



# Regional Strategies

## Sustainable Energy Planning **1**



## North Sea - Sustainable Energy Planning

### WP 3.2.3

#### Regional energy strategies and energy models in the North Sea Region - Including roadmap A regional perspective on the EU's Energy Roadmap 2050

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# 1. Background

## 1.1. Interreg IV b North Sea Sustainable Energy planning

This report is the conclusion from a survey undertaken within Work Package 3 North Sea Sustainable Energy Planning (North Sea SEP) project. It is a transnational EU project, partly funded within the North Sea Region Programme, Interreg IVB. The North Sea SEP project objective is the sustainable development of energy self-sufficient regions. The project was initiated by a group of interested specialists from different fields: green industry, regional planning and regional and municipal development. The project mainly focuses on the specific challenges municipalities and provinces face in the field of renewable energy and energy efficiency. The development of regional

energy strategies is an important part of the North Sea SEP project. The project aims to be holistic; it covers all of the aspects of energy planning that rural municipalities will encounter.

WP3 deals with the development and implementation of energy strategies. The WP3 consists of seven activities:

Activity 3.1: Stocktaking

Activity 3.2: Roadmaps and strategies

Activity 3.3: Business models

Activity 3.4: Public buildings

Activity 3.5: Dissemination

Activity 3.6: Concept of Economic Analysis

Activity 3.7: North Sea Investment Appraisal Model

## 1.2. Why North Sea SEP focuses on regional energy planning

The cost of fossil fuel energy has been increasing significantly during the last few years. It is clear that it will remain high (and continue to increase) in the medium and long term. A possibility of absorbing rising costs is to critically question the status quo of energy consumption in order to use existing local energy saving and production potential. Rising energy costs and declining budgets contribute to steadily increasing financial pressure for public utilities. In addition, towns and small towns, often situated in rural areas, have to face population

decline. This leads to a negative cycle: the citizens and public bodies have a lower budget at hand while at the same time the costs are rising, despite the lower demand. This combined with the flow of money out of regions because of the centralized (fossil fuel) energy supply, and the fact that the potential for the transition towards renewable energy is mainly based in local projects, means there's need for sustainable energy planning on a regional level.

## 1.3. Partners in North Sea SEP

The main partners in this activity are the partners who developed a regional strategy. They are shortly introduced here:

### **Aberdeen City Council, United Kingdom**

Local government for the City of Aberdeen.

Aberdeen is known as Oil Capital of the world and



is also known for its granite buildings. The City has approximately 217,000 inhabitants. The City Council focuses on promoting Renewable Energy in Public Sector Buildings and promoting low energy build through planning policies.

#### **County of Osterholz, Germany**

The County of Osterholz is located in Lower Saxony and neighbouring directly to the hanseatic city of Bremen. The region is represented in the North Sea - SEP consortium by two partners, the municipality of Osterholz-Scharmbeck and the stock company REON. The participation in North Sea - SEP is part of the mission 'Energiewende OHZ 2030' ('Energy u-turn Osterholz 2030'). Under this mission-statement municipalities, county and local businesses in Osterholz aim on meeting the demands of climate protection in combination with economic development since the economy in the region is quite weak. Overall goal is to become largely independent from energy importation until 2030.

#### **Energykontor Sydost, Sweden**

The Energy Agency for South-east Sweden, was established in 1999 as an EU project under the Association of Local and Regional Authorities in Kronoberg. The Energy Agency is working to initiate, coordinate and implement projects aimed at improving the energy efficiency and increased supply

of renewable energy in all sectors of society. The agency works strategically and systematically to link the projects at the local and regional level with the projects of the European and international market.

#### **Green Network, Denmark**

Private companies and public sector partners work together in Green Network to achieve greater sustainability in the fields of environment, social commitment and occupational health and safety. Five municipalities were involved in North Sea SEP: Hedensted, Kolding, Fredericia, Middelfart and Vejle.

#### **Intercommunale Leiedal, Belgium**

The intercommunale Leiedal is a partnership of thirteen municipalities in the Kortrijk region. The intermunicipal co-operation supports the broad socio-economic and spatial development of the region and deals with regional challenges. Making the shift from a traditional to a knowledge-based, creative economy is one of those challenges. Leiedal develops knowledge about the local implementation of sustainable energy and regional energy planning, and applies this on sustainable business parks, housing development projects and regional approaches towards the implementation of windmills. Leiedal developed an overarching regional energy strategy as a type of energy planning, to bring together a broad network of public authorities,

Impressions from a meeting  
in Middelfart, Denmark



private companies and education partners around the future of sustainable energy in the Kortrijk region.

**Province of Drenthe and the Municipality of Tynaarlo, the Netherlands**

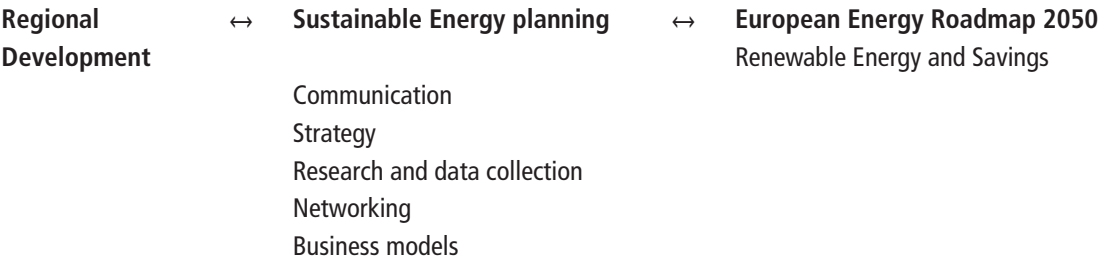
Drenthe is one of the three northern provinces of the Netherlands. With its beautiful landscape, dynamic economy and excellent working and recreational facilities, Drenthe is a great place to live! The Province of Drenthe has responsibilities in the field of Energy Planning, encouraging and

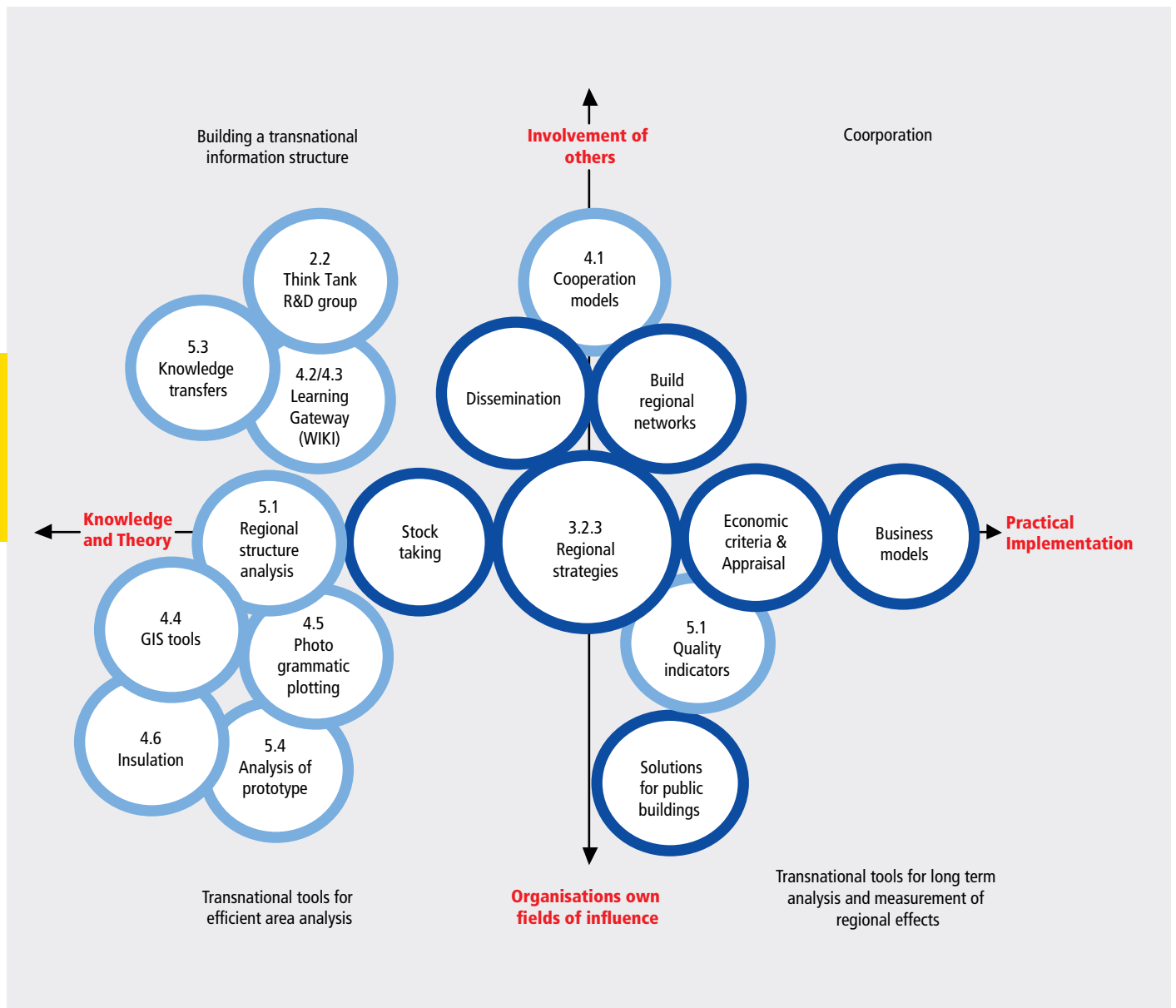
subsidizing the use of renewable energy, organizing cooperation between municipalities, business and energy companies, climate change adaptation and mitigation. Energy is one of the areas for special attention in the Northern Netherlands. In North Sea SEP the province is responsible for Work Package 3, together with subpartner the Municipality of Tynaarlo. The municipality developed an integrated vision on the development of an energy neutral area and focuses on an innovative business model for building sustainable housing development.

**1.4. The holistic approach of North Sea SEP**

The North Sea SEP concept of energy planning is based on an holistic vision. In this vision energy planning is concerned with regional development as well as a renewable energy supply, and includes the involvement of citizens as well as strategic planning. The scheme below shows all themes of the NS-SEP project and how they are related. In dark blue the activities in Work Package 3 are shown. The

development of regional energy strategies (centre) are the core to regional energy planning and steer local development. These strategies are encircled by (identifiable) local conditions requiring simultaneous attention. The light blue circles show the supporting tools and models: the focus is on sustainable strategies for the long term.





The scope of Sustainable Energy planning



# 2. Introduction

## 2.1. European objectives for 2020 and 2050

The European 20/20/20 objectives for energy and climate are: in 2020 the decreased emission of CO<sub>2</sub> by 20% (compared to 1990), 20% of fuel from renewable energy sources and a 20% increase in energy efficiency.

The Energy Roadmap 2050 is a step by step approach to reduce CO<sub>2</sub> emission by 80% to 95%. A carbon free energy system has to be achieved without disrupting energy supply and the competitiveness of Europe. All scenarios predict a substantial growth of renewable energy (source: Energy Roadmap 2050, European Council, 2011).

The Energy Roadmap 2050 also states that the average investment costs for the energy system will rise significantly. Those include investments in energy-production units and networks, industrial energy equipment, systems for heating and cooling (e.g. district heating), smart metering, insulation materials, efficient transportation and equipment for use of local renewable energy sources (photovoltaic energy, solar heat), low energy household equipment etc. This will have great impact on the economy and employment in industry, services, building, transport and agriculture.

## 2.2. Regions and energy policy

Regions have an important task realizing the EU energy objectives. Most of the renewable energy measures are implemented on a regional level, such as wind energy, solar parks and generating energy with biomass installations. The implementation is both physical and organizational. For example, the logistics around biomass plants as well as the erection of wind parks or solar parks takes place at a regional level. The regional networks, governments and administration on the regional level offer a good base for communication with businesses and

consumers. Regions may profit from local energy strategies if these go together with improved environmental quality, lower energy costs, higher regional income from local sources and tighter networks and new collaborations.

In North Sea SEP six regions (Osterholz (DE), Tynaarlo (NL), Kronoberg (SE), Leiedal (BE), Aberdeen (UK) and Sydland (DK)) are developing regional energy strategies. This creates various, useful examples for other EU regions.

