Autorità per l'energia elettrica il gas
e il sistema idrico

Innovation in the electricity sector in the framework of cooperation between energy and telecom regulators in Italy

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Ethical code of AEEGSI,10(2)

European Regulators recommendations (2010)

Ensure stable regulatory framework and long-term return on investments

Decouple profits and volume for grid operators

Incentivise innovative solutions (demonstration pilots)

Adopt open protocols and standards for interoperability

Disseminate the results and lessons learned from the demonstration projects

Perform societal cost-benefit assessment

Introduce output regulation: value for money of users

Distinguish grid-related versus market-related activities

Improve consumer awareness for energy use and market opportunities

Learn from best regulatory practices

***First,* keep the system secure**

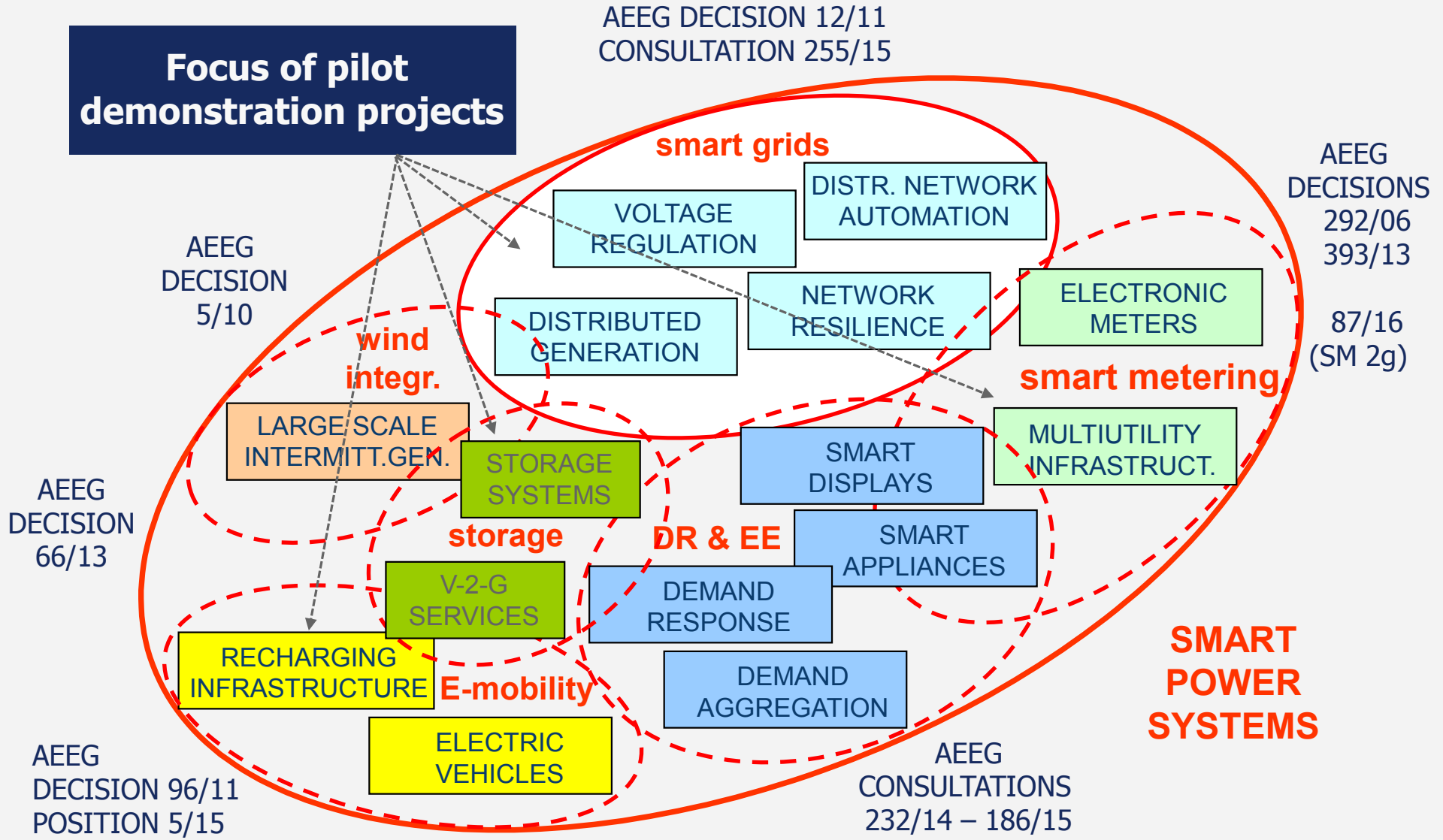
Source: CEER Smart Grid Position paper. June 2010 (E10-EQS-38-05)

