VPS
Virtual Power
Solutions

History of pioneering and market leadership

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ESaaS becomes mainstream in 2013

Pioneering cloud based energy management solutions (Energy Savings as a Service – **ESaaS**)

2010

GREEN PROJECT AWARDS

Gartner 2012 CoolVendor

Paving the way for market development

Pioneering Active Demand Management with energy community aggregation services

2015

Supporting energy transition

Pioneering Hybrid Virtual Power Plant enabling added value services with AI optimization and blockchain

2000

Pioneering cloud based oil & gas metering solution **(SaaS)**

SaaS becomes mainstream 10 years later

2012

Cloogy® launch (domestic EMS & ADR solution)

ISA Intelligent Sensing Anywhere

2014

ALISA LISTED NYSE ALTERNEXT

ISA Energy

2017

Kiplo® market deployment (new VPP user interface)

VPS Virtual Power Solutions

2020

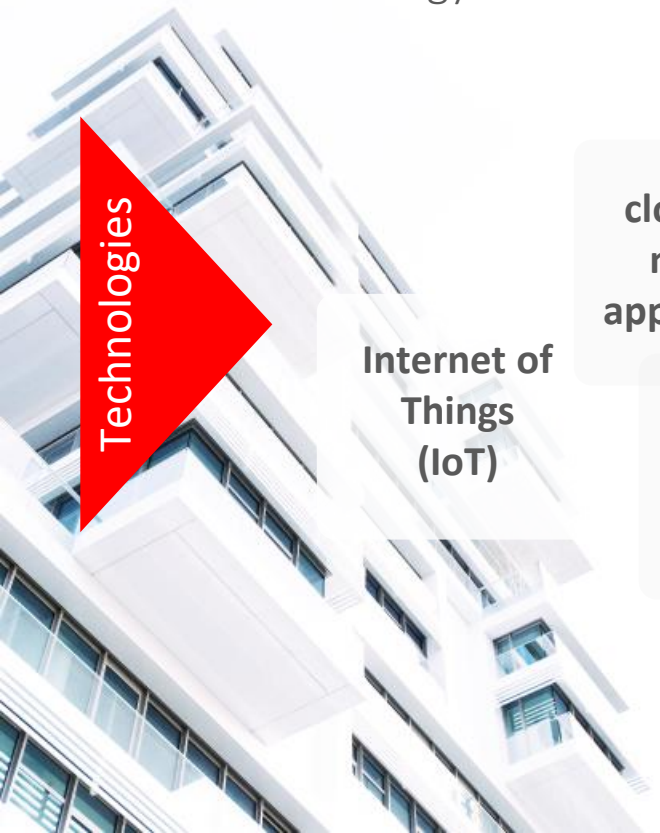
Harnessing the potential of Energy Distributed Resources and Demand Response

Powering a pro-active future

bp, REPSOL, Shell, TOTAL, PRIMAGAZ, Butagaz, galp, BANCO POPULAR, NOVO BANCO, Millennium bcp, edp produção, VINCI AIRPORTS, ANA Aeroportos de Portugal, S'mples energia, PESTANA HOTELS & RESORTS

Virtual Power Solutions

Virtual Power Solutions (VPS) is an established provider of technology and services for utilities and energy consumers. Provides **ESaaS (Energy Savings as a Service)** to all sectors: industrial and commercial, SME and domestic and enabling the creation of **Energy Communities** with VPP technology to deliver new added value connecting distributed energy resources



Technologies

- **Internet of Things (IoT)**
- **cloud and mobile applications**
- **M2M platforms**
- **hardware and software**

Products & Services

- kiplo™ — For utilities & aggregators
- kisense ENERGY OPTIMISER — For industrial & comercial buildings
- Cloogy — For domestic users & small business

Value for the Market

Connected Energy Networks

Manage Virtual Power Plants
Deploy Energy Communities

kiplo™

… take demand response to the next level

… demand-side as a new energy asset

One of the easiest ways to **“operationalize” demand-side resources** is to make them look like generation assets, i.e., virtual power plants (A. Zurborg, 2010)

kiplo™

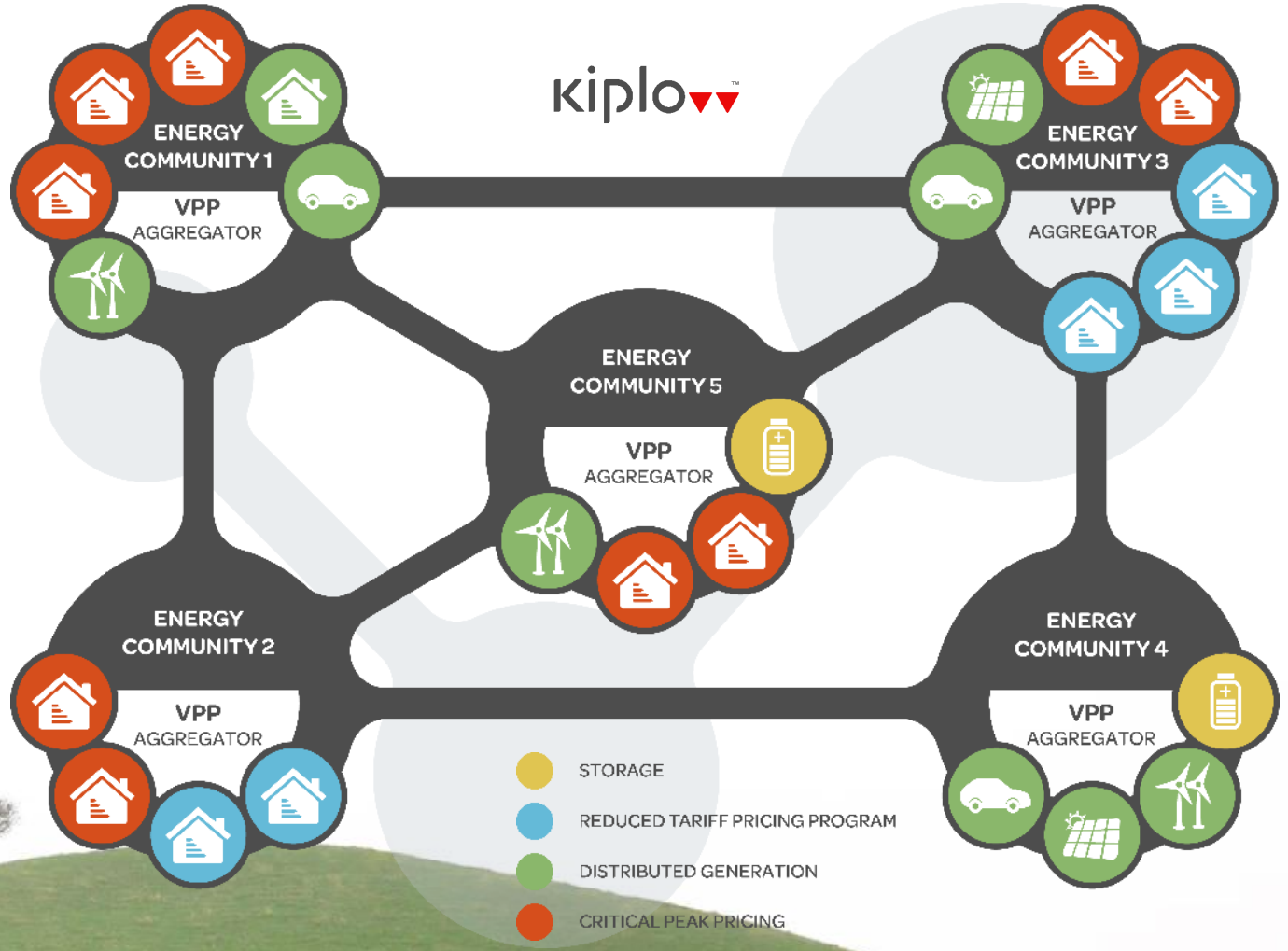
Control	Flexible loads
Forecast	Demand & distributed generation
Aggregate	Energy communities
Optimise	Loads, generation, and storage

