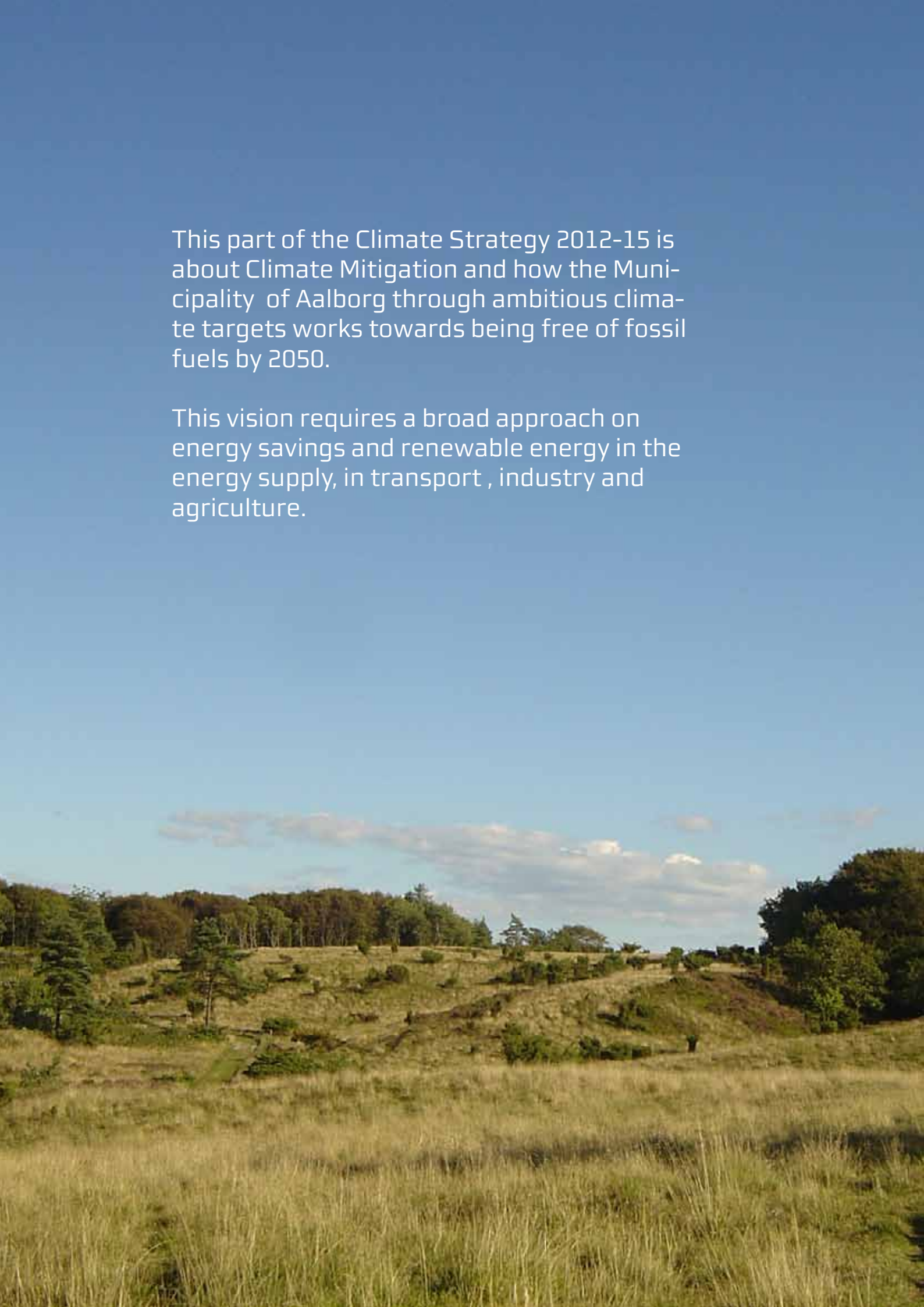
Climate strategy 2012-2015

Mitigation

CITY OF AALBORG

This part of the Climate Strategy 2012-15 is about Climate Mitigation and how the Municipality of Aalborg through ambitious climate targets works towards being free of fossil fuels by 2050.

This vision requires a broad approach on energy savings and renewable energy in the energy supply, in transport , industry and agriculture.



The global climate is changing

Climate change has always been a part of the earth's natural development.

"However, a broad scientific consensus has emerged that some of the observed climate changes are not a natural part of Earth's development, but are man-made and partly due to emissions resulting from the use of fossil fuels such as coal, oil, and natural gas to produce heat and electricity and for transportation. "

However, a broad scientific consensus has emerged that some of the observed climate changes are not a natural part of Earth's development, but are manmade and partly due to emissions resulting from the use of fossil fuels such as coal, oil, and natural gas to produce heat and electricity and for transportation. Climate change will, even with a reduction of current emissions of greenhouse gases, continue to increase in strength over the next several decades and the consequence will be global warming, more extreme weather, and rising groundwater levels.

The global consequences of climate change will also affect Denmark and thus Aalborg Municipality. It is expected that Denmark will experience longer droughts, more powerful and more extreme rainfall, stronger storms, and to some extent and over a longer time horizon, sea level rise.

Climate researchers employ various scenarios of how the concentration of greenhouse gases in the atmosphere could develop over the next 100 years and thus how strong climate change will likely be. The scenarios are based on parameters such as global economic development, population growth, and changes in technology. In the most favourable scenarios, average atmospheric global temperature increases will be around 2 degrees C, in the more pessimistic scenarios temperatures are projected to rise by 4-6 degrees C.

Over 70% of global CO_2 emissions come from cities because of population concentrations and thus aggregate energy and material consumption is highest in cities. Metropolitan regions therefore have a responsibility to reduce energy use and to actively develop renewable sources of heat and power supply.

This part of Aalborg Municipality climate strategy addresses how Aalborg Municipality takes local responsibility for the global climate challenges by relying on non-fossil energy and transport supplies, reducing emissions of greenhouse gases from agriculture, and increasing the uptake of CO_2 from new forest areas in the municipality.

International and national climate goals

37 countries have signed the UN Kyoto Protocol, which is a continuation of the United Nations Frame-work on Climate Change (UNFCCC). The Kyoto Protocol, ratified in 2005, means that global emissions of greenhouse gases must be reduced by 5.2% compared to 1990 levels until the period 2008 to 2012 in Annex I countries.

The Kyoto Protocol legally obliges the European Union by 2012 to reduce emissions of greenhouse gases by 8% compared to 1990. The EU has also enacted further, non-legally, binding policies to:

- Reduce greenhouse gases by 20% in 2020 compared to 2005;
- Increase the share of renewable energy to account for at least 30% of total energy consumption in 2020; and
- To achieve at least a 10% renewable energy share within the transport sector by 2020.

Denmark has ratified the Kyoto Protocol and is obliged to reduce greenhouse gas emissions by 21% on average over the period 2008 to 2012 compared to 1990. Current reductions are on the order of 9% from 1990-2011. Denmark also has a long-term goal to become 100% independent of fossil fuels and an interim goal that the use of fossil fuels in 2025 will be reduced by at least 15% compared to 2007.

At the Conference of the Parties (COP)-15 climate summit in Copenhagen in December 2009, climate scientists presented evidence that the global emissions of greenhouse gases should be reduced by 80-95% by 2050 if the average atmospheric temperature rise is be kept below two degrees. The parties were not able to deliver an agreement that ensures a framework for achieving that goal. Furthermore, the Kyoto Protocol expired in 2012, with no international framework in place for its continuation.

Greenhouse gas inventory

The Kyoto Protocol establishes legally binding commitments to reduce six greenhouse gases: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons, which are produced by the nations that have joined the agreement.

In this context, the main greenhouse gases are:

- Carbon dioxide (CO_2) released by burning fossil fuels and organic matter, especially from the intensive use of fossil fuels;
- Methane (CH_4) produced by the anaerobic decomposition of organic material and is primarily due to emissions from agriculture and melting permafrost; and
- Nitrous oxide (N_2O), which among other things arise from soil bacteria that release nitrogen from fertilizer, derived mainly from intensive agriculture.

In energy and climate policy, methane and nitrous oxide are often converted to CO_2 equivalents, and CO_2 is therefore gradually become synonymous with all greenhouse gases. However, it should be noted that many of the fluorocarbons and other gases have a Global Warming Potential (GWP) of 100-17,000 times that of CO_2.

Inventory of greenhouse gases may relate to different areas and/or units, for example:

- A geographical region, a nation or a region, or a municipality;
- A company involved in manufacturing, trading, or service activities; or
- A household consisting of one or more persons.

In connection with the inventory of greenhouse gases, different methods are utilised, such as:

- A statement of sales of energy for lighting, machinery, heating, transport, etc., which could be complemented with GHG contributions from agriculture, forestry, waste and wastewater; or
- An inventory of total emissions of greenhouse gases included in a given activity.

The first methodology in the calculation of national emission of greenhouse gases was used for reporting to the EU and UN. The calculation method is also applicable to the individual household that can calculate the emissions of greenhouse gases as a result of electricity and heat consumption, and motorised transport.

The second method of calculation is used, for example, when a municipality, a business, or a household wants to have a complete picture of the total greenhouse gas emissions, including embedded emissions. This inventory method is called carbon foot-printing, and is based upon life-cycle assessment (LCA) tools.

In addition to an energy balance for 2007, Aalborg Municipality, in the same year, made an inventory of CO_2 emissions from all sectors of the municipality as a geographical entity, using a municipal CO_2 calculator developed by the Danish Climate and Energy Ministry and Association of Local Governments (KL). This inventory covers greenhouse gas emissions from energy, transport, agriculture, forestry, waste, and sewage sectors within the geographical area of Aalborg's municipal boundaries.

Aalborg Municipality and climate

"With the Aalborg Commitments, Aalborg Municipality committed itself to put climate action at the centre of the municipality's policies on energy, transport, procurement, waste, agriculture, and forestry."

In 2008, the Aalborg City Council decided to develop a climate strategy for Aalborg Municipality, which would demonstrate both how Aalborg can reduce its climate impact through prevention and reduced emissions of greenhouse gases (mitigation) and how the municipality and the local community can best adapt to the inevitable consequences of climate change, such as more extreme precipitation events, more intense storm activity, and rising sea levels (adaptation).

Previous CO_2 reduction efforts in Aalborg

Aalborg Municipality's climate change actions to reduce greenhouse gas emissions date back to 1992 with the adoption of a Local Agenda 21 plan for Aalborg municipality. The LA21 plan addressed energy conservation, energy efficiency improvements, and restructuring of the energy supply. In 2004 the plan was amended to include new goals for energy supply. The Aalborg City Council, in connection with the "Sustainable Supply" and "Aalborg +10", adopted a target of CO_2 emissions from energy supply in the municipality of Aalborg will be reduced by 33% in the period 1990 - 2012. This objective does not include transport, agriculture, and Aalborg Portland (a cement plant).

Energy consumption in Aalborg in the period 2002 to 2007 increased by almost 7%, while the municipality's population increased by only 2% over the same period. Despite the increase in population and energy consumption, it was still possible to reduce CO_2 emissions by 29% between 1990 and 2007.

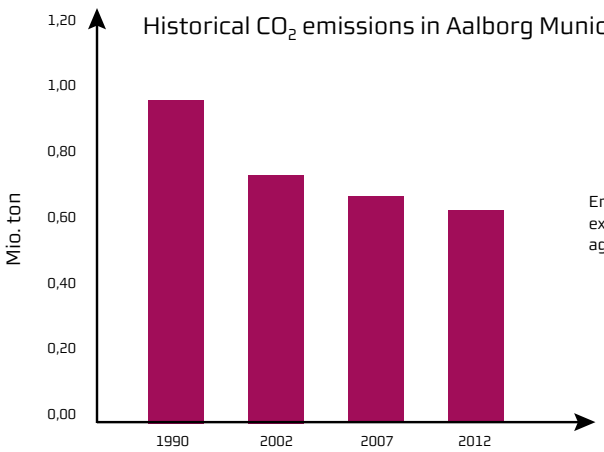
The primary means to achieve this CO_2 reduction targets are:

- Increased energy conservation efforts;
- Increased energy efficiency;
- Increased use of renewable energy in the form of wind, wood, and straw; and
- Increased utilization of waste heat, and increased waste incineration.

A Sustainability Strategy (2008-2011) was adopted by the Aalborg City Council in 2008, stating that from 2012, new targets for reducing CO_2 emissions were defined that are more ambitious than the national targets. Aalborg Municipality's current CO_2 emissions were measured as a basis for setting new targets for reducing CO_2 emissions and developing a climate mitigation strategy. An energy balance was prepared for 2007 that includes data on fuel types and energy consumption, and made a CO_2 calculation showing the total CO_2 emissions in Aalborg by the individual sectors.

In collaboration with Aalborg University, the Muncipality has prepared a scenario entitled Energy Vision 2050, which describes how Aalborg municipality can become independent of fossil fuels in 2050. On the basis of this scenario, an Energy Strategy of Aalborg Municipality until 2030 was developed that also builds on the vision that Aalborg will be independent of fossil fuels in 2050.

Aalborg Municipality's climate strategy will help to translate the vision to be independent of fossil fuels in 2050 to strategies, objectives and proposed actions that are subsequently expected to be implemented via municipal planning, energy planning, environmental planning, traffic planning, on so.



Emission of CO_2 from energy production, excluding Aalborg Portland, transport and agriculture

CO_2-Account for Aalborg

In addition to the energy balance for 2007, Aalborg Municipality for the same year made an inventory of CO_2 emissions from all sectors of the Municipality as a geographical entity using a municipal CO_2 calculator developed by the Climate and Energy Ministry and KL. This account deals with greenhouse gas emissions from energy, transport, agriculture, forestry, waste and sewage within the geographical area, which are emitted within the Municipality of Aalborg.

The cement factory Aalborg Portland's energy consumption accounts for around half of total energy consumption in Aalborg. The total emission of greenhouse gases in Aalborg Municipality including Aalborg Portland's energy consumption are 16.5 tons of CO_2 per year per capita. Including CO_2 emissions from the chemical processes (calcination) at Aalborg Portland cement production increases the total emissions to 30.7 tons of CO_2 per year per capita.

Since Aalborg does not immediately have any influence on either the volume or composition of Aalborg Portland's energy consumption, we have chosen to ignore the Aalborg Portland's energy and focus primarily on the remaining emissions of greenhouse gases in Aalborg Municipality. The CO_2 calculation excluded Aalborg Portland's supply of heat to the central district area is replaced by heat from the North-Jutland Plant.

Aalborg municipality's total emissions of greenhouse gases (CO_2, CH_4 and N2O) as a geographical entity, excluding Aalborg Portland is is then estimated at 1.52 million tonne of CO_2-equivalents, corresponding to 7.8 tonnes CO_2 per year per capita. The national average in Denmark is approx. 10 tonnes per year per capita.

CO_2 emissions from transport in the period 1990 to 2007 rose by a total of 32%. Alone in the period 2002 to 2007, CO_2 emissions from transport in Aalborg Municipality has increased by around 8%.

