# Status of Demand Response in Europe

**Jessica Stromback,**
**Smart Energy Demand Coalition**
EPFL Lausanne Switzerland
Sept 10th, 2015

SEDC
Smart Energy Demand Coalition

# The Smart Energy Demand Coalition (SEDC) is an European Industry Association with approximately 45 members

# *“In order to change the future you must challenge the present”*

***The SEDC Moto***

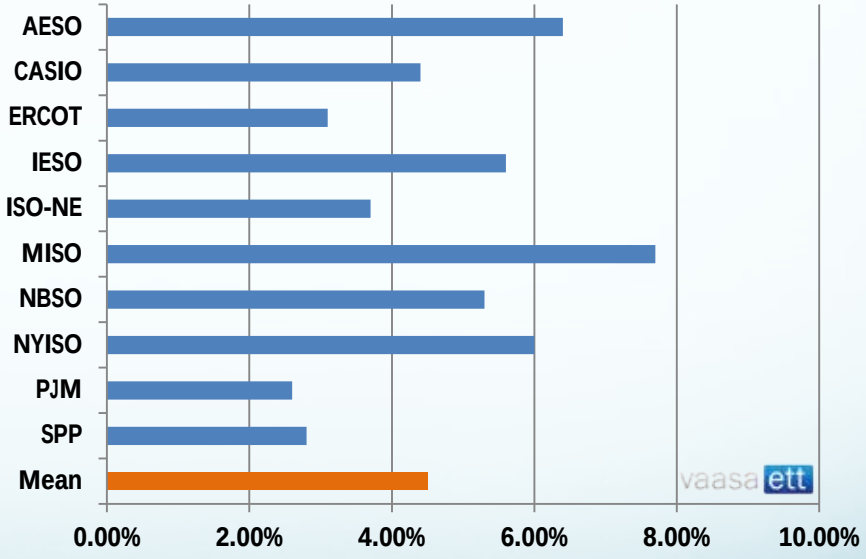
DR is the only none-subsidized resource in the energy markets today

# Demand Response – *The People Power Resource*

**Why Care? USA - As of 2014, over 3.5* billion Euros earned by the local economy annually through Demand Response**

***7 years after market opening 29 GW under Demand Response programs***

§USA Multi Billion $ Business Direct Revenue + avoided investments in generation
§Demand Response "took off" in 2005 with Demand Side access to capacity markets
§Average estimate peak clipping 8-11% US (FERC)
§Average estimate possible peak clipping 6-13% Europe (SEDC)
§Developed & developing nations looking at DR for peak clipping purposes: Canada, Australia, South-Korea, Singapore, Japan, India, Brazil, China etc.