## 2.3. North Sea SEP's transnational cooperation and local development

Six regions have worked together for three years (in the period 2009-2012) in the development of their regional energy strategies within the North Sea SEP project. They studied each other's approaches and observed the contextual differences during visits and

project meetings. In this way experiences from other regions could be applied to their own regions and local processes. In North Sea SEP work was done at two levels: knowledge exchange on a transnational level and practical work in the local context for the

region. This has improved insights into the different aspects that play roles in the development of energy strategies. A few milestones need to be mentioned: The local activities during the development of the energy strategies. The local processes showed great variety and opportunities for observation and insight. The joint evaluation of the process and the definition of important aspects of energy planning. This is described in chapter 5, 6 and 7.

At the beginning of the project partners made up an initial roadmap to describe the process they planned to develop. Based on the initial roadmaps and the evaluation a transnational roadmap is developed as a guideline for setting up an energy strategy. The roadmap is described in chapter 8.

The following regional energy strategies were developed under the North Sea SEP project:

#### **Denmark**

- Municipality of Vejle: Strategic Energy plan part I and II (2012)
- Municipality of Kolding: Strategic Energy plan part I (2012)
- Municipality of Middelfart: Strategic Energy plan part I (2012)
- Municipality of Hedensted: Strategic Energy plan part I (2012)
- Municipality of Fredericia: Strategic Energy plan part I (2012)
- Coordinated Strategic Energy Plan for the municipalities of Vejle, Hedensted, Kolding, Fredericia and Middelfart (2012)

## **2.4. Content**

Chapter three describes motives for working on a structured approach to energy planning. A brief summary of the local approaches of the strategies is described in chapter 4. Chapter 5 describes three energy models that give direction for the long term and are a framework for more concrete solutions. A number of solutions are described in chapter 6. Chapter 7 focuses on the key aspects regions encounter during the development of an energy plan. In chapter 8 the regions evaluated

#### **The Netherlands**

- Municipality of Tynaarlo: Energy Strategy, Summary based on:
- Municipality of Tynaarlo: Ambition statement and global framework for housing area De Bronnen (2009)
- Municipality of Tynaarlo: Roadmap for innovative sustainable urban design De Bronnen (2010)
- Municipality of Tynaarlo: Energy study De Bronnen part I, II and III (2010-2011)
- Municipality of Tynaarlo: Social Cost benefit analysis Energy model De Bronnen (2012)

#### **Germany**

- Baseline Paper: Analysis of energy context: County of Osterholz (2010)
- County of Osterholz: Regional Energy Strategy

#### **Belgium**

- Region of Leiedal Regional Energy Strategy

#### **United Kingdom**

- Aberdeen Alternative Energy Strategy for Council Owned Buildings

#### **Sweden**

- Energikontor Sydost, Climate and energy strategy for the county of Kronoberg and the region of Southern Småland.

their plans and three year process based on these keyfactors. Chapter 9 describes the roadmap for energy planning. The report ends with conclusions, recommendations and further work in chapter 10.

The English summaries of the strategies are combined in the Appendix report 'Summaries of the Energy Strategies in North Sea SEP'.

# 3. The need for a structured approach to SEP

## 3.1. Introduction

In the current European situation it is difficult for regional and local decision makers from governmental, private or civil organizations to judge if their decisions really lead to climate effectiveness. There is much energy policy but a lack of energy

planning. That is an important reason why regions should take up regional energy planning. During the project these and others were discussed by the partners in the WP3 meetings.

## 3.2. Economic benefit

The retention of money within a region by employing local resources, such as biomass, wind, sun, geothermal and waste heat is one of the main

reasons for regional energy planning. Also energy saving measures take place locally and the benefits stay in the region.

## 3.3. Socio-economic cohesion

Decentralized energy initiatives contribute to local socio-economic cohesion, which is especially important for areas with declining populations and budgets. Energy planning will stimulate the search

for mutual benefits between different fields such as waste collection, water management, economic development and environmental/urban renewal.

## 3.4. Knowledge about the potential for sustainable energy measures

Regions often don't know the energy potential of their local resources and the spatial environment in which case there's little direction for local action. Taking stock and mapping the potential

geographically could be of great help to planners and decision makers whilst also making communication easier.

## 3.5. A framework for effective partnerships

Different partners have different roles: governmental, academic, private, civil organizations and consumers all have different interests and hold different positions in the framework. Frameworks or joint

strategies for effective, sustainable and coherent activities and decisions on sustainable energy measures are often lacking at regional level. This means responsibilities between public and (semi)

private parties often remain unclear and are not

used effectively. A joint strategy can stimulate effective co-operation.

### 3.6. Need for sound judgments based on sustainability criteria

Each stakeholder (government, private, civil) should be able to judge whether an idea or measure is effective in terms of being sustainable and contributing to the energy objectives. Energy

planning might not be the equivalent of a formula but maybe it is nonetheless a set of criteria to judge if something is sustainable, achievable etc.

### 3.7. Commitment

More than about measures, energy planning is about process: how to use the available knowledge and how to create participation, how to define

ambitions together with the actors and stakeholders. A structured approach to energy initiatives opens possibilities for a process aiming at commitment.

### 3.8. Implementation

An energy strategy is likely to be the precursor of concrete projects and implementation in business cases and business models. In the end, this is what needs to happen, with the strategy as a strategic framework for the long term.



# 4. Local differences

## 4.1. Introduction

Each region developed a regional energy strategy over the period of three years. During the North Sea SEP project the local development has been shared several times during meetings by presentations of representatives of the region.

The working context of each partner varies due to the regional differences. Regional energy planning

therefore requires a customized process adapted to the area and local (social, political, economic, demographic and geographical) circumstances. It is clear that the different context of each region creates a different approach to the local process.

## 4.2. Regional approaches

### 4.2.1. Osterholz (DE)

'How does a self-sustainable energy supply help the County of Osterholz in terms of climate protection and in regional added value? - More than € 100,000,000 are spent for energy related services in the County of Osterholz each year. Energy savings and renewable energy can retain a lot of this money for the region' (Source: Introduction to the Think Tank meeting in the County of Osterholz, Becker, Worpswede, North Sea -SEP 2011)

In the Region of Osterholz the goals of a sustainable energy system and climate protection are very much common sense. The county, all municipalities and companies, such as the local utilities or the project partner REON AG actively support these goals. The approach of the region is to identify the potential for energy savings, energy efficiency and renewable energy generation and transform the results into tangible projects. Each project has the ambition to either save energy and retain purchasing power or generate renewable energy and create regional added value to a great number of stakeholders. All

projects in total shall lead to energy self-sufficiency for Osterholz in 2030.

Various working groups work on specific topics like subsequent insulation of buildings, street lightning or energy orientated facility management for public property. A steering group of all mayors and representatives of the other formal and informal partners develops a regional strategy and identifies needs for additional studies. Dissemination events for the councils, participation at popular exhibitions and a regional web portal.

#### 4.2.2. Tynaarlo (NL)

'The starting point of our strategy is the ambition to build an energy producing housing area by 2020. Buildings, infrastructure, landscape and the (waste)water system will be looked at in a different way; as potential energy producers'. This leads to an integrated model later in the process, the strategy was scaled up to a municipal strategy which linked different themes. (Source: Summary Integrated Energy model, De Bronnen, Tynaarlo, North Sea -SEP 2012)

The Municipality of Tynaarlo sees energy planning in a broader context of sustainable area development and sustainable urban design. The quality of the landscape, the water system, ecology, the flows of energy and water and the mutual impact of occupation in that landscape formed the background for Tynaarlo's energy strategy. For the development of the housing area five ambitions were set:

1. The natural landscape forms the basis for the housing development;
2. In the area energy is generated, water is purified and materials will be re-used;
3. As much as possible local materials are used;
4. The houses will accommodate a varied group people from different ages;
5. Other parties participate in the development and later exploitation and maintenance of the area.

A study was performed to see how these ambitions could be realised. It turns out that spatial quality and quality of the living environment is a very important sustainability criterion for energy measures in

Tynaarlo. It's needed to look at a wider area to optimize both for energy as for the quality of the environment. Several studies were performed to identify the energy demand and scenarios for an energy neutral development. The starting point was to maximize energy generation in the housing area itself, with respect for the spatial criteria. Other criteria were the availability of local resources, finance and spatial characteristics. The studies show that an energy neutral development has to integrate different measures at different scales but will have lower lifecycle costs than a standard development that is not based on renewable energy. The strategy for the housing development now acts like a catalyst for a broader energy and sustainability strategy for the whole municipality.





'The studies show that – within the boundaries of current and future regulations - energy saving and the production of renewable energy on site will not generate enough energy to achieve the objective. A wider area is needed to produce the additional energy demand using wind turbines, biomass or a solar park. Spatial aspects and economies of scale demand optimization. That's why we now concentrate on a municipal energy strategy.' (Source: Summary Integrated Energy model De Bronnen, Tynaarlo, North Sea -SEP 2012).

#### 4.2.3. Leiedal (BE)

Leiedal and IMOG focus on a broad coalition in their approach. Their roadmap is primarily based on (1) the power of regional stakeholders and their actions, (2) the strengths and weaknesses of the region, including the potential based on local resources. The priorities are set together with stakeholders. In the last six months Leiedal and IMOG organized an intensive regional process, including networking and dissemination activities. The result is a 'cahier' (booklet) proposing a vision on the energy transition for the Kortrijk region. It is a kick-off and a key ingredient for a regional energy

strategy. This vision is the result of a thought process based on several regional energy forums and expert working groups and was accompanied by a regional energy steering committee. The cahier synthesizes the knowledge of local governments and regional organizations, with new insights based on studies and advice from external experts. Leiedal developed an inter-municipal green energy tendering procedure for municipalities. Imog focused on events and initiatives specially oriented to households (collective tendering of insulation, energy mobile, energy paper).

'12.5% of the gross value added of the Kortrijk region is spent on energy. A much larger amount could return to the region, e.g. investing in the insulation of buildings creates local employment and reduces heating bills. The money is currently spent importing natural gas.' (Source: Management Summary An Energy neutral Kortrijk Region in 2050, North Sea SEP 2012)

#### 4.2.4. Kronoberg (SE)

Kronoberg have worked out in detail a regional energy strategy and a regional energy balance. Furthermore Kronoberg created and are fostering the

Triple Helix regional network 'Climate Commission of Kronoberg'.

The Climate and Energy Strategy for the county of Kronoberg and the Region of Southern Smaland is a guide to smart environmental choices. It will also inspire reductions in GHG emissions. As many as possible need to be engaged in a more conscious way of living to become smart energy users. The inhabitants of Kronoberg will contribute to the basis of our own (region's) and the county's particular conditions. This applies to companies and industry as well as organizations and private persons. Energy supply in society must be fundamentally changed if we are to reach the national environmental objectives. Your input is needed for it to be possible.' (Source: The Climate and Energy Strategy for the county of Kronoberg, North Sea SEP)

There are four main lines within the strategy:

- Reduce emissions from transport and vehicles;
- Use climate smart electricity and heat
- Switch to renewable energy
- Highlight the climate and energy work achieved by industry

Furthermore guidelines are given to address potential actions for renewable energy sources, biofuels, transportation, infrastructure, agriculture, buildings, waste, district heating and municipal and regional planning.

#### 4.2.5. Green Network (DK)

The five municipalities in the Green Network in Denmark jointly developed energy balances and energy strategies. They worked out a common methodology. This makes it easy to compare and cooperate. The strategies are developed in two parts. The first part focuses on a baseline of the energy balance in the municipality. Data about the current situation is collected. After that a basis projection was performed to show the trend of consumption and production of heat, power, cooling and transport (road traffic) to 2030 and 2050. The main focus of

the second part has been the identification of local energy resources, analysis of options for meeting the national targets for reducing GHG emissions and phasing out fossil fuels.

A coordinated Strategic Energy plan was developed next to the individual energy strategies. By working together the municipalities ensure that the perspective is inter-municipal and without conflict in process or approach.

#### 4.2.6. Aberdeen (UK)

Aberdeen City Council developed a strategy to promote the use of alternative energy technologies on Council owned public buildings. The strategy is a local authority strategy not a regional one and aims to help the Council reduce carbon dioxide emissions and future proof the Council from rising energy prices. The strategy encourages the installation of energy efficiency measures before installing low/zero carbon technologies.

