



**SWEDISH
SMARTGRID**.SE

SAMORDNINGSRÅDET FÖR SMARTA ELNÄT

The Swedish action plan for smart grid

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STATENS OFFENTLIGA
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Outline of presentation

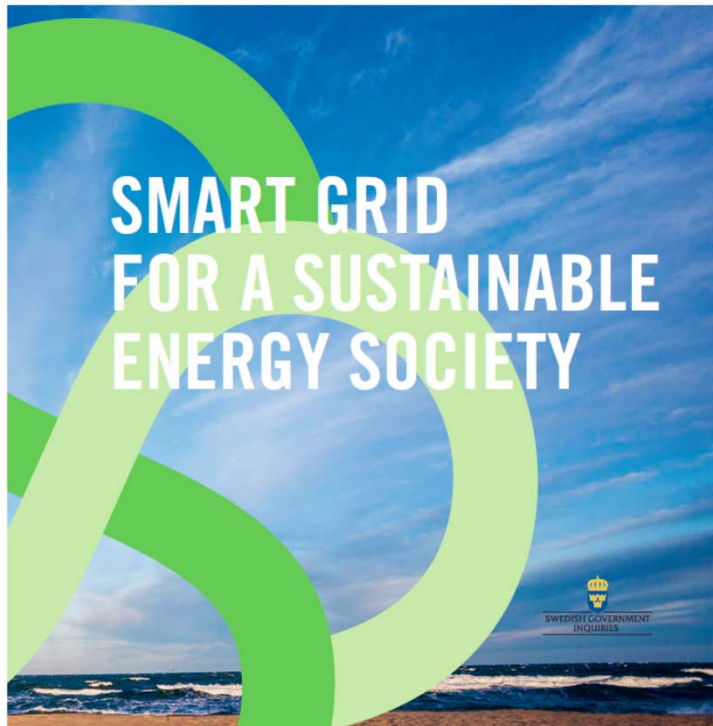
The Swedish Coordination Council for Smart Grid - overall mission and assignment

Background to Swedish Smart Grid policy – electricity market characteristics and other prerequisites

Driving-forces for smart grid in Sweden

The Proposal for a National Action Plan for Smart Grid

The way forward.....