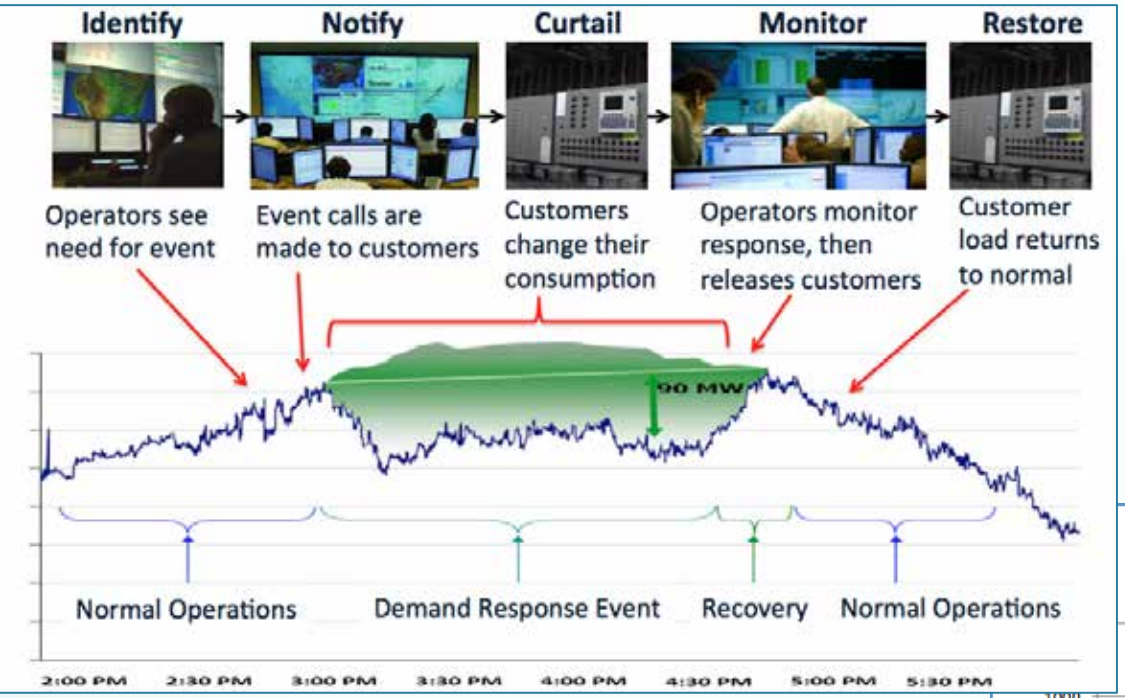



***A total of 66 GW were under some form of control, making up 9% of total US national capacity** (source FERC)*

*Joule Assets

# Aggregation Seviced KEY for successful DR

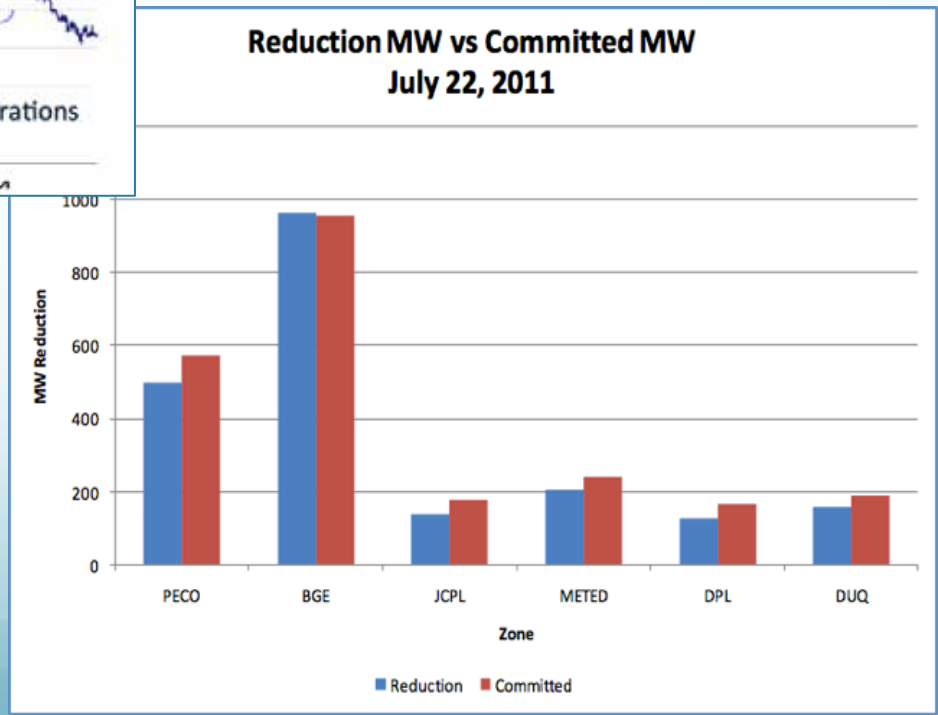
## Aggregator can be third party, utility, or retail supplier




**Aggregated Demand Response: a reliable source of flexible capacity**

**The aggregator collects multiple customers with multiple loads**

electric heating, freezers, refrigeration, fans, lighting, pumps, grinders, smelters, …

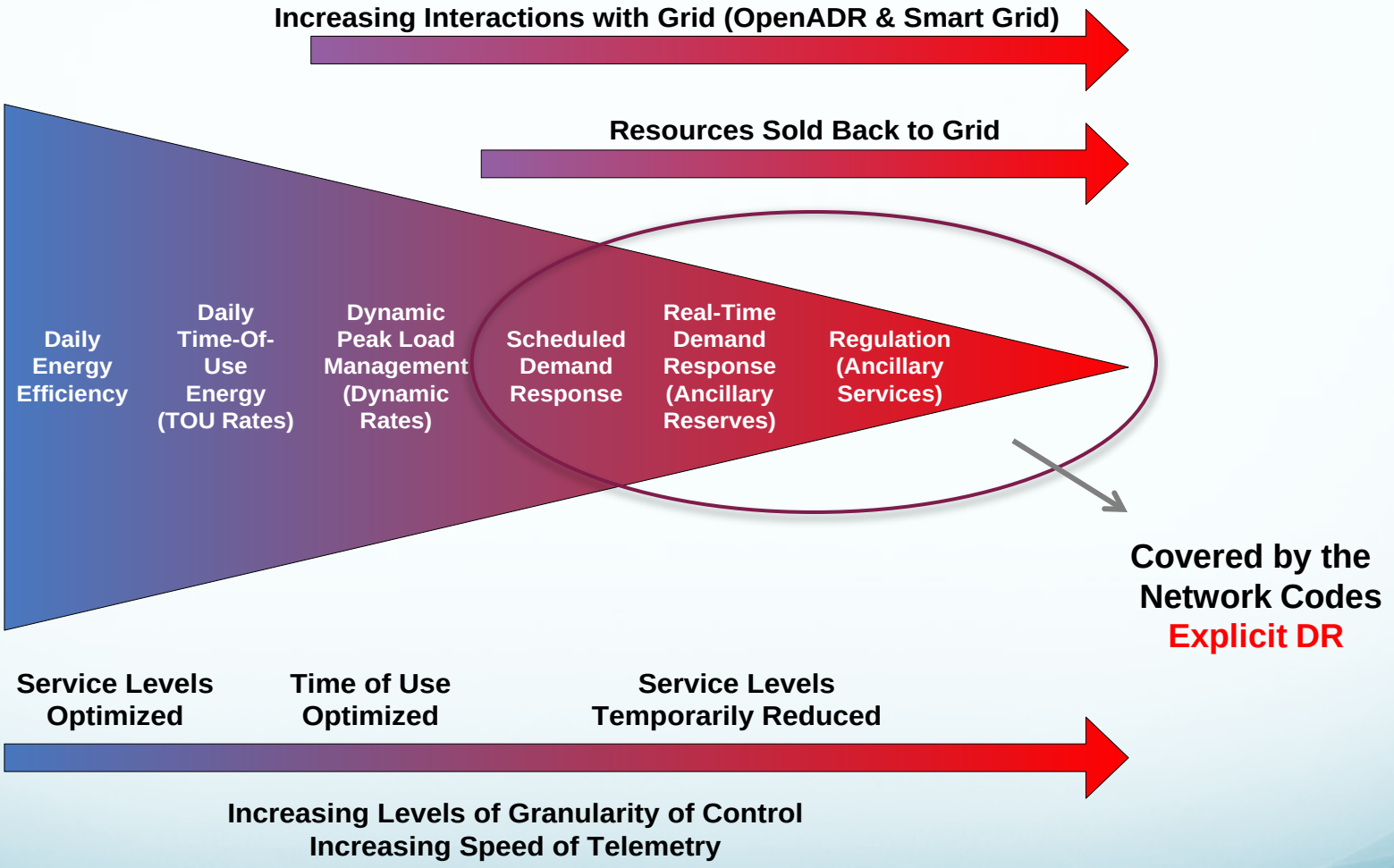



**PJM 2011 Final Emergency Load Management (ILR/DR) and Economic Demand Response summary.**

# Demand Response
# Economic Energy Dispatch

8/17/2009: Via phased DR, 75MW of expensive generation avoided

# State of the Art Integrated, Automated Demand Response for Control Centers




**Demand can participate:**

- **2 second, 30 second, 2 min 1 hour, intra-day...**

Time Scale of DR
Source: LBNL

# SURVICE IS KEY
## Demand Response Back Office

SEDC
Smart Energy Demand Coalition

**Identify**

Operators see need for event

**Notify**

Event calls are made to customers

**Curtail**

Customers change their consumption

**Monitor**

Operators monitor response, then releases customers

**Restore**

Customer load returns to normal

# Aggregation Service Role

- **Handle communication, registration requirements**
  - Real-time metering takes place at the level of the aggregator
  - If necessary the  then passes on the individual measurements of the consumers actions
  - Handle measurement and verification requirements
  - Secure standardization of communication interfaces

