



Vejen til et MERE bæredygtigt Bornholm Bornholms Energistrategi 2025

The Path to an Even More Sustainable Bornholm 2025 Energy Strategy for Bornholm





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EN GLOBAL AGENDA - ET BORNHOLMSK VAREMÆRKE

I dag benytter de fleste af os strøm og varme der er produceret på olie og kul med største selvfølgelighed. Men de begrænsede olieressourcer og den stigende velstand globalt gør, at forsyningssikkerhed og en markedspris der er til at betale hurtigt kan blive usikre faktorer. Som øsamfund er vi ekstra afhængige af transport - bl.a. som livline til omverdenen. For at opretholde den og en fortsat velstandsudvikling på øen ligger en stor udfordring i at sikre en stabil energiforsyning til en pris vi kan betale.

Bornholms Energistrategi 2025 - "Vejen til et MERE bæredygtigt Bornholm" viser en mulig vej til at udfase øens forbrug af fossile brændsler og gøre Bornholms energiforsyning mere bæredygtig. Strategien er udarbejdet som led i Bornholms deltagelse i det igangværende EU-støttede energiprojekt Transplan. Projektet er

initieret i B7 - det internationale ø-samarbejde mellem 7 øer i Østersøen som Bornholm er en del af.

Handlerne i Energistrategi 2025 kræver vilje til samarbejde, koordinering og en række investeringer, hvis visionen om en bæredygtig energiforsyning skal nås inden 2025. Med denne strategi lægges op til et tættere samarbejde mellem øens aktører allerede de kommende år. Det fælles mål er at skabe rammer for en energiforsyning, der viser ansvarlighed i forhold til reduktion af CO2 og samtidigt bidrager positivt til at understøtte øens erhvervsudvikling.

Bjarne Kristiansen
Borgmester
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A GLOBAL AGENDA - A BORNHOLM HALLMARK

Today most people use electricity and heat generated from oil and coal without giving it a second thought. Yet the finite nature of our oil-based resources and the spread of prosperity around the world can quickly undermine reliable supplies of these resources and market prices that are within our means. As an island community, we are particularly dependent on transport - including as our lifeline to the rest of the world. In our efforts to maintain this and continue developing our island's prosperity, we are facing a major challenge: ensuring stable supplies of energy at a price we can afford.

The 2025 Energy Strategy for Bornholm entitled "The Path to an Even More Sustainable Bornholm" shows a possible way to phase out the island's consumption of fossil fuels and make Bornholm's supply of energy more sustainable.

This strategy was prepared as part of Bornholm's involvement in "Transplan", an ongoing energy project supported by the European Community. The project was initiated under the auspices of B7, which is an international collaborative effort involving seven islands in the Baltic Sea, one of which is Bornholm.

The actions envisioned in the 2025 Energy Strategy require the will to work together, coordinate efforts and make a number of investments for implementing the vision of a sustainable supply of energy by 2025. This strategy sets the stage for closer collaboration among the island's players even during the next few years. Our common goal is to lay the groundwork for a supply of energy which reflects our responsibility in relation to reducing carbon emissions and, at the same time, makes a positive contribution to supporting the island's industrial development.

Bjarne Kristiansen
Mayor
Member of the B7 Steering Committee

RESUME

Denne energistrategi er udviklet som led i et igangværende energiprojekt ”Transparent Energy Planning and Implementation” kaldet Transplan. Projektet er udsprunget af samarbejdet mellem 7 øer i Østersøen (B7-gruppen). Projektet løber fra 1. september 2007 til 1. marts 2010 og er støttet af EU’s energi-agentur, EACI, under ordningen ”Sustainable Communities”. (Se evt. bilag A)

Visionen i Bornholms Energistrategi 2025 er at gøre Bornholm til et CO2 neutralt samfund baseret på bæredygtig og vedvarende energi i 2025.

Energistrategi 2025 er udarbejdet på grundlag af registreret og forventet energiforbrug i hhv. 2005 og 2025. Der er udarbejdet tre energibalancer: ”Bornholm 2005”, ”Bornholm 2025 - business as usual” og ”Bornholm 2025 - visionen er nået” der alle bygger på kendt eller afprøvet teknologi. Sidstnævnte scenarie er konkretiseret i 12 handlingsforslag der udgør hovedindholdet i energistrategien.

For at opnå størst mulig forankring af arbejdet, er der på hver ø nedsat et ”Energiforum” bestående af relevante lokale energiaktører og energiinteressenter (Energiforums medlemmer fremgår af bilag B). Bornholms Energiforum har på en række møder afholdt i 2007/08 givet feedback på de tre energibalancer der indledningsvis her kort præsenteres og på de 12 handlingsforslag der præsenteres under følgende overskrifter:

MERE OG RENERE FJERNVARME I BYERNE	1
MERE VEDVARENDE ENERGI UDENFOR FJERNVARMEOMRÅDERNE	2
MERE STRØM FRA FLERE VINDMØLLER	3
MERE BIOGAS	4
MERE MILJØ MED FLERE ELBILER	5
BORNBIOFUEL - NYE VEJE TIL ENERGI	6
BIOETHANOL TIL LANDTRANSPORT	7
SPAR PÅ STRØMMEN	8
SPAR PÅ VARMEREGNINGEN	9
MERE MOTION OG MINDRE TRANSPORT	10
MERE INFORMATION OG RÅDGIVNING	11
MERE KOORDINERING OG SAMARBEJDE	12

Bornholms Energistrategi 2025 er en levende og dynamisk plan. Målet i strategien er fastsat, men vejen - de konkrete handlinger - må regelmæssigt justeres, hvis strategien skal forblive aktuel og kunne danne grundlag for koordinering og optimering af muligheder og ressourcer.

This energy strategy was developed as part of “Transparent Energy Planning and Implementation”, an ongoing energy project commonly referred to as “Transplan”. The project came about as a result of the collaboration of seven islands in the Baltic Sea (the B7 Group). The project runs from 1 September 2007 to 1 March 2010 and is supported by the EACI (Executive Agency for Competitiveness and Innovation, also known as the EU’s energy agency) under the “Sustainable Communities” scheme. (See Appendix A for further details.)

The 2025 Energy Strategy for Bornholm envisions turning Bornholm into a carbon-neutral society based on sustainable and renewable energy by 2025.

The 2025 Energy Strategy was drawn up on the basis of the documented and anticipated consumption of energy in 2005 and 2025 respectively. Three energy balance sheets have been prepared: “Bornholm 2005”; “Bornholm 2025 - Business as Usual”; and “Bornholm 2025 - Vision Achieved”. All three are based on existing or tested technology. The last-mentioned scenario is made more specific in twelve proposed actions which make up the main contents of the energy strategy.

To maximise the embedment of these efforts, each island has set up an Energy Forum whose members are local energy players and parties interested in energy (the members of the Bornholm Energy Forum are listed in Appendix B). At a series of meetings in 2007 and 2008, Bornholm’s Energy Forum gave feedback regarding the three energy balance sheets presented in brief in this document and to the twelve proposed actions presented below under the following headings:

SUMMARY

MORE AND CLEANER DISTRICT HEATING IN TOWNS AND VILLAGES	1
MORE RENEWABLE ENERGY OUTSIDE THE DISTRICT HEATING AREAS	2
MORE ELECTRICITY FROM MORE WIND TURBINES	3
MORE BIOGAS	4
MORE CARS	5
BORNBIOFUEL - NEW SOURCES OF ENERGY	6
BIOETHANOL FOR LAND-BASED TRANSPORT	7
SAVE ELECTRICITY	8
REDUCE HEATING BILLS	9
MORE EXERCISE, LESS TRANSPORT	10
MORE INFORMATION AND ADVICE	11
MORE COORDINATION AND COLLABORATION	12

The 2025 Energy Strategy for Bornholm is a living, dynamic plan. The aim of the strategy has been determined, but the path we have to travel to reach it - i.e. the specific actions we employ - needs to be adjusted frequently to keep the strategy relevant and enable it to lay the groundwork for coordination and optimisation of opportunities and resources.

VISION 2025

VISION 2025

Bornholm er et CO2 neutralt samfund baseret på bæredygtig og vedvarende energi i 2025.

Med en koordineret indsats viste øens befolkning og centrale aktører, at det var muligt at stabilisere og omlægge Bornholms energiforbrug inden for en kort årrække. Det fælles projekt gav øens grønne image ny vind i sejlene, og sikrede bornholmerne en energipris der var til at betale inden oliepriserne for alvor gik til tops. Den større omsætning i lokalt produceret energi skabte øget beskæftigelse i landbruget og energisektoren, og Bornholm og bornholmske produkter vandt nye hjerter, da de blev markedsført med det grønne Ø-mærke.

Visionens sigte er:

- at øge forsyningssikkerheden
- at bidrage til den lokale beskæftigelse og værditilvækst
- at reducere Bornholms afhængighed af fossile brændsler
- at reducere bornholmernes CO2-udslip til et minimum
- at styrke øens grønne image

Visionen har været formuleret på forskellig vis tidligere. Senest i 2008 i brandingstrategien "Mere Bornholm", i den regionale udviklingsplan og i Bornholms samlede kommuneplan- og agenda 21-strategi.

Bornholm is a carbon-neutral community based on sustainable and renewable energy by 2025.

Through a coordinated effort, the island's residents and key players demonstrated that it was possible to stabilise and convert Bornholm's energy consumption within a short span of years. The joint project revitalised the island's green image and secured affordable energy for the residents of Bornholm before oil prices began to skyrocket in earnest. The large-scale turnover of locally-generated energy created more jobs in agriculture and the energy sector, and Bornholm and its products won over many new admirers when the products were marketed under the Green Island label.

The aims of the vision:

- to improve the security of supply;
- to contribute to local employment and value creation;
- to reduce Bornholm's dependence on fossil fuels;
- to minimise the carbon emissions generated by the Bornholm community;
- to reinforce the island's green image.

The vision has been formulated in a variety of ways in the past, most recently in 2008 in the branding strategy "More Bornholm", in the regional development plan and in Bornholm's combined regional-municipal development plan and Agenda 21 strategy.