Aalborg Municipality's Climate Strategy 2011-15 sets new CO_2 reduction targets that are more ambitious than the national targets. In doing so, CO_2 reduction targets are also set for areas not covered by quotas: forestry, agriculture, and transport, where there is a need for considerably more focus on CO_2-reducing measures.

Towards a low carbon Aalborg

Energy conservation, energy efficiency, and switching to renewable energy are fundamental prerequisites for Denmark to meet its international obligations on climate change while maintaining the necessary energy supply security and achieve the national target of becoming fossilfuel free.

The investment horizon in relation to energy is relatively large, given that energy production and consuming facilities, including buildings, is investment-demanding and has a relatively long amortization period, typically around 20 years or more.

There is a need for long-term energy planning, which ensures that society, energy companies, private companies, and households get the most value from money used for energy purposes.

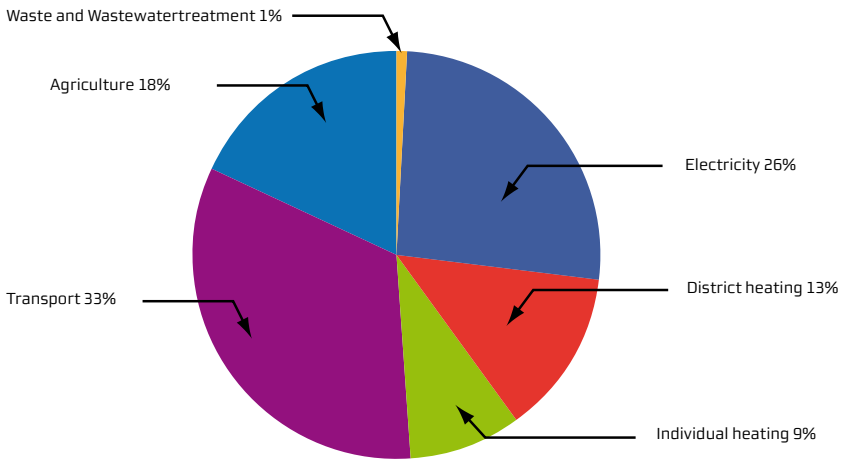
In accordance with the law on heat supply, the Municipality is to prepare a plan for heat supply in the municipality in cooperation with supply companies and other stakeholders. The aim is partly to promote the most economic and environmentally friendly use of energy.

Municipalities will, in accordance with the law on heat supply, approve projects for establishment of new collective heat supply facilities or major modifications to existing facilities. In connection with the project application and approval, a socio-economic analysis of projects is to be carried out in accordance with the adopted energy policy and the Danish Energy Agency's guidance of socio-economic analyzes of projects within the energy sector as well as the then-current calculation assumptions for this. At the same time, a general economic project appraisal should also examine corporate economics and / or household finances.

The purpose of the Energy Vision 2050 and the Energy Strategy 2030 is to create a long term basis so that Aalborg Municipality can continue to contribute to preventing global climate change and ensure the necessary security of supply, both locally, nationally and globally. Additionally, they form an important basis for the municipality energy and heat planning in the coming years and for the interested energy companies' planning for the future.

CO_2 emissions divided by sector

CO_2 emissions from transport (33%) and agriculture (18%) together accounted for over half of the total CO_2 emissions in Aalborg in 2007 of a total of 1.52 million ton, excluding Aalborg Portland.



Vision and stratey for climate change mitigation

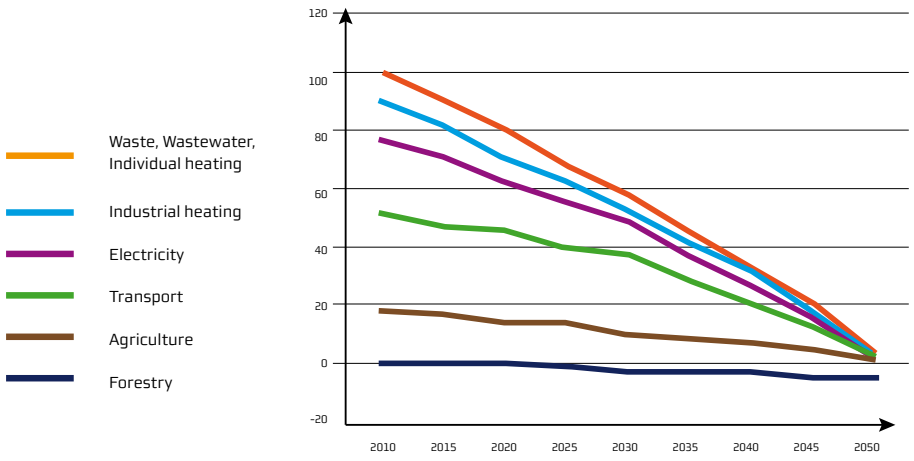
"The municipality of Aalborg's vision is to have a stable and efficient energy supply not based on fossil fuels by 2050 and also to act as a greenhouse gas neutral municipality which helps to prevent inevitable climate change as much as possible."

Future targets for reducing greenhouse gases

Climate Strategy 2012-15 is the first step in translating the above vision to strategy, goals, and actions for selected areas, which are to be implemented by 2015 in order to reduce energy consumption and use of fossil fuels and boost the share of renewable energy.

The Climate Strategy translates our vision into concrete CO_2 reduction targets for all sectors, corresponding to the municipality's total CO_2 emissions from fossil fuels of 1.32 million tonnes of CO_2 must be eliminated by 2050.

Reduction of greenhouse gas in Aalborg Municipality until 2050 (2010 = Index 100)



Energi Vision 2050

The municipality of Aalborg has, in cooperation with Aalborg University developed "Energy Vision for the municipality of Aalborg 2050" (Energy Vision 2050) during 2009 and 2010.

The basis for Energy Vision 2050 is an energy system based on renewable energy in the form of local biomass resources, with wind, solar, and geothermal heat combined with a focused effort to reduce energy consumption through energy conservation and energy efficiency. The Energy Vision 2050 presumes, among other energy savings and efficiency improvements in the range of 40-50%, a significant expansion of wind power, and extensive use of local biomass resources.

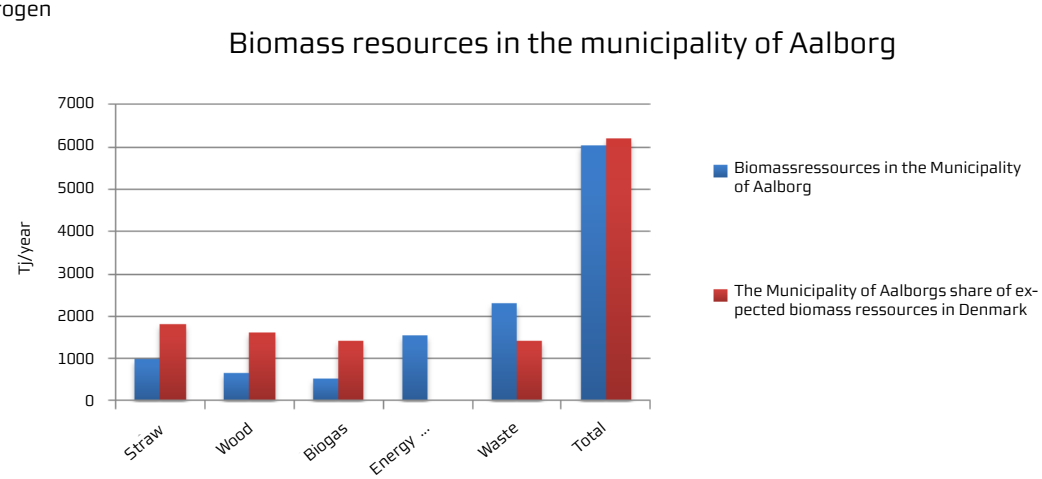
Energy Vision 2050 is based upon the principle that biomass resources should to be able to cover the energy consumption for housing, public institutions, commercial and service business, and the amount that is the equivalent of the municipality of Aalborg's population share of the total Danish industry and transport. This is assumed to occur solely through the use of the municipality's share of the estimated total biomass resources in Denmark, which is roughly equivalent to biomass resources in the Municipality of Aalborg. This means that Aalborg Portland's energy needs are only partly met with local biomass resources, while the rest of the industry in Aalborg Municipality is expected to have all of their energy needs met by local energy resources.

Apart from biomass resources for industry, a portion of the biomass is assumed to be transformed into fuels that can be used in transport and highly efficient, fuel cell-based CHP.

Energy consumption for transport beyond biofuels is assumed to be met by hydrogen and electricity. Although transport demand up to 2050 has been forecasted to slightly increase, the assumed energy consumption for transport is significantly reduced due to, among other things, a result of a shift to public transport and more efficient technologies. For example, electric cars could reduce energy consumption compared to conventional cars by a factor of three.

The Energy Vision builds on a premise for further development and efficiency of district heating, so dis-trict coverage in Aalborg in 2050 will amount to 85-90% of the net heat demand. District heating is assumed to come from biomass-based district heat plants, waste incinerators, heat pumps, industrial waste heat, and geothermal heat.

The Energy Vision presupposes that all biomass resources in the future should be used for transportation, process energy throughout industry and cogeneration, which conversely means that the use of wood and straw in the individual heating systems must be converted into other energy forms, such as heat pumps.

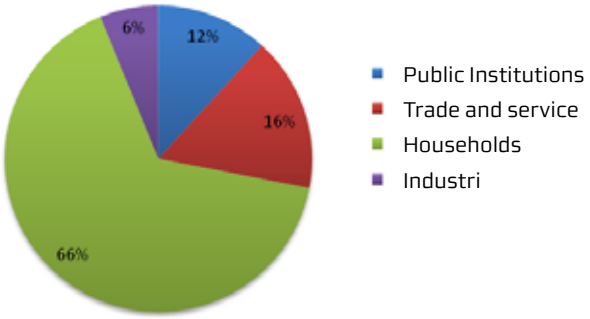


Biomass resources in the municipality of Aalborg compared with the municipality of Aalborg's share of expected biomass resources in Denmark.

Energy Strategy 2030

The Energy Strategy for Aalborg towards 2030 is based on the vision of a fossil-fuel free Aalborg, partly with considerations to security of supply, partly with consideration to CO_2 reduction and climate change prevention, although the municipality is not expected to be fossil-fuel free before 2050.

Heath consumption in Aalborg



The vision of a fossil-fuel free energy supply is important to look at in a global perspective, since the energy consumption of individual nations and regions should in principle be adapted to non-fossil energy resources that exist in the region. In practice, there will of course occur exchanges of biomass between different nations, regions or municipalities. But unilateral import of energy resources, and this refers especially to imports from poorer countries, should in principle be avoided to the extent that it removes biomass resources from these regions, which could be used locally. All the biomass resources in the future to be used in Aalborg Municipality should be local since from a global perspective it will not be sustainable if Aalborg imports biomass from third world countries to meet a target of fossil-fuel free energy.

In 2007, the total energy consumption in Aalborg was 36,370 TJ. The total energy figure excludes Aalborg Portland's demand of 17,550 TJ. The share from transport was 6,730 TJ. (38%)

Electricity consumption (excluding Aalborg Portland) in Aalborg was 3,890 TJ, equivalent to almost 1,100 GWh. 244 GWh was supplied by wind turbines in the municipality. The total renewable energy share amounted in 2007 to 21% of the total energy in Aalborg, excluding Aalborg Portland.

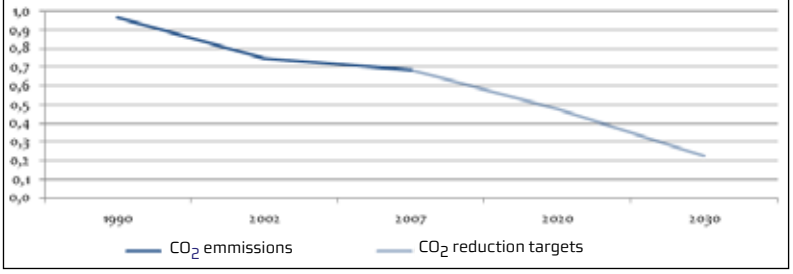
The total district heating consumption (excluding Aalborg Portland) was 6,860 TJ, of which the heat consumption in the central district heating area alone was 6,085 TJ. More than 50% of this total surplus-heat came from industry, waste incineration and sewage treatment plants, and the rest came from one of the world's most energy-efficient coal power plants. In addition, energy consumption from oil and natural gas boilers was 1,721 TJ and from wood and straw boilers it was 1,123 TJ.

Using the 2007 baseline, changes in the energy system and projection of energy data for 2030, is briefly explained below. The energy strategy is based on existing facilities and proven technology, describing the probable development of the energy sector by 2030, and the interaction with transport and agricul-ture.

Energy Supply sources in Aalborg in TJ (excluding Aalborg Portland and transport).

	2007	2030
Electricity import	2.370	291
Oil and coal	2.034	1.259
Naturegas	2.109	757
Waste	2.046	2.034
Biomass	1.370	1.409
Wind	865	2.770
Solar energy	11	106
Geotermical heath	0	43
Surplus heath	13	13
Heath pumps	1	333
Total	10.819	9.015

CO_2 emissions from energy supply in Aalborg

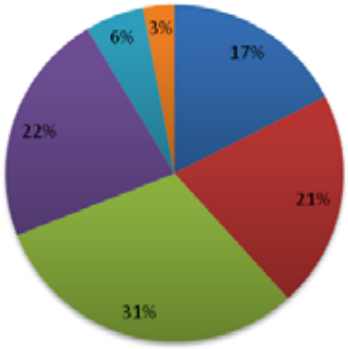


The total energy consumption of energy (electricity, heat and process energy) in Aalborg (excluding Aalborg Portland) is expected to decline from 10,819 TJ in 2007 to 9,015 TJ in 2030, representing a decrease of 17%.

The total energy consumption of energy and transport is expected to decline from 17,552 TJ to 14,457 TJ, excluding Aalborg Portland, representing a decrease of 18%.

The changes in the energy system, as proposed in the energy strategy for the municipality means that CO_2 emissions caused by energy supply are projected to decline from 0.69 million tons in 2007 to 0.22 million tons in 2030, representing a decrease of just over 65%. In the period 1990 to 2030, CO_2 emissions from energy in total will be reduced by more than 75%.

Electricity consumption



Electricity consumption in the municipality of Aalborg by consumer categories, excluding Aalborg Portland

How you read the climate strategy

The overall climate change strategy is a strategy for prevention of and adaptation to unavoidable climate changes, which in the future will shape Aalborg Municipality. This part of the strategy focuses exclusively on preventing climate change, and thereby covers strategies, objectives, and proposed ac-tions to reduce CO_2 emissions. The Climate Adaptation strategy is contained in a separate report.

The Climate Strategy is common to the municipality of Aalborg and therefore will go across all municipal sectors. The Climate Strategy's objectives and proposed actions should wherever possible be implemented through existing sector planning, and the climate strategy is to ensure that the climate is thought into everything that the municipality does.