- **Calculate and report baseline and saving change**
  - Use an already existing methodology that has been proven to be sufficiently accurate to allow for fair payment and adequate reliability

- **Handle penalty and payment structures (for example reserves)**

# Aggregation enables reliability

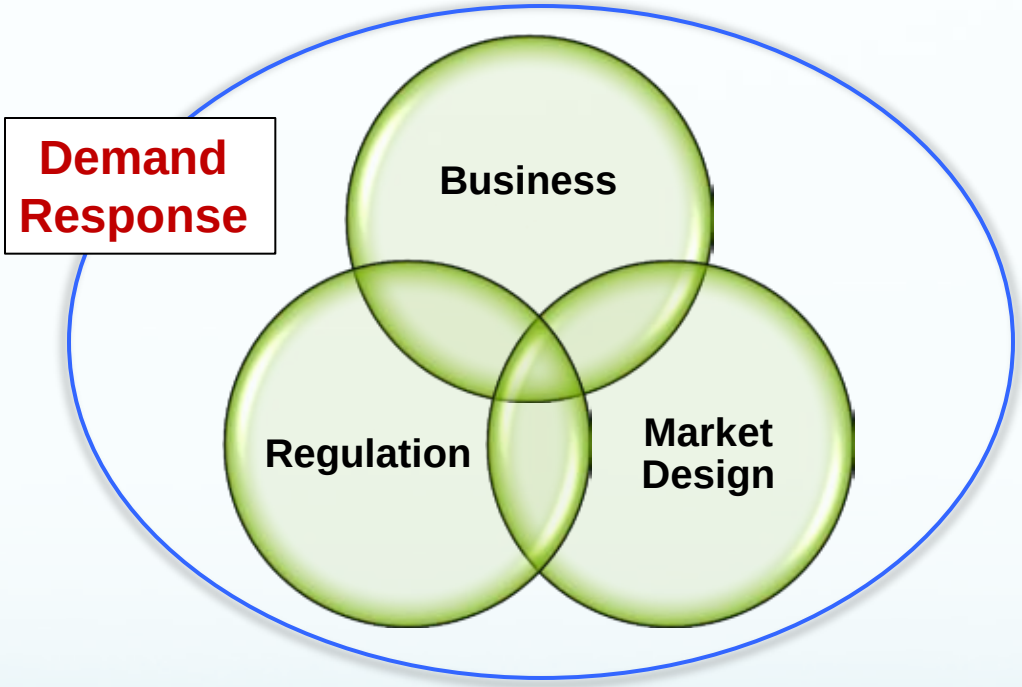
| Zone | Committed ICAP (MW) | Reduction (MW) | Over/under performance (MW) | Performance (%) | Re-test (%) |
|---|---|---|---|---|---|
| AECO | 43 | 67 | 24 | 155% | 9% |
| AEP | 1094 | 1674 | 580 | 153% | 0% |
| APS | 451 | 566 | 115 | 125% | 0% |
| ATSI | 640 | 868 | 228 | 136% | 0% |
| BGE | 667 | 1369 | 702 | 205% | 0% |
| COMED | 901 | 976 | 75 | 108% | 61% |
| DAY | 126 | 179 | 53 | 142% | 56% |
| DEOK | 244 | 287 | 44 | 118% | 46% |
| DOM | 731 | 938 | 207 | 128% | 0% |
| DPL | 122 | 149 | 27 | 122% | 2% |
| DUQ | 76 | 105 | 28 | 137% | 0% |
| EKPC | 123 | 132 | 9 | 108% | 0% |
| JCPL | 120 | 159 | 39 | 132% | 39% |
| METED | 188 | 239 | 50 | 127% | 0% |
| PECO | 341 | 408 | 67 | 120% | 7% |
| PENELEC | 241 | 270 | 29 | 112% | 0% |
| PEPCO | 184 | 253 | 69 | 138% | 6% |
| PPL | 503 | 628 | 124 | 125% | 4% |
| PSEG | 361 | 400 | 39 | 111% | 0% |
| RECO | 2 | 3 | 1 | 125% | 0% |
| Total | 7158 | 9668 | 2510 | 135% | 12% |

**Figure 1: PJM, Load Management Performance Report – 2014/2015. Load Management commitments, compliance, and test performance (ICAP) for Limited Summer product, DY2014/15,**