VEJEN TIL ET MERE BÆREDYGTIGT BORNHOLM
THE PATH TO AN EVEN MORE SUSTAINABLE BORNHOLM

Indholdet i Energistrategi 2025 bygger på tre energibalancer der er udarbejdet ved hjælp af et specialudviklet regneark, hvori alle data om energiforbrug og brændselstyper indgår. Kun handlinger der bygger på afprøvede og økonomisk rentable teknologier er indarbejdet. Med assistance fra konsulentfirmaet PlanEnergi er øens data indtastet og bearbejdet til tre energibalancer:

- Energibalancen ”Bornholm 2005”
- Energibalancen ”Bornholm 2025 - uden særlig indsats”
- Energibalancen ”Bornholm 2025 - visionen er nået”

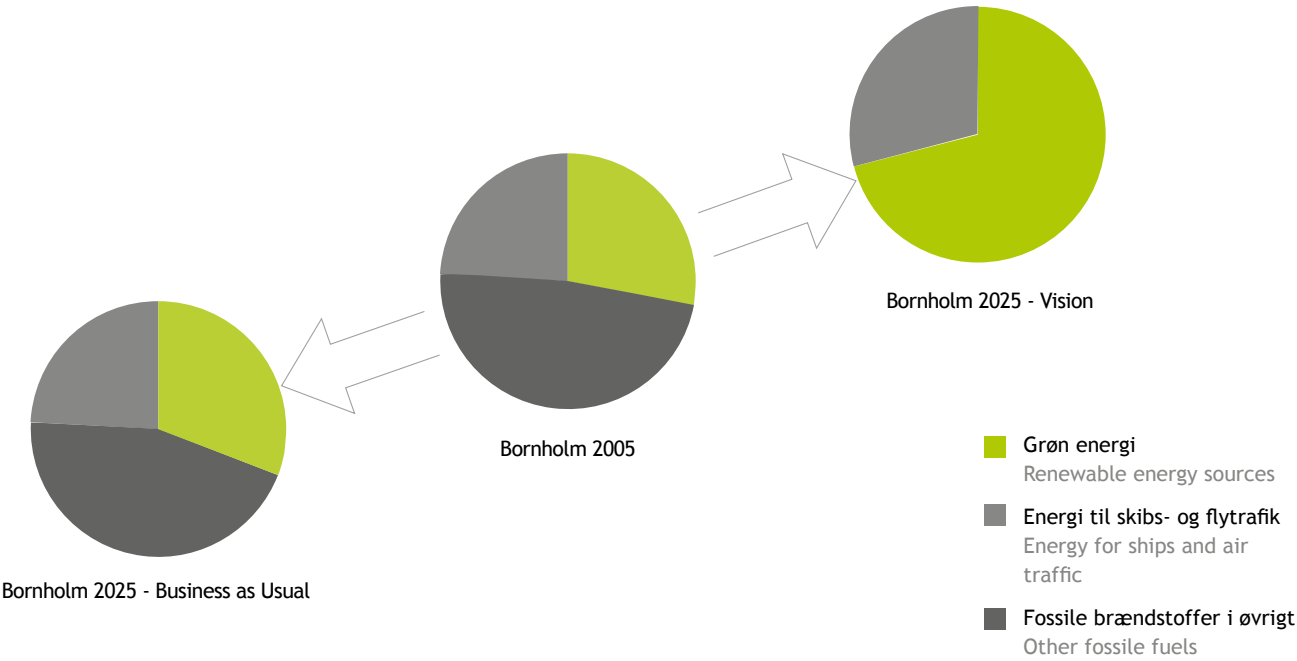
De konkrete data fra energibalancen ”Bornholm 2005” har dannet grundlag for de to scenarier for 2025.

The content of the 2025 Energy Strategy is based on three energy balance sheets prepared using a specially developed spreadsheet incorporating all data relating to energy consumption and types of fuel. Only actions that are based on tested, economically viable technologies have been incorporated. With the assistance of the PlanEnergi consulting firm, the island’s data were input and processed for the three energy balance sheets:

- “Bornholm 2005”
- “Bornholm 2025 - Business as Usual”
- “Bornholm 2025 - Vision Achieved”.

The specific data from the “Bornholm 2005” energy balance sheet laid the groundwork for the two scenarios relating to 2025.

ENERGIBALANCER
ENERGY BALANCES



	Bornholm 2005	2025 Business as Usual	2025 Vision
Affaldsbrænding / Waste burning	4%	4%	5%
Varme pumper / Heat pumps	0%	0%	1%
Biobrændsel (import) / Biofuel (import)	6%	6%	8%
Biobrændsel (lokal) / Biofuel (local)	9%	9%	15%
Halm / Straw	5%	5%	8%
Gødning / Fertilizer	0%	3%	6%
Solvarme / Solar	0%	0%	1%
Vind / Wind	3%	3%	22%
Organisk affald / Organic house waste	0%	0%	5%
Benzin / Benzin	10%	10%	2%
JP 1 / JP 1	1%	1%	1%
Diesel / Diesel	8%	8%	9%
Let olie / Light olie	29%	27%	17%
Tung olie / Heavy olie	0%	0%	0%
Kul / Coal	12%	12%	0%
Gasflaske import / Gas cylinder import	0%	0%	0%
EL / Electricity	12%	11%	0%

Energibalancen for 2005 (opgjort ultimo 2007) svarer stort set til det nuværende forbrug. Den viser at ca. 80% af øens samlede energiforbrug fortsat er baseret på importerede brændsler.

Den største udfordring ligger i at erstatte andelen af importerede fossile brændstoffer som kul, olie, benzin og diesel med energikilder med et lavere CO2-udslip eller som er CO2 neutrale. En væsentlig andel af de importerede fossile brændsler er importerede kul, der bliver anvendt af Østkraft og Rønne Vand og Varme i fjernvarmeproduktionen til Rønne. En anden væsentlig andel af de fossile brændsler der anvendes er olieforbruget til skibs- og flytrafik. Det udgør i 2005 37%

af øens samlede olieforbrug. Heri er kun medregnet brændstof bunkret på Bornholm. Transportregnskabet er valgt opgjort sådan på baggrund af drøftelser med de øvrige partnere i Transplan-projektet. Valget synliggør, at øer her har en særlig udfordring. Ved kun at medregne den ene transportstrækning (i princippet fra øerne) undgås at energiopgørelserne fuldstændigt domineres af fly og skibstrafik, hvis brændstof og teknologiudvikling afhænger af markeds kræfter vi som øsamfund kun har ringe indflydelse på.

The energy balance sheet for 2005 (worked out in late 2007) is basically commensurate with the present level of consumption. It shows that 80% of the island’s total energy consumption is still based on imported fuels.

The biggest challenge lies in replacing the percentage of imported fossil fuels - e.g. coal, oil, petrol and diesel - with energy sources that have lower carbon emissions or which are carbon neutral. An appreciable share of the imported fossil fuels is coal used by the Østkraft (power utility) and Rønne Vand og Varme (heat and water utility) for the production of district heating in Rønne. Another sizeable portion of the fossil fuels goes

to sea and air traffic, constituting 37% of the island’s total consumption of oil in 2005. This figure only includes fuel kept in bunkers on Bornholm. This method of accounting for transport was chosen on the basis of discussions with the other partners in the Transplan project. The choice underlines that this area is a particular challenge for island communities. Including only one direction of transport (in principle away from the islands) in the specifications avoids the risk of the energy accounts being completely dominated by air and sea traffic, whose fuel and technological development depend on market forces over which we, as island communities, exert little influence.

Mærkbar udvikling sker sjældent uden en bevidst indsats. For at illustrere dette er lavet en energibalance for Bornholm i 2025 med de forventede fremskrivninger af forbrugsmønstre bl.a. stigning i elforbrug og øget landtransport. Vi har kaldt dette scenarie ”business as usual”, og har valgt kun at medregne større energianlæg der ved

opgørelsestidspunktet var i drift som f.eks. Biokraft og fjernvarmeforsyningen i Hasle. Som det fremgår af tabel 1 vil CO2-udledningen per indbygger i dette scenarie fortsat stige. Generelt viser dette scenarie, at få større tiltag ikke er tilstrækkeligt til at ændre på status quo, da disse blot vil forsvinde i merforbrug.

Noticeable development rarely occurs without a deliberate effort. To illustrate this, an energy balance sheet was made for Bornholm in 2025 with the expected projected consumption patterns, i.e. increased consumption of electricity, increased land transport, etc. We call this scenario “business as usual” and chose to include only large-scale energy

systems that were operating at the time of specification, e.g. Biokraft, Hasle’s district heating system, etc. As Table 1 shows, the per capita carbon emissions continue to rise in this scenario. In general, this scenario shows that a few sweeping initiatives are insufficient to change the status quo, as they are merely offset by additional consumption.

Med implementering af de handlinger der peges på i denne energistrategi vil visionen, så godt som, være nået i 2025. At energibalancen fortsat rummer en del fossile brændsler skyldes, at der ikke er peget på alternative brændstoffer til skibs- og flytrafikken i denne strategi. Det forventes at pristigninger på olie og skærpede internationale miljøkrav vil sætte skub i en udvikling af alternativer til fossile brændsler også til skibs- og flytrafikken. Hvis ikke det sker indenfor de kommende år, må overvejes, hvordan der kan kompenseres for dette fossile brændstofferbrug i en kommende revision af energistrategi 2025.

Energibalance 2025 - ”Visionen er nået” viser, at energistrategiens vision kan nås ved en samlet indsats. Beregningerne der ligger til grund for energibalancen viste (ikke overraskende), at koordinering af energiressourcer (herunder prioritering af anlæg og teknologi) og en reduktion i forbrug (større energieffektivitet) tilsammen udgør nøglen til at energibalancen kan realiseres inden 2025.

By implementing the actions singled out in this energy strategy, the vision will - for all intents and purposes - be achieved in 2025. The reason the energy balance sheet still includes a number of fossil fuels is that alternative fuels for air and sea traffic are not specified in this strategy. It is expected that oil-price increases and stricter international environmental requirements will boost the development of alternatives to fossil fuels, also for air and sea traffic. If this does not take place in the years ahead, a forthcoming revision of the 2025 Energy Strategy should indicate how to compensate

for this consumption of fossil fuels.

The energy balance sheet “Bornholm 2025 - Vision Achieved” shows that the energy strategy’s vision can be achieved by making a coordinated effort. Not surprisingly, the calculations on which the energy balance sheet is based showed that the coordination of energy resources (including the prioritising of systems and technologies) and the reduction of consumption (greater energy efficiency) jointly comprise the key to implementing the energy balance-sheet figures before 2025.

CO2 emission (1000 t) og vedvarende energi % Carbon emissions (1,000 t) and renewable energy (%)

	I alt Total	Pr. indbygger Per capita	Skibe Sea traffic	Vedvarende energi% Renewable energy%
2005	253	5,8	61	24
2025 (0-alternativ)	271	6,2	61	30
2025	86	2,0	61	76

Hvad kræver det af lokale ressourcer? What local resources will be required to achieve this?

