REGULATING THE SMART ENERGY FUTURE: KEY ISSUES

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Regulating the Smart Energy Future

- Introduction
- Regulatory Overview
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Aim of FINSENY Task 1.4 on Regulation

Understand how regulation in both energy and telecommunications is moving in Europe as a whole and in selected countries, and how the FINSENY use cases might be impeded or encouraged by regulatory developments

Report on Regulatory Issues and Recommendations (D1.7, March 2013, Restricted report)

Motivation and Scope

- Motivation for regulatory work in FINSENY
  - Technical research needs to be aware of the influence of regulation on market and technology development
  - Policy makers and regulators need to understand the industry perspective in order to develop effective regulatory frameworks
- Scope
  - Examine regulatory issues in ICT, in line with FI-PPP focus on Future Internet
  - Key focus on regulatory issues in the Energy domain
- Objective is to identify key issues, not to design a regulatory framework

Approach

- Research combined hypothesis-led investigation with more open-ended exploration
- Research sources included
  - Publicly available information
  - Involvement from all FINSENY scenario work packages through a questionnaire and discussions
  - Primary research with EUTC members (utility companies) and other contacts
  - Participation in the FI-PPP Working Group on Policy, Regulation and Governance (WG-PRG)

Definitions of Regulation

- To regulate is…
  - To control by rule, or to subject to restrictions
  - To apply regulations as a means of implementing policy
- To regulate is also…
  - To maintain a state of (dynamic) stability by being able to adapt to changing circumstances

The regulatory framework (in the first sense) needs to allow regulatory mechanisms (in the second sense) to maintain the dynamic stability of the energy system

What is Regulation For?

- Energy regulation is designed to
  - deliver energy security in a low carbon future
  - whilst protecting consumers and ensuring competitiveness
  - to underpin sustainable economic prosperity and social stability/cohesion
- Regulation in telecommunications focuses on ensuring effective competition and consumer protection

The ultimate motivation for regulation should be to ensure that the regulated system remains able to fulfil its purposes, in changing circumstances, over the short and long term

Market Structure, Regulatory Focus

- Market structure
  - Critical aspect of the regulatory framework
  - Tends to be taken for granted, once established
  - The EC has encouraged unbundling of the Energy value chain through a series of Directives
  - Competitive generation, wholesale and retail
  - Regulated transmission and distribution
- Telecommunications regulation focuses on companies with SMP, to ensure competition & consumer protection
- Energy regulation focuses on TSOs and DSOs
  - Delivering cost-efficiency while ensuring security of supply, power quality, grid stability, third party access
  - Widespread recognition that cost-efficiency regulation impedes investment and innovation

Current Trends, Issues and Debates (1/5)

- Energy Efficiency and Renewables
  - Strong legislative and regulatory focus
  - Primary driver for the Smart Energy future
  - Climate and Energy Package 20:20:20 targets relating to carbon reduction, energy efficiency and renewables
  - Energy Efficiency Directive (2012) introduced to ensure 2020 energy efficiency target is met
- Single Market and Country-Specific Variations
  - Single energy market for the EU to be completed by 2014 (Third Energy Package, 2011)
  - General harmonisation of rules and regulations across Europe
  - The types of variations that are to be allowed from country to country is an ongoing issue

Current Trends, Issues and Debates (2/5)

- Encouraging Investment in Energy and Telecoms
  - Substantial investment in smart grid needed across Europe to support energy policy objectives
  - Widespread acceptance that cost-efficiency regulation fails to provide adequately for such investment
  - A number of countries are seeking to rebalance TSO/DSO regulatory frameworks away from pure cost-efficiency to performance-based regulation which explicitly incentivises investment: e.g. UK RIIO model
  - Telecoms infrastructure investment is needed to meet Digital Agenda broadband coverage targets
- Encouraging Innovation
  - Move towards performance-based regulation for TSOs and DSOs is also designed to promote innovation

Current Trends, Issues and Debates (3/5)

- User-Centricity
  - Regulators in both telecoms and energy are moving to encourage users to become more active participants rather than simply passive consumers of service
- Cyber-Security
  - Countering cyber threats to business, government and critical national infrastructure, including energy systems, is and will remain high on the agenda for policy makers and regulators
- Privacy and Data Protection
  - The development of data protection and privacy legislation and regulation is a high profile issue across all sectors, with specific work focused on smart grids being undertaken by the Smart Grids Task Force (SGTF), for example

Current Trends, Issues and Debates (4/5)

