EDP Distribuição Smart Grid Thinking : inovgrid

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António Aires Messias, Inovgrid, EDP DISTRIBUIÇÃO

S3C Midterm Conference 27.5.2014, Évora, Portugal

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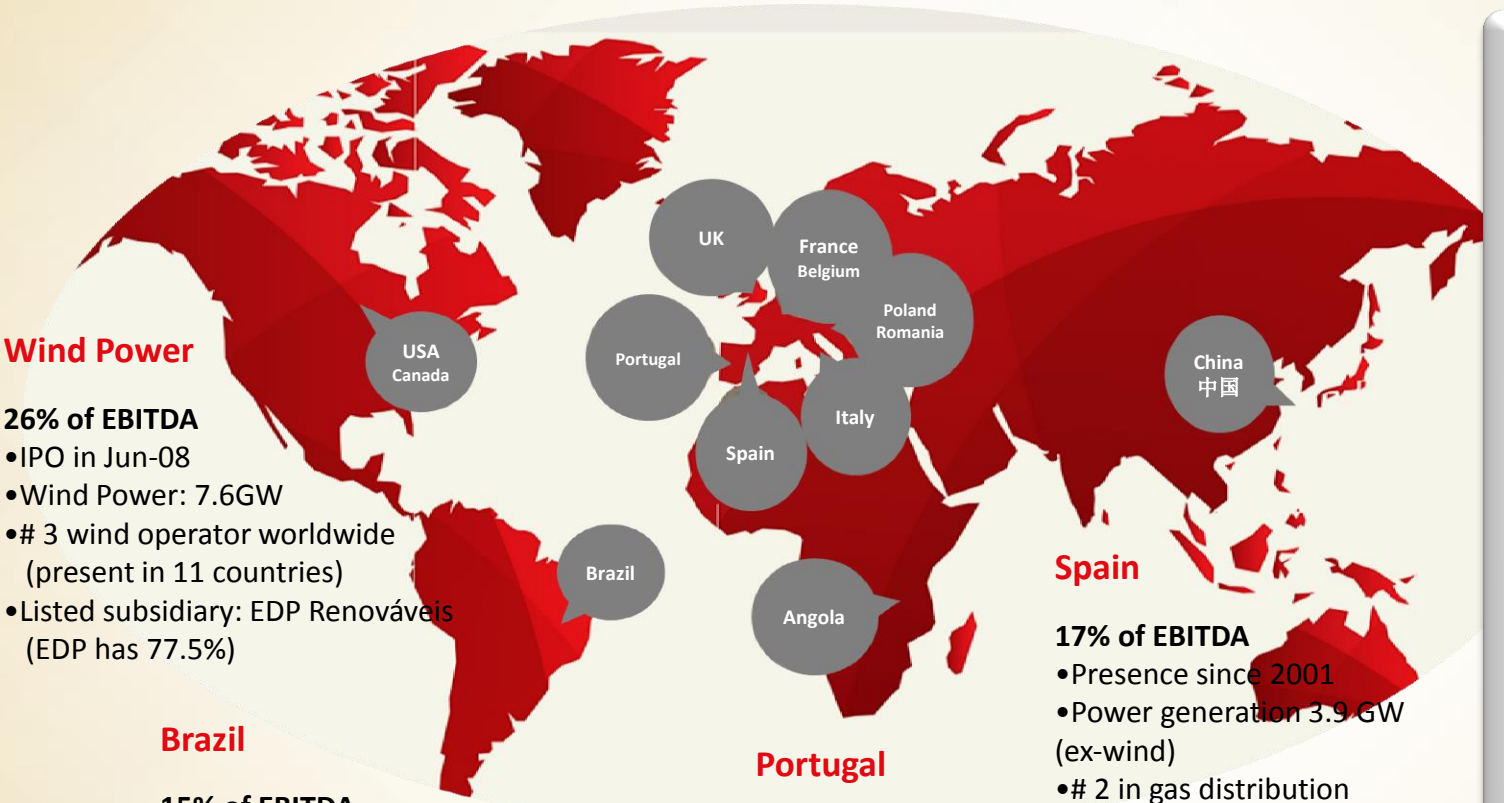
EDP Group, a global energy player…



Wind Power

26% of EBITDA

- IPO in Jun-08
- Wind Power: 7.6GW
- # 3 wind operator worldwide (present in 11 countries)
- Listed subsidiary: EDP Renováveis (EDP has 77.5%)

Brazil

15% of EBITDA

- Listed subsidiary: EDP Brasil (EDP has 51%)
- Presence since 1996
- Power generation: 2.0GW (from which 1.8GW is hydro)
- 2 electricity distribution concessions

Portugal

42% of EBITDA

- Privatization in 1997 (IPO)
- Single electricity distributor
- Power generation: 9.9 GW (ex-wind) (from which 5.4GW is hydro)

Spain

17% of EBITDA

- Presence since 2001
- Power generation 3.9 GW (ex-wind)
- # 2 in gas distribution

Key Figures:

- **# 1 Top World in Dow Jones Sustainability Index Utilities Sector**
- **#3 World wind energy company**
- **#1 Europe hydro project (+3,5 GW in development)**
- **#1 Portuguese industrial group**
- **EBITDA 2012 :**
  - **Portugal 42%**
  - **Other 58%**

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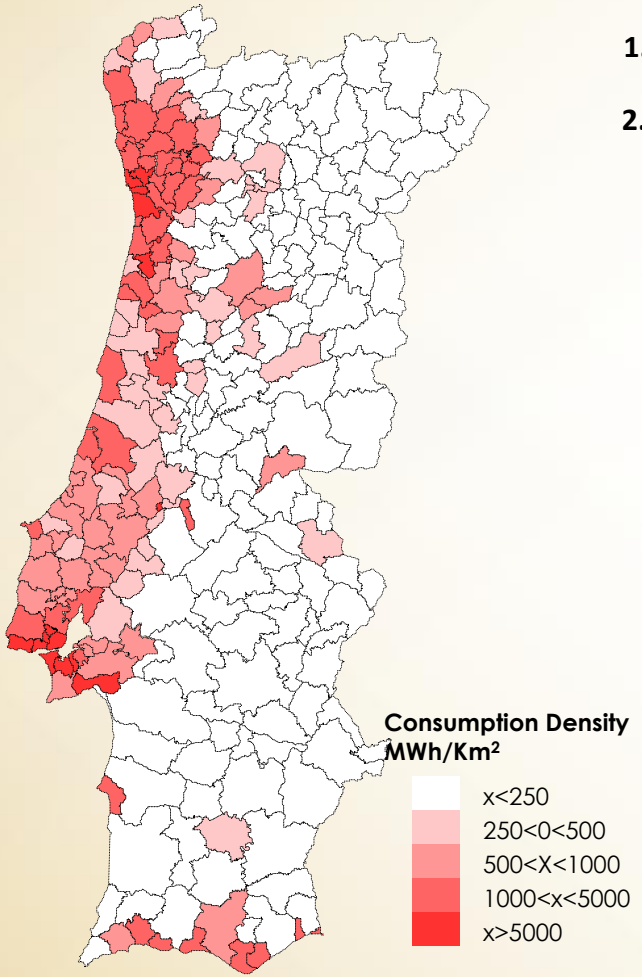
EDP Distribuição, Portuguese DSO with over 6 million customers …

