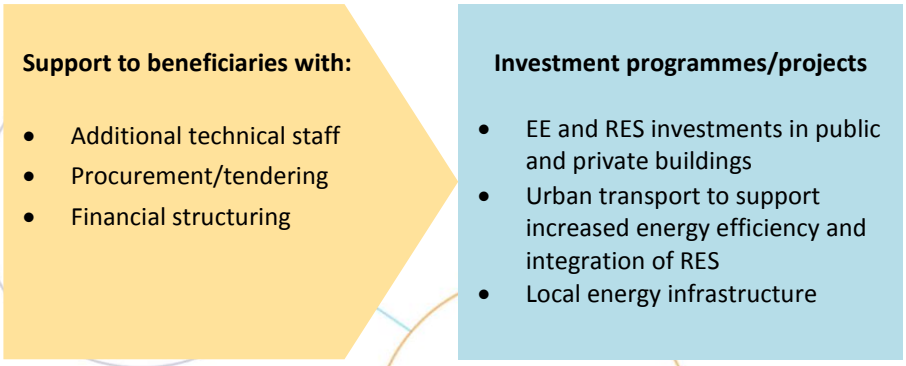
ELENA is a technical assistance facility, providing grants to cities, provinces, regions and entities acting on their behalf, of up-to 90% of eligible costs, for development of bankable sustainable energy investment programmes/projects at their territories. ELENA is financed through the Intelligent Energy-Europe programme. ELENA support covers a share of the cost for technical support that is necessary to prepare, implement and finance the investment programme, such as feasibility and market studies, structuring of programmes, business plans, energy audits and preparation for tendering procedures.

Many EU cities and regions have recently started to prepare or are initiating large energy efficiency and renewable energy proposals to tackle energy and climate change challenges. However, most of them are still at the conceptual stage and their implementation is proving difficult because many regions and cities, particularly medium to small ones, often do not have the technical

[u] For more information see the EU energy commission webpage at: http://ec.europa.eu/clima/funding/ner300/index_en.htm

capacity to develop large programmes in this area. ELENA helps public entities to solve such problems by offering specific support for the implementation of the investment programmes and projects such as retrofitting of public and private buildings, sustainable building, energy-efficient district heating and cooling networks, or environmentally-friendly transport etc.[v]

Scope of ELENA:



Figur 15 ELENA scope (presentation by Zoltan Deak, European commission for energy,on "EU energy policy – local communities", at BALREPA in Vilnius 2011).

EEE-F

On 1st July 2011, the Commission launched a new European Energy Efficiency Fund (EEE-F) as part of the European Energy Programme for Recovery (EEPR). The objective is to address specific financial needs of local public authorities for commercially viable public energy efficiency (EE) and renewable energy (RES) projects in the EU. The EEE-F funds investments in energy savings, energy efficiency and renewable energy projects, particularly in urban settings, achieving at least 20% energy saving or GHG/CO_2 emission reduction. The fund offers a wide range of financial products such as senior and junior loans, guarantees or equity participation to local, regional and (where justified) national public authorities to promote sustainable energy investments[w].

Additional information and materials

"Best practices guide: Economic &Financial Evaluation of Renewable Energy Projects", Alternative Energy Development, 2002. The guide is aimed at financial decision-makers, project developers and others involved in the financing or development of renewable energy projects. It provides analytic tools and technical understanding of renewable energy projects necessary to evaluate the projects economic and financial viability and to effectively structure such projects to meet requirements for project finance and market support.

[v] For more information see the EIB webpage at: www.eib.org/products/technical_assistance/elena/index.htm?lang=en
[w] For more information see the EU energy commission webpage at: http://ec.europa.eu/energy/eepr/eeef/eeef_en.htm

6 Theme – An intelligent energy system

The themes are thought to inspire to new approaches and new ways of seeing energy planning, while also presenting concrete examples (local cases) of how it can be done successfully. In the current version of the manual one theme is included. Additional themes will be added to the manual in the future. This first theme, "the intelligent energy system" is thought as a general introduction to the topic. The necessity of a future intelligent energy system can be partially realised at local level, and provides opportunities. Taking account of the requirements of the intelligent energy system can strengthen the local planning and make the plans more robust.