Innovation: AEEGSI approach

The Italian energy regulator (AEEGSI) since 2011 devoted a lot of effort in promoting innovation, coping with 4 issues:

- smart metering > Smart metering is firstly a powerful efficiency tool, but also an important pro-competitive enabler (retail competition, new services and new offers)
- smart grids > system security in front of a dramatic increase of distributed generation (e.g. observability)
- e-mobility > new electricity usage, efficiently substituting liquid fuels; recharge infrastructure business models
- storage > although this new technology is still too expensive in respect of viable alternatives, an important edge for innovation (including for system security)

Focus of pilot demonstration projects



Cooperation between energy and telecom NRAs in Italy (1/2)

Background

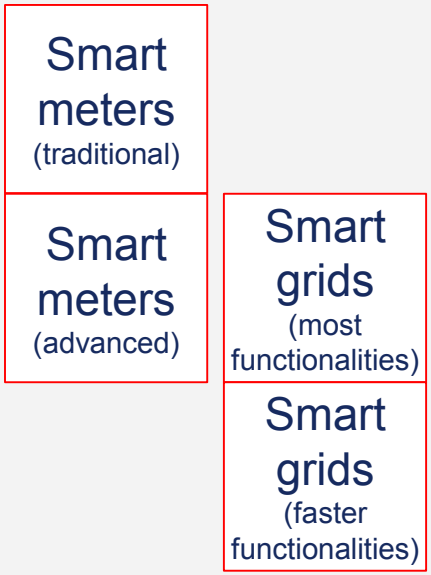
- Pilot projects promoted by AEEGSI have trialled in field new smart solutions and some M2M services
- Important issues for AEEGSI are:
  - Ensuring interoperability and easy (over-the-air) switch capability among TLC providers in competition (e-SIM)
  - Encourage the development of 'smart' applications that can minimize the cost (thanks to competition in TLC)
  - Ensuring that widespread adoption of M2M applications does not create any obstacle to the development of multi-sector solutions (*smart-city* approach), although different public services have different needs

Cooperation between energy and telecom NRAs in Italy (2/2)

2014 – AGCOM survey on M2M services

In particular, AEEGSI underlined the relevance of latency and proposed the following classification:

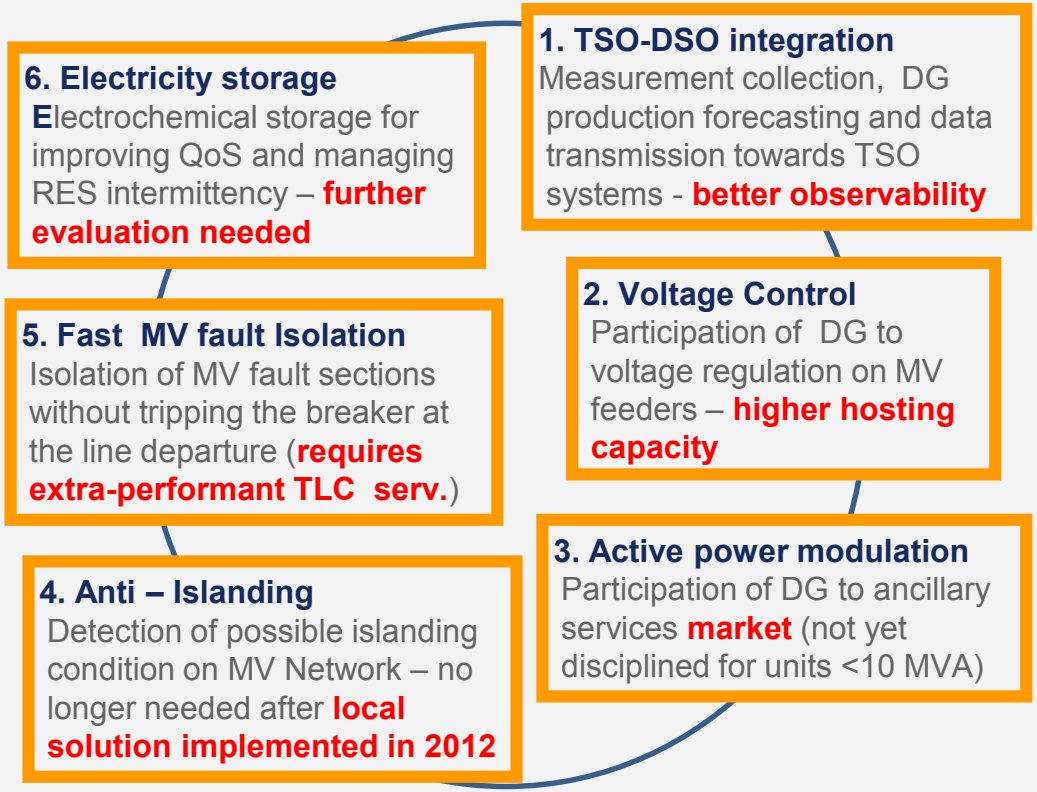
A. **monitoring**: remote data collection and configuration, without delay requirements
B. **control**: data collection and implementation commands with low delay requirements *(1s)*
C. **protection**: data collection and immediate reaction in difficult circumstances where speed is essential for safety or security reasons *(<1s)*