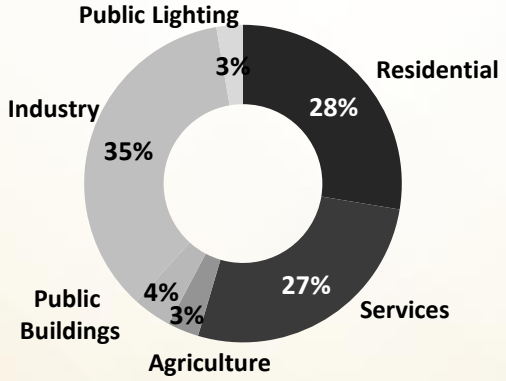
Energy Consumption Density



Main Figures (2012)

1.	**Headcount (#)**	**3 528**
2.	**Regulatory Asset Base (M€)**	**~3 000**
	• Substations (#)	414
	• MV/LV Substations (#)	65 161
	• HV/MV Network (km)	83 319
	• LV Network (km)	140 415
	• Customers (thousands)	6 095

Energy Consumption Use (2012)



Key Figures :

- **6 million customers;**
- **44.7 TWh Distributed Energy;**
- **58 min TIEPI;**
- **1708 Customers/ Employee**

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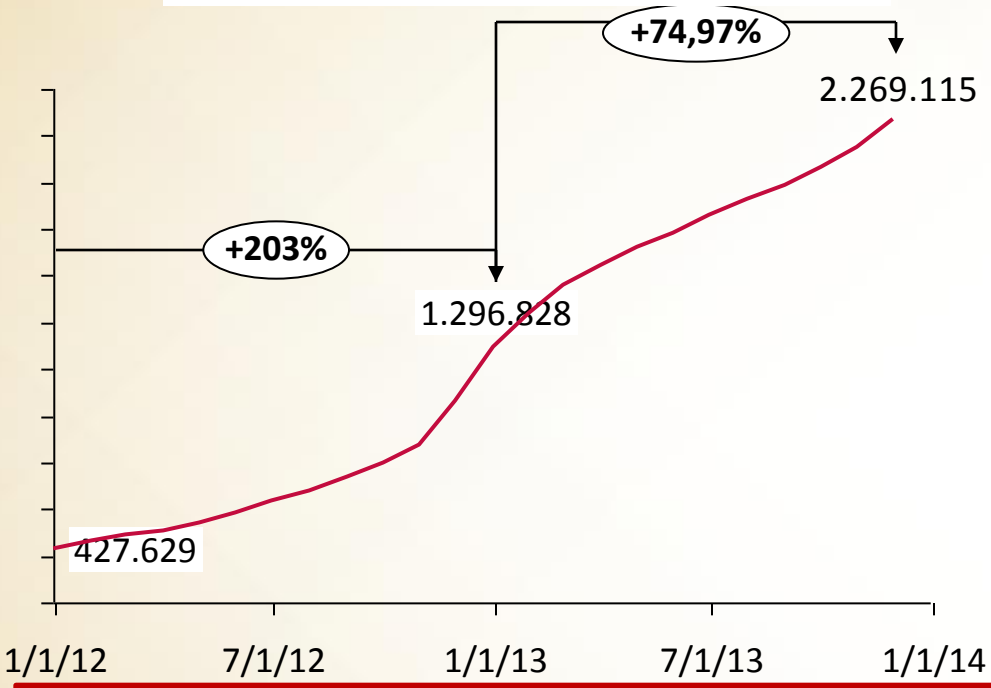
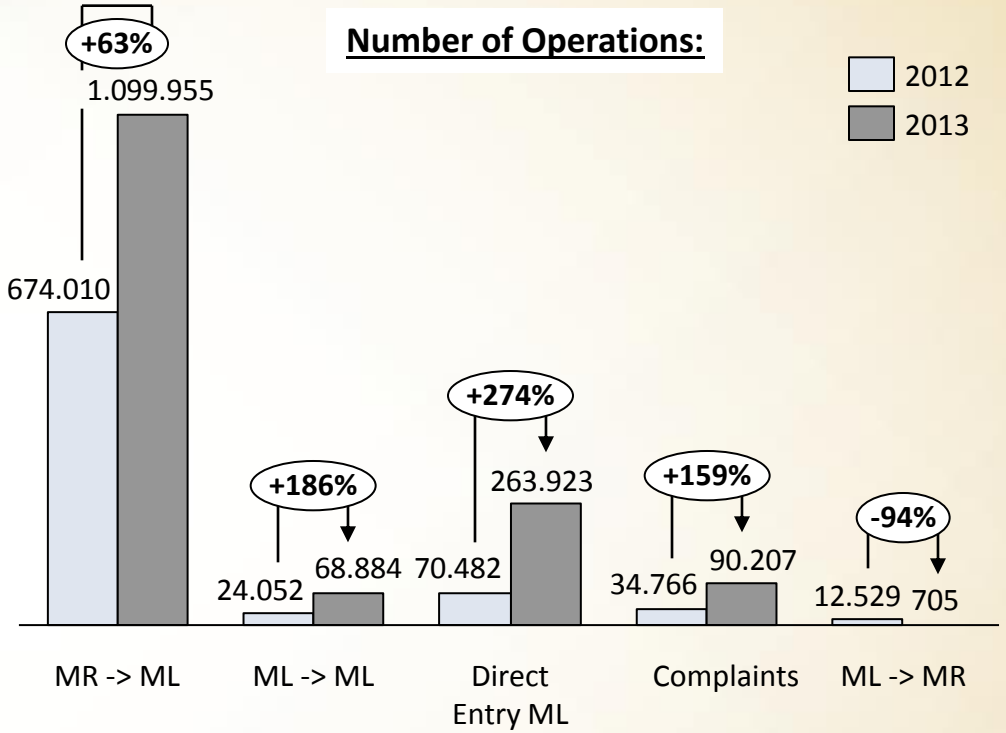
EDP Distribuição fulfils Switching Operator role, in a Liberalised market with a significant growth, recognised as a high quality and neutral process