Transition to an intelligent energy system

The increased use of renewable energy will mean that the energy landscape of the future to a higher extent will be characterised by distributed generation. The fluctuating nature of electricity generated by renewable energy systems such as solar photo voltaic systems or wind power increase the challenges of balancing the power system. New diversity of power generators, consumers and energy storage require a "Smart Grid" – a new generation of intelligent electricity networks designed to ensure energy-efficient and cost-effective grid operation based on real-time and bi-directional communication between the individual network nodes. Such a smart grid is widely understood as a key prerequisite for the integration of renewable energy sources.

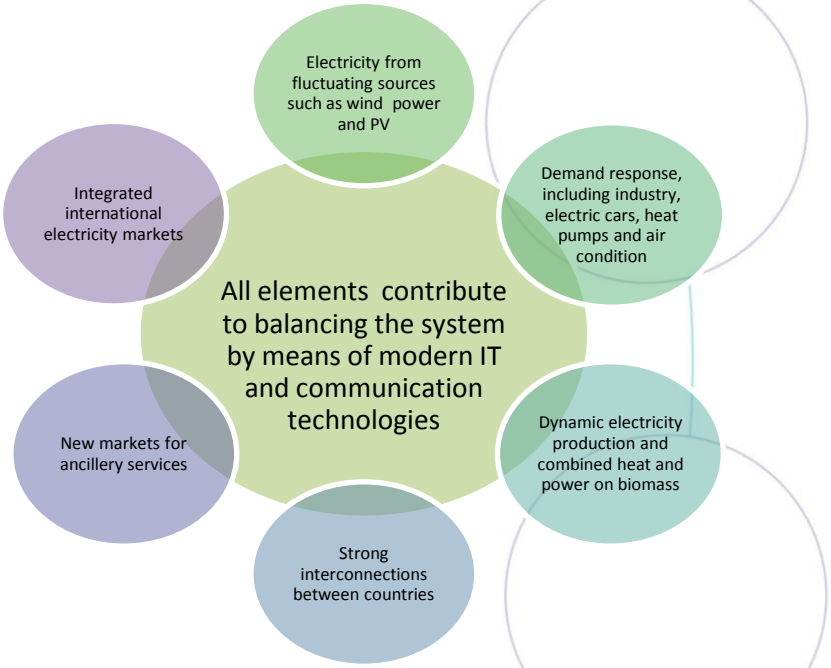


Figure 16 Elements in a future intelligent energy system.

Definitions of the intelligent energy system	There are many conceptions and definitions of the intelligent energy system depending on different starting points. However, there seems to be a consensus that from an infrastructure point of view, an intelligent grid is the infrastructure connecting energy demand and supply using communication technology in order to increase efficiency and security of supply. In a wider context, an intelligent system facilitates a high degree of interaction between electricity, heat and gas sectors. The energy system is being transformed from the former centralised producer-controlled system to a system much more decentralised and consumer-interactive. This transformation involves all stakeholders in the sector: Energy producers, energy suppliers, transmission system operators, distribution system operators, technology suppliers, suppliers of energy services, energy customers as well as regulators and other authorities.
Improved system dynamic	A priority area in this regard is improved system dynamic. In the conventional system the dynamic is limited – often it will take hours to start up additional power production capacity and it can only be regulated within a narrow margin – with considerable costs. Thus it is interesting to focus on the regulation capabilities of smaller production units such as the local combined power and heat plants (CHP), microCHP and consumption. Where the dynamic properties of local CHP's fall between those of the large power generation units and the micro plants, both microCHP and many forms of consumption can be started/stopped or regulated within seconds. At the same time microCHP enables an efficient co-production of heat and power. The benefits of microCHP can thus be extended into areas outside the current district heating areas[x].
Role of municipalities	An intelligent energy system is dramatically different from the energy system we have today. The municipalities have an important role in communicating the idea, and making sure that the involved stakeholders and affected citizens understand the changes needed. The municipalities also have a role as coordinators and representing the authorities. Thus the municipalities can act as a catalyst for the future development.
Additional information and materials	*"Denmark opts for Smart Grid – Intelligent power system with more renewable energy".* Magazine published by Energinet.dk. Can be found at: http://energinet.dk/EN/FORSKNING/Energinet-dks-forskning-og-udvikling/Smart-Grid/Sider/default.aspx or downloaded at