Lokale ressourcer Local resources	Forbrug 2005 Consumption, 2005	Forbrug 2025 Consumption, 2025	Produktion 2005 Production, 2005	Produktion 2025 Production, 2005
Gylle Slurry	40% 40%	80% af gyllen 80% of slurry	1,3 GWh 1.3 GWh	75 GWh 75 GWh
Halm Straw	33 % af overskud 33 % of the surplus	65% af overskud 65% of the surplus	73 GWh 73 GWh	110 GWh 110 GWh
Træ (flis og brænde m.m.) Wood (chips, firewood, etc.)	- -	- -	124 GWh 124 GWh	187 GWh 187 GWh
Affald Waste	89% 89%	95% 95%	57 GWh 57 GWh	61 GWh 61 GWh
Andet (til BornBioFuel) Other (for BornBioFuel)	- -	- -	- -	190 GWh 190 GWh
Import				
Træflis Wood chips	- -	7000 m³ 7,000 m³	9 GWh 9 GWh	18 GWh 18 GWh
Træpiller/briketter Wood pellets/briquettes	14.400 t 14,400 t	12.000 t 12,000 t	71 GWh 71 GWh	59 GWh 59 GWh

På de følgende sider præsenteres energibalancen 2025 - ”Visionen er nået” i 12 handlinger der tilsammen udgør den foreløbige vej. Til hver handling er knyttet en faktaboks der opsummerer målet for handlingen, forudsætninger, virkning (CO2-besparelse), handlingsforslag samt forslag til aktører.

The energy balance sheet “Bornholm 2025 - Vision Achieved” is presented on the following pages in twelve actions which jointly constitute the path at present. A facts box associated with each action sums up the goal of the action, its prerequisites and impact (reduction of carbon emissions), and the measures and players proposed.

MERE OG RENERE FJERNVARME I BYERNE
MORE AND CLEANER DISTRICT HEATING
IN TOWNS AND VILLAGES

1

Varmeplan Bornholm 2007 indeholder udbygningsplaner for fjernvarme baseret på biomasse i Hasle-Sorthat-Muleby-Nyker, Balka-Snøgebæk, Aakirkeby-Nylars-Vestermarie samt Østerlars og Østermarie. Den planlagte udbygning er indarbejdet i denne strategi. Det vil betyde at ca. 60 % af ejendommene på Bornholm på sigt vil blive forsynet med fjernvarme. (Fjernvarme i kystbyer med klippegrund som Allinge-Sandvig, Tejn, Gudhjem og Svaneke kan eventuelt blive aktuelt, når olieprisen stiger yderligere). Fjernvarmen ventes primært produceret på lokale ressourcer som halm, træflis samt overskudsvarme fra Biokraft og BornBioFuel m.fl. Markedspriser, tilgængelighed og teknologi vil afgøre hvilken biomasse der løbende prioriteres.

Fjernvarmeforsyningen i Rønne er baseret på varme fra affaldsforbrændingen (BOFA - Bornholms Affaldsbehandling) og varme produceret på kul suppleret med ca. 15 % biomasse (Østkraft). Derudover har Rønne Vand og Varmen reservecentral baseret på olie. Denne strategi lægger op til, at varmeproduktion på Østkraft inden 2025 primært er baseret på biomasse (halm og flis).

Beregninger viser, at mængden af lokal tilgængelig halm og træflis ikke rækker til fjernvarmeudbygning i yderligere 9 byer. I denne strategi er lokal biomasse valgt suppleret med fortsat import af træflis og solvarmeanlæg (ét eller flere) på samlet ca.12.500 m².

The 2007 Heating Plan for Bornholm includes plans to extend biomass-based district heating to the areas of Hasle-Sorthat-Muleby-Nyker, Balka-Snøgebæk and Aakirkeby-Nylars-Vestermarie, as well as to Østerlars and Østermarie. These extension plans are incorporated into the strategy. This will mean that 60% of Bornholm's households will eventually be supplied with district heating. (District heating in towns and villages situated on bedrock, e.g. Allinge-Sandvig, Tejn, Gudhjem and Svaneke, could become realistic when the price of oil increases to a higher level). District heating is expected to be generated primarily from local resources, e.g. straw, wood chips and surplus heat from Biokraft, BornBioFuel, etc. Market prices, accessibility and technology will determine which biomass will be given priority at the time in question.

The supply of district heating in Rønne is based on heat generated by the incineration of refuse (BOFA, waste management utility) and heat generated by coal, supplemented by biomass (15%) from Østkraft (power utility). In addition, Rønne Vand og Varme (heat and water utility) has a reserve-load facility powered by oil. This strategy sets the stage for basing Østkraft's heat generation primarily on biomass (straw and chips) by 2025.

Calculations show that the volume of straw and wood chips available locally is insufficient for developing district heating in an additional nine villages. Accordingly this strategy uses local biomass, supplemented by solar heating systems (one or more with a combined area of 12,500 m²), and the continued import of wood chips.

MÅL:	GOALS:
- Etablering af fjernvarme baseret på biomasse og sol i 9 byer - Udfasning af kul som brændsel inden 2025	- Establish district heating based on biomass and solar energy in nine villages/towns - Phase out coal as a fuel before 2025
FORUDSÆTNINGER:	PREREQUISITES:
- Lokale brændsler: 15.000 t halm og 25.000 m³ flis - Import: 7000 m³ flis - Solvarmeanlæg på 12.500 m²	- Local fuels: 15,000 t of straw and 25,000 m³ of wood chips - Import 7,000 m³ of wood chips - Solar heating systems covering 12,500 m²
EFFEKT:	IMPACT:
68.000 t CO2 sparet	Elimination of 68,000 t of carbon emissions
HANDLINGSFORSLAG:	MEASURES PROPOSED:
Koordinering af net-struktur, brændsler og optimering af net	Coordination of grid structure, fuels and grid optimisation
AKTØRER:	PLAYERS:
Forsyningsselskaber, Bornholms Regionskommune, brændselsleverandører m.fl.	Utility companies, Regional Municipality of Bornholm, fuel suppliers, etc.

MERE VEDVARENDE ENERGI UDENFOR
FJERNVARMEOMRÅDERNE
MORE RENEWABLE ENERGY OUTSIDE
THE DISTRICT HEATING AREAS

2

De fleste huse i det åbne land og i byområder der ikke er omfattet af fjernvarme opvarmes i dag med olie. Flere supplerer helt eller delvist olieopvarmning med el, brænde, træpiller, korn, halm, flis, solvarme, jordvarme og varmepumper.

Energistrategien forudsætter at stort set alle oliefyr er taget ud af drift inden 2025. De i dag mest anvendte alternativer til erstatning for olieopvarmning er varmepumper og træpillefyr. I beregningsgrundlaget for denne strategi er valgt en ligelig fordeling på 2000 varmepumper og 2000 træpillefyr. For at minimere importen af træpiller anbefales et scenarie, hvor der installeres solvarmeanlæg på halvdelen af træpilleanlæggene. Solvarme er i dag bruger-økonomisk fordelagtigt (for visse forbru-

gere) og vil kunne dække ca. 25 % af disse huses varmekorbrug. Der er naturligvis tale om et forsimplet foreløbigt scenarie. Den teknologiske udvikling og masseproduktion af udvalgte teknologier ventes snart at gøre det rentabelt at skræddersy energiløsninger til individuelle behov ud fra en langt mere varieret palet af kombinationsmuligheder.

Aktuelt er i Danmark i disse år fokus på miljøpåvirkninger fra private brændeovne og brændelseskedler. Hvis der kommer skærpede krav til forbrændingskvalitet og udslip kan det betyde, at dele af den private opvarmning baseret på biomasse, der i dette scenarie regnes for bæredygtig, helt eller delvist må omlægges.

Most houses in the rural and urban areas that are not included in district heating are currently heated by oil. A number of them supplement oil-based heating totally or partly with electricity, firewood, wood pellets, grain, straw, chips, solar heat, geothermal heat and/or heat pumps.

The energy strategy requires the removal from operation of virtually all oil furnaces before 2025. Today, the most widely used alternatives to oil-based heating are heat pumps and wood-pellet furnaces. The calculations of this strategy are based on an equal number of heat pumps and wood-pellet furnaces (2,000 of each). To minimise imports of wood pellets, the strategy recommends a scenario where solar panels are installed in combination with half of the wood-pellet systems. Today, solar heat is advantageous from a user-eco-

nomy perspective (for certain consumers), and it could meet about 25% of the heating needs of these households. Naturally, this is a simplified, preliminary scenario. Technological developments and the mass production of selected technologies are soon expected to make it profitable to tailor energy solutions to meet individual needs on the basis of a far more varied range of possible combinations.

At present, the negative environmental impact of private wood-burning stoves and firewood-fired furnaces is in focus. If stricter requirements are imposed on their combustion quality and emissions, this could require the complete or partial conversion of some of the private heating solutions based on biomass, that are otherwise considered sustainable in this strategy.



MÅL:	GOALS:
• Alle oliefyr omstilles til varmepumper, træpillefyr, solvarme etc.	• Replace all oil furnaces with heat pumps, wood-pellet furnaces, solar heating, etc.

FORUDSÆTNINGER:	PREREQUISITES:
• Solvarmeanlæg (1000 stk.) i forbindelse med etablering af træpillefyr (2000 stk) • 2000 varmepumper (jord-, bjerg-, sø- og luftvarme)	• Solar heating systems (1,000 units) in connection with the installation of wood-pellet furnaces (2,000 units) • 2,000 heat pumps (terrestrial, geothermal, sea/lake heat and air source heat pumps)

EFFEKT:	IMPACT:
• 32.000 t CO2 sparet	• Elimination of 32,000 t of carbon emissions

HANDLINGSFORSLAG:	MEASURES PROPOSED:
• Information og individuel rådgivning • Motivationsfremmende kam-pagner og tilbud • Kvalificering af håndværkere (fagskoler, kurser mm.) • Afdække potentialerne i lokal træpilleproduktion	• Information and consultancy • Motivational campaigns and offers • Skills enhancement of tradesmen (technical schools, courses, etc.) • Identification of prospects for local wood-pellet production

AKTØRER:	PLAYERS:
• Energitjenesten, Østkraft, private energirådgivere, VVS-branchen, Vækstforum, Bornholms Regionskommune, savværker m.fl.	• Energy Service Denmark, Østkraft, private energy consultants, HVAC sector, Growth Forum, Regional Municipality of Bornholm, timber mills, etc.