From 2010 - 2011 Aberdeen City Council spent over £8 million on energy (electricity, gas and heating oil) to heat and power the City's public buildings. This is only set to rise in future as demand for fossil fuel surpasses supply. Installing renewable technologies onto public buildings will reduce the Council's dependence on fossil fuels and decrease the Council's exposure to rising energy prices.

# 5. Succes factors of the Güssing region

## 5.1. Introduction

'Just to turn to renewable energy brought advantages we didn't dream of before," says Vadasz, Mayor of Güssing and a former schoolteacher. 'A lot of money that left before, now stays in the region." 'People here feel less vulnerable because they know their energy's coming from renewable sources and not imports," Vadasz says. 'This should be the top priority of anyone who goes into politics, anywhere in the world."

Güssing is a region in Austria that decided to become self-sufficient. Güssing is the capital of a region with 27.000 inhabitants. It's not easy to reach and was for a long time cut off trade from nearby

Hungary because of the Iron Curtain. In 1988 it belonged to the poorest regions in Austria. 70% of the people worked and lived in Vienna during the week. Youngsters left completely. The money flew out of the region. Energy was imported while the local resources remained unused. 45% of the area is covered with forest. The energy costs in the region were 36 million a year. Now the 36 million stays in the region. Consequentially the town of Güssing and the region is being transformed to better insulation and energy based on local resources. The strategy started in 1990 and is expanded ever since. During a visit to Güssing the partners in North Sea SEP found the following factors for success.

## 5.2. Success factors

### Focus on sustainability

By aiming for sustainability, the perspective for the region of Güssing has changed completely. It led to a shift of paradigms. Poor can be rich, waste can be energy, land can grow energy. From have not's to haves. The first successes opened the eye for a lot of new possibilities that give the region an economical base for existence. No longer dependent on physical infrastructure but connected to the world through knowledge and specialisation. Sustainable energy became the driver for innovation and economical development.

### Capitalisation: local money flow

Güssing shows how the regional money flows get an impulse by a local energy concept. It's essential to combine the money flows with local re-investment.

### Attracting investment from outside

The municipality offered stability, guarantees and the investments came from EU, the Land and private companies.

### Anticipation on chances, smart use of technical focus

There is a continuous development of technical improvements towards efficiency. There are good contacts with the university in Vienna and with Graz, the other Austrian example town.

### Sense of urgency

There was a common sense of urgency, a need to act, a common understanding/feeling that something had to be done.

**Stability**

- There is a proven long term commitment
- The municipality gives guarantees

**Specialisation and R&D**

Güssing specializes on biomass and later gasification as technique.

- Focus on ongoing R&D and further improvement of energy-efficiency and technique keeps giving new horizons and Güssing a front position within their specialisation.
- Energy efficiency and sustainable energy are key drivers for innovation
- Involvement of research institute and universities
- Attracting knowledge centres worldwide

**Clear methodology – one step at a time**

1. Identify costs and monetary flows of current energy situation (does the money get in or out of the region?)
  2. Start with energy saving in public buildings (private will follow when they see success)
  3. Identify local energy potentials/resources (sun, wind, forest etc)
  4. Decide / calculate energy demands (electricity, heat (temp. load curve etc)
  5. Choose transformation technologies
- > Start with a small positive (successful) step (project)

**A united proactive team**

In Güssing there is

- A proactive, positive municipality administration (public partner)
- Close cooperation between private and public partners (PPP)
- Good legal constructs and contracts

**Clear project owners and promoters**

Due to its small scale, Güssing manages the energy strategy with a small team:

- A central figure / face (Mayor Peter Vadasz) - Promoter and figure of authority and respect
- One local contact person for all citizens with questions and ideas (Reinhard Koch)

**A story**

- A clear, simple and positive story 'the Güssing Model' which promotes the idea and the projects and motivates to 'do your bit to change the world'

# 6. Energy Models: long term frameworks for decision-making

## 6.1. Introduction

Energy saving and pushing renewable resources such as wind, solar, biomass and geothermal may appear to be generic themes within the North Sea SEP project strategies. But how generic are they really? How to distinguish the relevant energy measures for your region? The previous chapter showed the local situations that play important roles. Because

of the long-term perspective of the objectives it is important not only to know about the trends and the potential, but also to have a strategic framework for decision-making; we call this an energy model. In this chapter some aspects of building an energy model for your region are described.

## 6.2. Basic components of energy demand and supply

A common basis for most of the energy models is a split between production and consumption and

a breaking down of the energy supply chain into different components.

### 6.2.1. Demand side

Current demand and the 20 to 40 year tend is usually accounted for in joules, kWh or CO<sub>2</sub> equivalents. This sets the overall targets for the regional strategy. They are based on the energy use of different domains.

#### Households

- Electricity for lighting and household devices
- Heating
- Cooling
- Tap water

#### Public organizations

- Public buildings
- Streetlights, Traffic Lights

#### Business and industry

- Buildings
- Processes

#### Road transport

- Fuel

Some significant factors determine regionally specific energy demands and CO<sub>2</sub> emissions. They are: economic structure, condition of housing stock (totally or partially insulated), car dependency (rural or built-up areas) and the traditional energy supply infrastructure. In the Netherlands almost all houses are connected to a national natural gas grid. For example, in Denmark district heating is very common and rare in the Netherlands.

#### Energy saving

Energy saving is important basic strategy. The lower the use, the lesser needs to be generated. Important aspects are

- Changing behaviour

- Technical options: insulation and building regulations, improved design
- Efficiency, closing cycles
- Monitoring and legislation. There are European standards.

### 6.2.2. Supply side

Renewable energy supply will consist of a mix of techniques and resources.

#### Wind turbines

- Large scale
- Small scale
- On shore
- Off shore

Aspects are: visibility, acceptance, shade, safety and noise.

#### PV

'All energy comes from the sun. There's more than enough, if only it can be captured on the surface.

- On roofs
- Stand-alone installations

#### Solar Thermal

- Passive solar energy
- Roof boilers

#### Biomass

Biomass is the biodegradable fraction of products, waste and residues from agriculture (including

vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste. Biomass can be in solid, liquid or gaseous state. Sources of biomass may be:

- Manure
- Energy crops
- Wood
- Grass, reed, peat
- Waste water
- Kitchen and garden waste

#### Geothermal

- Heat pumps
- Groundwater storage

#### Surplus heat from industry, hospitals

Of course, these components have different characteristics. The potential may differ in scale, spatial implications, return rates, CO<sub>2</sub> efficiency, investment costs, behavioural aspects and benefits for the end users. Local policy and political decisions will in the end determine the chosen energy model.



Insulated roof of a passiv house in Kortrijk





### 6.3. Policy options and variables

There is clearly a diversity of possibilities with which objectives can be achieved for each of the domains on both the sides of demand and supply. It is helpful

to realize that there are different variables with which to work.

#### 6.3.1. Quantitative criteria

- Energy cost
- % of investment
- Initial investment
- Amortisation: the time needed to earn back the initial investment
- Real-estate value
- Reduction of CO<sub>2</sub> emissions
- Amount of produced renewable energy
- Value in terms of CO<sub>2</sub> certificates
- Regulations (for example for wind turbines)

#### 6.3.2. Qualitative criteria

- Consumer acceptance and benefits like comfort, lower cost, health or higher real estate value
- Sale criteria
- Guarantees and approved technical standards
- Public acceptability
- Political acceptability
- Spatial integration
- Setting the example
- Potential for participation of consumers
- Short term visibility
- Level of flexibility or robustness

The list of criteria above is not complete. But it shows how many variables there are. The weighting granted to a variable is dependant upon the region. For long-term strategies on a regional level flexibility is needed as well as direction for decisions on the level of concrete actions and the reason why energy models are an important framework for further development. In the next paragraph we describe some of the energy models used by partners in the North Sea SEP project.

### 6.4. Trias Energetica or Duo Energetica?

A basic principle that lies behind energy models is the Trias Energetica. The Trias Energetica is a way to approach energy measures. The Trias Energetica is a 3 step approach to reduce use of fossil energy by firstly optimizing energy saving, secondly optimizing use of renewable energy and thirdly optimizing

efficiency. The Trias Energetica is used by all partners in the North Sea SEP project, although most have a two way approach that runs parallel:

1. Saving energy (including optimizing for efficiency)
2. Production of renewables.

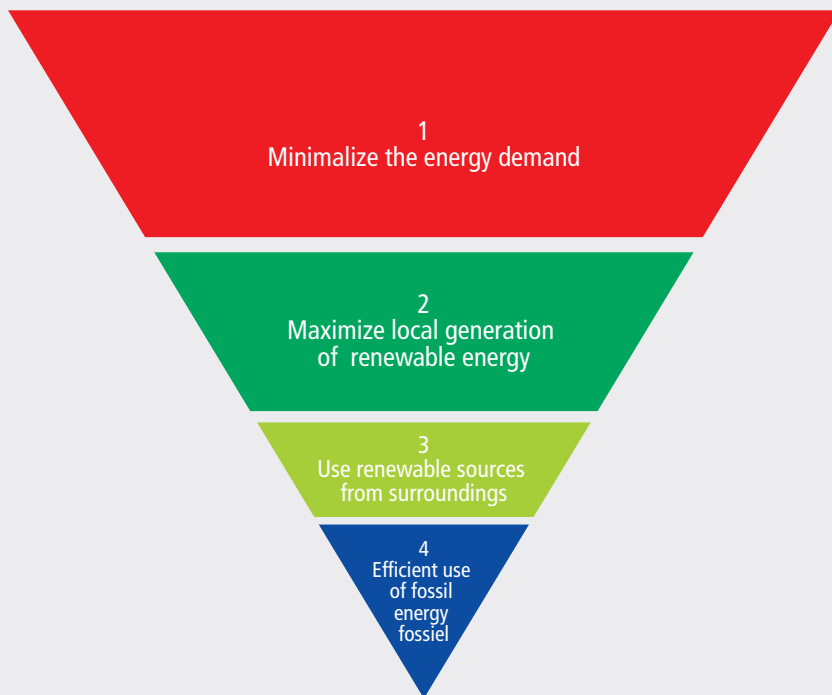
### 6.5. Trias Energetica Locus and benefits of scale

The Trias Energetica is a basic strategy but it does not include using the benefits of scale. Small scale developments such as PV on roofs are complementary to large scale developments as wind parks or biogas installations. The municipality of Tynaarlo developed an energy strategy for a

small-scale housing development. Here it becomes very clear some measures require a larger scale than others. Biomass plants or large wind turbines are not suitable for every location, but they do turn out to be good, financially viable options if developed at the right scale and the right location. In contrast, PV

panels on roofs can be placed almost everywhere. Because of the potential benefits of small-scale options for locations and end users, they should not be substituted for larger scale development because of financial arguments alone. Therefore, the municipality of Tynaarlo includes scale differentiation in the Trias Energetica:

1. Maximize reduction of energy demand by saving and efficiency;
2. Optimize renewable energy generated on the site itself (with respect for spatial criteria)
3. Optimize the generation of renewable energy in the surroundings.