Number of Clients in the Liberalised Market



Number of Operations:



- ✓ About 1.8m Clients have made the transition from regulated market to free market in just two years
- ✓ June 2012 and January 2013 marked the discontinuation of LV tariffs, which helped to accelerate the pace of migration of Clients
- ✓ The goal of EDP Distribuição is to be prepared to respond to the requests/needs of Suppliers, meeting the deadlines set by ERSE

- ✓ Audit 2010: Excellent Results for EDP Distribuição -> no priority recommendations
- ✓ ERSE has given particular attention to this area and has recognised and praised the quality and impartiality role of EDP Distribuição as Manager of the process of switching supplier

(1) Extrapolation from December 2013

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EDP Distribuição receives over 10 million contacts per year from clients through the main service channels

Commercial support line

+700,000 calls

Fault line

+1,000,000 calls

IVR Readings

~9,000,000 calls

Shops / Agents

~300,000 contacts

Business line

5,000 Clients with access

SMS

+1,000,000 SMS sent at critical moments in the relationship with the client

Online Distribution

+100,000 registered clients

Other channels

- ✓ InovGrid Line
- ✓ Priority Line
- ✓ IP Line

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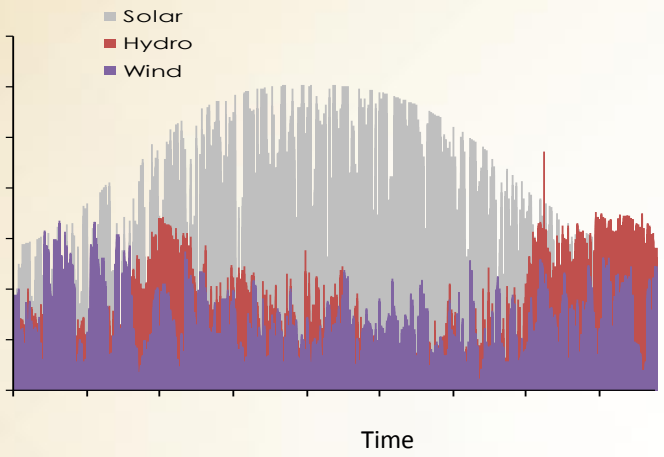
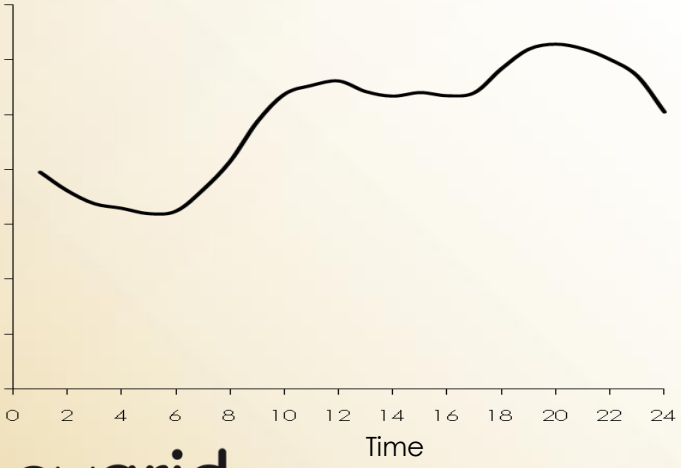
The Grid is an enabler for the increased penetration of intermittent renewables, adding flexibility between supply and demand...

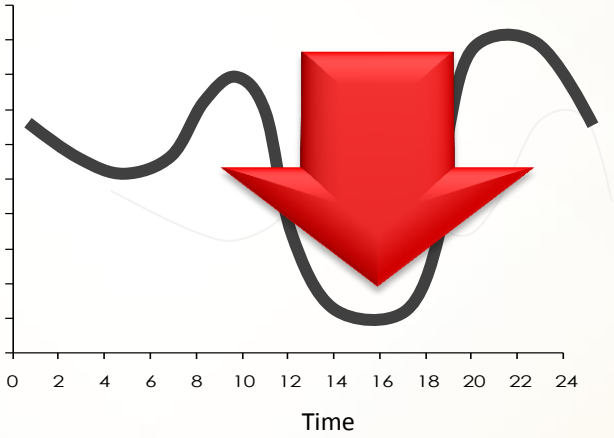
Supply patterns %



Demand patterns GW



Demand patterns with RES GW



Needs:

- Grid Control;
- Generation Mix Management;
- Storage Back-up;
- Energy Pricing;
- DSM/DR;
- ....

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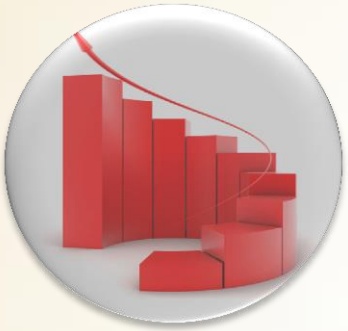
Smart Grid is key for DSO new challenges on market liberalisation, distributed generation, energy efficiency and electric vehicle integration...

Historical Challenges

Quality of Service



Operational Efficiency

- Supply customers with high quality of service
- Minimize OPEX and CAPEX

New Challenges

Advanced Metering Infrastructure

Renewables and Distributed Generation

Network automation & sensoring

Smart Grid
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Electric vehicle

Energy efficiency and new business models

New challenges:

- New ways of planning and managing the grid (e.g. DG, bidirectional energy flows...);
- More information to customer energy efficiency;
- New technologies (e.g. energy storage) and new business models (e.g. DSM, dynamic energy prices...);
- EV integration (e.g. V2G, smart charging...)
- ...

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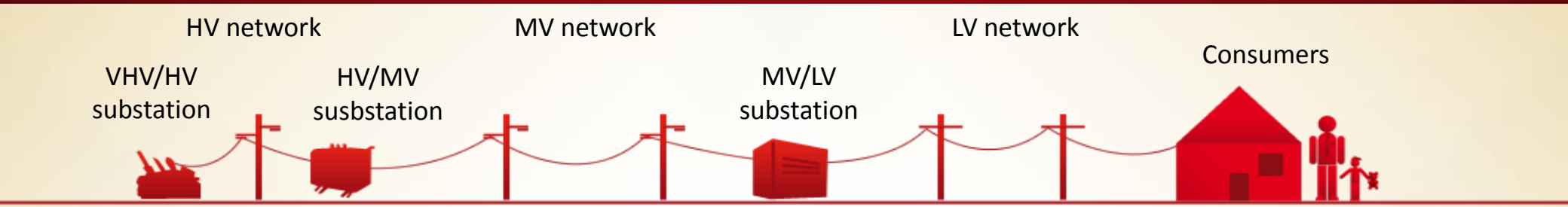
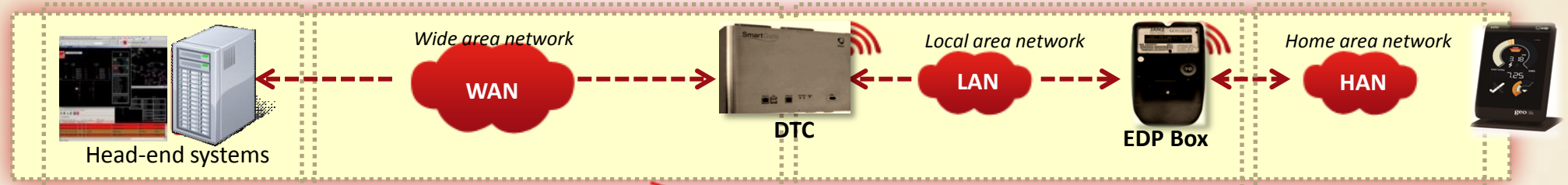
EDP Distribuição is building the inovgrid concept, smart grid based, with an integrated approach, touching different areas to this change…





