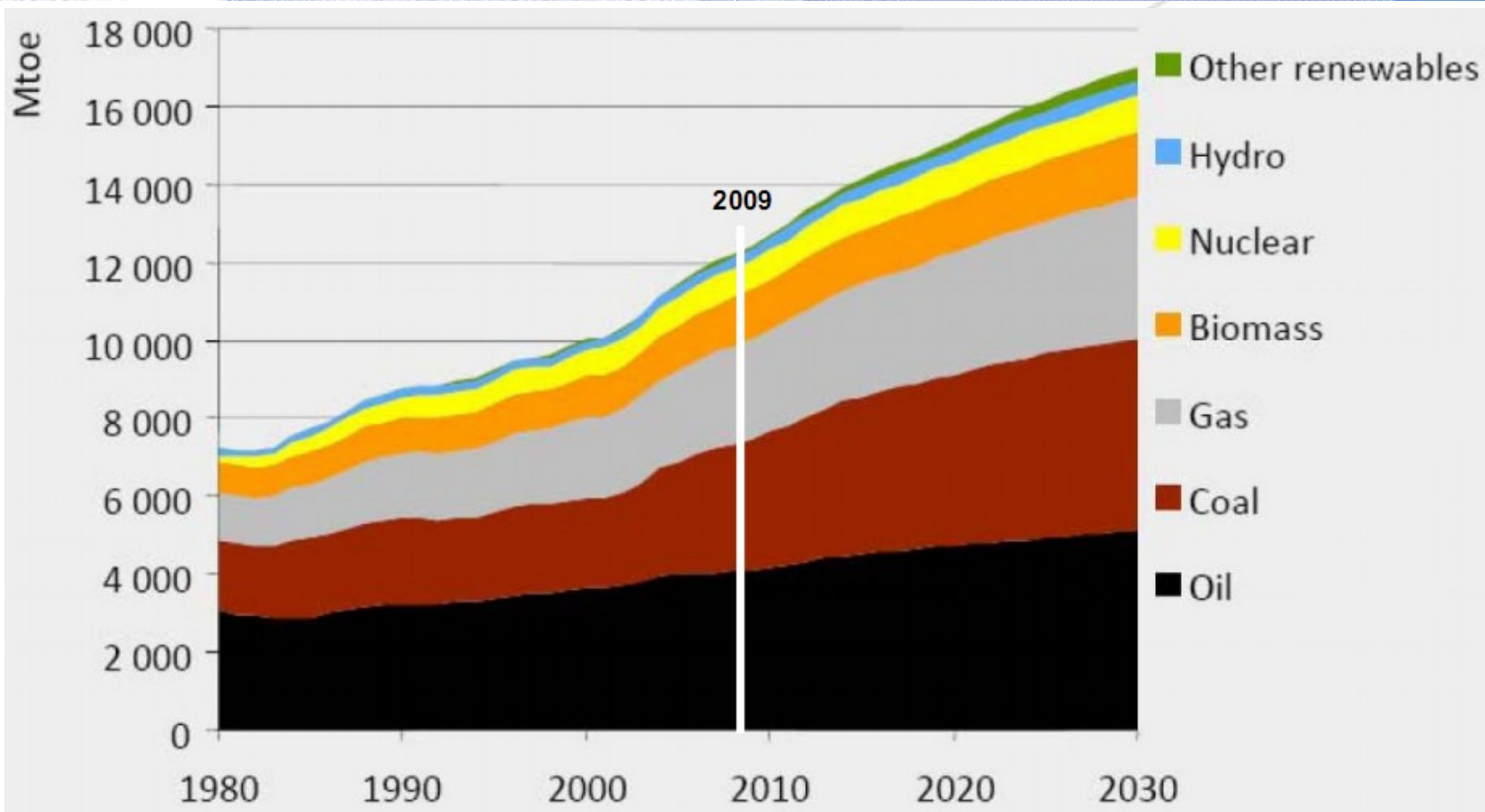


okt, 2009

INTPOW– Norwegian Renewable Energy Partners - your networking arena

By Geir Elsebutangen, Managing Director, INTPOW

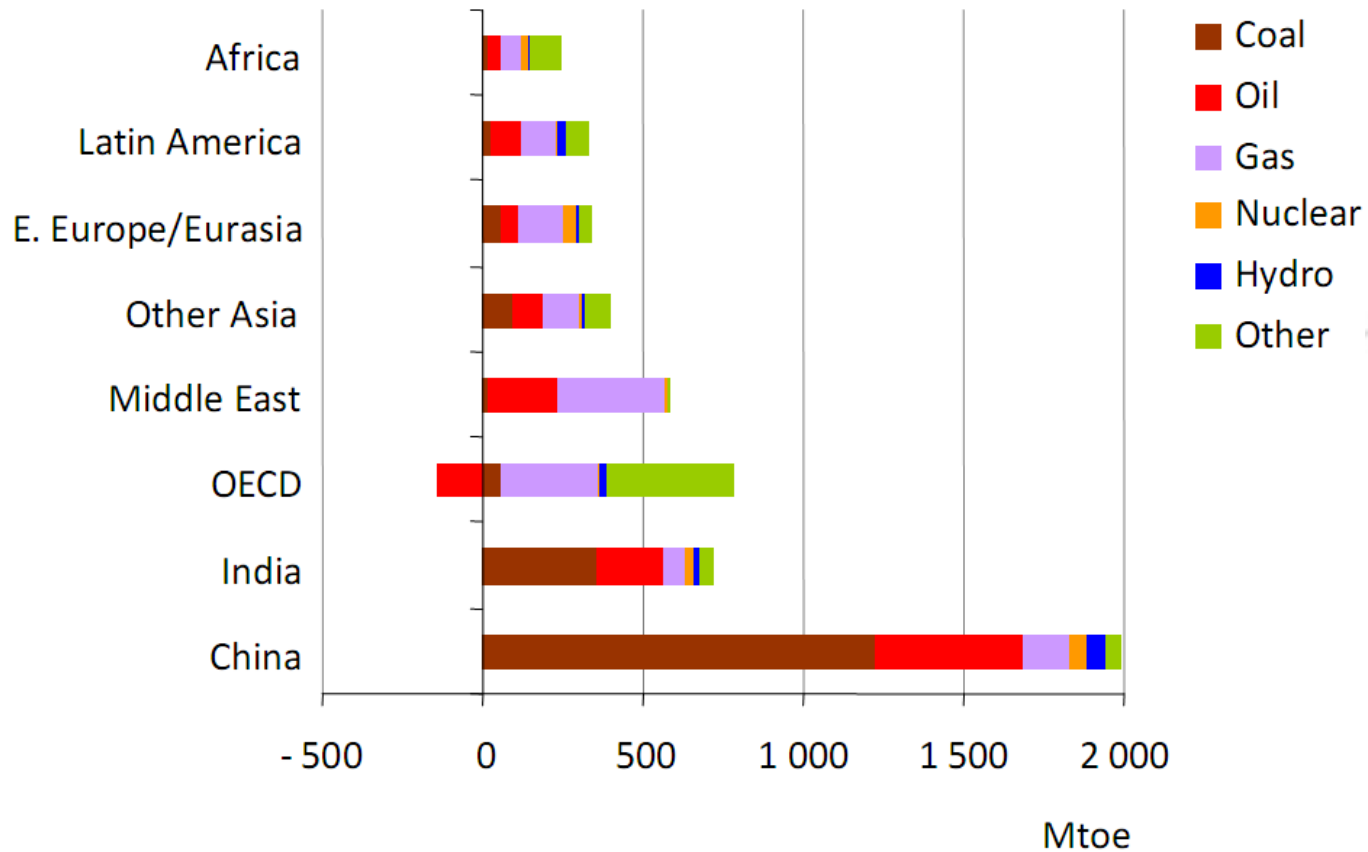
World Energy demand on the rise!