The AEEGSI contribution to AGCOM survey has been published: www.autorita.energia.it/allegati/inglese/457-14eng.pdf (in English)

Smart grid pilots: new functionalities

- Real operations in six real grid (small scale, but no lab)
- Effectiveness (performance) and efficiency (cost)
- Transparency of the rules
- Knowledge development (research and industry)
- Outputs disclosure: www.autorita.energia.it/it/operatori/smartgrid.htm
- Dissemination events of the best-practices



From pilot projects to large-scale roll-out, after consultation 255/2015, decision 646/2016 (Part III) introduced selective and output based incentives

Smart grids pilots: lesson learned on TLC (M2M) services

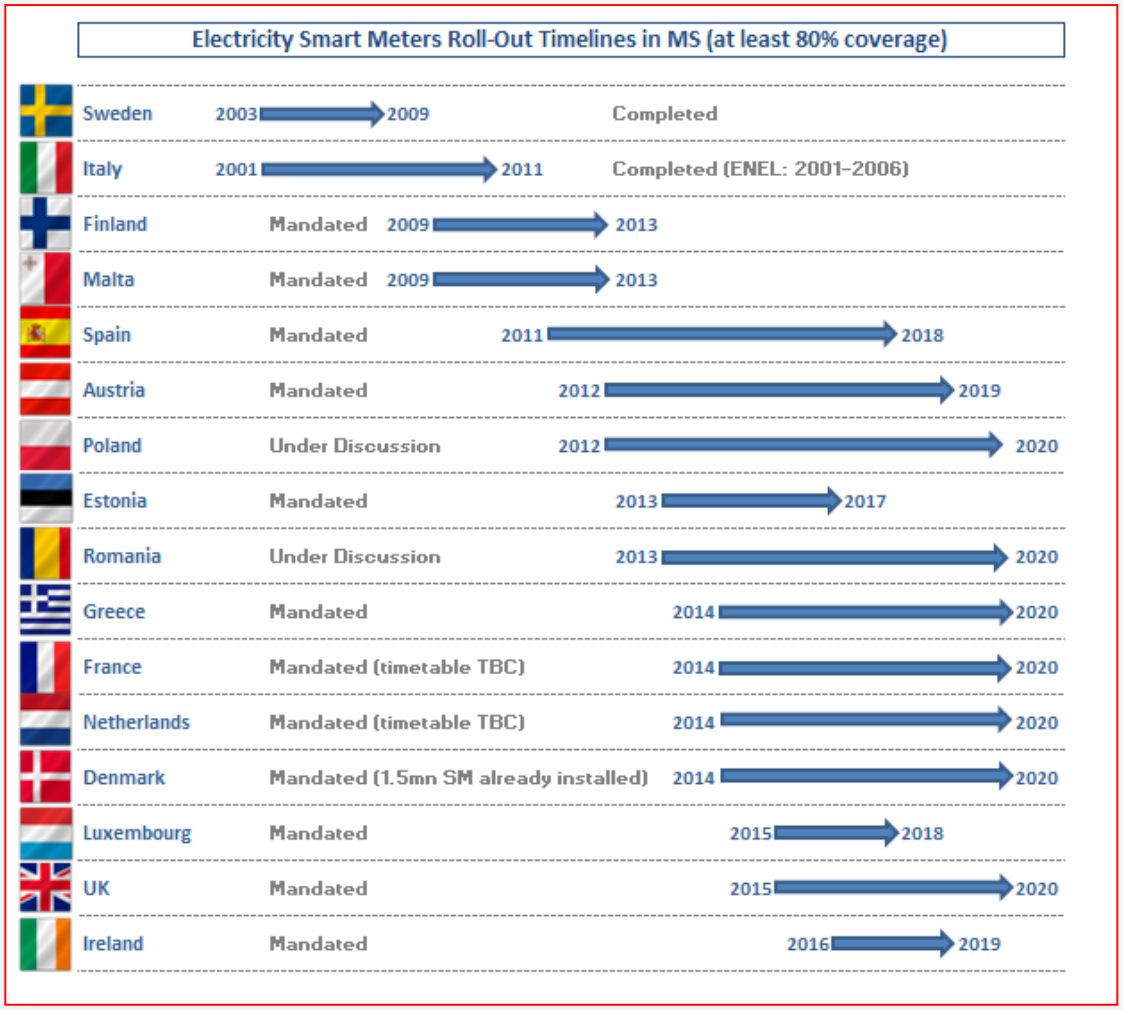
- The innovative applications are enabled by TLC based on a broadband technology (like LTE) that connects active network users, new loads (e.g. EVs), and primary/secondary substations
- Challenging TLC performance: always-on and extremely-low latency are essential; broad-band *per se* is not necessary
- In urban contexts, the public internet infrastructure (LTE-based) is available: fully compatible with almost all smart grid functionalities (except the fastest ones…)
- In rural areas, can new developments of the electricity network be the driver for the ICT deployment? Doubts: not enough traffic
- In order to reduce TLC costs: avoid too complex and customised protocol solutions and avoid dedicated networks
- Further technical analysis: www.autorita.energia.it/allegati/operatori/elettricita/smartgrid/15.00_Capone.pdf

