Smart Grids & Metering
Gas Natural Fenosa

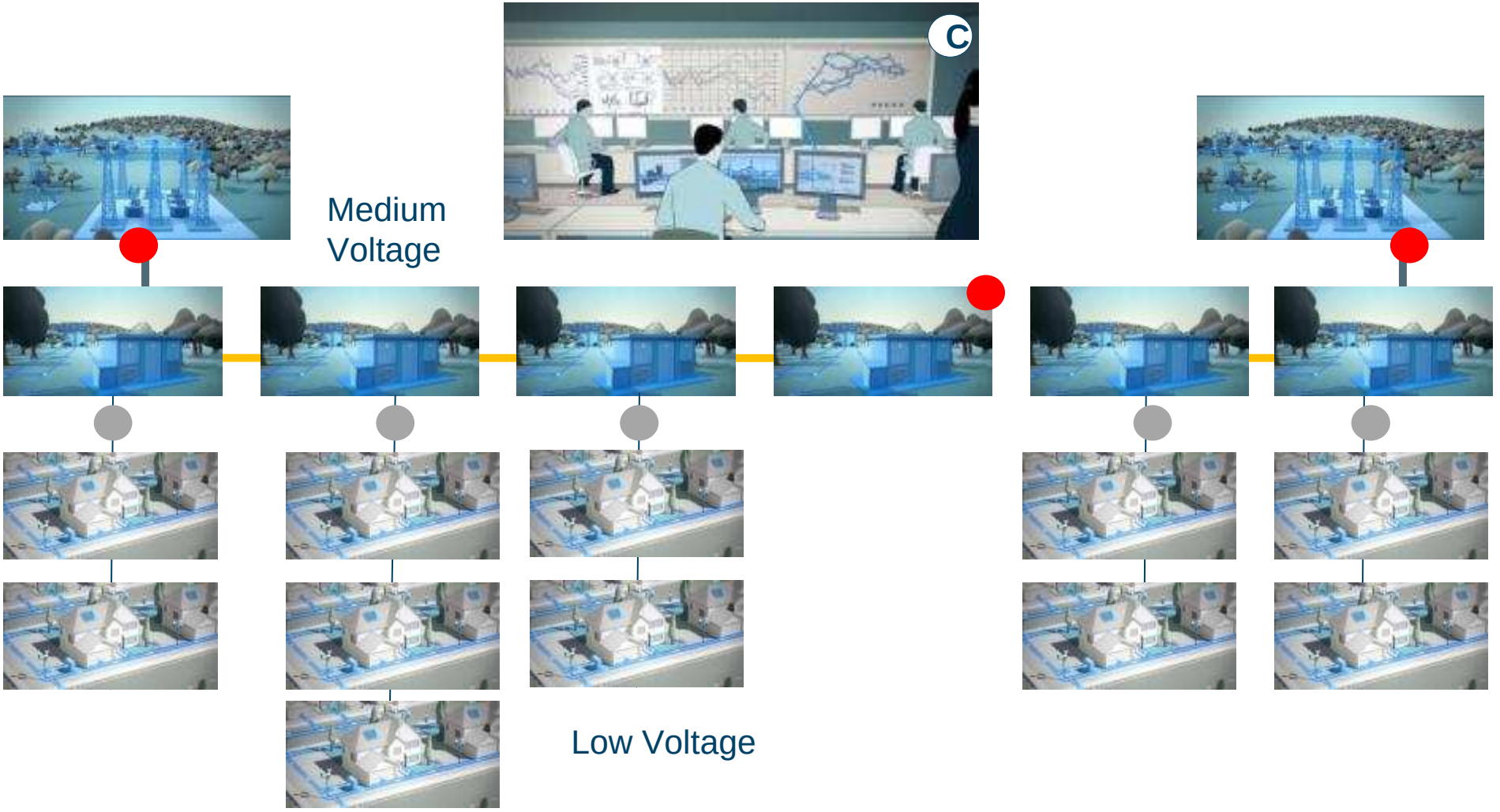
Mariano Gaudó Navarro

Barcelona, 03 December 2014

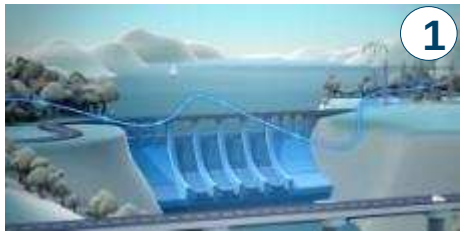
Agenda

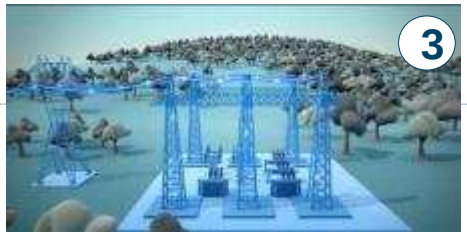
- **Situación del Smart Metering eléctrico en los países de la Unión Europea**
- **Calendario de implantación de los contadores inteligentes en España**
- **Tecnologías aplicadas: PRIME & DLMS**

Visibility of the Grid



The focus is on MV and LV level





Legend
1. Generation
2. Transport
3. Electrical Substation
4. Transformer
5. Low Voltage Distribution
6. Network Operation Center

▼ MV and LV level

Primary Substations
~380

~38.000

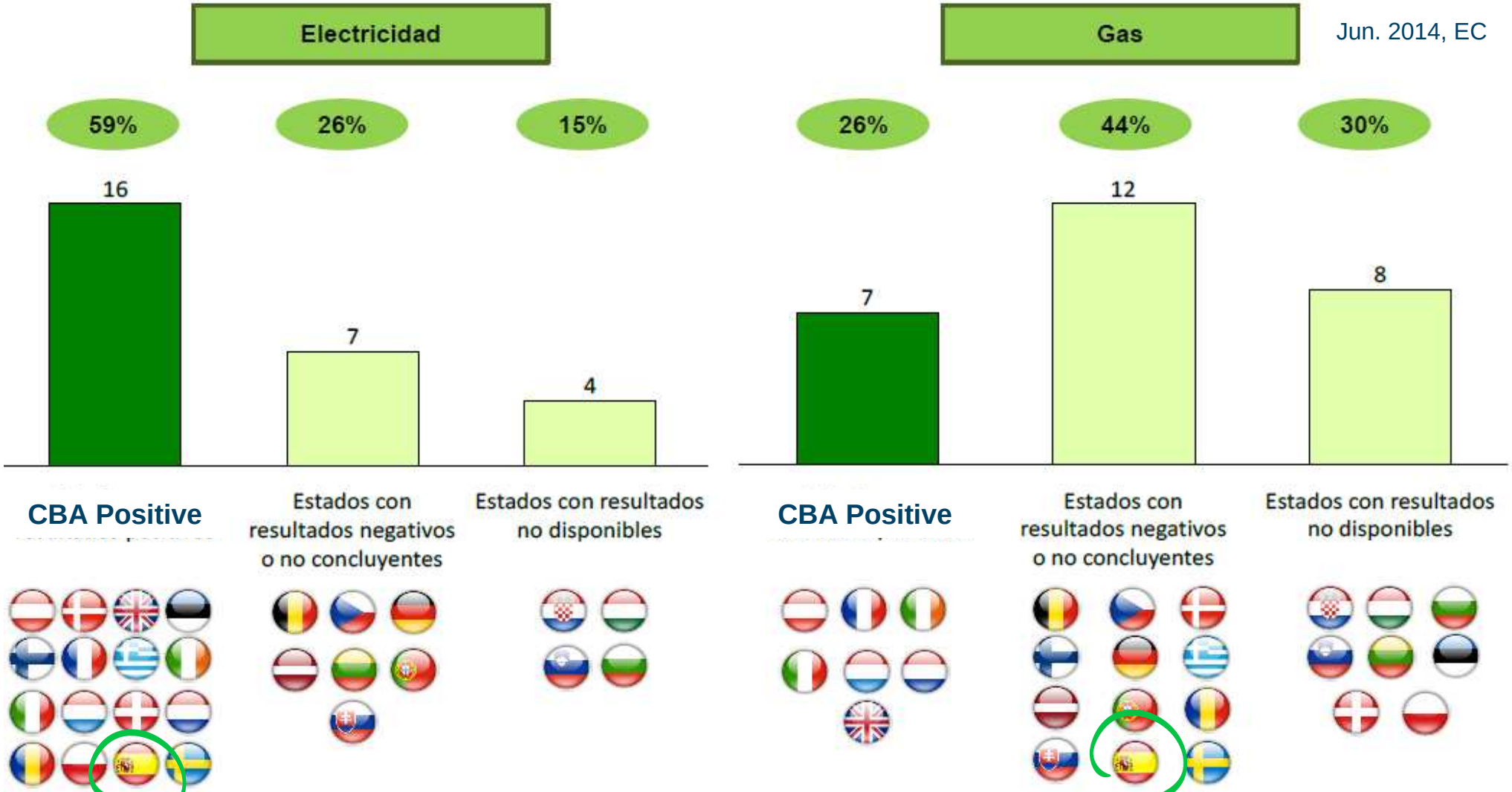
~3.800.000

Extension of the monitoring and control of the distribution network.

Innovation in new equipment and services is required.

EU progress on Smart Metering

Jun. 2014, EC



16 Member States (Austria, Denmark, Estonia, Finland, France, Greece, Ireland, Italy, Luxemburg, Malta, Netherlands, Poland, Romania, Spain, Sweden and the UK)

Market models for the roll-out (electricity)

MS rolling out smart meters	Deployment Strategy	Responsible party for access to metering data	Responsible party for roll-out and ownership	Metering Market	Financing of roll-out
Austria Finland France Greece Ireland Luxembourg Romania Spain	Mandatory	DSO	DSO (Multi-annual concession in France)	Regulated	Network tariffs (rental in Spain; DSO in Denmark, Italy and Sweden)
Italy Denmark	Mandatory + Voluntary				
Malta Sweden	Voluntary				
Netherlands	Mandatory and option for out				
Estonia Poland	Mandatory	Central Hub			
UK - GB			Supplier	Competitive	Private funds

16 Member States with Wide-Scale Roll-out by 2020.
72% EU electricity consumers with a smart meter by 2020

Key parameters (electricity)

	Range of values	average (on positively assessed cases)
Discount rates	3 to 10 %	5.7% ± 1.8% (70%)
Lifetime	8 to 20 years	15 ± 4 years (65%)
Energy saving	0 to 5 %	3% ± 1.3% (70%)
Peak shaving	1 to 13%	n.a.
Cost/metering point	€60 to €766	€215 ± €130 (80%)
Benefit/metering point	€18 to 765€	€300 ± €155 (85%)
Consumer benefits	20 to 80%	n.a.

10 Common Minimum Functionalities

CONSUMER	• Provide readings directly to the consumer and/or any 3rd party • Update the readings frequently enough to use energy saving schemes
METERING OPERATOR	• Allow remote reading by the operator • Provide 2-way communication for maintenance and control • Allow frequent enough readings to be used for networking planning
COMMERCIAL ASPECTS OF SUPPLY	• Support advanced tariff system • Allow remote ON/OFF control supply and/or flow or power limitation
SECURITY AND DATA PROTECTION	• Provide secure data communications • Fraud prevention and detection
DISTRIBUTED GENERATION	• Provide import/export and reactive metering

Overview on national roll-out plans

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Sweden		2003 → 2009	Completed
Italy		2001 → 2011	Completed (ENEL: 2001-2006)
Finland	Mandated	2009 → 2013	
Malta	Mandated	2009 → 2013	
Spain	Mandated	2011 → 2018	
Austria	Mandated	2012 → 2019	
Poland	Under Discussion	2012 → 2020	
Estonia	Mandated	2013 → 2017	
Romania	Under Discussion	2013 → 2020	
Greece	Mandated	2014 → 2020	
UK	Mandated	2014 → 2020	
France	Mandated (timetable TBC)	2014 → 2020	
Netherlands	Mandated (timetable TBC)	2014 → 2020	
Denmark	Mandated (1.5mn SM already installed)	? → 2020	
Luxembourg	Mandated	2015 → 2018	
Ireland	Mandated	2016 → 2019	

The Telegraph

19 Nov 2014

£11bn energy smart meter roll-out suffers fresh delay

Widespread installation of electricity and gas "smart meters" was due to begin late next year but could now be delayed until October 2016

The Government's £11bn plan to install "smart" energy meters in every home is being delayed by up to a year, after the company in charge of the communications system for the devices warned it would not be ready in time.