World energy demand expands by 45% between now and 2030 – an average rate of increase of 1.6% per year – with coal accounting for more than a third of the overall rise

Source: IEA Reference Scenario 2008

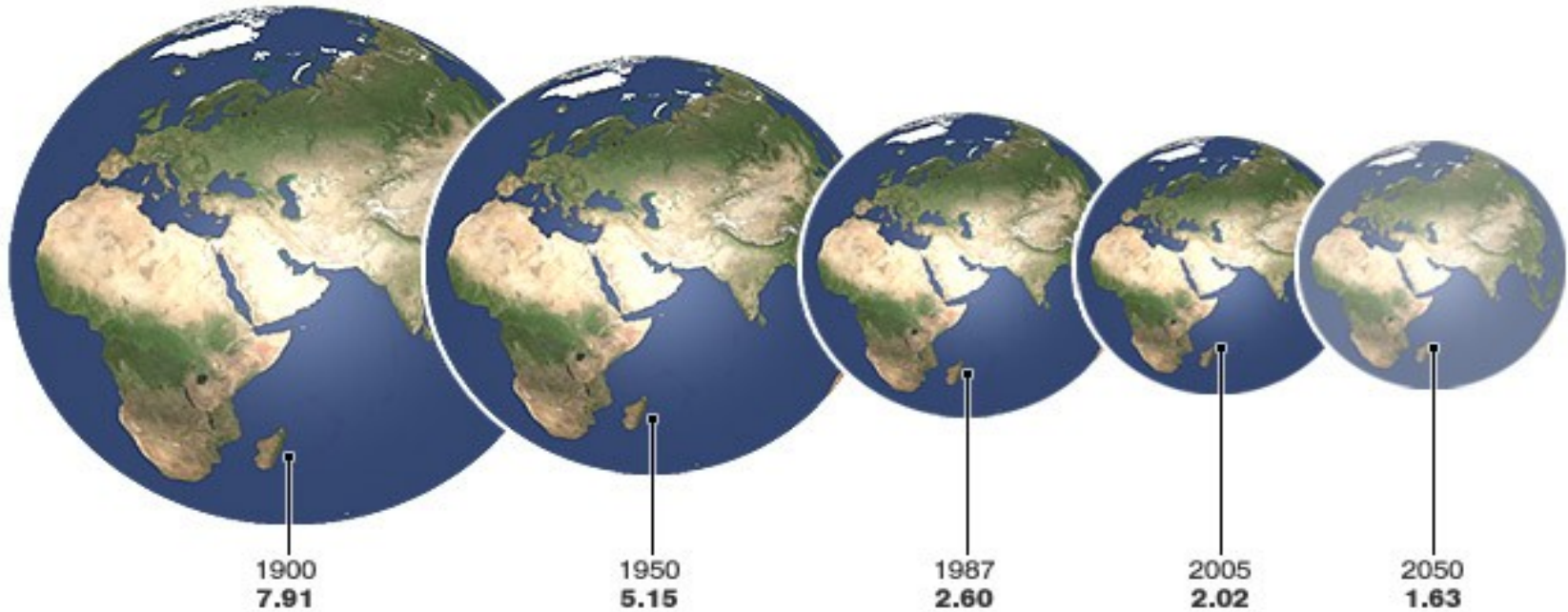
World Energy demand on the rise!



The increase in China's energy demand to 2030 – the result of its sheer market size & stronger economic growth prospects – dwarfs that of all other countries & regions se

Source: IEA Reference Scenario 2008

More people - less available land per person



Renewables will require land....

World average energy consumption per unit of land is 0,1 watt per sq.m

Bahrain consumes 10 watts per sq.m

Norway and Sweden are slightly above average

As is China

Botswana and Sudan 0,01 watt per sq.m

Imagine UK getting a third of its energy from wind, a third from desert solar power and a third from nuclear power

