

Drivkraft for fremtidsrettede energiløsninger



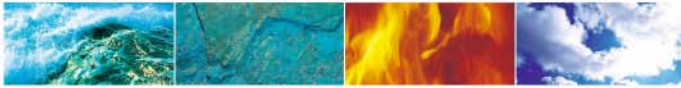
# Measuring and verifying energy savings within the Energy Fund Model in Norway

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IEA DSM Seminar

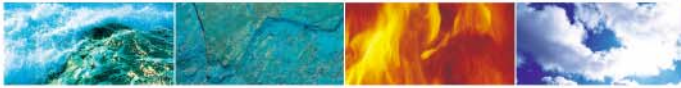
**Registration and validation of energy saving activities –  
Practical experiences and cost-effective  
solutions**

Copenhagen, 19 April 2006



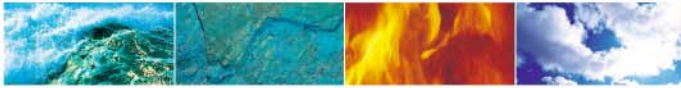
## Presentation Outline

- Short background on Enova, Energy Fund and Organization
- Philosophy and Guiding Principles
- Programmes and Measures
- Measurement and Evaluation
- Challenges Ahead



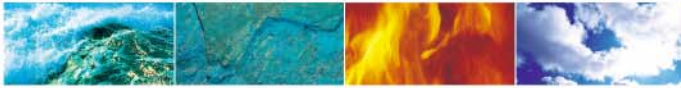
## Short background, Enova

- State enterprise owned by the Ministry of Petroleum and Energy
- Establishment ratified by the Norwegian Parliament in 2001
- Operational as of January 1, 2002
- Staff of 30
- Programme coordination, etc. carried out by sub-contractors



## Short background, Energy Fund and Organization

- Annual budget of approx. € 80 million
- Funds originate from levy on transmission of electricity for domestic consumption
- Funds channelled into an Energy Fund
- Enova appointed fund manager
- Enova's activities are governed by a 4-year contract with the Ministry of Petroleum and Energy
- Enova submits annual performance reports to owner
- Overall third party evaluation of Enova to be carried out in 2006



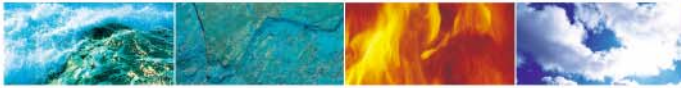
## Objectives and targets, by 2010

Overall objective: To achieve environmentally friendly production and use of energy in a cost effective manner and reduce dependence on electricity for heating

Overall target: 12 TWh/year in savings, renewable energy production and heat

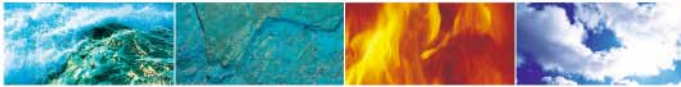
Specific objectives and targets:

- Limit energy use considerably more than if developments were allowed to continue unchecked
- Decrease dependency on electricity for heating and increase use of central heating systems based on renewable energy sources, heat pumps and waste heat of 4 TWh/year
- Increase wind power generation by 3 TWh/year
- Increase environmentally sound stationary use of natural gas (substitution of more polluting fossil fuels)



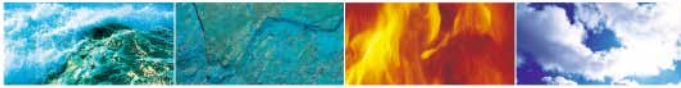
## Philosophy and guiding principles

- Market oriented approach to its “business” and operations
  - work with the grain of the market in cooperation with market actors, including strategic alliances with market and technology leaders
  - influence both supply and demand for energy efficient solutions and building practices to achieve market transformation, both in terms of building design, building practices, purchasing behaviour, and so on
- Programme coordinators and consultants are actively pursuing and recruiting project proposals to Enova’s programmes in the market place
- Competence of Enova staff and consultants essential to the development of project proposals, their assessment and implementation



