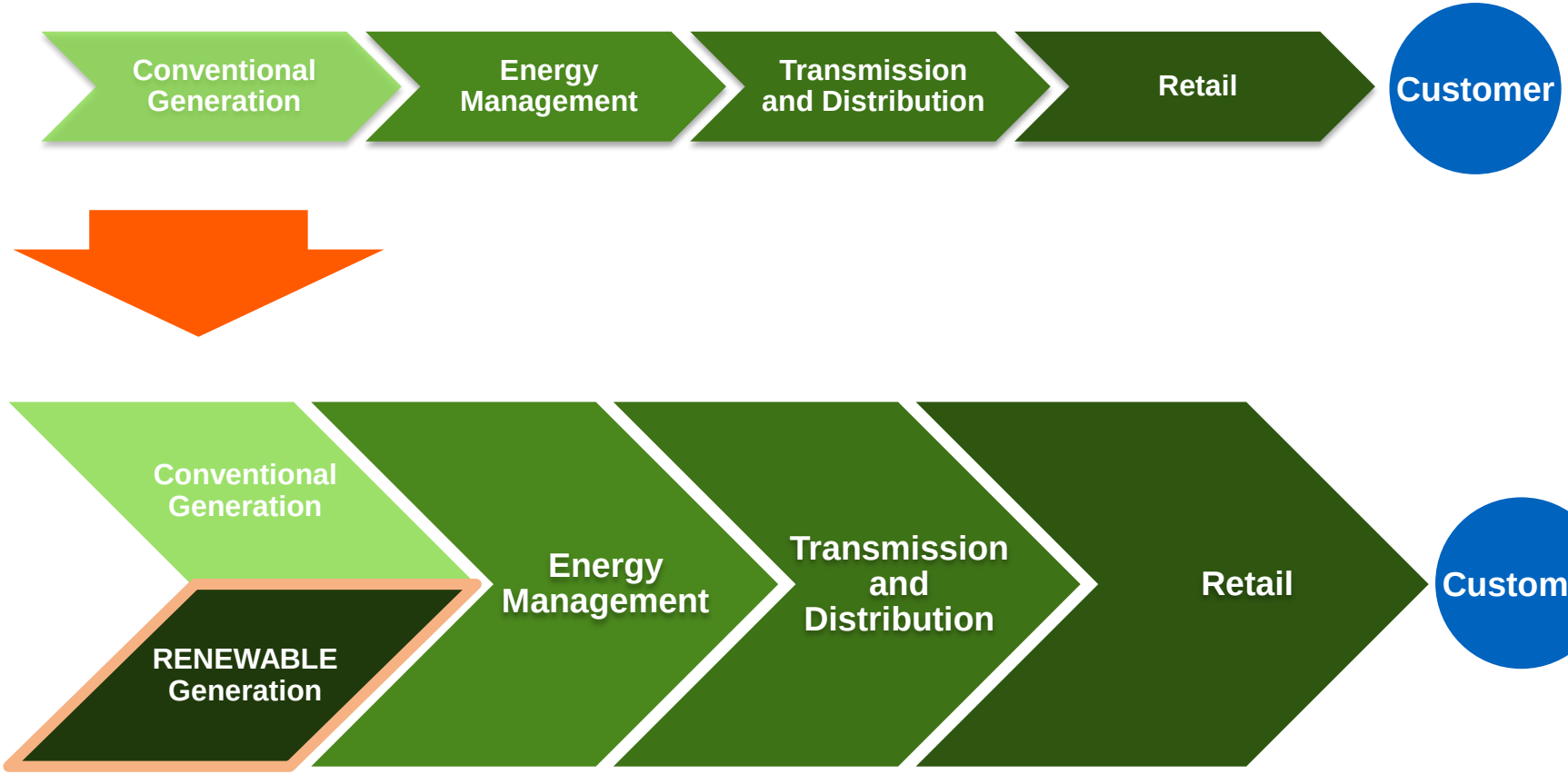
# Future Utility Models
# based on
# Distributed Energy Resources

July 2014

IBERDROLA

# The sector already faced the challenge of renewables …

From a **value chain** based on **conventional generation**…



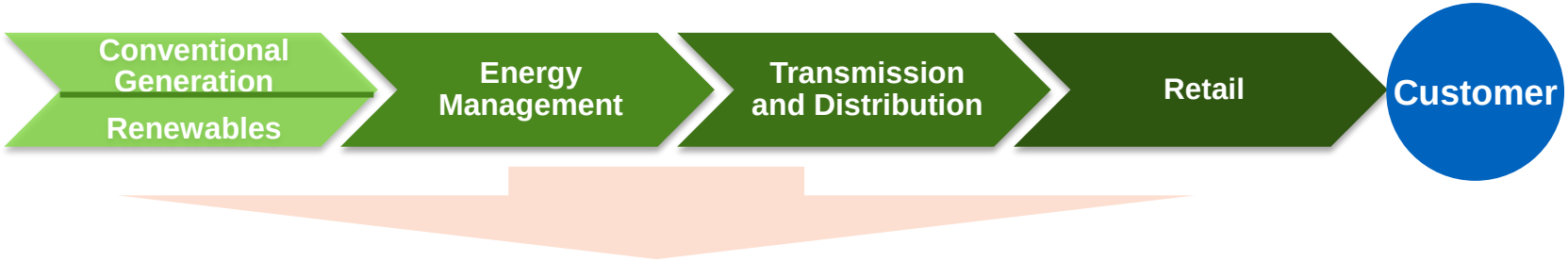

…to successfully integrate a **growing and massive** input of **centralized renewable generation** projects