MERE STRØM FRA FLERE VINDMØLLER
MORE ELECTRICITY FROM MORE
WIND TURBINES

3

På Bornholm er i dag 40 vindmøller med en samlet effekt på ca. 31 MW. De fleste møller er opført i perioden 2001-05 med en samtidig skrotning af udtjente møller.

Bornholms Regionskommune udsendte i 2007 et offentligt debatoplæg om vindmølleudbygning på land. Samlet kom forslag med en kapacitet på ca. 25 MW. Samtidigt blev offentliggjort et forslag til en havvindmøllepark med 12-15 møller placeret 6 km fra kysten ud for Arnager.

Søkablet til Sverige begrænser mængden af strøm der kan eksporteres. Derfor må vi på

Bornholm finde nye veje til afsætning/lagring af strøm, hvis vindkraften øges betydeligt. I denne strategi forudsættes, at der parallelt med udbygningen af vindkraft etableres et lokalt transmissionsnet der kan aftage den øgede strømkapacitet bl.a. til varmepumper, elbiler, deponi via omsætning til varme etc.

I denne strategi er indarbejdet en forholdsvis stor øgning af strøm fra vindmøller (ca. 90 MW). Beregningsmæssigt er valgt en fordeling med ca. 75 MW etableret på havet og ca. 15 MW på land. Den endelige fordeling, kapacitet mm må afklares i kommende drøftelser, aftaler og beslutninger.

Today, Bornholm has forty wind turbines with a combined output of 31 MW. Most of the turbines were erected between 2001 and 2005, at the same time as worn-out turbines were being scrapped.

In 2007, the Regional Municipality of Bornholm issued a public discussion paper concerning the increase in the number of wind turbines on land. Proposals with a combined capacity of roughly 25 MW were submitted. This coincided with the announcement of a proposal for a sea-based wind farm, made up of 12 to 15 wind turbines located 6 km off the coast at Arnager.

The undersea cable to Sweden limits the volume of electricity that can be exported. For this reason, we on Bornholm must find new ways of selling/storing power if we are to

substantially increase power generated by wind turbines. In parallel with the enlargement of wind-power capacity, this strategy requires the establishment of a local transmission grid capable of collecting the electricity generated from this increased capacity for heat pumps, electric cars, and storage by converting the electricity into heat, etc.

This strategy incorporates a relatively high increase of electricity generated by wind turbines (approximately 90 MW). For calculation purposes, the strategy is based on a breakdown of 75 MW established at sea and 15 MW on land. The final breakdown, capacity, etc., will have to be worked out in forthcoming discussions, agreements and resolutions.

MÅL:	GOALS:
Samlet udbygning af vindmøllestrøm på 90 MW	Increase the combined power generated by wind turbines (90 MW)
FORUDSÆTNINGER:	PREREQUISITES:
- Udbygning på land: ca. 15 MW - Udbygning til havs: ca. 75 MW	- Land-based development: 15 MW - Sea-based development: 75 MW
EFFEKT:	IMPACT:
33.000 t CO2 sparet - Samlet el-produktion 294 GWh	- Elimination of 33,000 t of carbon emissions - Total production of electricity: 294 GWh
HANDLINGSFORSLAG:	MEASURES PROPOSED:
- Udbygning af det lokale transmissionsnet - Politisk stillingtagen om udbygning på land - Fortsat dialog mellem energistyrelsen og relevante aktører	- Development of the local transmission grid - Policies for land-based development - Ongoing dialogue between the Danish Energy Agency and relevant players.
AKTØRER:	PLAYERS:
Vækstforum, Østkraft, private interessenter, Energistyrelsen og Bornholms Regionskommune (myndighed) m.fl.	Growth Forum, Østkraft, interested parties in the private sector, Danish Energy Agency and the Regional Municipality of Bornholm (authorities), etc.

MERE BIOGAS
MORE BIOGAS

4

Bornholm har erfaring med biogas fra det højteknologiske biogasanlæg på Biokraft ved Åkirkeby.

Biokraft forventer, ved fuld udbygning at anvende ca. 40 % af den tilgængelige gylle på Bornholm. Det svarer til en el-produktion på ca. 15 MWh årligt. Det anslås, at en tilsvarende mængde gylle vil være praktisk tilgængelig for biogas-produktion.

Udbygningen af biogasproduktionen (etableret som ét eller flere anlæg) ventes at give en el-produktion på ca. 15 MWh samt en overskudvarme der med fordel indgår i en fjernvarmeforsyning. Sidstnævnte bør tages i betragtning ved lokalisering.

En del biogas vil kunne anvendes som drivmiddel i stedet for diesel i den bornholmske busdrift (BIO-BAT) og derved understøtte den kollektive trafik miljørigtige image.

Bornholm has experience in biogas from Biokraft, a high-tech biogas plant near Aakirkeby.

Biokraft expects that when fully developed, the plant could process 40% of the slurry available on Bornholm. This would be equivalent to the generation of 15 MWh of electricity a year. It is estimated that a similar volume of slurry would be available in practice for biogas production.

The expansion of biogas production (established as one or more plants) is expected to generate 15 MWh of electricity as well as surplus heat that could be used for the benefit of district heating supply. The last-mentioned should be considered when determining the plant's location.

A certain amount of biogas could be used as fuel to replace diesel in Bornholm's bus operations (BIO-BAT), thus enhancing the eco-friendly image of mass transit.

MÅL: GOALS:

- Yderligere 40 % af den samlede gylleproduktion anvendes til energiproduktion
- Use an additional 40% of the total slurry production for generating energy

FORUDSÆTNINGER: PREREQUISITES:

- Etablering af traditionelle biogasanlæg
- Kobling til fjernvarmeproduktion (26 GWh)
- Kobling til offentlig biogasdrevet transport (7 GWh)
- Kobling til el-net (15 MWh)
- Establishment of traditional biogas plants
- Linkage to district-heating production (26 GWh)
- Linkage to biogas-powered public mass transit (7 GWh)
- Linkage to electricity grid (15 MWh)

EFFEKT: IMPACT:

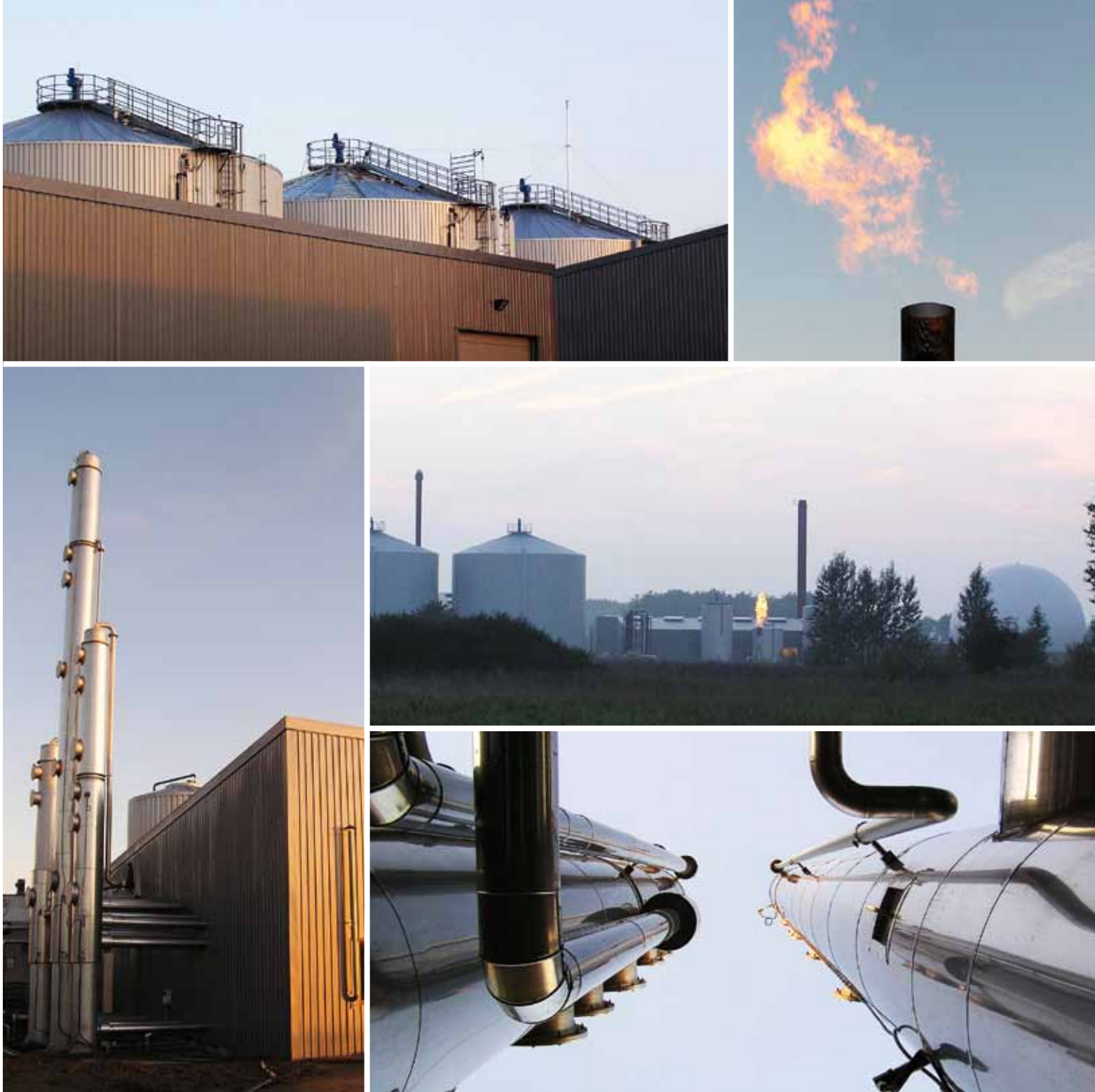
- 3.000 t CO2 sparet
- Elimination of 3,000 t of carbon emissions

HANDLINGSFORSLAG: MEASURES PROPOSED:

- Planlægning af anlæg og koordinering af afsætning
- Planning of facilities and coordination of sales

AKTØRER: PLAYERS:

- Private interessenter, Bornholms Landbrug, Biokraft, Forsyningsselskaber, BAT m.fl
- Interested parties in the private sector, Bornholm Farmers' Union, Biokraft, utility companies, BAT (regional bus company), etc.