Wind farms would occupy 10% of the land = Wales

Solar power stations would cover an area 5 times the size of London

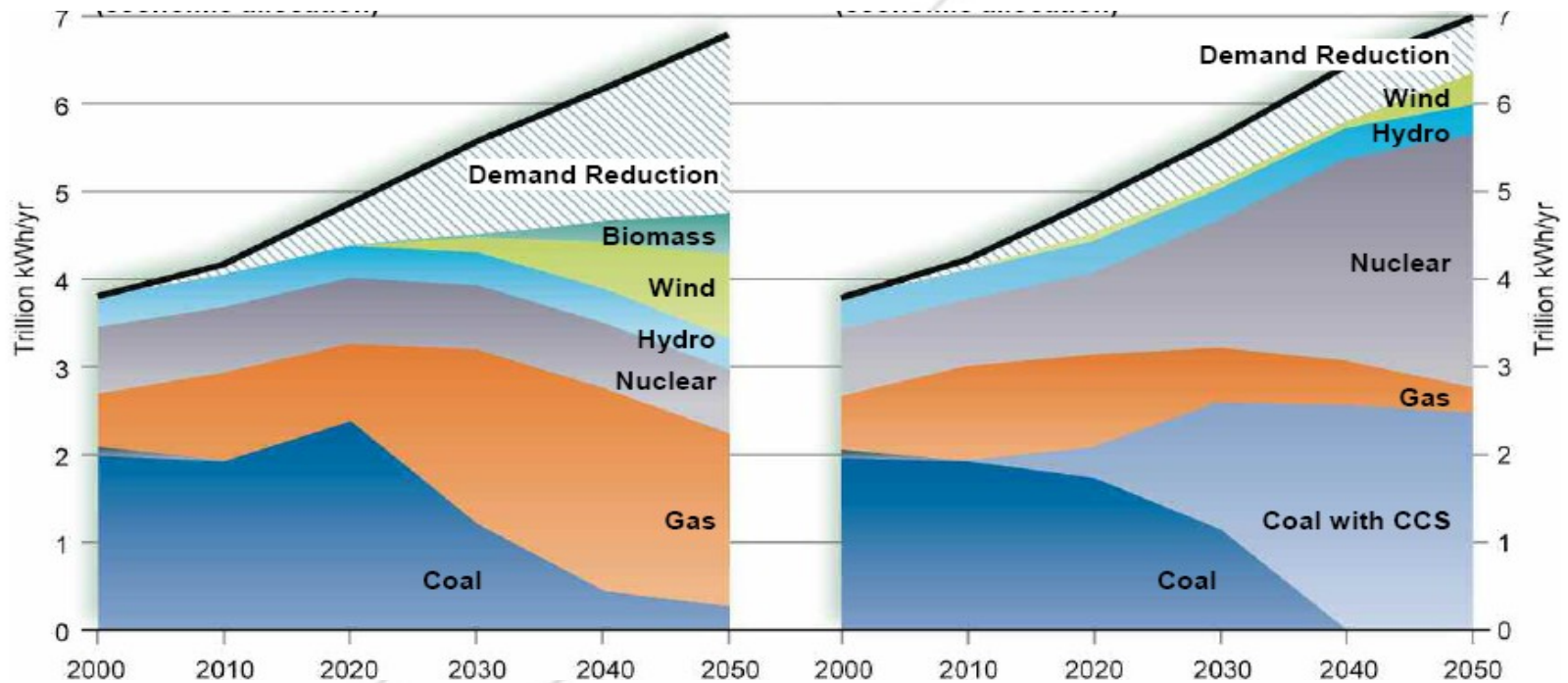
The 50 nuclear stations would occupy a more modest 50 square

Source: Professor David J.C, MacKay, University of Cambridge



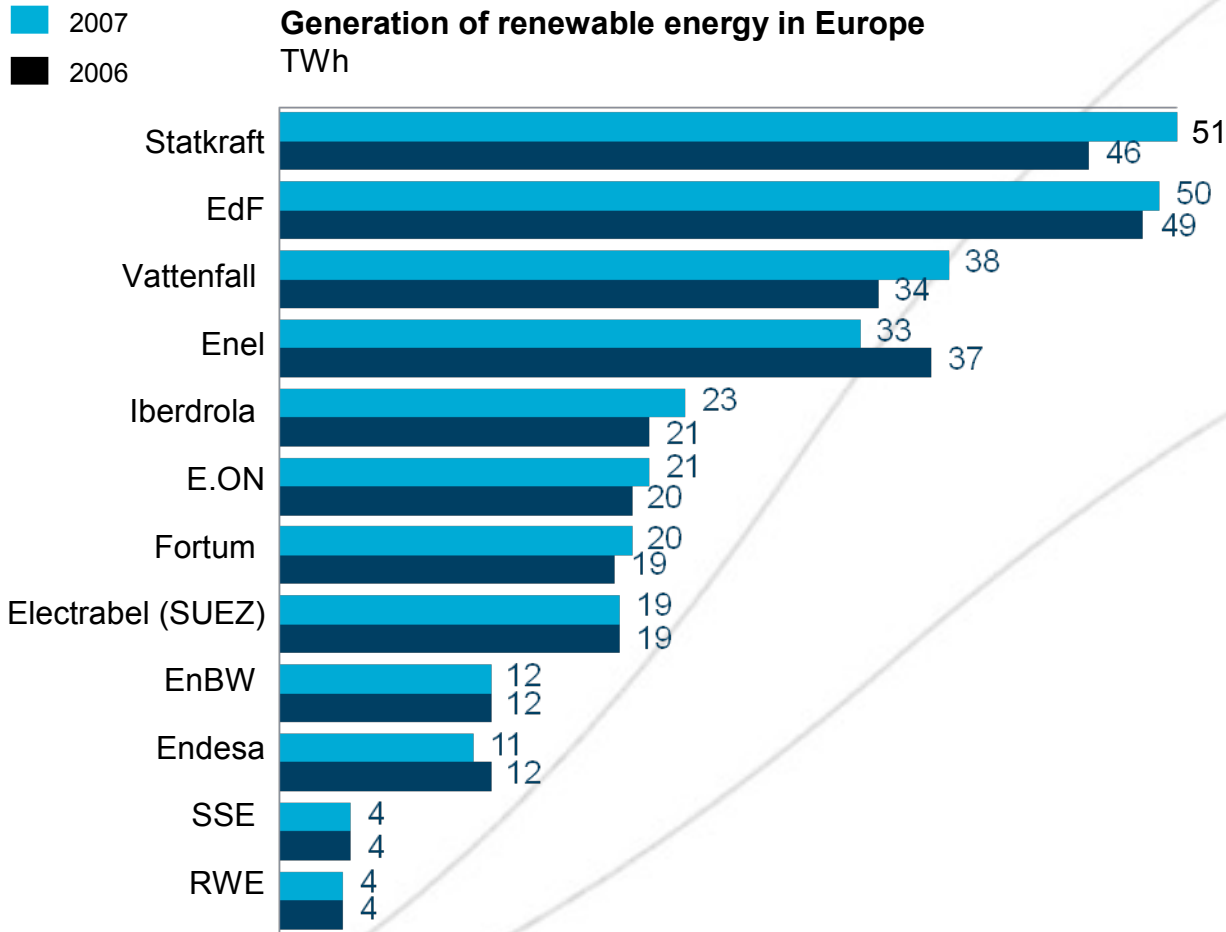
What can a cleaner energy future look like?

