Roadmaps for Norwegian industry

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Two models working together

*The «21-processes»*
- Politically initiated
- Involving the different sectors and their organisations
- Supported with secretariat from the Research council of Norway, Innovation Norway, Enova, and others
- Delivering the national strategies for R&D towards the 21st century targeting different sectors
- Priorities from the Research Council will follow the strategies

*Roadmaps for green competitiveness*
- The industries themselves
- Roadmaps targeting different sectors and their competitiveness in a low emission society
The Norwegian R&D strategies for the 21st century

Politically initiated

• **OG21**: Increasing added value in the norwegian oil and gas industry, and increased export of norwegian oil and gas technology

• **Energy21**: Increased value adding and stable, cost effective and sustainable use of the energy resources

• **Buildings21**: Cutting emissions by 20% within 2020

• **Environment21**: Present the long lines in norwegian environmental research and present concrete challenges and needs of knowledge

• **Oceans21**: Sustainable use of the oceans and use of all biomass. Best on quality and innovation in all parts of the value chain
The Norwegian R&D strategies for the 21 century

Continued

- **Digital21**: promote the abilities and possibilities to develop and use new technologies in line with increasing digitalisation
- **Transport21**: how can research, development and innovation solve the major transport challenges
- **Healthcare21**: promote knowledge based healthcare characterised by quality patient-security and efficient services
- **Maritim21**: sustainable growth and value adding, increased competitiveness in the maritime sector and realizing the potential in the synergies between ocean based sectors
- **Forests22**: increased value adding and employment in Norway and at the same time contribute to solving the global climate challenge
- **Process21**: How can norwegian industry work towards minimal emissions from the process industry in 2050 and at the same time secure sustainable growth
Energy21: 6 priorities

- Digitalised and integrated energy systems
- Climate friendly energy technologies for maritime transport
- Solar power for an international market
- Ocean wind for an international market.
- Hydro power as the core of norwegian power production.
- Climate friendly and energy efficient industry, including CCS/CCU
Oil and gas for the 21st century
• Establish a relevant knowledge- and technology base and develop new business areas
• Secure sufficient competence with the right appliances
• Make computing resources available and secure a business-oriented development of infrastructure
• Cyber security – a necessary premise
• Develop a public framework that stimulates innovation and digitalisation
10 principles for policy development.
Political agreement and willingness to implement these principles will trigger innovation and investment.
- The polluter should pay
- Emissions and other externalities should be priced
- Higher taxes on what we want less of. Lower taxes on what we want more of
- Informed decision-making by consumers should be facilitated
- Public procurements should require green solutions
- Public planning and investments should be based on the objective of becoming a low emission society by 2050
- A life cycle perspective should be the basis for public investments and procurement
- New legislative proposals should include an evaluation of CO2 effects where relevant
- Green competitiveness should be built on well-functioning markets
- There should be consistent reporting on what we want to achieve and what we want to avoid

Norwegian roadmaps for green competitiveness

https://www.regjeringen.no/contentassets/02d99c1cf18654970bc52e3773b9edbe1/green_competitiveness_executive_summary_november_2016.pdf
12 roadmaps covering the norwegian economy

https://www.gronnkonkurransekraft.no/linker/

- Veikart for sirkulær økonomi (Circular economy)
- Sjøkart for grønn kystfart (Green coast)
- Veikart for smart omstilling (Knowledge)
- **Veikart for prosessindustrien – Økt verdiskaping med nullutslipp i 2050** (Process industry)
- **Veikart for verdiskaping og reduserte klimautslipp på norsk sokkel fram mot 2030 og 2050** (Oil and gas)
  - Vannkart til økt grønn konkurransekraft i vannbransjen (Water)
  - Næringslivets transporter – Veikart med høy mobilitet mot null utslipp i 2050 (Transport)
  - Veikart for grønn konkurransekraft i skog og trenæringen (Forests)
  - Eiendomssektorens veikart mot 2050 (Buildings)
- Veikart for grønn handel 2050 (Green trade)
- Eiendomssektorens veikart mot 2050 (Real estate)
- Landbruksnæringen – Veikart mot fornybearsamfunnet 2050 (Agriculture)
Radmaps for the norwegian industry

https://www.norskindustri.no/dokumenter/bransjedokument/veikart-i-norsk-industri/

- Kompetanse for fremtidens industri (Knowledge)
- Veikart for prosessindustrien (The Norwegian process industries’ roadmap - Summary)
- Veikart for treforedlingsindustrien (Pulp and paper)
- Veikart for havbruksnæringen (Roadmap for the aquaculture industry – Summary)
- Veikart for teknobedriftene
- Veikart for design, merkevare og ferdigvareindustri (Design, goods)
- Veikart for elektroteknisk industri (Roadmap for electrotechnical industry - Summary)
- Veikart for gjenvinningsbransjen
- Veikart for norsk sokkel (KonKraft report no. 2016 - 2 - with roadmap for NCS)
- Veikart for legemiddelindustrien (Pharma)
- Veikart for mineralnæringen (Minerals)
- Mulighetsstudie for sirkulær økonomi i prosessindustrien (Circular)
The Norwegian process industry roadmap


• CCU and CCS
• Hydrogen
• Increased use of biomass
• Other technological breakthroughs
The Norwegian oil and gas industry roadmap


• CCS and CCU
• Electrification
• Hybrid, batteries, windpower, fuel cells and other renewable possibilities
• Energy efficiency an energy management
• New possibilities – Hydrogen form natural gas etc