# Overview, programmes and instruments

		Instruments and measurement		
		Investment aid	Information	Training
Programmes	New and existing buildings	Energy performance	Activity	Activity
	Industry	Energy performance	Activity	
	Public sector	Energy performance	Activity	Activity
	Households		Activity	
	Wind power	Energy performance		
	Heat	Energy performance		



## Measurement and Verification in Practice

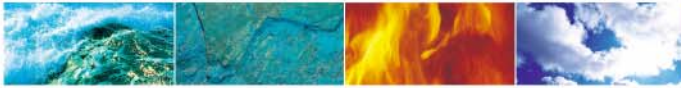
### Bottom-up approach

- Aggregation of energy results from individual projects within each programme

### Basis for measurement and target setting at project level:

- Project proposal submitted electronically to Enova
- Contract negotiation
- Contractually agreed energy performance and savings target and reporting requirements

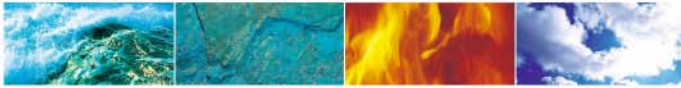




## Project assessment, a building's case (1)

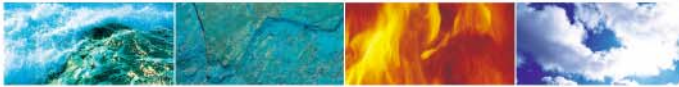
Proposal demonstrating and documenting:

- Baseline against which energy performance and efficiency is judged
- Energy performance or energy efficiency improvement potential
- Overview of measures to be implemented and energy saving scores for each measures (derived from engineering data, models and empirical research which are distilled in tools such as “Enøk Normtall”)
- For existing buildings, overview of past energy use, minimum of three years of historic data
- Identify and pinpoint energy savings target

