Transition to Renewable Energy until 2030 – 2050 in the EU and 7 countries, INFORSE Vision

- Gunnar Boye Olesen, International Network for Sustainable Energy (INFORSE)

EUSEW'09, Seminar, 13/2-09, Charlemagne Building, Brussels

International Network for Sustainable Energy

- Network of 150 NGOs worldwide, 72 in Europe
- Publish Sustainable Energy News
- Develop & promote sustainable energy visions
- Members cooperate and exchange information
- Training with Distance Internet Education for RES
- Follow international processes: Climate, IRENA
- INFORSE-Europe is European Region
- Follow EU Policies
- Supported by EC - DG ENV, Nordic Council & others

Global Energy Challenges

Global imperatives:
- The world energy use is beyond the environmental limits, we must limit global warming to 1.5-2°C above pre-industrial level
- Does not provide basic energy needs as light and healthy cooking facilities to 1/4 of the world’s population

Greenhouse gas emissions should be reduced > 80%
- EU must take the lead

INFORSE Sustainable Energy Visions

Global Vision
- Vision for EU-27
  - Bulgaria
  - Denmark
  - Latvia
  - Lithuania
  - Romania
  - Slovakia
- UK Zero Carbon Britain
  - Belarus
  - Russia
  - Ukraine

The Climate Challenge

- We must limit climate change to 1.5 – 2°C above pre-industrial level to avoid dangerous climate change
- Even this modest temperature increase can lead to the melting of most of Greenland's ice if maintained for centuries (+7 m of sea level)
- The temperature has already raised 0.7°C
- AND we already see climate effects (stronger storms, droughts, floods) that are dangerous on local level for those affected
How to keep Temp. Raise < 1.5-2'C

- IPCC 4 AR said that limit of greenhouse gases to 450 ppm CO₂eq gives a reasonable chance of keeping global avg temperature increase at 2°C
- Hansen (Nasa Goddard) argues for peak of 425 ppm CO₂ and limit to 350 ppm concentrations
- Climate Safety Report (collecting newer studies) finds that we should reduce concentrations to about 300 ppm

CO₂ has increased from 280 ppm (0.028%) to 385 ppm, + 2 ppm/year
Uncertainty is still large, mostly climate sensitivity

How to Keep GHG Concentrations Down

- IPCC 4AR: to keep GHG concentrations to 450 ppm CO₂eq, emissions must peak in 2015 and reduce 85% in 2050
- INFORSE proposes to reduce 100% until 2050, which would lead to concentrations about 400 ppm. This will require an energy transition AND to make land-use + agriculture carbon neutral, etc.
- Lower concentrations than 400 ppm will require faster reductions and active man-made carbon sinks
  And we must keep below triggers of natural positive climate feed-backs

The Global Emissions Needed

The Global Vision

Prof. Bent Sørensen, 100% Renewable Energy Scenario, Low Energy Consumption Scen. 1999

Energy Services per capita

Primary Energy (TWh/y)
Europe's Climate Challenge
- Europe has much higher per capita emissions than global average
- Europe have even higher historical emissions
- Europe can invest in climate mitigation and adaptation without anybody suffering

One proposal for a just global division of efforts is the Global Development Rights Framework:
- all citizens with higher income above 16$/day must act/pay
- historic emission since 1990 count

EU's Challenges in a Global Development Rights Framework

EU-27 Sustainable Energy Vision
Input:
- Modest increase in energy services, less road transport
- Large increase in energy efficiency, factor 4 in end-use sectors when possible
- Efficient energy supply with combined heat and power, smarter and more efficient grids
- Rapid development of renewable energy
- Phase out of nuclear finishing in 2025

Energy Efficiency
- Most equipment replaced many times before 2050: new efficient generations can come. Technology learning drives prices down.
- EU Ecodesign will lead reductions until 2025

One exception is houses. They could use only 1/7 of today’s heat demand, but slow change. For the vision is proposed 2%p.a. specific reduction from 2010 for most countries = 57% reduction to 2050.
- For transport: increase in conversion efficiency from today’s 15-20% to 50%, and re-gain of "break energy": factor 4 efficiency increase, 41% eff. increase 2000-2020 equal to change from 160 g CO₂/km to 95 g CO₂/km