# Business models

# DR Success is a Process

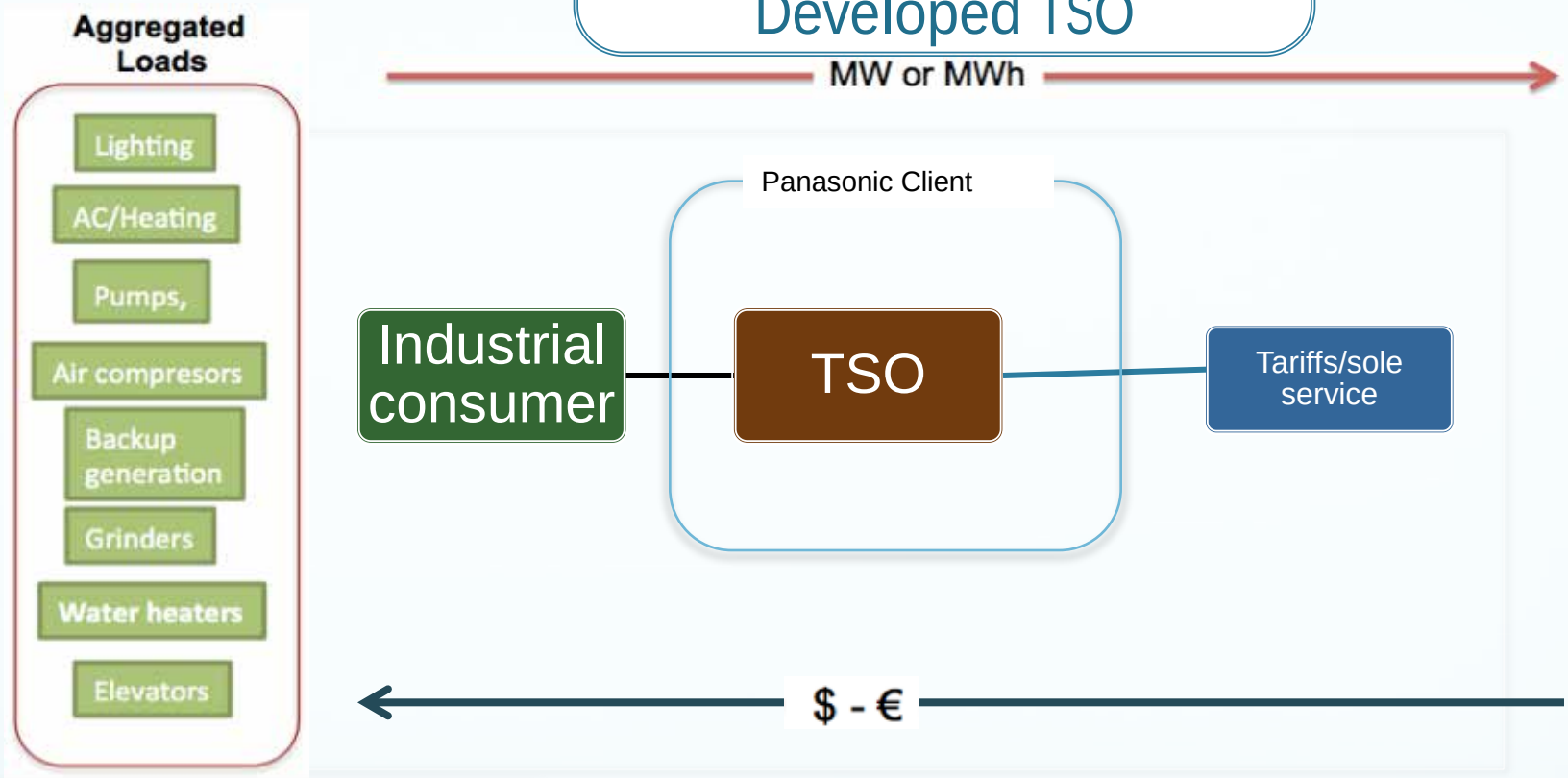
May need different requirements from different resources to deliver the same product




Market development is a process – gain one level of uptake then adjust

**Pay attention to product details and requirements**

# Market Structure Developed TSO




## Value Areas for Market Players

### Potential

- Low Potential if this is the only market
- Technology Provider: Bundle software

### Strategy

- Use as a differentiator
- First entrant advantage

### Risk: Types of Response

- Low risk
- Money spent developing software

### National Markets

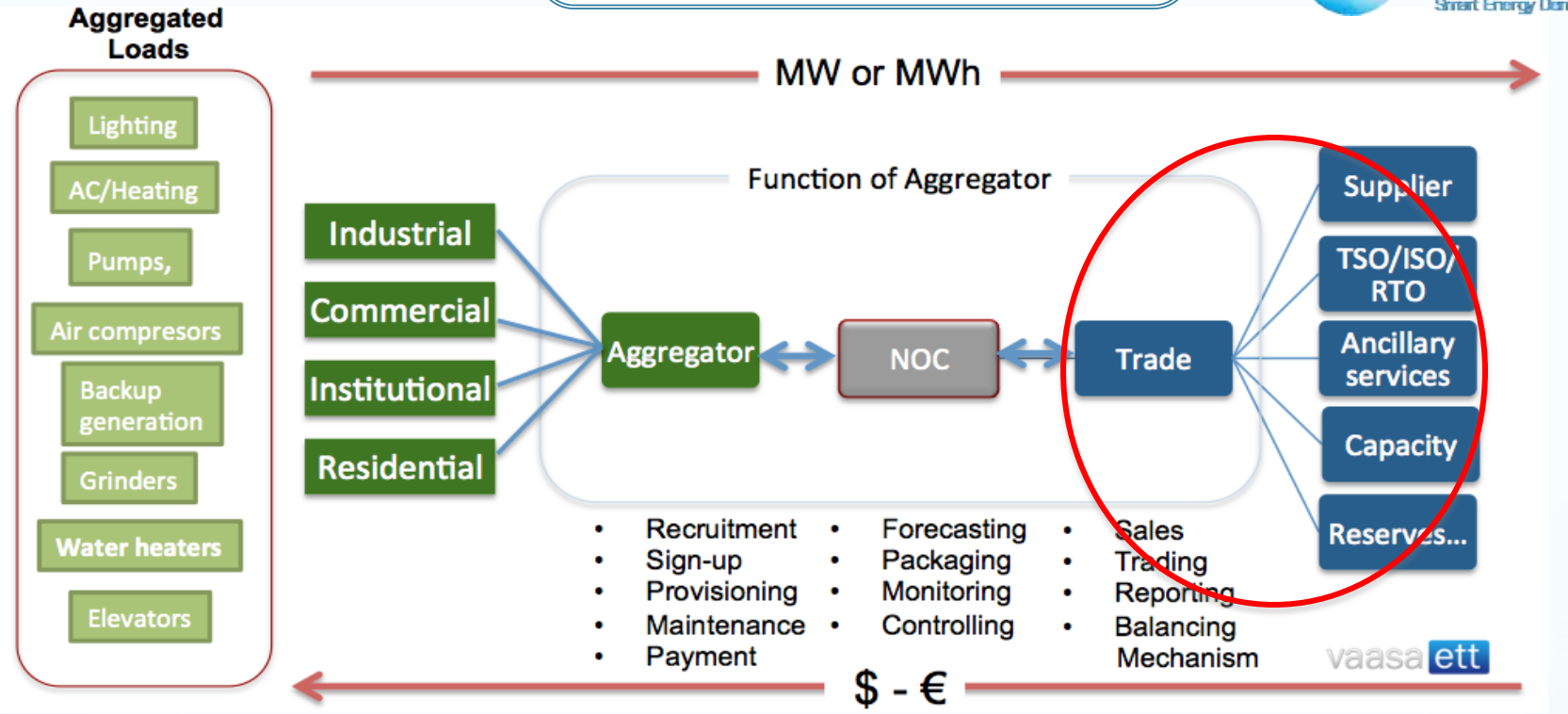
- Poland
- Italy
- Spain
- Slovenia

### Aggregators

- Cyber Grid (sole service)
- Flexitricity (Tariff)
-

SEDC
Smart Energy Demand Coalition

# Function of Aggregation




## Value Areas for Market Players

### Consumer

- Direct revenue
- Do-good
- Use of back-up Generation
- Control

### Government

- Security of Supply
- Justification Smart Grid
- Value to voters
- Avoided investment
- Green
- Increased wind and solar