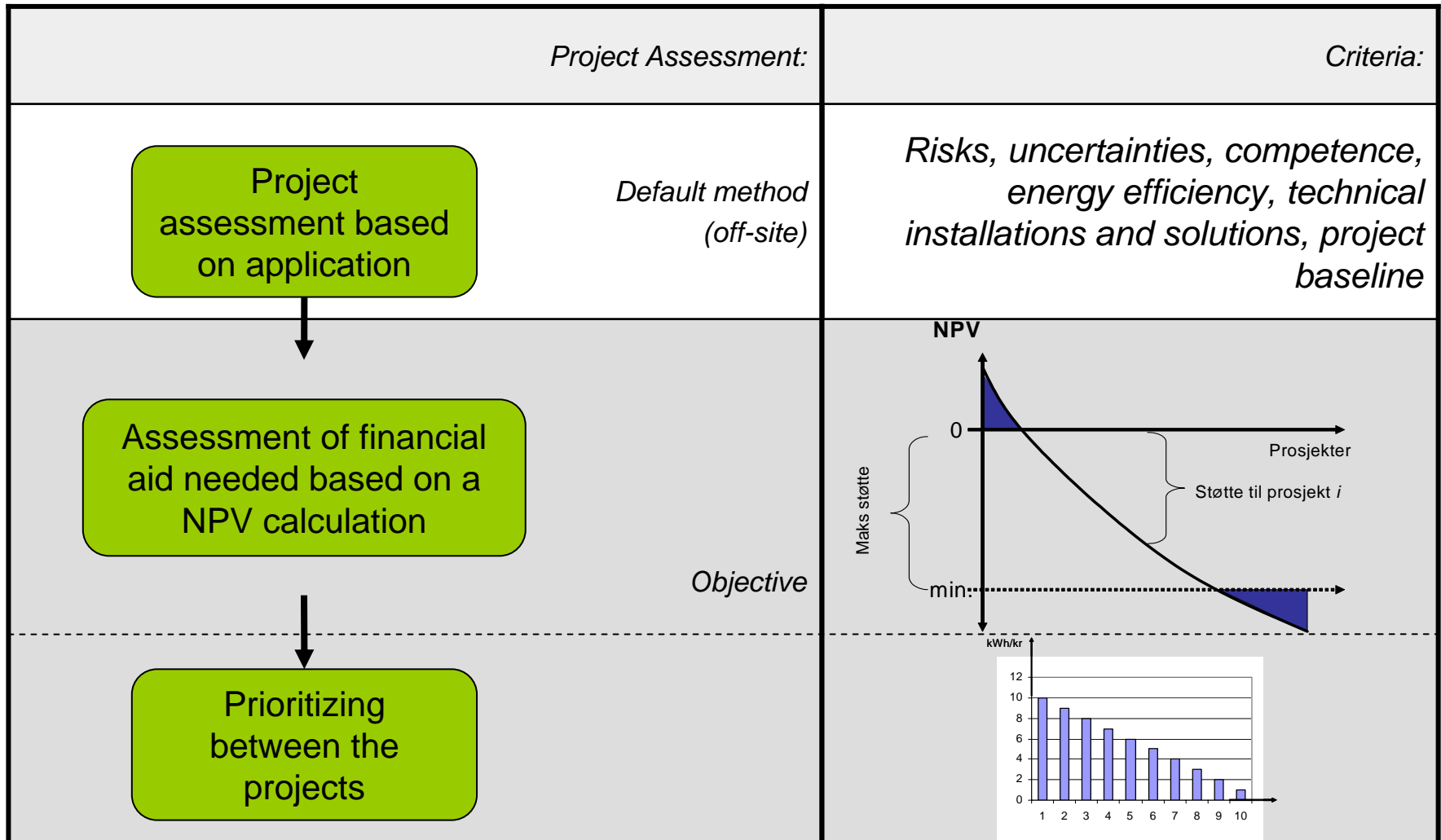


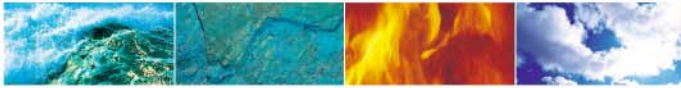
## Project assessment, buildings (2)

- Fair return on applicant's invested capital
  - Avoid over compensation (to comply with State aid regulations)
  - Net present value methodology
  - Risk assessment
    - Project risk reflected in cash flow
    - Market risk reflected in the rate of return (CAP and WACC)
- Cost effectiveness
  - Competition between projects for investment aid based on NOK/kWh



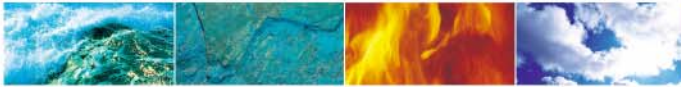
# Overview Measurement and Evaluation Approach