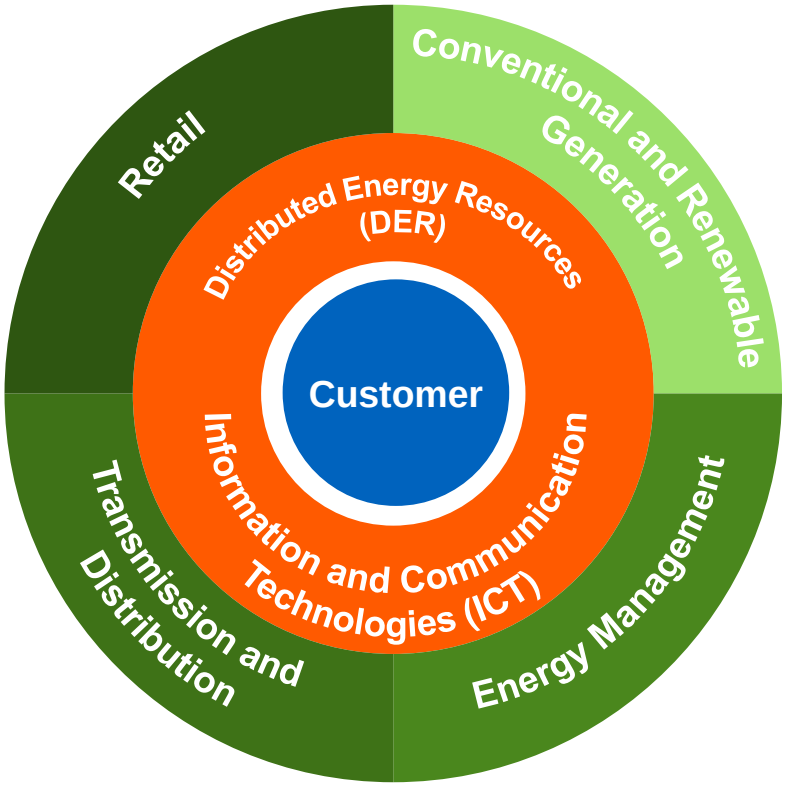
# … with large utilities reacting successfully …

| Traditional Business | | | | Renewable Energy Business |
|---|---|---|---|---|
| Conventional Generation | Energy Management | Transmission and Distribution | Retail | Renewable Energy Generation |
| | | | | **E.ON Climate & Renewables**:<br>Renewable generation subsidiary<br>(2007)<br>5 GW Onshore, Offshore, Solar |
| | | | | **Gaz de France**<br>5 GW Onshore, Offshore, Solar, Biomass |
| | | | | **RWE Innogy**<br>Renewable generation subsidiary<br>(2008)<br>2.8 GW Onshore, Offshore, Solar |
| | | | | **Southern California Edison**<br>4 GW Onshore, Geothermal |
| | | | | **IBERDROLA Renovables**<br>Renewable generation subsidiary (2001)<br>14 GW Onshore, Offshore, Solar, Marine, Biomass |

# … and the industry value chain keeps evolving …

From a **traditional energy model** based on **ASSETS** …




…to an **innovative CLIENT-focused business model**, which uses new facilitators (DER, ICT) to offer **more innovative and competitive products and services**

# … requiring adaptation to new business opportunities

IBERDROLA

| | Energy efficiency / Distributed Energy Resources / *Smart* infrastructures | | |
|---|---|---|---|
| | New companies | Acquisitions /*Joint* Venture | *Corporate Venture Capital* |
| e·on | **E.On Connecting Energies**<br>Distributed Energy Resources<br>e·on | **Matrix (£85M- £100M)**<br>Energy efficiency in commercial buildings UK<br>matrix | **E.On Ventures**<br>SUNGEVITY · orcan · AutoGrid · comverge · NUPHARO · Bloomenergy · FIRSTFUEL |
| GDF SUEZ BY PEOPLE FOR PEOPLE | **COFELY**<br>Energy and Environmental Efficiency<br>COFELY GDF SUEZ | **Balfour Beatty**<br>UK Facilities Management business<br>Balfour Beatty<br>**ECOVA**<br>US Energy Services<br>ecova | **GDF Corporate Venturing**<br>DeMeter · EMERTEC · EnerTech Capital · Capricorn Venture Partners |
| RWE The energy to lead | **RWE/ Partnerships**<br>RWE | **Green GECCO**<br>(RWE Innogy + 29 Municipal Utilities)<br>GREEN GECCO | **Innogy Venture Capital**<br>KIWIGRID · CERAMHYD · mantex · enercast · AIREC |
| EDISON INTERNATIONAL | **Edison Energy**<br>Distributed Energy Resources<br>EDISON INTERNATIONAL | **SoCore Energy**<br>Rooftop solar installations I&C<br>SoCore Energy | Minority Investments<br>Clean Power Finance · OPTIMUM ENERGY |
| IBERDROLA | **Iberdrola Servicios Energéticos**<br>Products and services for energy saving and efficiency<br>IBERDROLA | **In progress** | **PERSEO**<br>stem · INNOVARI · QBotix · climote · elcomax EFFICIENT FUEL CELL TECHNOLOGIES |

# New comers into the sector

Leading companies in other contexts are entering the energy sector, taking advantage of **emerging business opportunities** like distributed generation, smart homes and electric vehicle, among others.

