

RENEWABLE ENERGY

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Excellencies, ladies and gentlemen,

Star power is of course just a dream and a story people can only believe on April Fool's day. We therefore only showed this TV commercial on that very day. But it would have been great, wouldn't it - just what the world needed to meet two of the fundamental challenges that mankind faces:

- How to get MORE energy to secure growth and prosperity for everyone
- And at the same time, how to get CLEAN energy to avoid escalating climate change

Star power aside – my message this afternoon will be on the role that renewable energy sources can play in securing a sustainable energy supply in the future. I will focus on power generation and discuss aspects of the substantial untapped potential in hydro power, wind power, solar power in addition to other technologies that are not commercial today. Combined, these renewable energy sources have a key role to play going forward.

Demand for energy will continue to increase in the years ahead. Countries like India and China are now in a very energy-intensive phase of their development, where millions of people are buying electrical appliances, cars and mobile phones for the first time. We believe it is not an option to deny millions of people the right to economic growth and prosperity and demand that developing countries “sacrifice growth for green”. As affluent societies, we have a moral obligation to work for a fair distribution of prosperity and living standards and contribute to lifting millions out of poverty.

So we just *have to* provide the energy required to bring the world forward. The challenge of course is how to do this without compromising the climate and our common future. The Intergovernmental Panel on Climate Change concludes that we need to reduce carbon emissions by 50% by 2050, and by 60-80% in developed countries, if we want to stabilize the carbon concentration in the atmosphere at a level that would keep the temperature increase below two degrees. It seems an almost impossible task. I can understand that many people around the world feel a certain degree of desperation and hopelessness in the face of this formidable challenge. Our job is to find solutions.

There is not one single answer or action, nor is there one sector alone that can make it happen. But it goes without saying that the energy companies have a key role to play. This is one of the things that make it so interesting and rewarding to be part of this industry – and I think also our proven track record and willingness to lead the way is one of the things that should contribute to optimism in people around the world.

It will require a lot from us. We must be prepared to embrace change of a magnitude our industry has not seen before. We need to adopt a new mindset and way of thinking about the world, being bold, drive change and be responsible in every way. And also – as businesses - seize the opportunities that will present themselves.

That being said, we also need a policy framework that allows us to do the right thing. We are making investments decisions today that will impact the climate issue for 20 to 50 years or more into the future. The EU's ambitious target of 20% renewable energy consumption by 2020 clearly sets the pace for development in this sector. It will mean doubling the renewable power generation over the next 10-12 years, corresponding to more than 600 TWh in new production. This is about five times the current annual power generation in Norway. We believe a European market for green certificates would be the best way to reduce both the cost and the environmental burden of the enormous investments required to meet these goals. In this regard, the current process in the European institutions on the Renewable Directive does not look promising for cost-effective policies. We are concerned that companies wanting to invest in renewables will face 30 different support schemes across Europe, with governments focusing as much on industrial and agricultural policy concerns as they are on producing the most renewable power per euro. To put it simple, a common system would support wind power where the wind blows and solar power where the sun shines.

From our industry, perhaps the most important contribution is that of innovation. As highlighted earlier today by the executive director of the International Energy Agency, Mr Nobuo Tanaka, nothing less than an “energy technology revolution” is called for. A low-carbon future is possible, and technology innovation is the enabler. According to the IEA, technology innovation can realize a cut in CO₂ emissions, from 62 Gigatons in 2050 in a “business as usual” scenario, to 14 Gigatons.

Nearly half of this reduction is connected to end use efficiency of fuels and electricity. It is really a useful reminder, even for us who make a living out of producing and selling energy,

that the greatest greenhouse gas reduction will be achieved by energy that is not used or used in a more efficient way. So innovation that will make it possible to use energy more efficiently, must obviously be very high on the agenda.

Another one third of the reduction potential is connected to Carbon Capture and Storage and other carbon-related technologies. It is obvious that CCS technology for coal-fired power plants will represent an immense positive impact on curbing greenhouse gas emissions. It was both interesting and promising to hear Alexandra Bech Gjørsv describe the ongoing CCS initiatives from StatoilHydro.

If roughly half of the CO₂ reduction potential is related to energy efficiency, another third is Carbon Capture and Storage, than that leaves more than 20% for renewables. It is still a huge task. To put that in perspective, those 20 % in 2050 corresponds to absolute emission reductions of more than a third of all green house gas emissions globally today.

At Statkraft we regard this both as a challenge and as a huge opportunity. For us, renewables is not something we decided to focus on last year. We have a 100 years of experience as a major producer of renewable energy, and following an asset swap with E.ON signed just weeks ago, we are now the largest producer of renewable power in Europe. We have also ventured into fast growing markets in South-East Europe, Asia and South-America, building on our competence in environment-friendly hydro power. We feel well positioned to capture our share of the growth in renewables going forward.