To manage VPPs as effectively as conventional generation plants, the **aggregation of heterogeneous resources** must be rendered more predictable and controllable (Samad et all, 2016)

Local or Virtual Energy Communities

A Virtual Power Plant (VPP) is a cluster of energy producers and energy consumers creating a **Virtual Energy Community**

- An Energy Community can act as a single operating entity on the energy market
- The members work together to be more sustainable
- They can share local energy production
- Loads can be managed to achieve community goals
- Distributed community storage capacity also
- The community will benefit together from cheaper energy prices



Energy Communities & VPP platform

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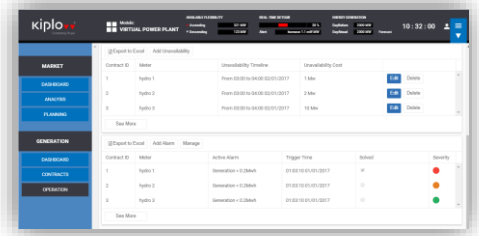
Data Features

- Aggregation of energy consumption
- Aggregation of distributed storage
- Aggregation of distributed generation
- Demand and generation forecast
- Demand flexibility aggregation



Business Features

- Real time management, analysis and planning
- Link to energy markets
- Economic performance reports for producers
- Individual power plants contracts management
- Energy assets performance analysis

Tools to create value for utilities and aggregators

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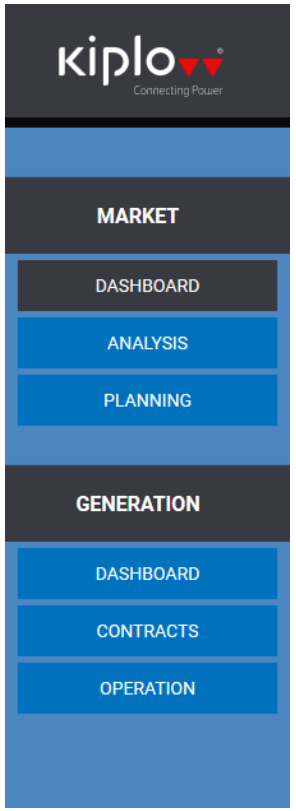
Virtual Power plant manager

- Manage a Virtual Power plant
- Aggregate generation from distributed resources
- Solar, wind, hydro, micro-producers
- Sell generation in wholesale market
- Optimise pool of distributed generation

Flexibility Pool manager

- Participate in balancing and ancillary services markets
- Participate in demand side response programmes
- Improve retail margins
- Minimise imbalance settlements
- Optimise distributed energy flexibility



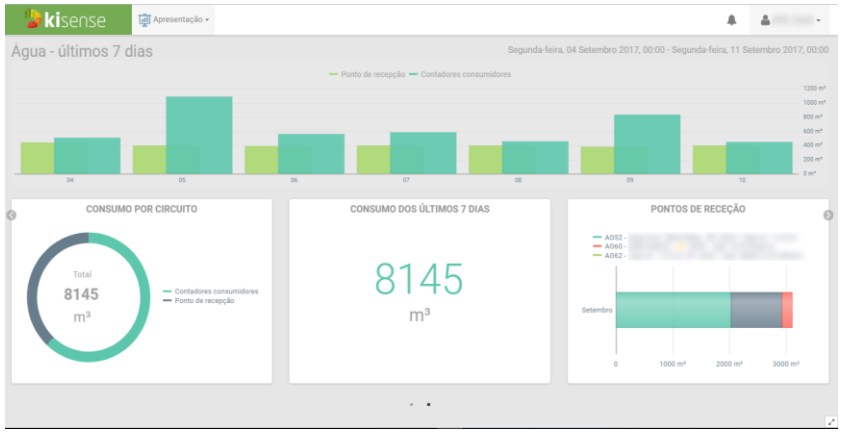
Connected Buildings

Efficient resources management in buildings

kisense
ENERGY OPTIMISER

… the power to do more with less

Energy monitoring and management



Know when, where and how energy is consumed

Define KPI regarding your business

Analyse consumption details

Check renewable generation values

Compare areas and facilities

Check the effects of implemented measures

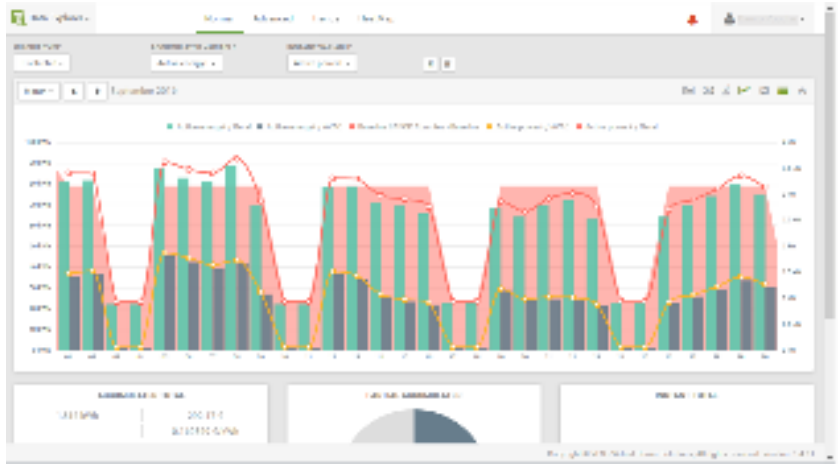
Define baselines

Define measures to achieve savings

Define alarm mechanisms for abnormal and excessive consumption and track savings goals

Control equipment and consumption

Integrate third party systems (AVAC, GTC, BMS, Smart Meters, etc)



