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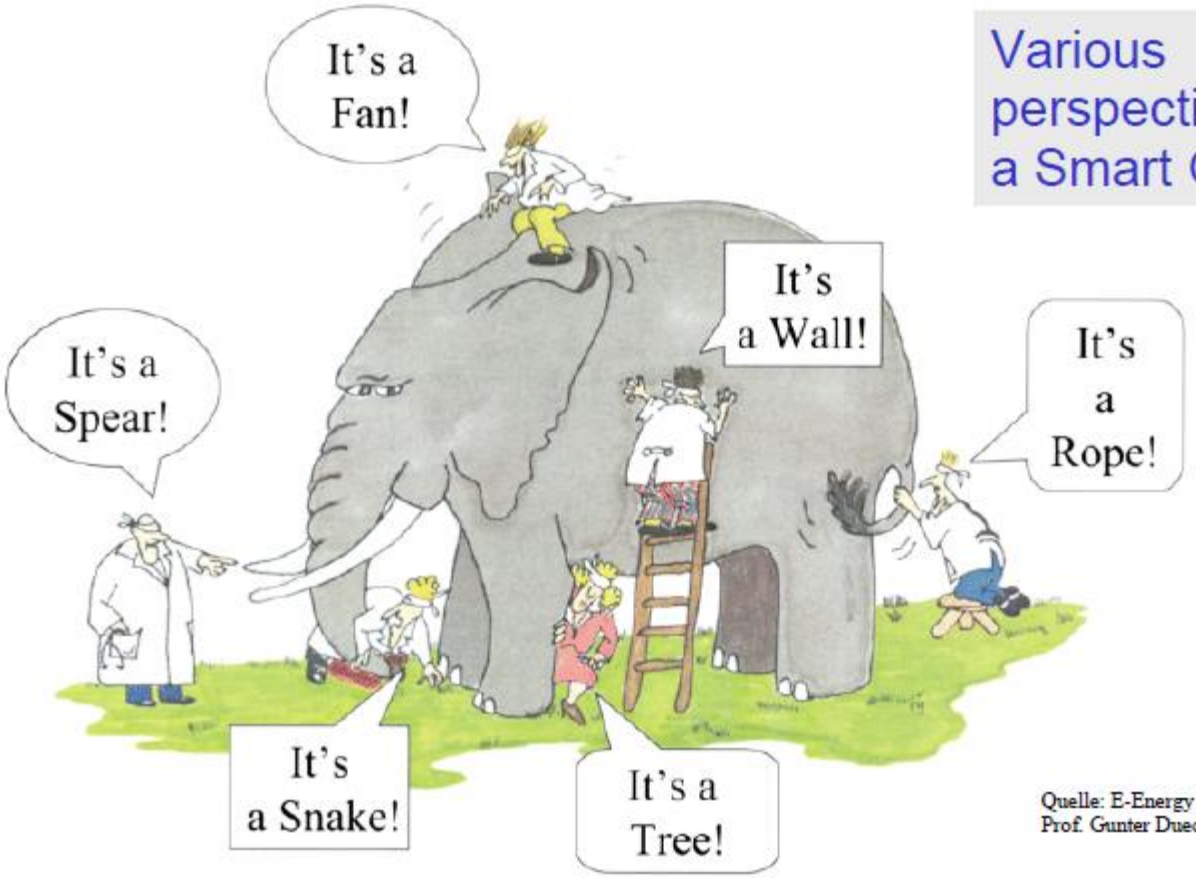
Smart Grids and the Regulatory Landscape

Green ICTs Seminar: Energy, Climate Change and Regulation
Brussels, February 24, 2011

Miguel Toledano – Cullen International

Is a smart grid like blinded men with an elephant?



Various perspectives on a Smart Grid

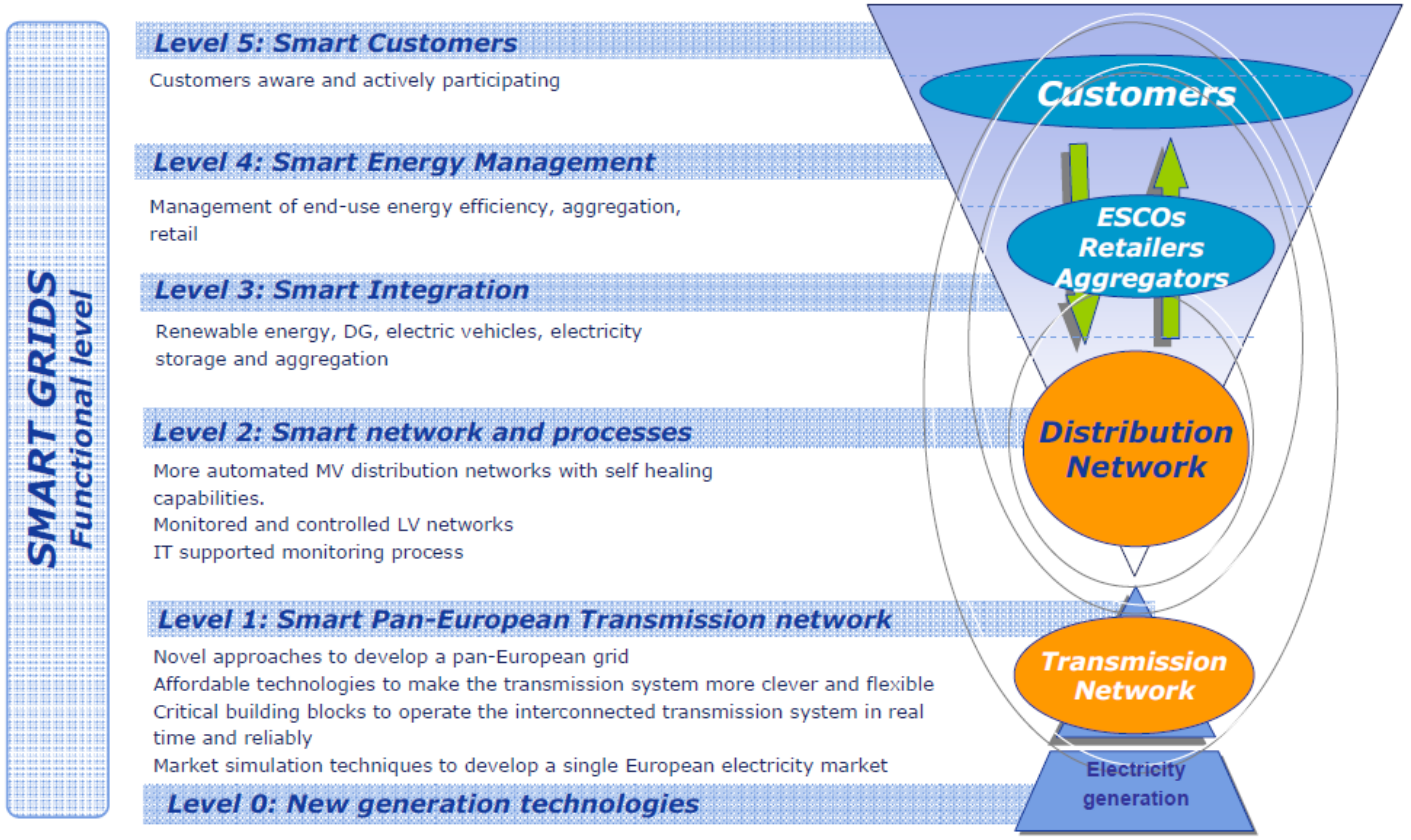
Quelle: E-Energy Jahreskongress 2009, Prof. Gunter Dueck