### Generation

- Energy Management System
- Bidding potential into new markets,
- Lower cycling costs,
- Increase efficiency…
- New communication requirements fulfilled…

### ISO/Market

- Policy – affordable, sustainable, reliable
- Best mix for assets
- Enlarge market for existing power plants
- Virtual power plant product

### Retailer

- Service to customers
- Control of purchasing risk
- Green
- Revenues

# Other:
## Example: Issues

- Lack of standardised baseline
- Complex contracts
- No pooled pre-qualification
- No realistic duration and minimum load requirements
- Penalties through network tariffs
- No appropriate settlement processes
- No access to historical data

**Can find all or a selection of these an other barriers throughout the EU**

# 4 Steps to successful Demand Response

# Step 1- **Involve the Consumer**

*Critical issue, difficult in **majority** of Member States*

1. Consumers require a **clearly defined offer,** which is both simple to use and contains clear benefits.
2. They require a **provider** this offer
   - **an independent aggregator or a retailer**.

**Requirements for success:**

**1) Legality:** Demand must be accepted as a resource in the markets

**2) Access**_ Consumer's should have access to service providers without interference from potential competition

**3) Standardized process:** A standardized process is required for the BRP-Aggregator as described in EG3

**4) Bi-directional payment BRP-Aggregator:** The BRP requires payment for sourcing costs.

# Step 2 – **Baseline & Measurement Requirements**

***This issue tends to be resolved as market matures***

## Measurement and verification protocols

**measurement** → **ensures fair payment.**

### Requirements for success

- **Baseline** and measurement standardization
- (A **single** consumer may be face contradictory requirements from his/her retailer, TSO and DSO).
- Measurement technology – though this is supplied during the program
  OR – access to standardized data

# Step 2 –**Baseline & Measurement Requirements**

***This issue tends to be resolved as market matures***

**ensures fair payment.**

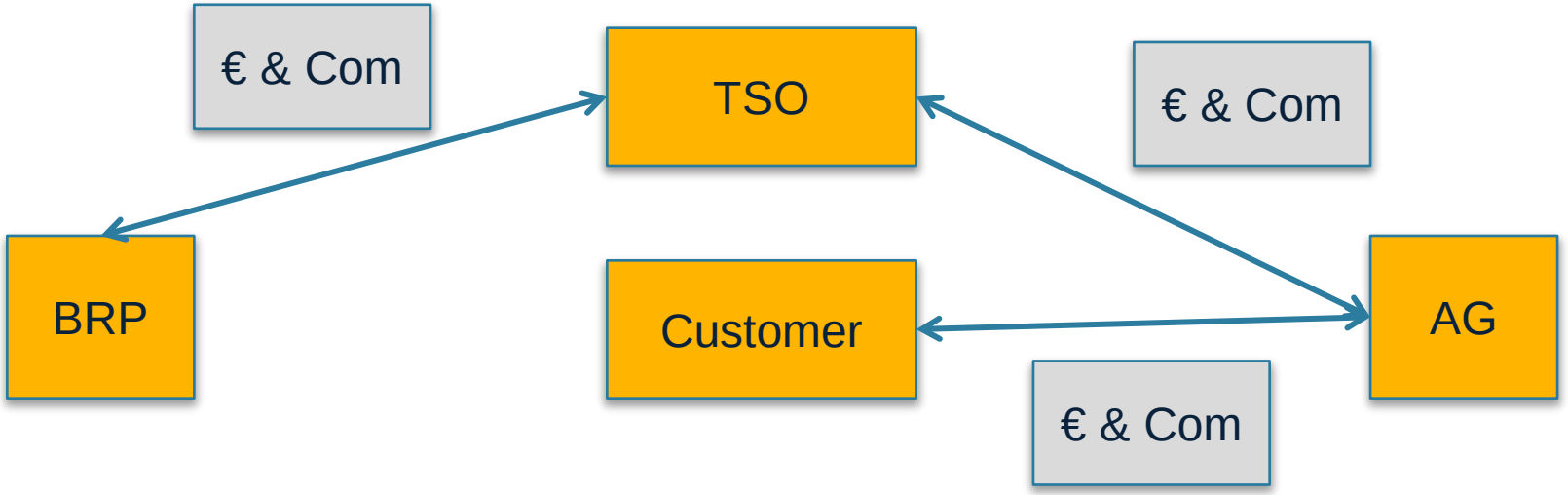
**Baseline** depend on the duration of the activation and the lead-time prior to activation.

1) They range from extrapolating (flat) the last value for limited duration event with no lead time (this is the case for tertiary reserve in Belgium f.ex.) to more elaborate extrapolation based on the curve of the last 8 from 10 days rescaled to the actual consumption just prior to the notification for longer events with longer lead times (such as strategic reserves in Belgium or capacity market in the UK).
2) The current baseline solutions used in balancing markets have proven to be up to the task and mature.
3) There is significant literature available on baselines.

# Step 2 – **Balancing** → **BRP**

**Critical to refine roles and responsibilities**

DR is designed to be activated **only a few hundred hours a year** (adequacy, tertiary reserves, exceptional market conditions on intra-day market …) therefore the split responsibility on the access point is only applicable for these exceptional situation and not the remaining more then **8000 hours of the year**.




