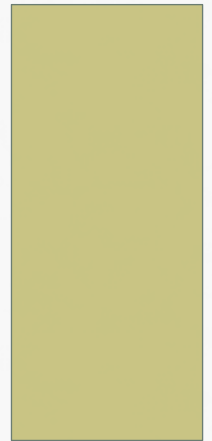




# *THE SMART GRID: WHOSE ENERGY FUTURE?*

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# ON-GOING WORK WITH ENERGY?

- PhD: Sociotechnical imaginaries of smart grids in Norway, at different scales...
  - Top-down (elite) discourses –(done)
  - Users of technology
  - Bottom-up initiatives/innovation – (in progress)
  - Interactions between scales
  - Supervisors: Knut Hidle (Geography), Kjetil Rommetveit (SVT), Håvard Haarstad (Geography).
- ERA-net project (SVT): PARENT
  - **P**ARTicipatory platform for sustainable **E**Nergy management
  - Smart Grids “living labs”: Bergen, Brüssel, Amsterdam, Barcelona (social acceptance framework)
- Other projects (in the pipelines)...
  - Responsible Research and Innovation (RRI)
  - Social aspects (ELSA) & social acceptability
  - SpaceLab –European cities as actors in climate and energy transformations (BFS)

# «SMART» ELECTRICITY METERS



- ▶ Read electricity consumption automatically
  - ▶ An automatic reading and management system
- ▶ Frequent measurements enabling more accurate prices for electricity
  - ▶ Establishing demand-response regime (reducing peak demand)
- ▶ Advantages (for everyone) - a necessary technological development
  - ▶ Examples: Correct invoices, postponing grid investments, improving the security of supply, connecting renewables to the grid



# “THE BELIEF IN A FUTURE”

- ▶ Smart electricity meters will be installed in Norwegian households within 2019.
  - ▶ A decade of discussions about advanced electricity meters. Negative cost-benefit analysis, decided to introduce it anyway (2007).
- ▶ Decision based on **«the belief in a future»**.  
(Informant from the Ministry of Oil and Energy).





# ENABLING A DESIRED FUTURE

## ENABLING A SMARTER ENERGY WORLD



### CONSUMER PROSUMER

#### Consumers/Prosumers

- more and better information on their energy consumption and generation (real-time feedback, correct billing, on-line data)
- dynamic tariffs, such as TimeofUse
- demand response programmes
- easy supplier switching
- an increasing number of consumers are becoming energy producers (selling energy generated locally) ("prosumer")

#### Smart Homes

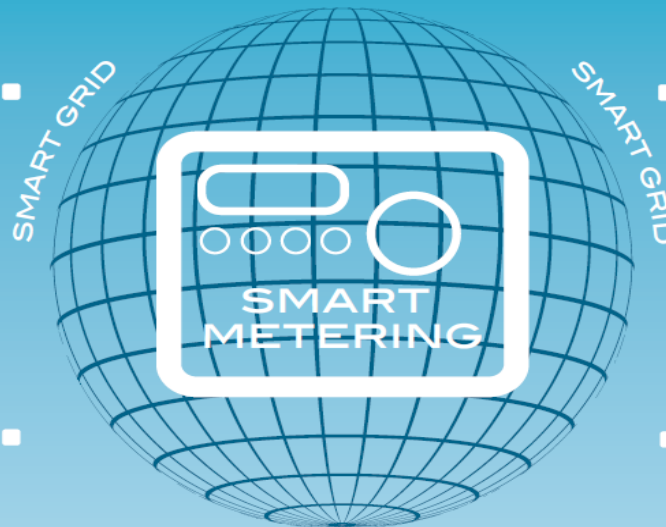
- provide an interface for smart homes devices
- allow for comprehensive home energy management
- enable buildings communications systems with knock on effects for controlling heating, lighting, ventilation and appliance use



### SMART HOMES

#### Smart Grids

- transmission and distribution of more energy within existing network capacity through more and accurate information
- optimisation and better energy management
- demand side management facilities: give network operators valuable tools to manage loads on their networks



#### Smart Meters are the cornerstones of Smart Grids

They give accurate insight in the quality of power supply and any disturbances in electricity networks. Fraud and leakages can be detected easily, so the cost of economical energy losses decreases.

They support the European efforts for efficient use of energy and getting climate changes under control.