Mission and assignment



Organization and deliverables

Appointed by the Swedish Government 2012

15 members: key positions within industry, academia and governmental authorities

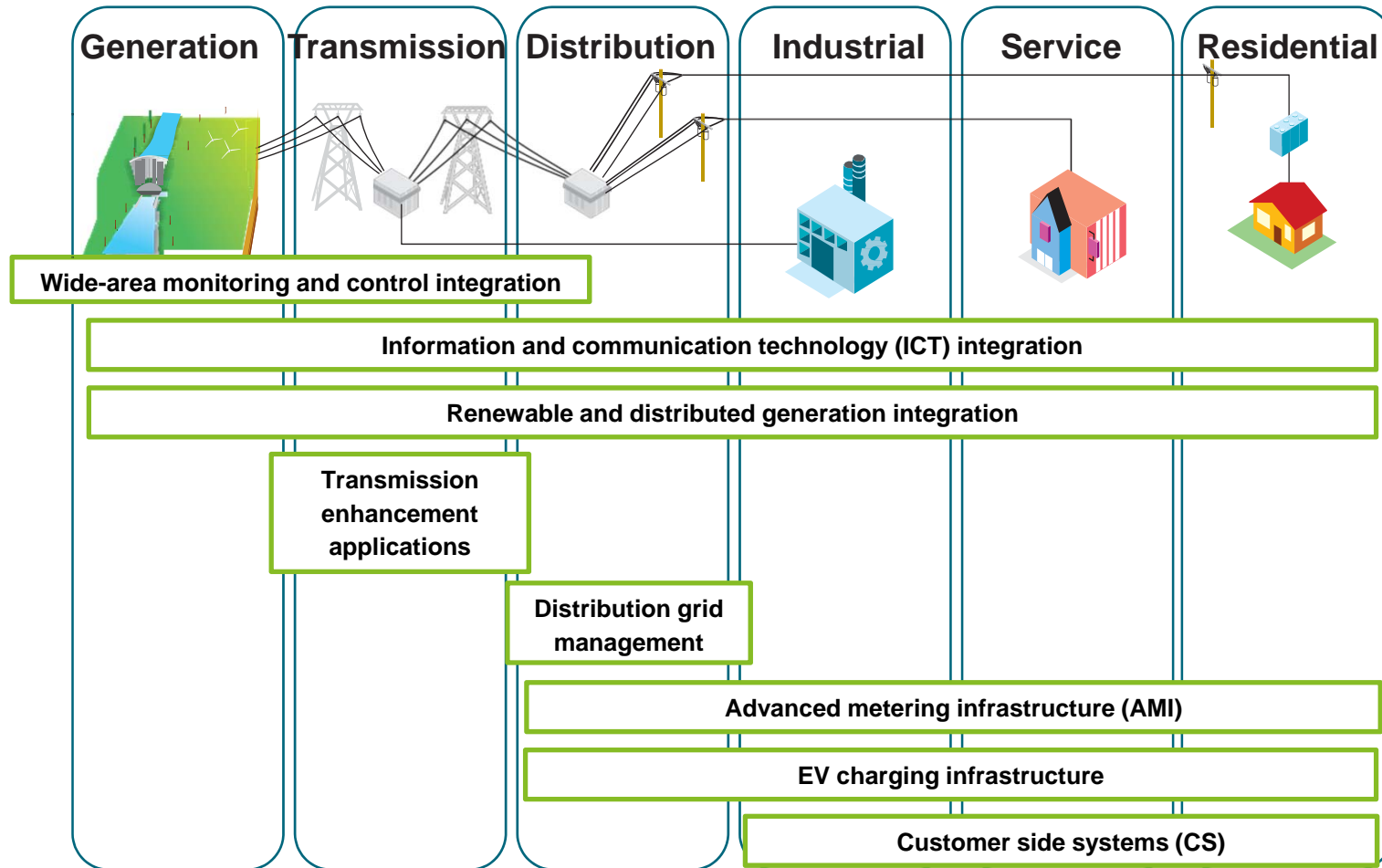
Coordinate and stimulate cooperation, knowledge transfer and discussions among stakeholders

Establish a website – a national knowledge platform for smart grid

Deliver proposals to remove barriers and stimulate the development of smart grid in a national action plan for the period 2015-2030 by December 2014



Technology areas covered



Smart Grids encompass a variety of technologies that span the electricity system (IEA definitions)



Main objective and Characteristic

Through increased cooperation, knowledge development and dissemination and a national action plan contribute to:

- clear and fair rules on the emerging smart grid market
- customer empowerment
- favourable conditions for the development of smart grid in Sweden
- making smart grid a growing Swedish industry



Smart grid is not an aim in itself but offers a rational way to meet future challenges



Focal areas significant for Smart Grid development in Sweden



Smart grid as part of the wider energy system

Electricity market design and customer empowerment

R&D and knowledge provision

Security and privacy

Economic growth and business development

Standards and interoperability

Communication and dissemination





Stakeholders involvement

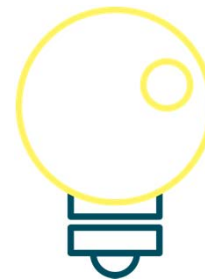
- Dialog fora
 - Open workshops on specific issues with a broad stakeholders involvement
- Expert groups
 - Established for each focal area delivering input and feed back to the council
- Knowledge platform



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Background to Swedish Smart Grid policy – electricity market characteristics and other prerequisites





Energy supply and demand

Total energy supply 598 TWh incl. non- energy purposes (2012)