MERE MILJØ MED FLERE ELBILER
MORE ELECTRIC CARS

5

Udviklingen af personbiler drevet på el er i hastig udvikling, og flere modeller ventes lanceret i de kommende år. Forinden skal gerne ske gennembrud i forskning og udvikling af batterier og anden teknologi, der vil give el-biler den fornødne komfort og kapacitet til at være et realistisk alternativ til benzin- og dieselbiler. Med de forholdsvis korte afstande der er på Bornholm ventes elbiler at blive et attraktivt alternativ for de der kører dagligt, så snart bilerne er konkurrencedygtige i anskaffelsespris og drift.

Det er skønnet i forbindelse med denne energistrategi, at 40 % af benzin- og dieselforbruget til persontransport vil kunne erstattes af transport i eldrevne køretøjer inden 2025.

The development of electrically-powered passenger cars is occurring in leaps and bounds, and a number of models are expected to be launched in the years ahead. Until then, an R&D breakthrough in terms of batteries and other technology will hopefully occur to give the electric cars the comfort and capacity required for becoming a realistic alternative to cars powered by petrol or diesel. In view of the relatively short distances on Bornholm, electric cars are expected to become an attractive alternative for people who drive on a daily basis - as soon as the cars' purchase price and operating costs are competitive.

This energy strategy estimates that 40% of the petrol and diesel consumed for passenger transport could be replaced by transport in electrically powered vehicles before 2025.

MÅL:	GOALS:
• 40 % af det samlede benzin- og dieselforbruget til persontransport erstattes af el	• Replace 40% of the total petrol and diesel consumed for passenger transport with electricity
FORUDSÆTNINGER:	PREREQUISITES:
• Rentabel brugerdrift, f.eks. elproduktion med nattakster • 80% nyttevirkning i elbiler • Infrastruktur til opladning af elbiler	• Affordable user operations, e.g. generation of electricity with night-time rates • 80% efficiency in electric cars • Infrastructure for recharging electric cars
EFFEKT:	IMPACT:
• 14.000 t CO2 sparet	• Elimination of 14,000 t of carbon emissions
HANDLINGSFORSLAG:	MEASURES PROPOSED:
• Elbilpionérer (Østkraft, Bornholms Regionskommune m.f.) • Etablering af opladerstationer • El-biler markedsføres hos øens biludlejningsaktører	• Electric-car pioneers (Østkraft, Regional Municipality of Bornholm, etc.) • Establishment of recharging stations • Electric cars marketed at the island's car rental agencies
AKTØRER:	PLAYERS:
• Vækstforum, Østkraft, Bornholms regionskommune, øens biludlejninger, miljøbevidste virksomheder og borgere m.fl.	• Growth Forum, Østkraft, Regional Municipality of Bornholm, island car rental agencies, eco-aware enterprises and citizens, etc.

BORNBIOFUEL - NYE VEJE TIL ENERGI
BORNBIOFUEL - NEW SOURCES OF ENERGY

6

BioGasol A/S er et dansk selskab der ejer rettigheder og knowhow til 2. generations-bioenergi-teknologi - en teknologi der kan vise sig banebrydende og som endnu ikke er implementeret. I 2007 stiftede BioGasol selskabet BornBioFuel med henblik på at etablere et demonstrationsanlæg på Bornholm. Grundlaget for etablering af et demonstrationsanlæg i Aakirkeby er klart. Projektet afventer pt. tilskudsmidler fra EUDP-puljen. Afklaring forventes i 2008.

2. generation af bioethanol-anlæg henter energi fra plantematerialer som græs (bl.a. fra grøftekanter), haveaffald, træflis, pap- og papiraffald, restprodukter fra biogasanlæg, våd halm og lignende. Den årlige produktion ventes at udgøre omkring 10.000 m³

bioethanol, 7 mio. m³ biogas og 10.000 tons brændselspellets. Produktionen forventes overvejende baseret på lokale affaldsprodukter der i dag ikke anvendes i andre energianlæg.

Den producerede biogas ventes afvendt som brændsel i et kraftvarmeværk, og varmen afsat via det kommende fjernvarmeværk i Aakirkeby. El-produktionen ventes afsat til nettet. Produktion og CO₂ reduktion af brændselspellets er ikke med i denne strategi, da der er usikkerhed om deres brændværdi.fald, restprodukter fra biogasanlæg, våd halm og lignende, overvejende baseret på lokale affaldsprodukter der i dag ikke anvendes i andre energianlæg.

BioGasol A/S is a Danish company which owns the rights and know-how for second generation bioenergy technology, which could turn out to be ground-breaking and which remains to be implemented. BioGasol founded the company BornBioFuel in 2007 with a view to establishing a demonstration facility on Bornholm. The groundwork has been laid for the establishment of a demonstration facility in Aakirkeby. The project is currently awaiting subsidy from Denmark's energy-technology development and demonstration programme (EUDP). Clarification is expected in 2008.

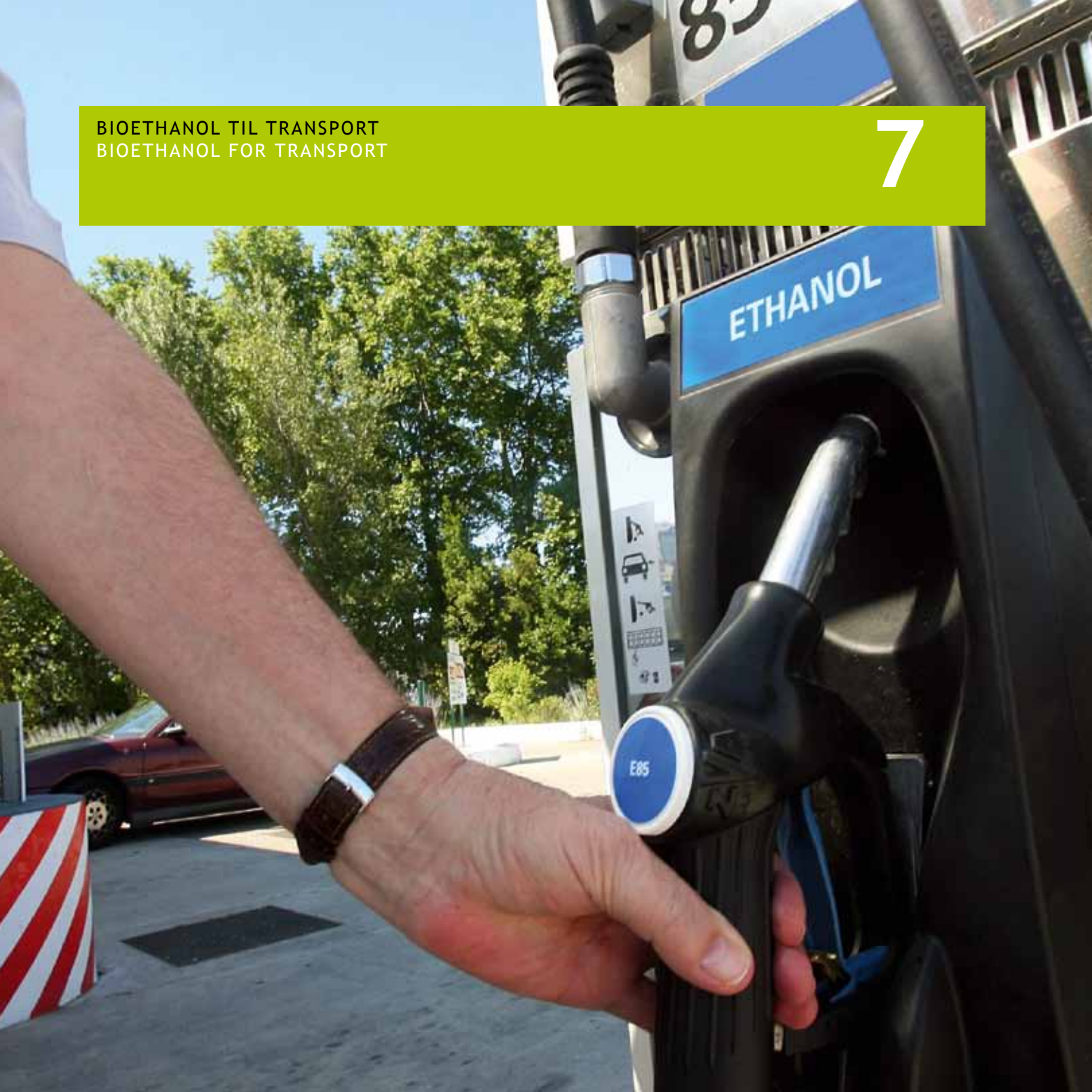
The sources of energy for a second-generation bioethanol plant will include plant matter (e.g. grass from grass verges, etc.), garden refuse, wood chips, waste cardboard and paper, residual products from biogas plants, wet straw and the like. Annually, production

is expected to be 10,000 m³ of bioethanol, 7 million m³ of biogas and 10,000 tonnes of fuel pellets. It is expected that the production process will primarily be based on local refuse products currently not utilised by other energy systems.

The biogas produced is expected to be used as fuel in a combined heat and power (CHP) plant, the heat from which will be sold to a future district heating plant in Aakirkeby. The electricity generated is expected to be sold to the grid. The production of fuel pellets and the reduction of carbon emissions associated with them are not included in this strategy due to uncertainty regarding their calorific value. Refuse, residual products from biogas plants, wet straw and the like are primarily based on local refuse products currently not utilised by other energy systems.



MÅL:	GOALS:
Etablering af 2. generations bioethanolanlæg (BornBioFuel)	Establish second-generation bioethanol plant (BornBioFuel)
FORUDSÆTNINGER:	PREREQUISITES:
- Finansiering afklares - Behov for biomasse osv. beskrevet i VVM-redegørelse	- Funding clarified - The need for biomass, etc., is specified in an Environmental Impact Assessment
EFFEKT:	IMPACT:
17.000 t CO₂ sparet (uden pellets) - Produktion af træ-pellets (brændværdi skal afklares)	- Elimination of 17,000 t of carbon emissions (without wood pellets) - Production of wood pellets (calorific value needs to be clarified)
AKTØRER:	PLAYERS:
BornBioFuel m.fl.	BornBioFuel m.fl.



BIOETHANOL TIL TRANSPORT
BIOETHANOL FOR TRANSPORT

7

BornBioFuels produktion af bioethanol forudsættes i denne strategi anvendt i personbiler og eventuelt i busser og lastbiler. Den samlede produktion ventes at ligge omkring 10.000 m³ ethanol. Det svarer til, at ca. 40 % af benzinforbruget eller ca. 22 % af det samlede forbrug af diesel og benzin til transport på land kan erstattes af ethanol.

Bioethanol kan blandes i benzin. Alle biler kan uden ombygning køre på benzin der indeholder 10 % ethanol. Enkelte nye biler kan køre på op til 85 % ethanol. Ethanol er i modsætning til benzin CO2 neutral.

