

Snapshot of the global energy discussion

- which political context should a discussion on "education for sustainable energy systems" fit into?

Lars Georg Jensen

Chief Adviser

Danish Energy Agency

Danish Ministry of Climate, Energy & Building

9 May 2012

Sustainable Energy – not invented yesterday

- 1987: UN report Our Common Future declares

"a safe and sustainable energy pathway" as "crucial to sustainable development" and calls for energy efficiency and "substantial changes to the global energy mix".

Four key drivers of global – and national - energy policy

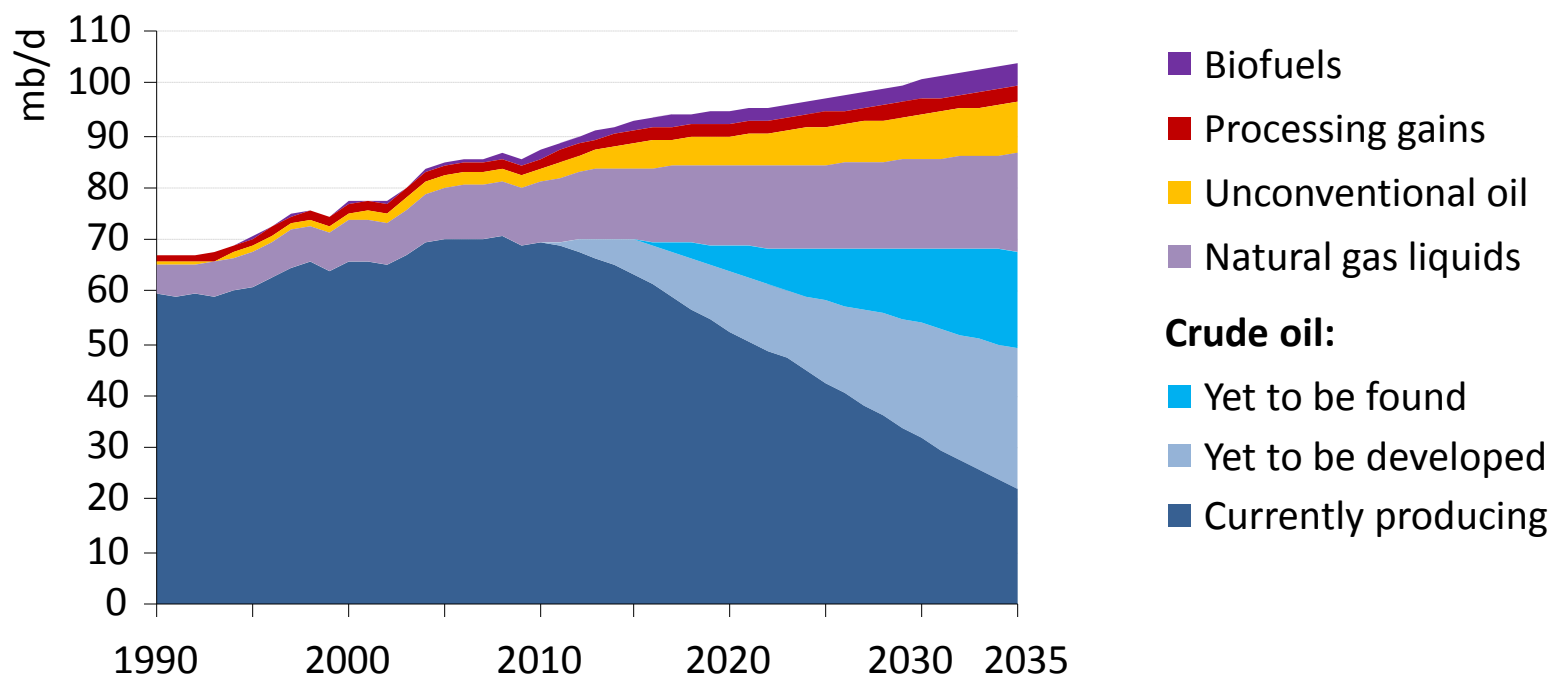
- **Energy security:** people & societies getting the *amount* of energy they need *when* they need it;
- **Economic development:** energy provided at a *price* which enables economic growth & welfare (and elimination of energy poverty).
- **Environmental priorities:** tackling climate change and local pollution.
- **Energy safety:** providing energy in a manner consistent with safety for people and societies.