Domestic energy production: 69 %

Almost fossil-free electricity production

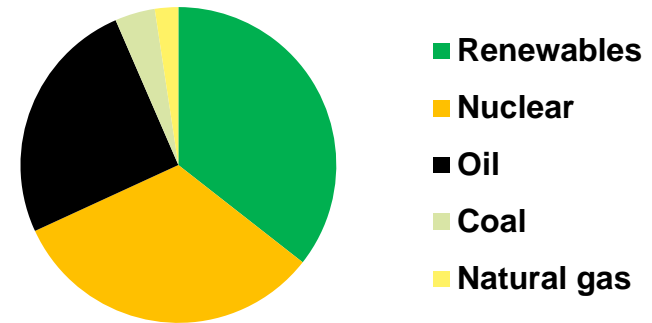
Limited supply of natural gas

CO₂ taxes since 1991 and other tax incentives

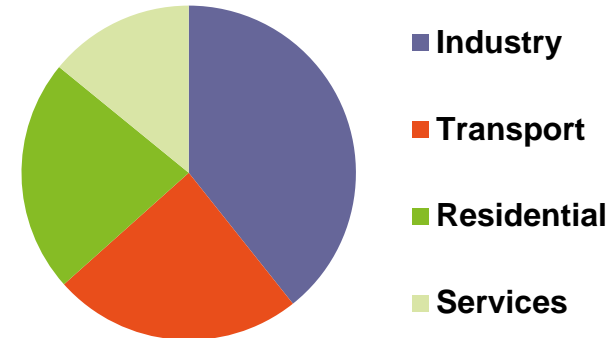
Green certificate system for RE since 2003