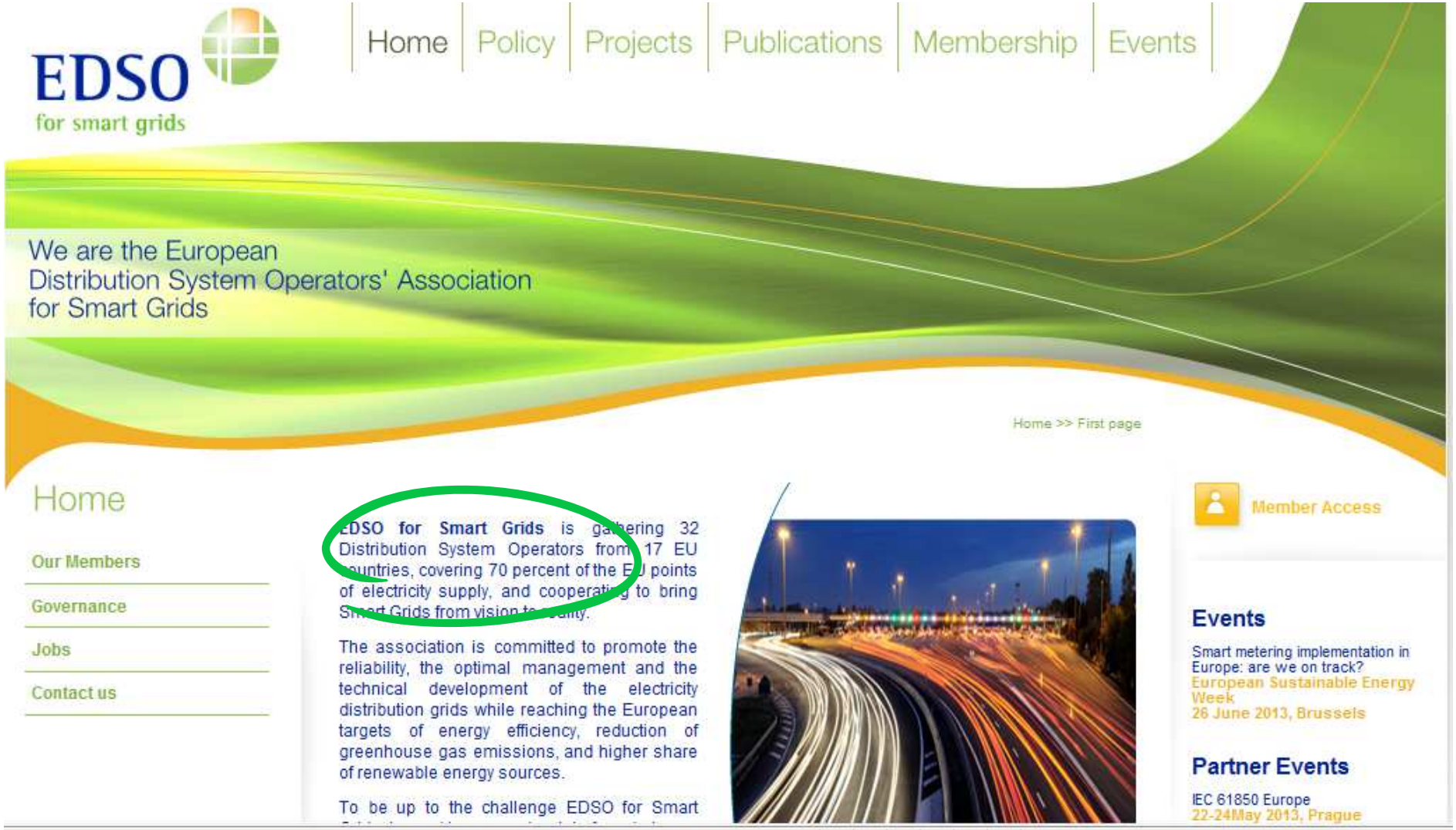
The meters, which will cost about £200 per household to install, monitor electricity and gas usage in real-time and send data back to suppliers daily, eliminating estimated billing.

Energy suppliers are supposed to start the full national installation programme in late 2015, when a central communications system to handle data transfer between meters and suppliers was due to go live, and complete the roll-out by 2020.

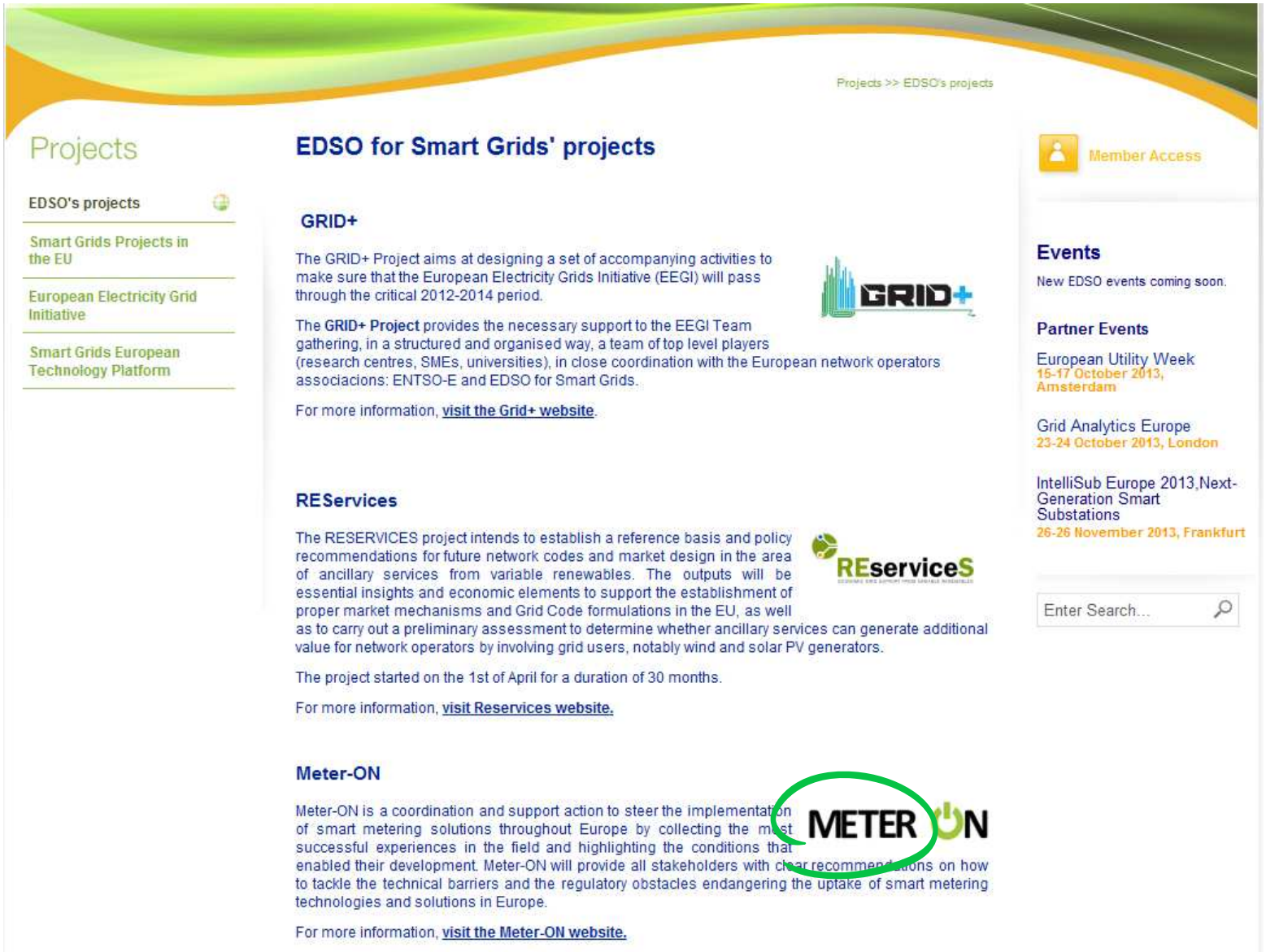
But the **Data Communications Company (DCC) in charge of the system has now admitted** there is "no feasible way to maintain the timescales of the current... plan", after Government officials changed the specifications, requiring parts of the system to be redesigned.

The company, run by outsourcing group Capita, is now proposing to delay the start date until as late as October 2016 and has said that the changes will add up to £90m in further costs.

European Distribution EDSO
70% coverage Supply Points



EDSO for Smart Grids
Smart Grids projects



Projects >> EDSO's projects

Projects

- EDSO's projects
- Smart Grids Projects in the EU
- European Electricity Grid Initiative
- Smart Grids European Technology Platform

EDSO for Smart Grids' projects

GRID+

The GRID+ Project aims at designing a set of accompanying activities to make sure that the European Electricity Grids Initiative (EEGI) will pass through the critical 2012-2014 period.

The **GRID+ Project** provides the necessary support to the EEGI Team gathering, in a structured and organised way, a team of top level players (research centres, SMEs, universities), in close coordination with the European network operators associacions: ENTSO-E and EDSO for Smart Grids.

For more information, visit the Grid+ website.

REServices

The RESERVICES project intends to establish a reference basis and policy recommendations for future network codes and market design in the area of ancillary services from variable renewables. The outputs will be essential insights and economic elements to support the establishment of proper market mechanisms and Grid Code formulations in the EU, as well as to carry out a preliminary assessment to determine whether ancillary services can generate additional value for network operators by involving grid users, notably wind and solar PV generators.

The project started on the 1st of April for a duration of 30 months.

For more information, visit Reservices website.

Meter-ON

Meter-ON is a coordination and support action to steer the implementation of smart metering solutions throughout Europe by collecting the most successful experiences in the field and highlighting the conditions that enabled their development. Meter-ON will provide all stakeholders with clear recommendations on how to tackle the technical barriers and the regulatory obstacles endangering the uptake of smart metering technologies and solutions in Europe.

For more information, visit the Meter-ON website.

Member Access

Events

New EDSO events coming soon.

Partner Events

European Utility Week
15-17 October 2013, Amsterdam

Grid Analytics Europe
23-24 October 2013, London

IntelliSub Europe 2013,Next-Generation Smart Substations
26-26 November 2013, Frankfurt

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METER ON

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About METER-ON

- Project overview
- Work plan
- Consortium

News & Events

Meter-ON has launched its first survey to collect information on smart metering projects

Date: 09/27/2012

EDSO for Smart Grids has launched the Meter-ON project

Date: 07/19/2012

SAVE THE DATE: 26th of June
METER-ON at the EUSEW 2013!

Home » About Meter-ON

Project overview

Meter-ON is a coordination an
throughout Europe. The projec
technologies and infrastructure
the field and highlighting the c

On the basis of the lessons learn
information platform with clear rec
obstacles endangering the uptake
System Operators, regulatory boc
European smart metering commu
materialized in public delivera
from all the previousEuropean
smart metering initiatives.