Certainties and uncertainties - some global energy trends 2012

- High and fluctuating oil prices – higher risks;
- Lots of natural gas on the market, but many uncertainties about price, delivery & environmental impacts.
- Lots of coal, but prices are uncertain, CO₂-emissions high, and development of CCS “painfully slow” – who wants to pay?
- Uncertainty about the future of nuclear power.
- Demand for energy is rising fast in emerging economies – and are still high in the OECD.
- Renewable energy is becoming more competitive.
- Energy efficiency potential is often not harvested

Most new oil production capacity is needed to offset decline

World liquids supply by type in the New Policies Scenario

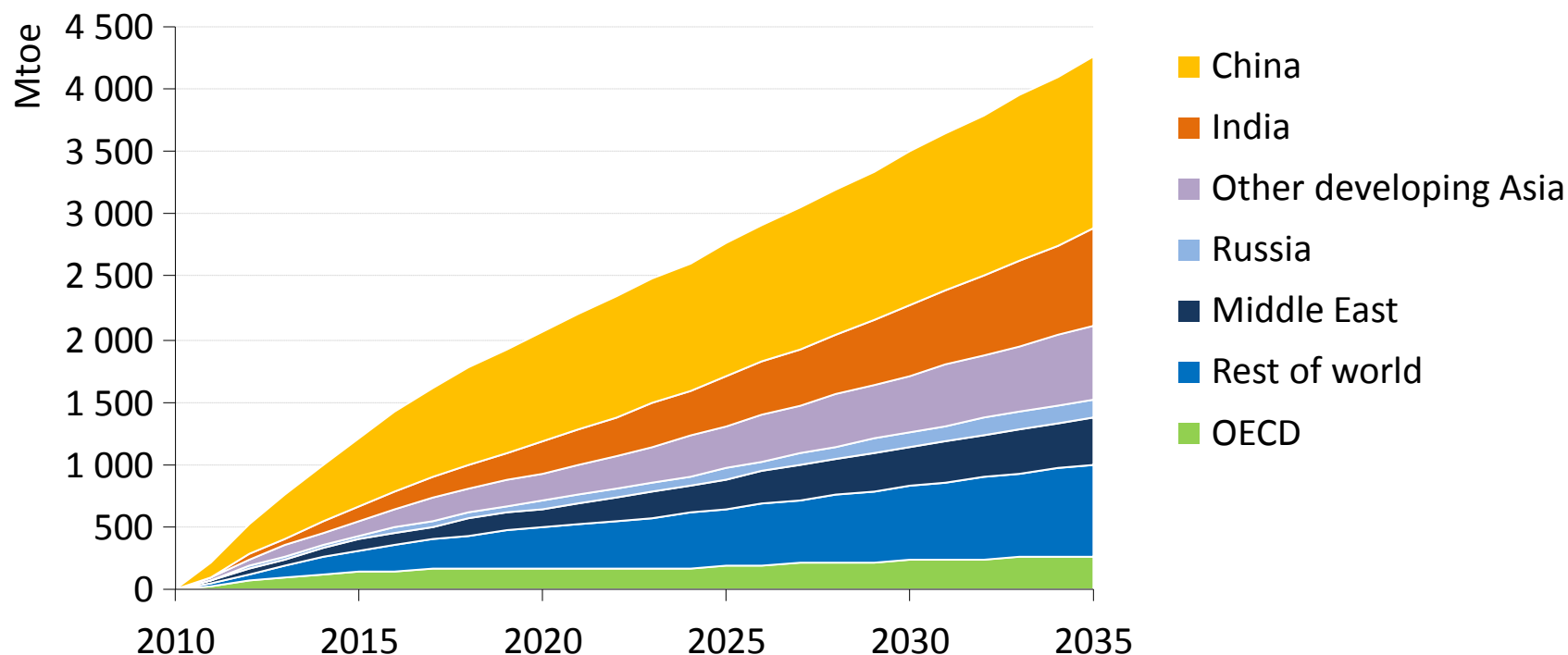


Decline at existing conventional fields amounts to 47 mb/d, twice current OPEC Middle East production; NGLs and unconventional production are the main sources of growth