Legal definition

- "Smart":
  - No definition in EU law
  - Positive side: stylish, clever and quick
  - Negative side: suspicion
- Definition by ERGEG:

"Smart grid is an electricity network that can cost efficiently integrate the behaviour and actions of all users connected to it – generators, consumers and those that do both – in order to ensure economically efficient, sustainable power system with low losses and high levels of quality and security of supply and safety." (User-centric and technology neutral perspective)

Smart Grid model



Source: European Electricity Grid Initiative, 2010

- "This management capacity requires generalised use of ICT and the possibilities it offers for communication and interaction between the different components and actors in the system" (ADEME)

EU legislation

- Directives:
  - 2009/72/EC, 2009/28/EC
- Regulations:
  - Nos. 713/2009, 714/2009
- Input: grid codes (ENTSO-e) thru comitology

Also see Guadalajara ICT declaration Dec. 2010 (§1): “accelerate efforts to make available smart grids”

Directive 2009/72/EC, concerning common rules for the internal market in electricity

- Recital 27
- Article 3.11
- Indirect provisions:
  - Article 3.1
  - Article 3.2 (security)
  - Article 3.7 (remote areas)
  - Article 3.10
  - Article 12: roles and responsibilities of TSOs
  - Article 25: idem of DSOs
  - Article 36
- Interpretative Note of 22 January 2010 (4.8)

=> Remote monitoring & control + automatic fault detection

Directive 2009/28/EC, on the promotion of the use of energy from renewable sources

- Article 16:
  - Recognizes need for “intelligent networks”
  - In order to allow secure operation of electricity system
  - With further development of renewable sources
  - But focuses on access to and operation of grids
  - Just saying that “Member States shall take the appropriate steps” to develop smart grids

EU technical regulation

- Standardisation:
  - Technology neutrality (see Art. 5 of Directive 2009/72/EC)
  - Have common open standards for interoperability (and quality) and to avoid stranded costs
  - International collaboration (e.g. Prime Alliance)
  - EG1 of EC TF for Smart Grids:
    - Recognition of existing standards plus recommendations for further standardisation
    - 26-12-2010 Internal approval of mandate with ESOs
    - Proposed milestones: 9 months for reference architecture, first set of standards by 2012

- R&D projects:
  - EEGI, GROW-DERS, ADDRESS, BeyWatch, Smart-A, Meta PV, OpenNode, FENIX, EcoGrid, Università di Genova+T&D Europe, 3e-Houses, SEESGEN-ICT, SmartGrids ERA-Net, SmartHouse/SmartGrid, CRISP, SmartLife, Dispower, ELEP, SA-WSN, Integris, IRED, EU DEEP, G4V, SmartCoDe, Alistore, TradeWind, EWIS, Reliance, Downwind, Greennet, Irene 40, Microgrids, BUSMOD, GreenLys Project, Cenit-Denise, Safewind, Windgrid, IS-Powers, Pegase, Optimate, Realisegrid, Twenties

Other policy initiatives

- Europe 2020 Strategy
- Energy infrastructures priorities for 2020 and beyond
- EC Recomendation of 9.10.2009 (12) and (13)
- Other:
  - EC Communication of May 2008 addressing the challenge of energy efficiency through ICTs, of 13.5.2008
  - EC Communication on mobilising ICTs to facilitate the transition to an energy-efficient, low-carbon economy, of 12.3.2009

Communication "Energy 2020 A strategy for competitive, sustainable and secure energy" (10 November 2010)

- Smart grids key to specified priorities (pp. 5-6)
- Priority 2, Action 3: ACER will present a detailed programme of action for roll-out
- Priority 4, Action 1: In order to extend Europe's leadership in technology and innovation, reinforce smart grids as one of the six European Industrial Initiatives and "speed up" development and demonstration projects
- Priority 4, Action 2: "The Commission will take forward a major European initiative on smart grids"

Communication "Energy infrastructure priorities for 2020 and beyond" (17 November 2010)

- Roll-out of smart grid technologies:
  - Fourth energy priority after European electricity corridors, diversification of gas supply and security of oil supply
  - Assess need for further legislation (EC TF, 1H2011)
  - Promote "rapid" investment in smart grids
  - Set up a transparency and information platform for best practices
- Annex, 3.4:
  - Definition of smart grids, though not legal
  - €200/year of individual saving (9%)

Funding up to 2020

- Necessary investments (estimations in Impact Assessment accompanying document to Energy infrastructure priorities for 2020 and beyond):
  - €40B 2010-2020
  - €126B 2020-2030
- Current investments (2010):
  - Germany: $397M
  - UK: $290M
  - France: $265M
  - Spain: $807M

Need for specific legislation?

- ERGEG:
  - Significant challenge for network companies (Position Paper on Smart Grids)
  - Supports 3rd Energy Package to pursue smart grids deployment (Factsheet: The Drive towards Smart Grids)
- BEUC:
  - Amend Directive 2009/72 plus Regulation
- EC TF:
  - Until 18-02, criteria and recommendations for funding (EG3)