Trias energetica locus  
(developed by ROiD,  
part of Tynaarlo's  
integrated energy  
model)

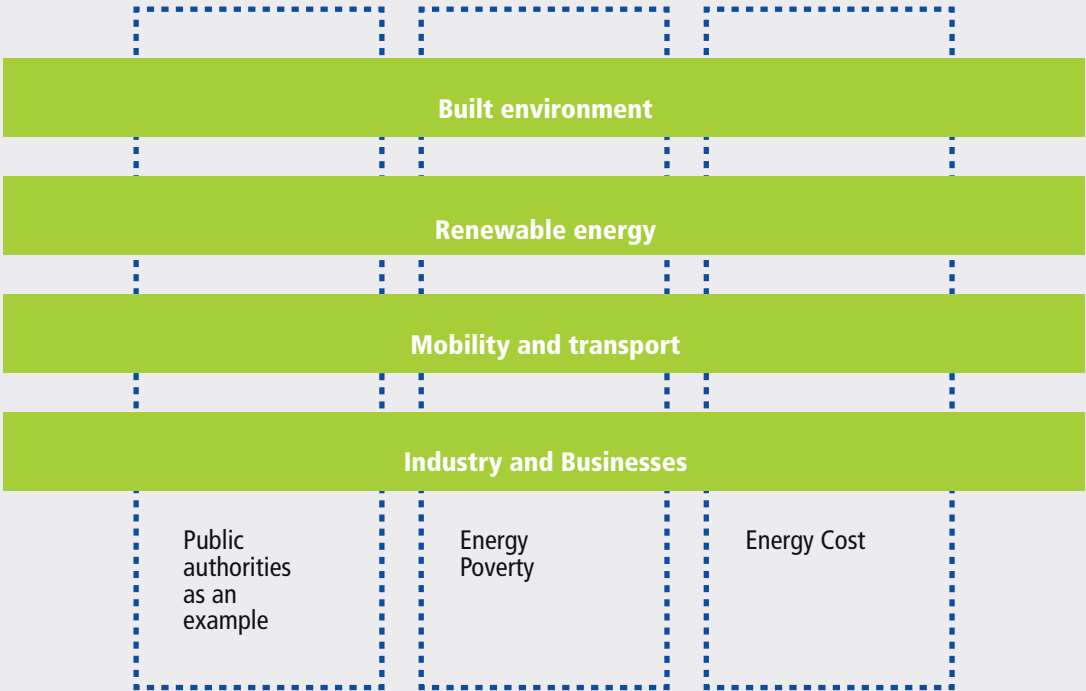
This way an optimal scale and the potential for solar on roofs and yield of biomass, is included in the Trias Energetica. This is done to prevent off-loading energy measures on other locations.

The Trias Energetica Locus is also important for energy strategies on a regional level. Different energy options comply with different economies of scale. One of the lessons here is that energy studies should be accompanied by a spatial analysis.

6.6. Thematic energy model Leiedal (BE)

Leiedal identified seven themes. Four themes are 'hard' and relate to CO<sub>2</sub> : the built environment (40% of the regional CO<sub>2</sub> emissions), mobility and transport (30% CO<sub>2</sub>) and business (25% CO<sub>2</sub>). Three themes are 'softer' and cut across the other themes.

Transition paths were developed for these seven themes to define how the Kortrijk region can realize a sustainable energy system and become an energy neutral region in 2050.

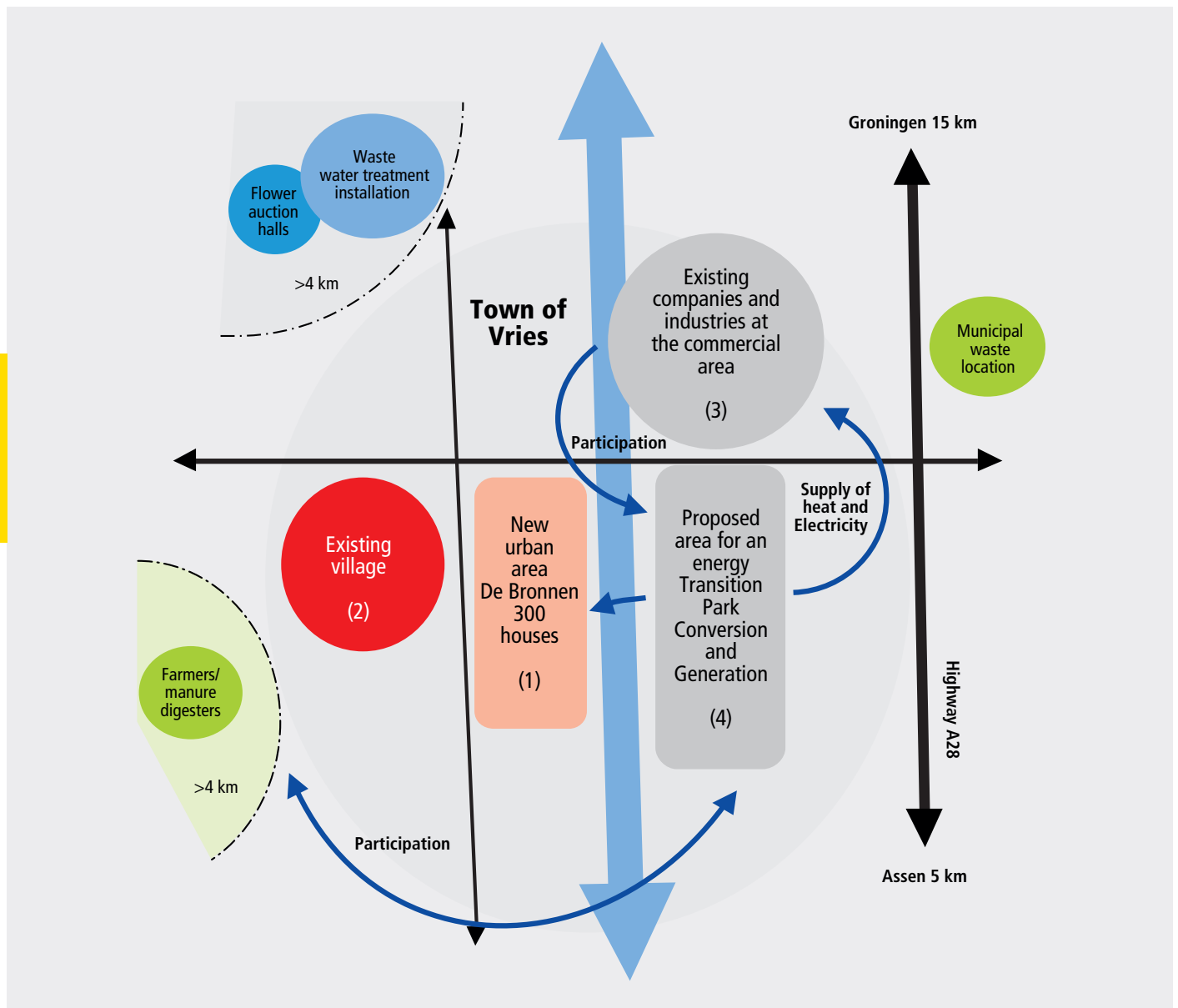


6.7. Scalable energy model Tynaarlo, De Bronnen (NL)

Tynaarlo identified two paths for the energy system: minimizing consumption and maximizing generation. An integrated sustainable design can be created

with the options described above, but it will not be possible to generate enough energy on the site itself to become energy neutral.

Technical options for saving, efficiency and generation in built up area									
Options	Saving and efficiency				Generation				
	EPBD or Passive	Heat-pump	Geo-thermal	LED Street-lights	PV roof	PV park	Small wind (Turby)	Wind-mill 2 MW	Biomass
Individual houses + MFA			Individual						
New urban area De Bronnen			Collective						
Surroundings or other location									



Energy model De Bronnen,  
Municipality of Tynaarlo

The municipality analysed potential at different scales. Because wind energy is only allowed outside the municipality other solutions have to be found. The energy model is based on a study about different measures and natural resources in the area. This leads to an inter-linked model where a combination of locations and the potential for mutual energy strategies is explored. See figure 1 below.

1. Catalyst project De Bronnen started consideration of a municipal energy strategy. 300 houses will be built on the site over a period until 2020. The strategy for the site will be to follow the latest building regulations and apply individual options for generation of solar energy (PV) and warming using heat pumps.

2. The focus in the existing villages in the municipality is on energy saving. Under the flag of 'Tynaarlo Tintelt van Energy' (Tynaarlo Sparkles with Energy) an energy saving and communication project has been started together with local NGO's and businesses.
3. The existing business area Vriezerbrug is part of a study into the potential of an Energy Transition Park where energy generation and conversion plants could be located
4. The municipality started thinking about a local business model to generate income out of the generation of sustainable energy.

## 6.8. Scenario based energy model Vejle (DK)

An energy model of the demand and supply situation in Vejle was developed to test the impact of various interventions over time. The demand side was split into sub-sectors: domestic, public, business and industry and road transport. The supply side included natural gas-fired cogeneration plants, wind turbines, PV, geothermal as well as individual means of heating such as oil- or natural gas-fired boilers, heat pumps and traditional biomass for heating. Electricity demand that cannot be met by local means of generation is imported from the national grid (average national emission factor).

### Reference Scenario

A reference scenario was created based on national trends and knowledge about local developments in housing and approved plans for conversions, among which the most important is the expected shift from natural gas to wood fuel in the district heating system supplying eighty per cent of the district heating demand in the municipality. The national forecast for the period 2010 to 2030 published by the Danish Energy Agency was used as the basis for the reference scenario till 2030.

An approximated continuation of trends towards 2050 was added to illustrate the long-term development pattern. The transport sector was

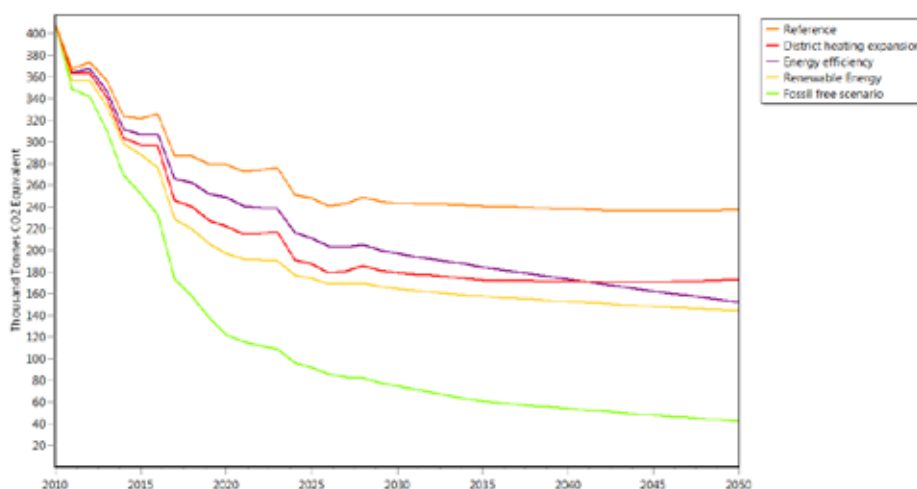
modelled on a separate forecast made for road transport presented as part of the mapping made for the Municipality of Vejle in 2011.

The municipality of Vejle in Denmark has grouped their policy options under five thematic areas:

- Energy Efficiency
- District Heating, expansion and densification
- Renewable energy
- Options integrating electricity, heating and cooling
- Transport

Each of the options has been described following a common template: a general description, an assessment of the potential for implementation, key economic factors, impact on emissions, as well as the stakeholders, obstacles and timeframe for implementation. To illustrate the impact of implementing the policy measures three main sub-scenarios were made covering the three areas of energy efficiency, district heating expansion and renewable energy. The scenarios are not to be seen as alternatives, but as an illustration of how far it is possible to reduce emissions if the suggested measures within a topic are fully implemented.

Fossil Free Scenario's  
Municipality of Vejle



## 6.9. Aberdeen's framework for implementation

Although not really an energy model, Aberdeen's approach gives an example of how an energy strategy can be steered by setting a framework for implementation. In their strategy for Council Owned Buildings Aberdeen focuses on the framework for future projects rather than the solutions itself. This includes:

- Investments will only be made in Council owned buildings that have a guaranteed lifespan to cover the payback period of any works carried out;
- Energy efficiency measures will be carried out in conjunction with any low/zero carbon technologies being fitted to Council owned buildings;
- Focus lays on the more established technologies which have a reasonable degree of experience in their use in order to ensure maximum performance and value for money. Newer technologies will be reviewed and considered in the future;
- Each of the properties will be assessed to identify ways of reducing energy demand through the implementation of energy efficiency measures and to determine the most appropriate type of alternative low carbon technology to meet the space and water heating needs. For each proposed alternative energy project, a feasibility study will be undertaken and a business case produced (including details of all costs).
- In order to achieve the strategy alternative methods of financing will be developed on a case by case basis. These can range from investment to saving mechanisms, private and public instruments, joint ventures, partnerships etc. This strategy will ensure that all financial models are considered and any available financing is fully utilized.



# 7. Regional Energy Solutions

## 7.1. Introduction

Taking a closer look at the solutions in the regional energy strategies we get a clearer view of the future development of the regional energy supply.

