

Electricity smart metering: regulatory experience in Italy

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«Smart Meter 360»

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Ethical code of ARERA, 10(2)

Key points

1. Why smart metering

- With the eyes of the final electricity consumer
- Process automation or service transformation

2. How smart metering: experience in Italy

- A few info on the Italian system
- 20% reduced metering tariff over 15 years
- New services: spot reading and «minimum vital» capacity
- Time-of-Use prices

3. How smart metering: next steps in Italy

- «Chain 1»: full data granularity, customized offers
- «Chain 2»: customer awareness and home automation

With the eyes of the electricity final consumer

- Electricity bills (content and frequency)
 - ⇒ Are my bills based on real data or estimated data?
 - ⇒ How frequently my actual consumptions are checked?
- Electricity prices change over time (hours and days)
 - ⇒ Can I save money moving some consumption over time?
- Supplier change (“switching”)
 - ⇒ Is my old contract really closed? Any further annoyance?
- Cost of metering service (within network tariff)
 - ⇒ Can I save money thanks to my meter automation?

Process automation or service transformation

- Process automation
 - ⇒ Making the same thing in a faster/cheaper/better manner
 - current experience counts: «in the final customer shoes»*
- Service transformation
 - ⇒ not only making better the same things...
 - ⇒ ...but also doing new, unexpected things
 - let's think beyond the current experience*
 - «future proof» design: let's ask for instance:*
 - can the meter help in coping with fuel poverty?
 - can the meter provide signals to my house?
 - (and not only being a piece of the company in my house)

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A few figure for the Italian system

Total demand 2017:
320 TWh/yr
(Household: 60 TWh/year)

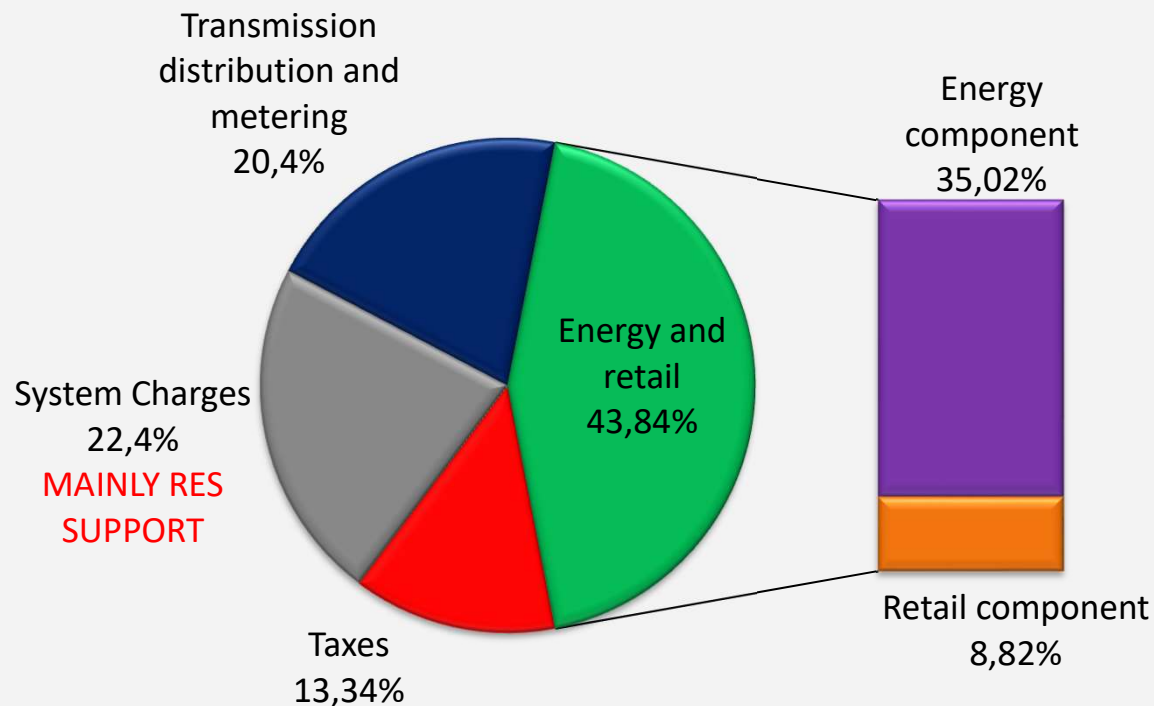
Self-consumption:
30 TWh/yr (estimate)