This strategy presupposes that the bioethanol produced by BornBioFuel is used in passenger cars and possibly in buses and lorries. The total production is expected to be around 10,000 m³ of ethanol. This is commensurate with replacing 40% of the petrol consumption with ethanol or saying that it is possible to replace roughly 22% of the total consumption of diesel and petrol for land-based transport with ethanol.

Bioethanol can be admixed with petrol. All cars can run on petrol with a 10% ethanol content without having to modify their engines. A few new cars can run on up to 85% ethanol. Unlike petrol, ethanol is carbon neutral.

MÅL:	GOALS:
22 % af benzin- og dieselforbruget erstattes af 10.000 m³ ethanol	Replace 22% of the petrol and diesel consumed with 10,000 m³ of ethanol
FORUDSÆTNINGER:	PREREQUISITES:
Produktion og distribution af bioethanol til konkurrencedygtige priser	Production and distribution of bioethanol at competitive prices
EFFEKT:	IMPACT:
16.000 t CO2 sparet	Elimination of 16,000 t of carbon emissions
HANDLINGSFORSLAG:	MEASURES PROPOSED:
- Etablere påfyldningsstationer og blandefaciliteter - Markedsføre biler til bioethanol	- Establish filling stations and mixing facilities - Market cars which run on bioethanol
AKTØRER:	PLAYERS:
BornBioFuel, benzindistributører, bilforhandlere, bilflådeejere (BRK, virksomheder)	BornBioFuel, petrol distributører, car dealers, car-fleet owners (Regional Municipality, enterprises)

SPAR PÅ STRØMMEN
SAVE ELECTRICITY

8

Elforbruget på Bornholm steg med godt 20 % i 80'erne, men siden 1991 har elforbruget ligget nogenlunde stabilt omkring 250.000 GWh/år. Strøm er en af de energikilder som i dag flyder frit over landegrænser. Sydsverige og dermed også Bornholm er aftagere af en strøm der er produceret på bl.a. vandkraft, kul og A-kraft. Den er derfor væsentligt mere CO2 neutral end strøm, der produceres på fossile brændstoffer.

I fastlæggelsen af grundlaget for denne energistrategi er

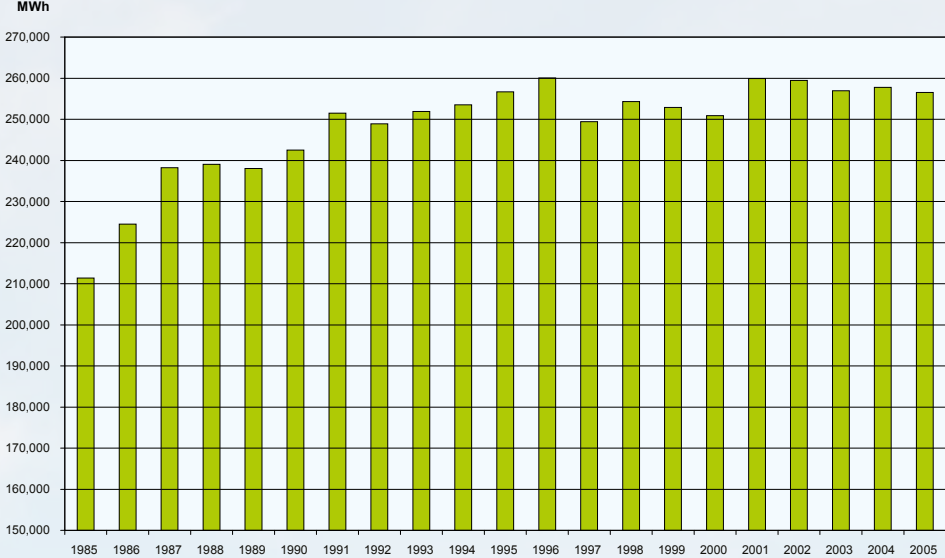
det vurderet muligt at reducere elforbruget med 5 % frem mod 2025. Reduktionen ventes opnået gennem produktudvikling, effektivisering og besparelser i private hjem, i erhvervslivet og i den offentlige sektor. Bemærk at de tiltag i strategien, der bevirker et øget elforbrug (ny varmepumper, elbiler mm) her ikke er medregnet. Samlet set ventes derfor en stigning i både elproduktion (baseret på vindkraft) og elforbrug (ny teknologi til erstatning for olieteknologi).

Although the consumption of electricity on Bornholm increased by more than 20% in the 1980s, it has more or less levelled off at 250,000 GWh/year since 1991. Electricity is a source of energy that currently moves freely across internationally borders. Southern Sweden and, thus, Bornholm buy electricity generated from hydropower, coal, nuclear energy, etc., making the electricity significantly more carbon-neutral than power generated solely from fossil fuels.

In determining the basis for this energy strategy, the potentially reducible power consumption was estimated

to be 5% by 2025. The reduction is expected to be achieved through product development and efficiency measures, as well as through reduced consumption in private households, the business community and the public sector. It should be mentioned that the strategy's initiatives which result in an increase in the use of electricity (new heat pumps, electric cars, etc.) are not included in these calculations. Overall, therefore, the generation of electricity (wind-based) and the use of electricity (new technology replacing oil-based technology) are both expected to increase.

POWER CONSUMPTION, BORNHOLM, 1985 - 2005



MÅL:	GOALS:	HANDLINGSFORSLAG:	MEASURES PROPOSED:
El-forbruget skal reduceres med 5 % (eksklusiv forbrug til ny varmepumper, elbiler etc.)	Reduce the consumption of electricity by 5% (excluding electricity for new heat pumps, electric cars, etc.)	- Koordineret informations- og energirådgivning - Kampagner og aktiviteter der kan få os til at ændre vaner	- Coordinated information and energy consultancy - Campaigns and activities to encourage us to modify our behaviour
FORUDSÆTNINGER:	PREREQUISITES:	AKTØRER:	PLAYERS:
Fortsat produktudvikling	Continued product development	Østkraft, Energijenesten, Bornholms Regionskommune og andre storforbrugere, VVS- og byggebranchen, private rådgivere, pengeinstitutter m.fl	Østkraft, Energy Service Denmark, Regional Municipality of Bornholm and other large-scale consumers, the HVAC and construction sectors, private consultants, banks, etc.
EFFEKT:	IMPACT:		
4000 t CO2 sparet	Elimination of 4,000 t of carbon emissions		

SPAR PÅ VARMEREGNINGEN
REDUCE HEATING BILLS

9

Alle undersøgelser viser, at der fortsat er et stort potentiale alene ved besparelser og effektivisering i den danske bygningsmasse, endda med få års tilbagebetalingstid (under 8-10 år).

Nettoenergi-forbruget på Bornholm til opvarmning af bygninger og brugsvand udgjorde ca. 425 GWh i 2005. Forbruget er steget siden 1985 trods øget isolering af bygninger mm. Det skyldes bl.a., at bygningsmassen er vokset. Det forventes at bygningsmassen på Bornholm fortsat vil blive udbygget.

I forbindelse med bygningsrenoveringer vil energiefektivisering i fremtiden veje tungere end før, alene i kraft af stramninger i byggelovgivningen. Det er sat som mål, i denne strategi, at varmemeforbruget til bygningsopvarmning vil kunne reduceres med 10 % frem til 2025.

All studies show that great potential savings can still be made solely by increasing efficiency and reducing consumption in Denmark's building stock, and with only a few years' repayment time (less than eight to ten years) at that.

In 2005, the net energy consumption on Bornholm for heating buildings and utility water amounted to 425 GWh. Consumption had risen since 1985, in spite of increased insulation of buildings, etc. One of the reasons for this was an increase in the existing building stock. Bornholm's building stock is expected to be enlarged further.

In connection with building refurbishment, energy efficiency will be more important than ever in the future, purely as a result of stricter building regulations. The target set in this strategy stipulates that it will be possible to reduce the amount of heat used to heat buildings by 10% up to 2025.

MÅL:

- Varmeforbruget reduceres med 10 %

FORUDSÆTNINGER:

- Aktiv rådgivning og markedsføring, kampagner etc.

EFFEKT:

- 15.000 t CO2 sparet

HANDLINGSFORSLAG:

- Koordineret informations- og energirådgivning
- Kampagner og aktiviteter der kan få os til at ændre vaner

AKTØRER:

- Østkraft, Energitjenesten, VVS- og byggebranchen, private rådgivere, Bornholms Regionskommune, pengeinstitutter m.fl

GOALS:

- Reduce heat consumption by 10%

PREREQUISITES:

- Active consultancy and marketing, campaigns, etc.

IMPACT:

- Elimination of 15,000 t of carbon emissions

MEASURES PROPOSED:

- Coordinated information and energy consultancy
- Campaigns and activities to encourage us to modify our behaviour

PLAYERS:

- Østkraft, Energy Service Denmark (Bornholm), the HVAC and construction sectors, private consultants, Regional Municipality of Bornholm, banks, etc.

10

MERE MOTION OG MINDRE TRANSPORT
MORE EXERCISE, LESS TRANSPORT

I 1985 blev benzin og diesel-forbruget til vejtransport på Bornholm opgjort til ca. 205 GWh. I 2005 var det steget til ca. 220 GWh. Det kan ikke afklares om opgørelserne er foretaget på fuldstændig samme grundlag, men hvis tallene er sammenlignelige, er der tale om en relativt beskedne stigning på knap 7 % over de 20 år. I de 20 år er bilparken og turisttrafikken øget, og den relativt beskedne stigning må delvist forklares med at de nyere køretøjer er blevet mere energieffektive.

Regeringens "Energistrategi 2025" venter en stigning i energiforbruget i den samlede transportsektor på 17 % fra 2005 til 2025. Målet i denne strategi er, at energiforbruget til transport på land kun vil stige med 10 % i perioden 2005-2025. Forventningen om denne lavere stigning bygger på de relativt beskedne transportafstande, og på at cykling og gang helt eller delvist er et reelt alternativ for mange i dagligdagen.

In 1985, the consumption of petrol and diesel for road transport on Bornholm was calculated to be 205 GWh. This figure rose to 220 GWh in 2005. It is not possible to determine whether these two assessments were drawn up on exactly the same basis, but if the figures are comparable, the increase - almost 7% over 20 years - is relatively modest. The number of cars and volume of tourism traffic grew over these twenty years, and this relatively modest rise must be partly attributable to the newer vehicles being more energy efficient.