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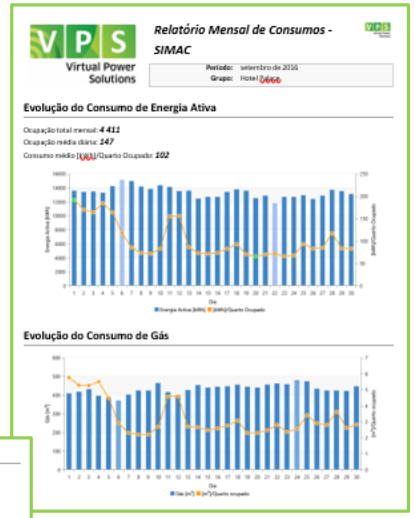
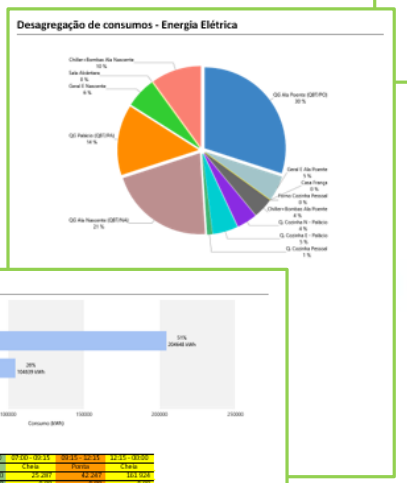
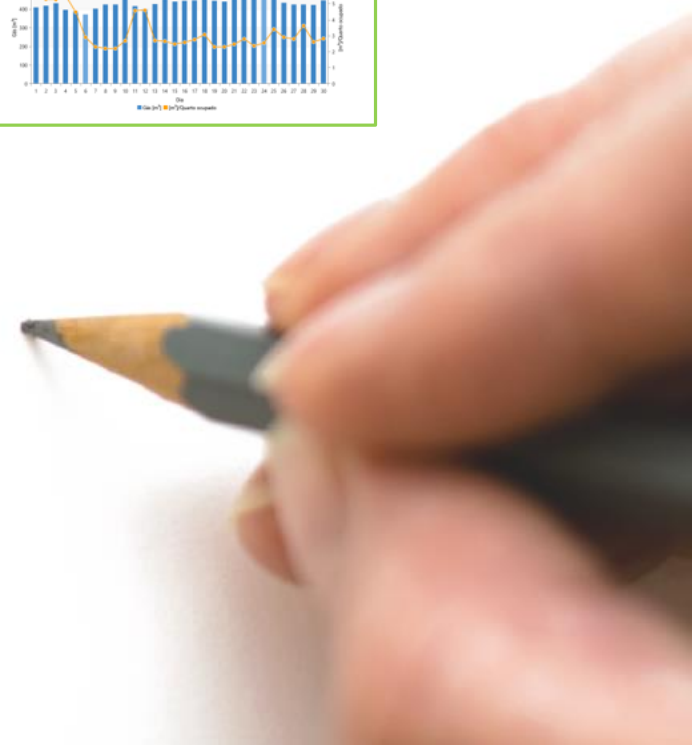
Energy Management Service

A continuous process of energy management is crucial to maximize energy savings. To allow our clients to focus on their business without having to allocate teams to the process, VPS created an energy efficiency management and training unit to support them







Direct Benefits

Definition of Energy regulations, according to consumption profiles

Energy costs reduction

Central management of all facilities

Greater efficiency in management of maintenance equipment, and consequent increase of its lifetime

Reinforcement of sector's sustainability policies along the following vectors:
- Energy efficiency
- Carbon footprint reduction

Indirect Benefits

Improved working conditions for staff: air quality, lighting, conditions, etc.

Improved corporate image with stakeholders - corporate sustainability and eco brand awareness

Improved ecological awareness of staff

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Schools

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Schools represent a significant part of a municipality's energy consumption.

The learnings acquired in the school context have a multiplicative effect at home and in the society.

The educational community spends most of it's day at school.

The school population is a big part of the energy consuming population.

Project goals:

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To promote a **more efficient** use of electrical energy.

Encourage schools to **optimize their consumptions**.

Project goals:

Foster the role of the **educational community as the means to disseminate best practices** in the energy efficiency field.

Foster an **interschools competition to encourage the flourishing of new ideas** and it’s implementation, both at school and at home.

The project includes:

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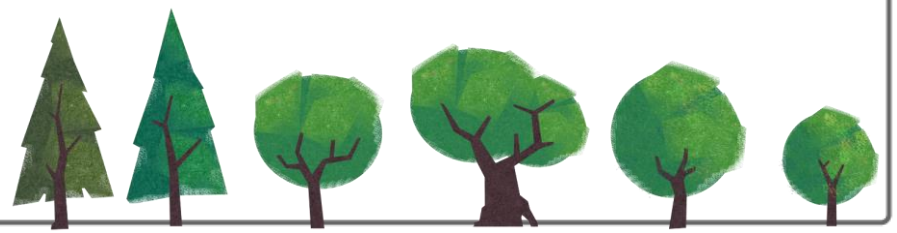
Teaching software, ***BeWatt***, with:

Educational videos, games, ecological forum and other learning and playing activities;

Access to energy consumption, indoor temperature and relative humidity data, allowing us to pool the actual information of the participating schools with the educational reality.

Schools with energy management systems.



Project development

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✓Phase I:

- ✓Monitoring system instalations – electricity, inside temperature and humidity.
- ✓Availability of the educational software – ***BeWatt***.

Teachers training: presentation of the project and ***BeWatt*** software usage.

Project Development

Virtual Power Solutions

Phase II:

Development of educational activities and programmatical contents, **definition of direct actions to optimize consumptions**, and permanently record and promote it's results.

Address **challenges** during the year, the challenges will be directed to the students in **each school year**.

Interschools competition and winner's selection.

Educational Sofware

- Map with 6 adventures:
  Hydroelectric, Solar, Wind, Fossil Fuels, Nuclear and Thermoelectric.

  - Instructional video
  - Information and curiosities (Did you know…)
  - Didactic game
  - Ecological debate

ADVENTURE

Educational Sofware

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- **Progress** – After exploring an entire adventure the student gets stars.
- Stars allow the student to **get virtual equipment** for the school and/or **new clothing items** for the user's avatar.

Progress

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bewatt.energy

Schools

Virtual Power Solutions

beWatt AVENTURA

Expected Results:

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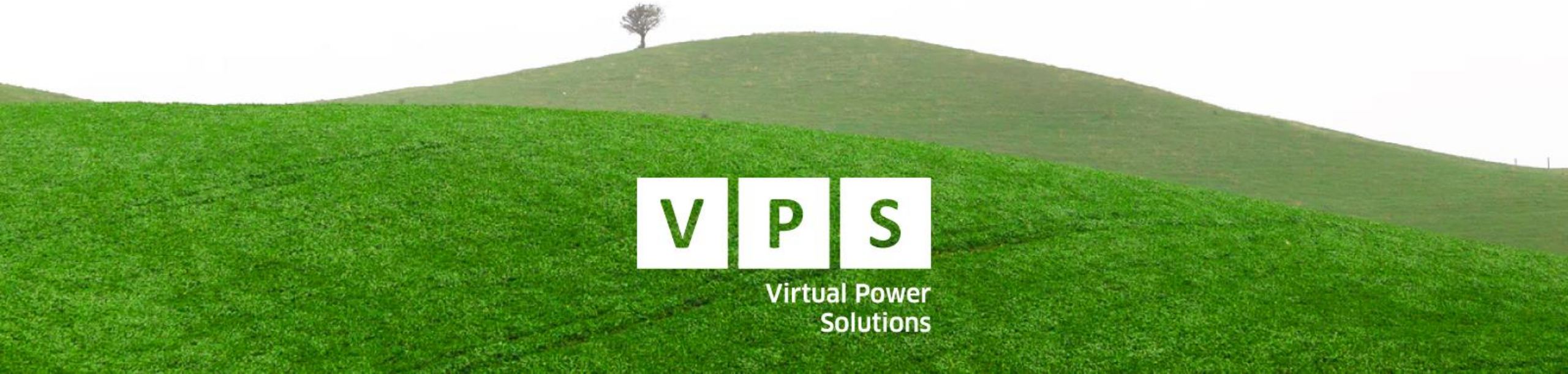
1) Rise of the energy efficiency in the school;
2) Actual cost reduction;
3) Training of the consumers of the future;
4) Engaging families, teachers and other school personnel;
5) Creation of innovative activities thought and implemented by the students;
6) Dissemination of the results and benefits of the project.

Case studies



Business References

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Utilities

Monitoring more than 1000 points over all Hydro Power Plant generation in Portugal and supporting more than 400 industry MV clients with energy management

Industry

More than 150 industries with Kisense Energy Optimiser installed (technology and energy service)

Banks

More than 700 bank branches with VPS's technology and energy service

Hotels

More than 30 hotels with VPS's technology and energy service

Airports

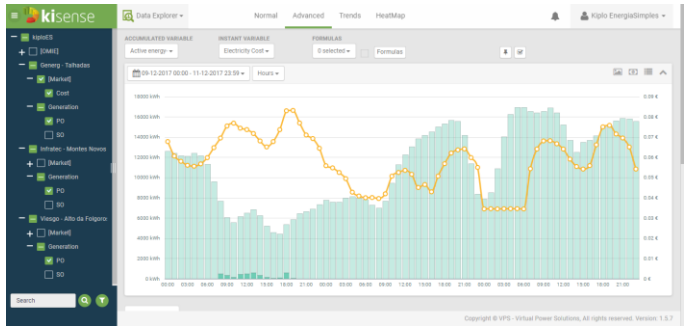
All international Portuguese airports with VPS technology (over 4000 measuring points)

S'mples energia · edp produção · galp energia · Recer cerâmica · MICAU · panidor · Banco Popular · Millennium bcp · Novo Banco · Pestana Hotel Group · The Ritz-Carlton · Vila Galé Hotéis · ANA Aeroportos · VINCI Airports

Retailer and aggregator

Building VPP for generation aggregation and market operations management

- Working with Simples since 2014
- Developing “customized” VPP platform for generation aggregation and market operations management
- Integration of TSO data
- Data integration from Hydro, Wind and Solar Power Plant monitoring systems
- Generation forecast integration
- Big generation for Day-ahead and Intra Day



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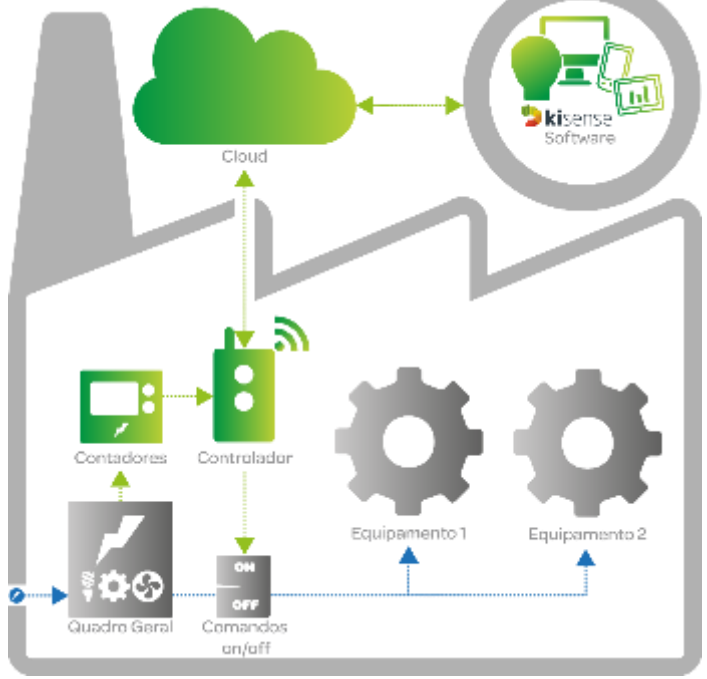
Galp Energy Manager

Energy real time monitoring and remote control in Industries

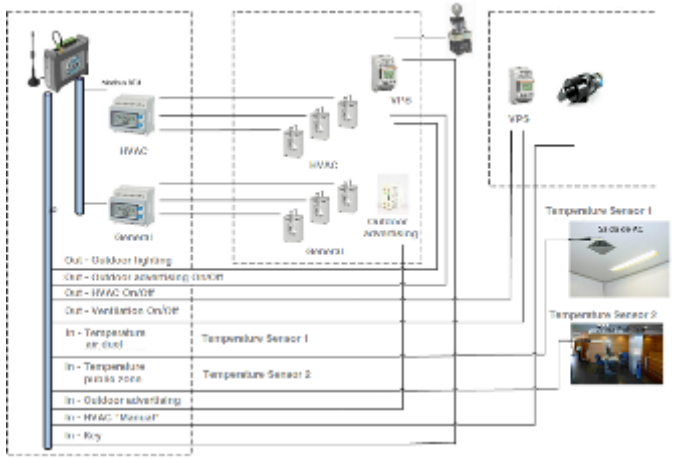
- Working with Galp since 2006
- Deployment of an energy flexibility and energy optimization service in 150 industries
- Setting alarms to detect abnormal consumptions
- Programming tasks and remote control selected circuits and devices in real time
- Automatically moving loads for specific times when energy is less expensive