## 7.2. Coordinating District Heating in the Green Network (DK)

The five municipalities in the Green Network together with the TVIS transmission company are developing a coordinated energy plan. Nearly half of the heat demand in the five Danish municipalities in the Green Network is covered by district heating. A quarter is covered by natural gas and the rest is covered with oil or renewable energy. It is very typical for heat distribution in Denmark that a great deal of heat comes from public systems such as district heating and natural gas. The electricity demand is covered primarily by centralised nationwide production, local CHP plants and wind turbines. Additionally there is little electricity production from PV or wave power. Electricity demand is expected to increase by 10 %, caused by the use of more household appliances combined with some heat production based on electricity. Heat demand is expected to reduce by 17%, primarily due to retrofits in existing buildings and future building codes for new construction.

### Resource mapping – local options

Using resources in the most efficient way is essential as a part of the strategic planning of the energy system. To be able to do this, the resources have been mapped and quantified. The result is that the local resources can cover about 4.5 million MWh, but the use for electricity and heat is 5.5 million. According to these figures 83 % of energy

consumption can be covered by these resources. By increasing the amount from some of the resources through more extensive use of farming, forestry and solar heating, they can cover 6,8 million MWh and thereby the total need for electricity and heat. It should be noted that for future transportation needs to be covered more resources are required.

### Scenarios

The scenarios for the future heat consumption are divided over four levels:

- Scenarios for the TVIS area
- District heating plants outside TVIS
- Creating a new public supply
- Heating outside district heating supplies

With the heat supply act the Danish municipalities have the possibility to affect the heat production in cooperation with heating plants.

Based on calculations for the TVIS distribution net, the best socio-economic solutions are to expand the net to include excess industrial heat, geothermal heat and replace the natural gas at the central CHP plant with biomass. Basically these solutions are based on less fuel and biomass. The biomass in these solutions can be found locally. Some of the other calculations result in reduced CO<sub>2</sub> emissions but

higher costs although the current heat supply act require solutions with the lowest costs.

District heating outside the TVIS distribution net should examine the possibility of joining the TVIS distribution, but it is not a financially good idea overall unless there is very cheap heat to add to the system at the same time. Alternatively, these plants must look into expanding to improve economically and produce heat based on renewable energy.

Heat demand outside the public supply should be covered by either new public supply, renewable gas supply or other renewable energy as well as heating in rural areas.

Most of the electricity consumption in the five municipalities is produced on large, central CHP plants based on either natural gas or coal. The rest is produced in local CHP plants, wind power and a little more from other renewable energy sources. The national strategy is to double the amount of energy produced by wind power but this still leaves a large gap in electricity production. The municipalities

depend on the central CHP plants to change fuels, while they have indirect influence on the local CHP plants through the heat supply act. National acts are needed to make electricity production renewable energy based.

Industrial excess heat can be used for district heating as this heat is not of value to the industry and sometimes the temperature and matter is useful for district heating. However the taxes added to this heat when used for district heating is a significant problem. The taxes can make it too expensive to use for district heating – often this is the case if the heat consumption is far from the industry. This is examined in the project.

### **Recommendation for organisation in future**

It is important the municipalities increase the amount of planning across the borders and coordinate their efforts to avoid conflicting acts. On the same note it should be mentioned that some acts are best handled in each municipality while other are handled best in cooperation.

## **7.3. Alternative energy for Council owned buildings in Aberdeen**

Solutions for public buildings are described in the compendium chapter ...WP 3.4 public buildings.

A roof full of PV in the area of Gussing



#### 7.4. Integrated solutions for sustainable urban design in Drenthe

The municipality of Tynaarlo performed a broad survey of integrated solutions for sustainable buildings, a sustainable water system, the use of local biomass and generation of renewable energy in the built environment. They found some solutions that require integration on different design scale levels. Heat pumps turn out to be the preferred solution for houses since they reduce use of fossil energy by 80%. They are most efficient in very well insulated houses with a demand for cooling. PV panels are possible to a limited degree because the site is relatively green with large trees that provide plenty of shade. The use of PV and passive solar energy should be taken into consideration in the urban design and architecture.

Smart grids and passive houses can be an expansion of the energy concept. An interesting integrated solution is the sanitation concept that favours the digestion of household organic waste and different flows of wastewater above the generation of energy and phosphate retrieval. This system could be linked to the natural purification of wastewater by natural filters of reed in the landscape. After the broad survey energy solutions were studied in more detail.

#### 7.5. PV

PV is one of the most favourite options because of its visibility and easy installation. It stimulates participation. Prices of solar systems are still

decreasing, and legislation about feed in tariffs is also developing in the right direction.

#### 7.6. Wind energy

Wind energy is a common measure. It is often mentioned as the most efficient way to produce renewable energy. The technique still develops. This leads to higher capacity per turbine. But it also meets serious resistance. The regional strategies mention wind as an important source, and many include new

locations. Legislation about erecting wind turbines is more strict in Germany where new plans were more successful than in The Netherlands for example. Long term price guarantees are a substantial stimulant for investments.

#### 7.7. Biomass

In Sweden biomass already plays an important role in the energy supply. In the region of Kronoberg, 75% of the land is forest. A gradual transition into bio-fuels is taking place. They are now the basis for district heating and household heating.

The Municipality of Fredericia investigates the possibilities of using a technology developed by DONG Energy – the 'Renescienc' technology. By this technology it is possible to turn more than 95% of the biodegradable material contained in mixed municipal waste into a 'bio-liquid'. This liquid

is highly suited for biogas production. Regional biomass collection is an option that comes back in different regional strategies. Biogas plants require a certain scale that is typically regional.

A relatively new development is the cultivation of energy crops.

## 7.8. Smart Grids

Electricity is becoming more and more important. Because wind and solar are fluctuating sources of energy, storage and buffering is also important. A smart grid is literally 'smart', it is able to balance energy supply and demand and it links different components to each other. This way the combined

power generated by 500 micro CHP's can form an energy plant. And, the smart grid may determine when your washing machine turns on. Smart grids contribute to the flexibility and the financial feasibility.

## 7.9. Supporting energy saving measures

A big challenge is the existing building stock. Improvements in building insulation are needed and therefore house owners need (financial and technical) support. Tynaarlo and Leiedal both have experience with energy saving projects consisting of energy scans, advice, group purchase of insulation material and financial instruments. In Drenthe businesses are encouraged to develop multi-disciplinary consortia that can offer the whole package to the consumer. This service oriented approach makes it easier for home owners to take steps toward investing in insulation.

More about the solutions can be found in the summaries of the energy strategies in the appendix to this report.

Biogas plant near Tynaarlo

Visit to Biogas plant near Gussing

Energy crops in the region of Leiedal



# 8. Lessons learned

## 8.1. Key aspects of energy strategies

The regions learned that the process of setting up an energy strategy varies according to circumstances. The North Sea SEP regions made many choices beforehand on an intuitive basis and worked them out differently in each local context. By comparing and evaluating the different regional processes it becomes clear that there are some core aspects

in the process of developing an energy strategy. Regions starting with energy planning may find the core aspects useful as a means to structure the way they organize the process.

## 8.2. Process

### 8.2.1. Arenas

An energy strategy does not stand on its own: it covers very different themes such as the built environment, mobility, renewable energy, behaviour and industrial activities. This means that different actors have to connect with it and play a role in the realisation of its measures. Like a softball team has different dynamics than a football team, the same goes for politicians, entrepreneurs, experts or colleagues etc. These actors operate in different arenas that determine how they interpret the strategy and the role they will enact. For example, compare the political arena with the business world and colleagues with experts. It is important for the initiator of an energy strategy to realise that actors from all of these arenas play a role in its realization. There are internal arenas and external arenas. Where the priority is placed depends upon the situation. It is better to bring that into the picture in advance so that clear choices can be made. They may require different levels of communication and participation that should be anticipated during the drawing up of the process. A learning point from North Sea SEP is that the way in which involvement of actors from

these arenas takes shape must be thought out in advance because:

- The way in which you communicate with them about energy will vary.
- Their participation will take different forms.

A tip learnt from North Sea SEP: Do not forget or underestimate the importance of internal communication with colleagues.

#### Examples of arenas

External:

- Commerce (entrepreneurs)
- Science (research institutes, schools,...)
- Consumption (citizens, shops,...)
- Administration (including other networks - e.g. the 100 EEEregion network))
- Politics (local, national)
- Local initiatives in the community.

Internal:

- Politicians
- Civil servants (also other governments), colleagues
- Local authority and government managers



### 8.2.2. Process types

There are different ways to approach the process. We mention:

- Top down
- Bottom up with stakeholders
- Hybrid (incorporating both of the former approaches)
- Based on a concrete project
- Private initiative

The bottom up approach involves stakeholders and they influence the content. This will make it easier to develop commitment. The top down approach means policy decisions are made at a high level and translated to others who take part in the implementation. This approach allows greater influence on the strategy's content. It depends on the local context which type you choose. When a (local) concrete project is used as a catalyst for starting energy planning on a larger scale, the process will more unpredictable and it's important to be clear about the borders of the project and when a new project or another policy level starts.

Ever more regions are lucky enough to have groups of private people or organizations who take up the

initiative for energy corporations or projects. The role of the government then changes to a facilitating role. It's the ultimate form of participation.

The strategies developed in North Sea SEP are mostly 'top down' or hybrid. Much time was invested in gathering information about the baseline and energy balance of the region or a specific location. Such is the case in Aberdeen (UK), Tynaarlo (NL) and the five municipalities of Green Network DK). Probably the most intensive process involving stakeholders took place in Leiedal (BE); the process with external stakeholders required in depth discussion and the strategy was based on a joint vision. In the region of Osterholz (DE) two processes took place: intensive networking aiming at concrete projects and top down development of the strategy. All regions came to the conclusion that citizens and residents should be more involved. Some are developing their communications especially for this need.



### 8.3. Scale in relation to energy measures

The aspect of scale determines how concrete measures and actions can be defined. A strategy on a regional scale means uncertainties on a local level will stay unresolved. A more detailed strategy for parts of the region is then needed. A strategy on a very local scale means some measures will be appraised as unfeasible. This may be the case for biomass and large wind or solar parks. Those measures operate at regional scales. Biomass and waste heat are measures that require connection

on a logistical or infrastructural level. This means the borders of an energy strategy may have to be flexible according to the energy measures. The municipality of Tynaarlo experienced this. Their strategy for an energy neutral housing development started on a project level. Based on the outcomes of several studies the focus widened to the whole town and even the municipality.

### 8.4. Motives and local drivers and quality criteria

Regions lay differing emphasis within their strategies. This is shown amongst other things in the communication and process. Regions tend to connect the strategy to other developments and core issues in the region. This affects the drivers or stimuli behind the strategy. A few drivers that are mentioned by the partners are:

- Energy can be a means to attract companies, earn money as a municipality and improve the regional economy
- Green image and reputation
- Regulation and policy 'We do it simply because we have to'.
- Practical mentality and capacity: In the German region Osterholz the project Energy transition 2050 is all based on the enthusiasm of a small group of people whereas in Hannover the whole organization works on the EU 20/20/20 objectives. Smaller municipalities are more pragmatic 'we don't make theories, we just do it!'. The partners in North Sea SEP learned that combining such drivers is important not only in terms of marketing and communication

but also because of the real opportunities for regional environmental and structural economic improvements.

Other regional characteristics also play a role. Demography will for instance determine the kind of consumers. Older people may be less interested in large investments. When the population decreases there will be a increased need for solutions with mutual effects, such as when wood chips from maintenance of the landscape feeds a biomass plant. Self-sufficiency is an option for smaller towns in a rural setting. Energy poverty is a growing problem. The geographical situation (high or low population density) and the economic structure of a region (for example mainly agricultural, industrial, service or tourism oriented) may influence the potential for different solutions. Regional characteristics may in this way be transformed into quality criteria for energy measures.

### 8.5. Data

Data collection was not equally important in all regions. Some regions did an extended theoretical stock taking of the energy balance and potential. In other cases instruments were developed such as the CO<sub>2</sub> monitors in Denmark. Other regions focused on the potential in the area. Data is not always easily

available. Maps can be drawn using GIS tools which is of interest from the perspective of analysis and communication.

## 8.6. Conclusion

In most cases, the regional energy strategies focus on technical and financial feasibility, whilst social feasibility is also important. This is why analysis of different arenas is important. Another lesson is how energy strategies can be connected to other themes in the region. The benefits of other energy strategies or the contribution to other regional criteria is not always clear because of the focus on techniques. Regional energy measures can be a goal in themselves and a means to solve other problems. The choice for a strategy at a certain scale may also be a constraint if measures require implementation on a different geographical level. If flexibility is needed, this should be made clear beforehand.