Economy wide CO2 emissions capped at 2010 level until 2020 then reduced with 3% per year



Source: US Electric Power Research Institute

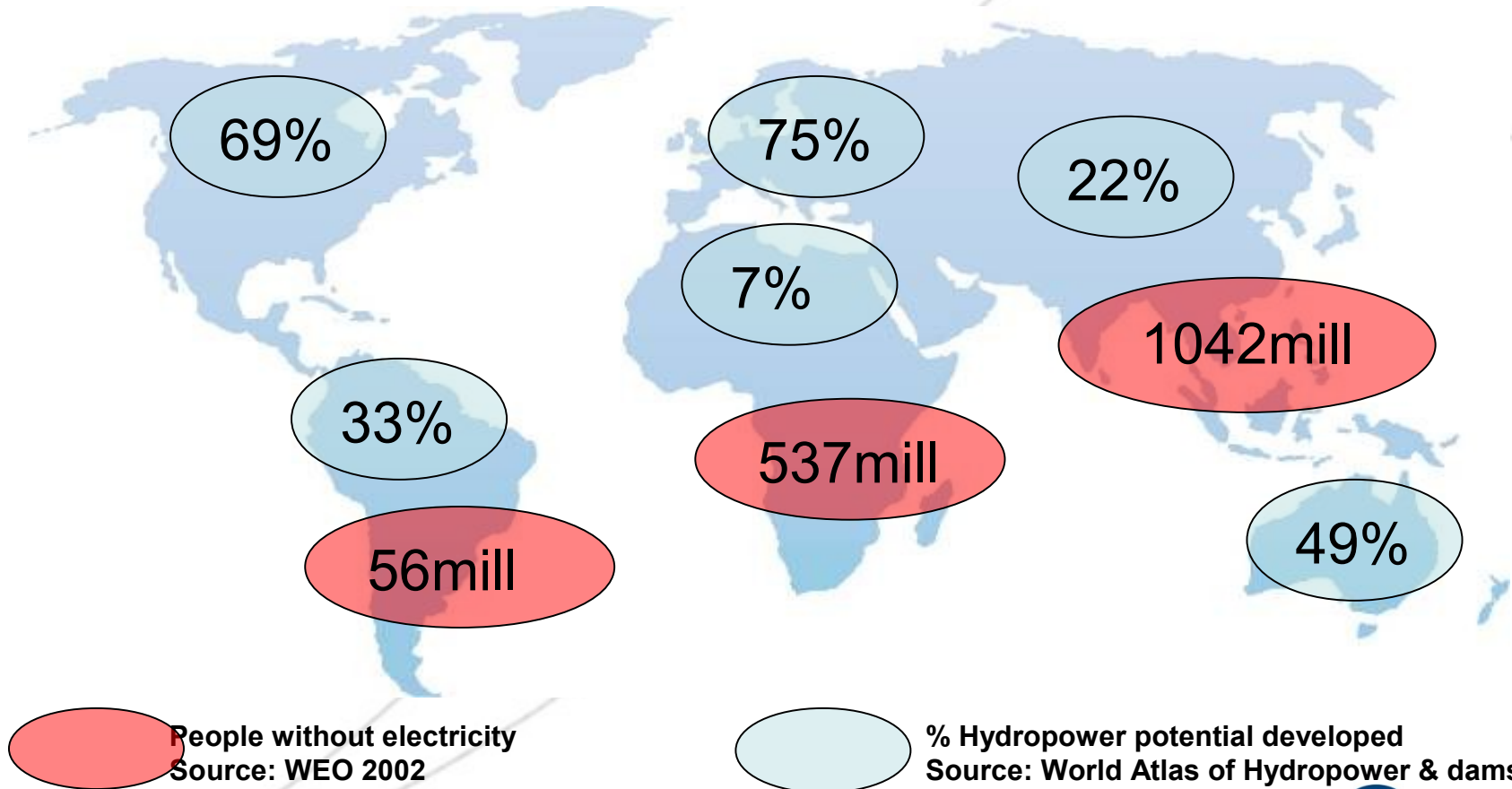
Largest in renewable!



Source:
Statkraft Annual reports

World hydropower potential

1.6 bn people worldwide with no access to electricity grids





**Promoting Norwegian
renewable energy capabilities
in international markets**

Services



- **Network based organisation with an ability to exchange information and learn from each other**
- **Providing in-depth information on the markets and priority projects in the energy sector**
- **Offering advice on international markets, entry strategies, clients and local supply chains**
- **Facilitating seminars and thematic workshops to profile member companies and products towards international clients**
- **Offering partner companies access to experienced local advisors in the main markets**