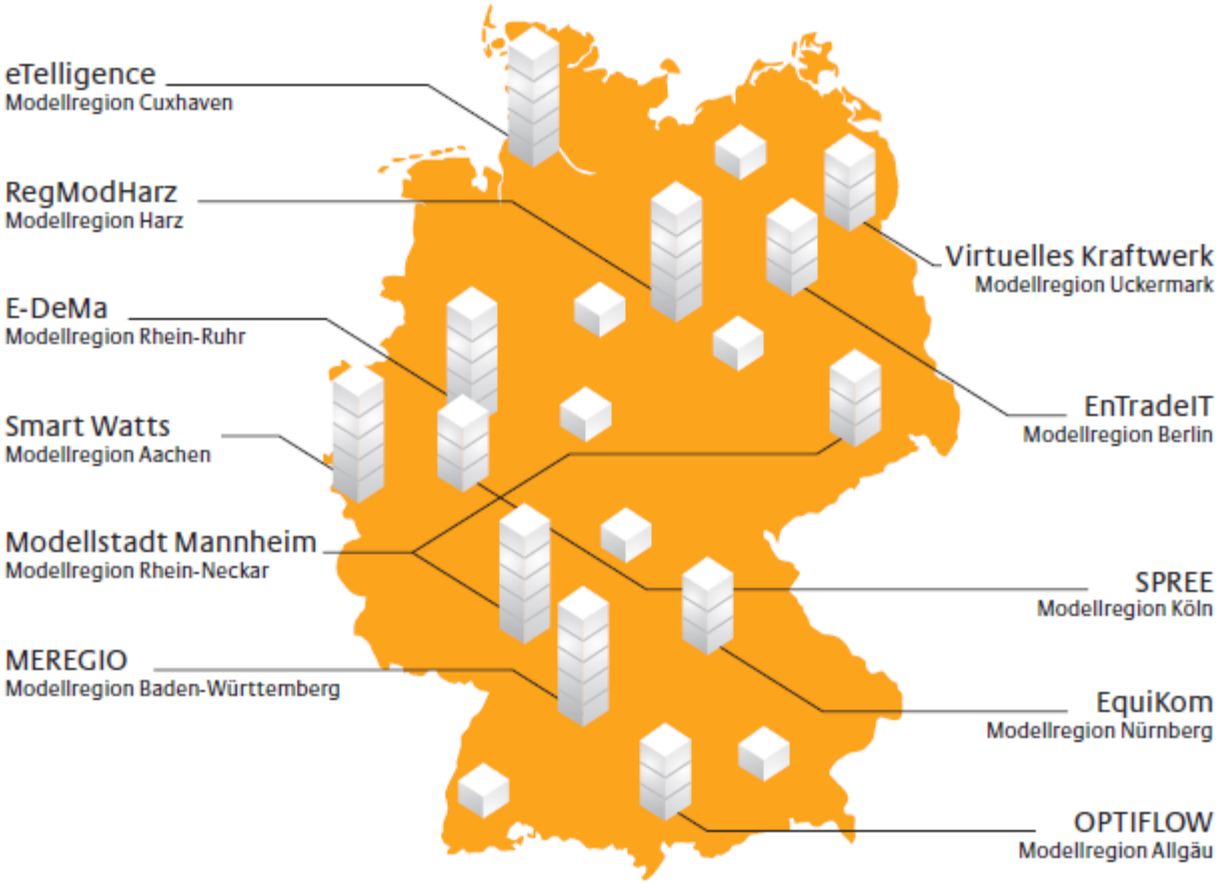
Role of energy regulators

- Demand response requires a smart grid; and more…
- Incentivize grid operators to adopt smart grid solutions (no windfall profits):
  - Cost allocation rules
  - Tariffs (risk, not fix for access, not only based on transported energy)
  - Roll-out plans and responsibilities
- Change market design and market rules e.g. balancing systems and markets (from day-ahead electricity billing closer to real-time) – EU Commission to issue Guidelines
- Set targets to discourage network losses
- Develop skills and consumer awareness (NIMBY)

Germany

- Energy Industry Act (EnWG) 07.07.2005
- Incentive Regulation Ordinance (ARegV) 29-10.2007 :
  - Not higher revenue for grid expansion
- “E-Energy”:
  - Funding programme of the Federal Ministry of Economics and Technology (BMWi) and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
  - Electronic legal transactions, digital interconnection of technical systems
  - Cost: €140M, of which €40M from BMWi and €20M from BMU
  - Readiness for market launching in 2012
- Other: T-City

Germany
E-Energy: 6 model projects



Source: BMWi

Germany

- eTelligence (Cuxhaven):
  - Integration of wind
  - uses IEC 61850 standard for automation
- E-DeMa (Rhein-Ruhr):
  - A smarter electricity marketplace
  - 2011: communication infrastructure
- MeRegio (Baden-Württemberg):
  - ICT help reduce carbon emissions
  - 2011: decentralized generation is sold at wholesale
- Model city of Mannheim:
  - Efficiency through ICT
  - 2011: third practical test of “Energiebutler” with 1200 customers
- RegModHarz (Harz):
  - Intermittent generation
  - Electric vehicles to store power, power surplus of region
- SmartWatts (Aachen)

Germany

- The German Association for Electrical, Electronic & Information technologies (DKE) has recommended the Federal Government to expand broadband networks for the smart grid.

"*Zweitens stünde die Mobilisierung zahlreicher Initiativen zum Ausbau leistungsfähiger Glasfasernetze bis in die Häuser und Wohnungen an. Hier wolle die Bundesnetzagentur die Synergien zwischen Telekommunikation und Energiewirtschaft sowie zwischen den underschiedlichen Unternehmen und der kommunalen Ebene fördern*"

(Presentation of last Annual Report of the BNetzA)

- "In second place there is the mobilization of numerous initiatives for the rollout of more efficient optical networks to the buildings and homes. The Federal Network Agency wants to promote here the synergies between telecom and energy as well as between the different companies and community levels".

UK

- Electricity Act 1989 and Energy Act 2008
- **UK Low Carbon Transition Plan** (DECC, July 2009):
  - Support for a smart electrical grid

- **DECC's Low Carbon Innovation Fund** (September 2009)**:**
  - £2.8M for 8 small smart grid demostration projects until December 2015

- **Ofgem's Low Carbon Networks (LCN) Fund** (July 2010)*:*
  - £500M over 5 years to support smart grid trials at distribution level:
    - £26.8M to CE Electric UK for 14,000 trial customers in northeast England
    - £24.3M to UK Power Networks for 25,000 EV charging points in London
    - £2.8M to Central Networks to connect distributed generaltion in East Lincolnshire
    - £7.8M to Western Power Distribution for 100,000 customers in South Wales

- UK Government: Work with Ofcom to **ensure allocation of suitable spectrum for smart grid use "as soon as possible"**(Response to Parliament's Energy & Climate Change Committee Report, November 2010)

- Ofgem and DECC jointly chair the Electricity Networks Strategy Group (ENSG) - smart grids **route map**:
  - develops **33 illustrative subprojects** for delivery of the smart grid vision
  - identifies **2010-2015 milestones** for large scale investment and developments
  - asks for **governance structure** to provide coordinated approach between Government, Regulator, Industry and stakeholders

UK

- New **price control model** for T&D networks: RPI-X@20 and RIIO model (last consultation December 2010):
  - Detailed review of network regulation
  - New regulatory framework
  - Objective: to encourage energy network companies to innovate
  - Involve third parties in delivery and ownership
  - **Stimulus package** open to projects "related to delivering the networks required for a low carbon sector":
    - Funding based on network operators' business plans
    - Decision document in March 2011

- Late Spring 2011: a Strategy for smart grid development is **expected** ("Electricity Market Reform White Paper")

- Other Ofgem programmes:
  - **Innovation Funding Incentive** (research and development for DSOs)
  - **Registered Power Zones** (connect generation at distribution level)

- Review of **Security and Quality of Supply Standards (SQSS)** considered "vital" for the development of the smart grid (Government Response to Parliament's Energy & Climate Change Committee Report)