System integration and cybersecurity

DG and storage

MV automation and telecontrol

Remote public lighting metering and management

Microgeneration integration

New tariffs, products and services

Information management and data mining

New tools for smarter network management

Improved network operation and quality of service

GIS and Work Force Management

EV charge network

Energy efficiency services

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InovCity Évora demonstrates, in a living lab, strategies for accessing remote and difficult customers, energy efficiency, public lighting and EV….

InovCity store

EV charging points

DTC installed in all secondary substations

MicroGeneration integration

Efficiency Case-study with selected Commercial Clients

Energy Efficiency with Public Lighting

New products and Services to Domestic Clients

Main attributes of Évora site:

1. Évora municipality:
   - 54 000 inhabitants
   - 1 307 km^2 of area (urban and rural)
2. Project includes:
   - 30k EDP Boxes and 341 DTCs
   - Integration of IT systems
   - Communications infrastructures
   - New services and products
3. Involvement of the major players of the municipality
4. Coordination with the national electric vehicle charging network

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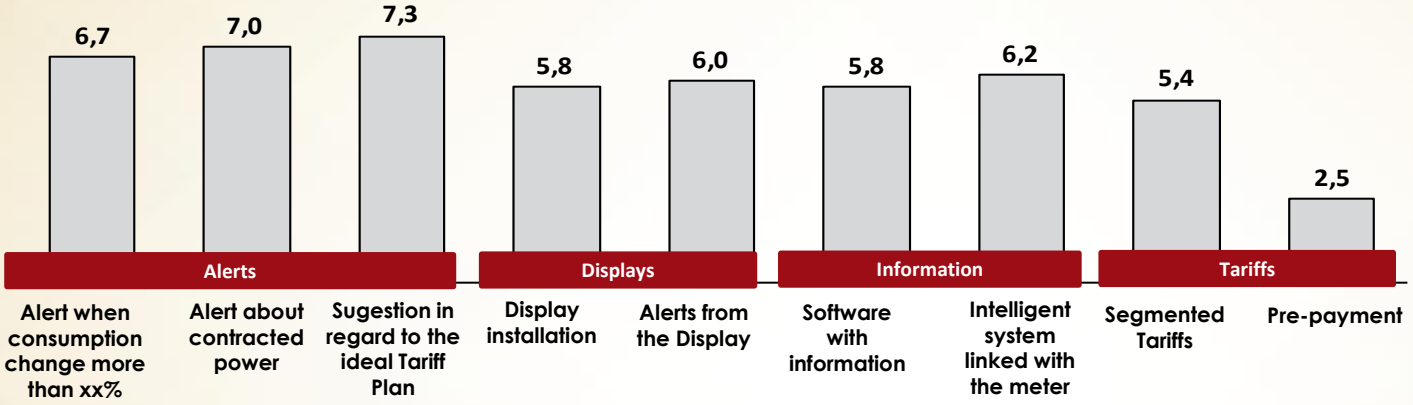
research have been made in order to characterize Évora customers , observe behaviours and collect perceptions about future energy services…

RESEARCH MADE AMONG A REPRESENTATIVE POPULATION

Customer intention on new services related to Energy Efficiency (1-10)



Evora customers showed interest on typical AMI/Smartgrid services but not on pre-payment

MAIN CONCLUSION

If you can have…

- **Advanced Metering Infrastructure (HAN recommended)** with DSO Processes and Systems Integration
- **Relevant stakeholders commitment**: - Regulator - Government - Municipalities - Retailers - Energy agencies - Customer associations - Some NGOs - Media…
- **Consistent strategies and action plans** (at national, local and business levels)
- **Information + Solutions + Intelligible signs for customers**: -Tariffs -Services -Support & "big causes/purposes" they can buy-in

THINGS HAPPEN !

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Focusing disruptive innovation for end users involvement...

Available Features

- Real-time control;
- Consumption + Production;
- Real-time billing;
- Online access µGeneration;
- Control of energy costs;
- Value added services;
- New tariffs and price plans...

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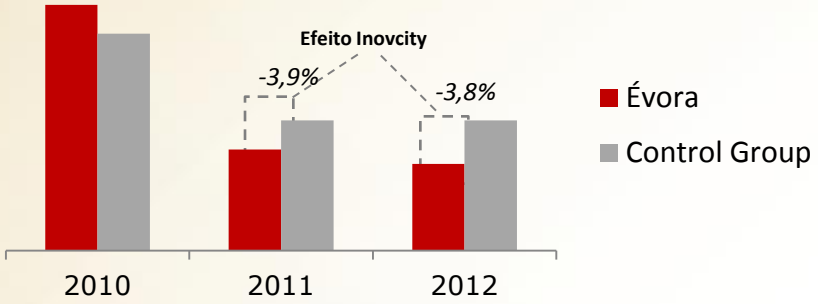
Significant energy efficiency gains demonstrated by smart grids and customers interaction in Évora …

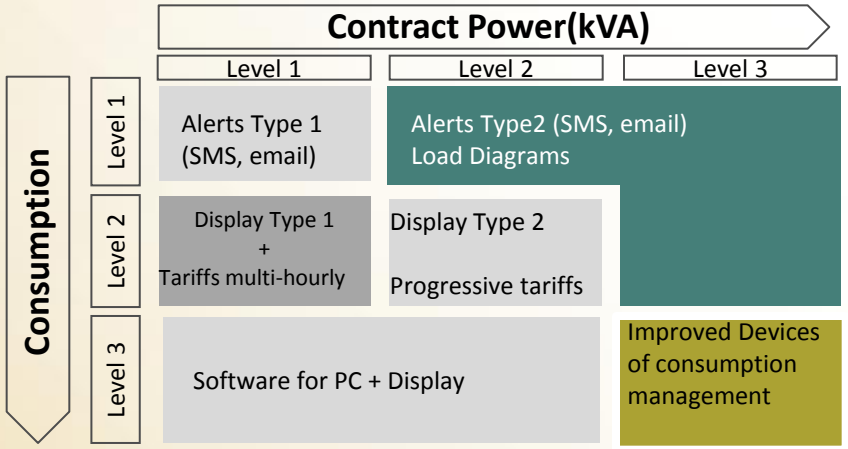
1 Inovcity (Évora Population)

Customer consumption evolution between 2010 and 2012[1]



- Consumption reduction[1] of **3,9%** comparing with the control group [2];
- Invoices based on real consumption. Permanent access to the consumption history in the EDP online portal. Exposed by project communication activities and energy efficiency recommendations.
- Results show to be persistent.