The INTPOW Board

Chairman

- Mr. Bjørn Blaker, Statkraft

Vice Chairman

- Ms. Anne-Grete Ellingsen, Agder Energi

Board Members

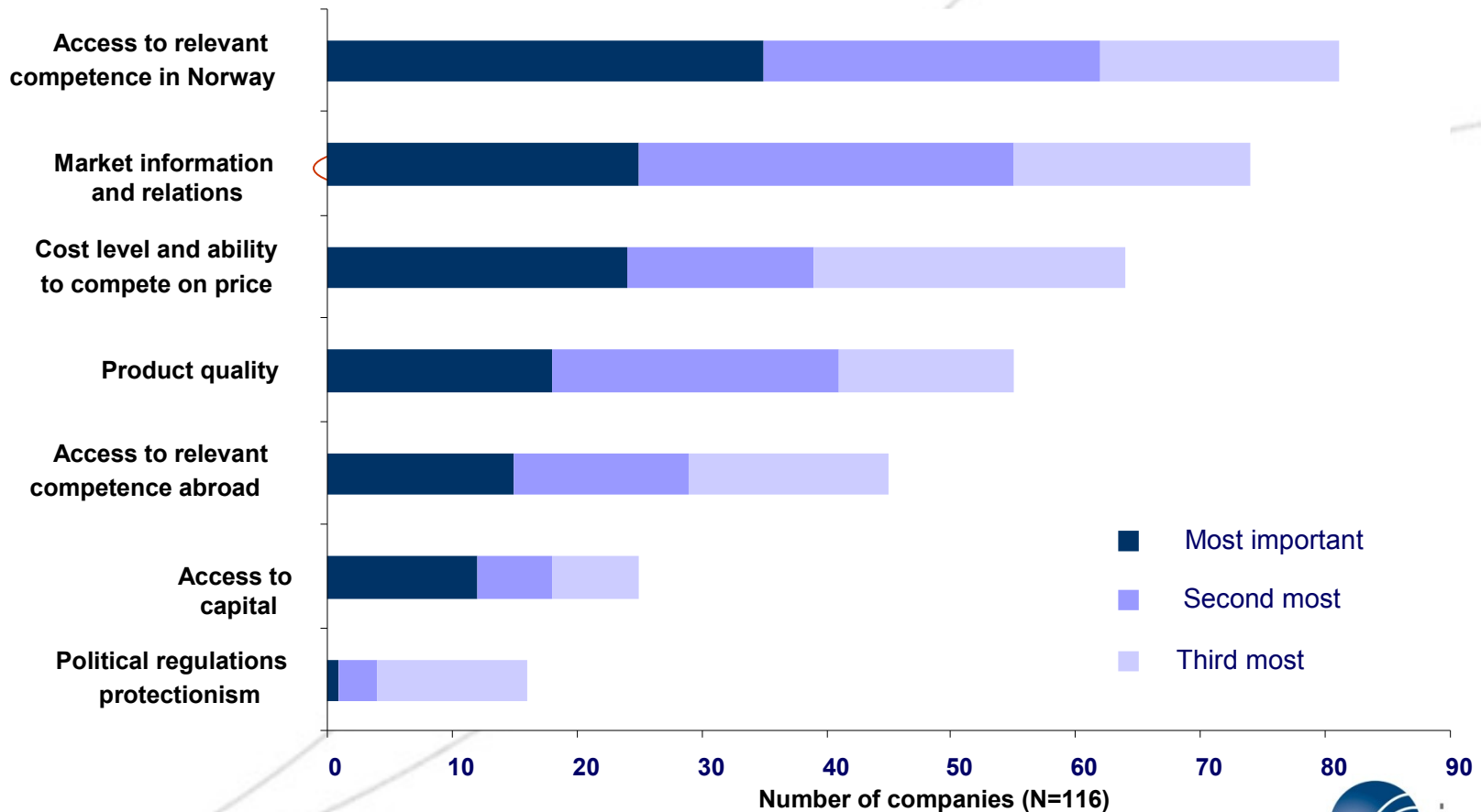
- Mr. Øivind Johansen, OED, Ministry of Petroleum and Energy
- Ms. Anne Marit Skulberg, NHD, Ministry of Trade and Industry
- Ms. Anne Kari Hansen Ovind, UD, Ministry of Foreign Affairs
- Ms. Anne Lise Aukner, Nexans Norway
- Ms. Elisabeth Tørstad, Det Norske Veritas
- Mr. Ola H. Norderhaug, Norconsult
- Mr. Knut H. Johansen, Navita Systems
- Mr. Lars G. Dysterud Hansen, Norsk Solkraft

