Kick off meeting
Experts Working Group

A.S. provided by distributed resources – 2014 & 2015

22/03/2013

Elia ENMAN

22/03/2012 Experts WG - meeting n° 1
Agenda

1. Introduction & Context

2. Pilot Project R3 from decentralized load: first learnings

3. Elements to consider in order to diversify A.S. Resources
   - Correction of BRP’s perimeter (2 reasons)
   - Implications if BSP ≠ BRP
   - Solutions investigated

4. R3 from distributed energy resources
   - Feasibility issues for 2014
   - Impact on DSO grid
   - Main characteristics
   - Realistic design of such a product for 2014

5. Next Steps
Introduction and Context
Introduction and context

1. Terms of Reference

• **Mission:** This working group is a consultation group of experts dedicated to analyse, exchange ideas and make propositions regarding specific (contractual and technical) issues related to the opening of A.S. market to resources (load, decentralized production) located in distribution grids;

• **Deliverables:**
  - concrete and pragmatic design proposals by Elia for the short-term
  - recommendations for the longer-term

• **Identify and examine overall contractual and implementation issues related to the diversification (new suppliers, new resources) of A.S.**
  - Results and lessons learned of the experimentation “R3 from decentralized load” launched in 2013 will be presented in order to illustrate some of those issues.

• **Debate, clarify, comment and make recommendations in order to work towards:**
  - feasible solutions on those issues for 2015
  - directions of solutions to be examined for the long term
REstore – ELIA pilot project:

First results & key learnings
Pilot project scope: 10 MW of interruptible load from industrial power consumers

<table>
<thead>
<tr>
<th>DR direction</th>
<th>Demand curtailment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term</td>
<td>1/1/2013 – 31/12/2013</td>
</tr>
<tr>
<td>Loads</td>
<td>All are DGO-connected</td>
</tr>
<tr>
<td># of sites aggregated</td>
<td>15</td>
</tr>
<tr>
<td>Response time</td>
<td>&lt; 3 min</td>
</tr>
<tr>
<td>Number of utilizations /year</td>
<td>25</td>
</tr>
<tr>
<td>Max. utilisation time / activation</td>
<td>120 min</td>
</tr>
<tr>
<td>Cease time</td>
<td>&lt; 30 min</td>
</tr>
<tr>
<td>Recovery period</td>
<td>12 hrs</td>
</tr>
<tr>
<td># of ARPs involved</td>
<td>4</td>
</tr>
<tr>
<td># of DSOs involved</td>
<td>3</td>
</tr>
</tbody>
</table>
Two deviations from ELIA-ARP contract, validated by all involved ARPs, due to DSO-connected load

Settlement: how to meter demand from DGO-connected loads

- REstore provides real-time metering signals at the level of the Aggregated Site to ELIA. One signal per 30 seconds shall be provided.
- Meters comply with the technical and accuracy specifications of DGO-approved AMR meters.
- Meters measure demand at the level of the EAN, or exceptionally in context of this pilot project, may be measuring the demand of the equipment which is contracted for demand curtailment.

- REstore provides to ARP in quasi real-time all relevant metering values whenever load from ARP perimeter is curtailed.

No “Nomination” available => no compensation of ARP perimeter

- No compensation of the ARP perimeter to correct for the interruption instruction, as no nomination data per EAN is available to ELIA for DSO connected loads.
- As a result, ARP will have an imbalance which is by default opposite to the overall system imbalance, hence will always receive the imbalance tariff as generation > demand.
- Validation for scope of pilot project with all involved ARPs
Two types of demand curtailment: “fixed $R^{\text{ref}}$” - model ($\sim$ R3 production) versus the “ICH / SL” – model

“Fixed $R^{\text{ref}}$”-model: $R^{\text{ref}}$ always 100% delivered

“ICH / Shedding Limit” - model

$R^{\text{ref}}$ not delivered.
Variable “energy” delivery over the year.