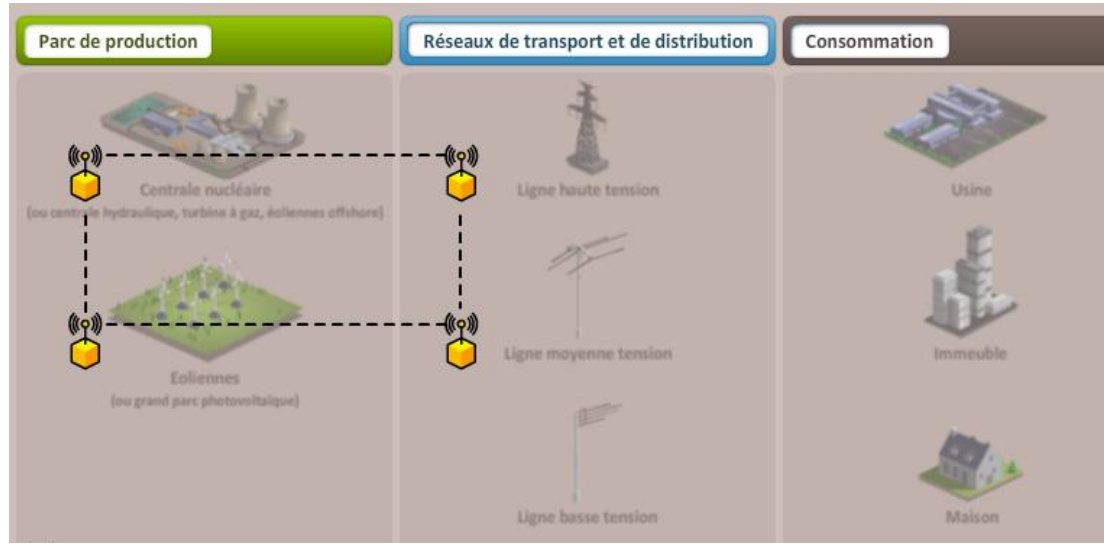
- Work with the **Sector's Skill Council**, Energy & Utility Skills, to train the 45,000 required for smart technologies

France

- Loi nº 2000-108 du 10 février 2000 relative à la modernisation et au développement du service public de l'électricité
- Loi nº 2010-1488 du 7 décembre 2010 portant Nouvelle organisation du marché de l'électricité (Nome)
- Investment needed €15B (source: EEGI and CRE), i.e., €450/user
- Financing proposals (source: CRE):
  - Tarif d'utilisation des réseaux publics (TURP) d'électricité
  - Financement incitatifs (e.g., appels à manifestation d'intérêt de l'Ademe)
  - European research funds

France

TODAY



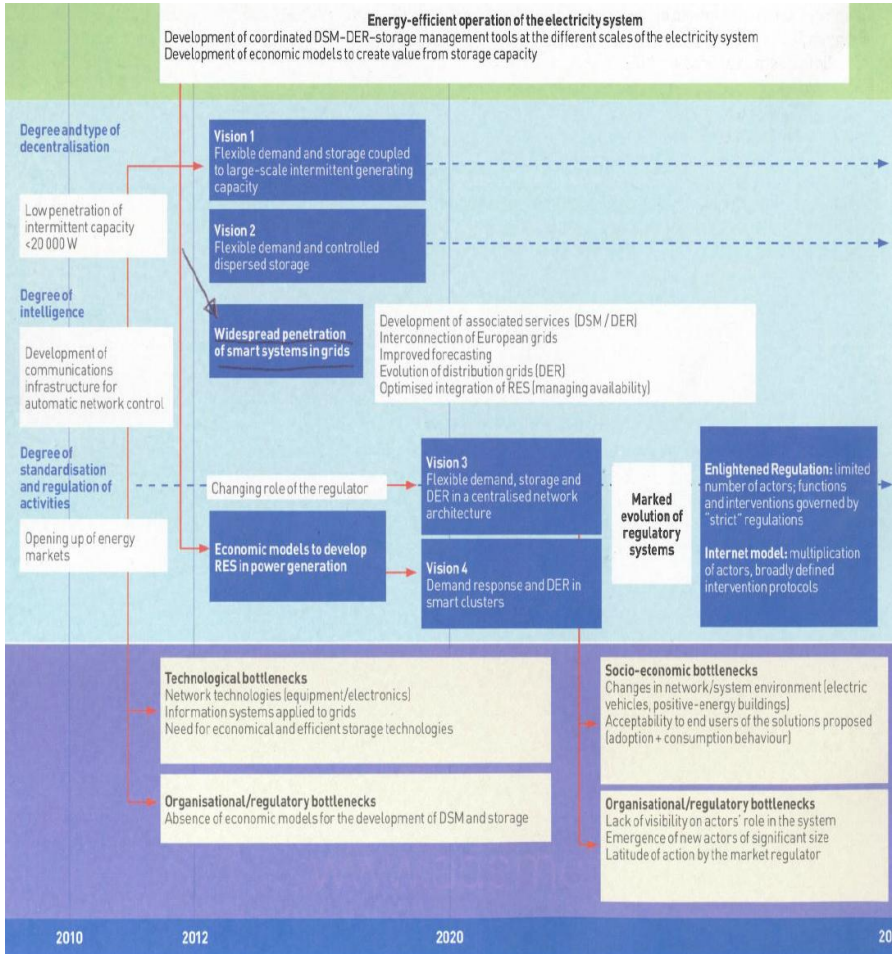
TOMORROW

(Source: CRE)

France

- Projects:
  - RTE Rose:
    - > protection, control & supervision through telecom network
    - 8,000/100,000 km up to 2011 plus 15 year maintenance (source: CRE)
  - Premio (Provence-Alpes-Côte d'Azur)
  - Écoquartier Confluence (Lyon)
  - Smart Campus (Saint-Quentin-en-Yvelines)
  - Bretagne (Enbrin, Vir'volt, Ecowatt, Voltalis)

France:
Roadmap for smart grids



Source: ADEME

Italy

- AEEG Deliberation 348/07, Annex A, Art. 11.4.d) recognizes a 2% premium on top of wacc for investments (pilot projects) in “automation, protection and control systems of active networks (*smart grids*)”; duration: 12 years

- Arts. 11.7 and 8 require approval of AEEG for premium after an expert commission’s evaluation of the project based on:
  - potential for development of distributed generation
  - improvement of voltage quality

- AEEG Deliberation ARG/elt 39/10:
  - Outlines objectives “in order of urgency”:
    - Connect distributed generation
    - System controlling
    - Promotion of efficiency
    - Permitting consumers participate in power markets through price signals
    - Other, such as power storage through electric vehicles (see further
  - Reference to deffinition of active network refering to technical Norm CEI 0-16:
    - Capacity to increase voltage from MV into HV at least 5% of functioning time
    - Applied to smart grids, at least 1%
  - Procedure for admission to premium treatment
  - Technical requisites for projects
  - Benefits of projects

Italy

"Regulatory Authorities can develop a significant role" (President of AEEG, April 2010)