Meter-ON approach is based on
projects. **Meter-ON** results will be

i. collection of smart metering
ii. per-project analysis accordin
iii. recommendations on the wa

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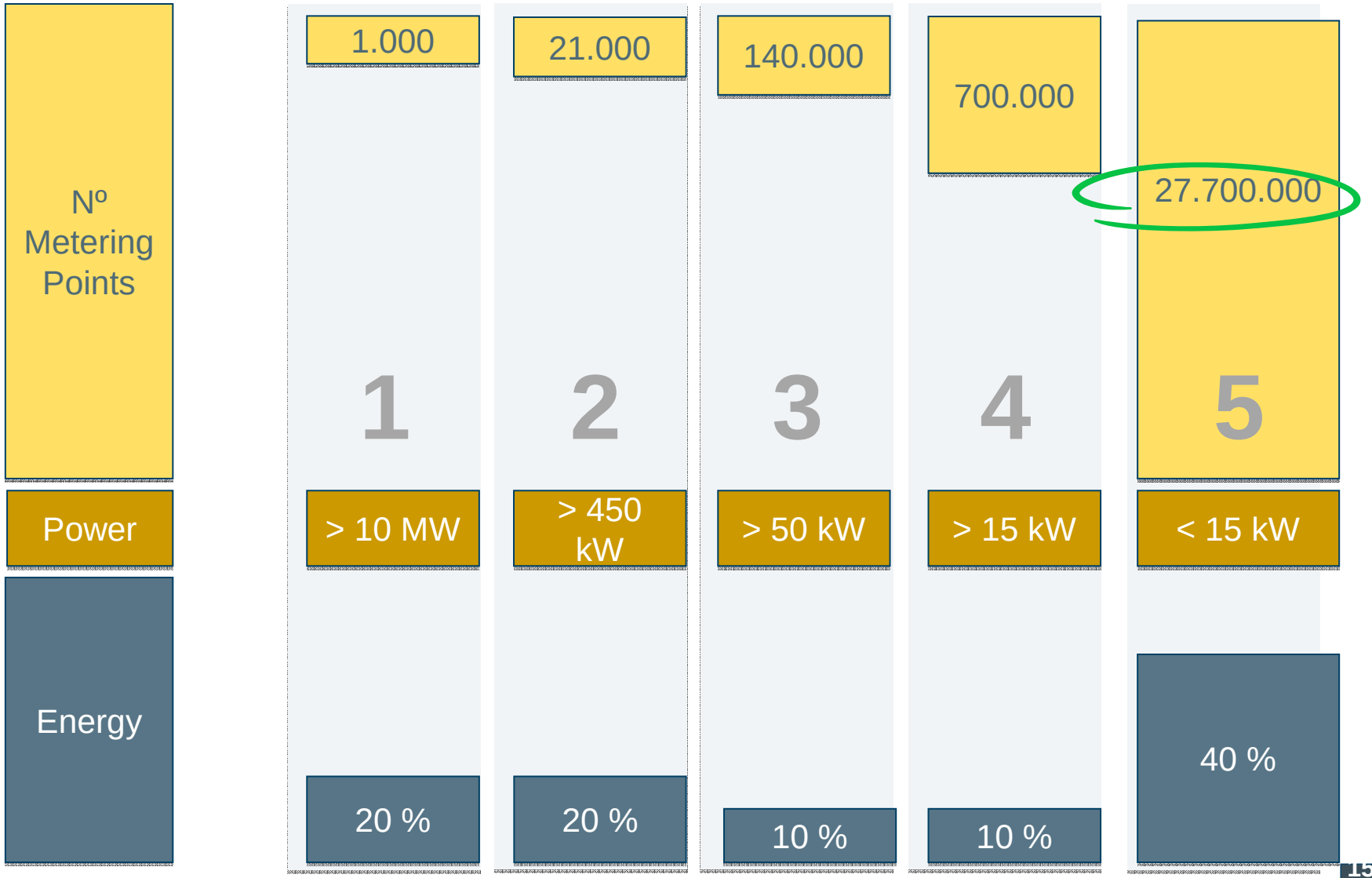
Replacement of Electric Meters
Regulatory Environment

The Ministry of Industry, Tourism and Trade decided ...

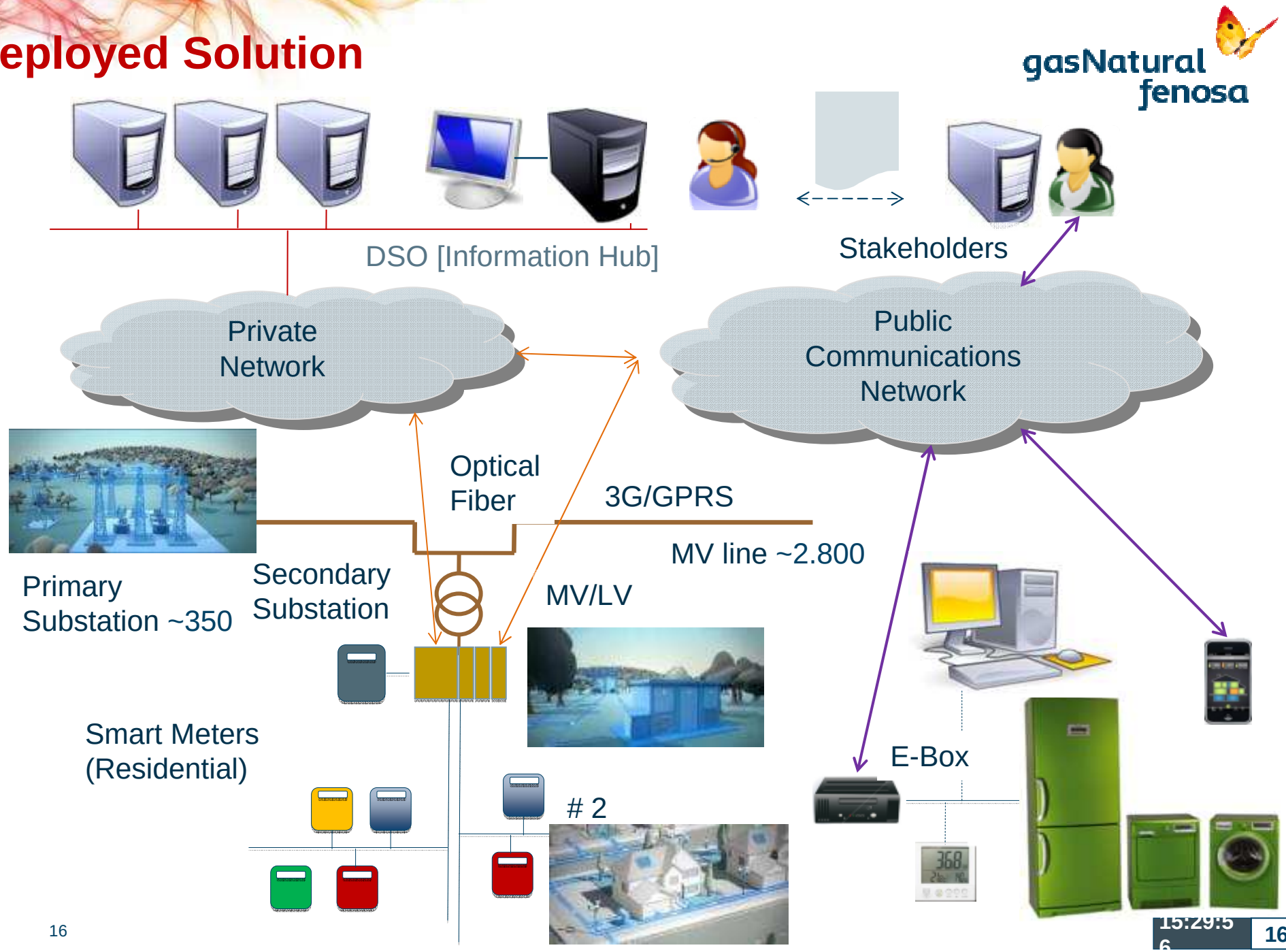
ITC/3860/2007 Ministerial Order of 28 December	**All smart meters as power supplies with a contracted up to 15 kW must be replaced by new equipment that enables remote management time discrimination and before December 31, 2018.**
Royal Decree 1110/2007, of August 24	By establishing the unified measurement points of the electrical system regulation defines the functions of the new measuring equipment (smart meter).
Orden IET/290/2012, de 16 de febrero	By amending the ITC/3860/2007 of 28 December, the electricity tariffs from 1 January 2008 as regards the meter replacement plan**.**

EC recommendations on preparations for the deployment of smart meters (March 2012)
European Directive on Energy Efficiency (Oct 2012)

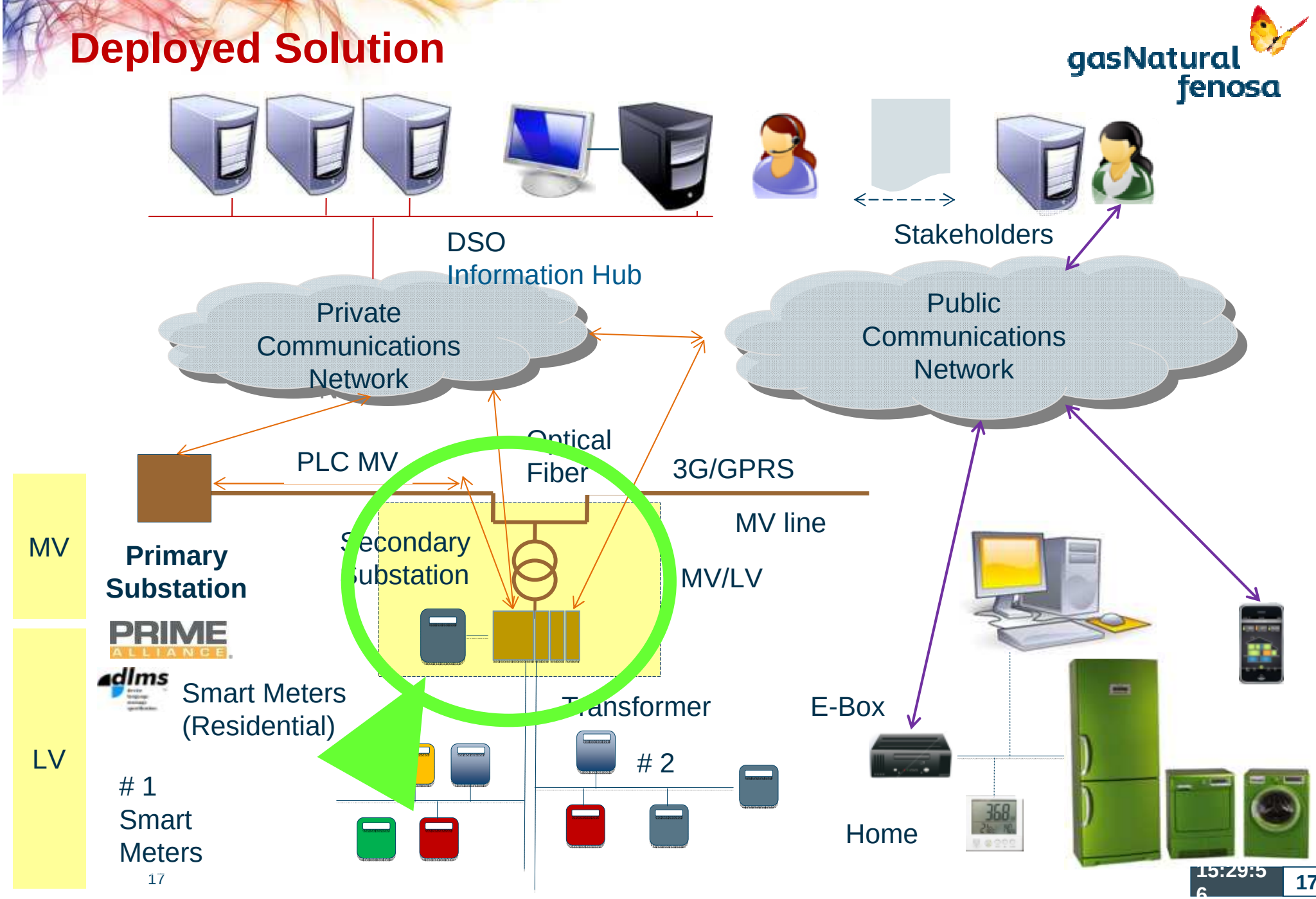
Metering equipment
Regulation of Metering Points