In addition, several of them are committed to **service aggregation**

| Company | Sector | New Energy Business |
|---|---|---|
| Telefónica | Telco | • Through its subsidiary (Telefónica Soluciones de Informática y Comunicaciones de España), approved an extension of its corporate purposes to include electricity retail to large clients |
| Vodafone | Telco | • E-mobility, Smart meters, Grid management, Energy management |
| Google | ICT | • $915M investment in renewable energy<br>• Smart thermostats: Nest Labs' acquisition for $3.2b |
| Chevron | Fuels | • Energy saving systems in buildings<br>• Design of efficient plants<br>• Energy management: Smart meters, analysis systems<br>• Development of renewable energy projects (solar, geothermal, biomass) |
| Volkswagen | Automotive | • Agreement with LichtBlick in Germany for selling micro-CHP to residential and commercial clients |
| Pepephone | Telephony | • PepeEnergy: electricity retailer, fair and tailored rates to end users' needs |
| Grupo Villar Mir | Infrastructures | • Electricity and gas retailer<br>• Energy efficiency services and representation of special-regime producers |

# Two complementary approaches to the energy business

## *Traditional Utility*


- Strategy based on ASSETS
- Resources focused on core business
- Bigger regulatory pressure
- High entry barriers
- Electricity as the main business driver
- High structural costs
- Rooted and traditional corporate culture and values
- Sector under social pressure

## *New Utility*


- Strategy based on the CUSTOMERS
- Flexibility towards facing new business opportunities and approaches
- Less regulatory pressure
- Few entry barriers
- New businesses: diversity of products and services
- New work environment
- Dynamic and adaptive internal culture
- Perception of innovative company

# Change Agents…

## New resources in the energy sector

- Distributed Generation (PV, micro CHP, heat generation, …)
- Distributed storage
- Loads (Demand)
- Data

## Information and Communication Technologies (ICT)

- Smart meters
- Smart grids
- Connectivity
- Mobility
- Cloud computing
- Big data
- Analytics
- Machine learning
- Social Networks
- Gamification
- E-Business …

## Regulation, policies and support schemes

- Unbundling
- Climate change
- Security of supply
- Net metering
- Self-supply
- Efficiency
- ICT
- Feed-in tariffs

…

**Business models based on <u>new products and services</u> applicable and adaptable to any geography**

# ...facilitating an offer based on new products & services

| | | |
|---|---|---|
| Generation and storage distributed assets | Installation, management, O&M and/or financing of distributed generation and/or assets management for residential, commercial and industrial customers | SolarCity |
| Energy demand management and optimization | Use of smart appliances to optimize and generate demand and cost efficiency in electrical and thermal loads | ENERNOC Get More From Energy |
| New products & services portfolio (customer data) | Follow-up and excellence services in distributed energy systems. Engagement through exhaustive customer intelligence towards a more costly and efficient use of energy | OPOWER |
| Distributed assets' aggregation | Building of micro-grids, VPPs, zonal aggregated systems and Community Choice Aggregations. Decentralized energy systems design and operation | SIEMENS |