2 New Products/Services (Test Group)



- Consumption reduction[4] of **5,3%** [5] for customers group with access to alerts, reports and special tariffs;
- Consumption reduction[4] of **6,6%** for customers group with displays/monitoring systems[6] .

(1) Results between March 2011 and February2013; (2) 2,1% of error margin, for an confidence interval of 95%95% ; (3) From 2011 until 2011 there was a general decrease in electricity consumption, probably associated to the negative economics conditions(effect normamaly filtered by using a control group;(4) Comparison Results 2012 vs. 2010. (5) Error margin of 5,2% in IC 95% (6) Error margin of 4% for IC 95%;

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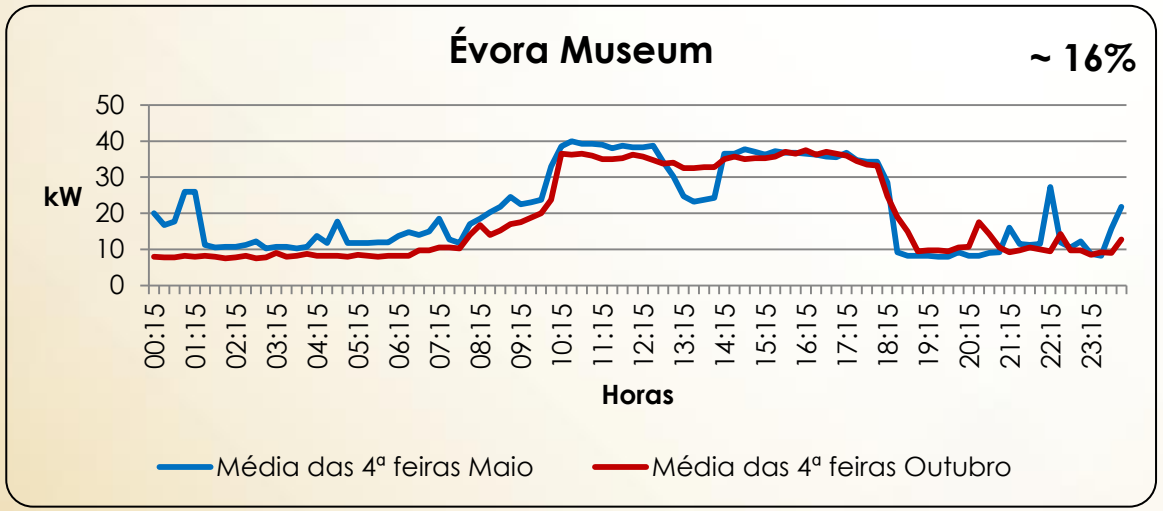
Significant energy efficiency gains with high consumption LV customers interaction …


diário do SUL

Leitura dos gráficos permite uma maior racionalização do consumo eléctrico

- "Data coming from EDP, particularly **the visual information**, has been **extremely useful** and interesting for all the Museum team"
- "There was a major concern of **involving all the 17 people** that work here, and making them aware of the energy consumption reduction topic"
- "We **started by solving the night problem**, (…) we chose to switch on the lights step by step, instead of all at the same time, when we needed to walk around the museum at night."
- "Natural light in the building was maximized in order to **reduce consumption**"



Main Findings:

- **Energy efficiency** gains between **6% and 24% ,** in high consumption LV consumers;
- Small reductions in consumption altogether have a large impact in the monthly bill for high consumption LV customers;
- Close interaction with consumers (in particular the facilities manager) is key to ensure effective consumption reduction, as only 11% of them accessed the online web service;

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EDP Distribuição is deploying the inovgrid concept in other locations, to consolidate knowledge and test different technologies …

inovgrid deployment schedule

2010 — 2011 — 2012 — 2013 — 2014 — … — 2020

30k EBs (Évora InovCity)

+100k EBs (7 new locations)

Guimarães
- Capital Europeia da Cultura, Centro Urbano e Cultural

S. João Madeira
- Forte concentração urbana e industrial

Lamego
- Rede Rural

Marinha Grande
- Desafio Qualidade de Serviço

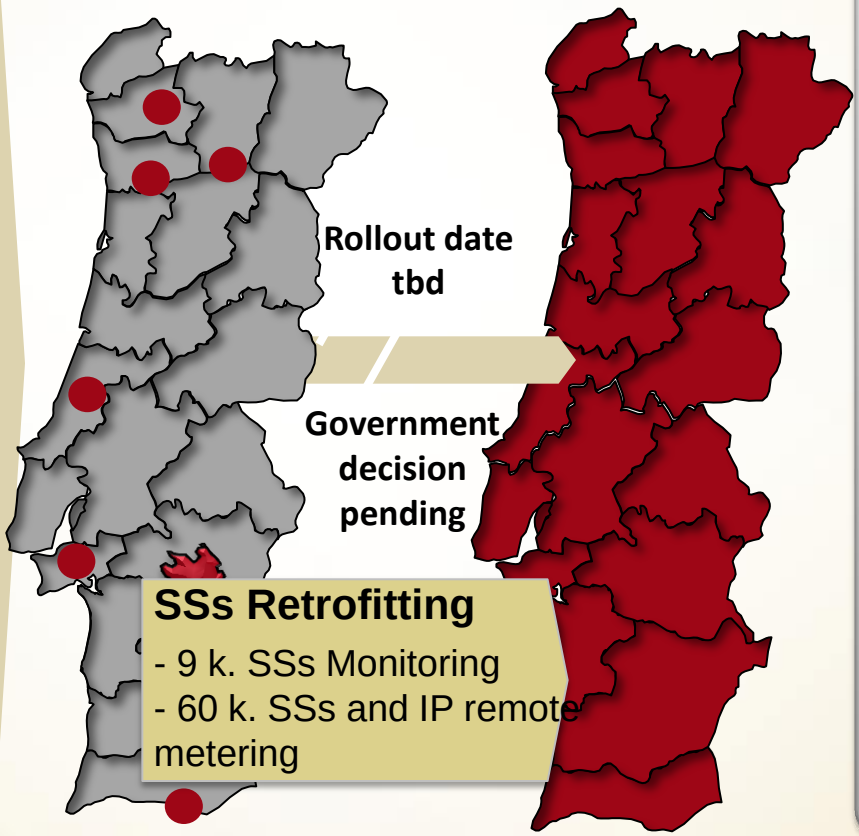
Batalha
- RF Mesh

Alcochete
- "Laboratório" de novas tecnologias

Ilhas Barreira
- Rede "isolada"