Low CO₂ emissions per capita and GDP

Supply

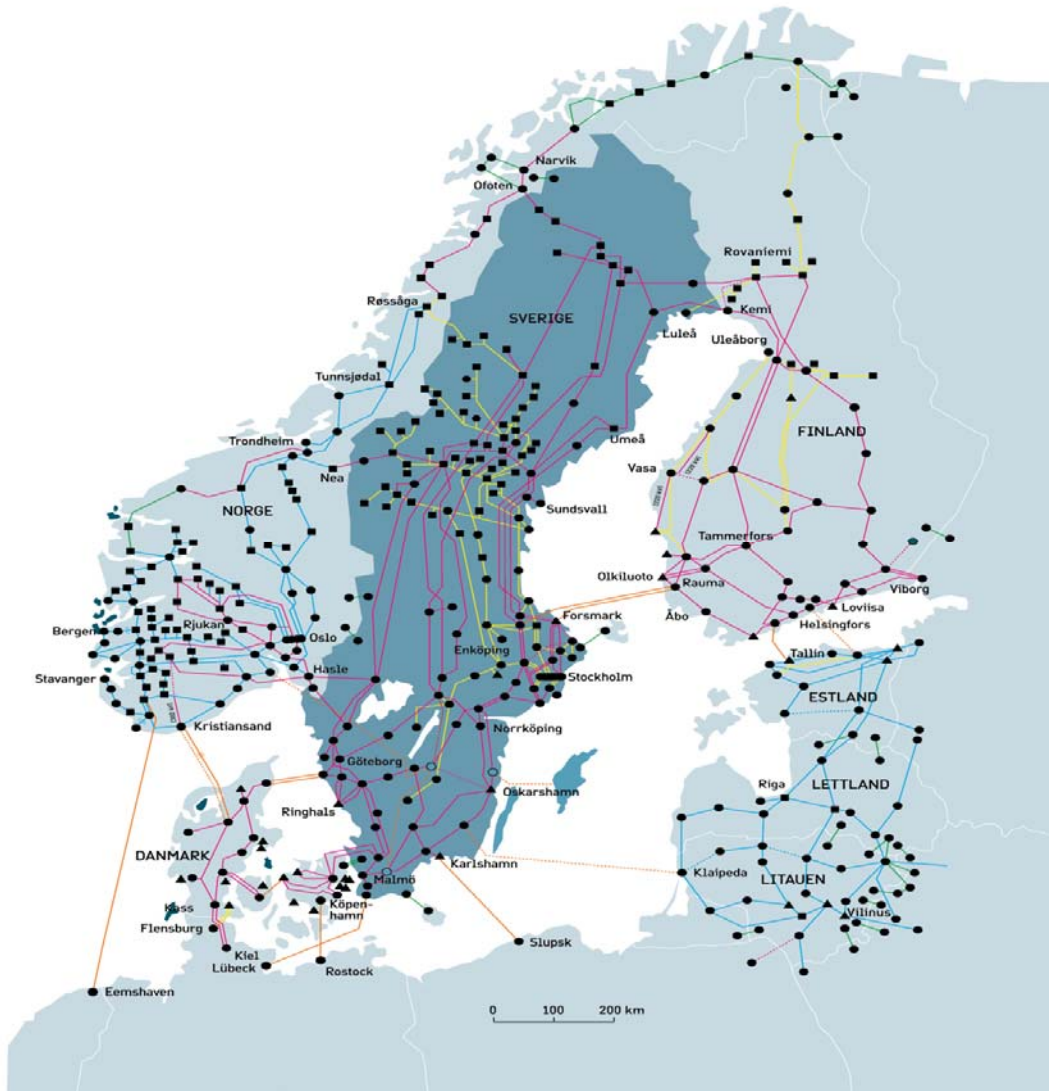


Consumption





The Swedish electricity market



Electricity supply	TWh (2012)
Hydro power	78
Wind power	7
Nuclear	61
Other thermal power	15
Export	20
Total	161



The Nordic electricity market

Sweden and the other Nordic countries liberalized their electricity sectors mid 1990s

Common Nordic wholesale market and Power Exchange – Nord Pool

High liquidity - About 75 % of the power generated in the Nordic region is traded via Nord Pool Spot

Focus areas for the future:

- Targets for renewable production
- Infrastructure development
- Demand flexibility and
- Consumer empowerment





Electricity Utilities in Sweden

Distribution

- National Grid, Svenska kraftnät - 400-220 kV
- Regional networks - 4 operators - 40-130 kV
- Local networks - 170 operators < 40 kV, 5.3 million customers, three companies have 50 % of the customers

Competition in supply

- Legal unbundling
- 100 + electricity suppliers
- Active customers, rate of switching > 30%





Electricity consumption

High electricity consumption (15000 kWh per capita) due to cold climate and extensive energy intensive industries