Smart metering: a synopsis of the Italian experience

Italy has been the first Country at global level that launched full roll-out of smart metering (2001):

- More than 35 million customers with smart meter
- More than 100 distribution companies operating their own smart metering systems (even the smallest ones)
- More than 400 million readings per year remotely operated
- More than 10 million operations per year for remote customer management
- More than 28 million customers with Time-of-Use tariff (households: 2 price-bands; small business: 3 bands)
- More than 15 years of experience in smart metering

Smart metering: the European benchmarking (2014)



Investments for smart metering

Italy: 97 euro/point

France*: 135 euro/point

G.Britain**: 161 euro/point

Finland: 210 euro/point

Netherlands**: 220 euro/point

Sweden: 288 euro/point

Spain: not available

Source: Eur. Commission, SWD(2014) 189 final
* roll-out on going
** roll-out on going, joint gas/electricity

Smart metering - benefits

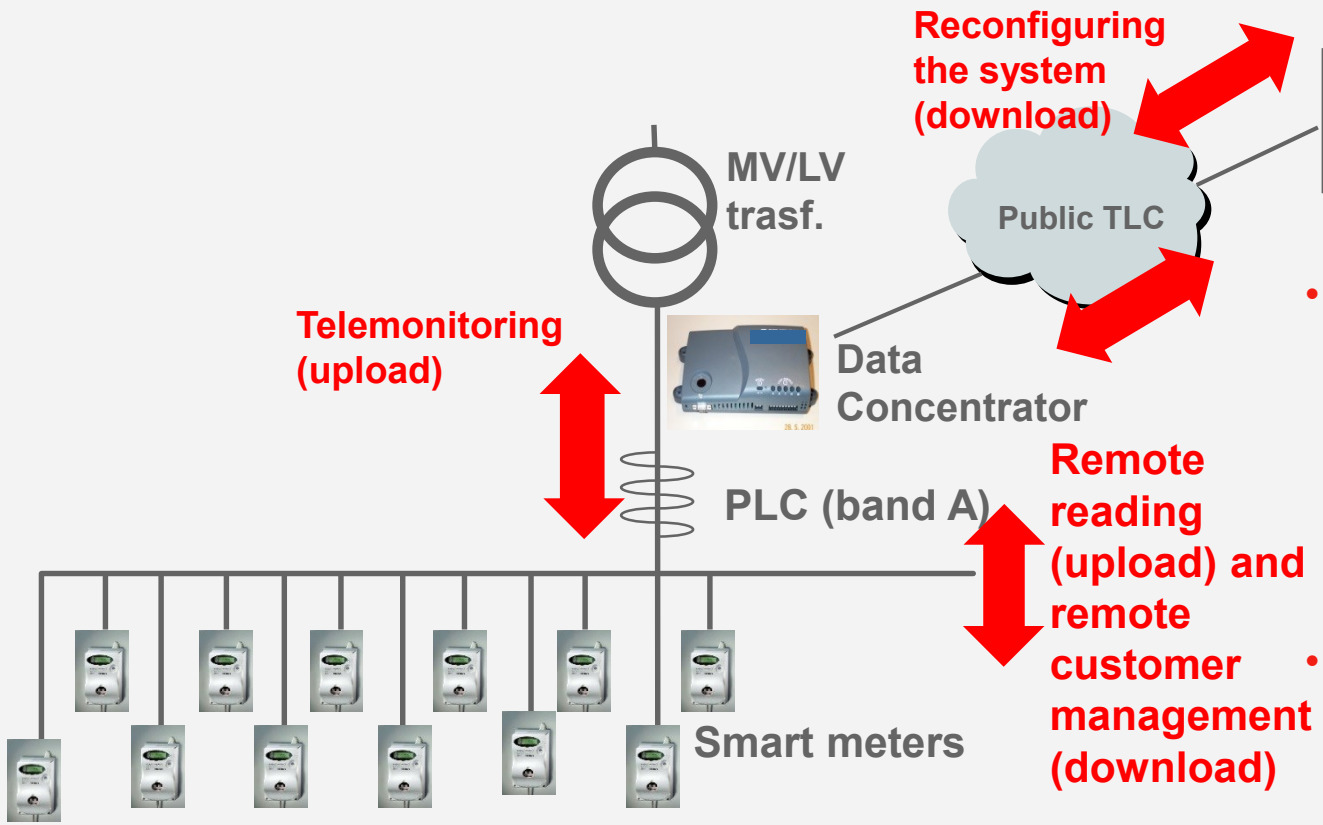
Smart metering is firstly a powerful efficiency tool

- efficiency in collecting readings,
- efficiency in preventing energy theft,
- efficiency in cost-reflecting (ToU: Time-of-Use) tariffs
- and in perspective efficiency could be shared among different public services (smart city approach)

…but also a pro-competitive enabler

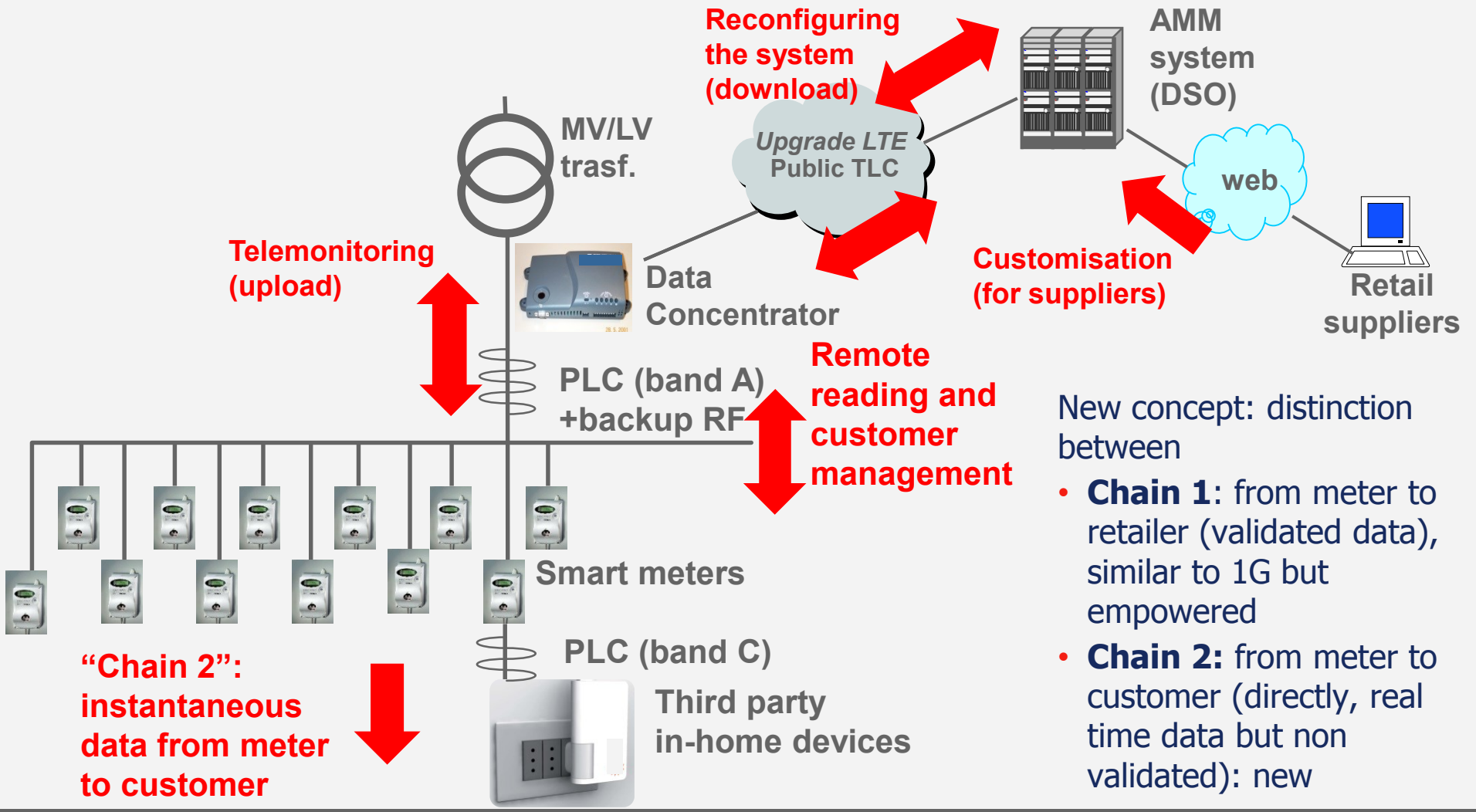
- facilitating retail competition (no need for manual reading when customer switches from one supplier to another)
- enabler for new services (e.g. customer awareness, social «minimum supply») e new offers (customised ToU)