Prosumers
0,8 Million

System peak: **55-59 GW**
~20 GW min.load night,
~30 GW Sundays, daylight

Household consumption
2,100 kWh/user avg/yr
3.3 kW capacity limit

Households: total price = 18,98 eurocent/kWh
(reference user: resident, 3 kW, 2700 kWh/year; 2018 2Q)



ELECTRICITY SMART METERING: the Italian experience

- Metering operated by **DSOs** with separate tariff
- **First generation (1G) started in 2001 voluntarily** by ED (Enel Distribuzione, 85% of network users)
- Initially, no extra cost allowed
- ED completed its own customer base in 2006; other DSOs compelled by the Regulator (2007-2011)
- **35 M customers** with smart meters; **400 M readings/year** and **10+ M remote operations/year** (customer managem't)
- 2-way communication also for security
- Excellent **cost** position: CAPEX 1G around 80 euro/unit
- Regulatory **lifetime** of smart meters: 15 years (aligned with legal metrology requirement)

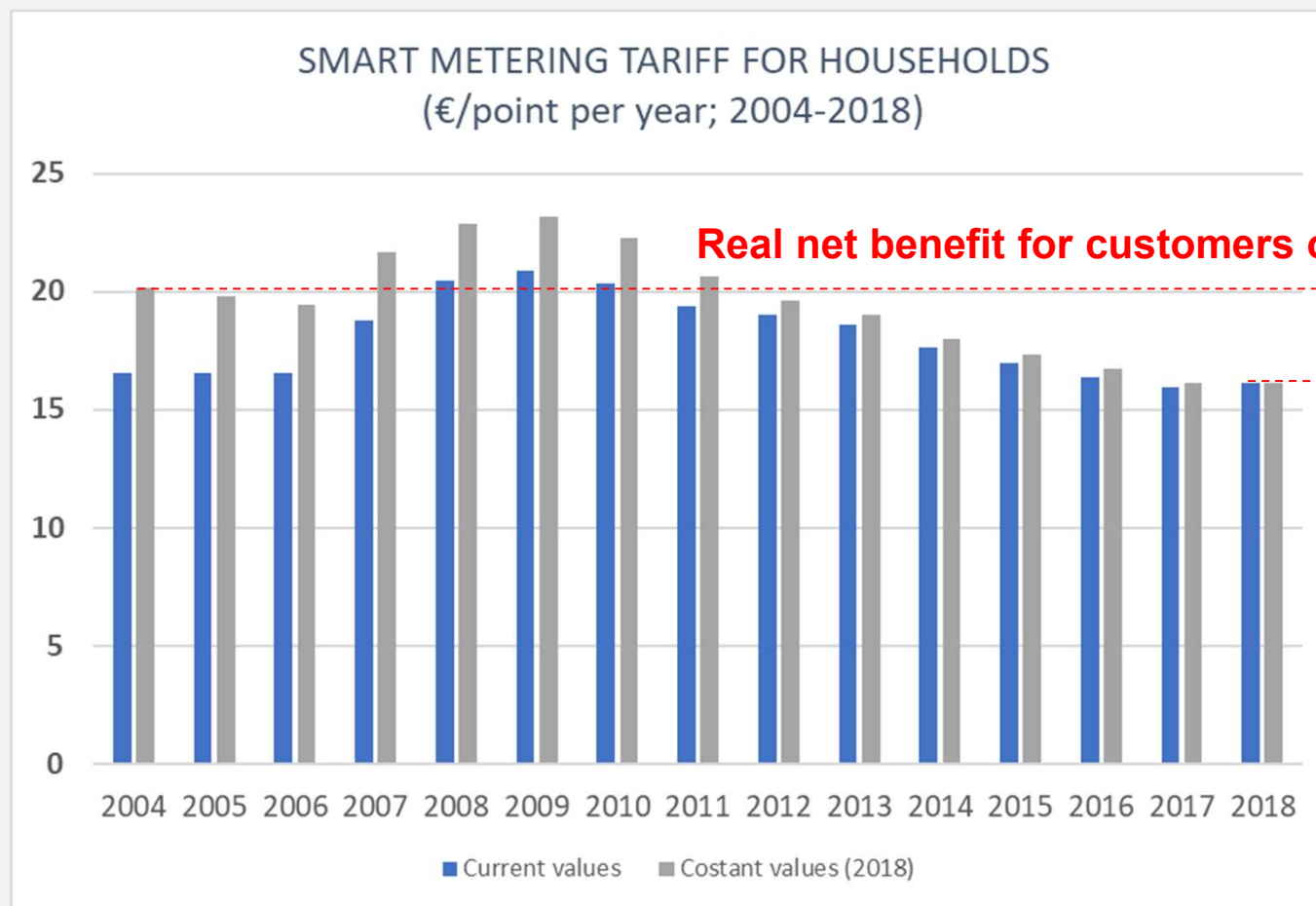
ELECTRICITY SMART METERING IN ITALY: benefits