- 9 projects have applied
- AEEG Determination no. 7/10 of 27 October 2010:
  - Approves mathematical priority indicator Benefits/Cost
  - Approves mathematical evaluation of Benefits

Italy

- AEEG Deliberation ARG/elt 191/10 of November 2010:
  - Modifies procedure for admission to premium treatment:
    - Requires an independent expert technical report of the project
- AEEG Determination no. 9/10 of December 28, 2010:
  - Approves independent expert for each project
- January 10, 2011 – AEEG Strategic Plan 2011-2013:
  - Development of Smart Grids under Objective 2
  - Objective 1: promoting market competition
- February 8, 2011 – AEEG Deliberation ARG/elt 12/11
  - Approval of 8 projects plus demand for modification of 1 (30 days)

Spain

- No specific regulation yet

- But see Royal Decree 1110/2007 for smart meters:
  - Art. 21.3 mentions different communication standards, such as RTC, GSM, GPRS and PLC
  - Art. 3 defines concentrators (intermediate and secondary) and networks

Spain

3. Smart Grids – Evolución de las redes eléctricas S.XX Vs S. XXI

Red del siglo XX	Red del siglo XXI
Electromecánica	Digital
Comunicaciones en una dirección	Comunicaciones bidireccionales
Generación centralizada	Integra generación distribuida
Algunos sensores	Red monitorizada y con sensores
Red "ciega"	Auto monitorizada
Reposición manual	Reposición semi-automática o auto
Propensa a fallos y apagones	Protecciones adaptativas
Comprobación manual de los equipos	Equipos con operación remota
Decisiones de emergencia humanas	Decisiones basadas en sistemas
Control limitado sobre flujos	Total control sobre flujos de potencia
Información precio electricidad escasa	Información total precio electricidad
Consumidores sin apenas elección	Consumidores protagonistas

Source: CNE, 2010

Spain – Smart Grid projects

- Endesa (SMARTCITY):
  - 300 industrial clientes, 900 service companies and 11K residential customers in Málaga
  - Cost: €31M
  - 20% efficiency saving

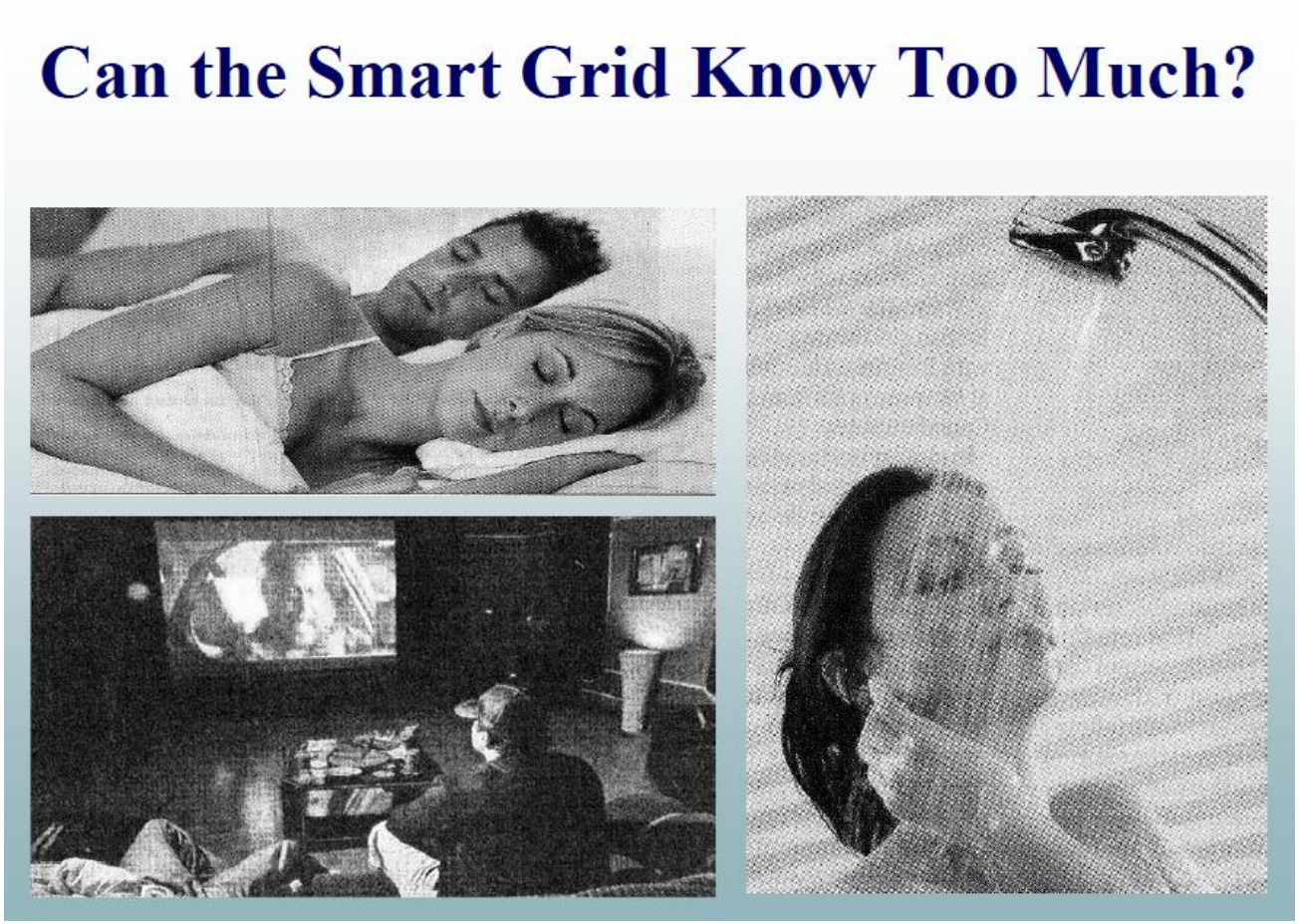
- Iberdrola (STAR):
  - 583 transformation stations in Castellón
  - Cost: (€21M)
  - 2011 expansion to other areas

- Gas Natural-Fenosa (ENERGOS):
  - Leads 39 entities
  - Cost: €24M
  - Up to 2012

Open issues

- Targets and timeline (binding/not binding)
  - 60% by 2020 (EU Technology Platform)
- Financing: network tariffs, higher ROI for network operator
- Guidelines for the setting of charges (art. 18 of Regulation No 714/2009)
- Roles and responsibilities (generators, consumers, retailers, marketeers, ICT providers…12)
- Spectrum policy
- Convergence of power and telecom networks
- Privacy and data protection:
  - Disclosure of personal data
  - Giving consent (opt-in/opt-out)
  - Dutch case: bill for smart grid deployment was refused by Dutch Parliament in 2009 on grounds of data protection concerns
  - Legislation beyond Directive 95/46/EC (and Directive 2002/58/EC)?
- Security:
  - Unauthorized access to personal data
  - Unauthorized use of remote disconnection

Smart grids - Security



THANK YOU!