Smart metering in Italy: system architecture "1G"



- **«Chain 1»** uses two different technologies: Power Line Carrier (between meter and data concentrator) and public TLC (GSM/GPRS so far) between concentrators and DSO central system
- **Functionalities**: Remote reading; Remote customer management (start/stop supply, switching, power capacity limit changes); Remote meter management (telemonitoring for security, reconfiguring)

Smart metering in Italy: system architecture "2G"

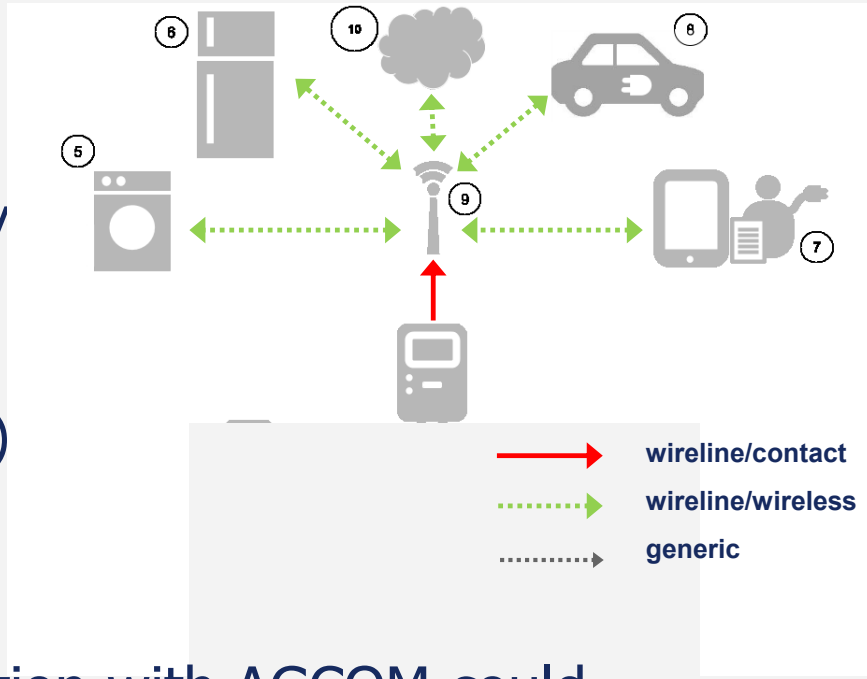


New concept: distinction between

- **Chain 1**: from meter to retailer (validated data), similar to 1G but empowered
- **Chain 2:** from meter to customer (directly, real time data but non validated): new