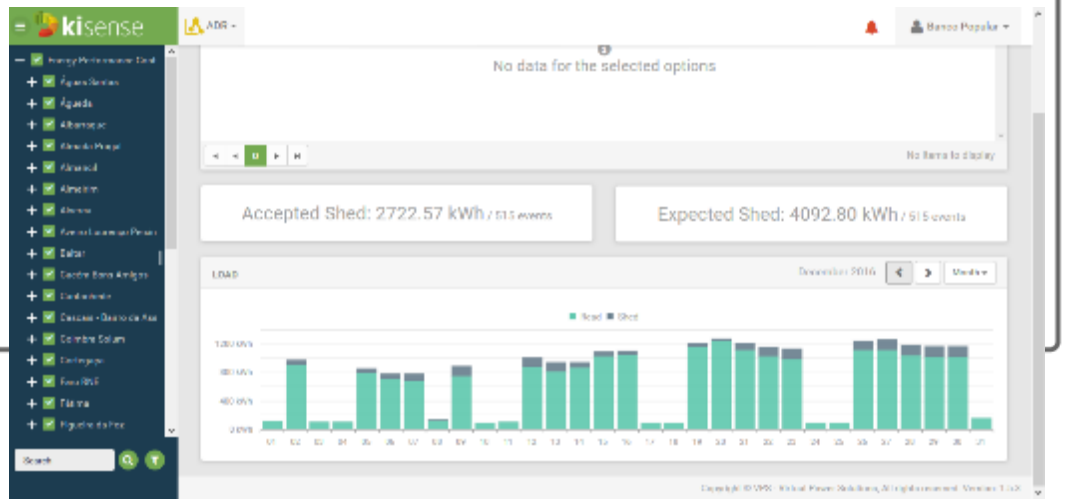


Energy Performance Contract

Efficiency and Flexibility Management in Bank Branches

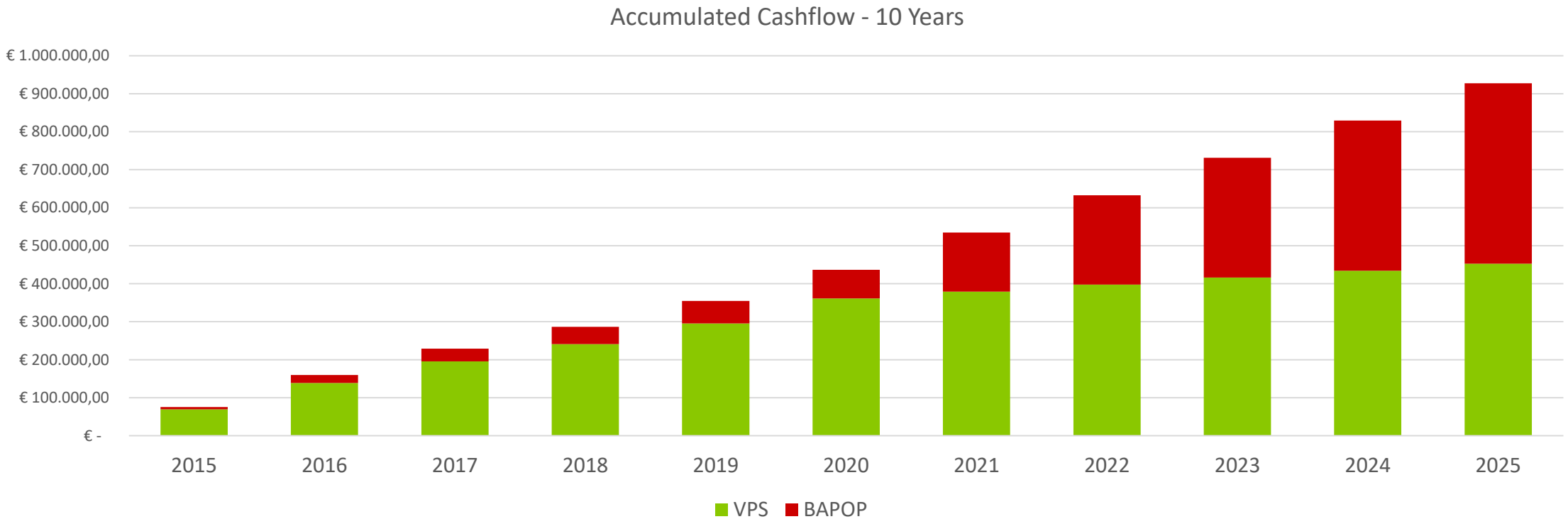
- Working with Banco Popular since 2014
- Monitoring and remote control in 170 bank branches
- Data collected and remote control includes
  - Total active electricity consumption
  - HVAC electricity consumption and remote control
  - Outdoor advertising monitoring and control
  - Indoor lighting monitoring and control
  - Ventilation monitoring and control
- Energy Efficiency savings up to 15%
- Flexibility management savings additional 7%





Energy Performance Contract

- *Total Investment:* ***286 000 €***
- *Total Investment (Per branch):* ***1 683€***
- *Total Savings (2017):* ***69 340 €***
- *Total Savings (Per branch - 2017):* ***613.62 €***
- *ROI:* ***2.6 Years***
- *Client's cost reduction (10 years):* ***474 867 €***



Energy Management Services

> 300 bank branches

NOVO BANCO

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Minimise

Costs

- Real-time information on detailed consumption values
- Energy costs reduction
- Better maintenance planning leads to increased equipment lifetime
- Increased efficiency in energy resources management
- Reduction of inefficiencies, waste and excessive consumption

Savings up to 22%

Annual savings 600.000 €

Payback < 2 years

Pestana Hotel Group

Energy Management Services in 27 Hotels

- Monitoring System
  - Electricity, Gas, Water, Enthalpy
  - Software accessible by Web or Mobile
  - Personalized accounts for each type of users
- Integrations
  - Daily Occupancy
  - Daily Covers
  - Outdoor temperature every 15 min
  - Outdoor humidity every 15 min
- Alarms
  - Daily alarms to all of 20 counters
  - Automatic notifications to Maintenance Team
- Energy Audits
  - Extensive survey of Hotel equipment and infrastructures
- Energy Management
  - Understand Hotel consumption patterns and detect savings opportunities
  - Staff training about platform and daily efficient behaviours
  - New supplier contracts

Pestana Palace

Energy Performance Contract

Full retrofit for energy related equipment

- 2 New chillers with TRANE
- 20 New Water Pumps
- 400 New valves
- 100% LED Hotel
- New Water distribution project to increase efficiency
- Hotel Automation through new BMS
- 80% of average occupation during all project

- *Average Savings:* ***23%***
- *Client's cost reduction (15 years):* ***~ 950 000€***

Check-Inn

Energy Efficiency standards for Portugal's Hospitality

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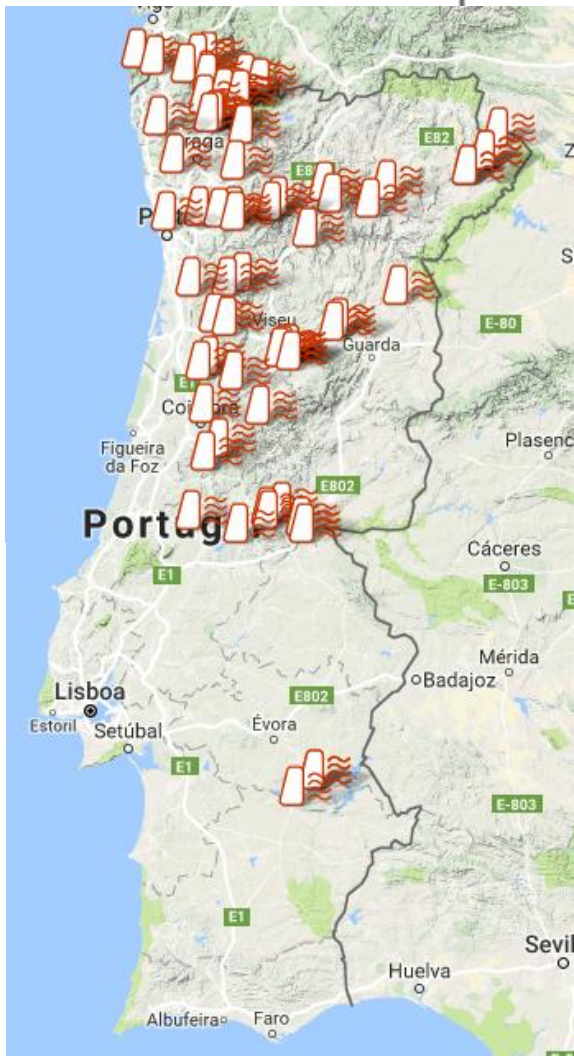
- Working with Algarve's Energy Agency
- 30 Hotels
- TOP 12 biggest chains & Biggest Independent Hotels
- > 150 monitoring points
- Create manual to be sector's standard for Energy Efficiency
- Workshops all over the country
- > 100 hotel staff engaged (Directors, Managers, Engineers, Chefs and etc)