Deployed Solution

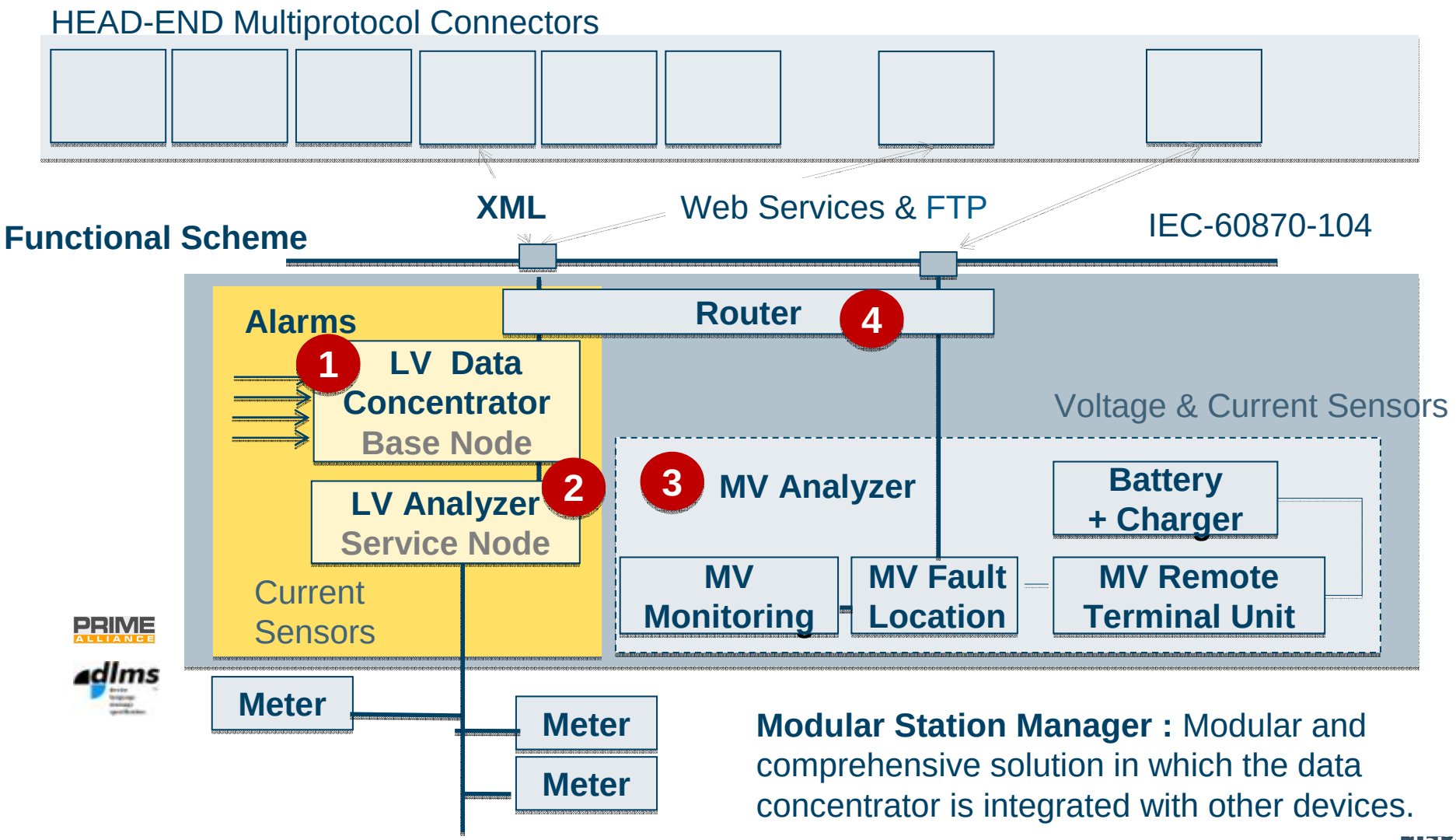


Deployed Solution



Modular Substation Manager (MSM)

Communication Router



Modular Station Manager : Modular and comprehensive solution in which the data concentrator is integrated with other devices.

[1] Gestor de Centros de Transformación: Secondary Substation Manager

Some real installations

Some real installations

Some real installations

Sensors are needed

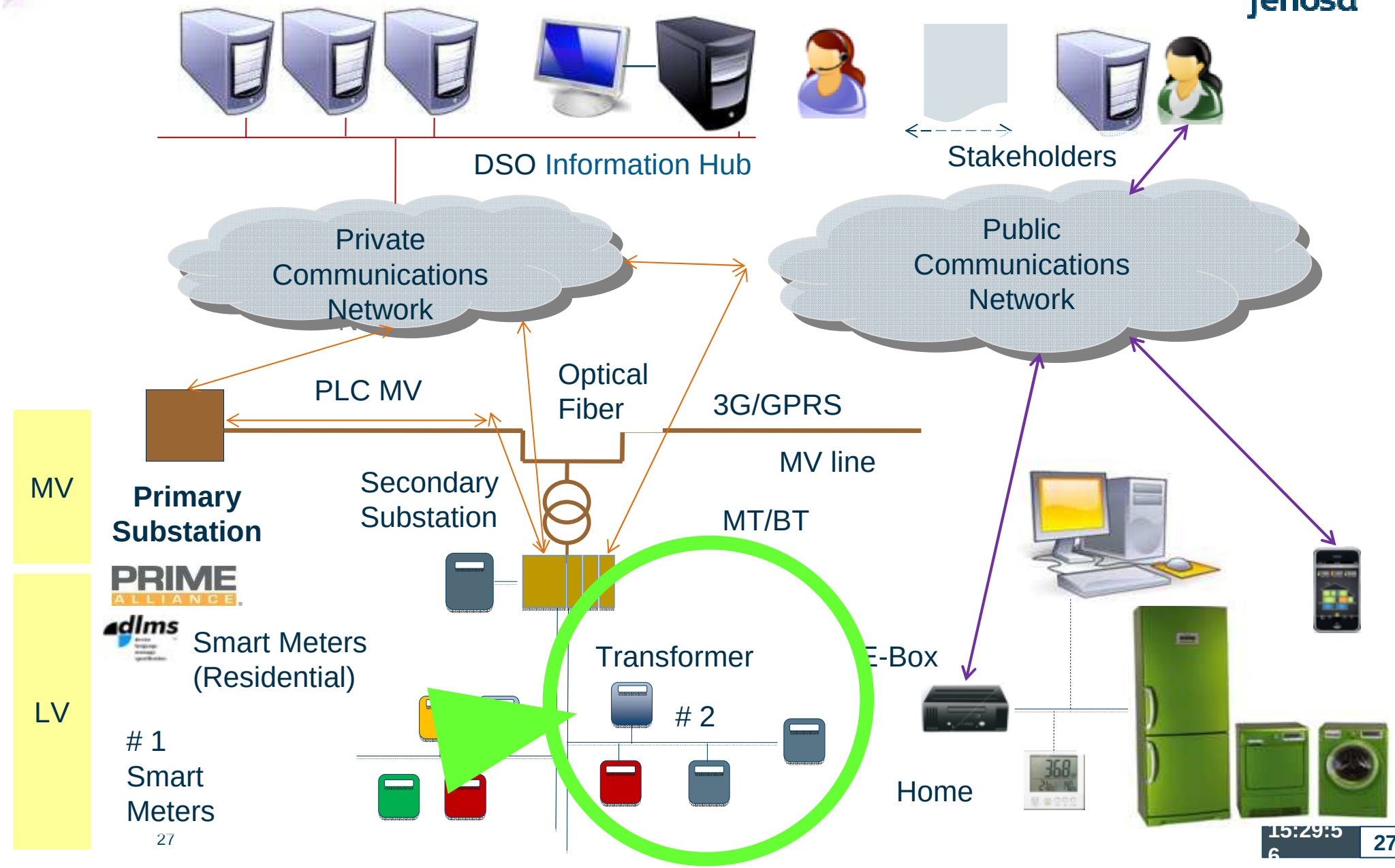
Sensors are needed

Sensors are needed

Sensors are needed

Sensors for Digital Inputs

Deployed Solution



Technology Deployed
Residential remote metering

IET/290/2012 Order of 16 February amending Order ITC/3860/200728 December Replacing 3.7million meters (Union Fenosa Distribution)

Plan Milestones

December 2014: 35%
December 2016: 35%
December 2018: 30%

[1] We have installed > 1.250.000 meters
The main solution adopted is based on PLC technology (using technology communications protocol PRIME under DLMS / COSEM, which guarantees **public access and open, and therefore the possibility to have multiple suppliers**

[1] Updated at December 2014

Technology Deployed
Residential remote metering

Alliance Technology Products Solutions Deployments

PRIME is deployed in various countries across Europe and recently expanded to Brazil and Australia as first footprints outside of Europe. For most recent detailed information about the ongoing deployments just click on the regions or utility logos.

PRIME technology is beginning to spread worldwide

PRIME Technology
Iberdrola, Gas Natural Fenosa, EDP, etc

PRIME (PoweRline Intelligent Metering Evolution) today is a mature, consolidated and worldwide **PLC standard for Advanced Metering, Grid Control and Asset Monitoring applications and the objective to establish a set of open international PLC standards has been met.**

More than 14 million consumers in Spain share the same smart meter.

- Common specification of Smart Meter.
- DLMS Companion.
- PLC-PRIME
- Approval Process (Lab External)
- Open Protocol between MSM (Concentrator) and MDC (Meter Data Collector)

Smart Meters

MDC, Meter Data Collection
DLMS COSEM

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We speak the same language...

DLMS Device
Language
Message
Specification

COSEM
COmpanion
Specification for
Energy Metering

...DLMS/COSEM
THE GLOBAL STANDARD FOR SMART METERING

The DLMS/COSEM standardization framework is based on the principle of one common data model and application layer, used over a range of communication media. This principle reflects the fact that the data model standards are driven by the use cases while data communication standards are driven by technology evolution.

DLMS/COSEM specifies the COSEM data model, the DLMS application layer protocol and communication profiles. It continuously evolves to meet new requirements. It is the only global standard for meter data exchange adopted by global, regional and national standards organizations.

Smart Meters

Billing Profile

The billing profile structure for residential meters is based on contracts. Contracts are the parameters needed for calculation on the measure values in order to apply for a singular tariff.

The groups of parameters of each contract are:

- **Seasons:** period of time during the year when billing conditions are always the same.
- **Week profiles and special days**: period of time during the week when billing conditions are always the same.
- **Day profiles**: discrimination of time along the day
- **Tariff periods**: blocks of time when the same billing is applied

There must be at least three contracts.

Daily billing information collect an array of total and rated values for energy magnitudes A+, A-, QI, QII, QIII and QIV.

Every day, it is stored at 00:00:00 the absolute measure if the six magnitudes. The array has a maximum of 10 registers (10 days). The units are kWh for active energy and kvarh for reactive energy**.**

Smart Meters
Load Profiles

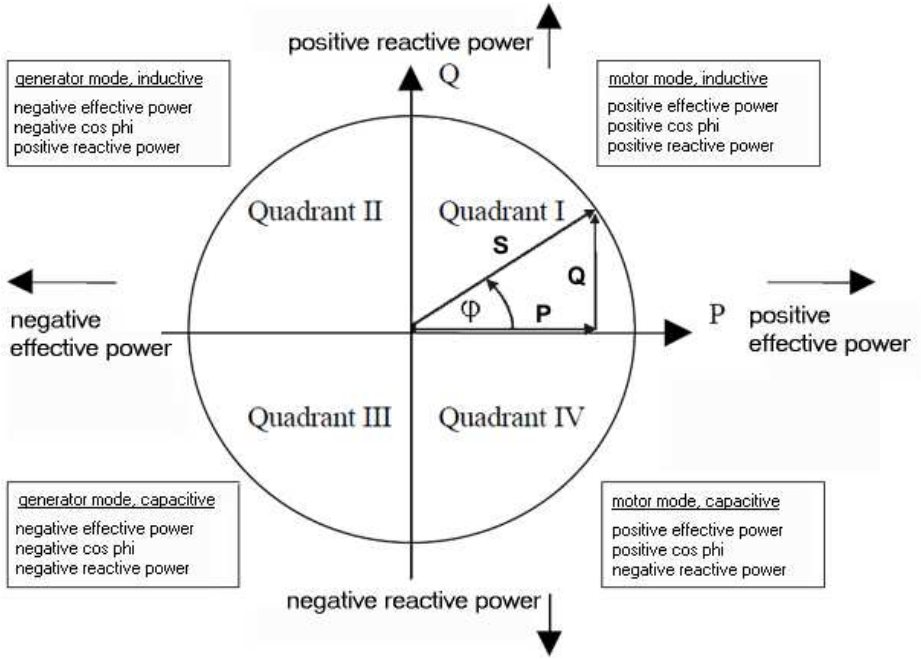
Load Profiles structure residential meters.

Hourly load profile: The meter must store six incremental energy values measured each hour during at least 3 months. These measures are:

- Active energy A+
- Active energy A-

- Reactive energy QI
- Reactive energy QII
- Reactive energy QIII
- Reactive energy QIV

Daily load profile: The meter must store every day at 00:00:00 the absolute energy value of six measures.