# 9. Evaluation

## 9.1. Introduction

The North Sea SEP partners evaluated their own projects with the assistance of the following 'yardstick'. It turned out to be an interesting method to get a quick insight into the most important, distinguishing features and those parts

of the approach that have turned out more or less successfully. The amount of attention or emphasis given to the aspects in the projects is expressed with a star - \* .

## 9.2. Evaluation

### 9.2.1. Municipalities of Vejle and Frederica (DK)

Energy strategy profile Velje and Frederica (DK)			Comments
Arenas	Political	*	
	Industry	**	
	Energy businesses	****	
	Citizens	**	
	Internal organization		
Process type	Hybrid		Focus lay on the producers, not so much the citizens, communication between the two is the next step
Scale	Regional policy	*****	The strategy is worked out at regional scale and must still be translated locally
	Local	**	
Motives	Socio-economic	*	
	Self-sufficiency	**	
	Innovation	**	
	Eco-growth	****	
	Image	***	
Other	A lighthouse strategy is typical for the approach; a point is set on the horizon. Transition is combined with economy and the starting point is a flexible and robust system.		

Scoring projects in this way sharpens the wits. It makes it clear which areas have received (too) little attention, such as attention for politicians and also where a result is achieved. In Vejle and Frederica the project is put in for economic growth in particular and to earn money for the municipality ('we can do business with it'). Attracting businesses was central and with that the creation of a better image. This is a top down process: the municipality set out the lines. There is for example no communication plan with which to inform the citizens drawn up as yet.

The biggest gain: everything is mapped out to be energy neutral in 2050. The objective is clear: 'that is the lighthouse for the future'. Another important lesson: dialogue is a must and the municipality does not have the capability or the knowledge to roll it all out on its own. Parties must work together to look for a robust yet flexible energy system that does not depend on one energy source.

### 9.2.2. County of Osterholz

Energy Strategy Profile Osterholz (DE)			Comments
Arenas	Politics	*****	It took three years to build the political climate up and to get everyone to pull together
	Entrepreneurs	*****	Politicians are convinced by good examples of entrepreneurs
	Government	****	Important for quick implementation and application of regulations
	Citizens	**	Are difficult to reach, pathfinders and lighthouse projects are needed
	Research centres	*	The consultancy REON, a partner that invests, is important for the region
Process type	Top down	*****	
	Projects	****	
	Bottom up	**	
Scale	Region	*****	Initiatives across the region scaled up to become policy and strategy
Emphasis in the process	Commitment	*****	
	Concrete projects	***	
Motives	Additional value for the region and self-sufficiency	*****	
	Climate	***	This is 'common sense', principle
	Image	**	There is no marketing budget for the strategy
Regional themes	Osterholz is an agricultural region, future prospects important for the farmers and the creation of additional value.		
Other	The motto is: viable and sustainable		

The political arena had the highest priority in this project and also cost the most time. That is, in other words, the building of a political climate within which new projects can be launched ('how to get somewhere instead of where to get to'). Business was also important: politicians can be convinced with successes in that field. Winning over the civil service also received a lot of attention: 'they execute the political will'. Addressing citizens remained much harder. Their role is not (yet) big: 'we need lighthouse projects to show people what is possible'.

The process was primarily top down and focused on initiatives, with additional value and self-sufficiency of the region as the most important stimuli.

Meanwhile a climate is created in which still more parties and individuals are convinced that this is the way forward. Important external circumstances:

declining returns for farming (and with that the need to develop different commercial plans for the region) and the wish to be less dependent on external energy sources. With the experience of earlier projects and a completed basic analysis the baseline is now created for decisions on future investments. The construction of a biogas installation was previously judged on its own but is now much more integrated into broader spatial planning.

### 9.2.3. Municipality of Tynaarlo (NL)

Energy strategy profile Tynaarlo (NL)			Comments
Arenas	Political	***	
	Citizens	*	The communication strategy gradually takes more shape, strengthened by knowledge from North Sea SEP
	Internal organization	****	
	Government	****	
Process type	Top down	*****	The residential construction project 'De Bronnen' gave rise to the strategy formation. Ideas for sustainable energy developed here worked as a catalyst for an approach at municipal level.
	Bottom up	*	
	Project	***	
Scale	Local, optimization		Scaling up took place because the energy measures could not function optimally within the boundaries of the project 'De Bronnen'.
Data	Area orientated	**	A regional survey of CO <sub>2</sub> emissions has not been made. A fixed level of ambition for new buildings based on national statistics was chosen beforehand.
Emphasis in the process	Road-mapping	*****	
	Business model	**	
Motives	Nationally, exemplary project	*****	
	Lower energy burdens for residents	***	
Regional themes	The emphasis lay on innovation from the start of the project; this has been displaced by the search for alternative sources of income by the economic crisis. The shift of the housing market from a demand to supply market is an important factor.		

Getting everyone within the municipality to pull together proved hard and that cost the strategy workgroup lots of energy. There is little continuity, with a resulting emphasis on attention internally and not towards the participation of external parties. The process was, until now, particularly top down: scaling up to Vries and the whole of Drenthe is now taking place. Lots of time is invested in 'road-mapping' and the drawing up of the business case. Innovation and the earning of money were the most important stimuli. The external circumstances have changed considerably: new creativity must be tapped because of the economic crisis. An opening has arisen within which to examine the energy balance of a much larger area. The role of municipalities in for example local energy companies is a theme that can be more closely explored in North Sea SEP II. It will certainly soon be of interest to regulate finances locally when a greater share of energy is being generated locally.

#### 9.2.4. Energi Kontor Sydost, Region of Kronoberg (SE)

Energy strategy profile Kronoberg (SE)			Comments
Arenas	Political	*****	
	External actors	****	
	Internal actors	**	
Process type	Top down	*****	
	Bottom up	*	
Scale	Regional		
Motives	Social-economic	***	
	Self-sufficiency	*****	
	Innovation	**	
	Economy	***	
	Image	*****	
Regional themes	Demographics	*****	
Emphasis in the process	Data collection	*****	
	Commitment	****	
Other	The organization itself does not have regional responsibility. The strategy is designed to define areas of focus, but action plans must be drawn up by local authorities.		

The Kronoberg region is not set to develop action plans; these can only be undertaken by the local authorities. That which now rests in the regional strategy must be above all seen as the basis upon which local authorities establish their own actions. Many meetings have been held particularly wherein politicians and civil servants took part. The political arena was in that way most important. A top down approach followed the political decision to take action. Demographics above all else play an important role in the external situation. The

population density is very low and therefore the focus has come to rest on the role of transport. The baseline for a regional strategy is also here well defined. Party commitment is strong. The long term goal is to become energy self-sufficient. That must radiate from the region: Kronoberg, the greenest region in Europe.



### 9.2.5. Communale Leiedal (BE)

In Leiedal the SEP program means above all a quest: what is energy planning actually about and how do we make it manageable? The project had to create added value, but it appeared to be difficult to calculate the direct financial returns. The main challenge was to tackle energy in an integrated approach. Integrating energy with the spatial planning of the city and region instead of purely managing energy grids. It was deduced at the start of the project that the reduction of CO<sub>2</sub> emissions can have positive effects upon economic growth and improve employment opportunities. 'Money for energy currently flows out of the region to Irak and Gazprom. How do we keep that money in the region and reinvest it there?' It is clear here that energy poverty has become a growing social problem; as

a result politicians are becoming interested in the issue. 'We are moving from cure to prevention. It is better to help people by insulating homes than by providing debt relief.'

After development of the regional strategy the next step is to translate it into concrete measures. That can mean for example that a new housing estate is built in such a way that it is energy neutral and that residents are encouraged to use the bicycle instead of their car. Lots of people appear to live close to where they work: their behaviour can become more sustainable by offering them more choices. This requires (spatial) planning policy that takes this more fully into account. In Leiedal's vision local authorities are in a good position to do this.

Energy strategy profile Leiedal (BE)			Comments
Arenas	Political	***	Involvement of politicians was part of the process with stakeholders. A steering committee attended the process and ratified the strategy.
	External actors	*****	The main focus was at stakeholders. Stakeholders were invited for fora and expert meetings. Different ideas were integrated in the vision.
	Internal actors	***	Leiedal's role is to disseminate to municipalities and to organize commitment. Internal coördination and tuning was important.
Process type	Top down	****	The CO <sub>2</sub> baseline was developed top down. This was important to get some structure and be able to select themes and target groups.
	Bottom up	****	Bottom up was equally important to know what is going on in the region's society. Also to link the outcome of the CO <sub>2</sub> baseline to existing initiatives.
Scale	Regional	*****	The goal was to bring in the regional perspective and link this to European and National energy policy.
Motives	social-economic development	*****	How can energy goals fit in socio-economically. Keep expenditure in region
	Self sufficiency	***	
	Renewable		
	Climate/renewable energy	****	European goals, and connection with socio-economics
Regional themes	Energie-costs, energy poverty Renewable energy Energy transition.		How to fit this in local situation
Emphasis in the process	Knowledge development Data collection vision, knowledge and creating a strategy – widespread communication		
Other	Development of vision – and widespread communication. Looking for missing links where local and region authorities can play a role in energy transtion.		

### 9.2.6. Aberdeen City Council

Aberdeen City Council developed a strategy to promote the use of alternative energy technologies on Council owned public buildings. The strategy is a local authority strategy not a regional one and aims to help the Council reduce carbon dioxide emissions and future proof the Council from rising energy prices. The strategy encourages the installation of energy efficiency measures before installing low/zero carbon technologies.

In 20010/11 Aberdeen City Council spent over £8 million on energy (electricity, gas and heating oil) to heat and power the City's public buildings. This is only set to rise in future as demand for fossil fuel surpasses supply. Installing renewable technologies onto public buildings will reduce the Council's dependence on fossil fuels and decrease the Council's exposure to rising energy prices.

Energy strategy profile Aberdeen (UK) Development of Alternative Energy Strategy			Comments
Arenas	Political	**	Committee approval gained to develop the strategy
	Internal actors	***	Project group of local authority officers led the development
Process type	Top down	***	Strategy gained political support at local level due to introduction of National Government financial incentives for installation of renewables
Scale	Local, Local Authority owned buildings / land		
Motives	Reduce energy consumption and associated carbon emissions	***	
	Encourage low / zero carbon technologies to be installed on Council owned buildings/ assets	***	
	Future proof the Council from rising energy prices	****	
Regional themes	Aberdeen City Council has recognised the potential value of installing renewable technologies in the City not only to meet carbon reduction targets but also as a potential source of revenue generation.		
Emphasis in the process	Data collection	**	
	Road mapping	**	
Other			

Throughout the NS SEP project Aberdeen City Council has been building up an energy baseline as well as carrying out studies to determine the City's potential for different types of renewable technologies. One such study was to identify and map the heating demands of strategic users within Aberdeen City, through creation of a GIS based map, and initial identification of priority areas for further analysis.

Energy strategy profile Aberdeen (UK) Development of Heat Mapping Strategy			Comments
Arenas	Political	***	The Council has committed to install a decentralised energy system in the City. This study has helped to plan the next phases.
	External actors	***	Private consultants carried out the study, organisations with large building portfolios in the City took part in energy profile survey.
	Internal actors	***	Project group of local authority officers
Process type	Top down		
Scale	Local, City level		
Motives	Social-economic	***	
	Self-sufficiency	**	
	Address Fuel poverty	***	
	Image	**	
Regional themes	Aberdeen City Council has a growing decentralised energy system in the City. The City commissioned a study to help plan future phases in order to reduce fuel poverty and take advantage of forthcoming Government financial incentives.		
Emphasis in the process	Data collection		
	Data processing		
Other	The strategy is designed to define areas of renewable heat potential however any priority areas identified will require further analysis, stakeholder engagement and development of a business case.		

### 9.3. Conclusion

The partners found it very useful to look back in this way at the energy strategies and the process from the past three years. The understanding of the various aspects of energy planning provides knowledge that can be applied in the next phase within which the regions work on energy plans. These various aspects can also be seen as criteria for the approach to the development of a regional energy strategy.

The program has provided lots of new knowledge. Furthermore, the necessary recommendations have been formulated - 'selling the importance to the region' - and it is clear that much can be learnt from each other.