CHECK-INN
ENERGY INNOVATION

Skipper CE Project

Real time monitoring and management of EDP Generation in all its hydro power plants in Portugal

- Working with EDP since 2008
- Develop a complex energy generation monitoring system
- Development of specific software modules to integrate monitoring devices with OSI PI system through DLMS protocol and Landis&Gyr FAG (SCTM) support
- Monitoring more than 1000 points



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European Innovation Reference Projects

… focused in smart grid integration

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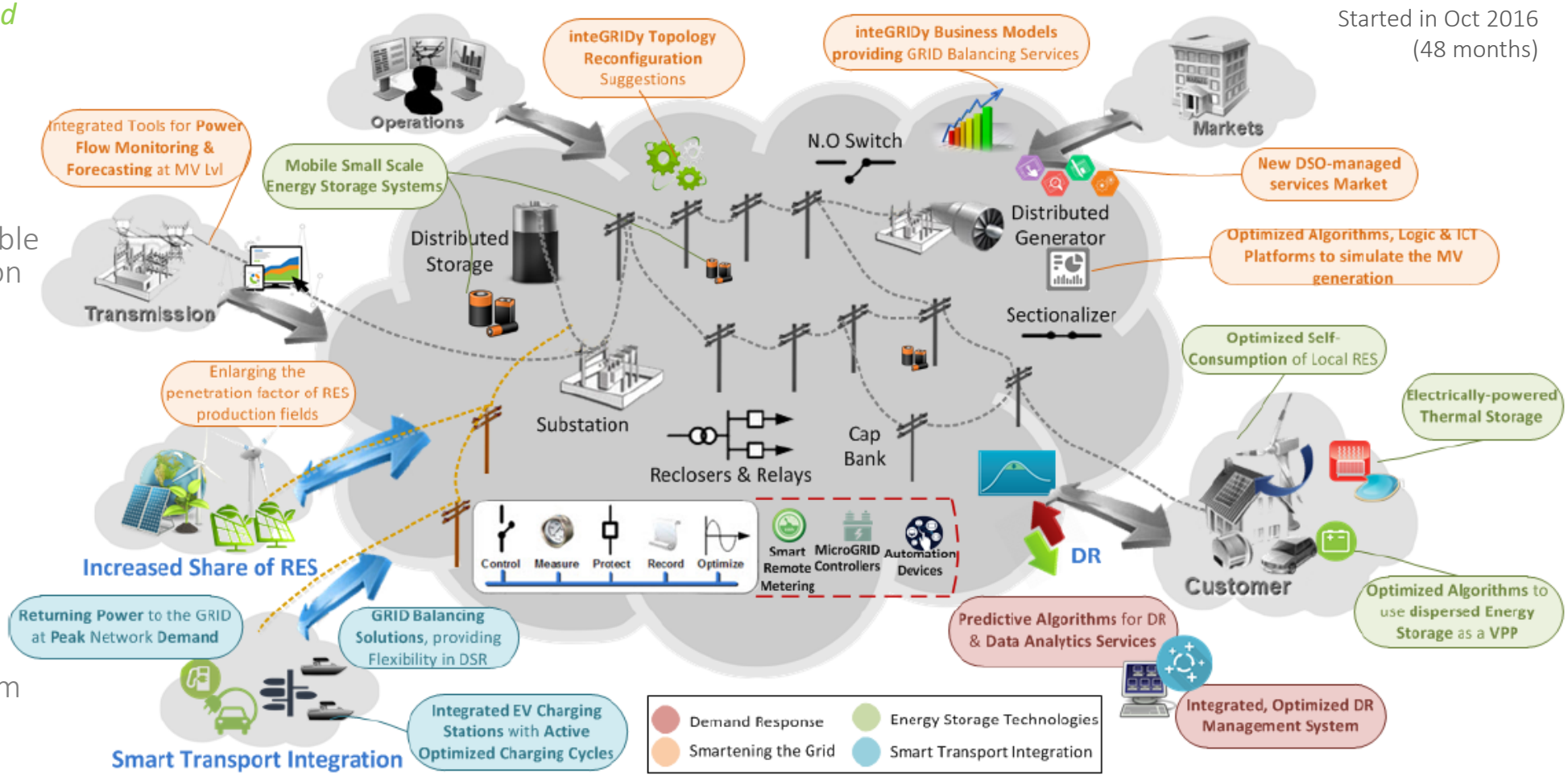
Integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies

Started in Oct 2016
(48 months)

Expected impact

- on operations by reconfigurable topology control & supervision
- on market by providing new services
- on customer by enhanced engagement through DR mechanisms
- on transmission by novel forecasting scenarios for the MV/LV areas
- on part of the production incorporating innovative storage targeting the optimum use of RES
- on environment by CO2 reduction



http://www.integridy.eu/

European Commission | Horizon 2020 European Union funding for Research & Innovation

