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Science policy approaches and responses to grand societal challenges:

A comparative analysis of research systems in Norway and Denmark - Work in progress

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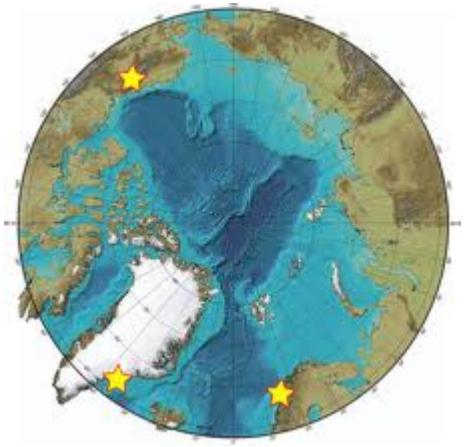
NIFU

Outline of our presentation



- Research questions
- Theoretical framework
- Data sources, selection of countries and Grand challenges
- Comparative analysis
- Conclusions so far

Research questions

- How do countries develop priorities for research and innovation in response to Grand challenges?
- How do two Scandinavian countries – Norway and Denmark – differ regarding research policy processes for defining agenda and priorities?
- What kind of balance between central steering and aggregation is optimal for addressing Grand Challenges?

Theoretical framework – agenda and priority setting

1. Agenda setting: define more general goal and rationale and bring some problems on the public agenda – the public societal discourses

2. Priority setting: selection of certain activities at the expense of others – who, what and how much research to fund and for how long

→ Increasing distinction between strategic levels (i.e. ministries) and operative levels (policy measures, programmes)

→ Need for coordination of multitude of actors

1. Theoretical framework – priorities for research and innovation policy

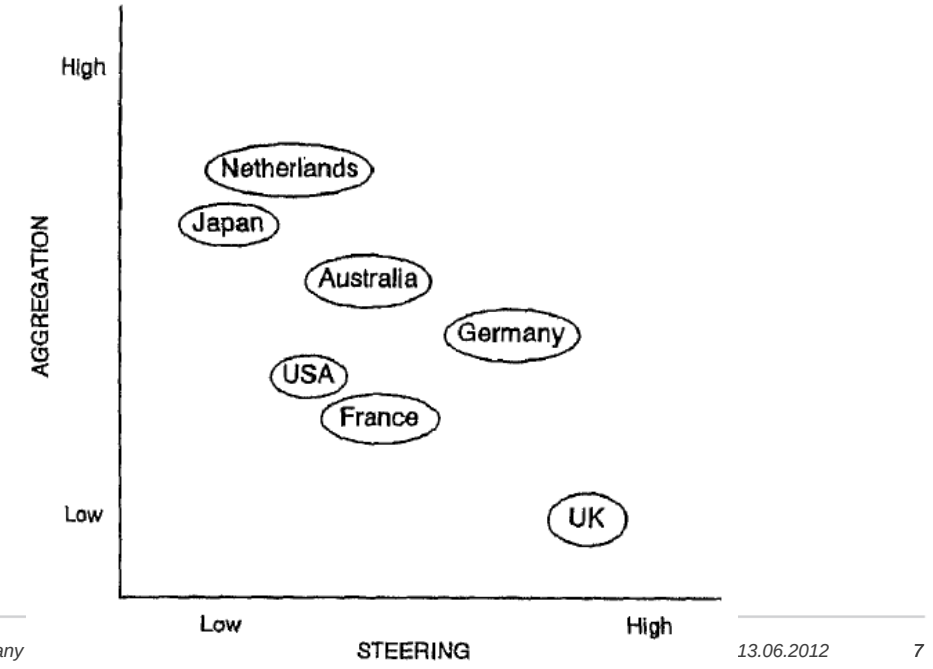
- Give priorities for research and innovation policy – Gassler, Polt & Rammer (2008), Stewart (1995), OECD (2010)
  - National innovation systems (NIS) vs. «mission oriented» research
  - Goal conflicts and path dependencies
  - Priorities and resource distribution
  - New «mission oriented» research policy:
    - Addressing global societal challenges
    - Societal demands and technological solutions
    - Decentralised processes
    - Involvement of many actors
    - Speedy dissemination of results

2. Theoretical framework – lock-in and path-dependency

- Technological and institutional ‘lock-in’ and path-dependencies as barriers for sustainable innovation – Foxon (2002), Shackley & Green (2007), Ruud (2008)
  - Existing technological systems gain advantage – strengthened by institution building supporting these technological systems
  - New, more sustainable technologies have less access to resources and supporting institutions, high costs and limitations to upscale
  - Policy’s role to facilitate and stimulate the development of more sustainable technology