Hydro Power

The untapped potential of hydro power is significant. According to the International Hydro Association, only one third of the global potential has been developed. Hydro power today represents around one fifth of the world's electricity supply, so the theoretical potential adds up to 60% of the current global electricity supply.

The advantages of hydro are many – it is renewable, it is clean, it is reliable, it is flexible and it is sustainable over generations. Also, the potential is largest in areas where the energy needs are greatest, such as South America, Asia and Africa. In countries like India, China, the Philippines, Peru and Chile hydro power can really make a difference. If we are to reduce global emissions in a major way there is no way without high growth in hydro power. The technology is well established, at very competitive cost levels compared to other renewables, without the emissions from the most likely alternative, namely coal fired power.

All power production has environmental costs and burdens, where sustainable development means more than the reduced climate emissions alone. But it is important to bear in mind that even though the technology is not radically changed over the last 30 years, the way we develop hydro power projects is actually quite different from before. We today have the knowledge and expertise to minimise the burdens on nature and society.

The hydropower industry has together with governments and other stakeholders developed sustainability guidelines and a compliance protocol to provide guidance on project planning, design and operation. These guidelines include recommendations for a thorough assessment of the energy needs and the available options where projects are considered;

- consultation and cooperation with all stakeholders;
- appropriate impact assessments on all aspects of sustainability;
- optimization of project design;
- safeguard systems for environmental and social aspects,
- as well as benefit sharing with affected communities.

Developing this system is an ongoing work, and in Statkraft we believe this should be the global gold standard when it comes to rating the quality of hydro power developments. We are also encouraged by the support the Norwegian government has given to this process.

Our experience from developing hydropower in emerging economies tells us that the Clean Development Mechanisms under the Kyoto Protocol is a valuable tool for securing profitability for climate-friendly energy alternatives. We believe it will be crucial to maintain flexible mechanisms in a post 2012 agreement. This is an important message to the parties that will negotiate in Copenhagen in 2009.

Many people will quite rightly say that Norway is a privileged country when it comes to energy. Not only do we have all that oil and gas, but we've also been blessed with waterfalls that make it possible to produce hydro power. With limited new development domestically during the last fifteen years, there may have been a feeling that hydro power as an energy source is fully developed in Scandinavia. With new European and national targets for growth in renewables and the global challenge of climate change, hydro power continues to represent climate friendly and sustainable energy in our region. Significant additional supply could be realized through upgrades and extensions of existing plants, development of new small scale plants, and also, through selected larger projects. In Norway alone the available potential, as estimated by Norwegian authorities, is more than 35 TWh in new projects. In comparison, this surpasses the annual hydro power generation in Switzerland.

It is now appropriate to open our minds and discuss how we could and should tap more of the hydro power potential in Scandinavia. The discussion has started in Sweden, it is starting here in Norway, too. In this area, I do embrace a climate change. The bottom line is that further development of hydropower can and will be realized in an environment-friendly and socially responsible way, and that this represents a significant opportunity for the global community to develop more renewable and climate-friendly energy. Hydro power is definitely future power.

Wind power

Now, let me move on to wind power, which is another renewable energy source that holds significant potential. And it is indeed a booming business. Over the past ten years, global wind power capacity has continued to grow at an average cumulative rate of over 32 %. By the end of 2007, the capacity of wind turbines installed globally had reached a level of more than 94 GW. More than 25 million households around the world get their electricity from wind power. It is conservatively estimated that the total wind power installed world-wide could reach 160 GW by 2012.

You will find wind power in more than 70 countries around the world. Europe accounts for 65% of the global wind power capacity, but other regions are beginning to emerge as substantial markets for the wind industry.

While the advantages of wind power are obvious – wind is clean, renewable and climate-safe energy – there are of course some challenges related also to wind power. One is still its costs and competitiveness. Although generation costs have fallen by 50% over the last 15 years, support schemes are still necessary in order to secure investments. The most generous support has so far not been in the geographies with the most favourable wind conditions, thus adding further to the cost of development.

Another key challenge is the effectiveness of wind turbines. We are seeing major improvements in their power rating, efficiency and reliability. But it is still a fact that you need fairly large wind farms to generate substantial amounts of energy. This again highlights the environmental issue – such as the impact on the landscape. The fact that wind parks can be dismantled and the landscape restored to its natural state after their 25 years lifetime is a limited consolation for those who see wind parks as visual pollution. So for society, further development of wind power remains a case of priority – how do we best balance interests against each other?

These dilemmas and the fact that the wind is stronger at sea, has been a main driver for a push to move wind power generation offshore. There will still be environmental issues related to marine life, fisheries and other aspects, but all in all the environmental and social considerations should be less of an obstacle than they are on land or within sight from land. There is little doubt in my mind that offshore wind power from the North Sea represents:

- a great potential that could meet much of Europe's need for renewable energy, and
- a giant opportunity for the energy sector.