Price-cap *X-factor* for metering costs:

2008-11: **5.0%**

2012-15: **7.1%**

2016-19: **1.0%**

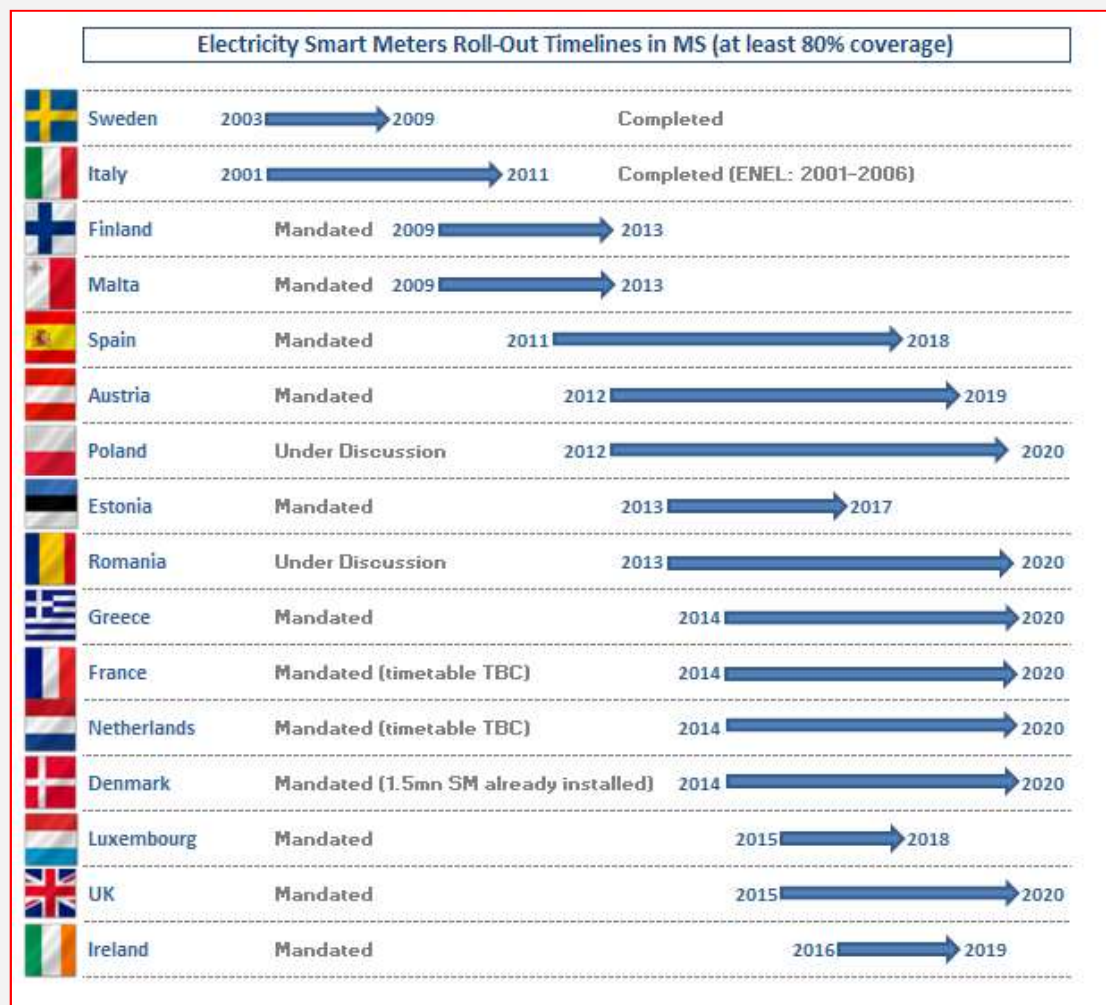


Real net benefit for customers of 1G SM over 15 years

↓ 19,9%

References to yearly
tariff decisions
(«Mis» component)
Del. 5/04
Del. 275/06
Del. 348/07
Del. 199/11
Del. 654/15
Del. 799/16
Del. 907/17

ELECTR. SMART METERING IN ITALY: cost leadership position



Estimated full cost
for smart metering in EU

Italy: 97 euro/point (1G)

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: European Commission,
SWD(2014) 189 final*

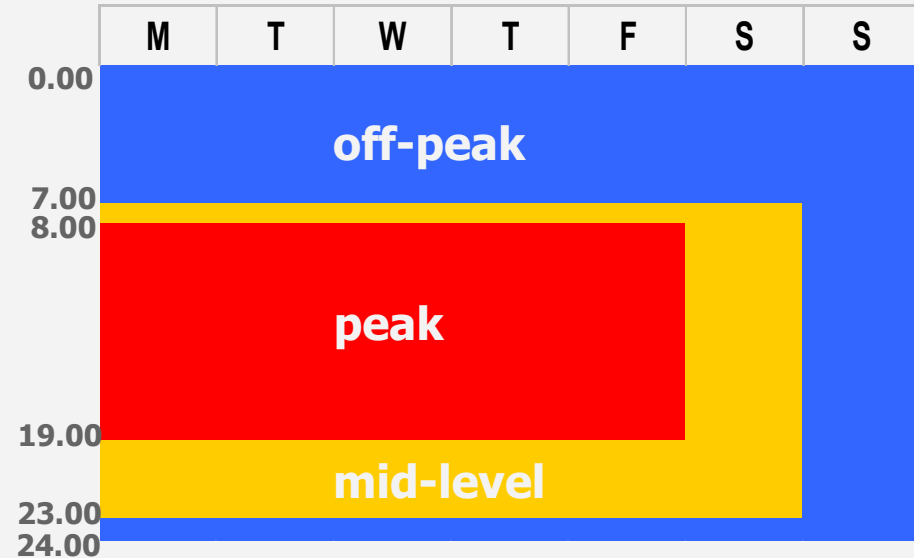
** roll-out on going*

*** roll-out on going, joint
gas/electricity*

Time-of-Use pricing (since 2009)

DSOs must use smart meters to collect **consumption data separately per time bands**

- Peak: weekdays 8.00-19.00
- Off-peak: nights (23.00-7.00) and Sundays/holidays
- Mid-level: remaining hours including Saturdays 7.00-23.00










- In the free market suppliers can offer whatever structure combining the 3 timebands, including «flat» prices
- In the «Universal Supply Regime» (*maggior tutela*) customers are mandatorily billed with 2 ToU prices (households) or 3 (shops and very small business)

Wrap-up: benefits of «first generation» smart metering

- **Efficiency gains passed to consumers**
If capital costs are kept low, gains in productivity on opex can result net benefit in tariffs (in Italy, -20% metering real tariff)
- **New services**
For instance in Italy Regulator introduced «minimum vital service» to provide limited electricity for the first 15 days of non-payment
- **Quality of service for final consumers**
Activation can be remotely and quickly (incl. after disconnection)
- **Time-of-use energy prices**
Timebands allow a first approximation to wholesale market prices
- **Easier switching procedure (change of supplier)**
Competition is made simpler – trust of consumers

SMART METERING: did the “1st generation” work?