+200k EBs (keep expansion)

6M EBs (full rollout)



SSs Retrofitting

- 9 k. SSs Monitoring
- 60 k. SSs and IP remote metering

Key drivers:

- New technologies (PLC PRIME, RF Mesh);
- Interoperability of different suppliers;
- Different social and environmental characteristics;
- Different grid conditions and large scale "plug and play";
- New smart grids applications;
- Increasing business process integration…

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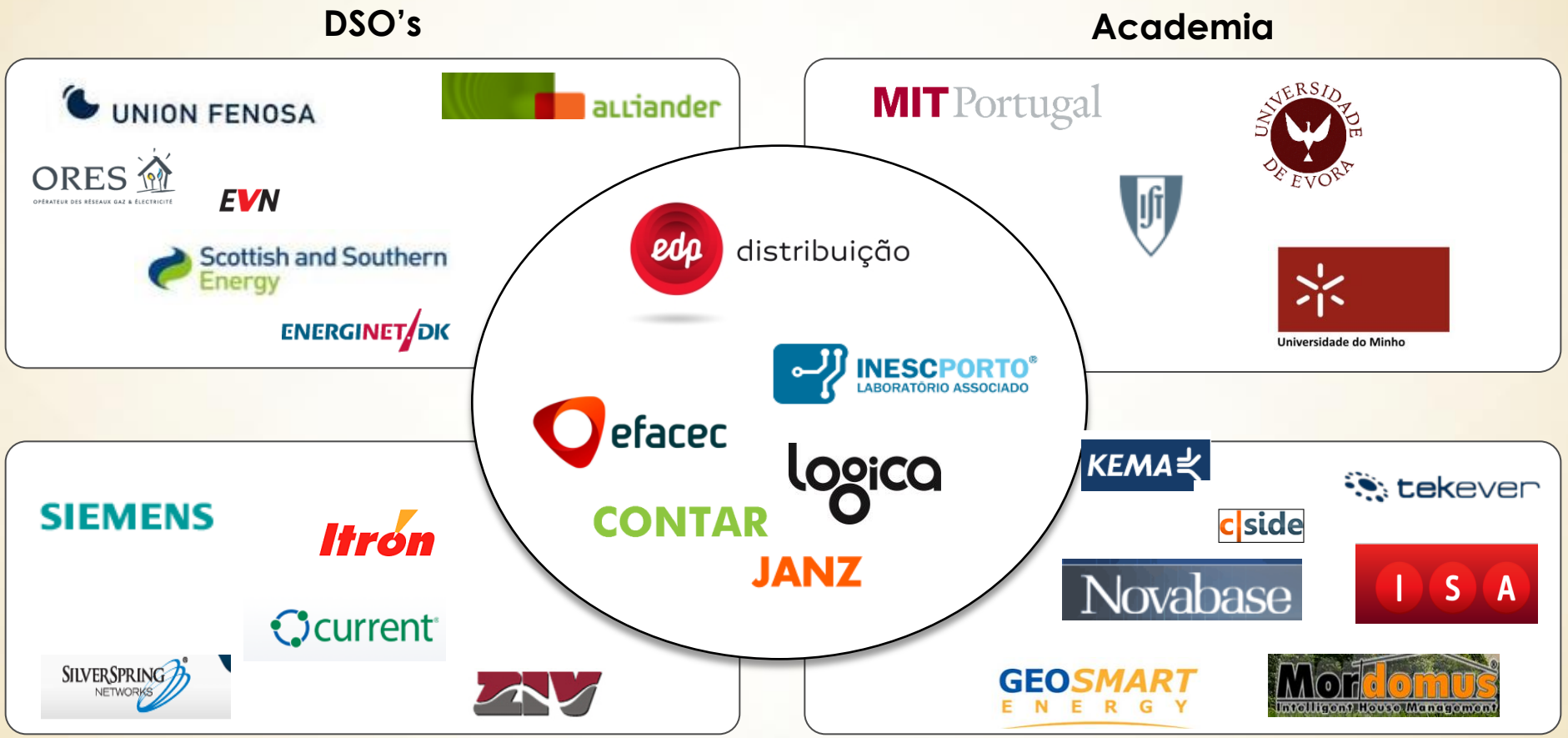
inovgrid Évora site had over 1600 visitors from more than 30 nationalities...

World wide visitants...

ERSE – Primeiro Ministro Japão - Prince Charles- China Three Gorges- Lógica- Eandis - Bandeirante- Corpoelect-DR ENER CE- Zhuai-França-Roménia-Ilhas Montanha-Macau - Fleming-DRC -Universidade Unioeste-Fundação Getúlio Vargas- Indonésia-ADREM- ERDF-ABDI-Sentec-Basildon Council-Tuas Power- Australia -QREN – Novabase-Mozambique- Singapore……

A large number of Portuguese and international players has joined EDP in this project …