The Climate Strategy consists of strategies and goals for the selected areas that aim to meet the long-term vision. In addition, the Climate Strategy 2011-2015 sets out actions and initiatives intended to be implemented over the next few years. Actions and initiatives are divided into:

- Guidelines - description of how the Municipality expects to adapt existing planning and task-solving
- New actions - describe any new actions needed to address climate change.
- Survey - description of where the need for more knowledge and information is.

For the chosen focus areas it applies that it is initiatives and actions which the Aalborg City Council has a real opportunity to influence developments either directly or indirectly. A direct influence may be, for example, that the City Council decides that all municipal buildings will be built as low-energy buildings. An indirect impact may be, for example, that Aalborg will work to change inappropriate laws and regulations.

For each initiative, there is a reference to Chapter 12, which shows which administration has the overall responsibility for implementing the initiative and indicates which management tool of existing sector plans that efforts must be integrated and anchored in.

In order to achieve the most cost-effective transition to a fossil-fuel free energy supply it is expected that socio-economic assessments of all initiatives will be conducted that are expected in connection with climate strategy.

Socio-economic, private or corporate financial assessments on all existing climate strategy initiatives are currently not conducted.

Klimastrategien besrives under otte indsatsområder:

Energy conservation

Energy Supply

Transport

Forestry

Agriculture

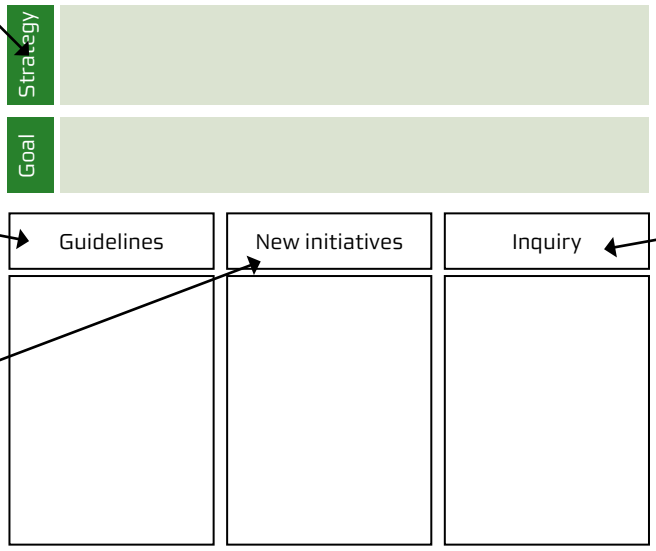
Partnerships

Climate teaching

Local green growth

Hovedmålet med klimastrategien er at blive fossilfri i 2050.

De opstillede mål for indsatsområderne er delmål, som underbygger den strategi, der skal lægges for at opnå dette.



Guidelines

Description of how the Municipality expects to adapt existing planning and task-solving

New initiatives

Describe any new actions needed to address climate change.

Inquiry

Description of where the need for more knowledge and information is

Energy savings

Energy saving is a fundamental prerequisite for achieving the goal of fossil-fuel free energy, and thus to be able to meet commitments to address climate change, and also obtain a necessary energy supply.

The Energy Vision for the municipality of Aalborg requires that energy consumption be reduced in the range of 40-50% over the next 40 years if the goal of fossil-fuel free energy is to be achieved.

National initiatives

Energy conservation is a fundamental prerequisite for achieving the goal of fossil-fuel free energy, and thus to be able to meet commitments to address climate change, and also obtain a necessary energy supply. The Energy Vision for the municipality of Aalborg requires that energy consumption be reduced in the range of 40-50% over the next 40 years if the goal of fossil-fuel free energy is to be achieved.

Through national energy taxes and subsidies for energy saving measures, tightening of building regulations, energy labeling of buildings and energy-consuming appliances, and requirements for energy companies, energy conservation efforts have resulted in considerable savings in recent decades. Re-cently, the regulatory requirements for the energy companies' energy-saving efforts doubled, and new stricter requirements are on the way in building regulations.

Consumer behaviour is also very central for energy savings. It is not enough to save 50% on energy consumption for heating if many citizens choose to increase their living space by 50-100%. Likewise, the energy savings when purchasing a new washing machine that uses less electricity than the old one could quickly be replaced by extra consumption if the household buys a bigger TV that uses more electricity than the old one. It is therefore important that consumers choose both sets with an energy usage that is as low as possible when the existing equipment is to be replaced, while minimizing the number and use of energy-consuming appliances. In addition, the energy and other resources that are used in the manufacture of the products should be included in the total picture.

From 2010, the total requirements for the annual energy saving efforts of the network companies in Aalborg, which supplies gas, electricity, and district heating, is on the order of 200 TJ (55 GWh), corresponding to approximately 2% of the energy supplied. Energy Center Aalborg has, by virtue of offering a holistic advisory services to private households and commercial customers since 1995, contributed significantly to the resource- and energy saving efforts in Aalborg. In accordance with agreements with the Local Government Denmark (KL) and the Danish Society for Nature Conservation (DN), the Municipality is committed to an annual reduction of CO_2 emissions by 2%, which can be achieved by implementation of energy savings on average of 2% per year of energy con-sumption in institutions and so on until 2020. Governmental institutions are also required to realise annual energy savings of 2% on average.

Although it is expected that grid companies' overall energy saving efforts of 200 TJ per year is realized in the Municipality of Aalborg, it will not be sufficient to meet the long-term objective that energy consumption for heating, ventilation, lighting, etc. in buildings should be reduced by 40-50% in 2050. The reason is that it is also expected that the population will increase by approx. 0.5% per year and it is expected that new energy-consuming appliances will also contribute to increased energy consumption. In the central district area heating, prices are now among the lowest in Denmark. As a result, it can often be difficult to achieve a positive personal and community economy for many energy saving projects. Many energy savings will often be profitable if implemented in conjunction with building conversion and / or renovation projects. In the central district area, it will usually be necessary to implement socio-economic calculations in connection with implementation of energy saving projects.

In the decentralized district areas, the incentive to implement energy savings will often be greater due to higher heating costs. In the individually-serviced areas, the incentive to implement energy savings will be greatest because heating costs are typically relatively high in these areas. In the individually-serviced areas, the choices are often between investments in energy conservation in the building envelope and investments in alternative supply, for example in the form of solar or geothermal system or in combination.

Depending on the developments in energy prices, national measures will be needed to complement local measures, for example in the form of increased energy requirements for existing buildings, increased energy taxes and / or subsidies for energy savings in order to achieve the long-term goal of energy conservation.

The climate strategy for energy savings is divided in to 4 main themes:

Buildings

Businesses

Private households

The municipality as a company

Buildings

Energy consumption for electricity and heat in buildings accounts for roughly 30% of total energy consumption. In the existing building stock there is great potential for energy savings.

In Aalborg, about 75% of the housing stock was built before 1980, when the first stricter requirements for buildings insulation and heating systems were introduced as a result of the 1970s energy crisis. More than 40% of the total housing stock in Aalborg was built before 1960.

In connection with the renovation of existing buildings there is a large potential for energy savings regarding insulating walls and ceilings, replacing the glazing, low ventilation with heat recovery, and insu-lating of pipes and valves in unheated basements, crawl spaces, and attics.

The Building Code's stricter requirements for new construction entails increased insulation thickness in walls and ceilings, and increased density of the buildings, which will result in significantly lower energy consumption from buildings in the future. The increased energy requirements for buildings will also imply a greater need to ensure that all new buildings meet these requirements.

Future climate change is likely to lead to lower energy consumption for heating buildings in the winter, while energy consumption for cooling in summer will increase. Already, electricity consumption takes up to 70% of new buildings' primary consumption. In the future there will be a need for much greater focus on electricity savings in buildings.

Strategy

All construction ought to be CO_2 neutral by 2050.

Through authority processing, collaboration with developers and the energy companies, it is ensured that the establishment and operation of the buildings is energy efficient.

Work to create financial incentives for energy savings in homes and businesses.

All options of regulation would be exercised in order to achieve energy-efficient buildings.

Goal

Energy consumption in buildings must be reduced by 40-50% through energy savings and energy efficiency by 2050.

Guidelines	New initiatives	Inquiry
There are basic demands for low energy buildings corresponding to energy class 2015 in all local plans and major renovation projects, with effect from 2012, assuming a positive economic return. [R 1] District heating is recommended in all construction, where possible. [R 2] There shall be an ongoing opportunity to finance energy initiatives through the active involvement of the financial sector. [R 3] Energy-saving measures must be appropriately integrated aesthetically and architecturally. [R 4]	Carry out energy screening of all construction projects over 1,500 m^2 before granting planning permission to ensure the best energy solutions. [NT 1] Random testing of new construction and major renovations must ensure that the building meets the existing energy requirements. [NT 2] Demonstration projects for en-ergy-efficient town / district / settlements are conducted. [NT 3] An expected ban on the installation of oil-fired boilers for space heating is examined and incorporated into the heat planning. [NT 4] Building owners are encouraged to use the energy companies' offer on thermography of the city's buildings and targeted energy counseling. [NT 5]	Studies and demonstration projects for energy efficient building renovation of existing buildings with respect for the original architecture is pursued. [U 1]

Businesses

About a third of Denmark's energy consumption is consumed by businesses. Therefore, an active effort in relation to business is crucial for achieving an overall energy efficiency of 40-50%.

Energy companies' existing energy-saving efforts have also shown that the energy savings potential in commercial enterprises is very large. The reason for this is the well-known potential savings have not yet been fully utilized, there are still new both technical and behavioural opportunities, and there are still changes in the production conditions.

Outsourcing of energy-intensive production can locally contribute to reduced energy consumption, but will nationally or globally not contribute to the reduction of CO2 emissions. In some cases, it may increase overall emissions.

Energy Center Aalborg has through energy advice for businesses such as Aalborg Supply, GAS, AKE EL-NET and VARME in 2009 alone realized documented energy savings primarily from business customers.

In agriculture, Aalborg Municipality established a partnership with Energy North who prepared energy reports for livestock farms that were seeking environmental approval. The report includes recommendations on energy saving measures supplemented with an estimated payback period and included in the environmental approval overall assessment of environmental impacts. Experience has shown that there are great savings to be gained also with simple solutions.

Climate and environmental promotion efforts are an integrated element of the municipality's commercial efforts and through networking, promoting innovation, and an active energy consultancy in production, consumption and development of competitive energy-efficient products including cleantech products is supported.

Strategy

Energy efficient solutions for businesses and agriculture must be supported by Municipal authority decisions and planning.

The financial sector should be involved in the promotion of energy efficient production.

Goal

Energy use in commercial enterprises shall be reduced by 50% through energy savings and energy efficiency by 2050 in order to achieve a 15% reduction in consumption by 2020 compared to 2010.

Guidelines	New initiatives	Inquiry
Climate promotion initiatives are an active part of the municipality's business efforts. [R 5] Through networking with businesses and agriculture, energy efficiency and climate-friendly products are to be promoted. [R 6]	The municipality will, in cooperation with energy companies as part of the environmental inspection, identify energy-efficient opportunities. [NT 6] From 2012, collaboration will begin with the North Jutland banks to develop climate-friendly counseling and loan opportunities for companies and financial assessment tools that promote green growth. [NT 7]	By 2012, an inventory of agriculture's total CO_2 emissions, including energy and methane emissions based on actual data for local agriculture is to be conducted. [U 2]

Private households

Energy consumption for electricity and heat in homes and energy consumption for motorised vehicles represents about half of the private household CO_2 contribution. The other half comes from consumption of food, consumer goods, services, and so on.

Savings and changes in household consumption of energy and goods can by experience be promoted through campaigns, education, grants and fees. Aalborg Municipality does not possess the possibility to use either taxes or subsidies, but can affect people's behavior through campaigns and education.

Energy Center Aalborg has, since 1995, been offering holistic advisory services to private households for resources and energy, and offer education of schoolchildren. After the sale of the electricity supply (Energiforsyningen), there is no longer a financial basis for continuing demonstration activities, education, and permanent exhibitions.

Strategy

The climate behavior of private householdes is influenced through information and education.

The implemention of effective citizen-oriented information campaigns on energy savings should be carried out.

The municipality will be involved in the creation of pioneer examples of climatefriendly behavior

We search to established partnerships to ensure full consultation in regards to energy savings.

Goal

Energy consumption for electricity and heat in homes should by 2050 be reduced by 40-50% through energy savings, energy efficiency, and behavioral changes.

By the end of 2013, there must be established a network with the financial sector, energy companies, builders and contractors in Aalborg, offering full advice in relation to energy refurbishment and energy savings.

CO_2 emissions resulting from energy consumption in private households in the municipality of Aalborg must be reduced by 2 % annually in the period 2013-2020.

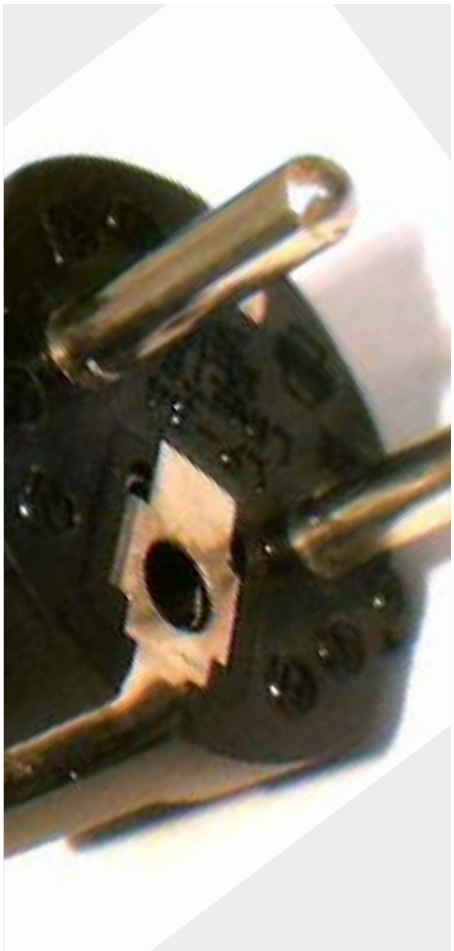
Guidelines	New initiatives	Inquiry
Energy advice must be included in all technical authority processing of relevant cases in the municipality. [R 7]	Aalborg Municipality will work for a national levy system that promotes "climate-friendly" behavior of citizens. [NT 8] Cooperation with energy companies, builders and contractors on energy saving campaigns. [NT9] Competitions between neighborhoods on energy savings should be held. [NT 10] Through the green shops initiative, the public should regularly be informed about their own potential for energy savings. [NT 11] Carry out citizen involving climate projects, such as CO2 neutral village Fjellerad. [NT 12] Citizens must be involved and the individual household's CO_2 footprint will be revealed. [NT 13]	The ability to create local and national economic incentive for people to save energy is to be examined. [U 3]

The municipality as a company

Aalborg Municipality will be a sustainable municipality and take the lead in climate and environmental work. In 2009, Aalborg became 'climate municipality' and pledged to reduce CO_2 emissions from its own activities 2% annually over the period from 2009-2020. As an organisation of approximately 18,000 employees, the municipality has many opportunities to reduce energy consumption, in particular in the operation of municipal buildings, street lights, in the operation of computers, server rooms and other IT equipment, and providing energy requirements for the procurement of goods and products.