Incremental energy value means that the stored value is the energy measured in one period time. **In hourly load profile, period time is 60 min by default.**

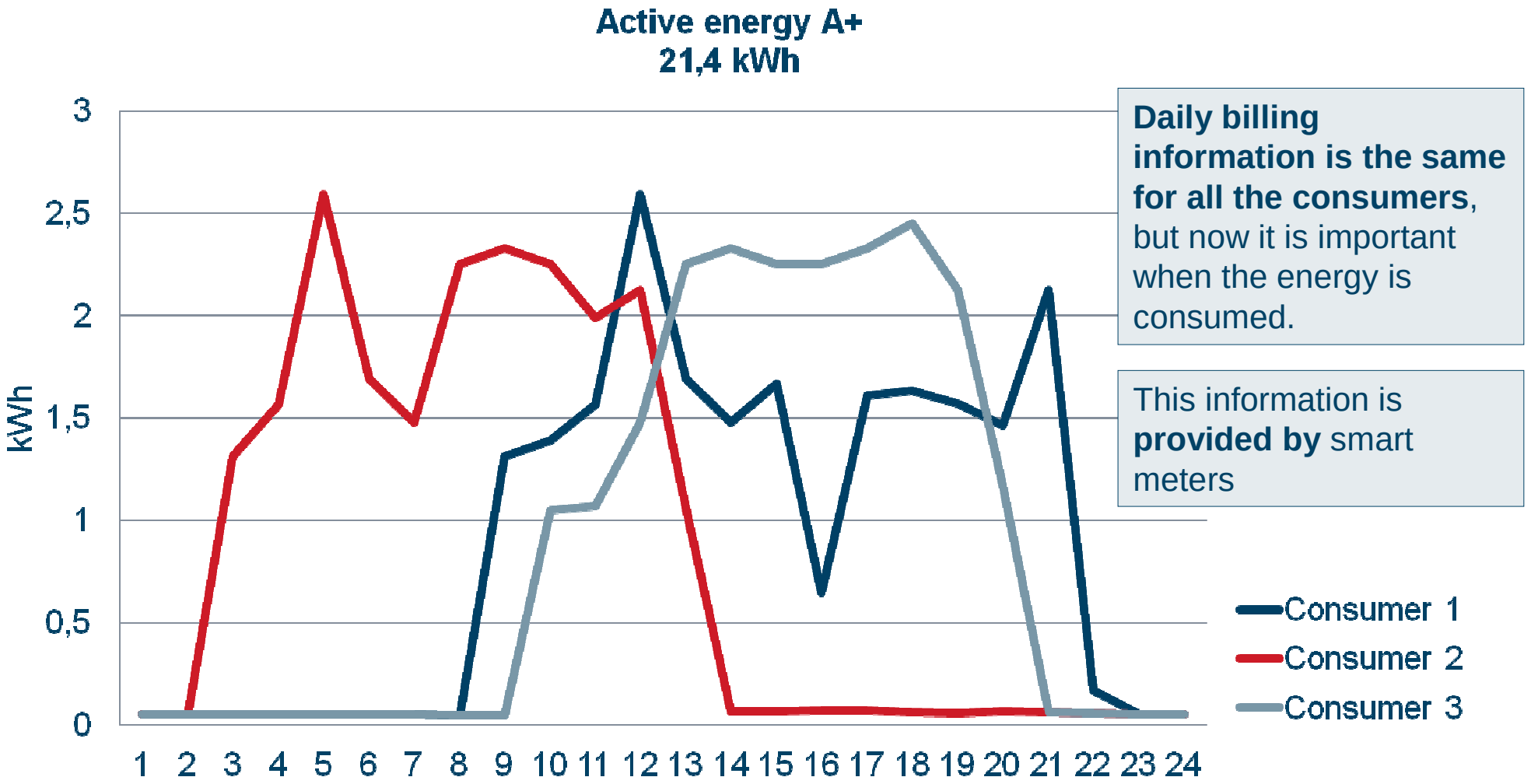
The date-time stamp for the values stored is the date-time at the end of a period time.

Smart Meters Features
Type 5 Meters (<15KW)

1. **Instantaneous measurement** of voltage, current and power factor per phase, as well as instantaneous network frequency.
2. **Load profile** recording. 6 energy values (imported and exported active energy and reactive in the 4 quadrants) either total or by the corresponding tariff.
3. **Versatile Time of Use (TOU) module**, providing up to three complete and independent contracts, each with an independent tariff configuration, 6 tariff periods per day, 10 types of ordinary days, 12 types of special days, up to 12 seasons, and a maximum of 30 special days.
4. **Maximum Demand Recording** (MDR) for each of the programmed tariffs.
5. Time **synchronization**
6. **Event recording**. Event and alarm recording with broad set of manageable events
7. **Power Quality recording**. Voltage variations outside the established thresholds and long term voltage interruptions.
8. **Breaking and reconnection** elements for remote switching operations, power control and demand side management..
9. **Self-diagnostics and monitoring.**

Smart Meters

Load Profiles



Daily billing information is the same for all the consumers, but now it is important when the energy is consumed.

This information is **provided by** smart meters

Smart Meters, Event Codes

Group	Subgroup (Buffer)	Name	Min Entries	Description
1	10	Standard	100	not special events
	11	Power Contract	15	Power contract changed with values of new and former power contract
	12	Firmware	15	Firmware changed with values of new and former firmware version
	13	Synchronization	15	Clock synchronization with values of new and former date-time
2	20	Disconnect control	20	Related to connector
3	31	Power failures	15	Related to quality defined in RD1110/2007. Long Power failures
	32	Quality	15	related to quality defined in RD1110/2007. Volta
4	40	Fraud	10	Related to fraud
5	50	Demand management	15	Related to demand management
6	60	frequent occurrence-Common	100	Local and remote communications

Six groups which cover up to 200 events

Event Codes, Examples

Number	Group	Sub-group (Buffer	DESCRIPTION	EVENT DESCRIPTION
255	1, 2, 3, 4, 5, 6		Event log cleared	Event log has been cleared
1	1	10	Boots and Power Fails	Reboot with loss of data
2	1	10		Reboot without loss of data
3	1	10		Power Fail
4	1	10		Power failure. Phase 1
5	1	10		Power failure. Phase 2
6	1	10		Power failure. Phase 3
7	1	10		Neutral loss
8	1	10		Low Battery
9	1	10	Critical internal error events	Critical Internal Error
10-20	1	10	Manufacturer. Other errors	Other Errors
21	1	10		End of power failure. Phase 1
22	1	10		End of power failure. Phase 2
23	1	10		End of power failure. Phase 3
24	1	10		Official change local time Winter->Summer
25	1	10		Official change local time Summer-> Winter
26-29	1		Reserved for future use	

Event Codes, Examples

Number	Group	Sub-group (Buffer	DESCRIPTION	EVENT DESCRIPTION
30	1	10		Register parameters change
31	1	10		Communication ports parameters change
32	1	10		Reading password change
33	1	10		Parameterization password change
34	1	10		Firmware password change
35	1	10		Battery cleared
36	1	10	Change of parameters	Automatic daylight-saving time change
37	1	10		minimum time between billing end change
38	1	10		Load profile capture period change
39	1	10		Transform ratio changed
40	1	10		clock synchronization mode changed
41	1	10		Program label changed
42	1	10		Manual closures activation status changed
43	1	10		Output magnitude changed

Event Codes, Examples

Number	Group	Sub-group (Buffer	DESCRIPTION	EVENT DESCRIPTION
90	1	10	Quality parameters change	Time threshold for voltage sags and swells changed
91	1	10		Time threshold for long power failures (T') changed
92	1	10		Nominal voltage (Vn) changed
93	1	10		Max voltage level changed (+V)
94	1	10		Min voltage level changed (-V)
95	1	10		difference between min voltage and no voltage changed

The information could provide the meter is diverse and complete. The meter is a sensor of the LV network and can report its status

Event Codes, Examples

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Number	Group	Sub-group (Buffer	DESCRIPTION	EVENT DESCRIPTION
1	2	20	Disconnect control	Manual Power control connection from meter push bottom.
2				Remote disconnection (command)
3				Remote connection (command)
4				Power contract control disconnection
5				Manual Power control connection from the household main interrupter.
6				no trip Current exceeded by blockade
7				Disconnect enabled
8				Disconnect disabled
9				Residual power control disconnection
10				Residual power deactivation control connection
11				Residual power control connection

Event Codes, Examples

Number	Group	Sub-group (Buffer	DESCRIPTION	EVENT DESCRIPTION
13		32	Quality finished Events	Under limit voltage between phases average
14				Under limit voltage L1
15				Under limit voltage L2
16				Under limit voltage L3
17				Over limit voltage between phases average
18				Over limit voltage L1
19				Over limit voltage L2
20				Over limit voltage L3
21				Long power failure for all phases
22				Long power failure L1
23				Long power failure L2
1	4	40	Fraud	Cover opened
2				Cover closed
3				Strong DC field detected
4				No strong DC field anymore
5				Current without voltage
6				Communication Fraud detection

Event Codes, Examples

Number	Group	Sub-group (Buffer	DESCRIPTION	EVENT DESCRIPTION
1	5	50	Demand management	Reception order management critic residual demand
2				Reception order management critic % decrease demand
3				Reception order management demand absolute value critic demand
4				Reception order management no critic residual demand
5				Client acceptance management no critic residual demand
6				Client rejection management no critic residual demand
7				Reception order management no critic demand % decrease
8				Client acceptance management no critic demand % decrease
9				Rejection management no critic demand decrease
10				Reception order management no critic absolute demand
11				Client acceptance management no critic absolute demand

The smart meter is prepared for demand management

PRIME Technology

PRIME Specification Version 1.4

https://www.youtube.com/watch?v=HyiVPdU-Jpw#t=30

Contadores Inteligentes
Beneficios para los Usuarios

1 Tarifas	• Permitirán contabilizar la energía consumida por tramos horarios y facilitarán la liberalización del mercado. • El consumidor podrá optar a un mayor número de tarifas y decidir cuál es la que más le conviene, además de trasladar su consumo a los tramos en los que la electricidad sea más barata. • Ajuste de mejor potencia contratada
2 Lecturas	• Las facturas serán siempre reales, no estimadas.
3 Incidencias	• Las incidencias se detectarán y se resolverán de manera más rápida. • Mejora de la calidad del suministro eléctrico
4 Gestión	• Los usuarios podrán activar o modificar numerosos servicios rápidamente y desde su ordenador: altas y bajas de nuevos suministros, cambios en la potencia contratada, etc.
Eficiencia Energética	• Existe un potencial de ahorro significativo independientemente de los nuevos contadores

Pero podemos mejorar la eficiencia sin contadores inteligentes

EL MUNDO

Edición España Versión Clásica

SECCIONES | Economía | Vivienda | Buscador de casas | Guía del comprador | Guía hipotecaria

CONSUMO La eficiencia, una cuestión de hábitos

Un hogar podría ahorrar 316 € al año con mejor cultura energética

- Mejorar el equipamiento y mantenimiento de los electrodomésticos, una de las claves
- El ahorro total equivaldría a 5.500 millones de euros, el 2,2% del PIB de España
- Hay una escasa penetración de las nuevas tecnologías de producción renovable

Loshábitos poco eficientes más extendidos entre la población son los siguientes:
:

- Poca frecuencia con la que se cambia la goma de la puerta del frigorífico.
- Desconocimiento o uso inadecuado de los sistemas de reducción del caudal de agua en los grifos.
- Desconocimiento de tarifas y potencia energética de sus hogares.