EU benchmark: 50Hertz, Tennet, National Grid, ...
First learnings

- Three activations so far, successfully and reliably delivered by aggregated DSO-load

- “Demand Side” delivers two different types of curtailment to ELIA, with strongly different value add:
  - R3 ICH with shedding limit: average availability
  - Fixed R(ref), available at any point in time during the availability window

- No nomination available for DSO connected load, whilst “vol d’énergie” should be avoided:
  - Clear model must be determined to facilitate demand-side market
    One possible model, “non-compensation”, is currently applied, with ARP approval for pilot project scope
  - Final rule must now be chosen and institutionalised to avoid bespoke agreements between ARPs, aggregators and consumers

- DSOs to be involved:
  - To ensure professional settlement: customer-ARP link; AMR metering data for settlement
  - What is impact of demand response on DSO grid in reality?
Elements to consider in order to diversify A.S. Resources
Correction of BRP’s perimeter (1)

Correcting the perimeter of the BRP during an activation with the requested energy is a powerful element as it incentivizes the BRP to effectively deploy this energy:

Example 1: TSO requests 100MW – BRP activates 100MW

Request: 100 MW  
Correction: -100 MW

Real activation: 100 MW

Activation settlement: 100MW @ Bidprice
Imbalance settlement: 0MW

Example 2: TSO requests 100MW – BRP activates only 80MW

Request: 100 MW  
Correction: -100 MW

Real activation: 80 MW

Activation settlement: 100MW @ Bidprice
Imbalance settlement: -20 MW @ MIP
With MIP ≥ Bid price

⇒ No additional control/penalty for the activation of Energy necessary
**Correction of BRP’s perimeter (2)**

Adjustment of the imbalance volume of the corresponding BRP is required in order to recover all activation costs for balancing purposes by the imbalance settlement.

Example 1: BRP 1 causes imbalance; BRP 2 is activated.

<table>
<thead>
<tr>
<th>BRP 1</th>
<th>BRP 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Position:</strong></td>
<td><strong>Initial Position:</strong></td>
</tr>
<tr>
<td>-100MW</td>
<td>0MW</td>
</tr>
</tbody>
</table>

Zone is short: -100 MW

Request: 100 MW
Correction: -100 MW

<table>
<thead>
<tr>
<th>BRP 2</th>
<th>BRP 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New Position:</strong></td>
<td><strong>Final Position:</strong></td>
</tr>
<tr>
<td>0MW → -100MW</td>
<td>-100MW → 0MW</td>
</tr>
</tbody>
</table>

Zone is balanced 0 MW

MIP = max bidprice

**Result:**

<table>
<thead>
<tr>
<th>BRP 1</th>
<th>BRP 2</th>
<th>BRP 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>-100 invoiced @ MIP</td>
<td>0 invoiced @ MIP</td>
<td>+100 Paid @ Bidprice</td>
</tr>
</tbody>
</table>

Total 0 0

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**Thanks to correction of perimeter, activation costs are recovered by balancing tariffs**

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Implications when BSP is not BRP (1)

Elia investigated how to create a product that allows new players to bid energy as independently as possible from the ARP. Therefore the impact that an energy bid coming from a GU could have on the BRP and on the supplier was analysed.

- **Issue n°1:**
  - GU sells the (40 MW of) activated energy to Elia but does not buy that energy as he reduces his consumption
  - Supplier (buys 100MW, sells 60) has to be remunerated for the activated energy

**BRP 2**

<table>
<thead>
<tr>
<th>GU (Load)</th>
<th>supplier</th>
<th>Prod</th>
</tr>
</thead>
<tbody>
<tr>
<td>offtake 100MW</td>
<td>Buys</td>
<td>Injection =100MW</td>
</tr>
</tbody>
</table>

**Initial Position:** +100 – 100 = 0MW

**BRP 2**

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</table>

**New Position:** +100 – 60 -40 = 0 MW

Request to GU: 40 MW
Correction BRP: -40 MW

Activation settlement: 40MW @ Bidprice for BSP GU
Implications when BSP is not BRP (2)

What if the GU activates less energy than requested (15 instead of 40)?