Headlines for the strategy:

Climate friendly Behaviour
Green IT
Streetlights
Collective transport
Municipal buildings



Climate friendly behaviour

Strategy

When purchasing energy-consuming products and services, the municipality will choose the most energy-efficient ones, price calculated with regards to the product / service's lifetime.

Goal

From 2020, all electricity purchases in Aalborg (excluding user-financed area) should be based on renewable energy from new plants.

Guidelines	New initiatives	Inquiry
Energy-using products purchased for Aalborg Municipality must comply with The Danish Knowledge Centre for Energy Savings in Buildings instructions on on energy-friendly purchases. [R 8]	The use of electricity for municipal buildings, plant and equipment. (excluding user-financed areas) must come from new renewable energy plants. [NT 14]	The possibilities for the establishment of municipal wind turbines should be examined. [U 4] Investigate the possibility of establishing a curve breaking agreement with The Danish Knowledge Centre for Energy Savings in Buildings. [U 5] The possibilities for the establishment of a fund to finance energy savings and renewable energy systems in municipal buildings must be examined. [U 6]

Green IT

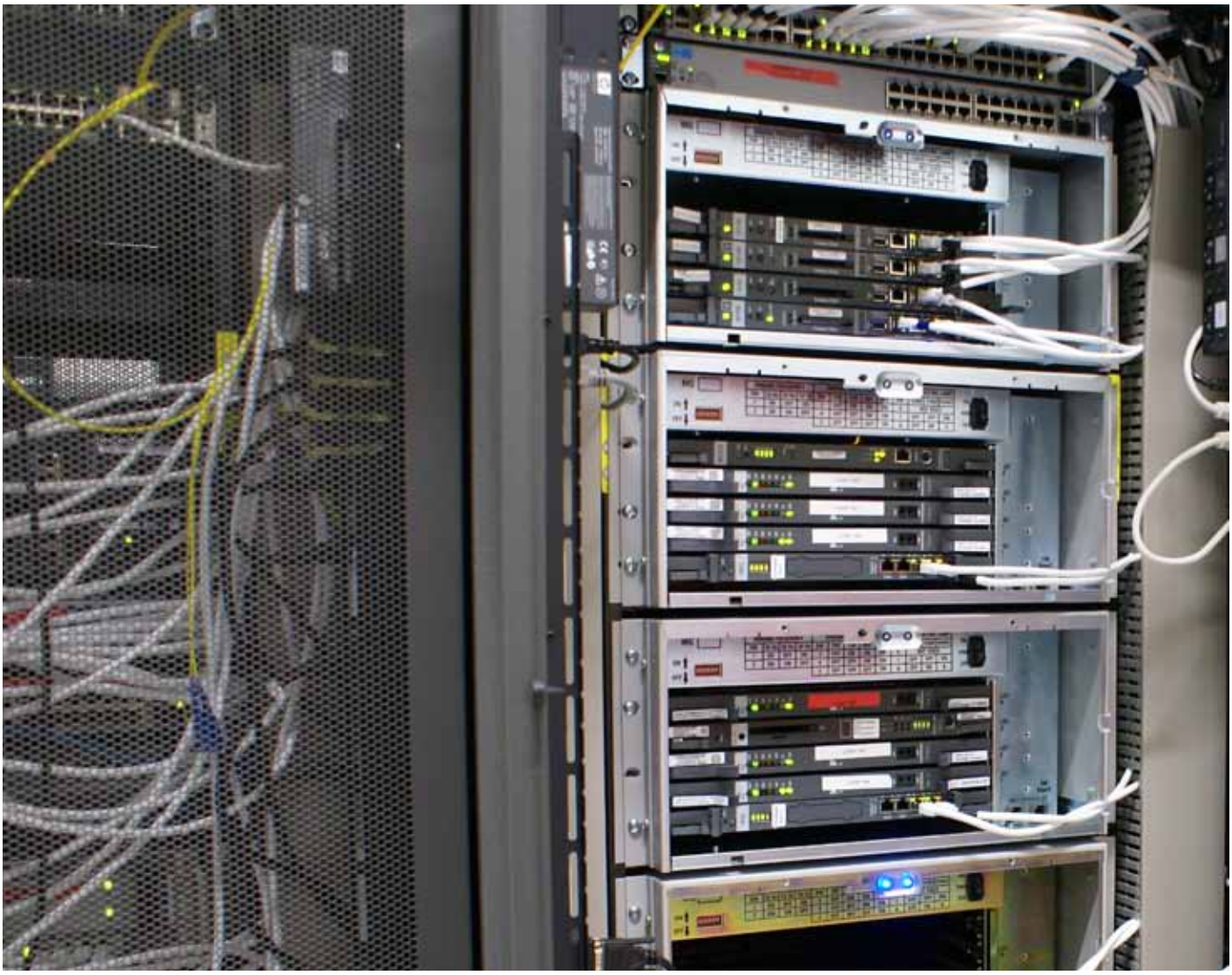
Strategy

Aalborg Municipality will continue to require the purchase of energy-efficient computers, copiers, and printers and optimize operation and control energy use of equipment, including standby power consumption through central control. Operation of the servers will be based on the latest principles and technologies.

Goal

Energy from municipal IT will on average be reduced by at least 2% per year by 2020 and by 50% overall by 2050.

Guidelines	New initiatives	Inquiry
All purchased PCs, printers, and copiers must meet the criteria for the EPEAT label, Nordic Swan, or equivalent environmental labeling and at all times the highest Energy Star level (currently 5) or equivalent. [R 9]	By the end of 2011, all administrative PCs in the municipality in relation to the Windows 7 platform shall be connected to a centrally controlled Sleep function. [NT 15] Server rooms should be designed with the utmost consideration to energy consumption and the instructions from The Danish Knowledge Centre for Energy Savings in Buildings. [NT 16]	It is considered whether leasing schemes on all municipal PCs should be exercised in order to ensure replacement of PCs every 3 years as the newest and thus often the most environmentally friendly / energy efficient models are used. [U 7] A survey of the possibilities of moving to thin-clients by the end of 2014 is to be conducted. [D 8]



Streetlights

Strategy

Aalborg Municipality will continuously reduce energy consumption for lighting of roads, residential streets, lanes and traffic lights in line with the technological development of energy efficient light sources and when their overall profitability is present. Replacement of lamps and lighting fixtures will be thought together with the maintenance of the existing lighting. For new installations, the most energy efficient lighting should be used.

Goal

Energy consumption from streetlights should on average be reduced by at least 2% per year until 2020 and by 35% overall in 2030.

Traffic lights should be replaced with LED diode technology or when it is the most efficient technology for the refurbishment/renewal of the intersection, so that all traffic lights in the municipality by 2020 are changed.

Guidelines	New initiatives	Inquiry
Technological progress will be monitored closely and is expected in the coming years to produce solutions with greater energy efficiency than currently possible. [R 10] For establishment of new and modernization of existing street lighting system, the best technologies (BAT) in terms of energy consumption and operating costs should be used. [R 11] Best available (BAT) technology is brought into use as it meets quality requirements in general. [R 12]	Street lights on roads, paths and squares in the municipality will be regularly renewed with new energy-efficient technologies with less power consumption. This includes existing metal halide and compact tube sources and newer LED technology. [NT 17] At traffic roads, BAT will be introduced when illumination requirements for this type of illumination solution can be achieved, and when the technology of light quality and total economic payback period of replacing and operating matches the other known light source technologies. [NT 18] On residential streets, BAT will be introduced when the technology light quality and total economic payback period of replacing and operating matches the other known light source technologies. [NT 19] Traffic lightning will be changed to LED technology or the best avalible technology when they are renovated or renewed so all traffic lightning in the municipality will be changed by 2020.[NT 20] Other new technologies for controlling lights will be tested for potential energy savings. In 2011, two new technologies for dimming were tested. [NT 21]	In terms of energy consumption mercury light sources are the least energy-efficient light sources we have currently and thus provides the greatest savings of potential (30-45% depending on lamp wattage and lumens). Since the mercury light sources are to be removed from production in 2015 according to an EU decree, there must be alternatives to the municipality's approximately 15,000 luminaires with mercury lamps. [U 9]

Municipal transport

Strategy

During the acquisition of municipal vehicles, the selection of vehicles with low energy consumption and use of vehicles with alternative fuels such as electricity, methanol, hydrogen, etc. must be encouraged. Official driving in private cars must be limited to the extent that the municipality can offer vehicles with lower CO2 emissions. Municipal travel by air should be limited and the ability to use bicycles and electric bicycles needs to be improved.

Goal

Energy consumption from municipal driving should on average be reduced by 2% per year until 2020 and be halved by 2050.

From 2050, the energy consumption for municipal vehicles should be fossil-fuel free.

Guidelines	New initiatives	Inquiry
Newly purchased municipal passenger cars must meet Energy class A specifications, at a minimum. [R 13] In connection with the provision of municipal driving (referred through kørselskontoret) requirements for maximum CO_2 emissions should at least be equivalent to the requirements the municipality imposes on its own vehicles. [R 14]	10% of the cars in municipality's elderly care division must by 2015 be electric cars. [NT 22] Each of the municipality's administrations should encourage staff to use public transport and offer bikes and electric bikes to the greatest extent possible. [NT 23] Municipal administrations should offer employees with official driving in their own car and with a driving needs of more than 10,000 km per year a municipal vehicle if their vehicle does not meet the requirements of the Energy Class A. [NT 24] Municipal employees with a significant work-related driving requirement (> 5.000km per year) included within the care sector and employees with work-related driving (trucks and contractors' machinery) must undergo a course in energy efficient driving techniques. [NT 25]	To reduce travels made by employees to meetings, conferences, etc., the technical and economic aspects of using video-conference equipment should be examined. [U10] A car-analysis of the municipal driving with consideration to efficiency and climate impact should be carried out. [U11]

Municipal buildings

Strategy

Aalborg Municipality will through its own construction be at the forefront of energy requirements in relation to both new construction and energy-refurbishment, so that stricter requirements in relation to national targets are set.

The municipality will increase its efforts for energy savings in municipal buildings through energy projects and energy-management.

Goal

The total energy consumption in municipal buildings by 2050 is to be reduced by 45%. This applies to both electricity and heat.

Energy consumption in municipal buildings must on average be reduced by at least 2% per year until 2020.

All municipal buildings should by 2030 be energy refurbished.

For new construction and renovation from 2015 solar cells that cover the building's electricity consump-tion should be integrated, if possible.

For renovation, conversion, and maintenance work energy-refurbishment should be required from 2012 onward.

Guidelines	New initiatives	Inquiry
Starting in 2012, Aalborg Municipality will require all municipal construction (new construction and renovation) to be built as low-energy building, similar to the Building Energy Class 2015, assuming a positive economic return. [R 15] Municipal buildings located in district heating areas are to be heated by district heating. [R 16] Municipal buildings located outside district heating areas should by 2050 have a renewable energy supply. [R 17] In connection with building refurbishment, energy refurbishment of relevant building sections must be simultaneously implemented. [R 18] All new municipal buildings must be provided with individual renewable energy, like solar power or similar, equivalent to at least 10% of the total energy consumption of the building. [R 19] Energy-saving measures must be integrated with what is aesthetically and architecturally appropriate. [R 20] All new construction and conversion projects over 500 m^2 should be screened to ensure that the best economic and energy solutions that are chosen. The screening is carried out during both the project proposal and project realisation. [R21]	By 2014 there must be developed a sustainability manual describing the goals and efforts in energy - and environmentally sound municipal construction and design. [NT 26] Energy Management should be implemented by the end of 2014 in all municipal buildings. [NT 27] Before the end of each council term there must be established a long-term plan for energy renovation of municipal buildings to an energy standard similar to the contemporary low-energy class. [NT 28]	In order to determine energy requirements, including specific requirements for building components for renovation and conversion tasks, the municipality will be included in possible demonstration projects. [U 12] A pre-analysis that can show energy-saving potentials and economics in relation to municipal / private partnership with a private energy service company (ESCO cooperation) should be carried out. [U 13]

Solar power on Kongerslev og Farstrup schooles

Energy supply

Aalborg has in the past 20 years worked hard to reduce energy and resource consumption in relation to energy supply. The principles of sustainable energy supply have been continuously incorporated into the heating plan for Aalborg Municipality, the municipal strategic energy plans, and in the utility companies strategic plans.

Today, waste heat from industry, waste incineration plants, and wastewater treatment plants, which are largely CO_2-neutral, make up a very large part of the heating supplied to Aalborg's central district heating. The remaining heat comes from Nordjyllandsværket, which is one of the world's most energy-efficient coal plants. Along with the heat from 12 decentralized CHP, district heating accounts for over 80% of the total heat supply in Aalborg.

District heating is a very flexible energy system, ensuring a high level of security of supply and the possibility of using CO2-neutral energy sources, such as waste heat from industry and from waste incinera-tion plants, and renewable energy in the form of biogas, solar, geothermal, straw and wood. District heating is thus a very central element in the transition to a fossil-fuel free energy supply.

Renewable energy is a vital resource for a fossil-fuel free energy supply and to reduce CO2 emissions and thus global warming. In Aalborg, renewable energy accounts for nearly 30% of the total gross energy consumption to energy supply, excluding Aalborg Portland. Electricity generated from wind turbines comprises a significant share. Increased use of wind energy will require new and more flexible system solutions in the electricity sector, where a smart grid with smart meters will allow that electricity consumption for laundry and charging electric cars and hybrid plug-in cars may advantageously be moved to the times the day when electricity prices are lowest.

The cost of conversion to a fossil-fuel free energy supply by 2050, according to the Energy Vision for Aalborg 2050 did not differ significantly from the cost of a continuation of the current energy. The reason for this is the money to purchase the daily consumption of fossil fuels in the future are expected to be used for investments in energy conservation, energy efficiency and continous-end energy, simultaneously reducing the direct costs for the purchase of increasingly expensive oil, gas, and coal.

District heating

Biofuels

Geothermal heat

Vind turbines

Solar cells

Solar heat

Heat pumps

Cooling

Fjernvarme

District heating is and will remain an essential and indispensable part of the future energy system. Not least because district heating gives the energy system a flexibility that makes it possible to use a wide variety of energy sources and conversion-plants.

District heating already accounts for a great deal of heat supply in Aalborg. In 2007, district heating accounted for 83% of the total heat supply. Of this amount, heat consumption in the central district area accounted for 89%, while heat consumption in the decentralized district heating areas accounted for 11%.

In 2030, district heating supply is expected to account for 86% of the total heat supply. It is expected that the heat consumption in the central district area will exceed 95%, while heat consumption in the decentralized district heating areas will account for 5%. Although both the population and the district heating supply's share of heat in Aalborg are expected to increase, expected CO_2 emissions from district heating is expected to continue to decline as a result of continued efficiency improvements, conversion to alternative fuels, and increased utilization of waste heat.

Strategy

District heating accounts for and should in the future constitute the primary heat source in Aalborg Mu-nicipality.