- Open Access Infrastructure
  - The European Commission is developing a stance to promote an open access policy for telecommunications infrastructure to ensure non-discriminatory access for all service providers not only to wholesale services, but also to passive infrastructure such as ducts, poles and fibre optic cables
- Cross-Industry Collaboration
  - There is a general awareness of the need for coordination and collaboration between industries, particularly at the business level but also for policy and regulatory development, although much of this is achieved in practice through trade associations etc., rather than formal structures

Current Trends, Issues and Debates (5/5)

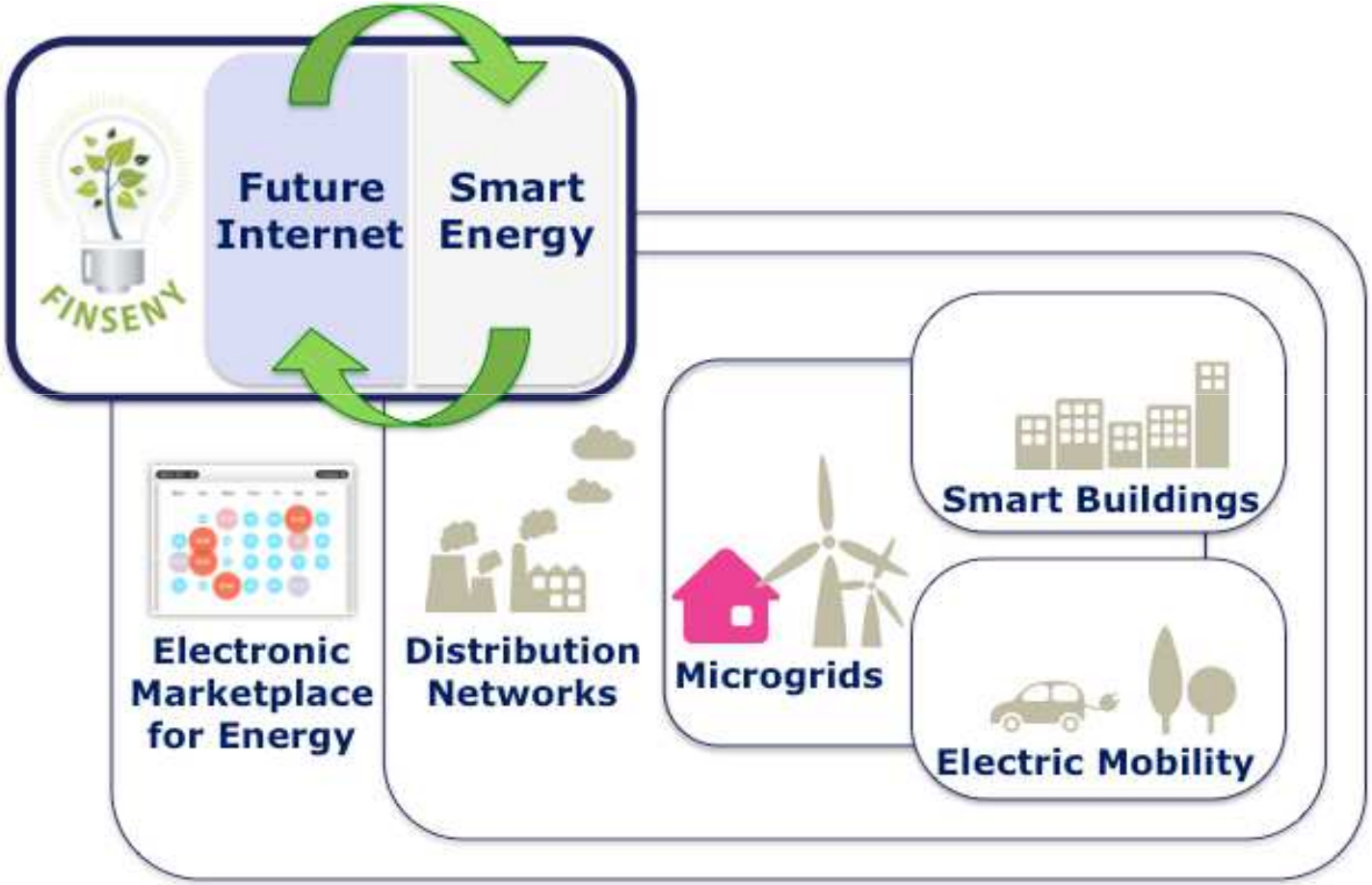
- Standardisation
  - EU is generally strong on encouraging the development and adoption of open standards in ICT to maximise interoperability, competitiveness, innovation, and delivery of value to all stakeholders
  - European standardisation mandates (M/490 smart grids, M/441 smart metering, and M/468 electric vehicles) – significant work completed, and ongoing (SG-CG, FINSENY D1.6)
- Energy Industry Structure
  - Focus tends to be on defining the evolving *market models* (SGTF EG3, FINSENY D1.8)
  - Some speculation, and increasing debate, about the long-term need for structural change at a more profound level in the energy industry to enable the stable transition from centralised to distributed control