# 10. Roadmap for setting up an energy strategy

## 10.1. Introduction

During the North Sea SEP kick-off meeting in Dundee (November 2009) the partners involved in WP3 developed a list of questions. These describe the steps each region planned to take in the process developing regional energy plans showing some

key elements of the process. After the evaluation of the strategies the initial implementation plans were reconsidered. This led to a guideline for other regions and municipalities for taking up actions to develop regional energy plans. It is described in this chapter.

## 10.2. Common criteria for a regional energy strategy

The evaluation of the regional strategies in North Sea SEP leads to some criteria an energy strategy needs to meet:

- Receives commitment from local politicians, business people and citizens
- Based on stocktaking of the local potential for energy measures
- Gives direction to decisions on a long term (energy model)
- Contains a selection of energy solutions and measures for the region
- Measurable objectives
- Contains criteria for sound judgment
- Is transferable into concrete action plans or business cases.

## 10.3. Steps towards a regional energy plan

This section lists the steps whilst in the next paragraph they are described in more detail. Keep in mind this is not an absolute framework since in practice a planning process is iterative (involving a constant cycle of reappraisal and fine tuning).

### Baseline

1. Definition of the preconditions
2. Stocktaking of the current energy balance and the trend
3. Analysis of the technical potential for energy saving and efficiency per theme (built environment, business and industry, behaviour, transport/mobility)
4. Analysis of the technical energy potential for generation of energy from natural resources
  - Wind
  - Solar
  - Biomass
  - Geothermal
  - Integrated solutions (use of surplus heat, wastewater and organic waste treatment)
  - Innovations



## Strategy

5. Setting objectives
6. Definition of criteria to appraise the realistic feasibility
  - Economic criteria
  - Social criteria
  - Sustainability criteria
  - Other criteria such as creating an exemplar, visibility, spatial criteria and local qualitative criteria
7. Scenarios
8. Energy model

## Commitment

9. Definition of the preconditions
10. Analysis of the stakeholders
11. Definition of a strategy for participation through dissemination and building regional networks (see chapter ... and .... In the compendium)
12. Initiation of dialogue with stakeholders concerning scenarios

## Roadmap

13. Selection of short and long term solutions and actions
14. Defining business cases

### 10.4. Baseline

The baseline delivers the basic information about the energy situation in your region which is needed to identify options and of equally importance to communicate about the need for an energy strategy with stakeholders.

#### 10.4.1. Preconditions

Before an energy balance is drawn up, it is important to think over the preconditions. What will be included, what are the assumptions, are national initiatives part of the sustainable energy planning? Are transport and large-scale industry included? What are the geographical borders of the strategy? What is the objective: being energy neutral as a region or reducing CO<sub>2</sub> emissions? Of course these

two go together but they are slightly different. Being energy neutral means that the net use of energy in a region is zero: an equal amount of energy used in the region has also to be generated there. Being CO<sub>2</sub> neutral is broader, it also applies to energy saving and storage. In practice both broadly lead to the same kind of strategies.

#### 10.4.2. Energy balance

Drawing up an energy balance is very useful. It delivers information about the scope of the regional energy challenge and it creates focus on the sectors that are huge energy consumers. An energy balance should include:

- The current energy consumption split into fuels (fossil, renewable) and sectors (households, business and industry, transport).
- The trend: the future energy consumption and demand.

- The amount of locally converted and generated renewable energy (split between sources; solar, wind, biomass, geothermal, co-generation, surplus heat)
- Share of renewables in the energy production
- Share of local resources in the energy production

Data can be shown in different entities, such as CO<sub>2</sub> equivalents, joules or kWh.

### 10.4.3. Technical potential for energy saving and efficiency

The technical potential for energy saving and efficiency can be split into themes:

#### Consumer behaviour

A very important factor in energy saving is the way consumers use their electrical equipment and lighting. Unfortunately it is hard to account for the potential due to difficulties in influencing consumers in their behaviour.

#### The built environment

- Existing stock
- New developments

The division between existing houses and new developments is important because energy measures in the existing stock are far more difficult to influence than in new developments. Within the existing stock there are large differences in energetic performance. Despite EU efforts to oblige house owners to obtain an energy certificate for their house it is rarely executed. Pushing house owners to insulate their home requires much effort in

communication and use of financing models. In new developments it is easier to come to agreements on higher energy performance since building regulations such as the EPBD (Energy Performance of Buildings Directive - 2002/91/EC) also enforce improved standards for insulation, efficiency and sustainability in houses and utility buildings.

#### Industrial processes

In some cases agreements on a national level or per sector of industry are made.

#### Mobility

Because energy saving is closely related to the decisions of consumers and businesses it makes sense to differentiate your strategy per target group.

### 10.4.4. Technical potential for conversion and generation of renewable energy

The technical potential for the generation of renewable energy in a region is formed by a combination of factors that differ for each source. Spatial information is very often needed. Tools like photogrammatic plotting and GIS analysis can be very useful.

#### Generation

**PV:** the technical potential is mainly determined by the amount of space on well-orientated roofs, the amount of radiation and the capacity of PV panels. The potential for stand-alone installations and parks will be determined by the availability of locations.

**Wind:** the technical potential is determined by the availability of locations and the speed of wind available at a certain height. There are wind turbines of differing size and capacity. Take into account the space needed for each wind turbine and regulations such as minimal distances from housing areas for example.

**Biomass:** this is a more complex natural resource since it may come from different sources. Because of its organic character, it is more difficult to quantify the potential. Woodland is an important source for dry biomass. Manure from farms and biomass from organic waste and wastewater are potential sources for biogas which can be used to produce electricity.

**Geothermal:** In some areas hot groundwater from deep underground strata can be used. Drilling and infrastructure require large investments.

#### Conversion

**Heat pumps:** are good options for converting low temperature underground heat to low temperature heating or cooling for individual houses or complexes. Heat pumps use groundwater layers at 30-100 meters deep. It is important to keep a year-round balance between heat and cold to keep those sources in good condition.

**Anaerobic Digestion:** Organic waste produces biogas if fermented. This natural process is the base for biogas installations for example on farms. Electricity can be generated from burning the gas. Alternatively, the gas can be transported to a grid or used to heat district heating systems.

**Incineration:** Wood and wood-like energy crops are used as burning material in furnaces.

#### 10.4.5. Background

Do not forget to analyze background data and reasons for varying energy consumption, the mix and size of the energy consumption and eventual losses during conversion and transmission. Analysing background data combines well with communicating

with stakeholders since it provides information and contacts. This will lead to solutions that fit to the regional circumstances.

### 10.5. Building the Strategy

Once the energy balance of a region is clear, it is time for the next step: to develop a strategy that encounters the challenge of becoming either self-sufficient, energy neutral or CO<sub>2</sub> neutral as a region.

#### 10.5.1. Setting objectives

Setting objectives is important. It will give a common direction for all partners involved. A region can either set out to attain a (measurable) goal or describe a 'light house' to aim for. A goal could be described as 30% reduction in emissions of CO<sub>2</sub>, or wanting to become energy self sufficient within thirty years. A 'Light House' to aim for could be described as wanting to work for a better climate and aiming to take as much part as possible in reaching the national objectives. It is important to consider the areas where a region or municipality can take action:

- Its own energy consumption
- As an authority:
- In relation to citizens and companies.

In other words: what is the free scope or liberty of action for the region or municipality?

#### Objectives

- Reducing the overall emission of CO<sub>2</sub>
- Reducing individual emissions of CO<sub>2</sub> – (t/citizen)
- Reducing energy consumption

- Increasing the share of renewable energy
- Use of local resources
- Achieving national objectives

The goal should be realistic and ambitious at the same time.

When setting a goal the following has to be considered:

- Municipalities cannot achieve objectives on their own.
- Objectives should be considered in combination.
- Objectives must be carried out in accordance with time frameworks.

#### Light house

A Light House is set to direct actions towards a future target. No specific objectives are set, but all actions have to point in the direction of the light house. Objectives can be set later if necessary. Light houses can be:

- An aspiration for CO<sub>2</sub> neutrality

- A wish to take a global responsibility
  - A wish for growth in the 'Green' job sector
- It is not the goal that is important, rather it is the direction for actions, hence the need for defining a Light House.

### 10.5.2. Transparent criteria

With the basic information available, the next step is to distinguish the better options and to know the reasons why. Setting criteria will enhance the transparency of your energy strategy. The most important criteria are about feasibility and impact. Feasibility is not an easy criteria though: it is determined by a lot of aspects, both economic as well as social. Think of visibility and short-term feasibility as criteria to select actions that may work as catalyst projects. Sustainability is also an

important criteria. For example placing wind turbines within an high quality, aesthetically vulnerable landscape may not be sustainable in the long term and a parallel discussion may be the use of agricultural land for growing energy crops. Criteria may be linked to local motives and context. The importance of criteria may differ per region and by weighting them you can implement the criteria in your local model.

### 10.5.3. Scenarios

Scenarios can be worked out on the basis of technical potential and the different criteria. Scenarios can show the impact of a strategy that focuses on only one source (for example a scenario where all the energy demand is generated by wind turbines) or a scenario using a combination of sources. Other ways to build up scenarios may be:

- An energy saving scenario
- A renewable energy scenario
- A scenario based on lowest investment costs
- A scenario based on lowest energy price for end users

- Lowest spatial impact
  - Highest level of participation from stakeholders
- Scenarios will clarify the challenges and the process that you will encounter and can be used to facilitate the process of engaging different partners to become involved in the sustainable energy planning.

## 10.6. Energymodel

Based on the scenarios an energy model can be drawn. Examples are shown in chapter 5.

## 10.7. Commitment

Getting commitment from partners may be the biggest challenge and this should be integrated in the process of developing an energy strategy. In the North Sea SEP project the activities 'dissemination'

and 'network building' were parts of Workpackage 3. Examples and recommendations are described in chapters ....of the compendium.

### 10.7.1. Preconditions

The most important question is whether your process will be bottom up or top down. This determines the role of stakeholders during your process. The 'participation ladder' (described in chapter ....about dissemination) can be of help. Consider the management style of your organization, is it an open

network style or a more closed and authoritarian style? It might also be necessary to focus on the internal commitment for the energy objectives to convince managers, politicians and colleagues about the effort needed.

### 10.7.2. Analysis of the stakeholders

Go out and speak to stakeholders, make a list of possible actors in the energy supply chain and energy saving sector. Stakeholders may come from different fields and may play different roles. See also the section on arenas in paragraph 5.2.

### 10.7.3. Develop a dissemination strategy and start building networks

Communication and stimulating involvement takes time and money, but it is a necessity to invest in participation. There's a wide range of activities or instruments to think of and there are many examples in the North Sea SEP project. See also chapters ....

### 10.7.4. Dialogue

Dialogue with stakeholders about scenarios must be part of your process. It is necessary to share ideas about the direction and to have constructive dialogue about the challenge the region has to face.

## 10.8. Road mapping; the definition of projects

Finally, a selection of concrete actions has to be made. In this phase, financial models, cooperation models and business models also need to be developed. Maybe planning instruments like zoning plans need to be developed or location studies performed or detailed studies into the feasibility of e.g. biomass plants. It is important to define short-term successes (low hanging fruit) to avoid loss

of attention. The 'big steps' will need a more time before they can be realized.

### 10.8.1. Selection of short and long term actions

A short-term success may be to purchase green energy, PV projects, energy saving contests, school projects, and of course: renovation and solar energy on public buildings themselves.

### 10.8.2. Use mutual gains to define beneficial business cases

A region should benefit from an energy strategy. With this in mind, it is necessary to think of beneficial business cases. Let your citizens participate in wind parks, and try to combine mutual gains in a project. For one farmer manure may be a problem, for the other a good opportunity and rural towns can profit from enterprising farmers. Surplus heat from industrial cooling processes can

be used for heating in towns. The budget for a local swimming pool may improve when using local woods for heating. This way your regional energy strategy becomes the means to solve other broader and specific problems rather than purely the original objective.

### 10.9. Appraisal model

Specific regions have specific circumstances, but they face the same problems and challenges. It is important the focus rests on the benefits different actors can expect from the energy strategy. More attention should be paid to the marketing of the strategy; selling the ideas. What a project delivers should be examined much more closely at the time an idea is selected and that must be subsequently communicated much better. 'Try to get this sort of information out in the open at a much earlier stage in the process. Otherwise sustainable energy remains a policy on paper (only) instead of resulting in concrete actions and investments.