High efficiency standards in building

High penetration of electrical heating

Well developed district heating systems - high use of bioenergy

Typical consumption per household: single family buildings with electrical heating 25000 kWh, apartments 4000 kWh



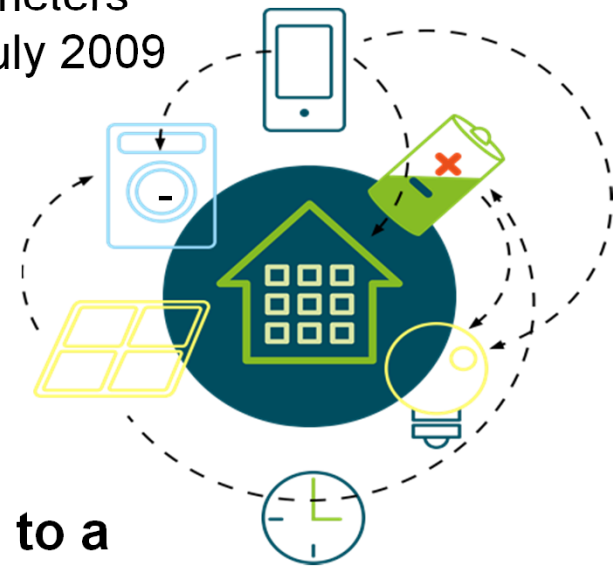
Roll out of smart meters

July 1, 2006; Mandatory hourly meter reading for all customers above 63 A; before above 200 A

July 1, 2009; Mandatory monthly meter reading for all customers

- A major roll-out of remotely read electricity meters - 99 % of all meters was replaced by 1st of July 2009
- No legal requirements concerning functionalities or communication systems
90 % of the meter capable of hourly meter reading

October 1, 2012; Obligation for network companies to deliver hourly data at no extra cost for customers subscribing to a hourly-based supply contract





Driving-forces for smart grid in Sweden





Energy policy goals



Objectives for 2020

- at least 50 % RE of total energy use
- at least 10 % RE in transport
- 20 % more efficient energy use
- 40 % reduction in greenhouse gas emissions

Vision ...