### RENEWABLES

#### Renewables and Distributed Generation

- better integrate the growing number of embedded renewable generators, such as wind and photovoltaic
- measure exported power when the customers use less power than they generate
- measure the output of the generator and supply this data to the energy company (complete picture of the generator's performance)
- manage fleets of embedded generators as though they were a single large plant – so-called virtual power plants

#### Electric Vehicles

- efficiently managed when charged or used as a power storage and source
- information on how and when to charge or give energy back to the network independently of the location or time



### ELECTRIC VEHICLES

# GOALS AND HOW TO GET THERE?

- ▶ **Mission**: Solving (all) current challenges.
  - ▶ *Peak demand, big investments in infrastructure, increase of electrical vehicles, security of supply (dependence on access to electricity), decentralized (renewable) energy production*
- ▶ **Solution**: More control (for the energy sector) and more flexibility (provided by the consumers).
- ▶ **How to get there?**

**Tools**: *i) Market mechanisms and ii) increased automation/control*

- ▶ More surveillance and gathering of information (data)
  - ▶ Enabling new market mechanisms and financial incentives
- ▶ More automation and remote steering

# WHO DECIDES? (WHOSE «TRUTH»?)

- Current recognized stakeholders and decision-makers:
  - **«traditional energy experts»**
    - The energy sector (at different scales), network companies (DSOs), the Energy and Petroleum Ministry, Energy directorate etc.
  - What kind of expertise?
    - Mainly engineers, economists, some technology developers & some scientists.
- What kind of decisions?
  - Value-based decisions, in the face of risk and uncertainty.
  - Working towards realizing a sociotechnical vision of what is seen as a desirable energy future.



# WHO AND WHAT IS MISSING?

- Politicians...? (technocracy)
- Data Protection Authorities?
- Prosumers? (not part of the vision)
- Local governments?
- The people who are protesting (social movements)?
- Affected groups: users, consumers, the general public?
- Scale: Seems to be easier with horizontal integration than vertical integration...

# COMMUNICATION TO (AN IMAGINED) PUBLIC

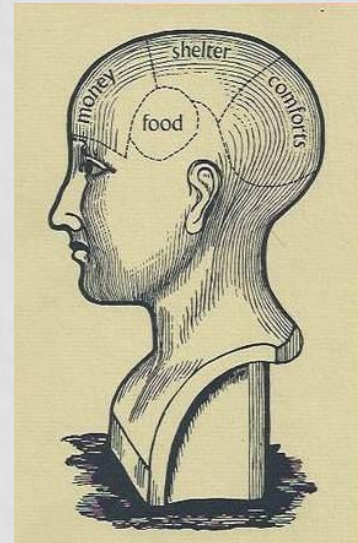
- ▶ Emphasizing advantages for consumers
- ▶ «Consumers won't understand the big picture»
  - ▶ Low interest for electricity, limited understanding
  - ▶ Care about costs for them as individuals
  - ▶ The consumers might not think that the benefits (the advantages for society as a whole) justifies the costs?
  - ▶ Some worries related to the public opinion...



# WHAT IS «CONSUMER BEHAVIOUR»?

“Most studies on energy consumption behaviour in households tend to see consumption in terms of individuals who “respond” to information, price, and social norms in order to reduce peak demand and to shift their loads. **References to consumer behaviour in “smart grid” configurations tend to narrow the focus exclusively on consumer response to price incentives.**”

Wolsink (2012, p. 824)



# RESISTANCE FROM THE PUBLIC



# THE DUTCH CASE



- «The Dutch case shows that privacy is not to be underestimated. (...) The necessity of smart meters infringing people's privacy and the necessity of (...) this had not been substantiated by the government».
- «The level of detail of smart meter readings and the mandatory or voluntary character of smart meters are crucial issues to take into account».

Cuijpers & Koops (2012, p. 289).



# HOW COULD THESE ACTORS CONTRIBUTE?

- We don't really know until we include them...! Different types of knowledge, expertise, experiences.
- Hypotheses/suggestions:
  - Potential social, ethical, legal issues
  - Alternative energy visions?
  - Emphasizing other values?
  - Privacy issues? Should the level of «smartness» of the smart meter be voluntary?
  - External steering of elements of private homes?
  - Security? Hacking?
  - Should we be able to keep your 'dumb' meter?
  - Commodification of our behaviour at home?
  - Class divisions? Financially vulnerable households...
  - Towards more sustainability, emphasizing environmental issues?





# BEYOND CHALLENGE?

- The traditional energy experts have had a «monopoly» as the policy-relevant knowledge.
- Is this - technoscientific knowledge and its underlying value system(s) - **beyond challenge**?
  - Recognition of other actors with different kinds of expertise as legitimate stakeholders?
  - Mutual trust – long-term commitment?
  - «Scientizing» of other types of knowledge? (Bremer, 2014)
  - **Significant institutional change necessary** to move towards more participative processes.
  - Protests necessary to achieve institutional change?





THANK YOU 😊

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Bremer, S. (2014): 'No right to rubbish': Mobilising post-normal science for planning Girborne's wastewater outfall, *Marine Policy*, 46: 22-30

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