With our current energy and maritime expertise as a strong basis, wind power could also enhance Norway's position as a major energy exporter. I would however like to add that offshore wind today faces a larger technology gap, higher costs, a more challenging grid development and a lack of regulatory environment than onshore wind and indeed other renewable energy sources. There is therefore an abundance of tasks and challenges for all parties in realising this potential.

One key aspect of wind power is the need for balancing power. As all inhabitants in *this* city are well acquainted with, the wind varies a lot. You therefore need some other production for the days or hours with fair weather. In this regard, wind power and hydro power complement each other. While hydro and wind are great energy sources stand-alone, the combination of the two is even greater. A central element of the vision of a large-scale deployment of offshore wind power is the way flexible hydro power can interplay with non-flexible wind power and secure a stable and sustainable energy supply. Again, no-one can claim a better position than Norway when it comes to having plenty of wind and water – and the expertise required to make the most of that powerful combination.

We also have an emerging offshore wind power supply industry, spearheaded by companies like Winsea and Sway, in addition to the major international technology companies strengthening their wind portfolios. So we really have an excellent starting point and there is a great potential ahead of us.

At the same time, we all realise the challenges related to making the offshore wind vision a reality. There is new technology to be developed, distribution must be established, and when all technological and structural issues have been solved, there is still the big question of cost. Land-based wind power is still far away from being competitive without government support, and we know that offshore wind will be significantly more expensive to establish and maintain. Again – well-designed incentive schemes in a European market for renewable electricity will be essential.

Incentives are important, because the technological challenges are great. The investments required to narrowing the gap between today's wind-power technologies for land or shallow waters and the deepwater technology of the future should not be under-estimated. We are still in an early phase. A great research and development effort is required. The industry has a key role to play, but I also think that close cooperation research institutions and academia is important. At Statkraft, we are partnering with NTNU, Uppsala University and the Technical University of Denmark in an extensive research programme on ocean energy that also includes wave and tidal power, in addition to offshore wind. We have also commissioned a concept study for a large, fixed-base wind power facility far offshore. The study, which is being carried out as an open innovation process, is meant to yield the most complete description possible of a construction concept for a field of up to 1000 MW installed capacity. It is one example of the many initiatives the industry is currently undertaking to move ahead with this very promising, high-potential renewable energy source.

Solar energy

Continued innovation is also the key to realizing the full potential of other renewable energy sources, like the sun. The theoretical potential of solar power is enormous, but more technology development is required to make solar competitive. However, without a doubt, solar will be an important element of a future sustainable energy supply. One of its main advantages is also that to a large extent, the power is generated close to where it is used, minimizing the need for distribution.

It has been really fascinating and impressive to follow the development of what has become a Norwegian solar energy industry – lead by REC, Elkem and others. Unlike hydro and wind, plenty of sunshine isn't exactly one of our natural advantages here in the north. There is however a link between the historic abundance of hydropower into industrial processes and companies, founding the basis for many of today's players. It is it is an example of how fresh thinking, cooperation between many parties and of course – a strong commitment, creativity and commercial drive by the people behind it all – can produce impressive results.

Ocean energy

I briefly mentioned tidal and wave energy as other areas where targeted innovation could release promising potential. One other water-based source of renewable energy is utilising the difference in salinity through osmosis. When freshwater meets saltwater, for example

where a river flows out into the sea, enormous quantities of energy are released. This energy can be utilised to generate power through the natural phenomenon of osmosis. In an osmotic power plant, freshwater and seawater is fed into separate chambers, separated by a membrane. The salt in the seawater then draws the freshwater through the membrane, causing the pressure on the seawater side to increase. This pressure corresponds to a waterfall of 120 meters, and can be utilised in a turbine to generate electricity. Statkraft is in the process of building the world's first demonstration plant for this technology.

The global potential is estimated to be an impressive 1600-1700 TWh – equivalent to China's electricity consumption in 2002. In Europe, the commercial energy potential is estimated at 180 TWh, corresponding to today's hydropower production in Scandinavia. A power plant the size of a football stadium could supply around 15,000 households with electricity. These power plants can be built underground, e.g. in the basement of an industrial building or under a park, minimising their visual impact. We are currently engaging the European institutions in a dialogue to safeguard that also this renewable potential falls within the scope of the new Renewables Directive now in process.

Renewables for the future

Renewables have a key role to play. Most leading economies and nations have reaffirmed their commitment to substantially increase renewables. Well proven and promising new technologies are available. It is now time for governments and industry to join forces in order to make it happen. In the short term, we can realize the added potential that lies in existing sources like hydro power, land-based wind power and photovoltaics. In the longer term, innovation can help us utilize new sources, if not star power, then other high-potential sources like offshore wind power, osmotic power and other new technologies.

For Statkraft, this is an opportunity, an obligation and a source of inspiration. We definitely want to be part of the solution and provide "pure energy for one world".

Thank you.