District heating systems in Aalborg is expanded as much as possible, taking into account social, corpo-rate, and personal finance in order to ensure a flexible and efficient energy supply.

Goal

By 2050 district heating in Aalborg shall be fossil-fuel free.

By 2030 district heating will cover at least 86% of heat supply in Aalborg Municipality.

Guidelines	New initiatives	Inquiry
There must continuously be implemented strategic energy planning for Aalborg. [R 22]	In connection with heat-planning in the current planning period societal, corporate and private economic and environmental assessments are carried out in relation to: 1) Different renewable technology solutions and local fossil-fuel free energy resources. 2) Establishment of transmission lines from the central district area to areas with decentralized district. 3) A conversion of heat supply from individual oil and naturalgas for heating to district heating. [NT 29]	The opportunities to conduct studies and demonstration projects for efficient use of district heating in low-energy buildings in district heating areas should be analyzed. [U 14] The possibilities of how the district heating system can be used as storage for fluctuating energy production is considered in strategic energy planning. [U 15]

Biofuels

Increased use of biomass from agriculture, forestry and organic waste from industry and households is one of the basic requirements for fossil-fuel free energy.

Biofuel plant

An increasing demand for biomass for the conversion to fossil-fuel free energy will also increase the dependence between the energy sector, forestry and especially agriculture, when demand for biomass exceeds the amount that is today considered as residues. In the long term, it is not unlikely that parts of agricultural production must be converted to energy crops. In order to maintain the current food production it will lead to a shift of a part of the current livestock production to a larger crop production in order to increase energy efficiency in the food sector.

In 2007 about 15% of total energy consumption in Aalborg, excluding Aalborg Portland but including transport, was covered by local biomass resources. By 2030 this is expected to be around 30%.

In the future it is expected that biomass for energy purposes is mainly used for the production of biofuels and cogeneration, as far as possible in combination with the production of food, feed and / or fertilizer. In the longer term, an increasing proportion is also expected to be used in the chemical industry. In the context of biomass for energy purposes, it is important to balance biomass production with food production and the interests of the organic cycle, including phosphorus and nitrogen cycles in the soil.

The use of biomass for burning, for example in stoves and solid fuel boiler, is expected in the future to be reduced to a minimum, since it is necessary to use as much biomass for biofuels and cogeneration. The reduced use of biomass in individual solid fuel boilers and stoves will simultaneously lead to reduced air pollution in the form of particulate matter.

Strategy

All biomass that is not part of a biological circuit is to be used for co-generation, process energy in in-dustries and transport.

Biomass and waste should increasingly displace fossil fuels in co-generation.

Biogas produced in Aalborg Municipality should generally be used in Aalborg.

The biofuels used in Aalborg Municipality should generally not exceed the local biofuel potential.

Goal

During a transitional period, biogas in the decentralized cogeneration should primarily displace natural gas.

The municipal plan should before 2013 ensure the possibility of constructing facilities for the conversion of biomass for cogeneration, process energy in industry, and transport.

Aalborg Municipality must be self-sufficient in biomass by 2050.

In 2030, 30% of total energy consumption in Aalborg Municipality should be covered by energy derived from biomass.

The proportion of energy from biogas plants must be increased to 1.000TJ before 2020.

Guidelines	New initiatives	Inquiry
Through the heat planning and strategic energy planning commercial outlets for biofuels must as far as possible be secured with the aim to displace fossil fuels. [R 23]	In the municipal plan (addition) areas with opportunity for placements of biogas plants are identified. [NT 30] As part of the environmental approval scheme, biogas pro-duction is promoted by motivating agriculture to deliver their manure to biogas. [NT 31] Areas in the municipality are designated where it would be appropriate to grow energy crops. [NT 32]	The potential for cultivation of energy crops must be investigated, including the potential for business development (Green Growth) from the biomass production. [U 16] The possibilities for use of biogas in city gas network, including use of biogas in buses, trucks and municipal vehicles should be examined. [U 17] In connection with heat planning, the extent to which a reorganization of the solid fuel boiler to solar and heat pumps in the areas without public supply can happen should be examined. [U 18]

Geothermical heat

The geological formations in much of Aalborg Municipality are interesting with regard to the use of geothermal heat. The three formations Gassum, Haldager and Frederikshavn, located 900-2000 meters below surface, are by Danish standards considered to be very good geothermal resources, which are assumed to meet the current need for district heating for a few hundred years.

The establishment of geothermal heating is associated with some risk in relation to the geological conditions, and is also very heavy investments. Geothermal heating systems should as far as possible be used whenever possible as basic load plants with high operating hours for relatively large contiguous district heating systems to be profitable.
In the case of geothermal heating systems, it is often necessary to raise the temperature of the produced water by using a heat pump. In the case of low-temperature heating, the energy consumption for this can be reduced to a minimum.

Integration of geothermal heat in the existing district heating, should however, be in competition with existing heat sources such as cogeneration and industrial waste heat.

In Aalborg it is expected that heat from existing CHP and surplus heating systems meet the baseload heating needs for the next 10-20 years. Geothermal heat is therefore first expected to take up a decisive share of heat supply in Aalborg Municipality, if such heat supply from Reno-Nord or Aalborg Portland is reduced significantly.

Strategy

Geothermal heat should be used for district heating to the extent that it is energy and environmentally optimal and socio-economically viable.

Goal

After 2030 geothermal accounts for a major share of the heat supply in Aalborg.

Guidelines	New initiatives	Inquiry
In the context of energy and heat planning a focus on when it is societal economically, company economically and environmentally optimal to implement geothermal heat will continuously be included. [R 24]	In connection with heat-planning a strategy for the use of geothermal heat in Aalborg Municipality will be determined. [NT 33]	In connection with heat-planning studies, possible / optimal locations of geothermal plants in Aalborg Municipality should be located. [U 19]

Wind turbines

Renewable energy from wind turbines is to cover a large part of the energy consumption in Aalborg Municipality in the future. Electricity produced by wind turbines in Aalborg Municipality is currently (2007) 17% of electricity consumption, including Aalborg Portland, and 24% of electricity consumption, excluding Aalborg Portland.

New wind turbines and replacement of turbines established before 2000 with larger and more efficient wind turbines is in 2020 expected to result in a total annual electricity production from wind turbines of 520 GWh. In 2030, electricity production from wind turbines is to be raised to around 750 GWh per year, corresponding to approximately 60% of electricity consumption. Excluding Aalborg Portland, electricity from wind turbines in 2030 is expected to be around 75% of total electricity consumption.

In the long term, the share of electricity production from wind turbines should be around 80% of the total electricity supplies to Aalborg.

To the extent that the expected wind capacity cannot be established as land-based wind turbines this must either alternatively be replaced by solar or acquired as proportions of offshore wind and / or wave powerplants.

As an increasing share of the electricity production comes from wind power, there will be a need for alternative use of this to avoid export of electricity at low prices. One way to create a better balance between production and consumption of electricity from wind power is, as previously mentioned, using part of this electricity for heat pumps combined with heat storage, both in district heating systems, but not least in areas without district heating, as well as for electric cars, for which batteries can provide an important buffer.

There is a need for a major expansion of wind power production in Aalborg by 117% by 2030 and 170% in 2050 compared to 2007. In total, an increase from 240 GWh to 1230 GWh, which is mostly expected to be carried out by replacing turbines in existing areas.

Strategy

There should be opportunities to build enough wind power in the municipality of Aalborg, first through replacement of wind turbines in existing areas and, secondly, by designating new areas for wind turbines, in order to ensure adequate power generation in the municipality based on renewable energy in 2050.

The municipality will actively contribute to the necessary expansion of electricity production from off-shore wind turbines in order to ensure that electricity consumption in Aalborg (excluding Aalborg Portland) in 2050 can provide electricity based on renewable energy.

Goal

Wind turbines in Aalborg will constitute 80% of electricity consumption in 2050, through the expansion of wind power production by a minimum of 170% from the 2007 baseline.

Guidelines	New initiatives	Inquiry
In all case processing, the municipality promotes local development of wind turbines and the use of wind energy. [R 25]	A wind turbine plan (addition to the municipal plan), which points out new wind turbine areas that can ensure the development of necessary wind power is carried out. [NT 34] Once every 4 years energy companies and stakeholders from the municipality are invited for dialogue on expansion of wind energy. [NT 35] Provide the public with information on the development of wind turbines in the municipality in order to promote private investment in wind turbines (wind turbine cooperatives). [NT 36] In cooperation with Aalborg University and relevant business enterprises, work on the positioning of a national test center for wind turbines in Aalborg will be carried out. [NT 37]	Assess the offshore location of wind turbines or modification of proximity requirements, for example in relation to housing, could be considered to ensure adequate wind power in Aalborg. [U 20] Opportunities to develop and operate their own wind turbines should be examined in connection with the Network for Sustainable Business Development, among others. [U 21]

Solar cells

Solar cells are increasingly used primarily related to new construction and renovation of roofs, balconies, etc.

Solar cells continue to have a relatively long payback at higher latitudes, though the economic payback of solar cells in recent years has evolved in a favorable direction, as a result of rising energy prices and lower prices for solar cells. Continued research and development of solar cells are expected eventually to make solar cells more competitive in Denmark.

Aalborg Municipality's Sustainability Strategy 2008-2011 includes a target to install at least 5,000 m² of solar cells by 2020.

Strategy

Solar cells are used in electricity production to the extent that it is energy- and environmentally beneficial and economically viable.

Goal

By 2020, a minimum of 5,000 m² solar power plants in Aalborg is installed.

In 2030 electricity production from solar cells constitutes of minimum around 1% of total electricity consumption.

Guidelines	New initiatives	Inquiry
Solar panels should appropriately be integrated aesthetically and architecturally in buildings in relation to new buildings and renovations of buildings. [R 26]	In connection with low energy requirements in district heating areas the integration of solar cells in buildings are recommended. [NT38]	Investigate the possibility of the establishment of private solar guilds including the establishment and location of large solar power plants. [U 22]

Solar heat

The potential for solar heat in Denmark is quite significant. Solar heat can be used both in individual plants, which supply the individual house or property and public facilities that provide for a district heating system.

Typically, there is a significant financial benefit from collective facilities in relation to individual installations.

Nationwide, the number of large solar plants for district heating plants has increased significantly in recent years. It has proven to be both an environmentally and an economically attractive solution to combine oil, natural gas, or biomass based district heating, with solar heat. Collective solar heating systems require large heat storage for both daily and seasonal storage. Most decentralized heating systems already possess storage tanks, which can be used for day storage. Today Ulsted Heating Plant is the only plant in the Municipality that has a large solar heat plan totaling 5,000 m².

There is still great potential in individual solar systems in areas without public supply. In these areas it can be combined with solar heat pump systems.

Strategy

Solar power is as a starting point used for domestic hot water and space heating in areas without district heating supply.

Collective solar heat plants are used to generate base loads in decentralized district heating systems and can be used as an alternative to biomass.

Goal

By 2030 solar heat (possibly in combination with heat pumps) is included as a base load for all heating outside the public service areas.

Retningslinjer	New initiatives	Inquiry
	In connection with heat planning, socio-economic and environmental assessments of the use of solar heating systems in both individual and collective facilities are carried out. [NT39] In connection with heat-planning guidelines for the use of solar heat in areas outside the collective supply areas are developed. [NT40]	The possibilities for the establishment of private joint solar heat plants (possibly combined with heat pump plants) should be examined during the heat planning. [U 23]

Heat pumps

Heat pumps for both individual, collective, and industrial heating combined with heat storage can be used in relation to the regulation of varying electricity production from wind turbines and will therefore be one of the options when the municipality must free itself from fossil fuels.

Large heat pumps in district heating systems will be simplest to use as regulating plants, but also smaller individual heat pump systems are expected eventually to contribute to the regulation of electricity consumption. It requires, however, that the necessary heat storage and automatic control options are present. It will also require a more flexible pricing policy that makes it more attractive to use electricity, for example, to transfer energy to heat pumps in times with large supplies of electricity.

Strategy

Expansion of heat pumps with the possibility of heat storage to ensure necessary regulatory options for electricity production from wind turbines should be secured.

Smaller heat pumps for individual domestic hot water and space heating systems used in areas without public supply should be applied.

Large heat pumps in district heating systems should be used in connection with the adjustment of electricity production from wind turbines and in the exploitation of terrestial heat, geothermal, etc. in collective installations.

Goal

In 2030, 750 TJ of total heat demand is expected to be supplied with heat pumps.

By 2030 heat pumps (possibly in combination with solar heating) represents the primary heating of buildings outside the public service areas.

Guidelines	New initiatives	Inquiry
In connection with heat-planning, guidance for the use of heat pumps in areas outside the collective supply areas is developed. [R 27]	In connection with heat-planning, socio-economic and environmental assessments of the use of heat pumps in both individual and collective facilities is carried out. [NT 41]	

Cooling

Energy demand for cooling has increased significantly in recent years. This applies especially to large buildings such as shopping centers, office buildings, hotels, and hospitals.

District cooling can in some cases be an alternative to more energy-consuming individual installations. District cooling is generally not an option for municipally-owned companies as it currently is not legal for municipalities to guarantee loans to local companies operating cooling systems.

A large part of the cooling load in buildings can be based on the sun, since solar energy will often be present on hot summer days when the cooling needs are greatest.

Strategy

Energy for cooling should as far as possible be minimized and supplied by renewable energy.

Electricity-based refrigeration systems should generally have the possibiliy of cooling storage in order to ensure optimal utilization of electricity production from wind turbines.

Goal

No specific goals before 2015.

Guidelines	New initiatives	Inquiry
	For larger building projects socio-economic and environmental assessments of major climate-friendly refrigeration, for example in connection with the new hospital in Aalborg East, should be carried out. [NT 42]	The scope for increased use of renewable energy plants based on solar energy for cooling must be examined. [U24] The possibilities for the establishment of district cooling plants should be examined. [U 25]

Transport

A significant part of the total CO_2 emissions stem from the transport sector. Especial road transport and personal transport weighs heavily in the accounts. Car traffic has historically been constantly increasing, with the exception of the periods of the energy crises of the 1970s. In recent years, according to the Danish Road Directorate, the car traffic index shows a slightly stagnating trend.

The transport sector's share of Aalborg's total CO_2 emissions is calculated using the CO_2 calculator, as discussed elsewhere in the climate strategy. The share is estimated at approximately 495,000 tonnes of CO_2, equivalent to nearly 33% of the municipality's total emissions and 2.5 tonnes per year per inhabitant in the municipality. The account includes transport by domestic flights, ships and trains and all transportation on the roads in the municipality, cars and other passenger transport, public transport, and freight transport. The share from road transport amounts to approx. 395,000 tons of the total municipal emissions and from this passenger transport emits approx. 272,000 tons, equivalent to 18% of the municipality's total emissions.

To achieve a CO_2-neutral transport system, it is expected, in addition to switching to electricity produced from renewable energy sources as a fuel, that it is necessary to reduce passenger transport, because the ambition to be self-sufficient in renewable energy sets a limit to the proportion that can be allocated the transport sector.