From Centralised to Distributed Control

- Overall trend to more distributed provision of energy, with associated need for a more distributed market system and more distributed information system

- The regulatory framework in the energy domain will have to transition from one that supports centralised control to one that supports more distributed control in a way that ensures the ongoing (dynamic) stability of the overall system

FINSENY Scenarios



FINSENY Views and Outlook

WP2: Distribution Networks Regulatory Changes Needed

- Distribution networks need investment and innovation to provide the smart grid functionality that underpins all FINSENY use cases across all scenario work packages
- Need to accelerate the shift to regulatory frameworks that encourage investment and innovation in grids
- Additional regulatory changes will be required to deliver the full promise of smart grids:
  - Allowing active management of distributed generation and loads by DSOs
  - Ability to balance supply and demand at DSO level

Such additional changes would be the start of a shift in the “activity structure” of the energy industry, which would mark a fundamental departure from the current model of centralised control

FINSENY Views and Outlook

WP3: Microgrids
Fundamental Regulatory Challenge

- The Microgrid concept, of largely self-sufficient customer-oriented cells within the wider energy system, presents a significant challenge for energy regulation
- Specific regulatory arrangements will be needed
- This does *not* imply a stark choice between “centralised and regulated” versus “decentralised and deregulated”
- An architecture of distributed control could be envisaged in which semi-autonomous microgrid “cells” operate within a wider regional system (again with a level of autonomous control), within a larger (national) system, within a yet larger trans-national system

A clear regulatory framework could endow every level in the system with sufficient autonomy to innovate while managing its own dynamic stability, whilst also cohering as an element of a larger evolving system

FINSENY Views and Outlook

WP4: Smart Buildings
Driven by Energy Efficiency Regulation

- The Smart Building scenario is largely *driven by* energy regulation, specifically Energy Efficiency regulations
- Full benefits of smart buildings depend on the deployment of smart grid functionality in distribution networks (WP2), as well as smart meters
- Regulation to boost the introduction of renewable energy sources (RES) in smart buildings:
  - Local empowerment with respect to building regulations, efficiency standards and mandatory renewable energy provisions for new buildings
  - Recognising that energy efficiency and renewable energy obligations have different effectiveness and reasonableness in different environments
  - Compensation, such as grants, for mandatory efficiency measures or renewable installations

FINSENY Views and Outlook

WP5: Electric Vehicles
New Industry, New Regulation

- Incentivising appropriate investment in the smart grid is critical to support electric mobility
- Public investment is needed, and is in general being provided, to ensure sufficient charging infrastructure, and individual incentives for electric vehicle ownership and use, in order to kick start this entirely new industry
- Additional enablers that require regulatory intervention are associated with ensuring standardisation of technology and processes for:
  - Technical interfaces
  - Non-discriminatory access to charging infrastructure
  - Enabling seamless roaming from country to country

FINSENY Views and Outlook

WP6: Electronic Marketplace for Energy User-centricity and Local Energy Markets

- eMarket4E can exist only because of the deregulation of retail and wholesale energy markets, and is underpinned and enabled by smart grid investment
- Regulation then plays a part in driving the eMarket4E through
  - Energy efficiency regulation
  - The general trend towards greater “user-centricity” which will increase the engagement of users as active participants in the energy system over time
- Increasing user-centricity is likely to drive a growing desire by consumers to exercise more complex choices over the trade-offs between source, price and quality of electricity
- Regulatory support is required to assist in creating the conditions for shaping local energy markets

Trialling Regulatory Frameworks

- Large-scale demonstrators, involving live customers, generally have to operate under existing regulatory conditions
- The result is that existing regulatory frameworks typically restrict the scope for innovation in trials
- It is proposed that it would be of mutual benefit, both for the development of regulatory frameworks, and for accelerated innovation, if it were possible to test new regulatory frameworks in R&D projects and trials

Whole System Activity Modelling

- The transition to the smart energy future is a huge shift in the *activity* structure of the energy system, which lies "behind" the *market* structure
- Such a radical change in *what is done* could entail a similarly radical shift in what kinds of organisation are best placed to do it, and the kinds of relationships that need to exist between them
- It is proposed that developing a reference model of the *activity of the whole system*, that transcends existing organisational boundaries, would provide a powerful means for enabling multiple actors to consider future scenarios and shared purposes
- EUTC is currently developing a proof of concept to demonstrate the feasibility and value of building such an activity model of the whole smart energy system

Summary and Recommendations

Regulatory Issues for FINSENY as a Whole

Smart Energy Issues

Investment and Innovation

User-Centricity

Enabling New Activities and Participation

Maximising Energy-Telecoms Synergies

ICT Infrastructure Sharing

Interworking

Spectrum

Standardisation

Security of CNI for Energy

Future Internet Issues

Privacy

Investment and Innovation

Issue

Incentivising investment and innovation in the energy industry, particularly in regulated energy networks and in electric mobility. Allowing alternative regulatory frameworks to be tested in live trials.