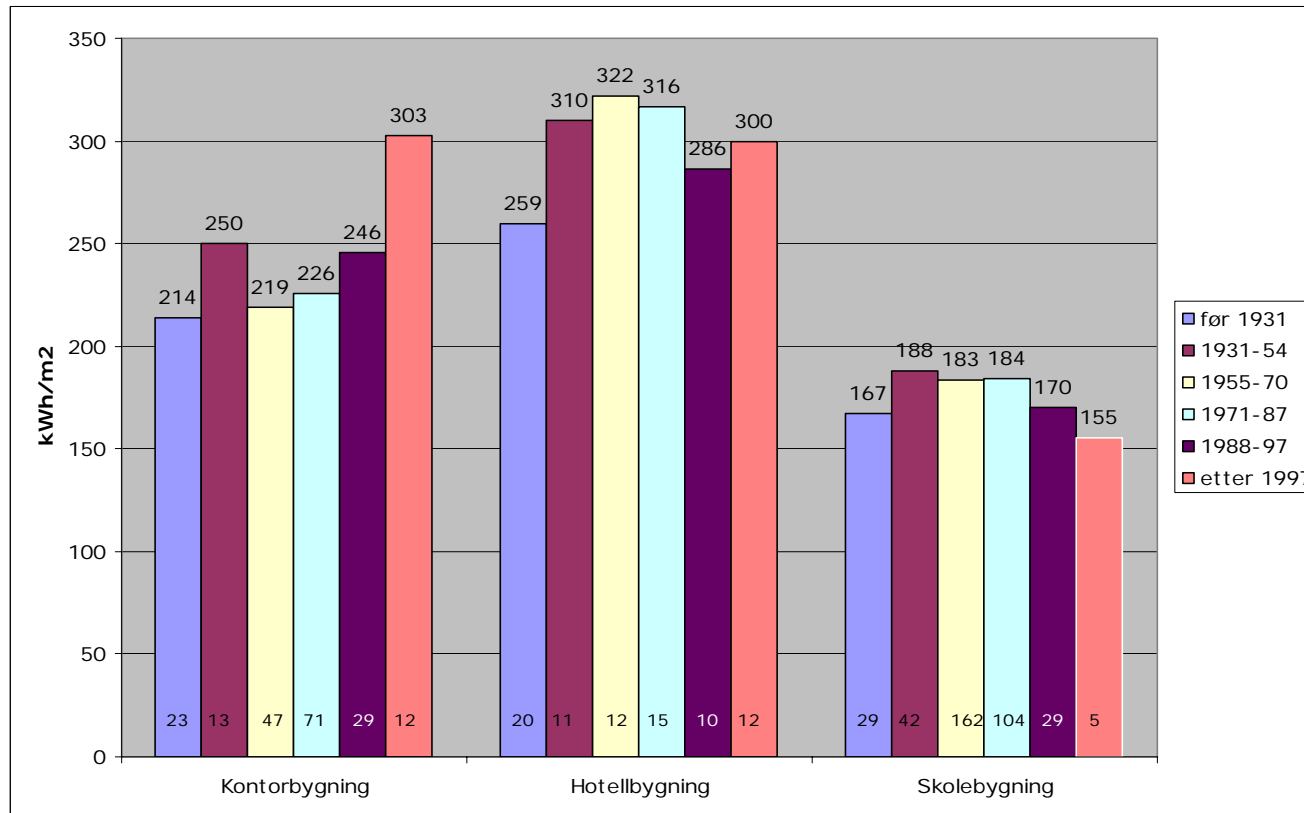


## Enova's Buildings' Statistics

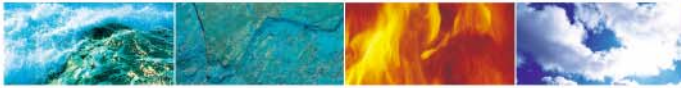
- Repository of implemented energy efficiency projects in the buildings sector funded by Enova
- Project owners' must report actual energy use annually for 3-5 years after project completion
- Established in 1996 by NVE
- Contains in excess of 2,200 buildings
- Report published annually (currently only in Norwegian)
- Means to assist in monitoring and reporting of the market uptake of energy efficiency and change in planning and building practices
- Means to assist in targeting of efforts within Enova's programmes