Managing Director

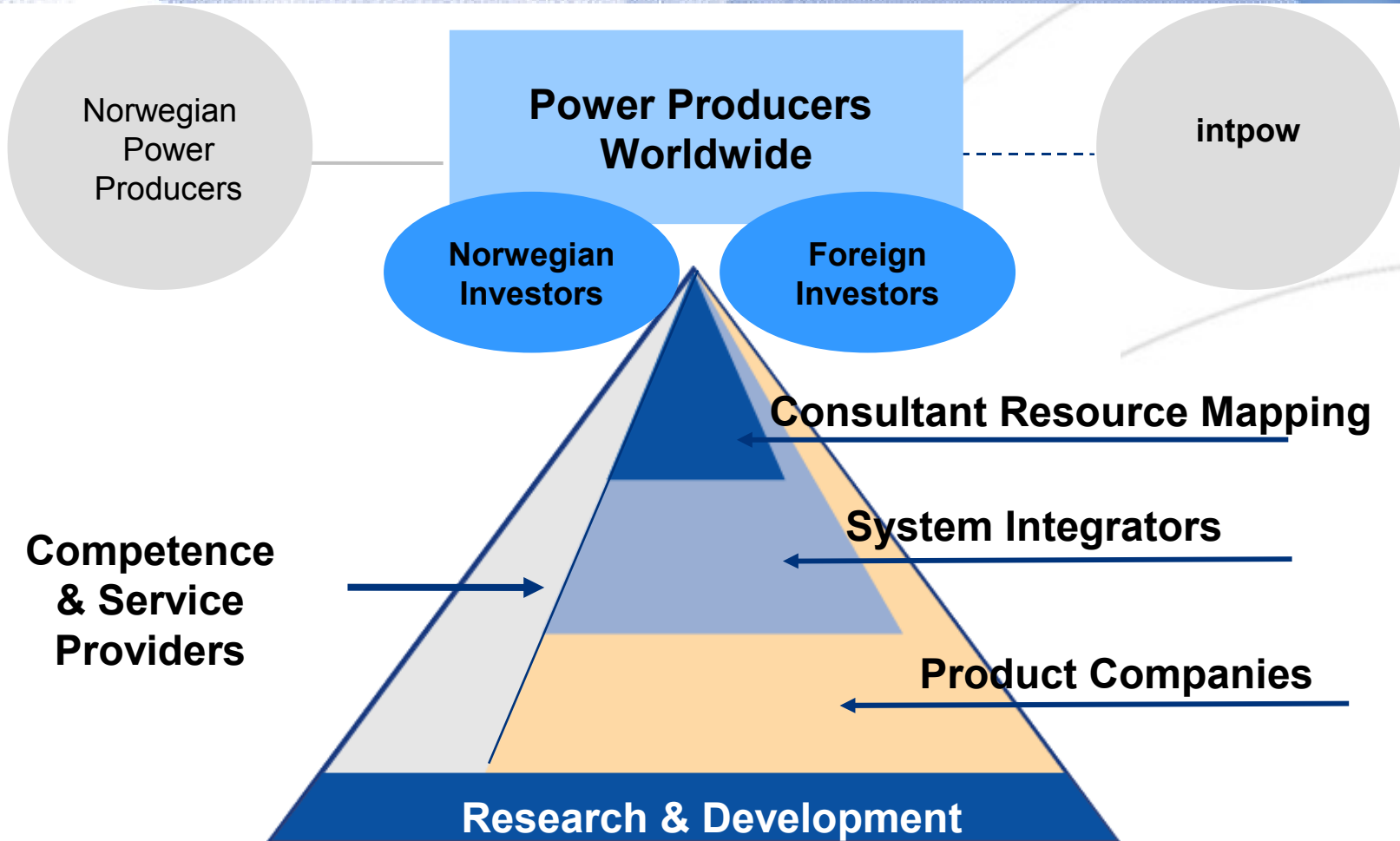
- Geir Elsebutangen

Providing market insights – and relations

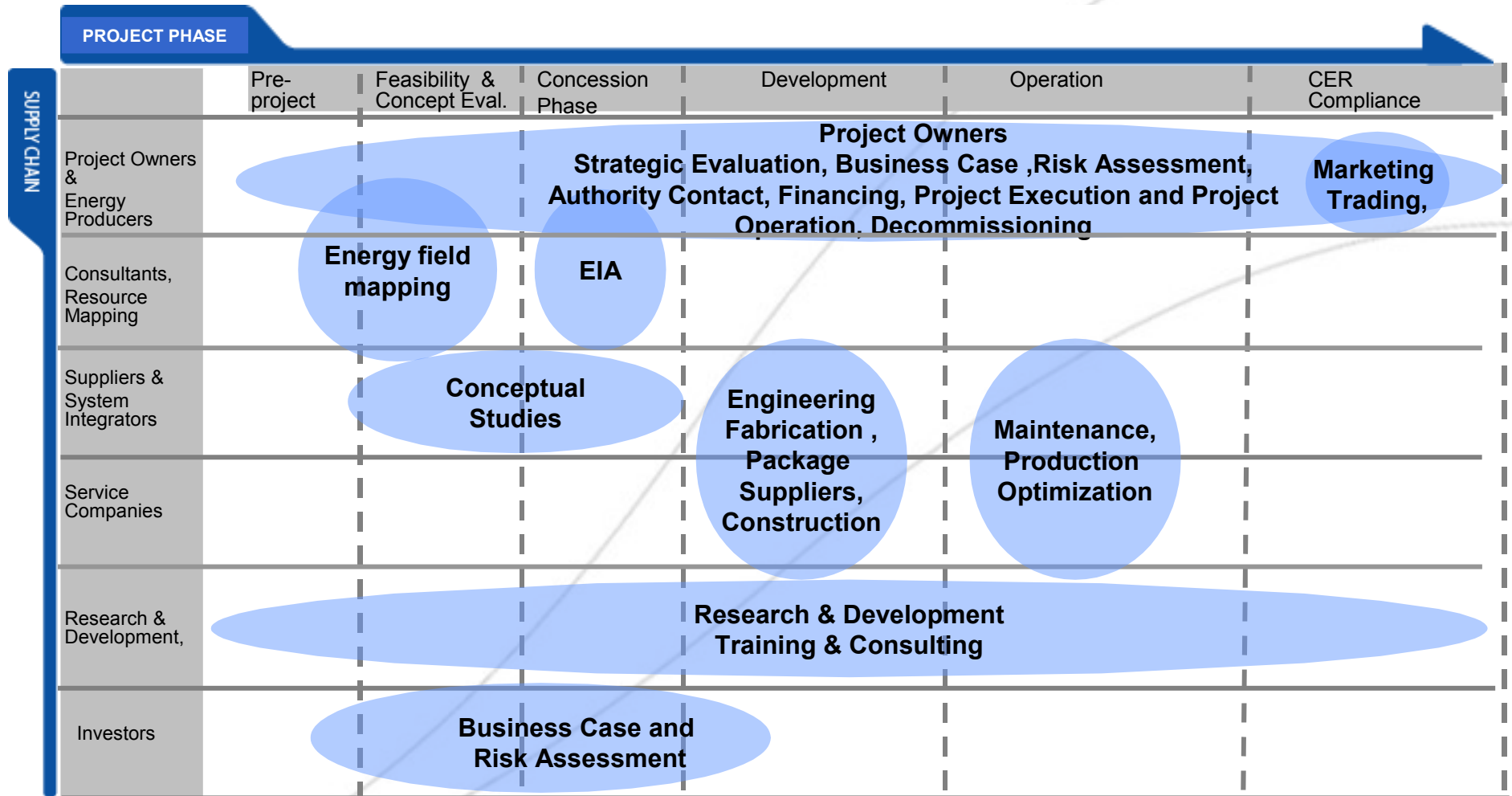
Rank the three most critical challenges for your company to succeed internationally
In the next 2-3 years