Jade Hochschule developed an appraisal model which can be used for this. It is an online tool that gives insight to the effects of an energy project, both

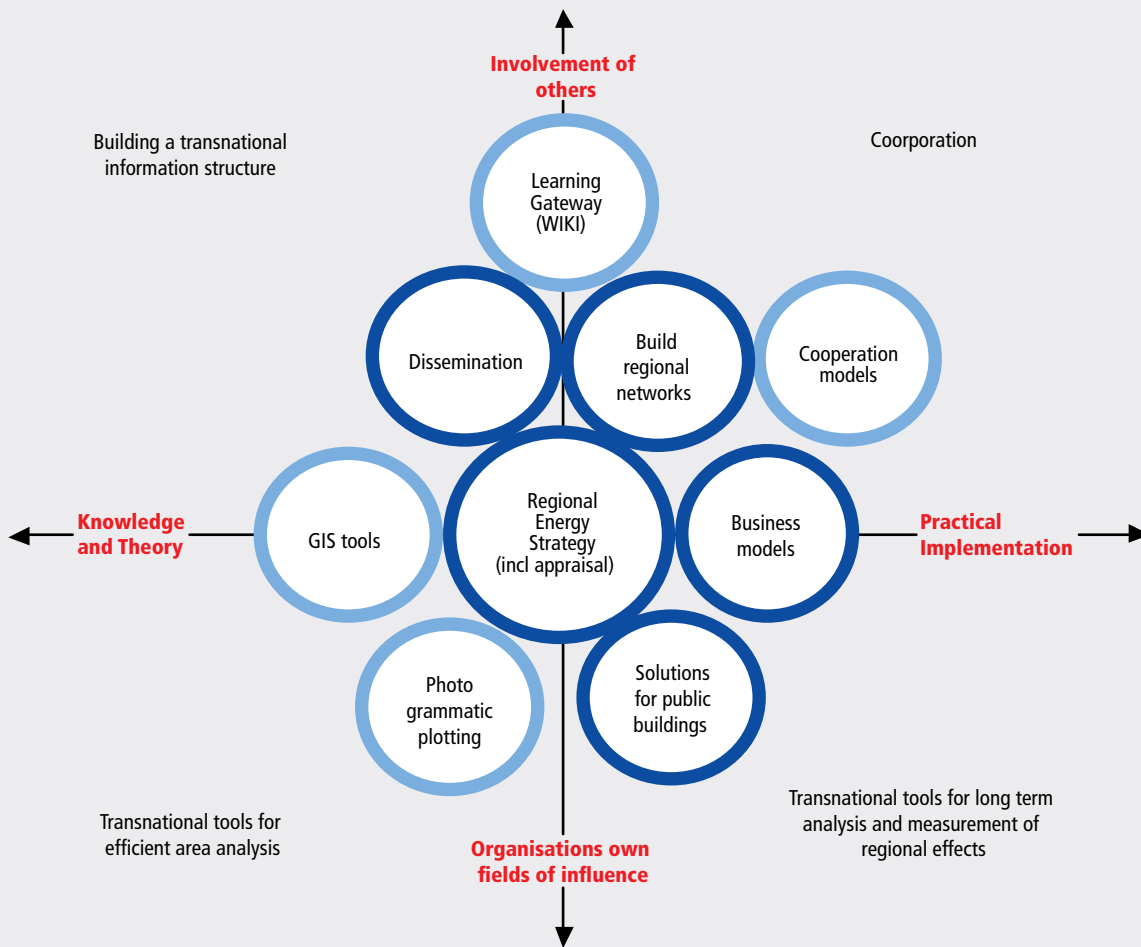
in regard to quantitative and qualitative aspects. It is possible by using this online model to make the effects of an energy project visible (CO<sub>2</sub> reduction, but also for example the benefits for a region). The economic and ecological 'benefits' quickly come into picture by filling in 20 information fields. Own experiences and regional criteria can also be fed into the appraisal model. Feedback from the other regions is welcome. The outputs from the model can be used for discussions with other parties and in that way give shape to the energy strategy

A description and background papers of the appraisal model are described in chapter XXX in the compendium of the North Sea SEP project.

### 10.10. Make use of the knowledge from North Sea SEP

Chapter 2 showed a scheme with all activities in North Sea SEP. Some are closely related to the development of regional energy strategies. In North Sea SEP tools, models and information systems are developed that may support the development of your regional plan. The same goes for the examples

and experiences gained about building regional networks and dissemination. The North Sea SEP activities closely related to the development of regional strategies are shown in the figure below.









# 11. Conclusion

## 11.1. General conclusions

### **Tremendous effort**

The main conclusion to draw from the regional energy strategies in this project is that the EU objectives require tremendous efforts from regions. All strategies that are part of this project mention the need for combinations of measures in different fields, ranging from convincing citizens to use their bikes more often to investments of millions in the extension of district heating systems or biogas plants. All scenarios show that, even if every potential solution becomes effective, it will still be hard to achieve entire objectives or to find the necessary enormous financial means.

### **Energy landscapes**

In many cases implementing the strategies will bring about significant changes to landscapes of all kinds. Woodlands become sources of energy, roofs are filled with PV panels, wind turbines change skylines and large areas will be allocated for industrial scale energy transition.

### **Stability and sustainability**

The transition to carbon free energy supply goes together with decentralisation. This will not only effect spatial planning, but it also means that the responsibilities for energy provision will be divided between a varied mix of new energy producers within the regions. One of the main challenges is predicting which of the solutions will be ultimately sustainable and stable. Current price increases for maize are so high it is becoming too expensive to use it as a fuel for biogas plants. This is disastrous for individual farmers who have invested millions in installations. The benefits of a self-sufficient community can thus

easily turn into negative effects. The economical risks of a decentralized energy supply should be considered and made clear. In future the intervention of regional energy directors may be essential to avoid imbalances and to ensure supply.

### **Economic risks need to be made visible more**

The introduction of new techniques is necessary. In the early stage of new techniques being introduced to the market they are often subsidized. In an ungrown market like the one for renewable energy it is also necessary to give price guarantees for a longer term. This will stimulate the development of techniques and investments. The technique for biogas installations for example is renewing constantly. Farmers with older installations have a much higher risk when prices of co products or energy tariffs change.

### **International and regional policies complement each other**

The basic barriers for implementation are caused by a lack of equitable pricing for renewable energy. Wind turbines, PV and biogas have to compete with the current prices for fossil fuels which are (still) cheaper if the environmental costs are not taken into account. Getting a fair price for wind or solar energy is sometimes obstructed by the lack of equitable regulations. For example in the Netherlands it is not yet possible for owners to sell solar energy from the roof of one party to another because of the tariff imbalance. Feed in tariffs are important conditions that determine the feasibility of energy projects. Moreover, priorities for electricity grids should switch to renewable energy to maximize efficiency.

Regulations differ between countries. The EU could learn from good practices and develop policies that facilitate regions. In the end, the sum of all projects on a regional level will determine the outcome of the greater part of EU objectives. Next to price, tariffs, and agreements on the use of grids, sustainability criteria and ethics should also be discussed on an international level to avoid ineffective transport of biomass from one country to another for example.

### **Local versus national**

The program has furthermore made it clearer that the need exists for solutions to some problems at national scales while other problems can be addressed just as effectively at local scales. This is also relevant to the theme of mobility: the question is who should address the car user and in what way should it happen? The use of bicycles can be encouraged locally by laying out attractive cycle routes and keeping villages, towns and cities compact so that in those places cycling is actually preferential and people can cover the short distances more easily. In contrast, the provision of nationwide power and distribution networks for electric bicycles and cars is an example of a matter that should be dealt with by national government in cooperation with regions. International measures could be necessary in some cases.

These are examples of how (inter)national and local policy can complement each other. On a regional level, the value of a sustainable energy system may result in reduced energy costs for citizens, higher regional income and increased budgets for public facilities.

It will take years before the carbon neutral energy supply will be a (stable) reality and how it develops is very dependant of national and international markets, regulations and maybe most of all persuasive politicians.

### **Risks**

Some uncertainties and imbalances may be avoided by finer tuning and exchange between regions and EU-policy makers since there are mutual benefits to be gained. Risks for the regions at least should be minimized. Projects contribute at a national or international level but funding is not always available.

### **Results**

The North Sea SEP partners have reached a common point that can be used as a basis for collaboration in new projects. The development of a common language by the partners, an important precondition for international collaboration and energy planning, can be seen as a clear result of the project.

It has been concluded that despite the existence of national differences in regulations and such like, the regions in the North Sea SEP are often tackling the same issues and running into similar problems. An ambition could be: no more reinventing of the wheel but rather working together on methodologies with broad application across the regions.

The regional energy strategies in the North Sea SEP project illustrate that there are different approaches. The region of Osterholz and the municipality of Tynaarlo both show an emphasis on the inventory of local potential in natural resources. The region of Leiedal focuses on a vision that involves the collaboration of stakeholders. Aberdeen puts an emphasis on concrete measures for public buildings and setting a good example as a government. The Danish municipalities in the Green Network set the scenario for a fossil free future.

### **Importance of networks**

Perhaps the most important lessons is that people as well as techniques and natural circumstances are important sources for renewable energy projects. Maintaining the vitality of the network is a large part of the work in the creation of energy policy. This leads to new projects and partnerships, local results and support of the internal organisation. In this way, new concepts receive a chance through a concentration of manpower and substantive resources.

Showing concrete numbers based on studies of the local potential for renewable energy and energy saving is a necessity. It gives focus to the regional challenges and helps to communicate EU objectives to residents.

## 11.2. Recommendations to other regions

### Make a start

It's important that regions start regional energy planning now. It's important and it takes time to get a grip on matters. Postponing action will raise the cost of the energy transition. Although investments are high, on the long term the overall social cost of energy in a carbon free region will be lower than in a region based on fossil energy.

### Build partnerships

The involvement of influential people is important; built contact between partners and not between opponents.

### Communication

Don't save on communication. Invest in internal communication, with for example brochures and glossy posters; products for politicians that pay in the long term.

### Regional energy directors

Directors on a regional level can be the lynchpin between different parties in the carbon free energy supply system. They might also play roles in cooperation between EU, national and regional administrations in the field of energy planning.

### Local energy cooperations

In some regions such as Denmark, locally owned energy corporations are very common where in other regions they are only just to arise (Netherlands). The overall image is that community initiatives will play a bigger role in future. This is a chance for the regions and it should be taken into account when developing an energy strategy.

## 11.3. Recommendations to National/ EU governments

For policy makers on the national and EU level it's important to take notice of the specific issues regions encounter. On the national and european

level legislation should be developed that gives sustainable power priority on the grid.

## 11.4. Further work

Subjects in which we want to develop more knowledge and opportunities for further cooperation:

1. Communication surrounding the acceptance of wind energy.
2. Local solutions for sustainable city transportation.
3. Tariff proposals for solar panels.
4. Tools for increasing awareness and networking.
5. Draw up baselines for local CO<sub>2</sub> emissions.
6. Methodology for the planning of wind parks.

### Transportation as a local energy theme

Transportation is a theme that is not actually included by all of the regions within their strategies. Some regions found transportation too great and illusive to take on and placed the emphasis on

energy production and the saving of energy in households. However, the Swedish region of Sydost actually made transportation a point of special attention, partly motivated by the fact that 80-85% of CO<sub>2</sub> emissions come from traffic and that energy consumption within households is already for the large part more sustainable through the use of biomass. Sydost got underway with electric cars, biofuel, behaviour (cycling) and car sharing. These examples show that transport can be dealt with at local scale.

For the partners in North Sea-SEP this lead to the conclusion that transport is one of the themes where plenty of knowledge exchange is still needed. According to the discussion partners the theme should be approached piece by piece, as well as

being approached at national and municipal scales. Local authorities must not sit back and wait since they have a task, for example, in planning areas and cycle paths, distribution centres, street lighting and providing information. Jonas Möller (EMC Varberg, Sweden) pointed out however that an alternative to petrol and diesel must be found at a trans-national level.

Besides this a further tip: bring more attention to the effects of these sorts of measures. Increased cycling leads for example to fewer health complaints and reduced need for medical services: that has financial implications.

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**1 Regional Strategies**

**2 Business Models**

**3 Networking**

**4 Public Buildings**

**5 Dissemination**

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