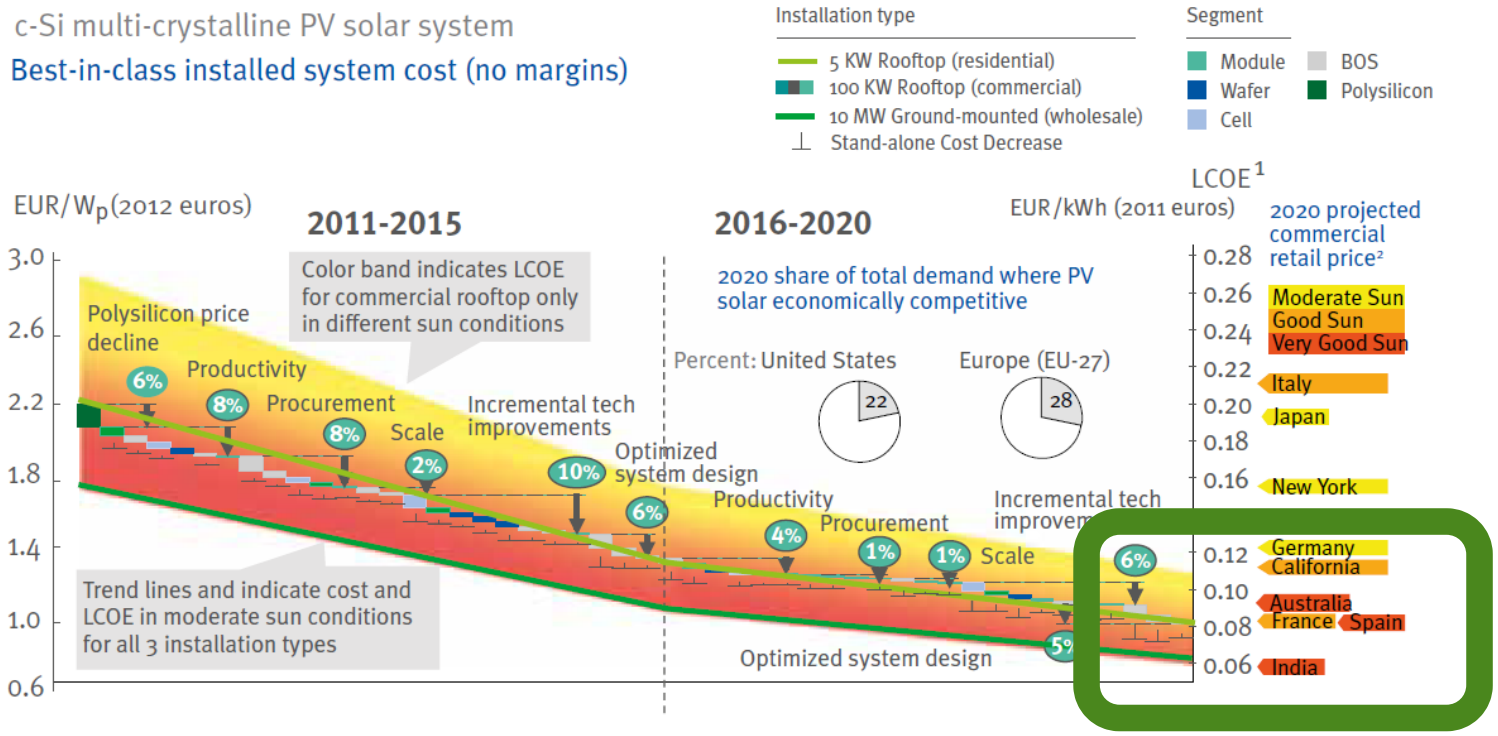
# Distributed Solar: PV perspectives

## Solar PV

2012 Cost ~ 2€/Wp (LCOE ~150-100 €/MWh)

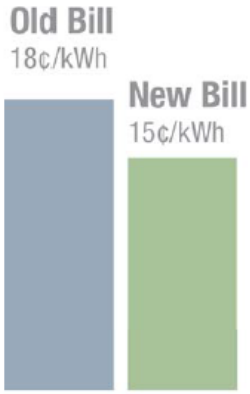
2020 Cost ~1€Wp (LCOE ~ 100-60€/MWh)

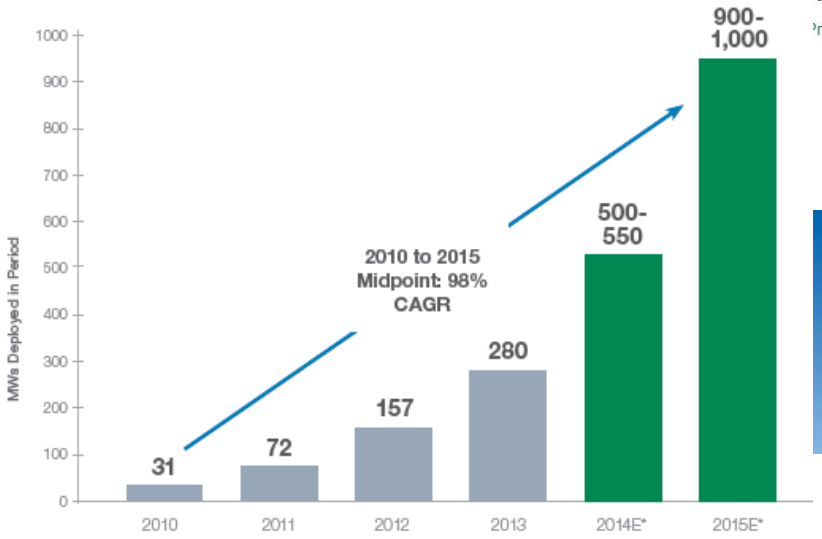
World capacity (2012 →100GW; 2020→350GW?)