3. Theoretical framework – steering and aggregation as important features of research systems – Rip & van der Meulen (1996)

- Steering of research systems: the institutional infrastructure and competence to align scientists to the objective and the aims of the principal, in our case the state
- Aggregation of research systems: institutional, *bottom-up* consensus oriented infrastructure and processes for processes of socially distributed agenda-building – creates coherence and supporting infrastructures



Analytical framework – Dimensions of comparative analysis

1. Institutionalisation – differentiation of institutional levels (ministries, agencies, intermediaries, research programmes)
2. Role of path dependency and lock-in
3. Strategy formulation of policy decision makers
4. Degree of aggregation and central steering of decision making processes in the research system

Data sources, selection of countries and Grand challenges

- Discourse analysis of political processes around prioritisation and agenda setting of research systems for solving Grand societal challenges
- Three Grand societal challenges:
  - Climate change and degradation of environment
  - Access to renewable energy
  - Welfare and ageing
- Why are these Grand challenges?
  - Need for global interaction and not confined to some countries
  - Need for interdisciplinary research
  - Interaction of public and private actors, involvement of new actors
- Selection of countries:
  - Norway and Denmark different degrees of steering and aggregation
  - Have started also analysis of Germany and UK

Comparative data sources

- Qualitative and quantitative data
- Statistics from EUROSTAT and IEA
- ERAWATCH reports and inventory
- International Energy Agency (IEA) Policies and Measures Databases

eco-innovation observatory

Ageing and Employment Policies
Live Longer, Work Longer

- Eco-Innovation Observatory
- OECD reports on Ageing and Employment

Institutionalisation – agencies and intermediaries

	Climate	Renewable energy	Ageing
Denmark	Danish Agency for Science, Technology and Innovation Strategic Research Council Council for Technology and Innovation Danish Board of Technology Danish Coordination Unit for Research in Climate Change Adaptation at Aarhus University	Danish Agency for Science, Technology and Innovation Energy Danish Energy Agency Strategic Research Council Council for Technology and Innovation Danish Board of Technology Danish National Advanced Technology Foundation	Danish Agency for Science, Technology and Innovation, Danish PWT Foundation – Investments in Public Welfare Technology (ABT-fonden), Business Innovation Fund (Fornyelsesfonden), Strategic Research Council, Council for Technology and Innovation Danish Board of Technology
Norway	Research Council of Norway Norwegian Board of Technology	Research Council of Norway Norwegian Board of Technology	Research Council of Norway Norwegian Board of Technology

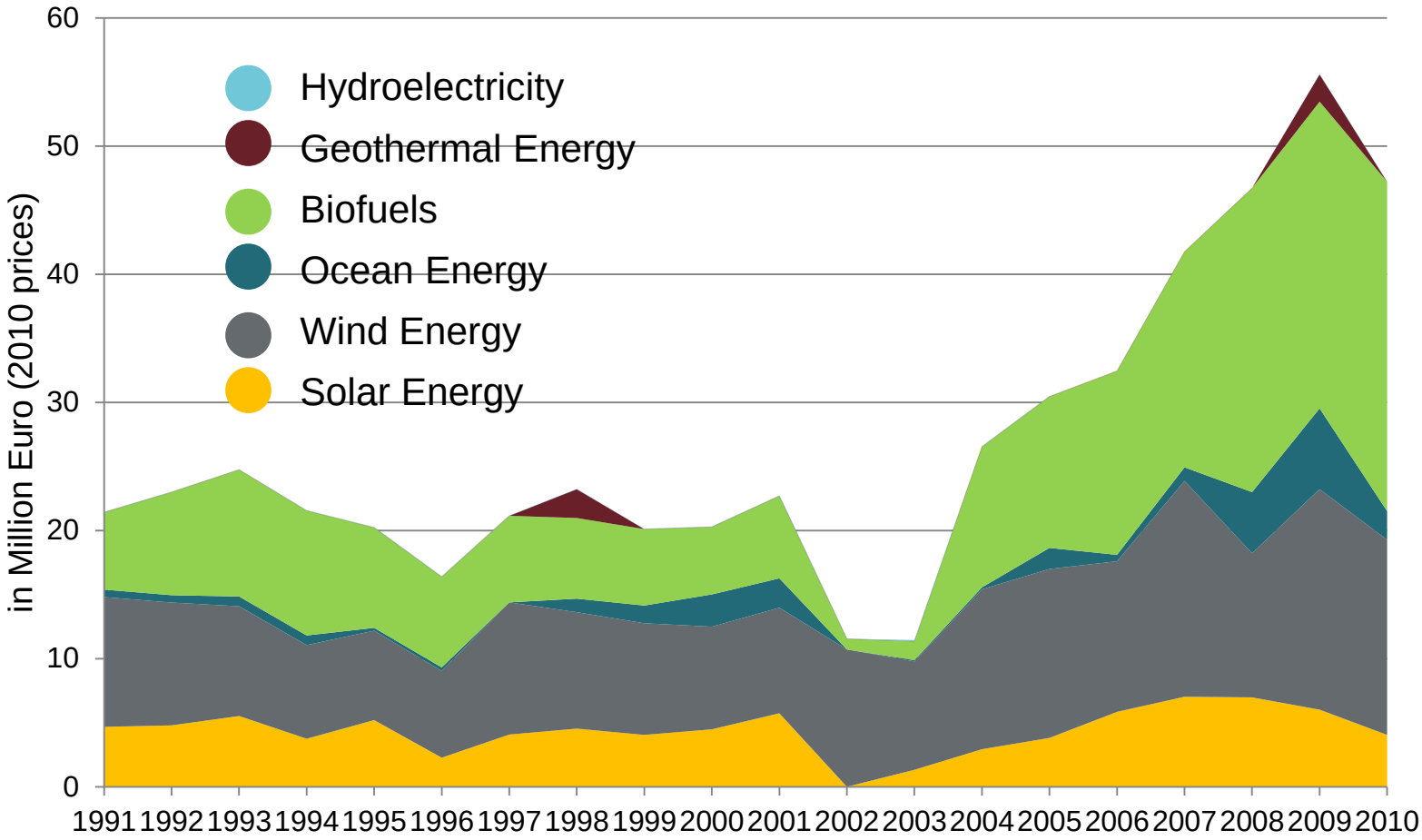
Institutionalisation – Programmes, Centres