	WHAT WE GOT OUT OF 1GAND WHY
	High availability	96% of remote readings properly accomplished (end-to-end)
	Very good reliability	No relevant cases for meter substitution due to manufacturing-originated faults
	Limited cases of interference between PLC and inverters	PV inverters EM emissions reduce data acquisition (esp. prosumers, impact <2%)
	1 channel only, not available for real-time data messages	Communication channel (via PLC band A) dedicated exclusively to validated data
	Very limited use for voltage data	Buffer for interruption events too short Voltage measurement not compliant with EN 50160
	No interoperability with 3rd party In-Home Devices	No message encryption (launched in 2001), non disclosed protocol (cyber-sec. reasons)
	Slow reconfiguration process	Overall firmware download: ≈9 months

ELECTR. SMART METERING: data granularity / frequency

1 st GENERATION	Capacity	1G Meter reading	1G reading content	Univ. Supply Regime billing
<i>Households</i>	<i>Any (typic 3 kW)</i>	<i>Monthly</i>	<i>3 timebands</i>	<i>2 prices (mandatory)</i>
<i>Small business</i>	<i>Up to 55 kW</i>	<i>Monthly</i>	<i>3 timebands</i>	<i>3 prices (mandatory)</i>
<i>Medium business</i>	<i>Above 55 kW</i>	<i>Monthly</i>	<i>96 quarter-hours per day</i>	<i>N/A (only free market)</i>

But: what happens if the President of the Republic declares a new National Holiday on Wednesday 11 March 2011, 150° anniversary of the Unity of Italy?....



1861 > 2011 > >
150° anniversario Unità d'Italia

AGENDA

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CHAIN 1: meter reading for billing, from 1st to 2nd generation