Emerging economies continue to drive global energy demand

**WORLD
ENERGY
OUTLOOK** 2011

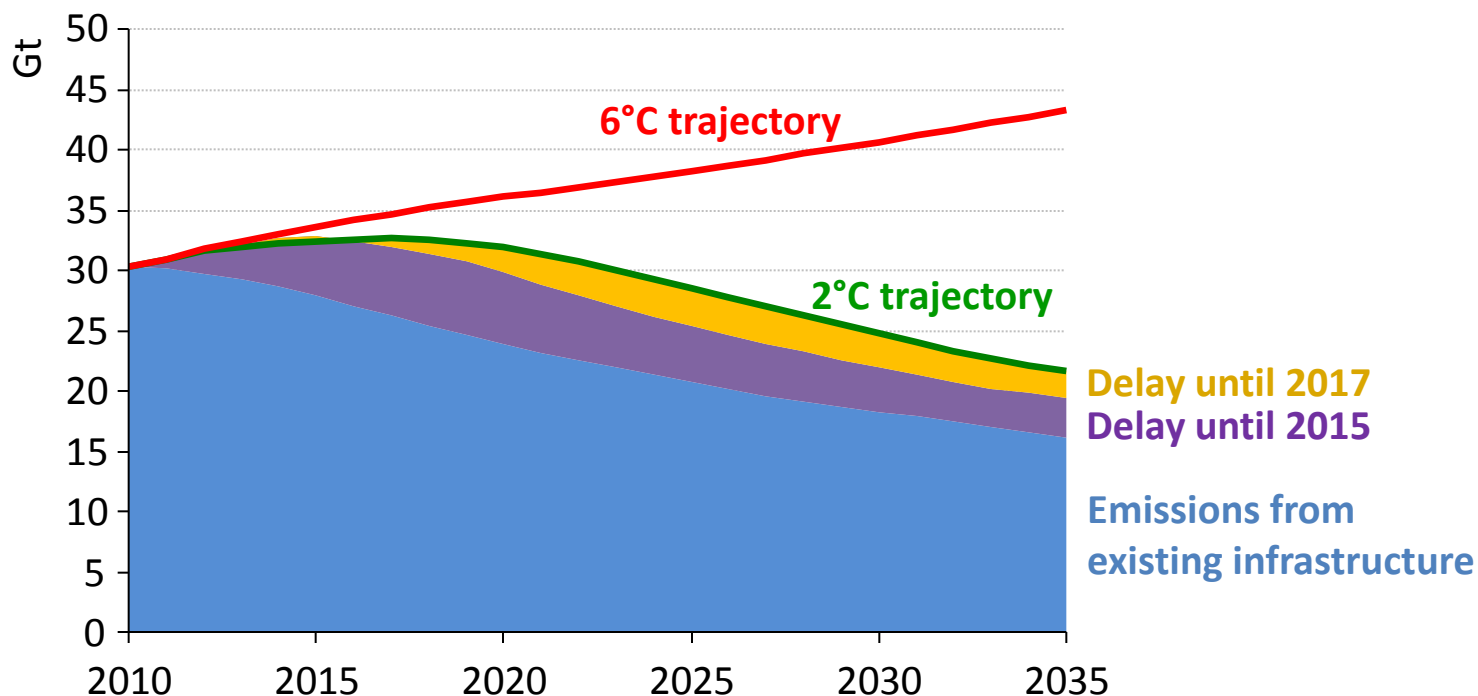
Growth in primary energy demand in the New Policies Scenario



**Global energy demand increases by one-third from 2010 to 2035,
with China & India accounting for 50% of the growth**

The door to 2°C is closing, but will we be “locked-in” ?

World energy-related CO₂ emissions in the Current Policies and 450 Scenarios and from locked-in infrastructure in 2010 and with delay



Without further action, by 2017 all CO₂ emissions permitted in the 450 Scenario will be “locked-in” by existing power plants, factories, buildings, etc.