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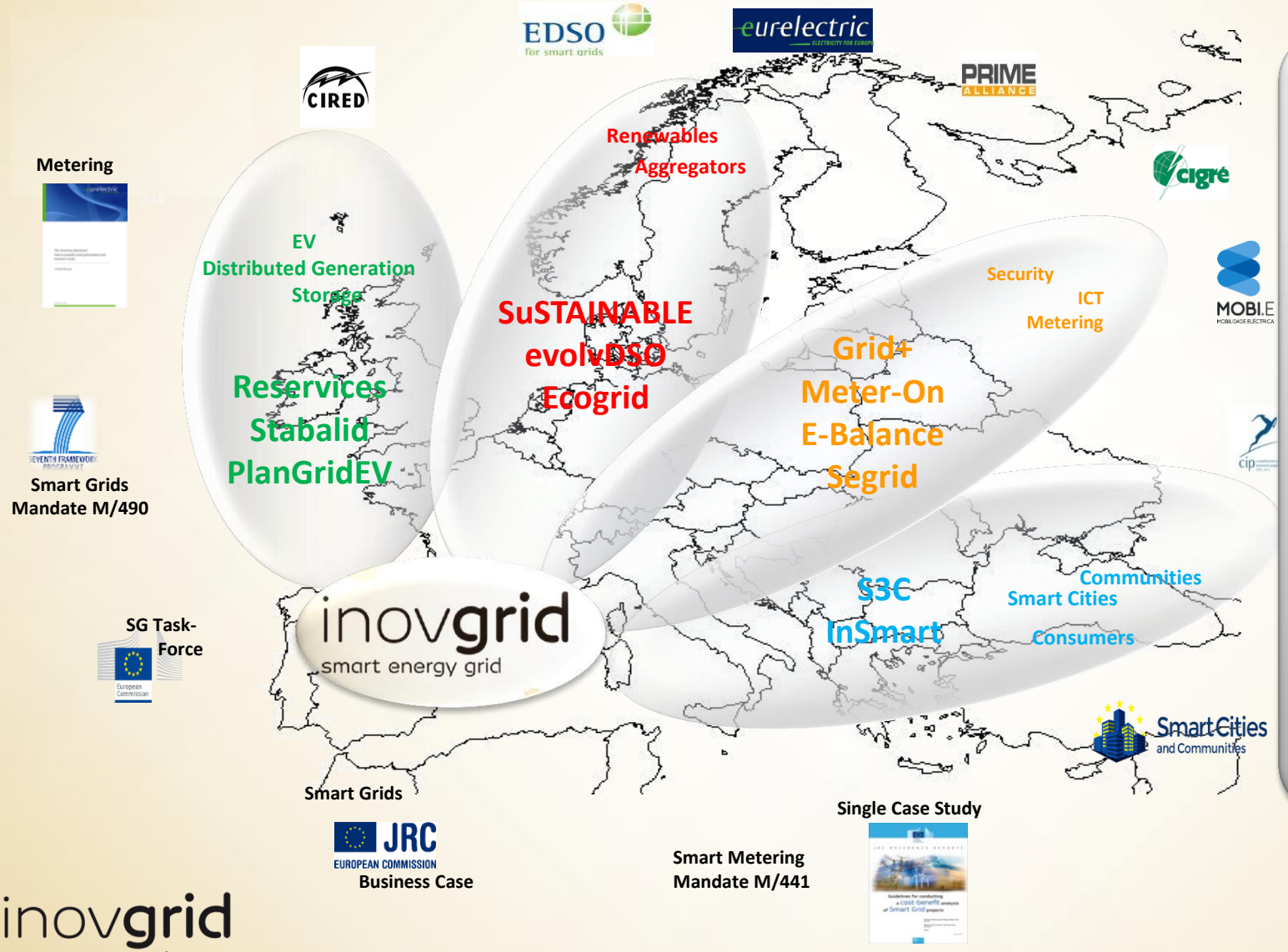
EDP Distribuição, with other DSOs, is actively participating, sharing and replicating knowledge and solutions in several European initiatives …



Projects

- Sustainable;
- evolvDSO;
- Grid+;
- InSmart;
- Stabalid;
- PlanGridEV;
- ….

Promoting Active Users participation in S3C, European FP7 Project , lead by VITO

New concepts: Foster 'smart' energy behavior of households and SMEs in Europe via active user participation.

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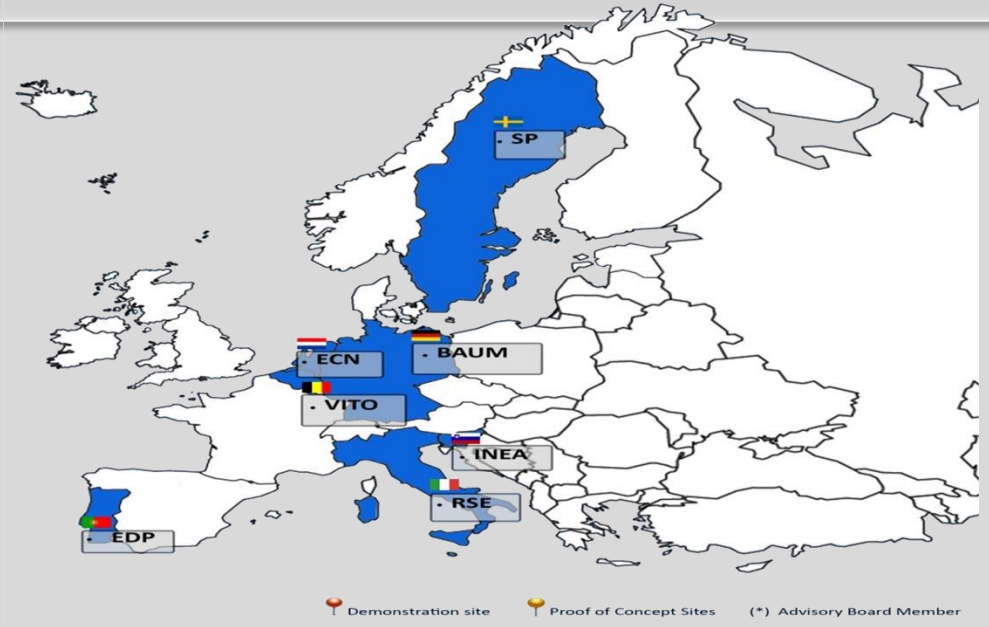

Project S3C

- Coordinator: VITO
- Start Date: Nov. 2012
- End Date: Oct. 2015
- Duration 36 months
- 7 Partners from 7 Member States.
- 24 Members in Advisory Board

http://www.s3c-project.eu

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inovgrid from a pioneer project to an international reference …

2007: smart grids are an emerging trend and inov**grid** is a pioneer project.

TODAY: smart grids are in all DSOs agenda and inov**grid** is a reference.