The Energy Vision 2050 (Energivision) paves the way for a share of 50% of personal transport by car, 10% by bicycle and the remaining 40% of public transport. Current modal share is, respectively, 75% (cars), 5% (bike) and 20% (public transport).

In transport, there are generally three different types of instruments that can reduce CO_2 emissions:

- Reduced transportation needs: Through urban planning we can work to densify cities in order to create smaller distances for different trafficgenerating functions such as jobs, shopping, etc. and improve the basis for public transport. At the state level, a change of transport allowance scheme to make it more attractive to live near workplaces with shorter driving distances and reduced CO_2 emission as a positive co-benefit.
- Development of technology: Improving vehicle and fuel technology can contribute to a reduction of CO_2 emissions through better fuel economy and fuel with little or no CO_2 emissions, including second generation biofuels.
- Shift to alternative modes of transport: Improving the competitiveness of, for example, public transport and cyclists can migrate traffic from passenger traffic to alternative modes of non-motorised transport, thus contributing to reducing CO_2 emissions.

The climate strategy focuses on the major priorities: Improving public transport, more cyclists, limitation of private car use, and the development of more environmentally friendly vehicles.

As citizens of Aalborg, individuals can help to reduce CO_2 emissions from the transport sector, as it is individual transport that is most important in the financial statements. Every time you are considering taking your car, you should consider whether you could have used alternative means of transport for the trip.

It can often be advantageous to use public transport for trips to the city center. The bus takes you right into the center and you avoid having to look for free parking and the expense that is often associated with parking in city center.

By choosing the bike it benefits not only the climate, but also your own health. Make it a good habit that kids take their bikes to school instead of being driven.

In larger workplaces, it can often be advantageous to have carpooling schemes with colleagues. By running several together the climate is spared, while the cost for driving is divided over more people.

Public transport

Cyclism/ cycling

Transport by private car

Environmetally friendly vehicle

Public transport

Passenger transport modal share has over the last 10 years has fallen. In an overall growing market with more transport, public transport lost market share to passenger cars and bicycles. In Aalborg, buses and trains have around 8% of the local share of personal trips.

A doubling of the public transport share of passenger transport will require a massive local focus on more bus departures with less friction through more roads allocated to buses and bus lanes and signal priority. In the long term, light rail will be needed to handle the increased share of transportation work. A number of national means are necessary, as it will be necessary to supplement with restrictions on private cars.

Ensuring 1-hour travel time between the major cities in Denmark, making it possible to get from Copenhagen to Aalborg in 3 hours, will also move people from cars and planes to public transport. The electrification of the railway all the way to Aalborg will mean that you can use environmentally friendly electricity instead of fossil fuel based means.

Local measures to lessen the friction of public transport, as light rail and bus lanes will be needed and public transport must increasingly be incorporated into the settlement and location of enterprises and the future municipal road development planning. Public transport must be used more efficiently, to ensure energy efficiency per seat, which is better than private cars.

Strategy

Public transport must be improved by increasing the supply, frequency, travel speed and reliability so that public transport is always perceived as an attractive alternative to the private car

CO_2 accounts for public transport in Aalborg Municipality will contribute positively to the municipality's total CO_2 accounts.

Goal

The market share of public transport should be doubled to 40% by 2050 through investments in improved bus services and rail-bound transport services in Aalborg and Nørresundby (light rail).

The market share of the busiest routes for public transport will be increased by 2% annually in each plan period.

Increasing the frequency of the lines that are not lane-used, and increased accessibility for buses on routes where it is difficult to get through.

The use of renewable energy in the buses in public transport should in 2020 be at least 50% of the total consumption of the fuel mix.

Guidelines	New initiatives	Inquiry
Partnerships with a view to the establishment of commuter plans for larger companies should be established. [R 28] Placing of new neighborhoods and densification of the city around the main public transport corridors. New districts and expansion plans are made taking into account public transport. [R 29] Public transport serving new neighborhoods and dense urban areas before the districts are fully developed, if necessary, with new routes. [R 30] In the short term, bus routes must be adjusted and extended in relation to changing travel patterns, new businesses, and re-developed settlements. The focus is on the major travel flows. Frequency increases significantly, especially during rush hour, so there is enough room on the bus. [R 31] Climate considerations should be included in the planning of the municipal driving (referred through Kørselskontoret) and route planning for public transport (road map). [R 32]	Projects for improved accessibility for buses [see the report "Forbedret busfremkommelighed i Aalborg" (specific projects, 1 project in each plan period)], must be carried out. [NT 43] The frequency on selected bus routes will be increased. [NT 44] Several roads have car traffic downgraded / removed in order to upgrade the bus service. [NT 45]	A possible light rail to serve the corridor between Aalborg Central City and the University Hospital in Aalborg East is explored. [U 26] Projects for the Investigation of improved accessibility of public transport over private motorists, including on the stretch between Aalborg Central City and City South in Skalborg, must be carried out. [U 27] It should be examined whether less expensive fares in public transport will increase the number of passengers. Experience shows that reduced tariffs by 25%, there will result in 5% more passengers in buses. Tariffs have the last decade increased approximately three times as much as the general price movement and half as much as the price of gasoline. [U 28] It should be determined whether to establish bus lanes / light rail / tram in corridors with major travel flows. The potential of such following lines need to be assessed: Downtown - Kastetvej Downtown - Skalborg Downtown - Nørresundby to the airport or No Uttrup Downtown - Vejgård - Aalborg east. [U 29]

Cyclism/ cycling

Aalborg Municipality adopted the Biking Action Plan in 2009. Here the focus is on good and safe options for transportation by bicycle. The plan will help to ensure that local cyclists continue to see the bicycle as a good means of transportation, and that new cyclists can choose the bicycle as an alternative to short car trips.

The Biking Action Plan contains a number of bicycle projects in urban and rural areas prioritized in relation to road safety, school, roads, comfort and consistency with the overall paths network. The list is a departure point for the next four years of development of new bike paths. The plan is revised every 4 years.

Via the ARCHIMEDES project a city-bike scheme and bicycle commuter service between Aalborg Central City and the university is established.

The concept 'bike commuter route' is carried on in the project 'Aalborg as a cycling city', as well as a focus on increased services and information for cyclists. The project focuses on improving cycling conditions in central Aalborg and especially to move the shorter commuting trips under 5 km from car to bi-cycle. Bicycle commuter routes between Aalborg Central City and City South and between Aalborg Midtby and Gug / Visse should be establish. Bicycle commuter routes shall provide a network of bicycle routes with high traffic flows, road safety, and service initiatives for cyclists. New bicycle parking, particularly in the city center, and service facilities such as air pump and water fountains should be establish.

Strategy

The conditions for cyclists will be improved by increasing accessibility and improved safety, security as well as service through a focus on commuter routes and promotion of cycling.

Goal

The number of cyclists in Aalborg should be increased by 10% by 2020 compared to 2007 levels, when the bike was responsible for 15% of trips.

The share of trips by the bicycle of the total transport will in 2050 be doubled to 10%.

Guidelines	New initiatives	Inquiry
The action plan for bicycle path infrastructure, will be adjusted every 4. Year. [33] For new local plans, standards for bicycle parking (see the municipal plan) should be incorporated in order to ensure sufficient parking. [R 34]	There must be conducted at least one cycle track project from the Biking Action plan in each planning period. [NT 46] After the project "Aalborg as Cycling City but by 2020 at the latest, the establishment of the remaining bicycle commuter routes to Aalborg Airport and Bouet is initiated. [NT 47] Efforts should be made to maintain Aalborg as a cycling city as a future brand. [NT 48]	

Road transport

Although there are efficiency improvements within energy use and conversion to fossil-fuel free energy in the transport sector, it is also necessary to limit the growth in passenger transport if there should be adequate local renewable energy resources. Motorists must be motivated to use other modes of transport, while the alternative transport modes are improved cf. the preceding sections.

At the national level, there must be efforts to change the rules about transport allowance to reduce the level of commuting to and from local jobs. In addition, a shift in taxation, so it costs less to buy a car, but more to drive a car, will have a significant effect in the reduction in passenger transport.

Strategy

Transport by private cars should be reduced, while maintaining an acceptable passability.

Goal

The modal share of the car within the overall transport system must be reduced from 75% to 50% in 2050.

Guidelines	New initiatives	Inquiry
The road infrastructure plan will be adjusted every 4. year. [35] The Traffic and environmental action plan is replaced by a Mobility strategy by 2012. [36]	Pass ability on the overall roads seeks to be optimizes through Information technology systems(ITS) to improve energy efficiency by driving. [49] Pass ability on the overall roads seeks to be optimizes through Information technology systems(ITS) to improve energy efficiency by driving. [NT 50] Good and useful information on alternative modes of transport and pass ability on the road, will be offered. [51] A Freight strategy will be devolped in 2011-12. [52] In cooperation with industry, commuter plans for all major companies should be developed. [NT 53] The parking action plan will be launched in 2012. [54]	The possibilities for the establishment of road pricing in Aalborg to restrict passenger transport in the city is to be examined, so the work has started if the legal framework is altered to allow for road pricing. [U 30] Before 2015, studies of new methods and measures to reduce car journeys should be carried out. [U 31] It should be examined whether the regulation of parking supply through maximum parking standards instead of minimum standards can be brought into play as a tool. [U32]

Environmentally friendly vehicle

According to Energy Vision 2050, the vehicle fleet is expected to consist of electric and hybrid cars, and synthetic fuels. Moreover, the technology must be sufficiently developed, and the electric cars are to be massproduced in a competitive price range, the infrastructure must also be in place.

Strategy

Aalborg Municipality will promote the use of environmentally friendly vehicles by favoring them in municipal traffic planning.

Goal

In 2050, all passenger transport should be carried out with CO2-neutral energy.

Guidelines	New initiatives	Inquiry
	In cooporation with private actors the municipality tests electric cars in 2011 and 2012 and installation of charge stations will be explored. [NT 55]	There should be an analysis of how the municipality can help to promote the use of environmentally friendly vehicles, including the construction of charging stations and free parking for electric vehicles. [U 33] The guidelines for the establishment of various refueling facilities and to ascertain whether those facilities and locations are in line with the municipal plan and other planning to provide a flexible approach when interest appears to installations.[U34]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Forestry

Afforestation

Afforestation will influence CO_2 accounts in a positive direction, because the trees bind CO_2.

New forests absorb CO_2 from the atmosphere during their early growing period when they produce leaves, stems and roots. A beech, for example annually absorbs and ties 3-4 tonnes of CO2 from the atmosphere.

Established forests are not relevant for CO_2 accounts, because the stock of CO_2 here is fairly constant. Woodfuels also reduce CO_2 emissions to the atmosphere, because they replace fossil fuels and because wood is CO_2 neutral since they emit the same amount of CO_2 by burning as they absorbed during growth.

Strategy

Increase in forest and wetlands must be coordinated with the municpal strategy to combat the reduction in biodiversity.

Goal

The municipality's share of forest should be doubled to 12% of the total municipal area within three generations (2070).

The municipality's share of forest and wetlands must be doubled by 2030 in such a way that also ensures higher levels of biodiversity.

Guidelines	New initiatives	Inquiry
Seeding of new and management of existing forests should be based on a plan to maximize variation and thus biodiversity. The same principles apply to the management of wetlands. [R 37]	The municipality must plan for and purchase land for afforestation in order to double the forest area by 2030. The aim must be to prevent fragmentation of natural areas and help stop the climate and societal decline in bio-diversity. A greater species richness and variation in the Danish countryside contributes in a positive direccion to CO_2 accounts. [NT 56]	Assess whether to further carry out afforestation in the future that must be coordinated with the increased demand for bio-mass production. [U 35] It should be examined whether afforestation for the production of fuel can be compatible with internationally agreed requirements of halting the decline in biodiversity. [U 36]

Agriculture

Agriculture

Removing farmland in marginal areas provides significant CO_2 reductions and is an option as yield potentials on these soils are relatively low.

At the same time, there are significant environmental co-benefits in terms of reduced nitrogen leaching, the possibility of increased biodiversity and thus help to achieve good ecological status, as required by the national water and environmental plans. The total cultivated area of marginal land with high carbon content is about 32.000 hectares (ha). It is estimated that about 21.000 ha of the total is part of the normal operation of agricultural properties. It is assumed that approx half of this area will be removed from cultivation by 2020, resulting in a reduction potential of 100.000t CO2 - equivalent/year.

Strategy

Agriculture must provide biomass for energy supply and even contribute to increased energy efficiency.

Cultivation of agricultural land must be CO_2-effective and contribute to the achievement of good eco-logical status.

Goal

Energy use in agricultural production should be reduced by 50% through energy savings and improve-ments in energy use until 2050 so as to achieve a 15% reduction in consumption by 2020 compared to 2010.

There must by 2020 be removed 10.000ha from marginal agricultural areas with high carbon content.

Guidelines	New initiatives	Inquiry
In connection with environmental approvals and regulatory decisions in relation to environmental and construction energysaving measures implemented through requirements and co-operation should be sought as it should be resolved in the extent to which agriculture can be used in production of biomass. [R38] In catchments areas to Natura 2000 areas, the use of manure from agricultural for biogas is intensified as much as possible. [R 39]	The establishment of wetlands, which is one of the initiated measures in the national water plan, is prioritized so that the municipality establishes as many wetlands as possible. The estab-lishment will be financed by the state if the wetlands remove sufficiently high nitrogen. The establishment of wetlands should be initiated by the municipality, but also in cooperation with farms as project owners. In both cases, the establishment will be based on close and voluntary cooperation with the farms. [NT 57]	In the first planning period, a detailed knowledge of opportunities to promote CO2 efficient agricultural production is to be established. [U 37]

Partnerships

Partnerships

A broad cooperation between the municipality, university and the private sector is essential for the vision and goals on climate change to be achieved. Today, there are a number of partnerships that aim to reduce energy consumption, create climate-friendly products, and enhance the business environmental profile and thus competitiveness.

Network for Sustainable Business development
Aalborg Municipality, in cooperation with Aalborg University and 15 companies, has set up a network to identify green innovation projects that strengthen corporate energy efficiency, development of climate-friendly versions of existing products, and development of new green products. This collaboration will strengthen competitiveness and help the companies to increase their global markets. The cooperation will as well support companies in their efforts to ensure knowledge and funding for it. The work is anchored in each company in a business plan for sustainable development.

The project is now an integral part of environmental work in Aalborg Municipality, but in Aalborg alone there are 40 companies on the waiting list who are ready to enter into the cooperation if more resources are allocated to the project.

Network for sustainable development of livestock production
Aalborg Municipality, together with 6 large livestock farms, LandboNord, Agri North, and the Council of Agro Industry has established a network to develop a concept for a business plan for sustainable development of livestock production. Besides treating traditional environmental impacts, nature actions, and establishing future development opportunities, the network will identify and possibly support green innovation projects, including initiatives to reduce energy consumption.