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Smart Meters and the Regulatory Landscape

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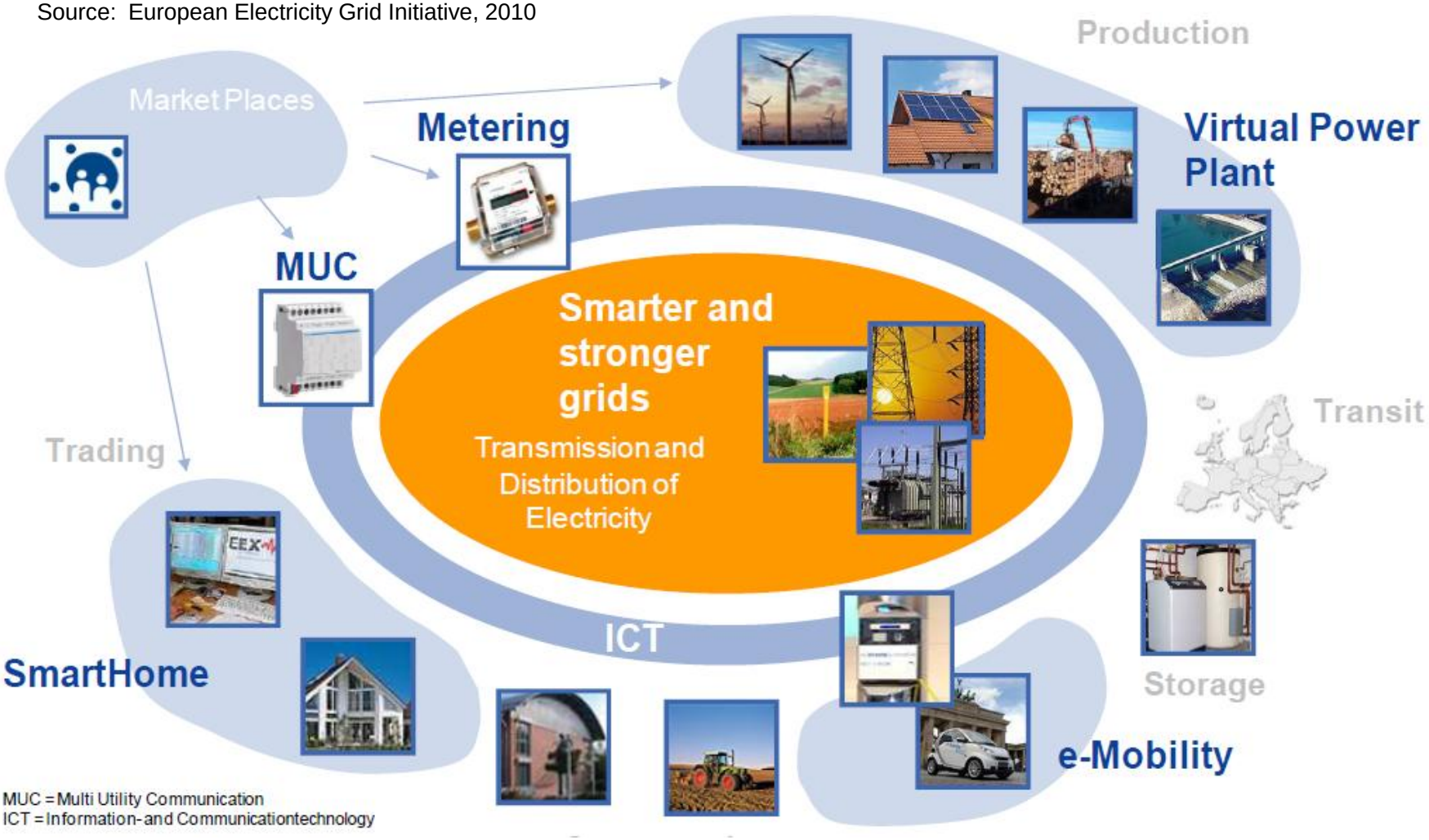
Legal definition

- No definition
- Closely related to smart grids
- “Asking a consumer to reduce energy waste based on the utility bill is like asking a dieter to lose weight without using a scale”

(American Council for an Energy-Efficient Economy)

Metering, a key part of Smart Grids

Source: European Electricity Grid Initiative, 2010



EU legislation

- Directives:
  - 2009/72/EC, concerning common rules for the internal market in electricity
  - 2006/32/EC, on energy end-use efficiency and energy services
  - 2010/31/EU, on the energy performance of buildings
  - Too - 2004/22/EC, on measuring instruments

Directive 2009/72/EC, concerning common rules for the internal market in electricity

- Article 3.11 – for efficiency
- Indirect provisions:
  - Article 3.5
  - Article 41
- Annex I:
  - Concept: “intelligent metering systems that shall assist the active participation of consumers in the energy supply market”
  - Obligation of MS to ensure their implementation
  - Economic assessment, by 03-09-12
  - If positive assessment, at least 80% consumers by 2020
  - Interoperability, standards
- Interpretative Note of 22 January 2010 (4.7):
  - monthly consumption and cost information enough

Directive 2006/32/EC, on energy end-use efficiency and energy services

- Recital 28
- Article 11.1 – MS can subsidize
- Article 13
- Annex III (r) – metering as eligible efficiency measure

Directive 2010/31/EU, on the energy performance of buildings

- Article 8.2 – MS to encourage and when

Directive 2004/22/EC, on measuring instruments

- Article 1 - scope
- Annexes I and MI-003 – essential requirements
- Article 7 – CE marking
- Article 8 – free movement through EU
- Article 9 – conformity assessment procedure

EU technical regulation

- Standardisation (M/441 of March 12, 2009):
  - The EU Commission has mandated the European Standards Organizations CEN, CENELEC and ETSI to develop European standards, that allow for:
    - Bidirectionality
    - Advanced information and management & control systems and
    - Secure data exchange
  - Result:
    - Standards to be finalized end of 2011
    - Roadmap for update 2010-2020
- R&D projects:
  - OPENmeter (includes regulatory, results 30-06-11)
  - DEHEMS, ESMA, Meters and More

Other policy initiatives

- Europe 2020 Strategy
- Energy infrastructures priorities for 2020 and beyond
- EC Recomendation of 9.10.2009 (22), (23), 8(a), 8(b), (12)

Communication "Energy 2020 A strategy for competitive, sustainable and secure energy" (10 November 2010)

- Priority 1, Action 3: DSOs and retailers to secure efficiency
- Priority 2, Action 3: ACER will present a detailed programme of action for roll-out

Communication "Energy infrastructure priorities for 2020 and beyond" (17 November 2010)

- Promote investment in smart meters (4.1.4)
- Impact Assessment acompanying Communication:
  - Estimates investment for 80% smart meter roll-out in another €40b up to 2020; and €50b up to 2030