	Climate	Renewable energy	Ageing
Denmark	Programme Commissions on Sustainable Energy and Environment and on Sustainable transport and infrastructure Danish Climate Centre at DMI Centre for Ice and Climate at the University of Copenhagen Climate research centre in Greenland, interdisciplinary centre for regional climate change research (2009) UNEP Risø Centre on Energy, Climate and Sustainable Development Board of Technology: different projects on Climate Change	Programme Commission on Sustainable Energy and Environment SPIR 2011: Energy Energy Technology, Development and Demonstration Programme (EDDP) Green Labs DK Board of Technology: STOA: Future Energy Systems in Europe, Sustainable Energy Catalogue	Programme Commission on Health, Food and Welfare SPIR 2011: Intelligent Solutions for Society and Welfare Technology Board of Technology: Focused prevention of obesity, Ageing society (public hearing) The prevention fund - new technology to prevent disabilities Danish Public Welfare Technology Foundation: Investments in Public Welfare Technology Danish Aging Research Center
Norway	RCN: NORKLIMA, IPY Bjerknes Centre for Climate Research, Centre for international Climate and Environmental Research CEER: Strategic Challenges in International Climate and Energy Policy (CICEP)	RCN: Renergi, 10 Centres for Environment-friendly Energy Research (CEER), Climit Board of Technology: Energy and environment, Future forestry	RCN: Welfare, Working Life and Migration, Health and Care Services Board of Technology: eHealth: The Future of Ageing

Role of path dependency and lock-in

	Climate	Renewable energy	Ageing
Denmark	Strong standing in climate science (many disciplines) → Important for relation to Greenland	Tradition for using fossil fuels → Oil crisis Energy strategies Over long period building capacity in wind energy technology and energy efficiency	Focus on health care service in municipalities
Norway	Strong standing in climate science (many disciplines) → Instrument for foreign policy (Arctic and Antarctic, Russia)	Energy consumption dominated by large hydro power plants → less focus on new renewable energy Export incomes of oil and gas → oil & gas sector attracts huge parts of engineers and scientists	Tradition for health care in hospitals and lacking care capacities in municipalities have meant a high burden for hospitals → Difficult to built up capacities in health care services in municipalities