2007 2008 2009 2010 2011 2012 2013 2014

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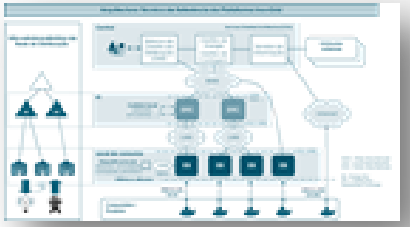
Évora InovCity

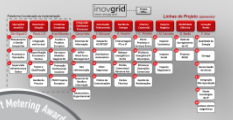
PRIME ALLIANCE

QUADRO DE REFERÊNCIA ESTRATÉGICO NACIONAL PORTUGAL 2007.2013



EEGI EUROPEAN ELECTRICITY GRID INITIATIVE – CORE –

EU/ Climate Action:
A world like you, with a climate you like.
Évora inovcity



European Smart Metering Awards 2012 – Utility of the Year Award 2012 – Winner EDP

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- …
- ***EEGI Core Label***
- **39 Initiatives**
- ***Utility of the year***
- **Extending to 7 locations**
- **1000 visitor to Évora**
- **JRC Reference Project**
- **+3,9% energy efficiency**
- **First remote Work Order**
- **Évora Inovcity**
- **First components (EB, DTC)**
- **Consortium ACE**
- **QREN**
- **Architecture and specifications**
- **Project starts**

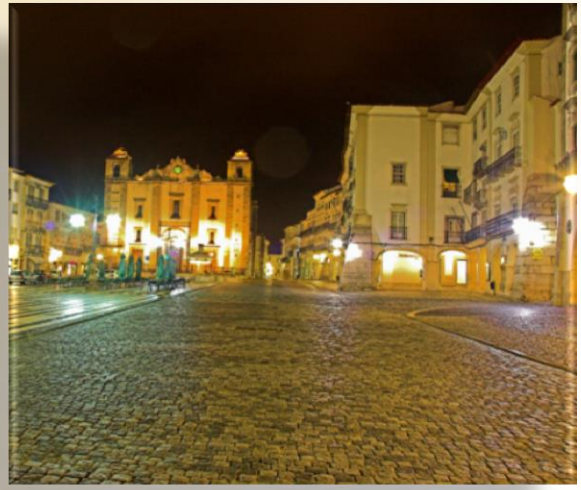
Conclusion

- Smart Grids **key drivers** , focus on value creation based on customer centric services and local stakeholders active participation …

- Concerns and Challenges in the European Economic context, aims future Services challenges from the **electrification increase**, as key to achieve EU ambitious climate goals, …

- Strategies for accessing consumers , based in a **future-proof solution** in a project commercially tested enabling innovative smart services, as demonstrated in Évora – the 1st Iberian inovcity...

Welcome to the Future!



You are invited!

Thank you!

Visit us at:

www.inovgrid.pt

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S3C Midterm Conference visit to Évora inovcity

27th May 2014

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S3C Midterm Conference visit to Évora inovcity
27th May 2014

Group #1 – Diogo Ramalho

14:30	inov**city** Showroom
14:40	Vinyl Café, Client with in-home display
14:50	Secondary Substation
15:00	Electric Vehicle Charging Point

Group #2 – Cristina Monginho

14:30	Vinyl Café, Client with in-home display
14:40	Secondary Substation
14:50	Electric Vehicle Charging Point
15:00	inov**city** Showroom

Group #3 – Guilherme Jacinto

14:30	Secondary Substation
14:40	Electric Vehicle Charging Point
14:50	inov**city** Showroom
15:00	Vinyl Café, Client with in-home display

Group #4 – José Valadas

14:30	Electric Vehicle Charging Point
14:40	inov**city** Showroom
14:50	Vinyl Café, Client with in-home display
15:00	Secondary Substation

MEETING POINT: OUTSIDE THE HOTEL at 2:15 pm

EDP Presenters:

inov**city** Showroom – Miguel Andrade & Pedro Godinho Matos
Vinyl Café, Client with in-home display – Andreia Zacarias
Secondary Substation – Filipe Matos
Electric Vehicle Charging Point – Susete Albuquerque

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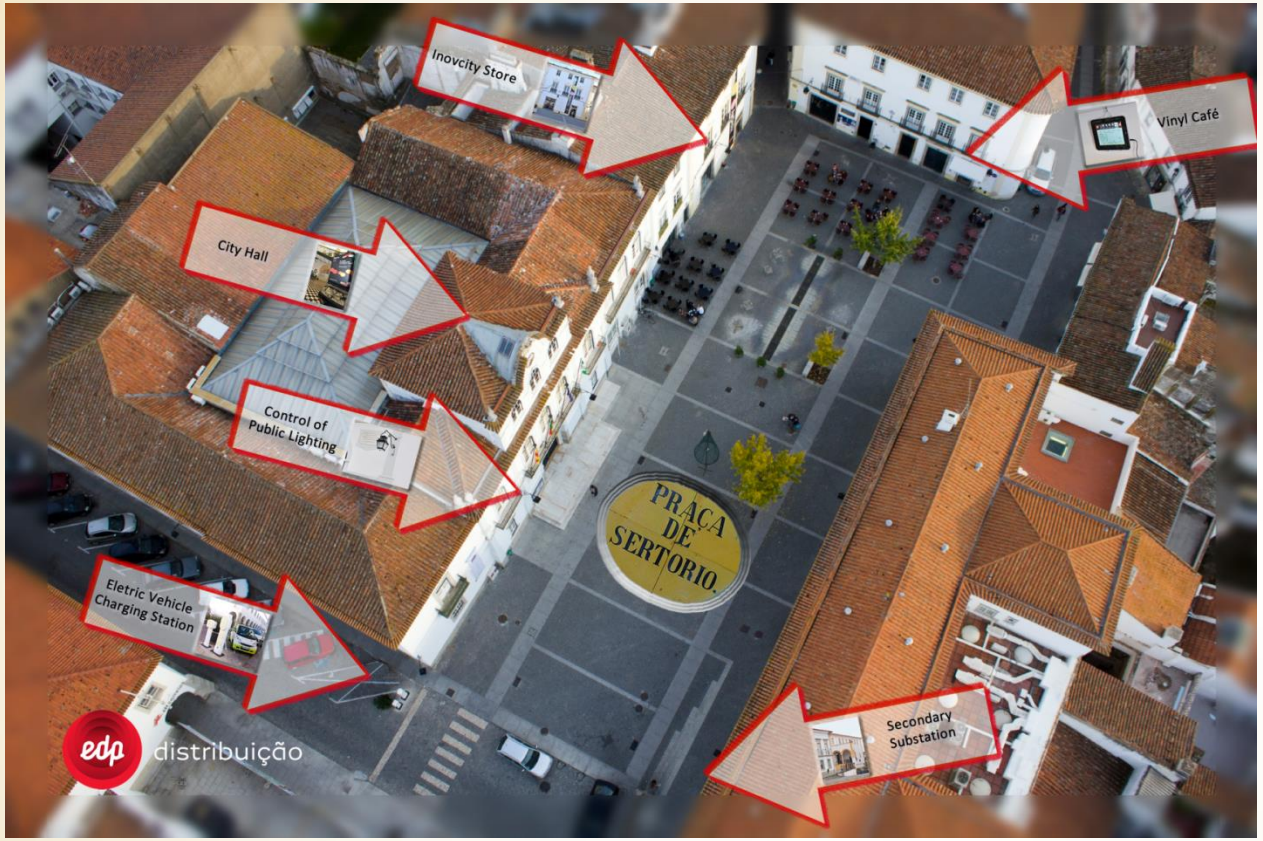

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