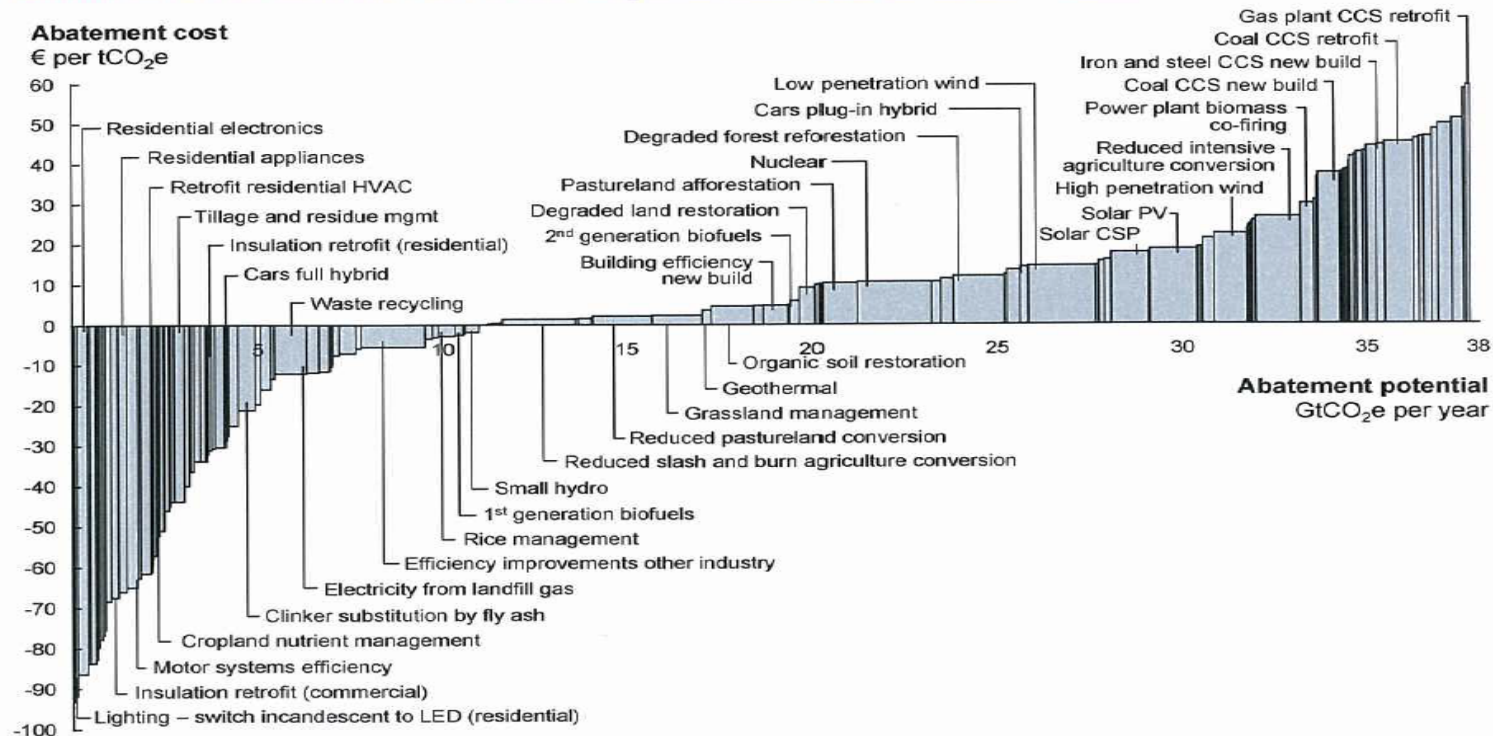
Moving beyond fossil fuels: Multiple benefits:

- Good for the economy – now, soon or not much later. Becoming fossil free is not cheap, but continuing with fossil fuels won't be cheap either.
- Predictable prices for businesses and consumers.
- Good for political independence – continuing with oil at a price of $> \$100$ is the largest transfer of wealth in human history (to oil producing nations).
- Good for the environment (climate change, local pollution).

Many options for low- or negative cost measures to reduce carbon dioxide emissions – the famous McKenzie curve

Exhibit 1

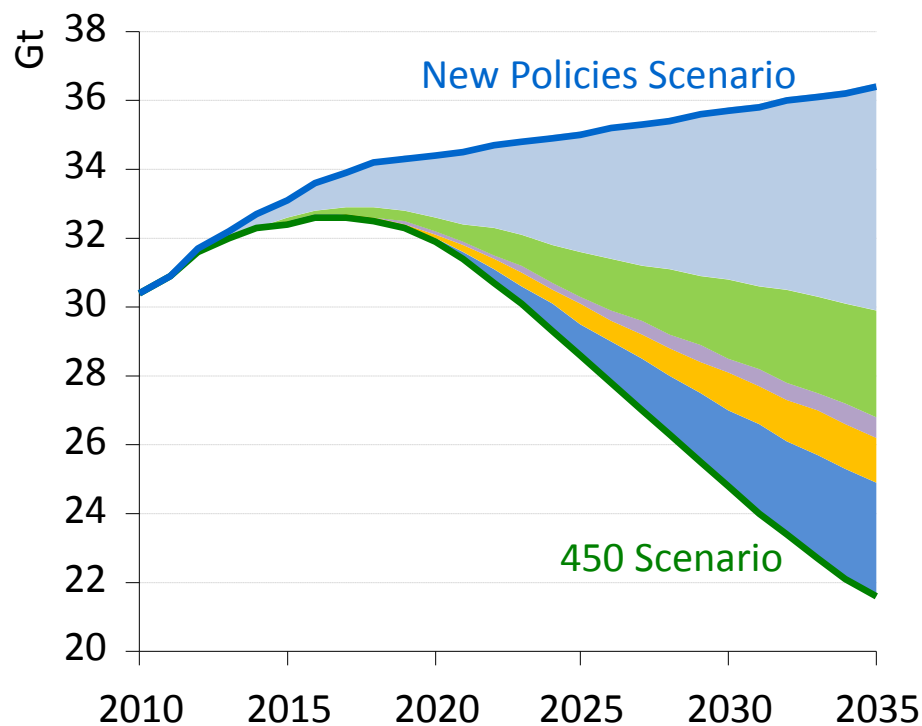
Global GHG abatement cost curve beyond business-as-usual – 2030



Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €60 per tCO₂e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.
Source: Global GHG Abatement Cost Curve v2.0

Efficiency gains can contribute most to emissions reductions

World energy-related CO₂ emissions abatement in the 450 Scenario relative to the New Policies Scenario



	Abatement	
	2020	2035
Efficiency	72%	44%
Renewables	17%	21%
Biofuels	2%	4%
Nuclear	5%	9%
CCS	3%	22%
Total (Gt CO ₂)	2.5	14.8

Energy efficiency measures – driven by strong policy action across all sectors – account for 50% of the cumulative CO₂ abatement over the Outlook period

The EU's 20-20-20 targets

- 20% Renewable Energy by 2020. Binding national targets.
- Greenhouse Gases to be reduced by 20% in 2020. Binding targets for non-ETS sectors.
- "20% improvement of energy efficiency – non-binding.

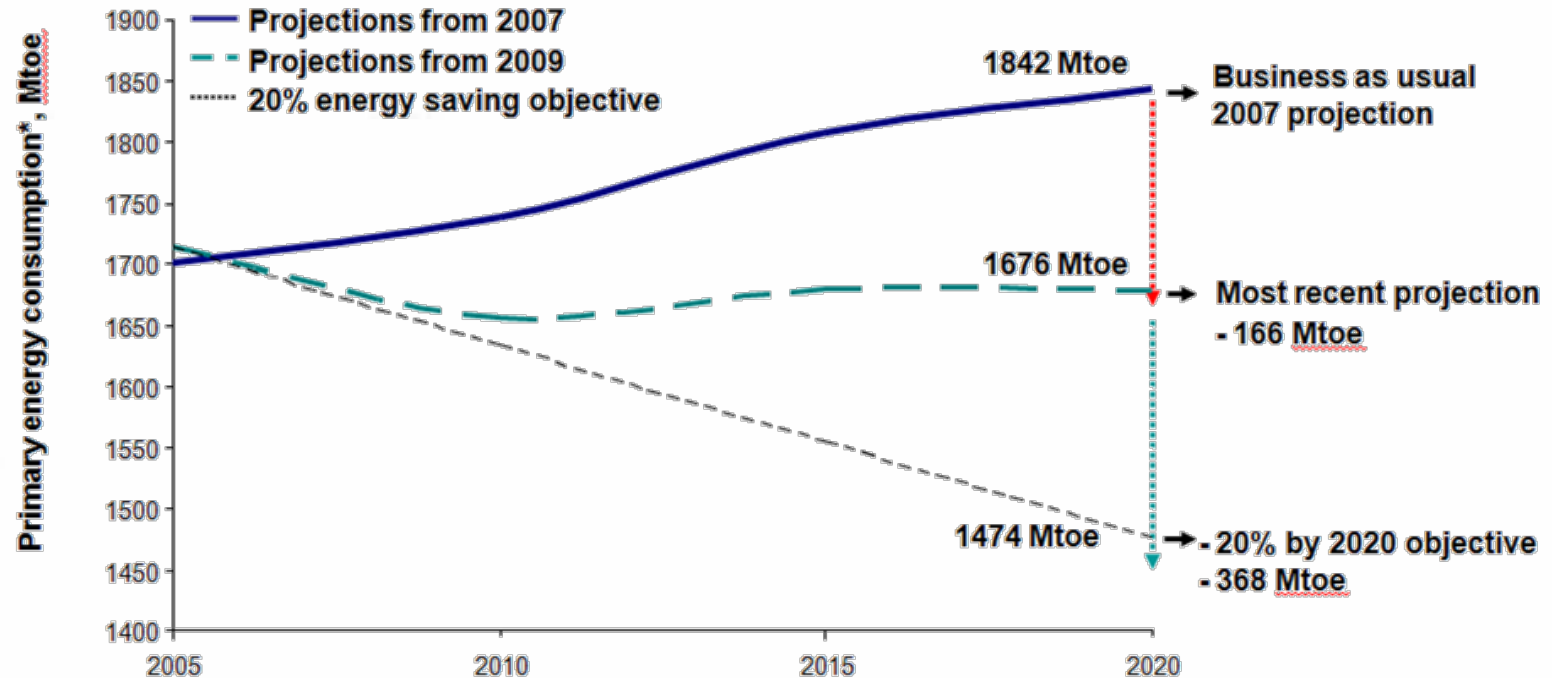
EU long-term targets

- Reduce greenhouse gas emissions by 80 -95 % by 2050 compared to 1990 – consistent with IPCC recommendations.
- Transforming EU to a competitive low carbon economy by 2050.
- Targets set for 2020. Ongoing negotiations on milestones for interim period: 2030, 2040.

Danish EU Presidency priority: Proposal for a Directive on Energy Efficiency.

- Why: Because EE is the single most important contribution to reduce GHG, especially until 2020
- Binding measures instead of binding targets
- Main themes are:
 - The public sector has to lead by example;
 - Energy efficient buildings;
 - Energy saving obligations on supply companies;
 - Promotion of CHP;
 - Energy efficiency in private sector to improve competitiveness.
- Rationale: Current policies will only deliver $\approx 10\%$ - target is 20%.

It matters: With and without a Directive on Energy Efficiency.



* Gross inland consumption minus non-energy uses

Cost and benefits of Energy Efficiency Directive in the EU (Comm. Calculations)

- increased EU GDP of € 34 billion in 2020;
- increased net employment of 400 000 in 2020.
- increased costs for investment in energy efficiency (house insulation, energy management, control systems, etc.): average of €24 billion annually (2011-2020);
- reduced costs for investment in energy generation and distribution of an average of €6 billion annually (2011-2020);
- reduced fuel expenditure of an average of about €38 billion annually as a result of a lower need for energy (2011-2020).

Benefits outweigh costs

- Total cost impacts of the Directive over the 2011-2020 period are **negative** – an average reduction in overall spending on energy of about €20 billion – annually!