Regulatory issues

- Legal responsibilities:
  - Installation
  - Maintenance
  - Meter reading
  - Data management
  - Role of regulator (Annex I)
- Roll-out policy (> predictability)
- Who pays: distributor, retailer
- Privacy issues
- Functional and technical aspects: i.a. PLC vs. GPRS*, metering interval

* Conservative Dr Phillip Lee MP (Energy & Climate Change Select Committee) has recently raised concerns over reliability of mobile network

Germany

- Market of 48M power meters
- 2008: Metering market open to competition (§21b of Energy Industry Act/EnWG and Metering Admittance Ordinance/MessZV)
  - Existence of metering operators (not mere outsourcing, not just supplier v.gr. Yello)
  - DSO responsible if no express choice of customer
  - actual energy consumption and information on time of use
  - Priorities:
    - Newly connected buildings to the grid
    - Buildings subject to major reconstruction
- 09.09.2010: Beschluß zur Standardisierung von Verträgen und Geschäftsprozessen im Bereich des Messwesens
- 01.01.2011: Mandatory introduction of variable tariffs (§40.3 EnWG)
- 01.10.2011: New mandated simplified processes come into force

Germany: roll-out plan?

- 2010: BNetzA report:
  - No mandated rollout
  - Increasing competition for customer to choose

«Das BMWi wird rasch einen Fahrplan für die Einführung von Smart Metern vorlegen. Ein wesentliches Element ist die Schaffung rechtlicher Rahmenbedingungen. Das betrifft die technischen Voraussetzungen des Smart Meters ebenso wie die Datenschutz-Regeln »(BMWi Monthly Report, December 1, 2010).

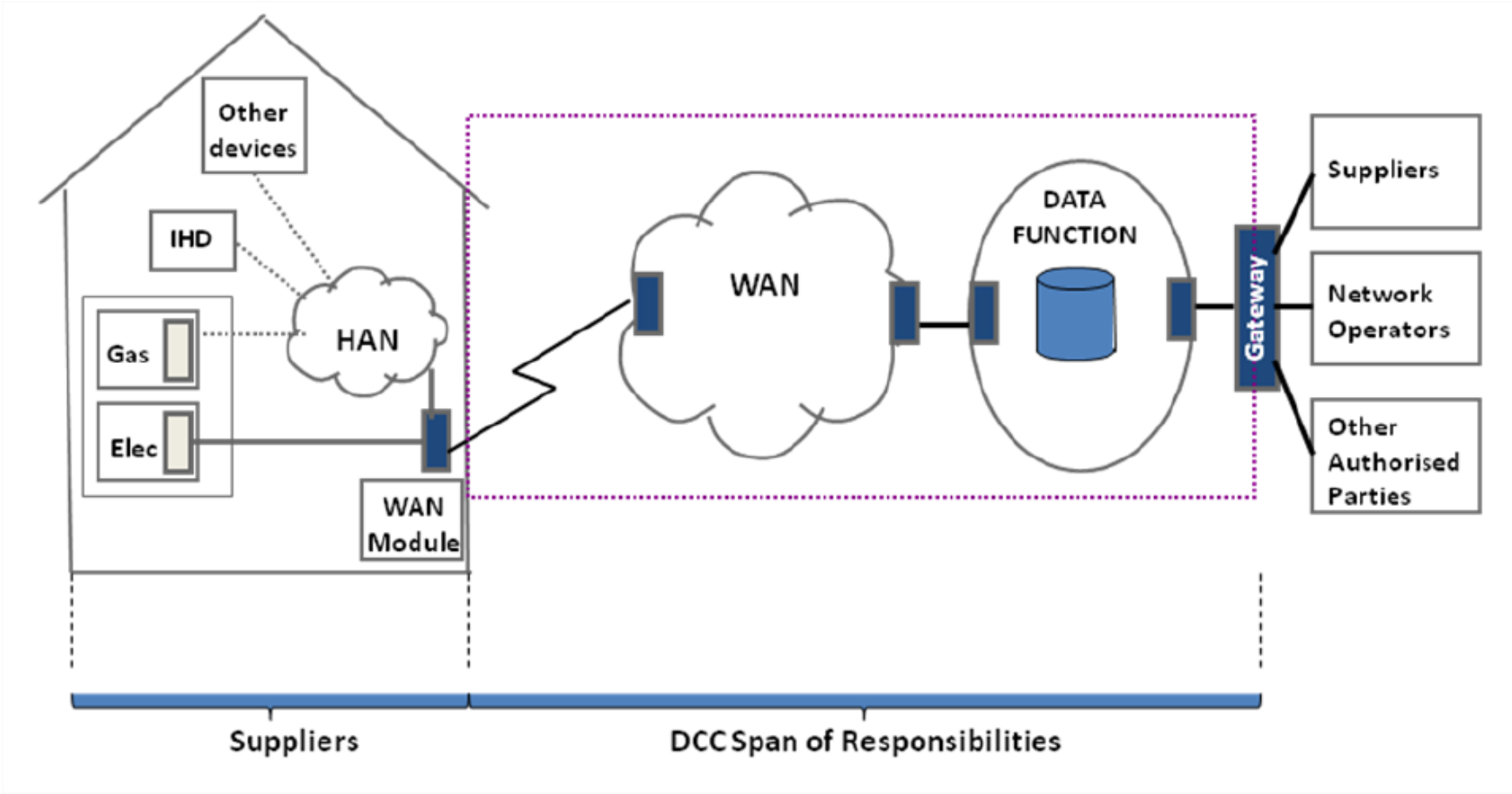
- "German government is about to set the legal framework for a smart metering" (Matthias Kurth, President of the Federal Network Agency, December 3, 2010):
  - Basic functionalities and minimum standards

UK

- DECC Impact Assessment, July 2010:
  - NPV of +7.2B£ up to 2030 for over 47M meters (of which 27M homes)
  - Up to now, consumers receive quarterly information (plus often estimates); 14£ average estimate saving in domestic bill
  - Without government intervention, less than 50% roll-out
- Announced regulated rollout October 2008; full deployment mandated 2020; share of roles between DECC and Ofgem
- Liberalized metering market:
  - responsibility of supplier (WAN for communications service provider?)
  - creation of a DataCommsCo (DCC), licence of 10 years, mandatory?
  - coordination with Ofcom to develop on DCC communication activities
- Consumer engagement:
  - Campaign cost estimation 100M £ (166M £ for digital switchover)

UK

Responsibilities of elements within the smart metering system
(Source: DECC)



UK

- Smart Meter Implementation Programme Prospectus (open to consultation, further rules expected spring 2011)
  - Proposal for Functional Requirements:
    - Smart meter - to record 12 months of ½-hourly data
    - Display (IHD) - including the possibility of (welcome) marketing messages – portability?
    - HAN – for value added services, such as water metering, microgeneration & telehealth
    - WAN
  - Supplier cannot charge customer for basic functionalities; maintenance and warranty of 1 year after installation; regulating commercial interoperability (tariffs vs. licence obligation)
  - Roll-out strategy and milestones (Phases 1-4):
    - Summer 2011: Confirmation of meter functional requirements
    - Early 2012-summer 2012: Suppliers final procurement activities
    - Spring 2012: Competitive application process for DCC licence
    - Spring 2013: Procurement of DCC for service providers

