National strategies and incentive programs for increased energy system flexibility

Thomas Berg, Senior Advisor Enova SF
The Norwegian Innovation Support System (simplified)

Technology development

The Research Council of Norway - *Stimulate R&D*

Enova - *From R&D to Market*

Business development

Innovation Norway / Investinor / SIVA - *Stimulate new and emerging businesses*

TRL 1-2 Grunnforsking
TRL 2-3 Industriforskning
TRL 4-5 Eksperimentell utvikling
TRL 6-7 Demonstrasjon
TRL 8 Markeds-introduksjon
TRL 9 Marked

ENOVA
Vibrant change
- Towards the low emission society
Enova – the basics

• Public enterprise owned by the Ministry of Petroleum and Energy (MPE)

• National agency, promoting climate gas reductions, security of supply and energy- and climate technology

• Established in 2001

• Four year contracts with the MPE

• A budget around 300 - 400 m€

• Around 80 employees

• Located in Trondheim
The purpose of Enova

- Reduced greenhouse gas emissions
- Increased innovation of energy and climate technology
- Strengthened security of supply
Enova – between politics and market
Enova has support programmes for both development of new technology and for market adoption.
The energy system is changing

Drivers

Challenges

Possibilities

Solutions

If you add to the above:

- Demographic changes
- Investments in grid -> stranded assets
- New technologies
- Digitalisation
- Demand side flexibility
- Smart houses, cities
- Prosumers
- etc
Large scale demonstration program
Two basic strategies and 4 + 1 generic financial support mechanisms
What are the main barriers?

• Significant development costs and risk for the “first mover”

• Grid companies are natural monopolies and strictly regulated -> lack of innovation and a “traditional” attitude

• Lack of knowledge and experience

• The scale of the pilots so far are not big enough to verify the technology or the business models
Purpose

«Demonstrate new technology, digital solutions and business models that increases the flexibility of the energy system»
Synliggjøre verdien av fleksibilitet

**Sources**
- Industri
- Næringsbygg
- Boliger
- Elbiler
- Incentiver

**Technologies**
- Sol (PV)
- Batterilagring
- Lokal varme

**Transactions**
- Multilateralt marked
- Bilaterale avtaler
- Forventet respons

**Added value**
- Lavere nettinvesteringer
- Billigere systemdrift
- Leverings sikkerhet

**Industri**
- Batterilagring
- Sol (PV)
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**Næringsbygg**
- Batterilagring
- Sol (PV)

**Boliger**
- Batterilagring

**Elbiler**
- Batterilagring

**Incentiver**
- Batterilagring
Three different areas of innovation

1. Demonstration of innovative models for efficient resource utilization and the use of other energy carriers than electricity
   - local production
   - storage (thermal and batteries)

2. Demonstration of new "smart" solutions that reduces the stress and increases the flexibility of the energy system
   - "Smart grid" technology
   - Load shifting/"peak shaving"
   - Control systems

3. Demonstration of new market models that stimulate increased utilization of flexibility in the energy system
   - flexibility markets
   - aggregator
Thank you for the attention!

Thomas.berg@enova.no
+47 90654308