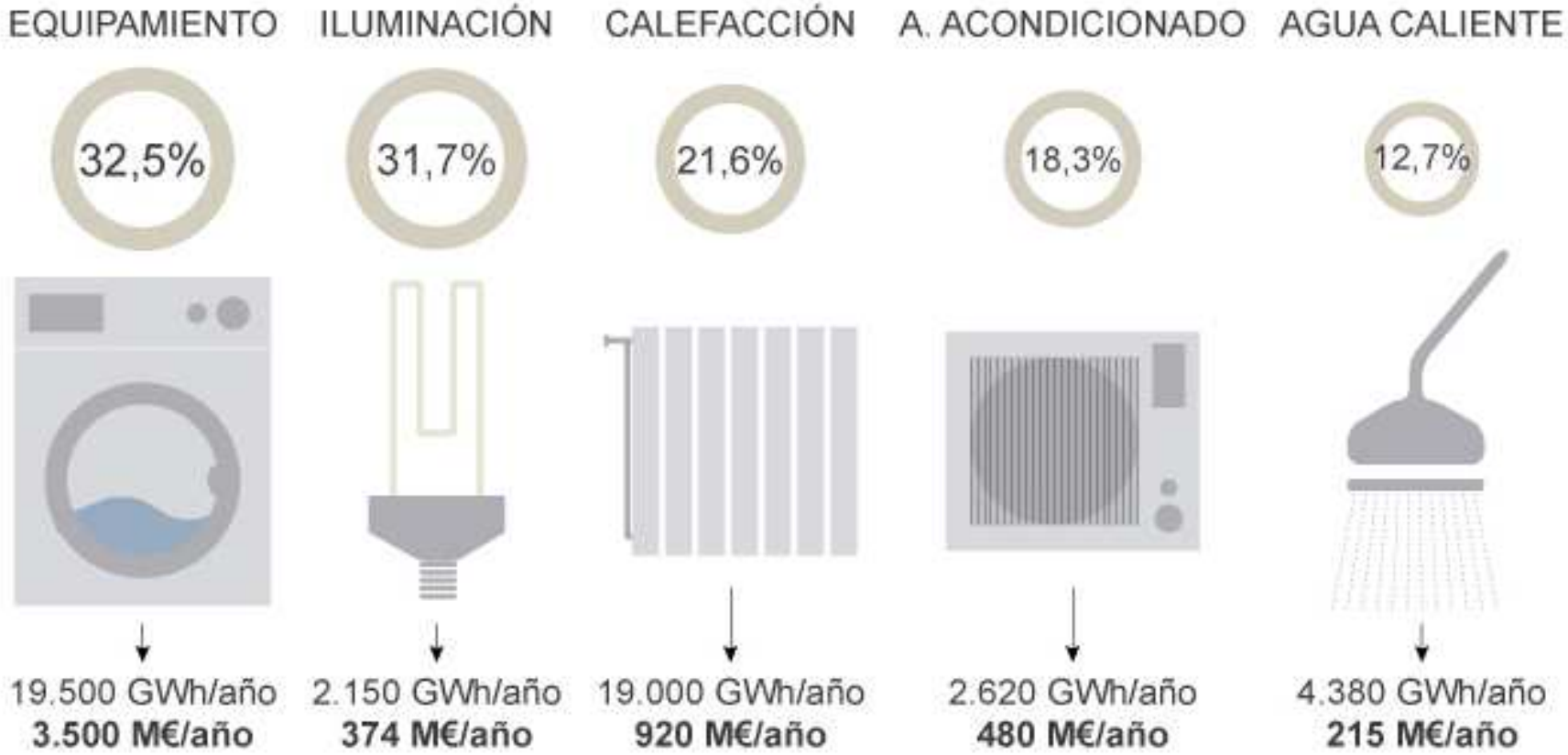
Los hábitos de eficiencia energética que aparecen más extendidos son los siguientes:

- Precaución de despejar las ranuras de ventilación de electrodomésticos y no tapar la superficie de los radiadores.
- No introducir comida caliente en el frigorífico.
- Revisar el estado de las luces y los equipos antes de acostarse.
- Uso eficiente de la lavadora y el lavavajillas (esperar siempre a llenarla lavadora para ponerla-Lavar en frío y esperar siempre a llenar el lavavajillas para ponerlo).
- Utilizar adecuadamente la calefacción cuando no hay nadie en el hogar y/o por la noche (apagarla o bajarla).

Eficiencia Energética

Ahorro potencial de los hogares españoles

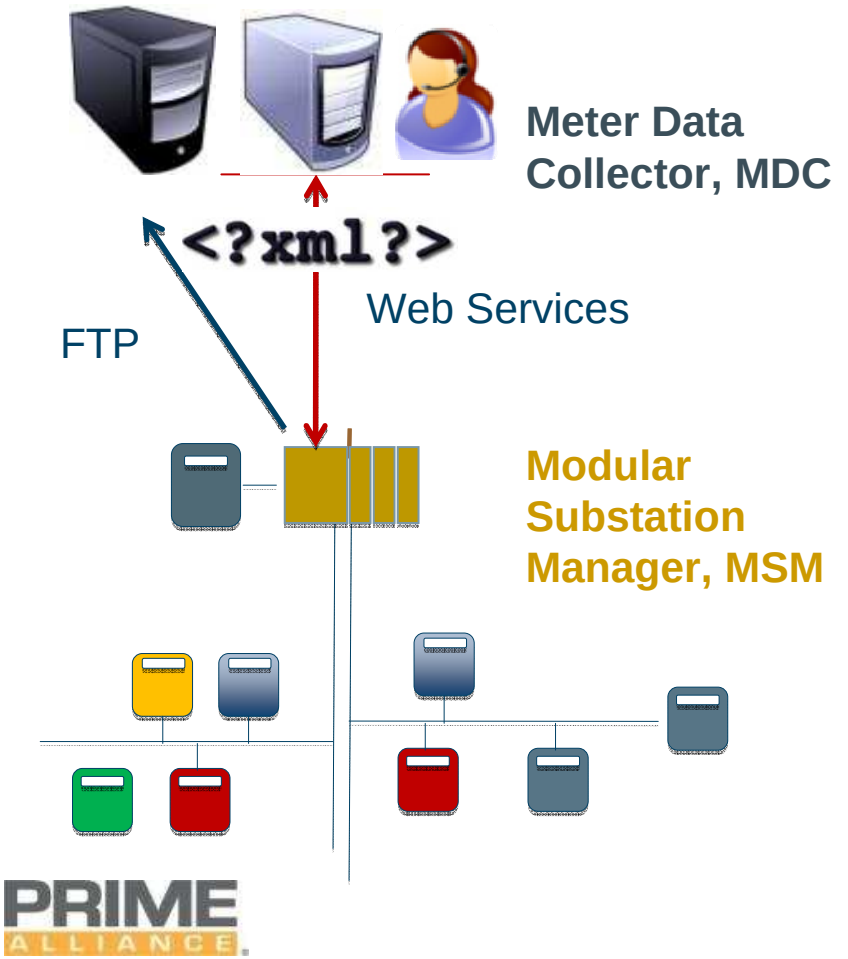
En Gigavatios por hora y millones € al año



Fuente: Gas Natural Fenosa

Alejandro Villarreal /EL MUNDO

MDC, Meter Data Collector



The information flux between the MDC System and MSM (Modular Substation Manager) **will be in both Directions**

1.The MDC can send an order or request a report to de MSM will proceed to the corresponding actions or answer with the requested values

2.The MSM will be able to send to the MDC information such as:

- **Data programmed** to be sent to the MDC in MSM internal task.
- **Events occurred** in a meter or in the concentrator itself

MDC, Meter Data Collection

Information exchanged

Orders from MDC (System) to MSM (Concentrator)

- B02 - Power modification
- B03 - Cut-off / Reconnection
- B04 - Contract modifications
- B05 - Meter firmware update
- B06 - Meter Activation Control
- B07 - Modification of the concentrator
- B08 - Concentrator firmware update
- B09 - Meter parameters modification

Reports from MSM (Concentrator) to MDC (System)

- S01 - Instant data values
- S02 - Load Profile – Daily Incremental
- S04 - Monthly billing profile
- S05 - Daily billing values profile
- S06 - Meter Parameters
- S07 - Voltage Failure report
- S08 - Quality Power report
- S09 - Meter Events
- S10 - Intruder equipment in PLC
- S11 - Base Node PLC Information
- S12 - Concentrator parameters
- S13 - Meter spontaneous event
- S14 - Voltage and current profile
- S15 - Spontaneous concentrator events
- S17 - Concentrator Events
- S18 - Cut-Off & Reconnection
- S19 - Meter Firmware update
- S21 - Advanced Instant data values
- S23 - Contract definition
- S26 - Instant data values on demand
- S27 - Current billing values on demand

MDC, Meter Data Collection

Information exchanged

Reports from MSM (Concentrator) to MDC (System)

Communication Statistics related messages

- G01 - Report of hourly communication statistic with meters.
- G02 - Report of daily communication statistic with meters.

Supervision meters related messages

- G03 - Report of average curve (MED) of voltages, currents and powers.
- G04 - Report of maximum curve (MAX) of voltages, currents and powers.
- G05 - Report of minimum curve (MIN) of voltages, currents and powers.
- G06 - Report of instant value curve (MOM) of voltages, currents and powers.
- G07 - Report of average curve (MED) of unbalance and harmonics.
- G08 - Report of extended meter parameters

DC Configuration Messages

- G09 - Report of digital I/O parameters

- G10 Work in progress
- G11 Requests and tasks log
- G12 DC's performance log
- G13 FTP transferred file log
- G14 Meter's firmware update
- G21 Report of instantaneous values (INS) of voltages, currents and powers

MDC, Meter Data Collection

How Does it works?

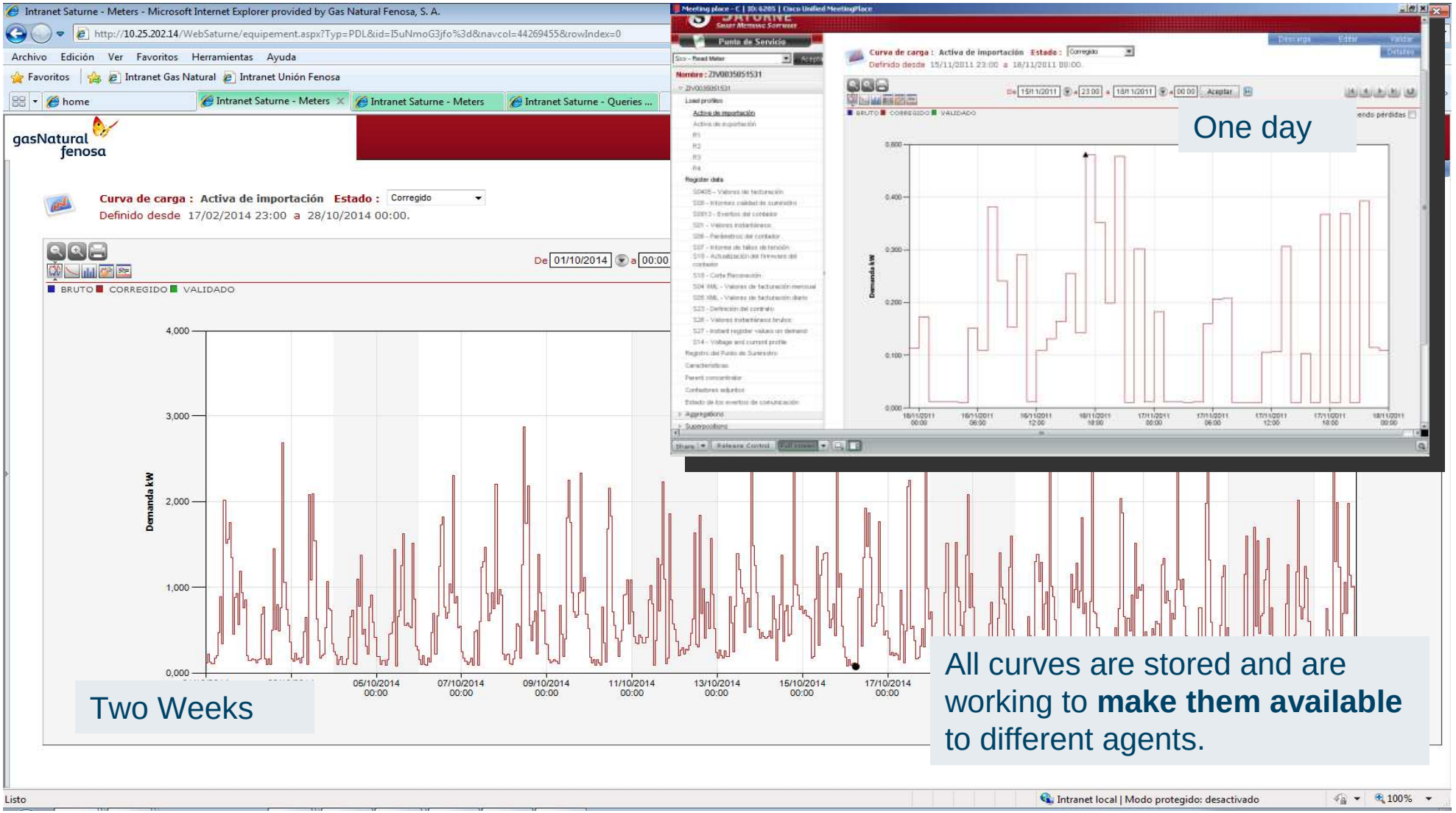
2 **Operations**

1 **Readings**

3 **Events**

- Smart Meters are programmed to send their Daily Billing Profile and Load Profile every midnight to the System.
- Furthermore, a Monthly billing profile is sending the first day of each month.
- Events and additional information is sent spontaneously or on request depending on the configuration.

