



## **Energy policy and climate change**

*Denmark leads the way*

### **Narrator**

It's far from an energy utopia but the people of Denmark live within one of the most innovative energy systems in the world. The traffic lights, computers and mobile phones, heat in houses and offices, everything essential to the function of modern society, comes supplied with the aim of optimum efficiency and rapid progress towards environmental sustainability.

### **Hans Jorgen Koch**

Going from a contribution of zero percent in 1973 we have now a contribution of more than 70 percent of our electricity consumption now covered by renewable energy.

### **Svend Auken**

You can make progress a win, win, win situation, you get better energy security, you get better environment and you make new jobs and new export income and you have less political dependence on unstable areas.

### **Narrator**

In this section we'll explore the Danish energy experience, from the rejection of nuclear on to the decentralisation of production and the push for clean and renewable solutions to climate change.

### **Hans Jorgen Koch**

Many of the people that are a little sceptic about what has happened in Denmark, the investments in energy efficiency, and in renewable energy should look at the figures which demonstrate that the Danish economy is booming since 1980. The GDP has grown with 60 percent, and in the same period there has been virtually no increase in the energy consumption, and that demonstrates that it is possible to decouple economic growth from growth in energy consumption.

### **Narrator**

Ironically it was economics and not environmental fears that provided the impetus for renewable energy in Denmark which now accounts for 30 percent of national electricity supply. In the 1970's the country relied almost exclusively on oil, then drastic oil price rises hit the economy hard. A more secure energy policy was needed... urgently.

### **Svend Auken**

This was energy supply, it was not an environmental concern but now added to the political reasons, the economic reasons, the energy reasons, come climate change, come the rest of it and then it's very big, and I felt when I was Environment and Energy Minister in Denmark energy was in fact my most important portfolio, it was sort of the lever for the rest of the environmental policy, that was where we could really make a difference.

### **Hans Jorgen Koch**

Wind energy which is covering today something like 20 percent of our electricity consumption which is a figure corresponding to the contribution from nuclear to UK electricity consumption, and the rest of the figures then coming from bio mass, that is burning straw and waste, the two other main sources of the renewable contribution to electricity supply.

### **Narrator**

Nuclear power was of course an option, but it was dismissed in the 1980's.

**Svend Auken**

There have been a strong anti-nuclear movement in Denmark and we believe was happy that we didn't use the money for that, that we consider a technology of the past, but we went for the technologies of the future.

**Narrator**

Heat and power generation in denmark still relies substantially on fossil fuels like natural gas and coal, but unlike the coal burning dinosaurs of britain denmark has optimised efficiency through a system called 'combined heat and power', or chp.

Most of britain's power stations burn fossil fuels, the heat is blown away in cooling towers, or disappears into our rivers and seas or along transmission wires, by the time it reaches our homes two thirds of the energy has been thrown away, that's enough to provide most of the heating and hot water needs of the uk, to say nothing of pointless of co 2 emissions.

In denmark you have smaller, more efficient power stations near to where they're needed. This de-centralised energy enables both the heat and the electricity to be used in the local district, more than doubling overall efficiency.

**Hans Jorgen Koch**

55 percent of the total electricity production is coming from combined heat and power, and that gives a very strong contribution to the energy efficiency because utilisation of the fuel content in combined heat and power is at 85 percent.

**Narrator**

Renewables like bio mass and wind are also major contributors to danish energy supplies, with wind meeting a fifth of the country's electricity needs.

**Svend Auken**

We went from this being, you know, something that only idealists were concerned with and a few crazy scientists to a situation as today where 20 percent of all our power supply comes from wind energy, not only giving us more energy supply security in, in, we're using indigenous forces but it's also given us a strong position in the world energy market, Denmark today is producing something like 40 percent of all the wind turbines and so forth in the world, and that has given us thousands of new jobs and billions of pounds in export income. On top of that we have a huge research and development facility and we are building up factories all over the world and I think that this is the biggest industrial accomplishment of Denmark in the post World War Two period.

**Narrator**

One of the major problems in some countries is being convincing communities that the turbines are not a blight on the landscape. Here in denmark there are many incentives to encourage local ownership. Small groups of turbines or even individual ones on properties are a common sight.

**Gunnar**

The advantages of small, smaller wind farms for the local communities is that if they owned themselves they also get some of the benefits and they have made a fairly good personal economy from having a, a share in a wind farm.

**Narrator**

Wind turbines fly on the site of a de-commissioned nuclear test facility at the riso energy research laboratories. Here it's recognised the long term future of wind power lies off shore.

**Poul**

I believe that off shore will play a significant part in the future. What we have seen is that the price of off shore wind power by now is higher than, than on shore, but due to that we have a much higher production from the off shore wind turbines, it will to a certain extent lower the price in the long term, so we need a little more development of off shore wind farms, but when

five, ten years we will see that the price will get closer to what we have on land by now and perhaps it even will get cheaper.

**Narrator**

So denmark achieves 20 percent of its energy from wind, but what happens when the wind doesn't blow?

**Poul**

We need some power plants that can assist when the wind is not blowing and especially if we have natural gas combined here in power plants, we have the possibility of being very flexible, so they can switch on and off and, and then we can have the production when we, we need it.

**Hans Jorgen Koch**

Unfortunately we don't have any hydro power in Denmark because of geographical conditions and therefore we benefit from the grid connection to Norway and Sweden, both those two countries have very substantial contributions from hydro power, and if there's then a need for electricity because of lack of wind in Denmark we can draw upon the reservoirs in those countries.

**Narrator**

At the riso labs scientists are pushing back the boundaries of clean technologies. Here fuel cell experiments tests combustion free electro chemical power, developing renewable fuel for cars is also a major research project and could be the next big breakthrough, but traditional bio fuels are already here on a big scale. [inaudible] in copenhagen is a bio mass plant fuelled by essentially co 2 neutral straw, wood and plant waste. Three bales of straw can supply enough heat for a home for a year, not bad for agricultural waste that may otherwise be burnt in the farmer's field.

Currently six percent of denmark's total energy consumption is covered by bio mass.

Heating from bio mass is being taken down to a very local level. At the hjortshøj eco village near [10:09:41:09 arhauss] a community of eco friendly houses has been built using sustainable materials and is home to more than 200 people.

**Gunnar**

We have here a combination of solar heating which is providing so much hot water so we can turn off heating system during the summer, and the rest of the year we have wood chips from local forests which we are using in a wood chip boiler to provide the additional heating that we need.

**Narrator**

The experiences of communities like hjortshøj as they bid to create to create their own clean sustainable energy will provide crucial lessons, indeed across the board there's much to be learnt from denmark's approach to a cleaner efficient energy supply.

**Svend Auken**

First of all we have very strict amounts for insulation of houses, secondly we have a, a strong energy taxation and a lot of the money is being ploughed back into industry and into research and development and so forth, so the combination of energy taxes and ploughing funds back to people has proved very efficient indeed.

**Hans Jorgen Koch**

What we need is long, loud and legal efforts, and that means that legal means that it should be based on support from Government regulation, long means that you can not have go/stop effects, you have to have long term incentives for the populations and loud mean that the incentives created should be clear and obvious for the private and industrial investors.

**Narrator**

So is denmark on track to meet its own goals?

**Poul**

By 2050 we should have a totally renewable energy system in Denmark, and, and we have the chances of doing so.

**Gunnar**

We also need to have more emphasis on energy efficiency particularly in companies which is set back in the energy policies, we also need to have other technologies develop, we have a huge potential of wave power which is not really researched into and we have a number of other things additional measures to make it happen.