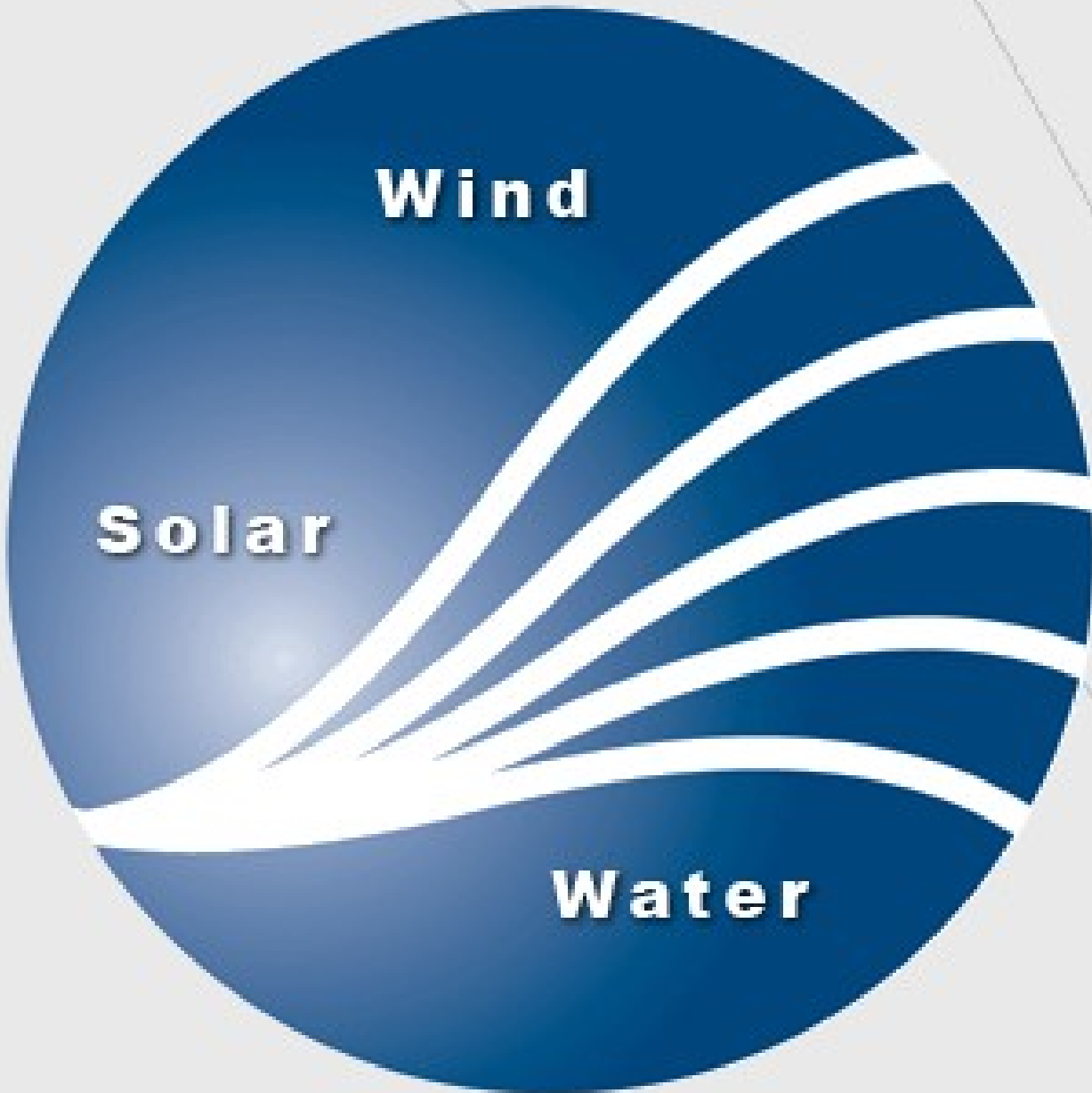


Serving the Renewable Energy Market



Norwegian Renewable Development Clusters





Challenges in hydropower development

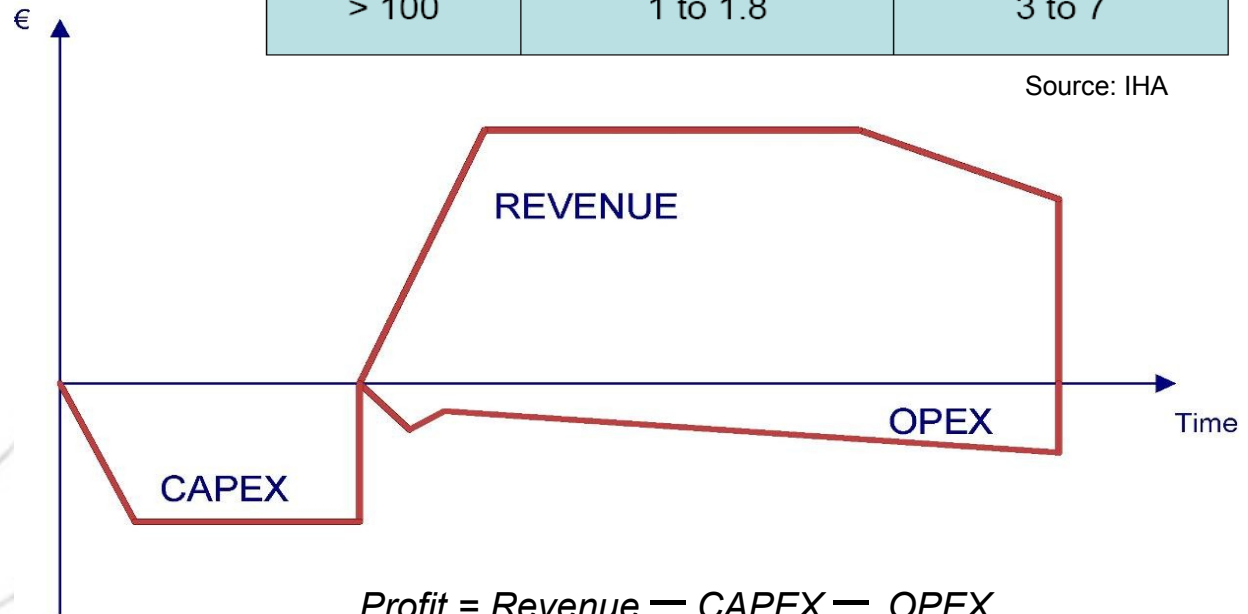
- According to the World Bank, the major constraints for hydropower development are:
 - high capital costs and lack of financing
 - shortage of planning and properly assessed project pipelines
 - unsettled conditions for private sector participation
 - lack of capacity throughout the industry and client countries
 - weak regulatory and policy frameworks
- Environmental and social impacts of hydropower development
 - IHA Sustainability Assessment Protocol under development to assess the sustainability of hydropower projects taking into account social, economic, technical and environmental impacts
- Main potential markets are in developing countries, several of these with limited developed institutions and systems
- Global and regional political will is absolutely necessary for further exploitation of global hydropower

Hydropower costs

- Hydropower has, like wind farms, a very high initial cost. Expenses for building dams, roads et cetera occur before any income can be earned
- Post-construction however, the costs are low and also fairly known, due to the free energy input
- Thanks to the extensive industry experience, the costs for operation and maintenance are very low and predictable
 - With proper service and maintenance, the lifetime for a hydropower plant could well exceed 50 years

Costs of hydropower development		
Project size (MW)	Development cost (US\$ million/MW)	Operational cost (US\$/MWh)
< 10	1 to >5	3 to 10
10 to 100	1 to 2.8	3 to 8
> 100	1 to 1.8	3 to 7

Source: IHA



Government support models for wind power

There are basically six models employed by governments to support wind power:

- Fixed tariffs for the 'feed-in' of wind powered electricity (REFIT).
- Renewable Portfolio Standards (RPS), which lay down a rising percentage of renewables supply, as used in the USA.
- Bidding processes, as used in the USA (Request For Proposals), Ireland and the UK in the past.
- Price premium/energy taxes and other tax related benefits.
- Investment grants, often in combination with other incentives, as in Norway and the UK offshore.
- Green certificate markets, where production of renewable electricity is rewarded by the issuing of certificates. These are then sold in a market where power companies and consumers buy them to fulfil their obligation to cover a defined part of their consumption from renewable electricity.