Denmark: RD&D budgets on renewable energy. 1991-2010



Source: IEA

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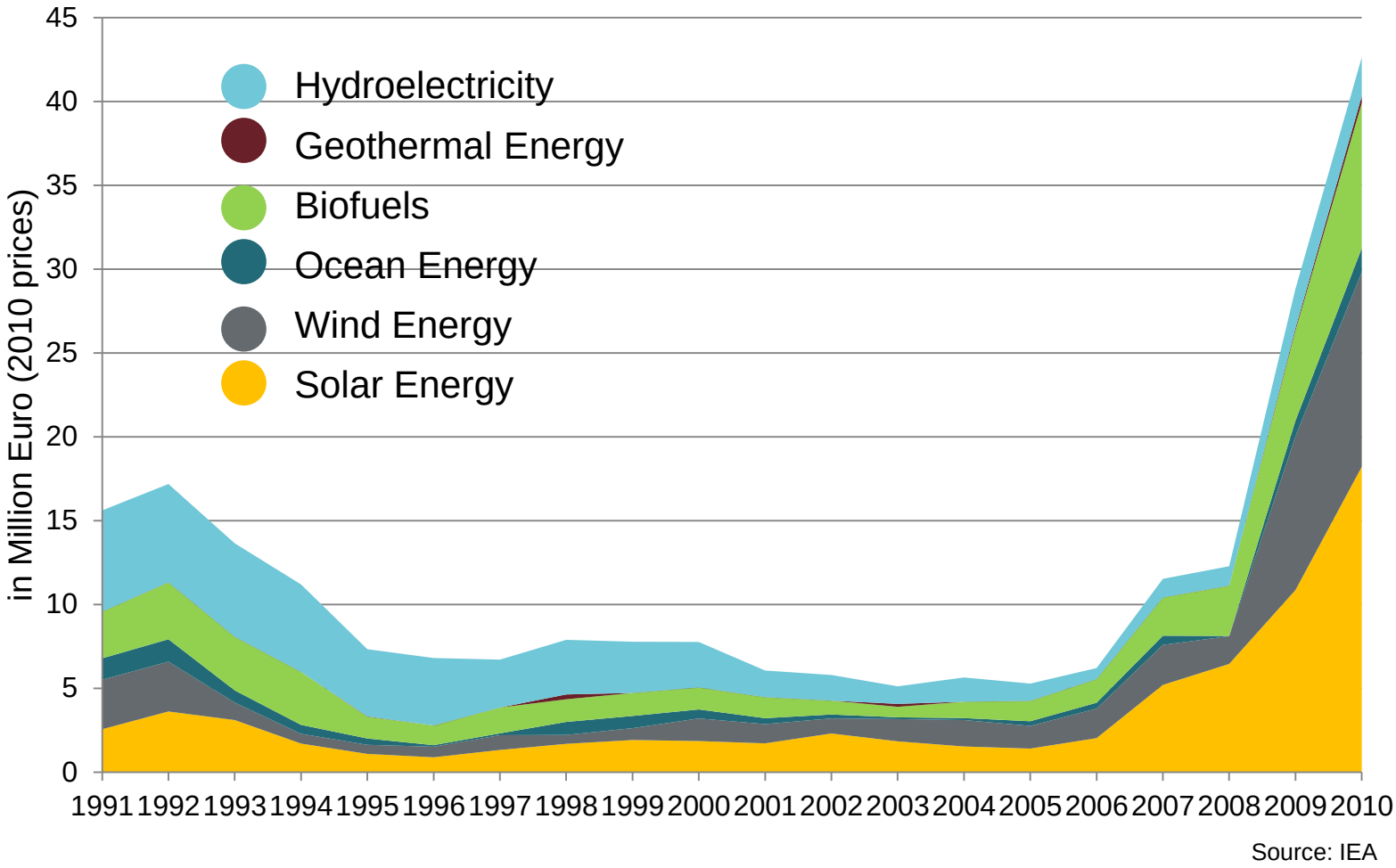

Source: IEA

Balance of aggregation and steering processes

- Denmark:
  - All three grand challenges addressed by a balanced research policy combining strategic steering and aggregation processes
  - Defining research priorities in a consensus-based processes, but not clear decision what has highest priority (RESEARCH2015) – new RESEARCH 2020 process more steered
  - Cases of governmental steering not backed up sufficiently in the research community
  - Episode of discontinuity of R&D funding in renewable energy with the former government
  - Plenty of strategies and changes – danger for overloading the research system

- Norway:
  - Tradition for aggregation processes for all three challenges
  - Lack of government steering and strategies
  - Lack of implementation after developing research and innovation strategies
  - Changes for renewable energy: more strategic steering over the last years, but less than in Denmark
  - Role of Parliament for strengthening governmental steering processes (climate and energy) – helps public acceptance and awareness

Conclusions: Grand challenges mobilise bottom-up processes but require strategic steering!

- Need for strategic steering of research policy prioritisation processes grounded in aggregation processes
- Strategy bottom-up processes have contributed raising awareness and activity level in the research community and help increasing public acceptance
- Research systems characterised by high degree of aggregation, without steering processes tend to favour existing networks and not the development of new ones
- Research systems characterised by a high degree of steering have a problem with motivating changes in the research community