This process is described within the **Electricity Balancing Network Code** by **ENTSO-E.** Is currently under review by the Commission

# Step 3 – **Create viable products**

***Progress made in several Member States***

## Products/programs that fit Consumer capabilities

**Requirements for success:**

**Historic regulation:** Participation requirements in markets historically directed toward the needs of the national generators.

Now must be adjusted to maximize the use of a range of resources included demand and renewables

**Allowing consumer participation**

- **Product Design:** It is **critical** that participation requirements for a market allows a range of resources to participate, including demand side resources.

# Step 4 – **Ensure fair payment**

**Pay equality has seen little progress and is an issue in a majority of Member States**

## Transparency and Equal Pay!

All resources, including demand side resources, should be paid the full value of services provided!


**Requirement for success:**

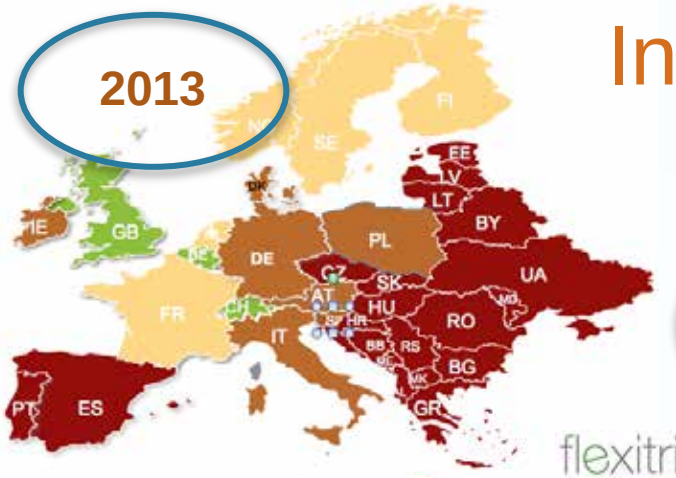
**Equality:** Today Demand Side Resource are not always paid the MW to MW as generation for the same resource

**Transparency:** Prices are often set through bilateral agreements, are not published, and are not transparent.

**Value for Flexibility:** The value of flexibility is not currently reflected in current market structures

**Standardized bi-directional BRP-aggregator payment methodology:** to ensure transparent smooth  are required for development

# Industrial DR business activity




2015

flexitricity

Matrix Sustainable energy efficiency

REstore

Noodvermogenpool

seam GROUP

energia kolmio

Enspirion

electricity norfolk

ENERNOC

electric Ireland

KiWiPOWER demand management

ACTIVATION ENERGY

Dalkia

Energy Pool smart energy management

SMART GRID ENERGY

EDF

actility Making Things Smart

VOLTALIS

BeSmart

OMPEX

CYBERGRID

E.ON

DONG

entelios

VATTENFALL



Key:

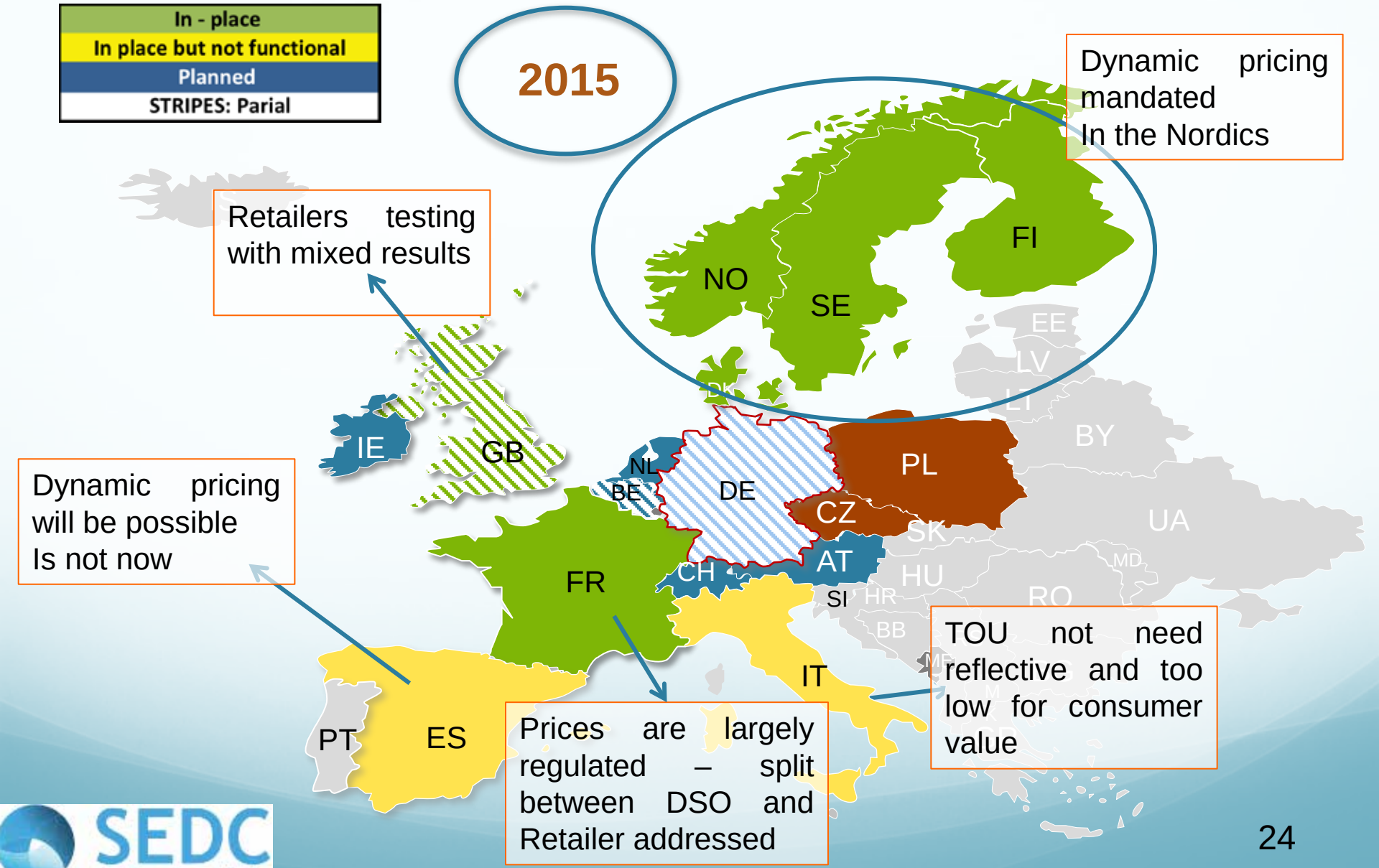
- Commercially available
- Partial opening
- Preliminary development
- Closed