The Danish Government's "2005 Energy Strategy" anticipates a 17% increase in energy consumption in the entire transport sector from 2005 to 2025. The target of this strategy is to limit the increase of energy consumption for land-based transport to only 10% in the period from 2005 to 2025. The expectation of a lesser increase is based on the relatively modest transport distances and on the fact that cycling and walking are fully or partly a genuine alternative for many people in their daily lives.

MÅL:

- Max 10 % stigning i energiforbruget til landtransport

FORUDSÆTNINGER:

- Aktiv rådgivning og markedsføring mm. (ændring af vaner)

EFFEKT:

- 5.000 t CO2 sparet

HANDLINGSFORSLAG:

- Udbygning af den kollektive trafik
- Udbygge trafikssikkerhed og komfort for cyklende og gående
- Reduceret jordbehandling (traktorkørsel)
- Økokørsel - kampagner, kurser og information

AKTØRER:

- Vækstforum, Energi-info-center, BAT, Bornholms Regionskommune, lokale foreninger m.fl.

GOALS:

- Limit the increase in energy consumed by land-based transport to 10%

PREREQUISITES:

- Active consultancy and marketing, etc. (behaviour modification)

IMPACT:

- Elimination of 5,000 t of carbon emissions

MEASURES PROPOSED:

- Enlargement of mass transit
- Improvement of traffic safety and comfort for cyclists and pedestrians
- Reduced soil processing (tractor driving)
- Eco-driving: campaigns, courses and informatio

PLAYERS:

- Growth Forum, Energy Info Centre, BAT (regional bus company), Regional Municipality of Bornholm, local societies, etc.

INFORMATION OG RÅDGIVNING
INFORMATION AND CONSULTANCY

11

Flere af denne strategis handlinger er rettet mod private forbrugere og virksomheder. Deres medvirken vil i de kommende år få afgørende indflydelse på energiuudviklingen. I denne strategi lægges op til, at der foretages omfattende ændringer der indbefatter langsigtede investeringer for mange på øen.

For den enkelte borger eller virksomhedsejer vil det være vigtigt at få valgt den mest optimale løsning. Efterspørgslen på energirådgivning ventes derfor at stige i de kommende. Uanset hvad der driver os (økonomiske incitamenter eller andre) vil de fleste, i den indledende afgørende beslutningsfase, have behov for en uvildig kvalificeret rådgivning.

Energirådgivningen på øen er i dag spredt mellem offentlige og private aktører. Kompetencer og interesser virksomhederne imellem varierer. Enkelte rådgiver gratis mens andre har det som levebrød. Meget peger i retning af at der kunne være fordele ved at samle og koordinere nogle af disse ressourcer, som det er sket på andre områder fx indenfor erhvervsrådgivningen, i et "Single Point of Entry". Et fælles uvildigt informations- og rådgivningscenter vil bl.a. kunne stå for individuel rådgivning, foredrag, kurser mm. Forud for etablering vil være behov for at afklare og fastlægge snitflader og samspil mellem den gratis/offentlige rådgivning og de private energirådgivere på øen.

Several actions of this strategy are aimed at private consumers and businesses. Their efforts in the years ahead will have a decisive impact on energy consumption trends. This strategy sets the stage for comprehensive changes embracing long-term investments for many parties on the island.

Choosing the most advantageous solution will be crucial for individual citizens and business owners alike. For this reason, the demand for energy consultancy is expected to increase in the years ahead. Regardless of motivation (economic or other), most people will require qualified advice in the introductory and crucial decision-making phases.

The energy consultancy available on the island is currently spread between public-sector and private-sector experts.

The expertise and interests of these consultants vary. The services of a few salaried consultants are free, whereas others earn a living from charging for the services they provide. There is much to indicate that gathering and coordinating some of these resources in a single point of entry could be beneficial, similar to what has occurred in other areas such as business consultancy. A common, impartial information and consultancy centre could provide individual advice, lectures, courses, etc. Before establishment, there will be a need to clarify and determine the interfaces and interaction between the free/public-sector consultancy and the advice offered by private-sector energy consultants.

MÅL:	GOALS:
Etablering af et bredt sammensat energirådgivningsteam for erhvervsliv og private	Establish a broad-based energy consultancy team for the business community and citizens
FORUDSÆTNINGER:	PREREQUISITES:
- Vilje til at samle øens rådgivningsressourcer - Afklaring af snitflader mellem private og offentlige aktører	- Willingness to unify the island's consultancy resources - Interfaces between private-sector and public-sector players clarified
EFFEKT:	IMPACT:
Realisering af besparelser på strøm, varme og transport	Actual reduction in consumption of electricity and heat and use of transport
HANDLINGSFORSLAG:	MEASURES PROPOSED:
- Etablering af en informations- og rådgivningsenhed - Løbende nyheder, tilbud og debatter i det offentlige rum	- Establishment of information and consultancy unit - Continuous news, offers and public debates
AKTØRER:	PLAYERS:
Vækstforum, Østkraft, Energitjenesten, Bornholms Regionskommune, VVS- og byggebranchen, private energirådgivere, pengeinstitutter m.fl.	Growth Forum, Østkraft, Energy Service Denmark, Regional Municipality of Bornholm, the HVAC and construction sectors, private consultants, banks, etc.





12

MERE KOORDINERING OG SAMARBEJDE MORE COORDINATION AND COOPERATION

MÅL:	GOALS:
Sikre fortsat koordinering og fremdrift i projekter der kan bidrage til at nå Energistrategiens mål	Ensure continued coordination and progress of projects which can contribute to achieving the Energy Strategy's goals
FORUDSÆTNINGER:	PREREQUISITES:
- Vilje til samarbejde og koordinering - Nytænkning - Handlekraft	- Willingness to collaborate and coordinate - Innovation - Power to act

HANDLINGSFORSLAG:	MEASURES PROPOSED:
- Aktiv medspiller i udvikling af energiløsninger gennem ny samarbejder og netværk - Løbende dialog og koordinering mellem energiaktører på øen - Opdatering af Bornholms Energistrategi hvert andet år	- Active team player in the development of energy solutions through new partnerships and networks - Ongoing dialogue and coordination among the island's energy players - Updating of Bornholm's Energy Strategy every two years

AKTØRER:	PLAYERS:
Statslige og eksterne aktører, Vækstforum, Energiforum, Bornholms Regionskommune, politikere, virksomheder og borgere der aktivt handler og derved fungerer som energi-ambassadører, m.fl.	Governmental organisations, NGOs, Growth Forum, Energy Forum, Regional Municipality of Bornholm, politicians, enterprises and citizens who actively participate and thus serve as energy ambassadors, etc.

Skal visionen om at blive selvforsynende med bæredygtig energi nås, må kvalifikationer og ressourcer, dvs. viden, økonomi og råvarer, udnyttes optimalt. Konstruktivt samspil og en forståelse for hvordan de enkelte handlinger tilsammen danner en helhed må præge udviklingen fremadrettet. Det gælder koordinering og samarbejde internt på Bornholm, men også samarbejder udenfor øen om konkrete projekter, forsøg og forskning & udvikling relevant for uddannelsesinstitutioner eller virksomheder.

De fleste af de forudgående handlinger (afsnit 1-11) har energiforsyningssselskaber eller private hovedaktører som hovedinteressenter. Med denne strategi lægges op til, at der

for hver aktuel handling ned sættes en ansvarlig implementeringsgruppe. Interessenter og relevante aktører ventes i 2008/09 udpeget blandt Energiforums medlemmer og i deres netværk. Målet er, at disse grupper i vid udstrækning bliver selvkørende og dynamiske (opstår/opløses efter behov), og at de ser muligheder i at informere og koordinere deres aktiviteter i Energiforum.

Bornholms Regionskommune forventer at skulle opdatere energibalancen hvert andet år i årene frem til 2025. Sammenholdt med den aktuelle udvikling og de konkrete muligheder vil det vise, hvor der er behov for at justere, sætte ind og etablere ny samarbejder.

To achieve the vision of becoming self-sufficient with sustainable energy, the utilisation of qualifications and resources - i.e. knowledge, financial aspects and raw materials - must be maximised. Constructive interaction and an understanding of how the various actions jointly comprise a whole must progressively affect future developments. This applies to local coordination and collaboration on Bornholm, but also to collaboration extending beyond the island regarding specific projects, experiments, and research and development relevant to educational institutions or businesses.

The main interested parties in most of the preceding actions (sections 1 through 11) are energy utilities and/or private-sector players. This strategy sets the stage for appointing

an implementation group that is responsible for each specific action. Stakeholders and relevant players are expected to be designated among the members of the Energy Forum and their network in 2008 and 2009. These groups are intended to be largely self-motivating and dynamic (established/dissolved as required) and they should see opportunities in informing and coordinating their activities in the Energy Forum.

The Regional Municipality of Bornholm expects to update the energy balance sheet every two years in the years leading up to 2025. A comparison of the balance sheet with actual developments, trends and specific options will show where adjustments, interventions and new collaborative efforts are required.

FORVENTET PRIORITERING AF HANDLINGER

Flere af energistrategiens handlinger er helt eller delvist klar til at blive realiseret. Andre kan opstartes ved at igangsætte planlægning og detailundersøgelser. Energistrategiens realisme ses ved at en stor andel af de nævnte handlinger er forholdsvis ”lavthængende frugter”. En samtidig igangsætning af flere handlinger ventes at give den størst mulige synergi og drivkraft til en omlægning.

Handlinger der ventes igangsat i år 2008-2009

- 1. Fjernvarme i Hasle, Aakirkeby, Nylars, Snogebæk og Balka
- 2. Omstilling uden for fjernvarmeområder
- 3. Vindmøller
- 6. BornBioFuel
- 7. Bioethanol til transportformål
- 8. El-besparelser
- 9. Varme-besparelser
- 11. Etablering af Energi-Info-center
- 12. Samarbejde mellem aktører og ambassadører

Handlinger der ventes igangsat i år 2010-2012

- 1. Fjernvarme i Sorthat-Muleby
- 4. Biogas
- 5. El-biler
- 10. Besparelser i landtransport

Handlinger der ventes igangsat efter år 2012

- 1. Fjernvarme i Nyker, Vestermarie, Østerlars og Østermarie og brændselsomstilling i Rønne

En række teknologier er ikke vurderet økonomisk rentable at ind-
drage nu. Blandt de teknologier hvor videreudvikling afventes er:

- Store varmepumper
- Bølgeenergi
- Brint
- Solceller

ENVISAGED PRIORITIES FOR ACTION

A number of the Energy Strategy’s actions are ready to be imple-
mented, wholly or partly. Other actions can be launched by initia-
ting the planning and detailed studies. The realism of the energy
strategy is demonstrated by the fact that many of the actions
mentioned are relatively “easy winnings”. The launch of several
actions simultaneously is expected to generate the greatest possible
synergy and motivating force for conversion.