Relevance

Achieving EU energy policy targets and maximising the benefits of all FINSENY use cases through investment in smart grids in particular

Action

Encourage and accelerate the current shift in regulation of Distribution System Operators (DSOs) from cost-effectiveness regulation to performance-based regulation

Moderate support, increasing

Summary and Recommendations

Enabling New Activities, and Participation of Existing and New Actors

Issue	Designing a regulatory framework to enable the full range of activities and behaviours envisaged for the smart energy future
Relevance	Maximising consumer, societal and business value, competitiveness, innovation and environmental benefit. Ensuring the ongoing dynamic stability of the whole energy system
Action	Develop models of the “activity structure” of the whole energy system to guide the evolution of “whole system” regulatory frameworks that could enable the stable transition from centralised to more distributed control

Poor support

User-Centricity

Issue	Enabling consumers to actively participate in energy markets, becoming responsible participants in energy management
Relevance	Stimulating market innovation leading to business opportunities. Maximising user and societal value
Action	Develop regulatory strategies to ensure that consumers are not only well-informed but are also engaged in learning loops with suppliers and governments

Moderate support, increasing

Summary and Recommendations

Maximising Synergies between Energy and Telecoms Markets with Regulation

Issue	Ensuring collaboration between energy and communications regulators to address the likely tensions between their differing approaches to regulation
Relevance	Ensuring that Europe is able to lead in developing opportunities at the nexus between the Future Internet and Smart Energy
Action	Formalise and strengthen dialogue between policy-makers and regulators in communications and energy

Poor support

Summary and Recommendations

Interworking Between Organisations, Industries, and across Borders

Issue	Encouraging or requiring data sharing and constructive collaboration through standards and protocols. Defining roles and responsibilities of different types of actor
Relevance	Essential for the effective functioning of the whole electricity system and supply chain across Europe, as information flows play an increasing part in control and market activity
Action	Encourage and extend the current focus on data sharing, to optimise interworking between different organisations, industries, and across national borders

Moderate support, lacks holistic planning

ICT Infrastructure Sharing

Issue	Enforcing open access ICT infrastructures. Encouraging use of public ICT by electricity network operators. Enabling utilities to become telecoms businesses in all countries
Relevance	Maximising opportunities for innovation and competitive activity in telecoms and IT. Reducing wastage from duplication. Contributing to the European digital agenda.
Action	Remove barriers to ICT infrastructure sharing created by energy regulation, by ensuring commercial ICT services are not discouraged, and by allowing utilities to use assets to sell telecoms services to third parties

Mixed support

Spectrum

Issue	Considering allocation of harmonised spectrum for smart grids across Europe, recognising the existence of conflicting interests in such spectrum between utilities and telecoms operators, in particular
Relevance	Reducing smart grid costs. Reducing cross-border radio-frequency interference
Action	Consider the allocation of harmonised spectrum for smart grid use across Europe, including frequencies below 1 GHz for resilience and coverage, plus spectrum in the range 1-3 GHz for capacity

Mixed support

Standardisation

Issue	Encouraging the development and adoption of open standards
Relevance	Maximising competitiveness, innovation, and delivery of value to stakeholders
Action	Continue to encourage the development and adoption of open standards in ICT across the EU, with a general principle of technology-neutral regulation, but mandating standards if essential

Good support

Privacy

Issue	Data protection legislation and regulations
Relevance	Consumer protection
Action	Continue with the strong development of data protection and privacy legislation and regulation, with an increasing focus on the specific requirements of smart energy

Good support

Summary and Recommendations

Security of Critical National Infrastructure for Energy

Issue	Ensuring that appropriate security controls, for the enabling ICT in particular, are in place to protect the energy system
Relevance	Minimising the chance of accidental or malicious disruption to energy services, which could have potentially enormous impact on economic and societal stability of member states
Action	Encourage, and continue to focus on ensuring, appropriate security controls, for the enabling ICT in particular, to protect the energy systems of member states

Moderate support

Regulating the Smart Energy Future

Thank you for your attention

Questions?