- Privacy issues:
  - Data protection act 1998 (DPA), enforced by the Information Commissioner's Office (ICO)
  - Privacy and Security Advisory Group headed by DECC to develop a privacy policy for smart metering data – Privacy by Design & Privacy Impact Assessment (PIA) for Privacy Charter
  - Principle:*"The customer shall choose in which way consumption data shall be used and by whom, with the exception of data required to fulfil regulatory duties"* (e.g., for suppliers to bill consumers)

- Security:
  - Security by design
  - Important role of DCC

France

- Legislation and regulation:
  - Art. 4.IV of Loi nº 2000-108 du 10 février 2000:
    - « horosaisonnalité », CRE)
  - Art. 18 of Loi nº 2009-967 du 3 août 2009 de programmation relative à la mise en œuvre du Grenelle de l'environnement :
    - « effacement »
  - Communications de la CRE du 5 juillet 2001, 29 janvier 2004, 6 juin 2007, Orientations du 10 septembre 2007 et Délibération du 11 février 2010:
    - Required functionalities domains:
      - Improvement of consumer information (billing on real consumption derived from daily metering, storage of 2 years data)
      - Improvement of electricity market functioning conditions (tailored tariffs based on time of use)
      - Management of network operators costs (remote management, "télérelevé" instead of "relevé à pied", activation, deactivation)
      - Management of energy load (communication data from supplier to network operator before 4pm on the eve) and reduction of carbon emissions (production measurement)
  - Décret nº 2010-1022 du 31 août 2010 relatif aux dispositifs de comptage sur les réseaux publics d'électricité:
    - Responsibility
    - Roll-out policy
    - Financing
    - Privacy and security
    - Arrêté to decide on functionalities and specifications

France

The « Linky » meter

France

- Roll-out policy:
  - Phase I (experimentation at least up to 31 march 2011):
    - +130K/200K Lyon and +70K/100K Indre-et-Loire
    - Technology: PLC and GPRS
    - 3 smart meter models: Linky, PME-PMI et HTA
  - Phase II (generalization):
    - Procurement for other potential smart meter suppliers
    - All new installations below 36kVa
    - DSO w/>100K customers (ERDF covers 95% of territory) - 50% end 2014, 95% end 2016
- Financing:
  - Cost for EDF €4B for its 35M customers, i.e. €120/user
  - via the « Tarif d'utilisation des réseaux publics d'électricité (Turpe) », paid by the consumer together with consumption cost and taxes
  - But financed over 20 years, through 1€/month billing, to be reinvested by ERDF in the total cost for 7 years
- Privacy and security:
  - Loi du 6 janvier 1978 relative à l'informatique, aux fichiers et aux libertes
  - Points raised by CNIL to Senate (December 1, 2010):
    - Securitize meters if in a public building
    - Services prior express demand by consumer (opt-in?)
- Criticism (source: UFC):
  - Stress on info on behalf of DSO, but not for consumer
  - Not enough tariff information
  - Not enough price comparison
  - No assurance of free information

Italy

- No cost-benefit analysis derived from Directive 2009/72/EC
- “Progetto Telegestore” System implemented by Enel SpA:
  - Started in 2002; cost €2.2B, expected annual recovery €0.5B
  - Completed installation of 32M smart meter points (close to 100% of Italian households)
  - PLC and GSM
- AEEG Deliberation no. 292/06:
  - Roll-out timetable (95% 31-12-2011)
  - Incentive for meters with quality of supply management of up to €15 per meter

Italy

Italy

  - Minimum functional requirements:
    - Billing on real consumption
    - Bidirectionality
    - Supply switching
    - Time of use tariffing
    - Metering reading every 2 months
- AEEG timeline for time-of-use tariffs:
  - July 2010: authorized
  - January 2011: 20M customers
  - January 2012: all customers (w/smart meters)
- Progetto Acea Distribuzione: 1.5M smart meters
- Progetto E-Cube

Spain

- Law 54/97, of 27 November, of the Electric Sector
- Minister of Industry Order of 12 April 1999:
  - Technical requirements of meters
  - Currently under revision by CNE
  - Cost of equipment over basic requirements
  - Any communication standard
- Royal Decree 809/2006, of 1 July, 2nd Additional Disposition:
  - First mention – “meters that enable time discrimination of measurements as well as remote management”
- Royal Decree 1634/2006, of 29 December, 22nd Additional Disposition:
  - Mentions nation-wide sustitution to be designed in Regulator (CNE) report

Spain

- Royal Decree 1110/2007 of 24th August 2007, approving Regulation of Points of Measurement, and modified by Royal Decree 1565/2010 of 19th November 2010 :
  - Defines remote management:
    - Bidirectional
    - Maximum guarantee of integrity and security
    - Energy and power management
    - Activation and deactivation management
  - Other functional requirements
  - Property of DSO or client (lease). Role of suppliers?
- Minister of Industry Order ITC/3022/2007 of 10th October 2007:
  - Administrative approval of meters
  - Management of a minimum of 6 time-of-use tariffs
  - Two years storage of data
  - Information available to customer
- Minister of Industry Order ITC/3860/2007 of 28th December 2007, First Additional Disposition:
  - Full deployment mandate to EACH DSO 01/01/2008-31/12/2018 (2010 - 30%)
  - Remote management effective before 01/01/2014

Spain: roll-out

endesa — 13M customers - 100% at 2016 – PCL and GPRS

IBERDROLA — 11M customers – so far 100K meters - PCL

gasNatural fenosa — 3.7M customers – 200K meters 2011 – PCL and GPRS

e·on España — 650K customers – 100% at 2015 – PCL and GSM

HidroCantábrico — 650K customers – 2K meters so far - PCL, GPRS, ADSL

Open issues

- Vulnerable consumers
- Tariff jungle (mobile communications)
- Access to data free of charge or “in a non-discriminatory manner” (art. 3.5 of Directive 2009/72/EC)
- Standard communication protocol? (ERGEG)
- System security of smart meters (hack to see when houses are empty)

Open Issues (II)

- Privacy:
  - opt-in or opt-out
  - quantity of data (v.gr., for demand response, no name, telephone number, address)

Parties involved	Use of data
DSO	Grid operation, billing, forecast, loss detection, customer service, process automation, customer switching, power quality monitoring
Supplier	Billing, Tendering, Forecast, Trading
Generation (distributed)	Plant operation
Customer	Decision making
Third Party (ESCOs)	Energy efficiency measures, Input to home and building automation
Government Body or Regulators	Power quality monitoring, statistics

Source: ERGEG

Regulation for Smartness

Maria, I believe the new Smart Refridgerator does not only order automatically missing food, it eats it as well…

THANK YOU!

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