EU Ecodesign Can Drive Efficiency

http://www.inforse.org/europe/conf_EUSEW_09_INFORSE.htm
Realise Efficiency – example

**Vision for appliances, industry, etc 2.8% p.a.**

- TV
- Heating machines

**Danish efficiency increase 5-yr av.**

- 0%
- 1%
- 2%
- 3%

EU Energy Supply

**Wind:** Growth to 75,000 MW in 2010 (current trend), 230,000 MW in 2020 and 400,000 MW in 2040 (up to 15,000 MW/year), ⅓ offshore. This is higher than EWEA/EREC forecasts for 2020.

**Solar:** PV take-off from 2010 with 30 mill. m2/year (3 GW/year) until 2020; more later, (less than EPIA forecast), solar thermal: more until 2030 then less

**Biomass:** use potential of residues, biogas, 7% agri.land for solid biomass, 7% for biofuels

Biomass, Sustainably in EU (PJ)

- Solid energy crops
- Biofuels/crops
- Biogas
- Straw
- Old timber/waste
- Industrial wood residues
- Wood/biomass

EU Sustainable Energy Vision

Develop energy balances for 2010, 2020, 2030, 2040 and 2050

Renewable Energy Supply - EU27

Solar heat

Windpower

Biomass

Geothermal

Hydro

http://www.inforse.org/europe/conf_EUSEW_09_INFORSE.htm
INFORSE-Europe, EUSEW 2009, February 13, 2009
EC Charlemagne Building, Brussels

**Primary Energy**

*Total Primary Energy Supply, EU-27*

- **Nuclear**
- **Natural Gas**
- **Oil Products**
- **Coal & waste**
- **Biomass**

*Other RE*

**INFORSE's EU-27 Vision**

*Electricity Divided in Supply, EU-27*

- **Nuclear**
- **Fossil**
- **Wind**
- **Biomass**
- **Hydro**

**INFORSE's EU-27 Vision**

*CO2 from Energy - EU-27*

- **New -12**
- **EU-15**

- **80%**
- **70%**

**Vision for Denmark (OVE)**

- Strong growth in windpower until 2030
- Half specific building consumption 2005-2025
- Flexible electricity use: heat pumps electric cars and hydrogen
- Sustainable transport system by 2030 (33% reduction in car use)
- El-storages from 2025

**A Sustainable Energy Vision for Lithuania**

- High growth of windpower, straw, wood, energy plantations until 2020, then growth in solar
- Growth trends in energy services in transport, buildings etc. will continue till 2015, and then level off gradually
- Substantial energy efficiency potentials to be realised
- Biomass CHP important part of new structure

http://www.inforse.org/europe/conf_EUSEW_09_INFORSE.htm
Proposals for Actions until 2020

- Windpower development
- Better biomass use, also more efficient
- Straw use and energy plantations
- District heating and CHP plans
- Transport strategy to reduce fossil fuel use
- Strategies for biogas, solar, geothermal, hydro
- Energy efficiency strategies for heating, electricity, service sector, production

Lithuania Energy Vision

Supplementary Work

- Electricity Balance
- Costs of Alternatives
- Employment and other social effects

Evaluate hourly energy balance

Energy & Employment (Poland)

PRELIMINARY FIGURES

http://www.inforse.org/europe/conf_EUSEW_09_INFORSE.htm
### Employment of Change to Biomass

#### PRELIMINARY FIGURES

| Employment of investment in wood heating station, 1 MW (job-years) |
|---|---|---|---|---|
| Investment | Saved coal | Used wood | Net costs ($5 million Zl) |
| -100 | -50 | 0 | 50 | 100 | 150 |

- **20 year lifetime, 6% discount, net present value calculation**
- **Investment**: 1.4 million Zloty, running 5000 hours/year, 90% efficiency, replacing coal boiler, 70% efficiency.

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http://www.inforse.org/europe/Vision2050.htm

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http://www.inforse.org/europe/conf_EUSEW_09_INFORSE.htm

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Thank you