SEDC Smart Energy Demand Coalition

# Residential DR business activity in Europe EE and DR….

Key

| |
|---|
| In - place |
| In place but not functional |
| Planned |
| STRIPES: Parial |



# Questions?

# Thank You

Jessica Stromback
SEDC
+358 44 90 66 821
Jessica.stromback@smartenergydemand.eu

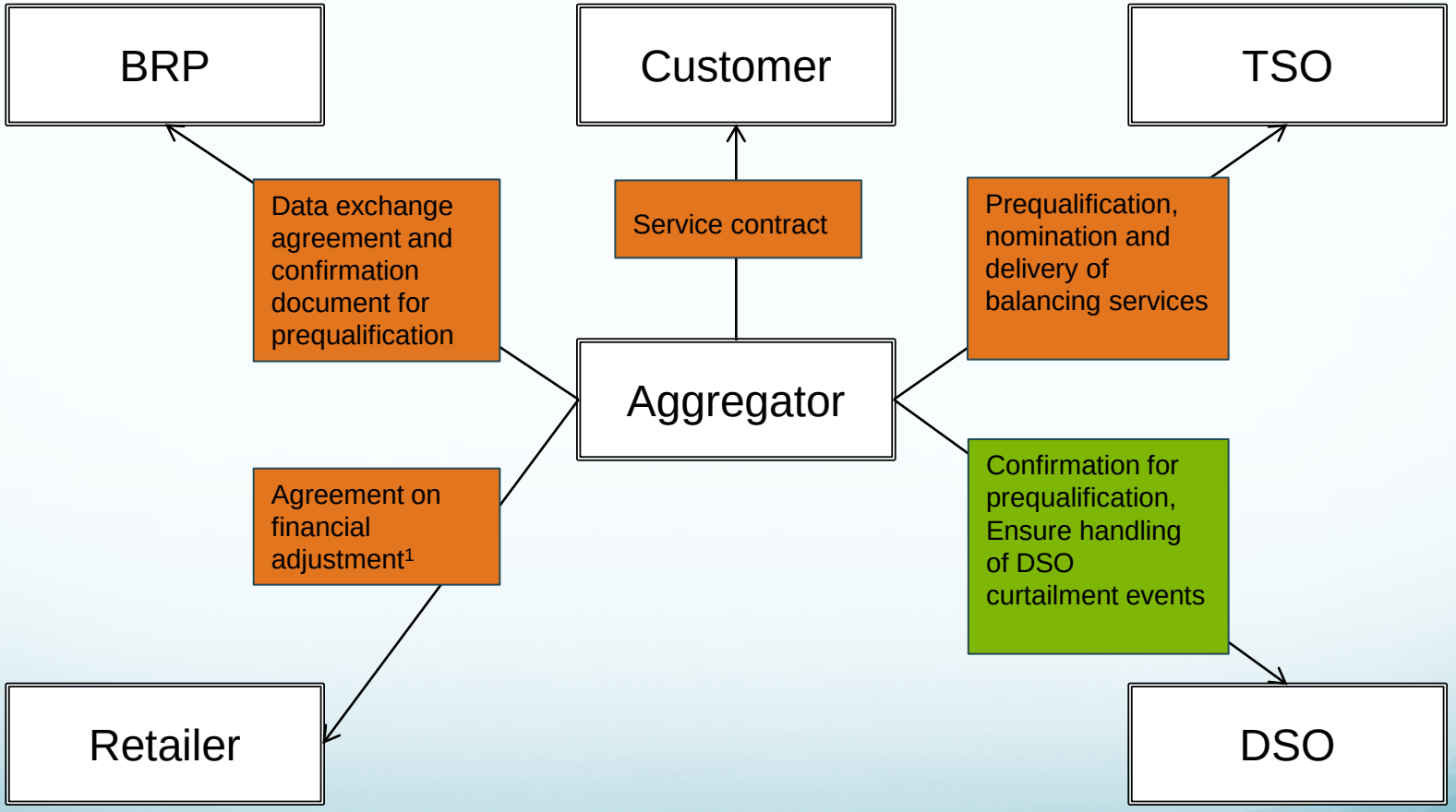
Commercial Contract

Standardised process

# Step 1- **Involve the Consumer**

## Contractual Relationships

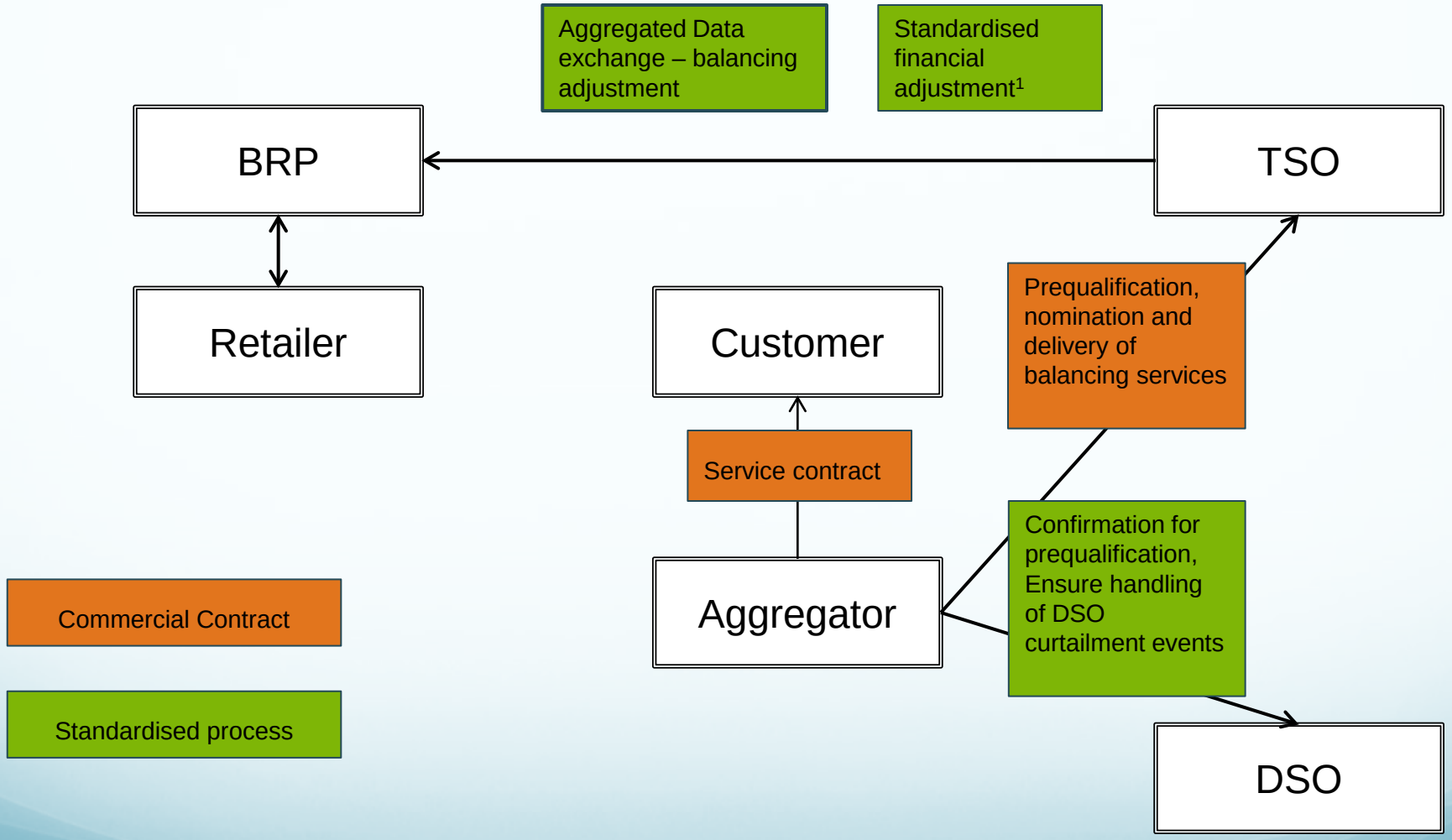
Without standardised process




[1]An alternative way is an agreement between customer and retailer

# Contractual Relationships

## Switzerland, Belgium, France



# Demand Response

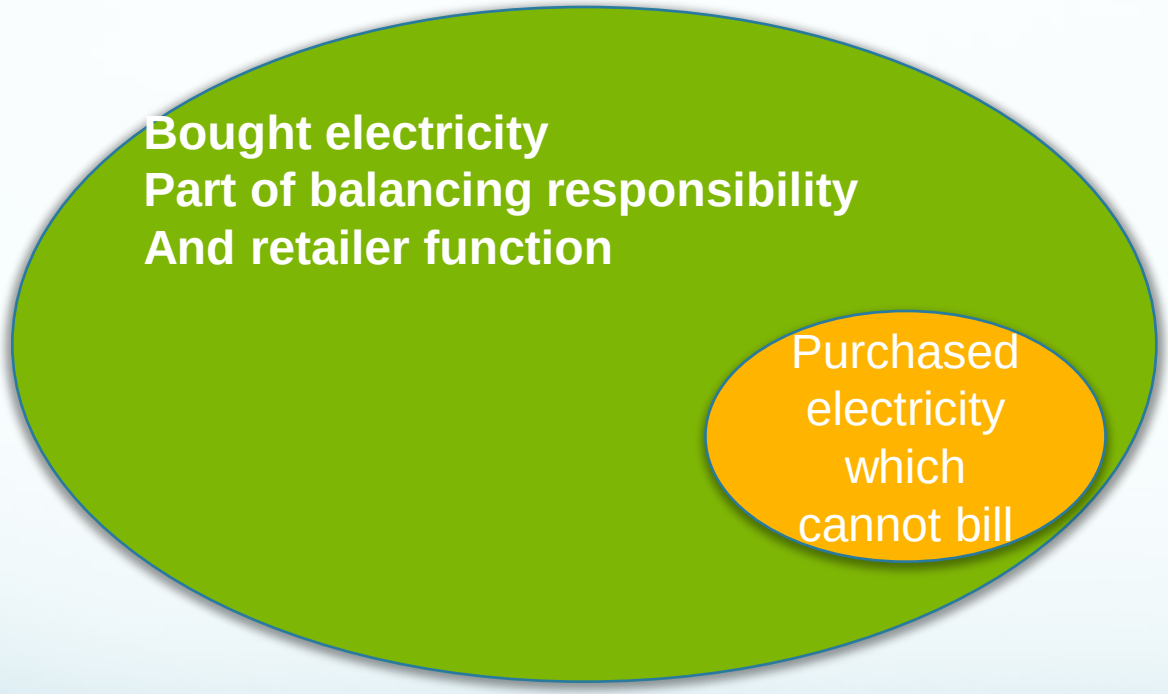
## Measurement against baseline

8/17/2009: Via phased DR, 75MW of expensive generation avoided

# Step 4 – **Ensure fair payment**

## Lost sales for retailer

## Payment of sourcing costs




A few Retailers look for payment of full costs, which they calculate, generation, retailer, profits…

# Issue – BRP- Aggregator

**The SEDC promotes:**

1) **Standardized Payment/Settlement:** Payment methodologies should be standardised but should follow market development
   1) A mix of forward and day ahead prices
   2) An average price which follows the market
   3) A price all BRPs agree upon as a fair methodology

   'Energy' is transferred between market parties

2) **Aggregated Information:** No direct communication of any consumer related data should be provided directly between the BRP and aggregator
   but **rather aggregated data** for all DR participating in a given area should be transferred through a third party to the BRP