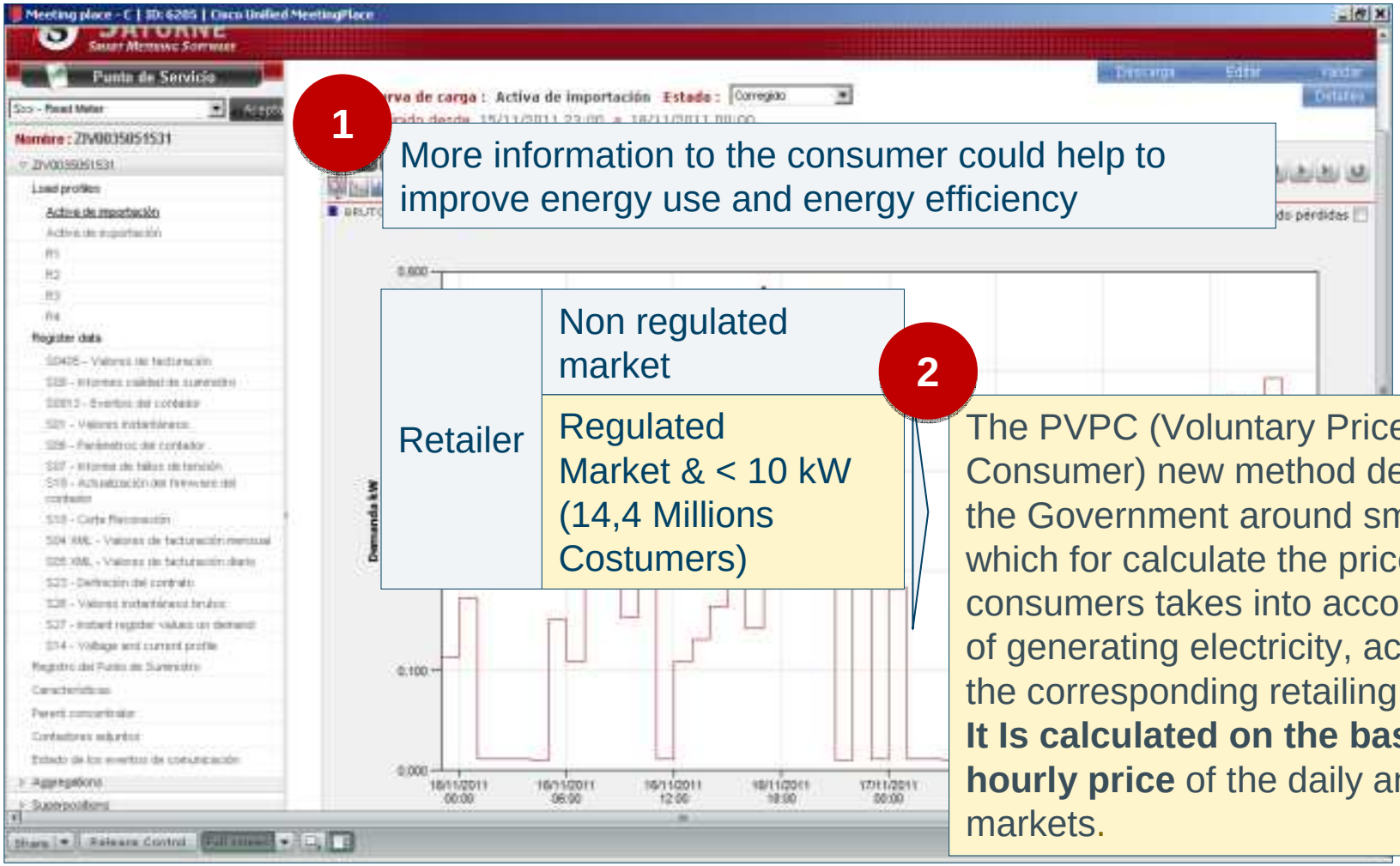
Reports: Daily Billing and Load curve



Meter parameters, Definition of contract

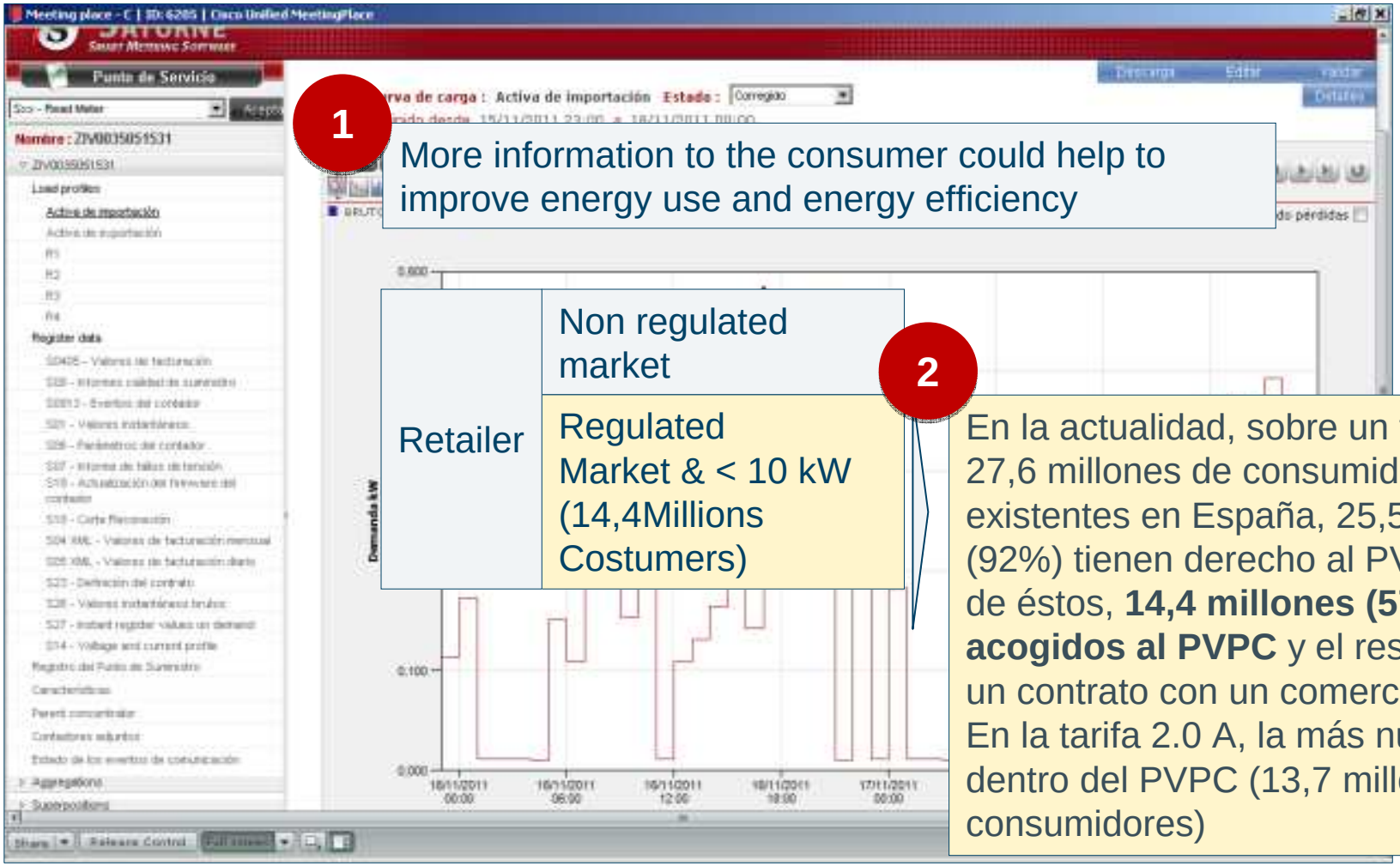
All information on contracts and meter data is **automatically filled** in the MDC.

Why load curve is necessary?



http://www.omie.es/en/home/markets-and-products/electricity-market/pvpc

Why load curve is necessary?



http://www.omie.es/en/home/markets-and-products/electricity-market/pvpc

Why load curve is necessary?

CNMC COMISIÓN NACIONAL DE LOS MERCADOS Y LA COMPETENCIA

La CNMC publica el informe sobre la propuesta de puesta en funcionamiento de la facturación por horas de los contadores inteligentes

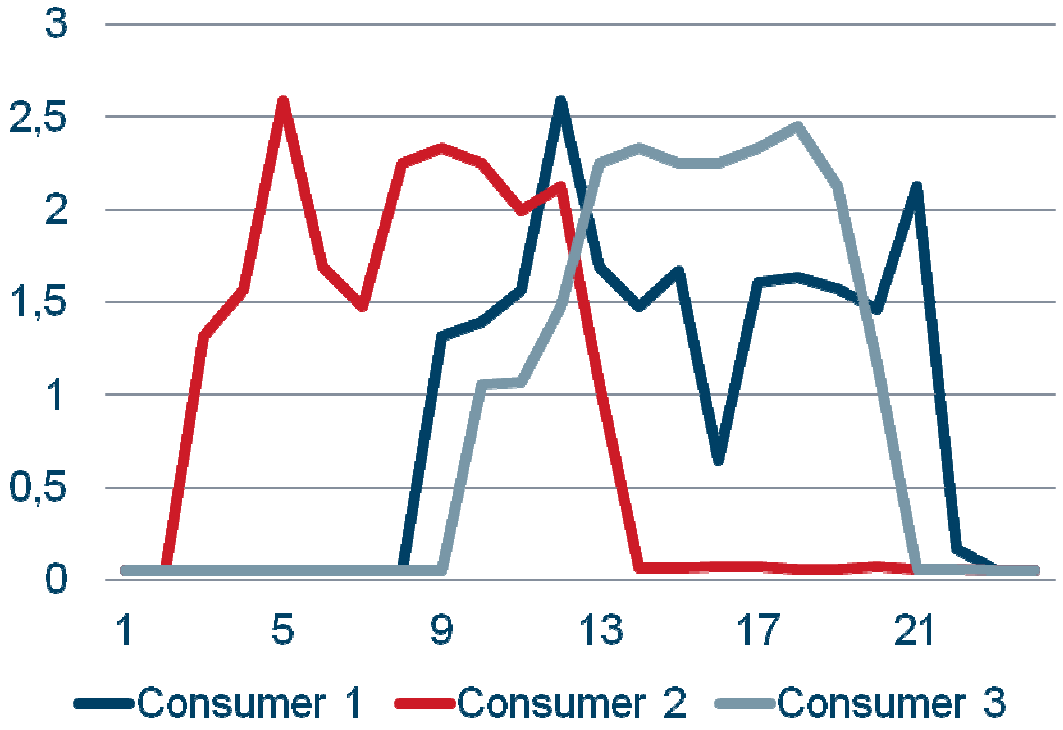
- La CNMC establece el 1 de enero de 2015 para que los distribuidores implementen los nuevos procedimientos de recogida de datos, que se emplearán en los contadores inteligentes.
- A partir del 1 de abril, los comercializadores deberán empezar a facturar a los consumidores con el nuevo sistema por horas.

Madrid, 24 de noviembre de 2014.- La Comisión Nacional de los Mercados y la Competencia (CNMC) ha publicado el Informe sobre la *Propuesta de modificación de los procedimientos de operación y comprobación, validación, cierre y puesta a disposición de los datos de los equipos de medida conectados al sistema de telegestión (contadores inteligentes)*.

Estos equipos son los que recogen los datos de consumo de los usuarios conectados a la red eléctrica y posibilitarán la facturación horaria. Así se establece en el artículo 6 del Real Decreto 216/2014, de 28 de marzo, por el que se establece la metodología de cálculo de los precios voluntarios para el pequeño consumidor de energía eléctrica. El nuevo mecanismo de facturación pretende que los ciudadanos perciban las variaciones del precio de la energía que consumen en cada momento.

La CNMC ha recabado la información de los distintos agentes que participan en las nuevas mediciones del sistema. Tras el análisis de estos datos, la CNMC considera que la fecha idónea para la implementación de los nuevos procedimientos por parte de los distribuidores es el 1 de enero de 2015.

Why load curve is necessary?