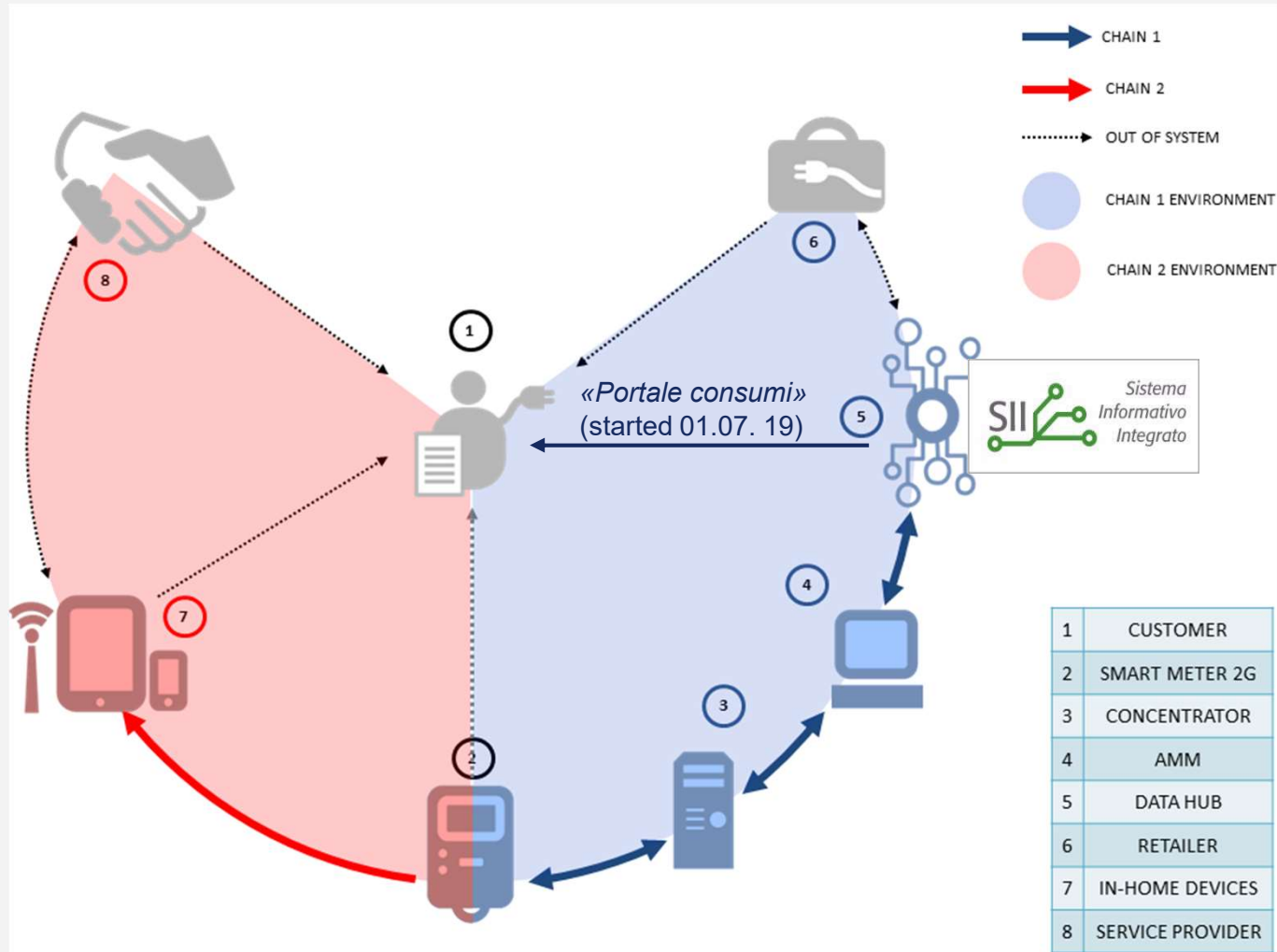
1 st GENERATION	Capacity	1G Meter reading	1G reading content	Default.suppl billing
<i>Households</i>	<i>Any (typic 3kW)</i>	<i>Monthly</i>	<i>3 timebands</i>	<i>2 prices (mandatory)</i>
<i>Small business</i>	<i>Up to 55kW</i>	<i>Monthly</i>	<i>3 timebands</i>	<i>3 prices (mandatory)</i>
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1G: fixed time bands, preloaded in the meter → need for massive reconfiguration