- By 2020, fossil fuels for heating will be phased out
- By 2030, Sweden should have a vehicle stock that is independent of fossil fuels
- By 2050, a sustainable and resource-efficient energy system and no net emissions of greenhouse gases





Future Challenges

Higher degree of complexity demands changes and adaptation of **the electricity network**

- Integration of large scale renewables
- Integration of distributed generation
- Electric vehicles integration
- Keeping and enhance quality and security of supply
- Forecasts and handling of peak load and excess power balance – avoiding curtailment

An **electricity market** in transformation - new business models and new services

- Empowered and active customers
- Demand response
- Energy storage, aggregation
- Energy efficiency services
- Demand profiles difficult to predict





Flexibility is not only technology

Understanding customer behavior and customers reactions to new market possibilities

Create incentives attractive enough to activate early adopters

Different kinds of incentives for different kind of costumers needed – economy, simplicity, environmental concern, independence etc.

Demand response and price formation – how do we get it right?

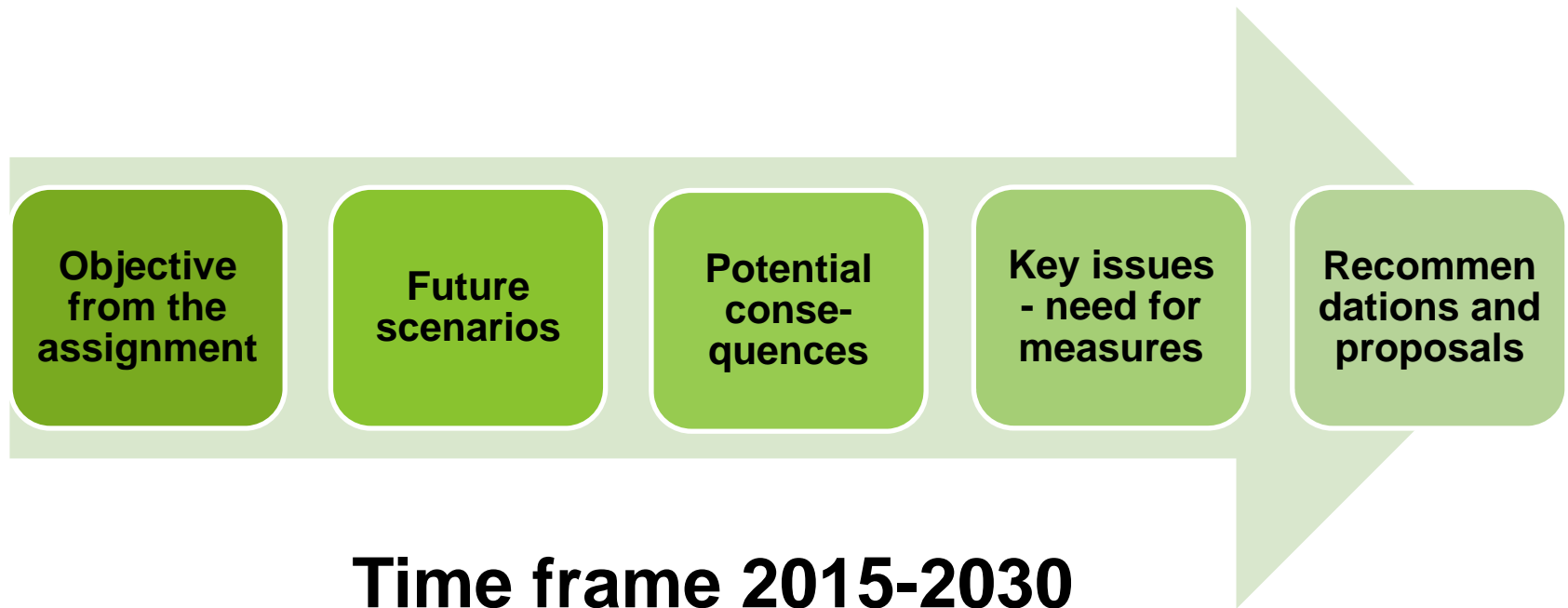




The Proposal for a National Action Plan for Smart Grid



The development process for the national action plan





Main areas in the action plan

Political framework and market conditions

- Ground rules on the electricity market
- New conditions for the electricity grid
- Cooperation with other parts of the energy market
- Long-term development of the policy framework and market conditions

Customer participation and societal aspects

- Smart grid from a customer perspective
- Customers' access to measurement data and information
- Synergies between smart grids and other societal development (community planning and products and services)

R&D, innovation and growth

- Knowledge and skills development
- Research priorities and cooperation
- An integrated smart grid innovation strategy
- Conditions for pilot and demonstration projects
- Smart grid on a global market





Structure – main areas and key issues

Objective for each main area

Recommendations for each key issue also valid in the longer term – 25 recommendations

Motivation explaining why this is important

Proposals for concrete measures (short term) and further initiatives (mid/long term)

Assessment of work in progress and need for future steps

Responsible parties identified





Recommendations

Proposals, type of measures, responsible party, timeframe



Rekommendationer. Politiska samverk och rekommendationer

- 4.2.1 Utvärdera marknadsregleringens spridning med syfte att främja systemansvar, övervakningar samt för att öka tillgängligheten genom bättre incidenter och samordnings och spridningsarbete till åtgärdsplan och för ökad resiliens i systemet.
- 4.2.2 Utvärdera en marknads- och balanseringsplan som engagerar alla och för ökad resiliens i energisystemet.
- 4.2.3 Utvärdera möjligheter för smarta
- 4.2.4 Hög kapacitet och säkerhet och tillgänglighet och säkerhet avseende på övervakning av smarta elnät.
- 4.2.5 Samverka med andra om en energisystem
- 4.2.6 Utvärdera hur övervakning och övervakning av smarta elnät.
- 4.2.7 Förstå, samordna och utvärdera övervakning av smarta elnät och övervakning av smarta elnät.
- 4.2.8 Utvärdera övervakning av smarta elnät och övervakning av smarta elnät.
- 4.2.9 Utvärdera övervakning av smarta elnät och övervakning av smarta elnät.
- 4.2.10 Utvärdera övervakning av smarta elnät och övervakning av smarta elnät.