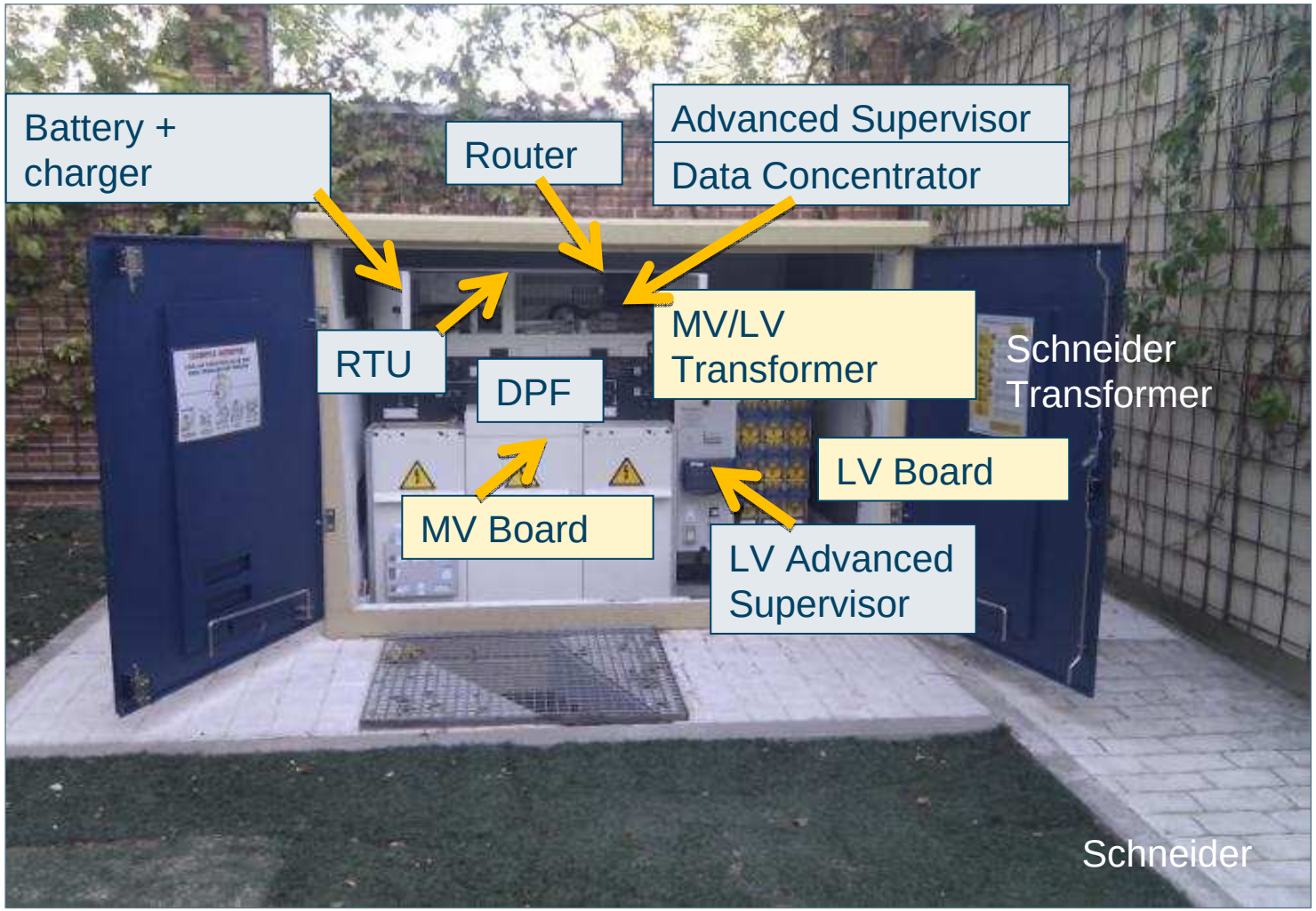
$\sum Ei \times Pi$

Same energy but different amount to pay
31 days x 24 Hourly Measure x Hourly price

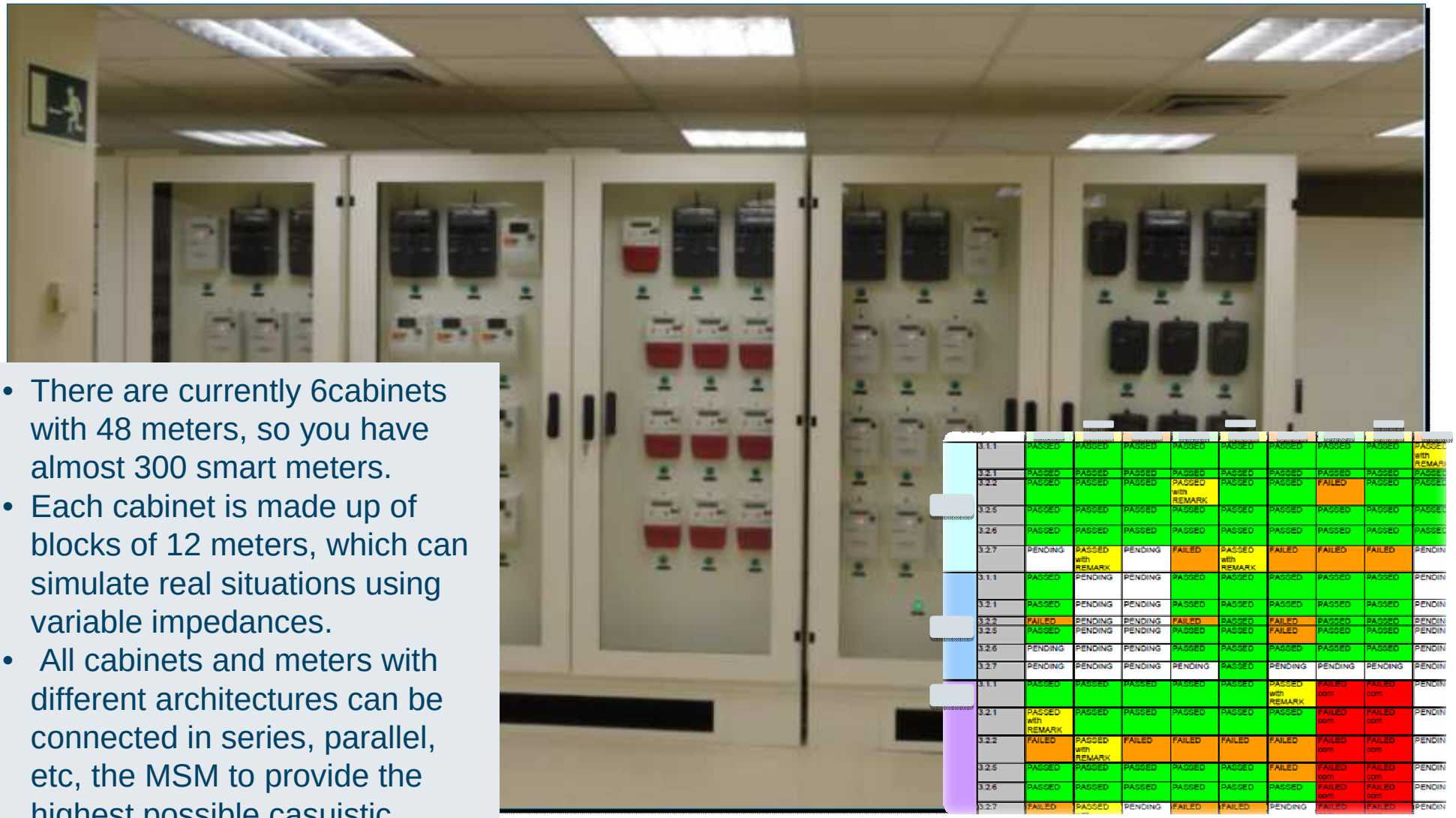
Grid Integration Laboratory
Equipment outside the building

The substation is located within a plot, on the southern edge of Manzanares River, close to the 30 Street , in Madrid, and it shares the facilities of the University Corporate Company and offices of **the high-voltage network operation.**

(LINTER)
Smart Secondary Substation I



Interoperability Laboratory



- There are currently 6cabinets with 48 meters, so you have almost 300 smart meters.
- Each cabinet is made up of blocks of 12 meters, which can simulate real situations using variable impedances.
- All cabinets and meters with different architectures can be connected in series, parallel, etc, the MSM to provide the highest possible casuistic.

One step beyond: Index of the Certificate of Homologation

1. Equipment identification
2. Reference documents
3. Documentation submitted by the manufacturer
4. Reason Certification / Re-Certification
    1. Changes FW MID.
    2. **DLMS Changes FW.**
       PRIME FW changes.
    3. Changes FW CEM.
5. Essays
    1. Functional tests
        1. Tariff change with auxiliary relay Essays
        2. **Cutting element Essays.**
    2. Hardware Analysis Essays
    3. TESTS
        1. First firmware update test
        2. General tests with Data Concentrator 1
        3. Specific Tests with Data Concentrator 1
        4. General tests with Data Concentrator 2

Moltes gràcies

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MDC, Meter Data Collection

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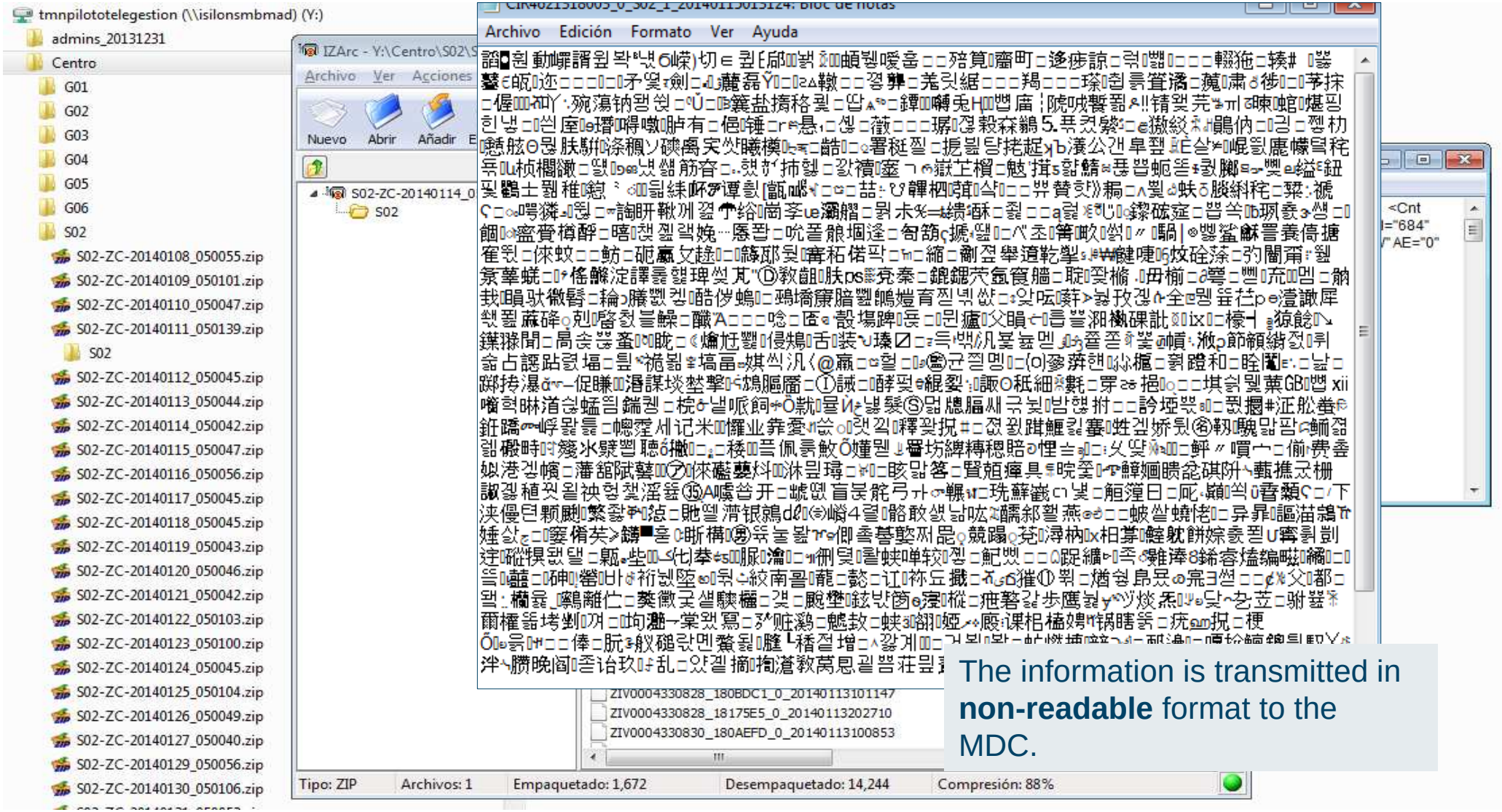

The information is transmitted in **non-readable** format to the MDC.

enisa
European Network and Information Security Agency

gasNatural fenosa

Smart Grid Security

1. Loss of control over grid devices.
2. Tampering with data communications among control equipment and central offices.
3. Power fraud.
4. Loss of communication between grid entities or control centres.
5. Blackouts.
6. Power routing infrastructure attacks.
7. Denial-of-service attacks.
8. Cascading failures.
9. Corporate espionage.
10. Privacy-related incidents.

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