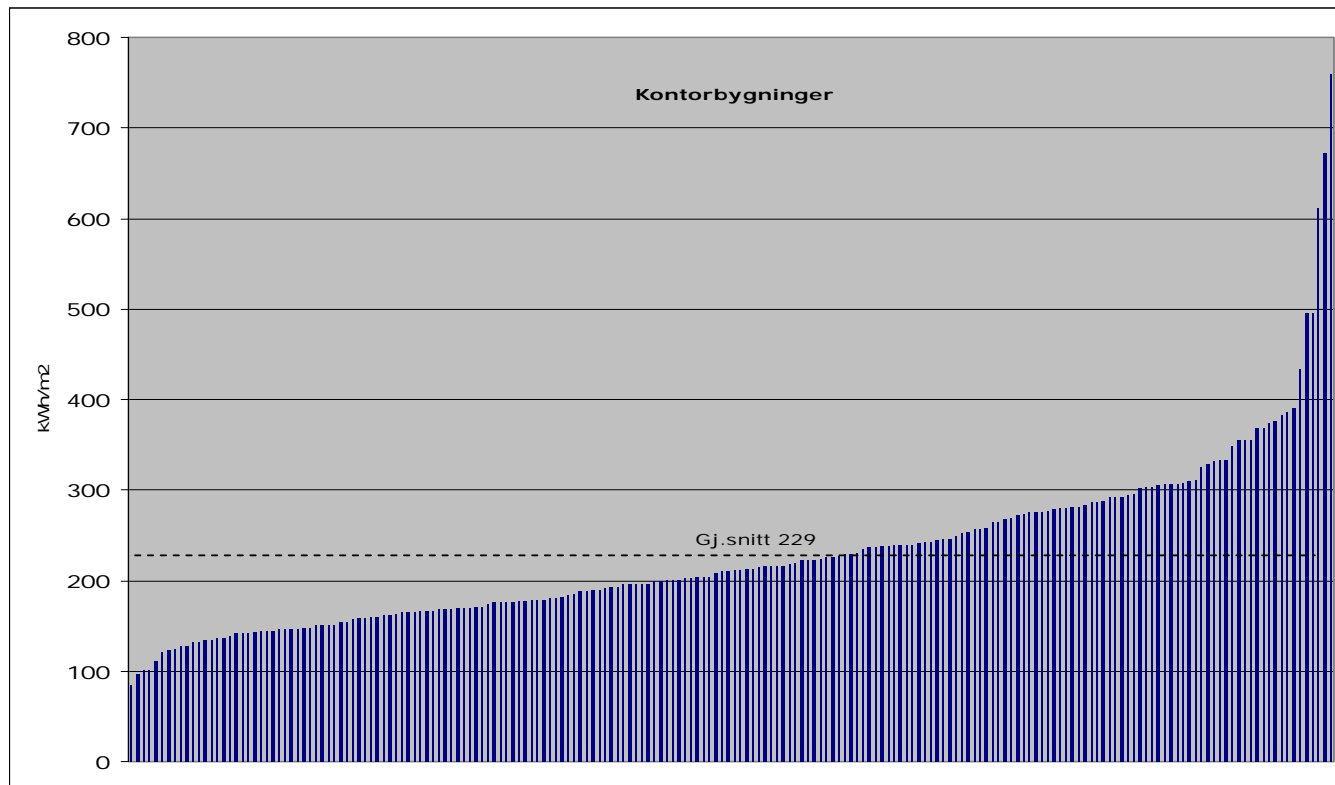
# Energy use in buildings



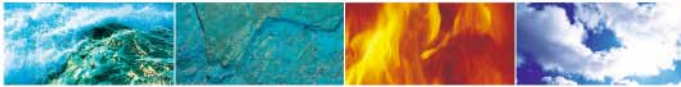
Source: Enova's buildings' statistics



# Office buildings, variations in consumption

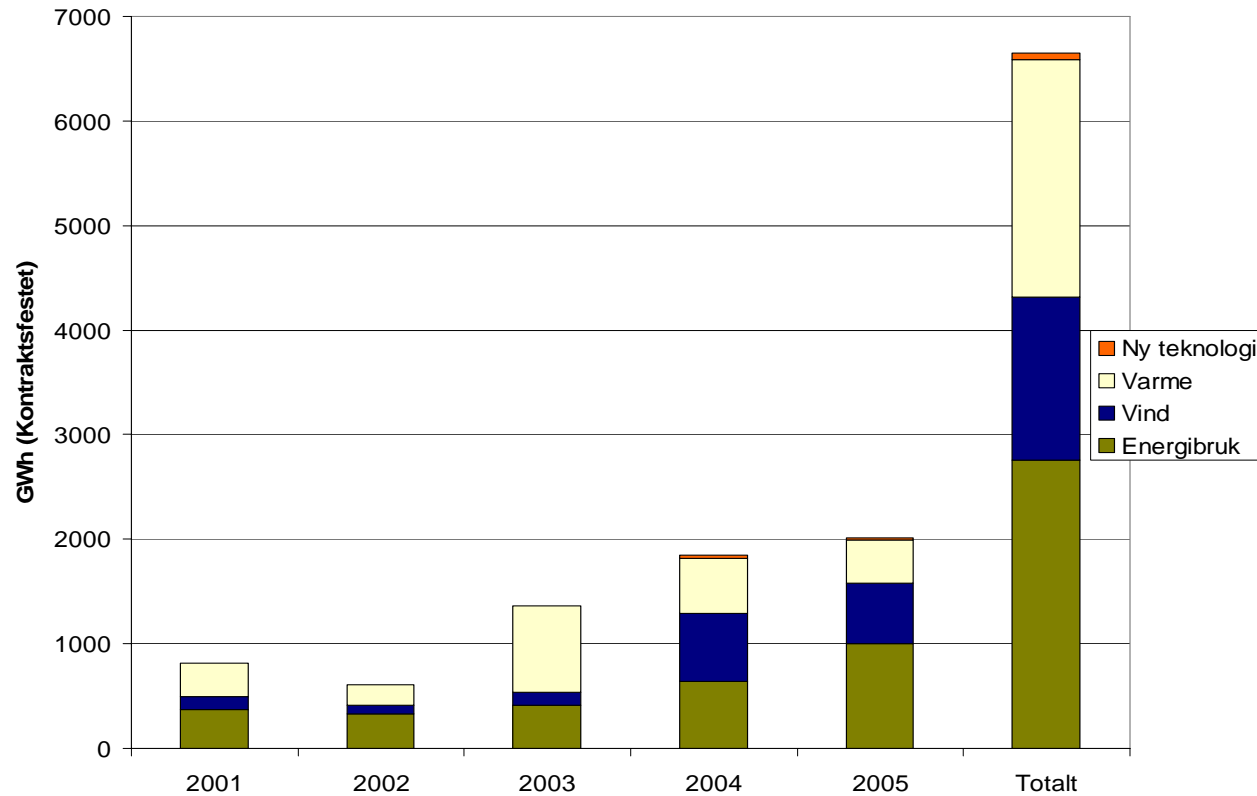


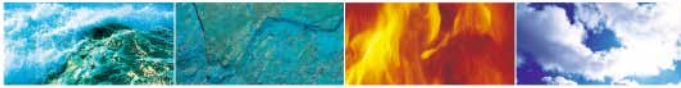
Source: Enova's buildings' statistics



# Energy performance results, 2001-2005

Programme areas: Energy end-use, wind, heat and new technology

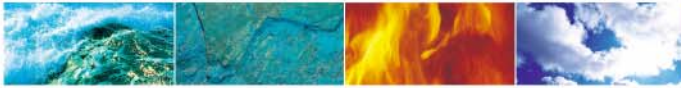




## Cost effectiveness, all programmes

- Cost per kWh
  - Energy efficiency: 0,024€
  - Heat: 0,024€
  - Wind power: 0,05€
- Average cost over lifetime
  - Energy efficiency: 0,0024€
  - Heat: 0,0012€
  - Wind power: 0,0024€
- Life time buildings' projects average of 10 years





## Overall programme measurement and evaluation

Aggregation of  
Project Savings' Targets

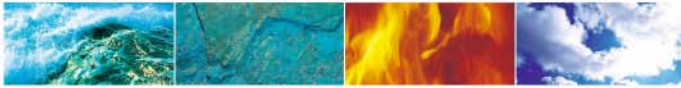
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Annual Reports,  
Energy Performance

Periodic Third Party  
Programme Evaluations

Third Party  
Project Auditing and  
Verification

- Aggregated contracted energy results reported annually by Enova to the Ministry
- Results adjusted based on annual project reports, programme evaluations and project auditing/verification
- Evaluation costs account for about 0.5% of total annual investment aid granted by Enova
- So far Enova has not carried out third party auditing and verification of individual projects, thus some uncertainty about the energy results exist



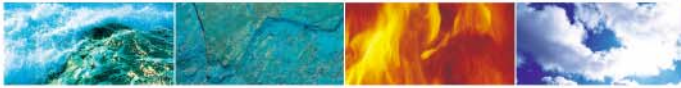
## Challenges Ahead, Measurement and Verification in view of EE Directive

Enova, programme level:

- Development and implementation of third party verification of actual energy savings
- Double counting
- Methodology to account for market transformation and attribution effects

National level

- Major challenge to estimate, evaluate and verify the energy savings from early action and policy measures outside of Enova's responsibility
  - Especially to avoid double counting
  - To isolate autonomous energy savings



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# Thank you for your attention!

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