[x] "Intelligent Energy Systems - A White Paper with Danish perspectives", Ea Energy Analyses, May 2010

http://energinet.dk/EN/FORSKNING/Energinet-dks-forskning-og-udvikling/Smart-Grid/Sider/default.aspx

CASE (Denmark): Bornholm – a smart grid laboratory

Bornholm is a Danish island located in the Baltic Sea. Bornholm has 42,000 inhabitants and covers a land area of 588 km^2. The sole electricity connection to the outside world is a sub-sea 60-kV AC-cable to Sweden. A very interesting and unique fact about Bornholm is that the local electricity system can operate in true island mode by decoupling the sea cable.

Denmark with the island of Bornholm in the circle

Bornholm has a relatively comprehensive RE infrastructure including a number of straw and wood chip fired district heating plants, biogas plants, a waste facility plant, and 30 MW wind turbine capacity (35 turbines). District heating covers 45% of the island's current demand for space heating. Four of the island's five district heating plants use biomass exclusively.

The largest intelligent power grid in the world

The largest intelligent power grid in the world will be established on Bornholm in the coming years as part of the EUR 21 million EcoGrid EU project, which is a large-scale demonstration of the complete power system. Of a total of 28,000 customers on Bornholm, approximately 2,000 residential consumers will participate with flexible demand response to real-time price signals. Installation of smart solutions will allow real-time prices to be presented to consumers and allow users to pre-program their automatic demand-response preferences, e.g. through electricity contracts.

A real-time market concept will be developed to give small end-users of electricity and distributed RES new options (and potential economic benefits) for offering TSO's additional balancing and ancillary services. 'Automation' and customer choice are among the key elements in the concept.

What to be demonstrated on Bornholm

Power generation
30 MW wind power
16 MW CHP (biomass)
2 MW biogas
2.1 MW photovoltaic power

EcoGrid EU is a full scale demonstration of a real-time market place including a very broad mix of distributed energy resources

Demand side/storage
"Intelligent" control of household applications
Electric vehicles
Heat pumps with smart grids applications
Micro CHP
Electricity storage in district heating

Source: EurObserER case description

7 Conclusion

The content of this manual builds on lectures and discussions from earlier BALREPAs and thus reflects key questions and problems addressed during the academies. The different chapters of the manual each address different aspects of the planning process with the aim to qualify the individual municipalities with respect to both technical and process aspects of energy planning. The focus of the manual is on areas of the planning process with special relevance for the cooperation within the Baltic Sea Region.

The thought behind the manual is that the manual should be continuously developed, reflecting the focus areas of future BALREPAs and the general development within the field of energy planning. Our hope is to continuously update the contents of the chapters, add new case examples, and include new themes in future versions. Based on best practices and good experience from municipalities around the Baltic Sea Region, new suggestions for measures and initiatives on the municipal level will be added continuously, to provide useful and up-to-date guidance to municipal planners.

The manual is structured so as to highlight and strengthen the link between the overall development goals for the region and the concrete challenges and obligations on the local level, describing the different steps from vision to praxis. This includes international and regional goals as well as measures and studies highlighting how the region can become sustainable in the long term, to highlight the municipalities' role in reaching the common goals for a sustainable development and encourage and inspire to actions. Through BALREPA and this manual, the hope is to create a clear linkage between the different levels so as to ensure coherent local and regional development.