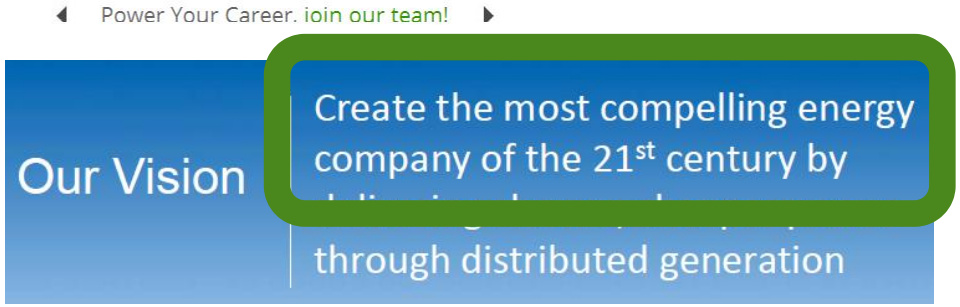



*Source: Mckinsey*

# Distributed solar: SolarCity

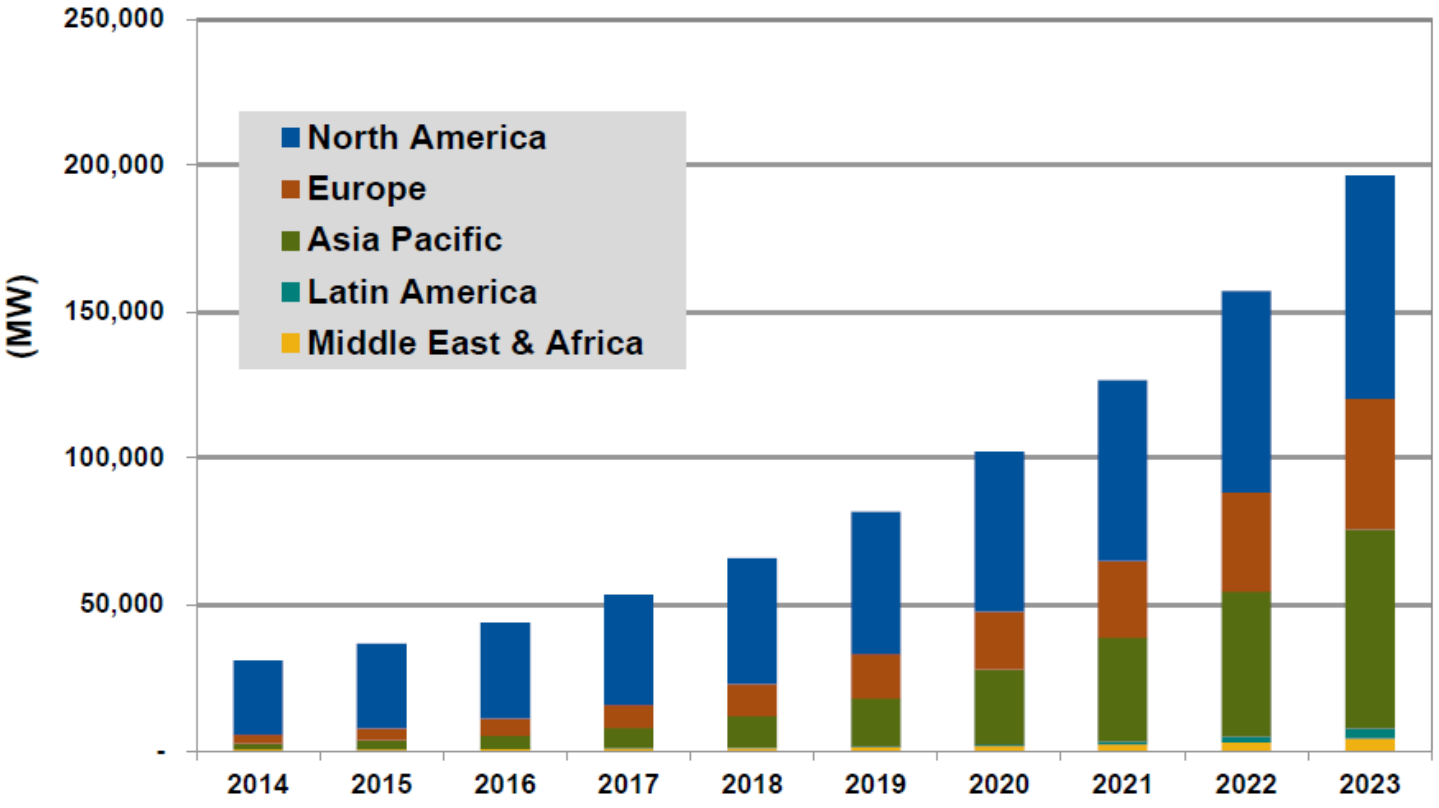



# Demand response

*Chart 1.1 DR Capacity by Region, World Markets: 2014-2023*




*(Source: Navigant Research)*

# Demand response: Enernoc

ENERNOC
Get More from Energy

for business | for utilities | solutions | our network | resources | contact us


**Take Control of Your Energy Bill**

Our *Peak Demand Management 101* guide teaches you how to tame costly demand charges

Get the guide

## Powerful Energy Intelligence Software

**Commercial Buildings and Institutions**

Unlock smart solutions to use less energy, identify waste, and optimize your portfolio.

READ MORE

**Industrial and Manufacturing Facilities**

Gain visibility into your energy use and take control of costly peak demand charges.

LEARN HOW

**Utilities and Grid Operators**

Are you a utility, system operator, or energy retailer? We can help you meet your demand -side management goals.