Green Shops - Green City Aalborg.
Today Aalborg has 45 green stores, which each year complete 3 environmental initiatives in relation to their operations. In the municipality alone there is a potential of 250-300 stores that will choose to be green. Based on the principle of many small streams, energy savings in retail and service industries is reached. Since the shops, hotels, and service companies are very visible in the city, in conjunction with example companies, an intensified effort in the field will support the ambitions to be conceived as a green and attractive growth city, and it will indirectly influence citizens to think about climate and the environment in their everyday lives.

Climate Smart energy solutions - Project PRINCIP
Many sustainable energy solutions often have difficulties to get realized. It is due to a number of inappropriate barriers and missing intersectoral coordination. The project PRINCIP is a Scandinavian energy and environmental project in Northern Jutland with participation of Aalborg and Frederikshavn and Aalborg University - has the task to highlight potential climate-friendly energy supply, develop visions for such and identifying barriers to realization and provide inspiration to act in relation thereto. This opens up an inter-scandinavian experience, where North Jutlandic skills and knowledge are brought into play.

Strategy

In order to promote climate work in Aalborg Municipality, the municipality will work with stakeholders locally, nationally, and internationally.

Goal

In order to ensure the necessary information, dialogue and cooperation on the climate challenge there must be before the end of 2011 established a climate forum, consisting of politicians, citizens, businesses and interest groups.

Aalborg will be active and visible in Danish and European climate policy and participate actively in inter-national climate projects.

The Green store concept is spread to 50 stores annually in the period 2011-2014, to include 250 shops in the municipality by 2016.

The network for sustainable business expanded with a minimum of 10 companies per year in the period 2011-2014 and the primary focus will be on energy efficiency, development of climate-friendly products, and the development of cleantech products.

Through a coordinated biogas, agricultural, and heat planning the development of biogas is supported to be an important element in business development.

Guidelines	New initiatives	Inquiry
	Aalborg Municipality joins the Covenant of Mayors. [NT 58] Network for sustainable devel-opment of livestock production is started in 2011 with special focus on energy efficiency. [NT 59]	Aalborg Municipality will work to develop a regional strategy for the implementation of the climate commission's recommen-dations. [U 38]

Climate education

Climate education

Children and young people must be involved in the climate effort in order to realize and maintain the energy saving effort that is necessary in order to achieve the goal of a fossil-fuel free municipality in 2050.

Children and young people in Aalborg must be trained to deal with climate change and understand its contexts. They must be equipped to take climate responsible choices in their everyday lives both at school and at home. The climate skills they learn in school could be transferred and used at home and possibly kept for a lifetime.

Energy savings in schools is achieved both through energy efficiency of school buildings and through behavioral changes among teachers and students, so synergies are sought between school energy management and student instruction in specific science classes and other disciplines where there exists the possibility of integrating the energy data, environmental, and educational goals.

Strategy

All children and young people in educational institutions located in the municipality should through education have knowledge of the climate challenge and be made aware of climate-friendly behavior.

Goal

All schools in Aalborg must by 2015 have achieved certification as a Green Flag Green School including conducting training in climate and energy savings.

Aalborg Municipality will work towards having all educational institutions located in the municipality by 2018, achieving certification as a Green Flag Green School.

Guidelines	New initiatives	Inquiry
Climate, energy and green touches are implemented into teaching in the public schools. [R 40] Energy management and energy use must be visible in the municipal schools. [R 41]	Create a resource bank where links and inspiration for instruction in energy and environment provides an overview of the opportunities that exist for teaching in external learning environments, school services, other administration and educational initiatives which can support green teaching activities. [NT 60] Climate courses for teachers and leaders at all public schools should be offered at minimum every two years. [NT 61] The development of an Aalborg model for sustainable schools based on Green Flag Green School system should be carried out. [NT 62] A cooperation and partnership between Aalborg Municipality and educational institutions in the Municipality is established, in order to create synergies between local targets on climate and environment and education. [NT 63]	

Local green growth

Local green growth

The realization that we are facing major climate and environmental challenges means that energy and environment are important parameters of competition for businesses.

Companies that demonstrate climate-friendly production, develop energy efficient products, and develop cleantech products such as wind turbines and solar cells can achieve significant competitive advantages. This is reflected in both the EU and the Danish government's growth strategies, where great importance to future growth must be based on / supported by fostering a "climate-friendly resource-efficient and sustainable Europe".

There is a direct correlation between the development of climate-friendly and green business in the municipality and the promotion of positive business development.

Aalborg has strong capabilities in energy and the environment, both professionally and know-how that can be translated into business benefits. Aalborg Municipality's vision of a fossil-fuel free municipality in 2050 requires a further development of these skills, which will enhance the visibility of Aalborg as a climate and energy responsible municipality and will be crucial for attracting business investment and recruitment of qualified labor.

Strategy

Aalborg will expand cooperation with industry to promote climate-friendly and sustainable production and products.

Aalborg Municipality will actively utilise local expertise in the energy area and have them translated into business benefits.

Aalborg wants to focus on energy and the environment by contributing to world-class networks and clusters by supporting the development of cleantech products, renewable energy technologies, and energy efficiency measures in companies.

Goal

Business Network Hub North should be further developed and strengthened, so the North Jutlandic wind power industry continues to improve, in order to cope with increasing global competition.

Through business network FleksEnergi, Aalborg and North Jutlandic skills within collective energy supply and district heating should be further developed to ensure local solutions and technologies to achieve the goal of a fossil-fuel free municipality and to strengthen the competitiveness of enterprises.

Guidelines	New initiatives	Inquiry
For all business advice in Aalborg, climate and energy should be included as an integral part of the overall advice. [R 42] The local and regional business community in the climate and energy sector must be continuously involved in the planning of local business advice. [R 43]	There will be a number of design projects on development of district heating solutions based on local renewable energy sources. [NT 64] New strategic partnerships between companies in the existing business network FleksEnergi is to be developed. [NT 65] Collaborations between North Jutlandic companies in the wind energy industry and Aalborg University will be developed further. [NT 66]	The potentials for export in relation to the use of renewable energy sources in the collective heating must be identified. [U 39] The possibility of establishing several business networks for climate and cleantech companies must be examined. [U 40]

Implementating the strategy

The strategy for climate mitigation uses strategy, goals, and proposes initiatives to reduce CO_2 emissions.

The climate strategy is common to Aalborg Municipality and will span all municipal sectors. The climate strategy's objectives and proposed actions should wherever possible be implemented through existing sectoral planning and associated action plans and the climate strategy to ensure that climate is thought into everything Aalborg is doing.

To ensure that the climate strategy is anchored in the municipal organization and problem solving, including that the strategy guidelines are followed, the new measures will be initiated and knowledge gaps are identified for each initiative the responsible administration is pointed out, and is responsible for the project coordination and follow-up effort. It is simultaneously described, on which level efforts are expected to be further elaborated and translated into concrete action.

The total inventory of climate strategy initiatives concerning climate mitigation is reported in Tables 12.1, 12.2 and 12.3:

Tabel 12.1

Guidelines

Guideline name	Theme	Plan Type	Department	Guideline description
R 1	Buildings	Municipal and local plans	TMF	There are basically demands for low energy buildings in energy class 2015 in all local plans and major renovation projects, with effect from 2012, assuming a positive socio-economic
R 2	Buildings	Local plans	TMF	District heating is recommended as a starting point in all construction, where it is possible.
R 3	Buildings		TMF, FV, SBU	There shall be an ongoing opportunity to finance energy initiatives through the active involvement of the financial sector.
R 4	Buildings	Building permitting	TMF	Energy-saving measures must be integrated in an aesthetically and architecturally appropriate manner.
R 5	Businesses	Economic plan	BF	Climate promotion initiatives are an active part of the municipality's business efforts
R 6	Businesses		TMF	Through networking with businesses and agriculture, energy efficiency and climate-friendly products will be promoted.
R 7	Private households		All	Energy advice must be included in all technical authority processing of relevant cases in the municipal system.
R 8	Climate-friendly behaviour	Purchasing policies	All	Energy-using products purchased for Aalborg Municipality must comply with the Center for Energy Efficiency's information on energy efficient purchases.
R 9	Green IT	IT strategy	All	All purchased PCs, printers and copiers must meet the criteria for EPEAT label, Nordic Swan, or equivalent environmental labeling and at all times the highest Energy Star level (currently 5) or equivalent.
R 10	Street lighting		TMF	Technological progress is monitored closely and is expected in the coming years to produce solutions with greater energy efficiency than current.
R 11	Street lighting		TMF	For the establishment of new and modernization of existing street lighting, Aalborg Municipality should utilise the best possible technologies(BAT) in terms of electricity consumption and operating costs.

Guideline name	Theme	Plan Type	Department	Guideline description
R 12	Street lighting		TMF	Best available(BAT) technology shall be put into use as soon as it can meet the other technical criteria.
R 13	Municipal transport	Purchasing policies	All	Newly purchased municipal passenger cars must be at least Energy Class A.
R 14	Municipal transport		SBU	In connection with the offering of the municipal driving services (via the driving office) it shall be required that vehicles maximum CO2 emissions are at least equivalent to the requirements municipality imposes on its own vehicles.
R 15	Muncipal buildings		All	From 2012, Aalborg Municipality requires that all municipal construction (new construction and renovation) will be built as low-energy buildings, equivalent to energy class 2015 regulations, assuming a positive economic return.
R 16	Muncipal buildings		All	Municipal buildings located in the district heating areas shall be heated by district heating.
R 17	Muncipal buildings		All	Municipal buildings located outside district heating areas should be supplied by renewable energy by 2050.
R 18	Muncipal buildings		All	Energy efficiency upgrades shoud be conducted in connection with building renovation projects.
R 19	Muncipal buildings		All	All new municipal buildings will be equipped with individual renewable energy, like solar power, equivalent to at least 10% of the building's total energy consumption.
R 20	Muncipal buildings		All	Energy-saving measures must be integrated in an aesthetically and architecturally appropriate fashion.
R 21	Muncipal buildings		All	All new and conversion building projects of more than 500 m2 shall be screened to ensure that the best economic and energy-efficient options are chosen. The screening is carried out both in the project screening and design phases.
R 22	District heating	Heating plan, Energy plan	FV	Strategic energy planning must be continuously implemented for Aalborg.
R 23	Biofuel	Heating plan	FV	In heat planning and strategic energy planning Aalborg Municipality must as far as possible ensure a market for biogas in order to displace fossil fuels.
R 24	Geothermal heating	Heating plan	FV	In the context of energy and heat planning, there will be a running focus on when it is socio-economically and environmentally optimal to implement geothermal heat.
R 25	Windmills			Aalborg Municipality will in all permit processing promote local development of wind power and the use of wind energy.
R 26	Solar cells	Building permitting	TMF	Solar panels should be integrated in an aesthetically and architecturally appropriate manner for new construction, alterations, and renovations of buildings.

Guideline name	Theme	Plan Type	Department	Guideline description
R 27	Heat pumps	Heating plan	FV	In the heat planning Aalborg Municipality will draw up guidelines for the use of heat pumps in areas
R 28	Public transport		TMF	Establish partnerships with a view to the establishment of commuter plans for larger companies.
R 29	Public transport	Municipal plan	TMF	Locating new neighborhoods and densification of the city around the public transport corridors. New districts and development plans are made with consideration for public transport.
R30	Public transport		SBU	Public transport serving new neighborhoods and dense urban areas within the districts are fully developed, if necessary, with new routes.
R 31	Public transport	Collective transport plan	SBU	In the short term, bus routes must be adjusted and extended in relation to changing transport habits, new businesses and changes in settle-ment patterns. The focus is on the major travel flows. Frequency increases significantly, especially during rush hour, so there is enough room on the bus.
R 32	Public transport		SBU	Climate considerations in the planning of municipal driving (through the driving office) and route planning for public transport.
R 33	Cycling		TMF	The action plan for bicycle path infrastructure, will be adjusted every 4. Year
R 34	Cycling	Local plans	TMF	For new local plans standards are incorporated for bicycle parking in accordance with the municipal plan, thus ensuring sufficient parking.
R 35	Road transport		TMF	The road infrastructure plan will be adjusted every 4. year
R 36	Road transport		TMF	The Traffic and environmental action plan is replaced by a Mobility strategy by 2012
R 37	Forestry	Afforestation plan	TMF	Planting of new and management of existing forests should be based on a plan to maximize variation and thus biodiversity. The same principles apply to the management of wetlands.
R 38	Agriculture		TMF	In the context of environmental permits and authority decisions in relation to environmental and construction energy-saving measures implemented through requirements and cooperation should be sought to the the extent that agriculture can be used in production of biomass.

Guideline name	Theme	Plan Type	Department	Guideline description
R 39	Agriculture		TMF	In catchments to the marine Natura 2000 areas, the conversion of manure to agricultural biogas is sought as much as possible.
R 40	Climate education		SKO	Climate, energy and green approach shall be considered in teaching within the public schools.
R 41	Climate education		SKO	Energy management and energy use must be visible in the municipal schools.
R 42	Local green growth	Economic plan	BF/TMF	For all business advice in Aalborg, climate and energy should be included as an integral part of the overall advice.
R 43	Local green growth	Economic plan	BF/TMF	The local and regional business community in the climate and energy sector must be continuously involved in the planning of local business advice.

Tabel 12.2

New initiatives

New Initiative	Theme	Plan type	Department	Initiative description
NT 1	Buildings	Building permitting	TMF/FV	Carry out energy screening of all construction projects over 1,500 m2 before granting planning permission to ensure the best energy solutions.
NT 2	Buildings	Building permitting	TMF	Random testing of new construction and major renovation must ensure that the building meets the existing energy requirements.
NT 3	Buildings		TMF	Conduct demonstration projects for energy-efficient town / district / settlements.
NT 4	Buildings	Heating plan	FV	An expected ban on the installation of oil-fired boilers for space heating examined and incorporated into the heat planning.
NT 5	Buildings		TMF/FV	Building owners are encouraged to use the energy companies' offer of thermography of the city's buildings and targeted energy advice.
NT 6	Businesses		TMF	The Municipality will, in cooperation with energy companies as part of environmental monitoring issue guidance on energy efficiency opportunities.
NT 7	Businesses		TMF	Starting from 2012 a collaboration with the North Jutland banks to develop climate-friendly counselling and loan opportunities for companies and financial assessment tools that promote green growth will be in place.
NT 8	Private households		All	Aalborg Municipality will work for a national tax system that promotes "climate-friendly" behavior of citizens
NT 9	Private households		FV	Cooperation with energy companies, builders, and contractors on energy saving campaigns.
NT 10	Private households		SBU	There should be competitions between neighborhoods on energy savings.
NT 11	Private households		TMF	Inform the public regularly about their potential for energy savings through the green shops.
NT 12	Private house-holds		SBU	Implement citizen involving climate projects, such as CO2 neutral village Fjellerad.
NT 13	Private house-holds		FV/SBU	Citizens must be involved and the individual household's CO2 footprint will be revealed.
NT 14	Climate friendly behave-ior		All	The use of electricity for municipal buildings, plant and equipment (excluding user-financed areas) must come from new renewable energy plants.
NT 15	Green IT		BF	By the end of 2011, all administrative PCs in the Municipality related to Windows 7 platform, will be connected to a central control, such as sleep functions.
NT 16	Green IT		BF	Server rooms designed with the utmost consideration to energy consumption and following guidance from the Centre for Energy.