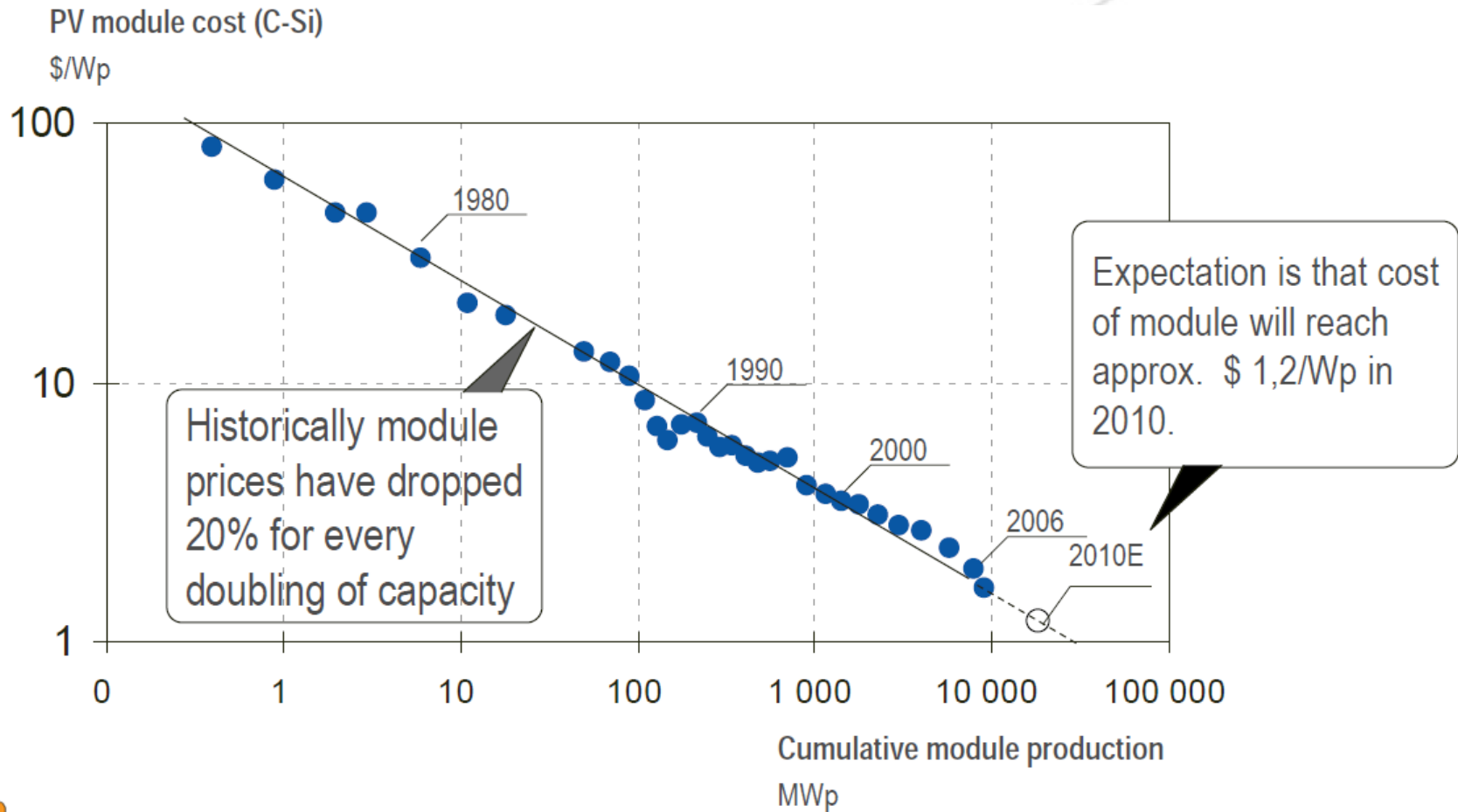
Seems to have been the one to encourage the most rapid development. This is evident from the experience in Germany (9.20-15 Eurocents/kWh), Spain (9.34) and Denmark (6.94) over the past decade

The PTC (Production Tax Credit), a credit of 2,1 cents per kWh, has been an effective instrument in the United States (it is now extended until 2012).

A popular (among politicians) new model is the green certificate system, coupled with an "RPS-type" obligation on the consumer side of the market. The track record for this has shown varying success. Italy appears to have been the most successful

Source: BTM Consult 2008

PV Module costs dropped substantially



Norwegian development aid market

Norad

- Liberia, Mozambique, Nepal, Tanzania, Uganda and East Timor are the main countries for bilateral energy cooperation. Here Norway aims to have solid, well-integrated, flexible programs and the capacity to be a strategic dialogue partner.
- In Afghanistan, Angola, Ethiopia, Ghana, Bhutan, the Palestinian areas, Vietnam and Laos, Norad has partnership programs that vary greatly in content and size, and where Norwegian money and expertise are both in demand.
- India, China and South Africa prefer Norwegian expertise to financial support. Climate and purification technologies, and energy planning and efficiency are in demand. Experience tells us that mobilization of Norwegian know-how is subject to serious capacity constraints. Within the framework of the Clean Energy Programme, efforts can be made to establish fora for the exchange of know-how and cover the added costs associated with the expansion of the technical base and other activities in the collaboration.

Source: Norad

Norwegian development aid market cont'd

NorFund

- Africa:
 - No investments as yet. It has won licenses for Karuma and Bugoye in Uganda, but these have been sold to “Trønder Energi” and Norpak, respectively. In Mozambique it has a Heads of Agreement with the national power company EDM. The companies are considering establishing a joint venture company for upgrading and operating two hydropower plans (Mavuzi and Chicamba), which have a total installed effect of 90 MW. It is also considering projects in South Africa, among other countries.
- Asia:
 - The Philippines, it has established a joint venture company, SN Aboitiz Power, together with the national player (Aboitiz Equity Ventures, Inc.).
 - Sri Lanka, it purchased 40% of the shares in the hydropower company Nividhu Pvt. Ltd. in 2003. SN Power’s partner, Lanka Transformers Limited (LTL), owns 45% of the shares in this hydropower company, which plans to expand the 30-40 MW capacity in the mini power plant within the next few years. In 2006, it took a majority ownership interest in the power company Himal Power Limited after taking over Statkraft’s shares. At the same time, set up its own office in the country.
 - Nepal, it has acquired licenses to develop Tamakosi II and III. The installed effect of these power plants is designed to be approx. 500 MW, and annual production will be approx. 2,600 GWh.
 - India, it holds a minority ownership interest in Malana Power Company Ltd. (MPCL), which is a joint venture between SN Power and LNJ Bhilwara. MPCL operates the 86 MW Malana hydropower plant and is currently building a 192-MW power plant (Allain Duhangan) in Himachal Pradesh.
 - It has begun to explore the possibility of becoming involved in hydropower projects in Bhutan.

Source: Norad

Success criteria's?

- Joint effort between government, Power producers and the industry
- Hydro power
 - Large and small HPP will enhance infrastructure
- Wind
 - Building competence through large projects in Norway
- Solar
 - Support R&D in Norway with field testing abroad
- Hybrid;
 - Combination of technologies
- Market priorities (Access to finance more difficult just now)
 - Less countries receiving more governmental funding
 - Increase funds and grants to those remaining
 - Focus on both on-grid and off- grid solutions
 - Move funds from studies to projects