- These costs are based on the assumption of oil prices of 88\$/b in 2020 (2008 prices), rising to 106\$/b in 2030. If prices stay higher than this, the cost saving from energy efficiency will be greater.

Many forums for discussion

- International Energy Agency
- G-20
- Major Economies Forum / Clean Energy Ministerial
- UNFCCC
- EU
- And many more...

DANISH milestones towards independency from fossil fuels:

- 50 % of electricity consumption to be based on wind power by 2020.
- Coal is to be phased out from Danish power plants by 2030.
- All electricity and heat to be based on renewable energy in 2035.
- 40 % reduction of GHG emissions by 2020 compared to 1990.
- Costs: 3.33 Euro/week per household

Key messages from Danish experience:

- The transition to independence of fossil fuels is:

- Challenging

- Amounts to no less than a structural shift in the economy
- The necessary investments are considerable.

- Affordable.

- For the economy as a whole the transition is expected to have limited negative impact, if any
- For individual companies the transition will create winners as well as losers

- Technically feasible

- Alternatives to fossil fuels are available and can deliver on a large scale
- Alternatives to fossil fuels need supportive policy frameworks to be competitive in the short run

And presents new business opportunities

- incentives for profitable energy renovations in industry and other business sectors
- first mover advantages for cleantech companies

Conclusions:

- Energy policy is driven by energy security, economics & climate change.
- Many uncertainties in the global energy supply;
- Some countries are taking steps to either become more independent of fossil fuels or to substantially lower their carbon dioxide emissions;
- But most countries are investing in coal, oil and gas.
- Some renewable technologies are cost competitive already today, and may be even more in the future;
- Research and development continues to be crucial, but technological breakthroughs are highly needed.

Plug the hole, invest at home!

- *“From 2010 to 2011 alone, the EU’s oil bill increased by nearly €100 billion. It is high time that we put a plug in this hole and redirect our money from importing energy from outside the EU to making energy investments in Europe. Improving energy efficiency is not in opposition to economic growth, it is instead a prerequisite for economic growth.”*

Martin Lidegaard

Danish Minister for Climate, Energy and Building

February 2012

Thank you for your attention

More information:

<http://www.ens.dk>

<http://www.kebmin.dk>