10 Pilots: Isle of Wright (UK); Saint-Jean de Maurienne; (France); Lisboa (Portugal); Barcelona (Spain); Terni (Italy); Nicosia (Cyprus); Thessaloniki (Greece); Xanthi (Greece); Ploiesti (Romania); San Severino Marche (Italy)

dominoes
market driven distribution grid

… focused on developing new local energy market models

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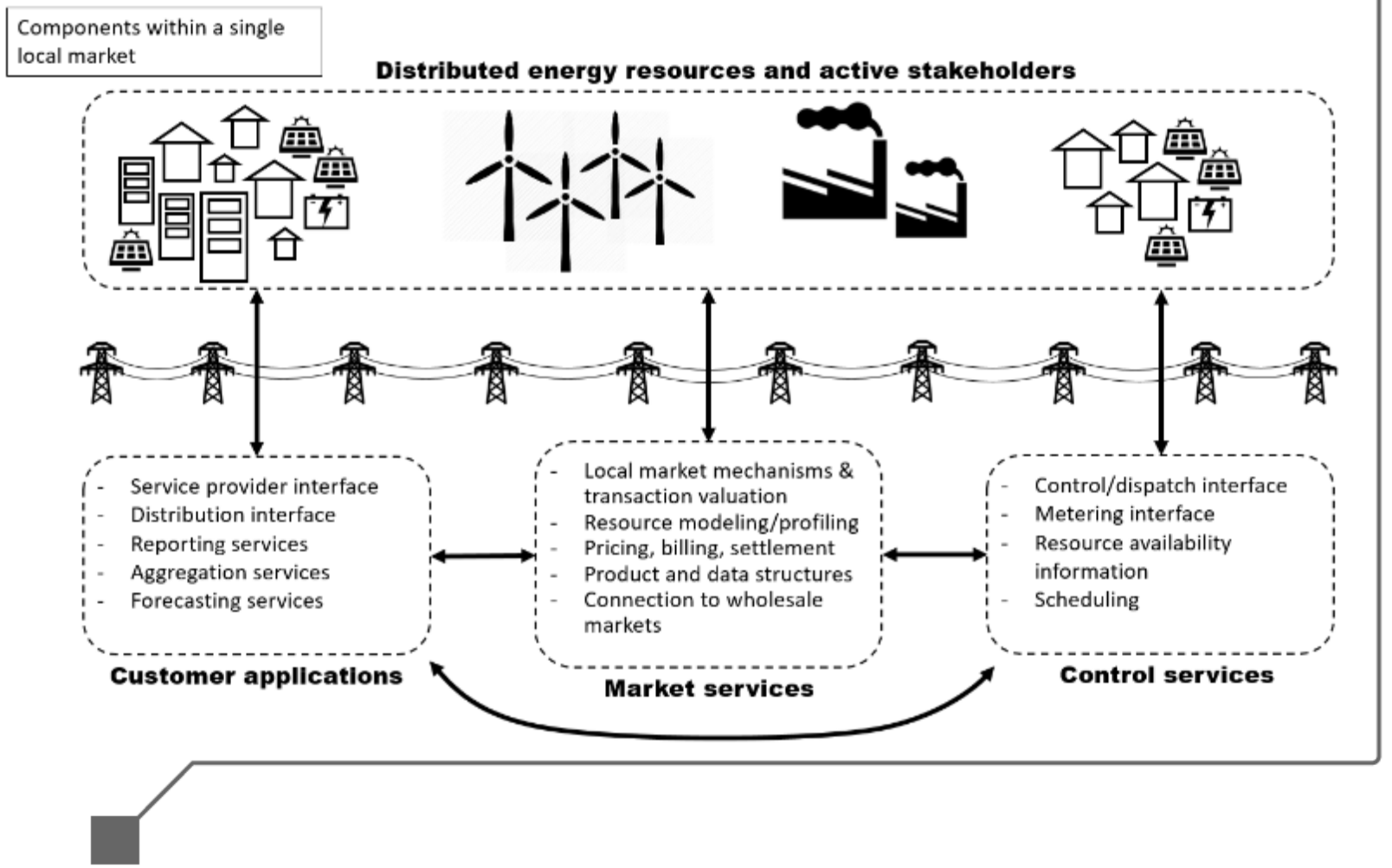
Smart Distribution Grid: a Market Driven Approach for the Next Generation of Advanced Operation Models and Services

- Development of new demand response, aggregation, grid management and peer-to-peer trading services
- Developing and validating a transparent and scalable local energy market solution
- Dynamic grid management with microgrids, ultra-distributed generation and energy independent communities



European Commission | Horizon 2020 European Union funding for Research & Innovation

Started Oct 2017 (duration 42 months)

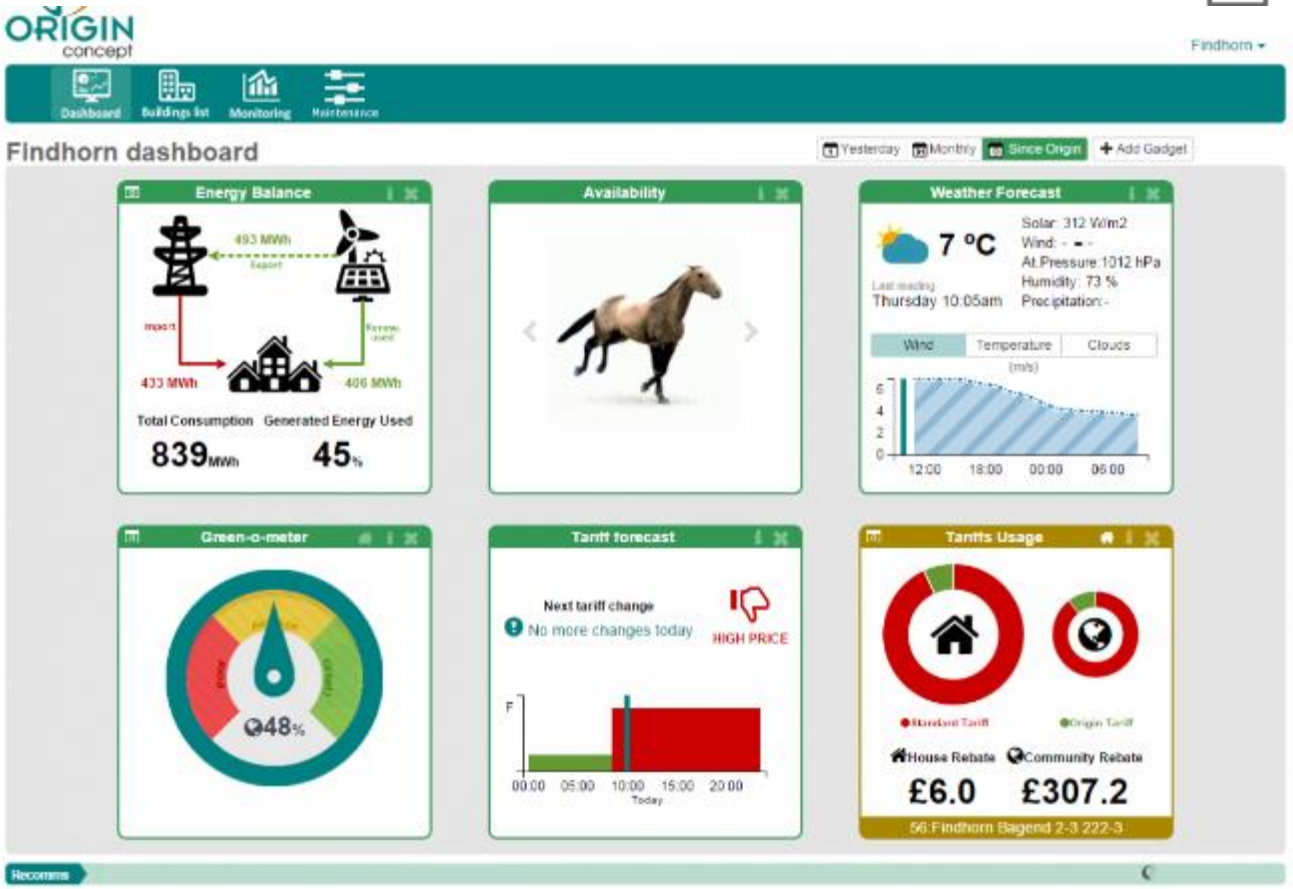
… focused on optimizing local renewable sources, such as wind or solar energy at the community level