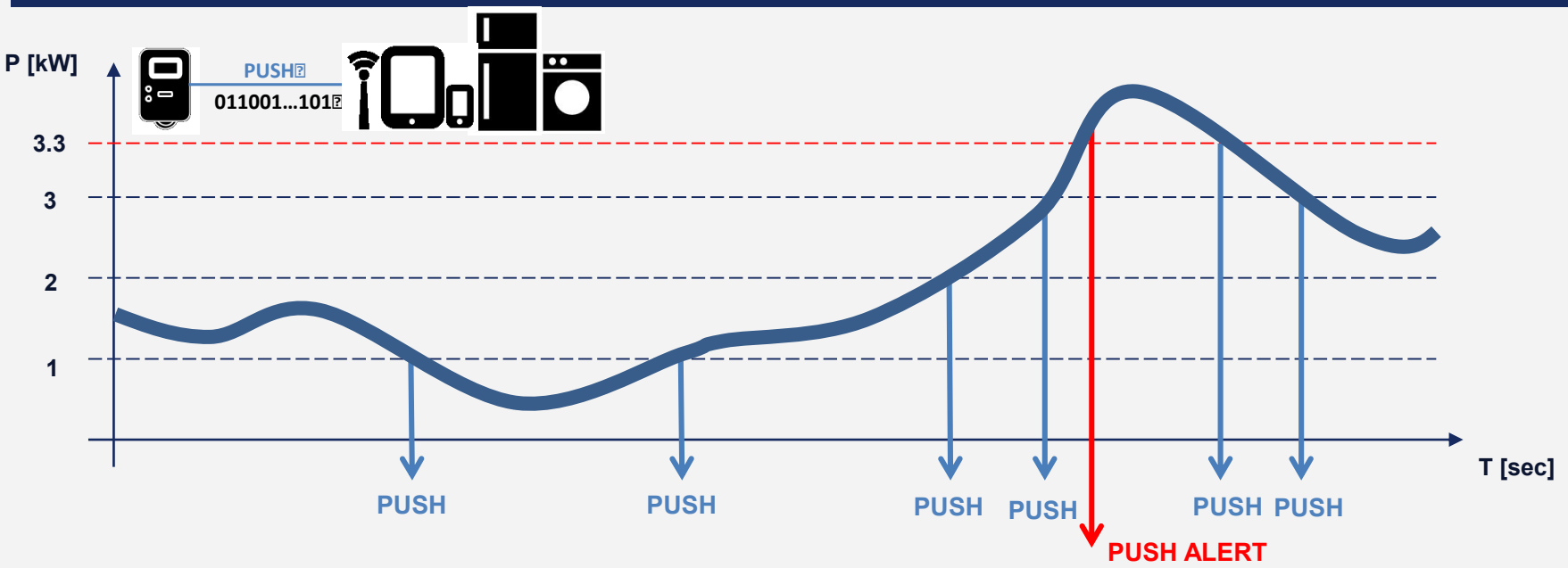
Chain 2: interoperable In-Home Device

- Standard communication protocol (chain 2 independent of chain 1)
- To be developed by CEI by mid-2017
- Possibly bidirectional (vulnerability issues, communication QoS)
- IHDs developed by third parties (integrated with home ecosystem)
- Start with physical layer PLC in CENELEC "band C"



- "Release 2.1": AEEGSI in cooperation with AGCOM could consider further options of physical layer (e.g. optical port and/or back-up channel) with possible cost re-opening.

Chain 2: real-time communication



- "Instantaneous data": level of used power capacity changes very rapidly; limitation of contractual power can lead to disconnection
- Requirements: sampling up to every 1 second (monodirectional, no acknowledgement at least in the first version of the protocol)
- "Instantaneous data" are not to be stored (strong *privacy* issues)

Smart grid and smart metering: a synthesis

	Smart grid	Smart metering
Benefits	RES integration System security	Cost efficiency Retail competition
Latency issues	Close to 100 ms (fast fault selection)	Close to 1 sec (non validated data)
Size (number of points, IT)	35 M customers	0,6 M prosumers 0,4 M MV/LV substations
Asset management	TLC layer relatively independent	TLC layer intimately embedded
Cooperation energy/TLC NRAs	Access to passive infrastructure (OF)	Technology neutrality *vs* best performance

Thank you for your attention

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