FIND OUT MORE

**$879,188,192**
Dollars Saved

**19,315,671**
Tonnes of $CO_2$ Saved

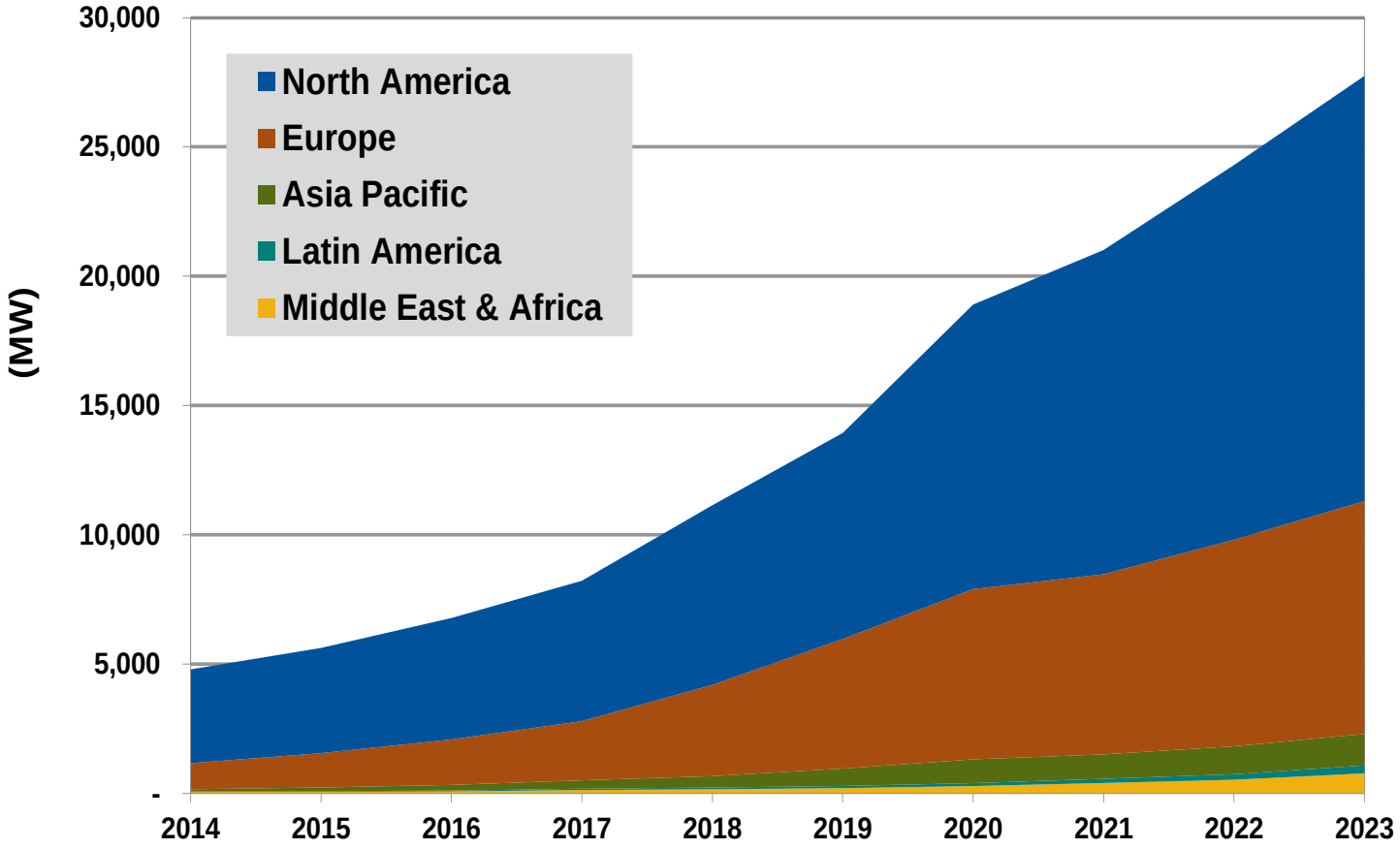
**85,411,426 MB**
Data Streaming into Our NOC