• **Issue n° 2:**
  - BRP’s perimeter is adjusted with the quantity of energy requested (40MW)
  - the BRP is penalized for the discrepancy between the requested and effectively activated energy (40-15) → BRP will be invoiced for the resulting imbalance at MIP
  - Remark: When the BSP is also BRP there is no need to control and penalize discrepancy as this is automatically done through the tariffs
Solutions aiming at independency of BSP towards BRP:

Solutions must keep main principles (1.a & b) but mitigate any damage to BRP nor Supplier (2 & 3)

1. Adjust the metering of the consumed energy and neutralize ARP’s position:
   - the perimeter of the ARP is neutralized (adjusted with the effectively activated energy) (1.b & 2)
   - the load curves are adjusted so that the GU buys the energy he sells to Elia from it’s Supplier (3)
   + BSP independent of BRP
   + Transparent for BRP and supplier
   - A specific control of the activation is necessary (not optimal for Energy only portfolio based bids such as Free Bids) (1.a)
   - Adjustment per load curve is necessary: not realistic in the short term in a big scale (for distributed resources)

2. Give to the ARP the adequate data so that:
   - he can control the effective deployment of requested energy and apply penalties (2)
   - he can organise with the supplier the correct settlement of the energy (3)
   + Preserves the principle of incentivizing correction (adapted for Energy only portfolio based bids) (1.a)
   - strong contractual relationship between the BSP and the BRP

3. Do not correct the BRP’s perimeter (INNOVATION – adequate for DER)
   - BRPs position is deviated with the effectively activated energy
   + BSP independent of BRP
   + BRP and supplier are fairly remunerated (by tariffs) and not penalized (2 & 3)
   + Simplicity: no adjustment of perimeter nor load curve is necessary → feasible in a large scale
   - A specific control of the activation is necessary (1.a)
   - Not applicable to all balancing services (see next slide)
R3 from distributed energy resources
1. NO correction of BRPs perimeter:

- BRPs position is raised with the effectively activated energy
  - BRP (and through him Supplier) is remunerated by the tariffs
  - BRP is not penalized for the discrepancy
- A specific control of the activation is necessary as there is no incentivizing correction
- This works under the assumption that the final position of the BRP is favourable towards the position of the zone ⇒ NRV must have the same sign during the whole activation period
  - duration of activation has to be limited (and recovery time as well)
  - activation must happen after R3 production and volume has to be limited

Request to GU : 40 MW
No correction

Activation settlement : 40MW for BSP GU
Imbalance settlement : + 40 MW @ MIP
2. Capacity Only product:

**BRP 1**
**Initial Position:** -100 MW

**BRP 2**
**Initial Position:** 0 MW

**BRP 1**
**Position:** -100 MW

**BRP 2**
**New Position:** +100 MW

**Result:**

<table>
<thead>
<tr>
<th>BRP 1</th>
<th>BRP 2</th>
<th>GU</th>
<th>Prod</th>
</tr>
</thead>
<tbody>
<tr>
<td>-100</td>
<td>+100</td>
<td>100 MW</td>
<td>100 MW</td>
</tr>
<tr>
<td>invoiced</td>
<td>paid</td>
<td>MIP</td>
<td>MIP</td>
</tr>
<tr>
<td>BRP 2</td>
<td>BRP 2</td>
<td>GU</td>
<td>Prod</td>
</tr>
<tr>
<td>+100</td>
<td>+100</td>
<td>100 MW</td>
<td>100 MW</td>
</tr>
<tr>
<td>paid</td>
<td>paid</td>
<td>MIP</td>
<td>MIP</td>
</tr>
<tr>
<td>Total</td>
<td>+100</td>
<td>Bid price</td>
<td>Bid price</td>
</tr>
</tbody>
</table>

- As there is no correction of BRP’s perimeter, activation costs are not covered by tariffs
- Activation costs have to be = 0 €/activation & entire remuneration provided on capacity fee
  ⇒ # and duration of activations have to be contractually fixed
- Such product cannot be price maker
  ⇒ out of merit order (at the end of )
  ⇒ Tariff signals have to be adapted when such product is activated

**Activation settlement fur GU**

**Imbalance settlement:** +100 MW for BRP 2

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1. **Contractual impact for Elia:**
   1. Balancing rules have to be adapted
   2. “Contrat ARP” has to be adapted (contractual obligation for BRP to be balanced)
      » Obligation to be balances must remain
      » In real time deviations caused by activations should be authorized

2. **Data exchanges that are needed**
   See 2 next slides

3. **Congestion management**
   - Congestion management tools: at Elia and at DSO’s sites
   - Condition: use the energy via aggregator for balancing purposes, without downgrading the SO’s flows conditions
   - To be analysed and further discussed between SO
Data exchanges that are needed (1)