New Initiative	Theme	Plan type	Department	Initiative description
NT 17	Street lighting		TMF	Streetlights on roads, paths and squares in the municipality will be regularly renewed with new energy efficient technologies using less power consumption. This Includes metal halide and CFL as well as the newer LED diode technology.
NT 18	Street lighting		TMF	At traffic roads, BAT will be introduced when illumination requirements for this type of illumination solution can be achieved, and when the technology of light quality and total economic payback period of replacing and operating matches the other known light source technologies.
NT 19	Street lighting		TMF	On residential streets, BAT will be introduced when the technology light quality and total economic payback period of replacing and operating matches the other known light source technologies.
NT20	Street lighting		TMF	Traffic lightning will be changed to LED technology or the best avalible technology when they are renovated or renewed so all traffic lightning in the municipality will be changed by 2020.
NT21	Street lighting		TMF	Other new technologies for controlling lights will be tested for potential energy savings. In 2011, two new technologies for dimming were tested.
NT 22	Municipal transport		ÆLD	10% of the cars in municipality's elderly care division must by 2015 be electric cars.
NT 23	Kommunal transport		All	Each of the municipality's administrations should encourage staff to use public transport and offer bikes and electric bikes to the greatest extent possible.
NT 24	Municipal transport		All	Municipal administrations should offer employees with official driving in their own car and with a driving needs of more than 10,000 km per year a municipal vehicle if their vehicle does not meet the requirements of the Energy Class A.
NT 25	Municipal transport		All	Municipal employees with a significant work-related driving requirement (> 5.000km per year) included within the care sector and employees with work-related driving (trucks and contractors' machinery) must undergo a course in energy efficient driving techniques.
NT 26	Municipal Buildings		TMF, SBU	By 2014 there must be developed a sustainability manual describing the goals and efforts in energy - and environmentally sound municipal construction and design.
NT 27	Municipal Buildings		All	Energy Management should be implemented by the end of 2014 in all municipal buildings.

New Initiative	Theme	Plan type	Department	Initiative description
NT 28	Municipal Buildings		All	Before the end of each council term there must be established a long-term plan for energy renovation of municipal buildings to an energy standard similar to the contemporary low-energy class.
NT 29	District heating	Heating plan	FV	In connection with heat-planning in the current planning period societal, corporate and private economic and environmental assessments are carried out in relation to: 1) Different renewable technology solutions and local fossil-fuel free energy resources. 2) Establishment of transmission lines from the central district area to areas with decentralized district. 3) A conversion of heat supply from individual oil and natural-gas for heating to district heating.
NT 30	Biofuels	Municipal plan	TMF	In the municipal plan (addition) areas with opportunity for placements of biogas plants are identified.
NT 31	Biofuels	Municipal plan	TMF	As part of the environmental approval scheme, biogas production is promoted by motivating agriculture to deliver their manure to biogas.
NT 32	Biofuels	Municipal plan	TMF	Areas in the municipality are designated where it would be appropriate to grow energy crops.
NT 33	Geometric heat	Heating Plan	FV	In connection with heat-planning a strategy for the use of geothermal heat in Aalborg Municipality will be determined.
NT 34	Wind turbines	Municipal plan	TMF	A wind turbine plan (addition to the municipal plan), which points out new wind turbine areas that can ensure the development of necessary wind power is carried out.
NT 35	Wind turbines	Municipal plan	SBU/TMF	Once every 4 years energy companies and stakeholders from the municipality are invited for dialogue on expansion of wind energy.
NT 36	Wind turbines		SBU/TMF	Provide the public with information on the development of wind turbines in the municipality in order to promote private investment in wind turbines (wind turbine cooperatives).
NT 37	Wind turbines	Municipal plan	TMF	In cooperation with Aalborg University and relevant business enterprises, work on the positioning of a national test center for wind turbines in Aalborg will be carried out.

New Initiative	Theme	Plan type	Department	Initiative description
NT 38	Solar cells		TMF	In connection with low energy requirements in district heating areas the integration of solar cells in buildings are recommended.
NT 39	Solar heat	Heating Plan	FV	In connection with heat planning, socio-economic and environmental assessments of the use of solar heating systems in both individual and collective facilities are carried out.
NT40	Solar heat	Heating Plan	FV	In connection with heat-planning guidelines for the use of solar heat in areas outside the collective supply areas are developed.
NT 41	Heat pump	Heating Plan	FV	In connection with heat-planning, socio-economic and environmental assessments of the use of heat pumps in both individual and collective facilities is carried out.
NT 42	Cooling	Heating Plan	FV/TMF	For larger building projects socio-economic and environmental assessments of major climate-friendly refrigeration, for example in connection with the new hospital in Aalborg East, should be carried out.
NT 43	Public transport		TMF/SBU	Projects for improved accessibility for buses see the report "Forbedret busfremkommelighed i Aalborg" (specific projects, 1 project in each plan period), must be carried out.
NT 44	Public transport		SBU	The frequency on selected bus routes will be increased.
NT 45	Public transport		TMF	Several roads have car traffic downgraded / removed in order to upgrade the bus service.
NT 46	Cycling		TMF	There must be conducted at least one cycle track project from the Biking Action plan in each planning period.
NT 47	Cycling		TMF	After the project “Aalborg as Cycling City but by 2020 at the latest, the establishment of the remaining bicycle commuter routes to Aalborg Airport and Bouet is initiated.
NT 48	Cycling		TMF	Efforts should be made to maintain Aalborg as a cycling city as a future brand.
NT 49	Road transport		TMF	Pass ability on the overall roads seeks to be optimizes through Information technology systems(ITS) to improve energy efficiency by driving.

New Initiative	Theme	Plan type	Department	Initiative description
NT 50	Road transport		TMF	Continue to work with behavior-regulating parking charges in the city center, and regulation of parking supply through maximum parking standards instead of minimum standards can be brought into play as an instrument.
NT 51	Road transport		TMF	Good and useful information on alternative modes of transport and pass ability on the road, will be offered.
NT 52	Road transport			A Freight strategy will be devolped in 2011-12
NT 53	Road transport		TMF	In cooperation with industry, commuter plans for all major companies should be developed.
NT 54	Road transport		TMF	The parking action plan will be launched in 2012
NT 55	Environmentally friendly vehicles		TMF	In cooporation with private actors the municipality tests electric cars in 2011 and 2012 and installation of charge stations will be explored.
NT 56	Forestation		TMF	The municipality must plan for and purchase land for forestation in order to double the forest area by 2030. The aim must be to prevent fragmentation of natural areas and help stop the climate and societal decline in biodiversity. A greater species richness and variation in the Danish countryside contributes in a positive direction to CO2 accounts.
NT 57	Agriculture		TMF	The establishment of wetlands, which is one of the initiated measures in the national water plan, is prioritized so that the municipality establishes as many wetlands as possible. The establishment will be financed by the state if the wetlands remove sufficiently high nitrogen. The establishment of the wetland should be initiated by the municipality, but also in cooperation with farms as project owners. In both cases, the establishment will be based on close and voluntary cooperation with the farms.
NT 58	Partnership		SBU	Aalborg Municipality joins the Covenant of Mayors.
NT 59	Partnership		TMF	Network for sustainable development of livestock production is started in 2011 with special focus on energy efficiency.

New Initiative	Theme	Plan type	Department	Initiative description
NT 60	Climate education		SKO/SBU	Create a resource bank where links and inspiration for instruction in energy and environment provides an overview of the opportunities that exist for teaching in external learning environments, school services, other administration and educational initiatives which can support green teaching activities. [NT 56]
NT 61	Climate education		SKO/SBU	Climate courses for teachers and leaders at all public schools should be offered at minimum every two years.
NT 62	Climate education		SKO/SBU	The development of an Aalborg model for sustainable schools based on Green Flag Green School system should be carried out.
NT 63	Climate education		SKO/SBU	A cooperation and partnership between Aalborg Municipality and educational institutions in the Municipality is established, in order to create synergies between local targets on climate and environment and education.
NT 64	Local green growth		BF/TMF/FV	There will be a number of design projects on development of district heating solutions based on local renewable energy sources.
NT 65	Local green growth		BF/TMF	New strategic partnerships between companies in the existing business network FleksEnergi is to be developed.
NT 66	Local green growth		BF/TMF	Collaborations between North Jutlandic companies in the wind energy industry and Aalborg University will be developed further.

Tabel 12.3

Inquiry

Inquiry name	Theme	Plan type	Department	Inquiry description
U 1	Buildings		BF (AK buildings)	Studies and demonstration projects for energy efficient building renovation of existing buildings with respect for the original architecture is pursued.
U 2	Businesses		TMF	By 2012, an inventory of agriculture's total CO2 emissions, including energy and methane emissions based on actual data for local agriculture is to be conducted
U 3	Private households		FV	The ability to create local and national economic incentive for people to save energy is to be examined.
U 4	Climate-friendly behavior		FV/TMF	The possibilities for the establishment of municipal wind turbines should be examined.
U 5	Climate-friendly behavior		SBU	Investigate the possibility of establishing a curve breaker[1] agreement with The Danish Knowledge Centre for Energy Savings in Buildings.
U 6	Climate-friendly behavior		SBU	The possibilities for the establishment of a fund to finance energy savings and renewable energy systems in municipal buildings must be examined. **[U 6]**
U 7	Green IT		BF	It is considered whether leasing schemes on all municipal PCs should be exercised in order to ensure replacement of PCs every 3 years as the newest and thus often the most environmentally friendly / energy efficient models are used.
U 8	Green IT		BF	A survey of the possibilities of moving to thin-clients by the end of 2014 is to be conducted.
U9	Street lightening		TMF	In terms of energy consumption the mercury light sources are the least energy-efficient light sources we have currently and thus provides the greatest savings of potential (30-45% depending on lamp wattage and lumens). Since the mercury light sources are to be removed from production in 2015 according to an EU decree, there must be alternatives to the municipality's approximately 15,000 luminaires with mercury lamps.
U 10	Municipal transport		All	To reduce travels made by employees to meetings, conferences etc., the technical and economic aspects of using video-conference equipment should be examined

[1] Curve breaker is a term used when a curve is increasing i.e. showing an increase in consumption and the initiative is to break the curve and thereby making it break i.e. a decrease in consumption.

Inquiries

Inquiry name	Theme	Plan type	Department	Inquiry description
U 11	Municipal transport		All	A car-analysis of the municipal driving with consideration to efficiency and climate impact should be carried out.
U 12	Municipal buildings		BF	In order to determine energy requirements, including specific requirements for building components for renovation and conversion tasks, the municipality will be included in possible demonstration projects.
U 13	Municipal buildings		SBU	A pre-analysis that can show energy-saving potentials and economics in relation to municipal / private partnership with a private energy service company (ESCO cooperation) should be carried out.
U 14	District Heat		FV	The opportunities to conduct studies and demonstration projects for efficient use of district heating in low-energy buildings in district heating areas should be analyzed.
U 15	District Heat		FV	The possibilities of how the district heating system can be used as storage for fluctuating energy production is considered in the strategic energy planning.
U 16	Bio fuel		TMF	The potential for cultivation of energy crops must be investigated, including the potential for business development (Green Growth) from the biomass production.
U 17	Bio fuel		FV	The possibilities for use of biogas in city gas network, including use of biogas in buses, trucks and municipal vehicles should be examined.
U18	Bio fuel	Heating Plan	FV	In connection with heat-planning, the extent to which a reorganization of the solid fuel boiler to solar and heat pumps in the areas without public supply can happen should be examined.
U 19	Geothermic heat	Heating Plan	FV	In connection with heat-planning studies, possible / optimal locations of geothermal plants in Aalborg Municipality should be located.
U 20	Wind turbines		FV/TMF	Assess the offshore location of wind turbines or modification of proximity requirements for example in relation to housing could be considered to ensure adequate wind power in Aalborg.
U 21	Wind turbines		TMF	Opportunities to develop and operate their own wind turbines should be examined in connection with the Network for Sustainable Business Development, among others.
U 22	Solar cells		FV	Investigate the possibility of the establishment of private solar guilds including the establishment and location of large solar power plants.

Inquiry name	Theme	Plan type	Department	Inquiry description
U 23	Solar heat		FV	The possibilities for the establishment of private joint solar heat plants (possibly combined with heat pump plants) should be examined during the heat planning
U 24	Cooling		FV	The scope for increased use of renewable energy
U 25	Cooling		FV	The possibilities for the establishment of district cooling plants should be examined.
U 26	Kollektiv transport		SBU	A possible light rail to serve the corridor between Aalborg Central City and the University Hospital in Aalborg East is explored.
U 27	Public transport		SBU	Projects for the Investigation of improved accessibility of public transport over private motorists, including on the stretch between Aalborg Central City and City South in Skalborg, must be carried out.
U 28	Public transport		SBU	It should be examined whether less expensive fares in public transport will increase the number of passengers. Experience shows that reduced tariffs by 25%, there will result in 5% more passengers in buses. Tariffs have the last decade increased approx. three times as much as the general price movement and a half times as much as the prices of gasoline.
U 29	Public transport		SBU	It should be determined whether to establish bus lanes / light rail / tram in corridors with major travel flows. The potential of such following lines need to be assessed: Downtown - Kastetvej Downtown - Skalborg Downtown - Nørresundby to the airport or No Uttrup Downtown - Vejgård - Aalborg east.
U 30	Road transport		TMF	The possibilities for the establishment of road pricing in Aalborg to restrict passenger transport in the city is to be examined, so the work has started if the legal framework is altered to allow for road pricing
U 31	Road transport		TMF	Before 2015, studies of new methods and measures to reduce car journeys should be carried out.
U 32	Road transport			It should be examined whether the regulation of parking supply through maximum parking standards instead of minimum standards can be brought into play as a tool.
U 33	Environmental friendly cars		TMF	There should be an analysis of how the municipality can help to promote the use of environmentally friendly vehicles, including the construction of charging stations and free parking

Inquiry name	Theme	Plan type	Department	Inquiry description
U 34	Environmental friendly cars		TMF	The guidelines for the establishment of various refueling facilities and to ascertain whether those facilities and locations are in line with the municipal plan and other planning to provide a flexible approach when interest appears to installations.
U 35	Forestry		TMF	Assess whether to further carry out forestation in the future that must be coordinated with the increased demand for biomass production.
U 36	Forestry		TMF	It should be examined whether forestation for the production of fuel can be compatible with internationally agreed requirements of halting the decline in biodiversity.
U 37	Agriculture		TMF	In the first planning period, a detailed knowledge of opportunities to promote CO2 efficient agricultural production is to be established.
U 38	Partnership		BF/TMF	Aalborg Municipality will work to develop a regional strategy for the implementation of the climate commission's recommendations.
U 39	Local green growth		BF	The potentials for export in relation to the use of renewable energy sources in the collective heating must be identified.
U 40	Local green growth		BF	The possibility of establishing several business networks for climate and cleantech companies must be examined.

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