**$15,100,000,000**
Energy Spend Under Management

**24,000-27,000MW**
Peak Load Under Management

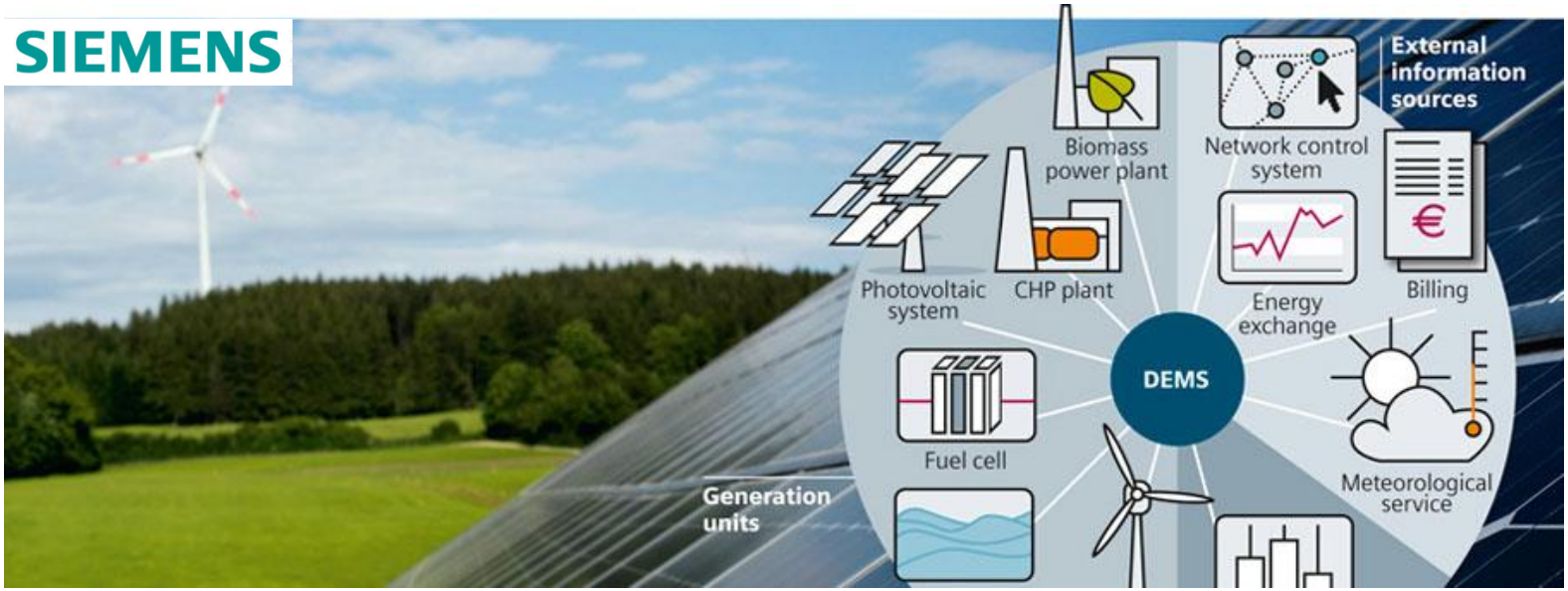
# Virtual Power Plants

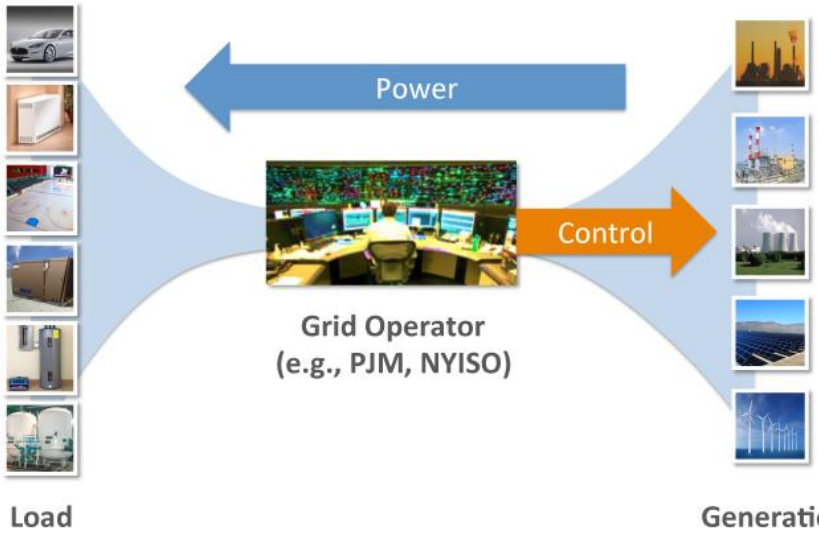
*Total Annual VPP Power Capacity by Region, Base Scenario, World Markets: 2014-2023*