1. **Settlement of the service (availability, activation):**
   - Elia: verifies the availability of /activates a contractual reserved power
   - Aggregator: “splits” the reserve power into it’s pool of access points
   - DSO: owns the validated metering of the concerned access points

   - Rem: time needed to administrative adaptation when composition of pool changes (→ Number of changes has to be limited and announced with a period of notice)

   - **Before 2016:** the metering data is provided by each DSO

2. **Imbalance Settlement:**
   - AS Today : no need to correct BRP’s perimeter and therefore to know the “split” per BRP of the activated energy
Data exchanges that are needed (2)

3. How to Report each activation to the right BRP:
   o Elia: activates a amount of energy (cf; contractual reserved power)
   o Aggregator: “splits” the power into it’s pool of access points
   o DSO: owns the register of the supplier and BRP per access point
   o Contractual existing relation: GU/supplier
     - GU has to inform it’s supplier of the fact that he is part of a pool and that he is activated
     - The aggregator could provide that service to the GU (and send the information to the supplier/BRP on behalf of the GU)

- Before 2016: GU has to be proactive in informing it’s aggregator by any switch of contract

4. Real Time information
   o Aggregator provides the aggregated 10” signal to Elia only for real time view of the dispatching and not for invoicing purposes
1. **Contractual impact for Elia:**
   1. Balancing rules have to be adapted
   2. “Contrat ARP” has to be adapted (contractual obligation for BRP to be balanced)
      - Obligation to be balances must remain
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Tentative proposition for a R3 from distributed resources (1)

1. Needs:
   - Any new R3 product should have nearly the same ‘quality’ as R3 prod (availability, flexibility…) and at most competitive price
   - Remark: aggregators announce be competitive with R3 production

2. Volume:
   - Has to be limited in comparison with R3 prod due to characteristics of Model
   ⇒ Proposition: start with ~30 MW with max 15 MW per BSP in order to limit the risk

3. # and duration of activations:
   - Contractually predefined and will influence the reservation price
   - As close possible as # & duration of R3 prod. activations
   - # can be less, as activated in end of merit order
   ⇒ Proposition:
     • ~40 activations but depending on price
     • Accept 12h between 2 consecutive activations
   - Duration of activation must be limited in order to avoid a change of NRV sign
   - On the other hand a duration of activation must fulfil to current R3 prod characteristics and needs of dispatcher
   ⇒ Proposition: maximum duration = 2 hours

Trade off between conservative need and price
Tentative proposition for a R3 from distributed resources (2)

4. Reservation

- Need: 100% availability
- Based on real metering and not on nominations
- Controlled per quarter-hour
- Reduction on R3 – Pmad (Penalty on R3min-Pmad)
- No control of availability during 2 hours after activation
- Example of penalty:

\[
\text{Pmad} = \min(P_{\text{mes}} - \text{margin}; R3) \\
\text{Missing power} = R3 - \text{Pmad}
\]

\[
\text{Penalty for missing power} = \max(1.3 \times \text{annual remuneration} \div \#\text{quarters}; BPX)
\]

- To be investigated:
  - Increasing penalty based on cumulative missing energy + exclusion after a threshold
  - Monthly cap= 2 times the monthly reservation remuneration
  - Possibility for aggregators to collaborate (ex ante during contracting) in order to cover together a band of R3
5. Activation

- 1 activation = # quarters between start and stop
- No remuneration necessary due to characteristics of Model
- Based on real 15’ metering and not on 10” T.M.
- Reference curve: based on last 15’ metering
- Penalty per 15’ on \( \frac{(\text{Energy that should be activated} - \text{really activated energy})}{\text{Energy that should be activated}} \)

- Control of availability starts 2 hours after activation
Next Steps

• Slides will be sent to all participants

• Written comments and reactions are welcome by the end of March
  ➞ Hans Vandenbroucke (Hans.Vandenbroucke@elia.be)
  ➞ Pauline Ottoy (Pauline.Ottoy@elia.be)

• Final proposition of a product for 2014 in next task Force balancing (17/04/2013)

• Next WG meeting: doodle will be sent for possibilities close to 17/4/2013