2 nd GENERATION	Capacity	2G Meter reading	2G reading content	Default.suppl billing
<i>All customers</i>	<i>Any</i>	<i>Daily</i>	<i>96 quarter-hours per day</i>	<i>N/A (only free market)</i>

2G: time bands directly customizable by suppliers → no need for massive reconfig.

CHAIN 1 & CHAIN 2: concept of 2G (Regul. decision 87/2016)



«Chain 1»

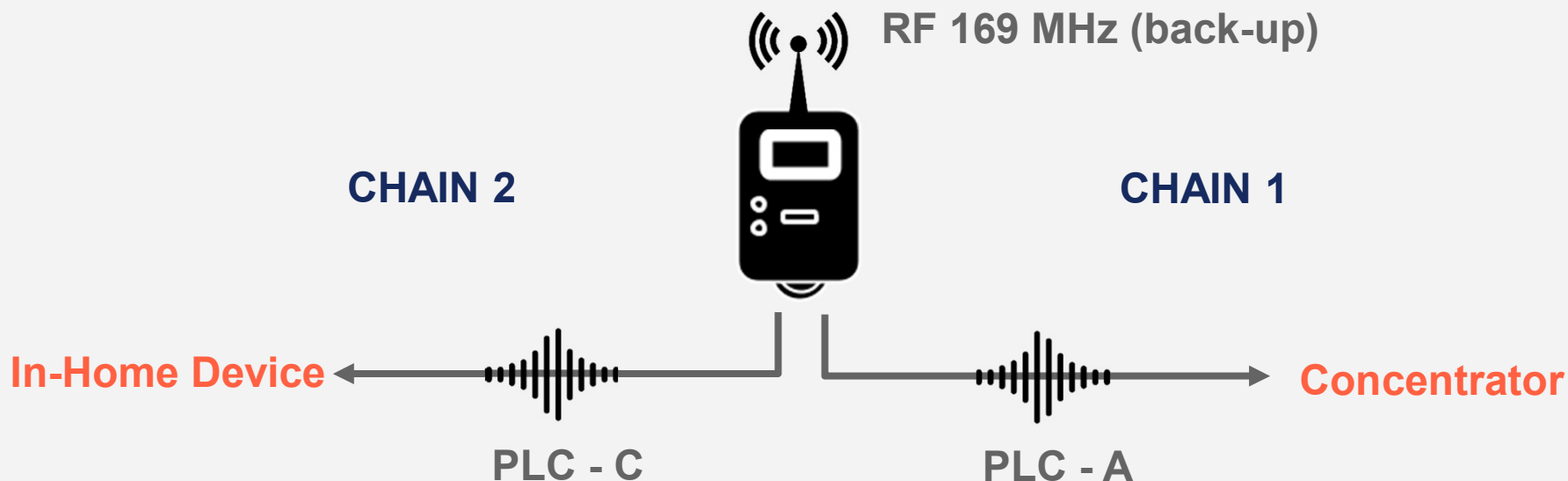
- Purpose: billing and network management
- **Validated** data, SLA
- Daily collection
- Operated by DSO
- Back-up channel