Orchestration of Renewable Integrated Generation in Neighbourhoods

Development of a **sophisticated intelligent ICT system for the management of energy in a community**

Included the development and deployment of an **intelligent demand prediction and community scale energy management system**

Pilot sites: Findhorn (Scotland), Tamera (Portugal) and Damanhur (Italy)



http://www.origin-energy.eu

Finished in 2015

… focused on Smart Grids balancing through **neighbourhood demand flexibility**

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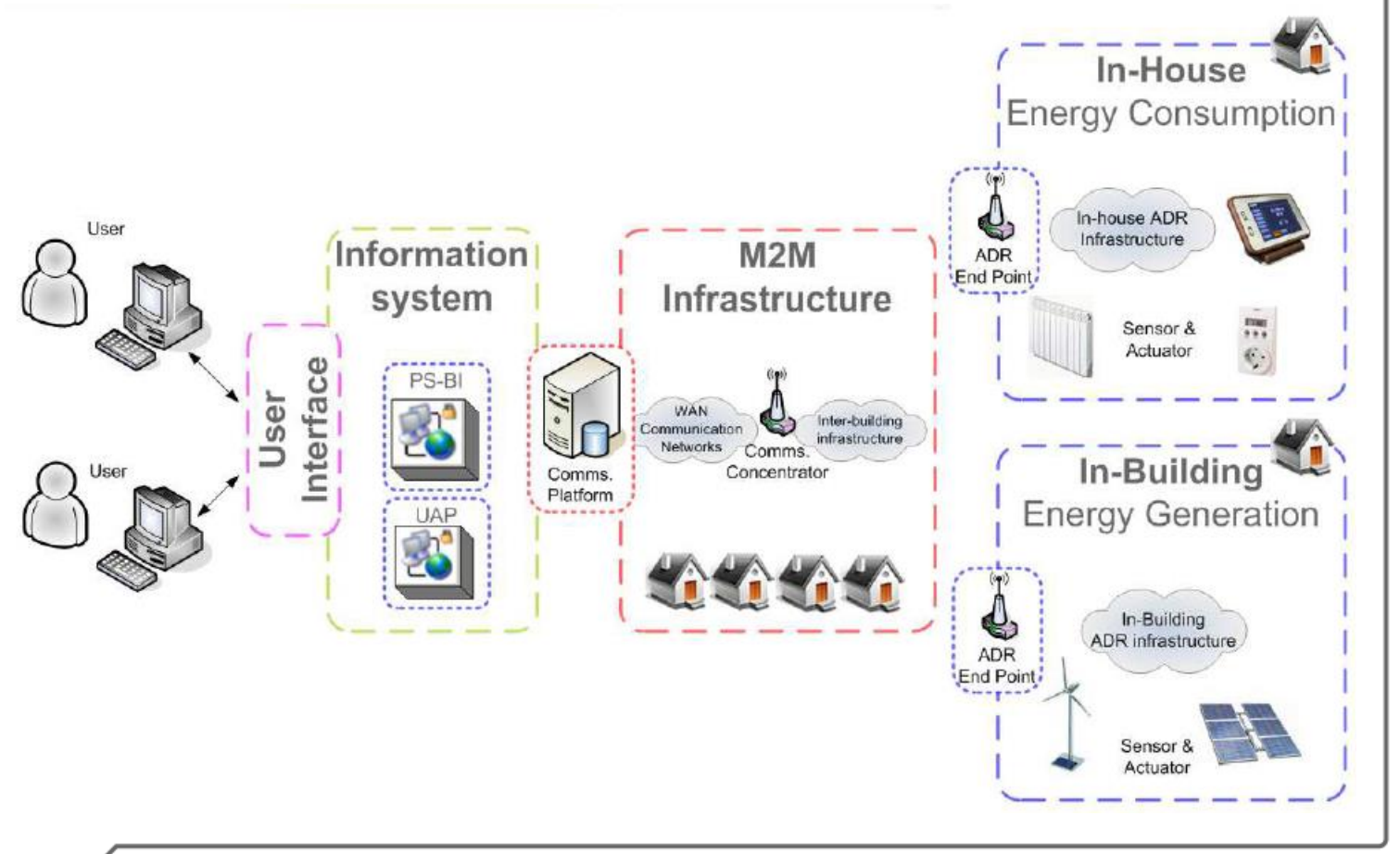
ENERgy Saving Information Platform for generation and consumption networks

- Monitoring usage patterns in households
- Controlling energy generation in green buildings
- Providing advise to users on how to optimize usage
- Integrating at neighbourhood level the demand and the generation
- Providing mechanisms to integrate with other energy grids



https://sites.google.com/a/enersip-project.eu/enersip-project/

Finished in 2012

SEVENTH FRAMEWORK PROGRAMME

Our Research Partners

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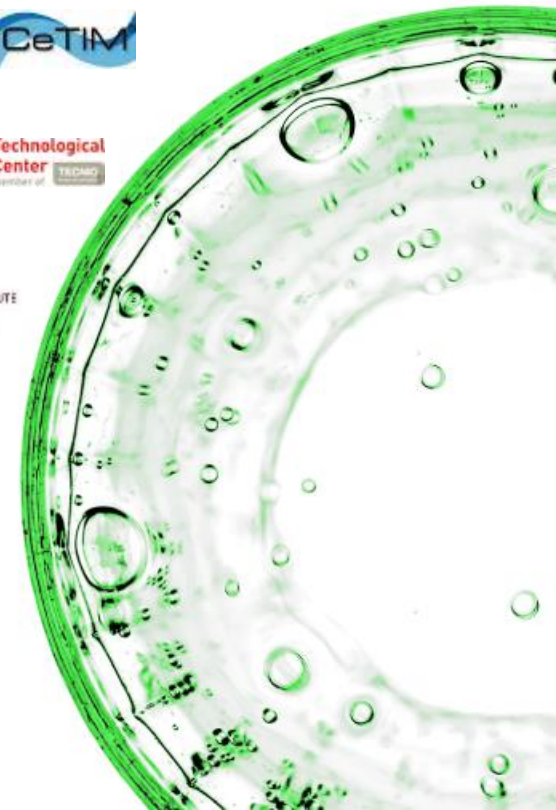

Virtual Power Solutions

Thank you

Thank you

Is an innovative, market leader in the design and operation of dynamic connected platforms, providing real-time granular data to consumers, network operators and utilities. Minimising consumption by increasing energy efficiency, optimising the time of use and realising the monetisation of loads. With over 10 years of experience, VPS has a proven team of experts with a strong track record of providing significant benefits to all stakeholders in the modern energy network.