Rekommendationer. Kvalificerings- och utbildningsåtgärder

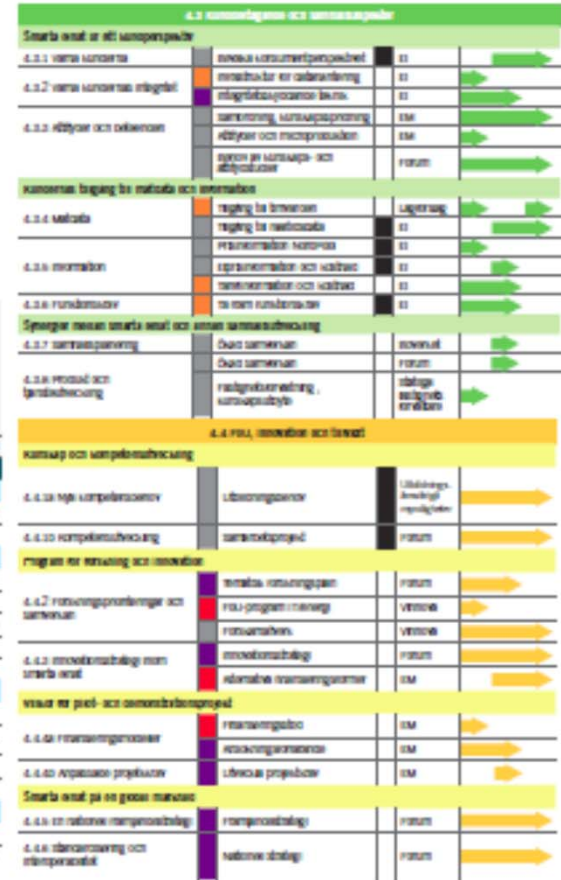
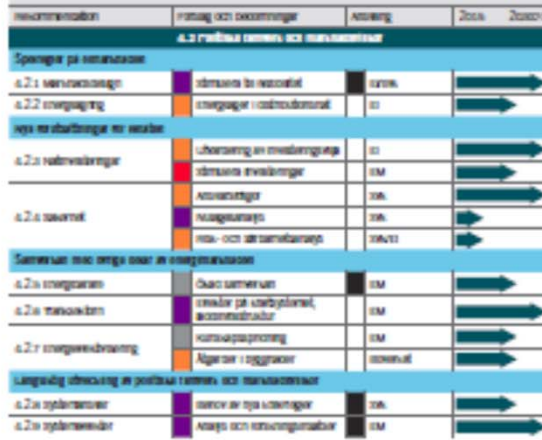
- 4.3.1 Smarta elnät är ett utvecklingsområde
- 4.3.2 Utvärdera övervakning av smarta elnät och övervakning av smarta elnät.
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- 4.3.10 Utvärdera övervakning av smarta elnät och övervakning av smarta elnät.

Samordningsrådets handlingsplan för smarta elnät 2015-18 2020

Handlingsplanen bygger på en ökad öppenhet av smarta elnät och ökad övervakning av smarta elnät och ökad övervakning av smarta elnät. Handlingsplanen bygger på en ökad öppenhet av smarta elnät och ökad övervakning av smarta elnät. Handlingsplanen bygger på en ökad öppenhet av smarta elnät och ökad övervakning av smarta elnät.

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■ Regeländringar, inriktning och främjande
■ Stödåtgärder, policy och program
 Forslag
■ Ekonomiska stimulansåtgärder och utvärderingar
■ Samverkan, kunskapsutveckling, bevakning och utvärdering
■ Bidragning
 EM = Energimyndigheten SEK = Svenska kraftbrett
 E = Energisamarbetsrådet Forum = Del forum för smarta elnät som försäkra av tidigt





Proposals in the action plan – examples from different areas and type of measures

Legal measures and regulation

- Legal right for customers to get access to hourly measurement values without the requirement for an electricity contract and at no extra cost
- An oversight of the regulatory framework to overcome obstacles to energy storage in the distribution grid

Economic instruments

- Support to network companies aimed at mitigating risk when investing in commercial but as yet partly unproven smart grid solutions
- An integrated smart grid innovation strategy including new and supplementary forms for funding all along the value chain

Specific programs and strategies

- Proposal for a thematic research plan to be further developed and included in the national research bill
- Develop programs to incorporate information security and integrity protecting technology in the electricity infrastructure

Cooperation and knowledge dissemination

- Integration smart grid solutions and demand response in energy efficiency measures
- Promote knowledge exchange regarding the potential of smart grid in sustainable community planning



The way forward.....

- **The Action Plan will be sent out for public consultation**
- **The Councils proposes to establish a national forum for smart grid – this proposal will be handled by the government**
- **Proposed mission for the Forum**
 - promoting dialogue between the actors involved
 - monitoring implementation of the action plan
 - identifying the need for supplementary measures
 - coordinating the implementation and follow-up of certain proposals
 - responsibility for managing and developing the knowledge platform www.swedishsmartgrid.se



Thank you for your attention!

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