«Chain 2»

- Purposes: customer awareness and value offering for suppliers
- Close to real-time, **not validated** data
- Continuous flow
- Interoperable with 3rd party IHDs
- No back-up channel

CHAIN 1 & CHAIN 2: implementation by DSOs

- **Law mandate to Regulatory Authority** for setting functional requirements
- **Approach «technology neutral»**: DSOs must decide how to implement
- **SLAs set by the Regulator** for the main processes (penalty can be applied)
- **The chart shows the technology solution defined by *e-distribuzione***; other DSOs can define different technical solutions provided these are compliant with both 2G functional requirements and SLAs defined by Regulator



CHAIN 2: opportunity for new value propositions

- Different use cases have been investigated: can be grouped in **four** categories:
 - **customer awareness**: e.g. alert for exceeding thresholds
in Italy: power is limited via breaker
 - **home automation**: e.g. automatic peak shaving using “smart” energy and capacity management
in Italy: economically relevant because network tariff is largely capacity-based
 - **market participation**: e.g. customer energy flexibility sold directly to the Ancillary Service Market, even through an aggregator
in Italy: trials ongoing, LV resources to be included
 - **innovation in retail offering**: e.g. further services as “prepayment”
in Italy: never used before
- Meter operator (DSO) can not carry out commercial activity beyond the meter: hence, **interoperability is absolutely necessary**

Wrap-up (2G): regulatory pillars and expected benefits

- **Regulation must be technology-neutral**
Regulator to set only functional requirements and service levels, choice of technology is with DSOs
- **Interoperability with third parties' IHDs is a must**
Needed open communication protocols (CEI TS 13-82/85)
- **Smart meter can be an enabler for IoT**
IoT expected to be the reference ecosystem for home automation
- **Unbundling is relevant (separation Dso vs retail)**
DSO shall not have commercial contacts with final customers
- **Advanced metering can help customers to save energy**
Trials in Italy proved a significant 3% of energy saving, if adequate communication is provided (community-based)

Please visit:

www.arera.it

**Suggested reading on the
Italian case (innovation)**

*CHANGING THE REGULATION
FOR REGULATING THE CHANGE
Innovation-driven regulatory
developments in Italy*

**ICER Distinguished regulatory
scholar Award 2012**

http://www.iern.net/portal/page/portal/IERN_HOME/ICER_HOME/ABOUT_ICER/Distinguished_Scholar_Award_2012

**Suggested reading on the
Italian case (smart metering)**

*SMART METERING: AN
EVOLUTIONARY PERSPECTIVE
Guidelines and lessons learnt from
the Italian regulatory experience*

**Highly Acknowledged Paper ERRA
regulatory research Award 2017**

<http://erranet.org/knowledge-base/erra-regulatory-research-award/#winner2017>

Thank you for your attention

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