Actions that are expected to be launched in 2008-2009:

- 1. District heating in Hasle, Aakirkeby, Nylars, Snogebæk and Balka.
- 2. Conversion outside district-heating areas.
- 3. Wind turbines.
- 6. BornBioFuel.
- 7. Bioethanol for transport purposes.
- 8. Electricity savings.
- 9. Heating savings.
- 11. Establishment of an energy information centre.
- 12. Collaboration among players and ambassadors.

Actions that are expected to be launched in 2010-2012:

- 1. District heating in Sorthat-Muleby.
- 4. Biogas.
- 5. Electric cars.
- 10. Reductions in land-based transport.

Actions that are expected to be launched after 2012.

- 1. District heating in Nyker, Vestermarie, Østerlars and Østermarie and fuel conversion in Rønne.

A number of technologies are assessed as not economically viable
for inclusion at present. Technologies where further developments
are awaited include:

- large heat pumps.
- wave energy.
- hydrogen.
- solar cells.



BILAG A:
MERE OM TRANSPLAN

Transplan er initieret af samarbejdet i B7. B7 er et samarbejde mellem 7 øer i Østersøen (www.b7.org). I Transplan deltager følgende partnere og observatører:

Partnere:

- Bornholms Regionskommune (projektkoordinator)
- Gotlands kommune
- Ålands Landskapsregering
- Saaremaa County Government
- Sardinien - Sassari provinsen - Punto Energia Provincia di Sassari - PEPS
- PlanEnergi (konsulentfirma)
- ISLENET (europæisk netværk af øer)

Observatører:

- Rügen
- Øland, Borgholm kommune
- Hiumaa
- Sardinien - tre energikontorer i tre provinser: (Agenzia Energia Sostenibile Provincia di Oristano, Agenzia Energetica Sulcitana og Ufficio Energia della Provincia di Cagliari)

Projektet løber i perioden 1. september 2007 til 1. marts 2010. Projektet er støttet af EU's energiagentur - EACI - under ordningen "Sustainable communities". Projektet er støttet med ca. 5,3 mio. kr. og medfinansieres af partnerne med personalemæssige ressourcer.

Transplan-projektets overordnede formål er:

- at anvende et enkelt planværktøj der giver sammenlignelige tal, til systematisk at afdække, hvor langt en given region er med at nedbringe sin CO2- udledning,
- at komme med eksempler på effektive metoder til at nedbringe CO2- udledning.

Alle partner-øer gennemfører en proces med følgende elementer:

- Kortlægning af øens energiforbrug
- Udarbejdelse af en energistrategiplan med prioriterede handlinger
- Formidling og informationskampagner
- Opstart implementering af udvalgte handlinger

Kortlægningen af energiforbruget udføres i samarbejde med PlanEnergi. Vi benytter et regneark - Transplan - hvor data indtastes og bearbejdes. Regnearket giver en god oversigt og et stabilt grundlag for videre planlægning. Regnearket vil om nogle måneder kunne downloades gratis fra projektets hjemmeside: www.transplanproject.eu

ISLENET står for udvikling af hjemmeside og information og formidling af projektet internationalt.

APPENDIX A:
FURTHER DETAILS ABOUT "TRANSPLAN"

Transplan was initiated by the B7 collaboration. B7 is a partnership of seven islands in the Baltic Sea (www.b7.org). The following parties and observers participate in Transplan:

Partners:

- Regional Municipality of Bornholm (project coordinator)
- Gotland Municipality
- The Åland Government
- Saaremaa County Government
- Sardinia, Sassari Province (Punto Energía Provincia di Sassari), PEPS
- PlanEnergi (consulting firm)
- ISLENET (European island network)

Observers:

- Rügen, Germany
- Öland, Borgholm Municipality, Sweden
- Hiumaa, Estonia
- Sardinia, three energy offices in three provinces (Agenzia Energia Sostenibile Provincia di Oristano, Agenzia Energetica Sulcitana and Ufficio Energia della Provincia di Cagliari), Italy.

The project runs from 1 September 2007 to 1 March 2010 and is supported by the EACI (Executive Agency for Competitiveness and Innovation, i.e. the EU's energy agency) under the "Sustainable Communities" scheme. The project receives DKK 5.3 million in subsidy and is co-funded by the partners with staff resources.

The overarching goals of the Transplan project are:

- to systematically identify the progress made by a given region in reducing its carbon emissions by using a simple planning tool that generates comparable figures; and
- to provide examples of efficient methods for reducing carbon emissions.

All partner islands are implementing a process with the following elements:

- charting the island's energy consumption;
- drawing up an energy strategy with prioritised actions;
- dissemination and information campaigns; and
- initiating the implementation of selected actions.

Energy consumption is charted in collaboration with PlanEnergi. We use a Transplan spreadsheet where data are input and processed. The spreadsheet provides a good general perspective and a reliable basis for further planning. In a few months, it will be possible to download the spreadsheet free of charge from the project's website: www.transplanproject.eu.

ISLENET is responsible for developing the website and information and for disseminating information about the project all over the world.

BILAG B:
BORNHOLMS ENERGIFORUM

De aktuelle medlemmer (25.07.08) i Bornholms Energiforum er:	
Virksomhed	Navn
Østkraft	Dir. Poul Erik Sjøberg
BOFA	Dir. Ole Morten Petersen
Rønne Vand & Varme	Dir. Erik Steen Andersen
BRK, forsyningsvirksomheden	Afd.leder Torben Jørgensen
Nexø Varmeværk	Driftsleder Søren Nielsen
Vestbornholms Varmeforsyning	Dir. Ole Kofod
BRK, Komm. ejendomme, energi	Energikonsulent Flemming Johansen
Q8 - Kuwait Petroleum A/S, Rønne	Dir. Peter Christophersen
Energi Øst Projektudvikling	Dir. Steffen Olsen
Bornholms Byggerådgivning I/S	Energikonsulent Johan Lorentzen
Dansk Industri - Bornholm	Formand Peter Vesløv
Tekniq - Bornholm	Dir. Eitel Bidstrup
Håndværksrådet	Dir. Roar Schou
Bornholms ErhvervsCenter	Dir. Carsten Gjessing
Bornholms Landbrug	Centerchef Henry Jespersen
Skovdyrkerforeningen Øst	Skovfoged Steffen Jørgensen
Danmarks Naturfredningsforening	Lokalkomitedlem B. Biggas
Finansieringssektoren på Bornholm	Dir. Ole Ligaard
Bornholms Vækstforum	Sekr. Diana Michelsen
LAG Bornholm	Sekr. leder Hans Jørgen Jensen
Energitjenesten på Bornholm	Vejl. Mikkel Engset Høst
Bornholms Miljø- og Energiforening	Formand Sune Glarbo
BornBioFuel	Dir. Thor Gunnar Kofoed
Østkraft	Energirådgiver Hans Henrik Ipsen
Østkraft	Ing. Poul Sonne-Pedersen
Teknik & Miljø	Chef Anna Sofie Poulsen
Teknik & Miljø	Chef Knud Erik Thomsen
Teknik & Miljø	Biolog Louise Lyng Bojesen
Teknik & Miljø	Arkitekt Vivi Granby
Økonomi & Analyse	Analysekonsulent Kristian Pihl
Politisk deltagelse ved relevante møder	
Projektgruppen bag Transplan består af:	
Louise Lyng Bojesen (T&M, projektleder), Kristian Pihl (Ø&A), Vivi Granby (T&M), Diana Michelsen (Bornholms Vækstforumsekretariat), samt Poul Sonne (Østkraft).	

APPENDIX B:
THE BORNHOLM ENERGY FORUM

Currently (as at 25 July 2008), the members of the Bornholm Energy Forum are:	
Enterprise	Name
Østkraft (power utility)	Poul Erik Sjøberg, Director
BOFA (waste management utility)	Ole Morten Petersen, Director
Rønne Vand & Varme (water and heating utility)	Erik Steen Andersen, Director
Regional Municipality of Bornholm (supply department)	Torben Jørgensen, Head of Section
Nexø Varmeværk (district heating utility)	Søren Nielsen, Plant Supervisor
Vestbornholms Varmeforsyning (district heating utility)	Ole Kofod, Director
Reg. Municipality (Bornh.), municipal property, energy	Flemming Johansen, Energy Consultant
Q8 - Kuwait Petroleum A/S, Rønne	Peter Christophersen, Director
Energi Øst Projektudvikling	Steffen Olsen, Director
Bornholms Byggerådgivning I/S	Johan Lorentzen, Energy Consultant
Confederation of Danish Industries, Bornholm	Peter Vesløv, Chairman
Tekniq - Bornholm	Eitel Bidstrup, Director
Danish Federation of SMEs	Roar Schou, Director
Bornholm Business Centre	Carsten Gjessing, Director
Bornholm Farmers’ Union	Henry Jespersen, Centre Director
Danish Forestry Extension, East	Steffen Jørgensen, Forester
The Danish Society for Nature Conservation	B. Biggas, local committee member
Banking sector on Bornholm	Ole Ligaard, Director
The Bornholm Growth Forum.	Diana Michelsen, Secretary
LAG Bornholm	Hans Jørgen Jensen, Head of Secretariat
Energy Service Denmark, Bornholm office	Mikkel Engset Høst, Advisor
Bornholm Environment and Energy Association	Sune Glarbo, Chairman
BornBioFuel	Thor Gunnar Kofoed, Director
Østkraft (power utility)	Hans Henrik Ipsen, Energy Consultant
Østkraft	Poul Sonne-Pedersen, Civil Engineer
Technical and Environmental Department (reg. mun.)	Anna Sofie Poulsen, Head of Section
Technical and Environmental Department (reg. mun.)	Knud Erik Thomsen, Head of Section
Technical and Environmental Department (reg. mun.)	Louise Lyng Bojesen, Biologist
Technical and Environmental Department (reg. mun.)	Vivi Granby, Architect
Financial Affairs & Analysis	Kristian Pihl, Analysis Consultant
Political participation at relevant meetings	
The project group behind Transplan comprises:	
Louise Lyng Bojesen (T&E, Project Manager), Kristian Pihl (FA&A), Vivi Granby (T&E), Diana Michelsen (secretariat for the Bornholm Growth Forum), and Poul Sonne (Østkraft).	



BORNHOLMS
REGIONSKOMMUNE



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