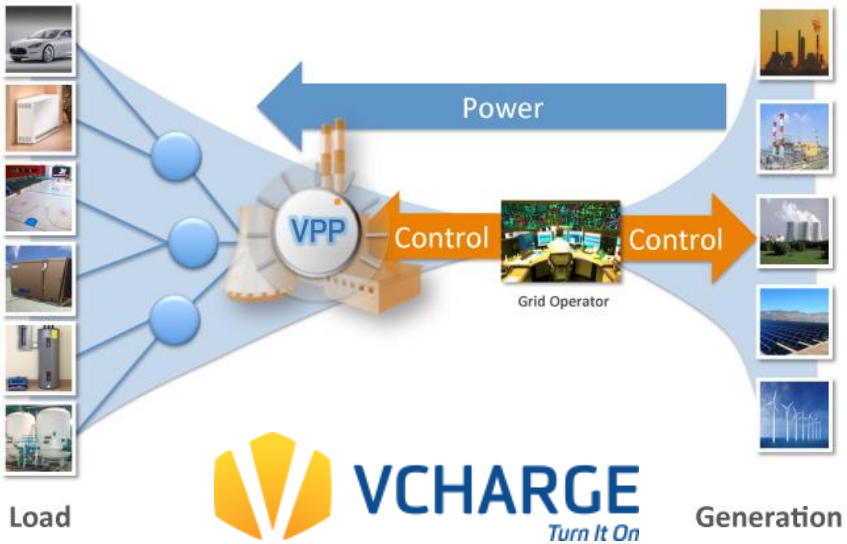


# Virtual Power Plants

IBERDROLA



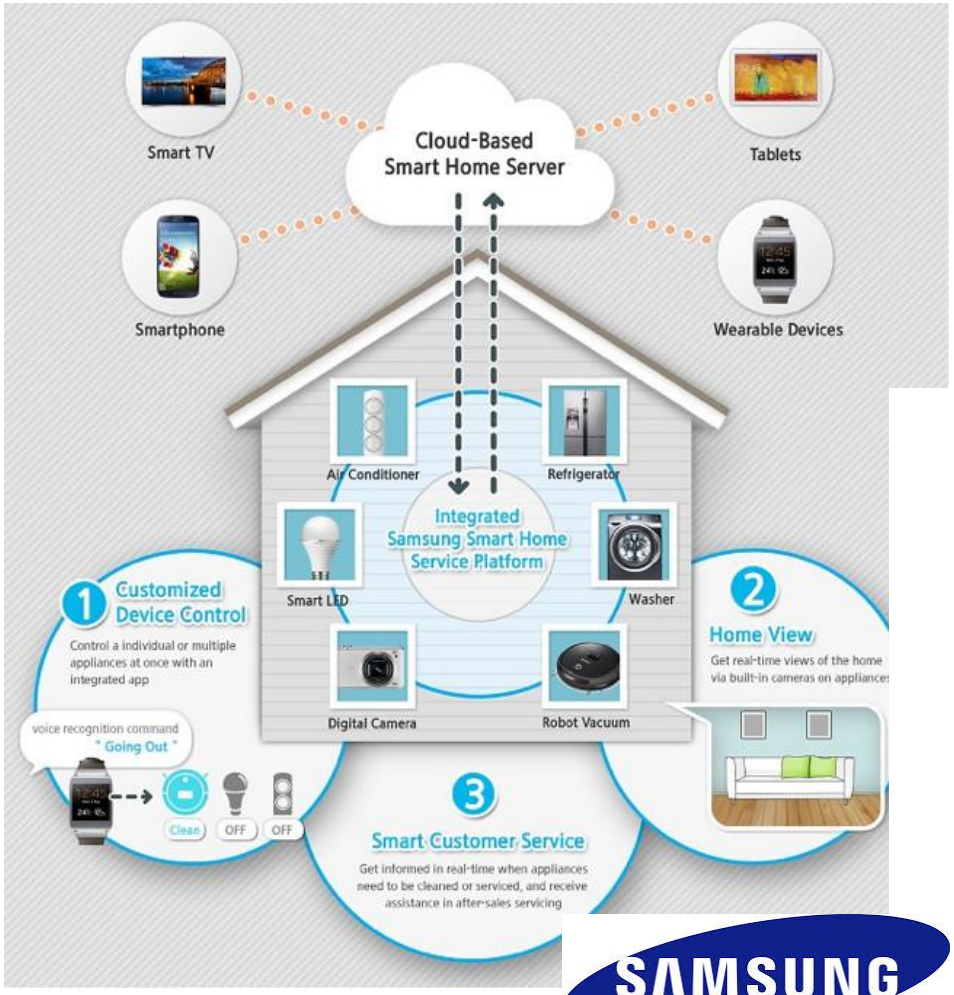




VCHARGE
Turn It On

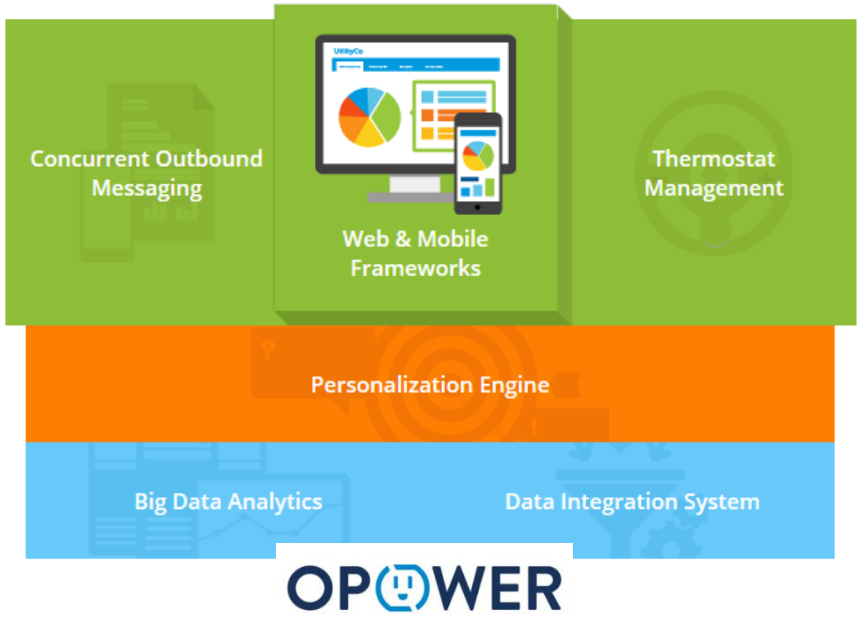
# Data: New ways to engage with the client

IBERDROLA




SAMSUNG


nest




OPOWER

# Growing competence with an innovative P&S portfolio

IBERDROLA

## Distributed assets

- Bloom energy
- SUNGEVITY
- AWANGO by TOTAL
- SolarCity
- Trinity SOLAR
- NautilusSolar
- Dimplex
- TESLA
- ecova
- stem
- SoCore Energy
- AQUION ENERGY
- SONNEN-BATTERIE
- GE Energy Storage
- LG Chem
- OptimumEnergy

## Demand generation & optimization

- INNOVARI
- ENERNOC Get More From Energy
- nest
- KIWIGRID CONNECTING ENERGY
- comverge
- BuildingIQ
- SIMPLE energy
- SIEMENS
- GRIDPOINT

## Customer data management

- OPOWER
- ENERNOC Get More From Energy
- Powerit Solutions
- wireless glue
- AutoGrid
- Energy
- tollgrade
- DEMAND energy Take charge.
- SPACE-TIME INSIGHT

## Aggregation & optimization

- Sonoma Clean Power
- MCE
- SIEMENS
- EnBW
- SW//M Stadtwerke München
- RWE
- npower
- SOM energia
- ZENCER TU ENERGIA

# Future Utility Models
# based on
# Distributed Energy Resources

July 2014

IBERDROLA