Overview - project ENERGISE / Introduction

Framework:
- CSA – Coordination and Support Action for the Horizon 2020 Call on Low Carbon Energy LCE 7 - 2014 - Distribution grid and retail markets

General Questions:
- How will the future ICT infrastructure for smart grid applications look like?

Timeline:
- Start: 01/2015 – end: 03/2017
- Duration: 27 months

Partners:
- TÜV Rheinland Consulting
- WIK
New applications are increasing the demand for communication and data exchange in grids.

Differences between sectors make synergies hard to exploit.

How can a coordinated approach be achieved?
ENERGISE Goal

4. Solution Concept

- Identification of the relevant stakeholders
- Analysis of the current state of play and assessment of case studies and best-practices
- Provide information and support the decision making processes
- Support the exchange of hands-on-experience
Overview - survey on Communication Infrastructure

Core target group of ENERGISE

Structure of respondents

- Energy distribution grid: 22%
- Energy transmission grid: 20%
- Energy generation/trading/resale/solutions: 18%
- Communications infrastructure/services: 14%
- Equipment manufacturer: 13%
- Research: 8%
- Other: 5%
- ICT-based ENRgy Grid Implementation – Smart and Efficient (ENERGISE)

European coverage

- Total respondents: 294
- 26.9% of the represented organisations are DSOs
- 11 DSOs are also active in the field of communications infrastructure/services
Core Question of ENERGISE

Co-operation modes and infrastructure usage between energy and telco sector

- **Parameters influencing decisions:**
  - internal – external
  - technical – organisational
  - financial – regulatory
  - energy – telecommunication

- **Use Case:** Fiber deployment on electric poles
- **Use Case:** Joint Venture to deploy ICT
- **Use Case:** Existing market based solutions
- **Use Case:** Network security

**Type of interaction**
- non-co-operative
- co-operative

**Usage of infrastructure**
- dedicated
- shared
Future Smart-Grid Engagement

**Smart Grid services and solutions as inevitable competitive asset**

Engagement in smart grid projects and activities

- About 94% of the represented companies are or have been active in the field of smart grid

Overall planning of future smart grid activities

- About 89% of all respondents are planning smart grid activities in the next two years (99% of DSOs; 82% of communications providers)
Asymmetric competition among DSOs and communications providers

DSOs see communications providers as relevant competitors

Main competitors for DSOs

- Energy distribution grid: 27.8%
- Energy transmission grid: 22.8%
- Energy generation/trading/resale/solutions: 5.1%
- Communications infrastructure/services: 15.2%
- Equipment manufacturer: 3.8%
- Research: 2.5%
- Other: 2.5%

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Main competitors for communications providers

- Energy distribution grid: 9.1%
- Energy transmission grid: 61.4%
- Energy generation/trading/resale/solutions: 4.5%
- Communications infrastructure/services: 2.3%
- Equipment manufacturer: 4.5%
- Research: 6.8%
- Other: 11.4%

n=51

ICT-based ENERgy Grid Implementation – Smart and Efficient (ENERGISE)
### Top 5 - Reasons for co-operation

<table>
<thead>
<tr>
<th>DSOs</th>
<th>Communications providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faster implementation of new services/solutions</td>
<td>Strategic strengthening of the market position (be prepared for new markets and competitors)</td>
</tr>
<tr>
<td>Synergy effects during infrastructure deployment</td>
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</tr>
<tr>
<td>Financial pressure for cost savings</td>
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</tr>
<tr>
<td>Synergy effects during operation</td>
<td>Synergy effects during operation</td>
</tr>
<tr>
<td>Increased customer access</td>
<td></td>
</tr>
</tbody>
</table>

- **DSOs**
  - Faster implementation of new services/solutions: 59.5% vs. 62.7%
  - Synergy effects during infrastructure deployment: 55.7% vs. 49.0%
  - Financial pressure for cost savings: 48.1% vs. 47.1%
  - Synergy effects during operation: 43.0% vs. 47.1%
  - Increased customer access: 32.9% vs. 39.2%

- **Communications providers**
  - Faster Implementation of new services / solutions
  - Strategic strengthening of the market position (be prepared for new markets and competitors)
  - Synergy effects during infrastructure deployment
  - Financial pressure for cost savings
  - Synergy effects during operation

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03.03.2016

ICT-based ENERgy Grid Implementation – Smart and Efficient (ENERGISE)

TÜVRheinland®

Genau. Richtig.
# Reasons and Hurdles for co-operation for DSOs and telecoms

## Top 5 - Hurdles for co-operation

### DSOs

<table>
<thead>
<tr>
<th>Hurdle</th>
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<tbody>
<tr>
<td>Unclear regulatory responsibilities</td>
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<td>Difficult liability and responsibility (data security / data protection)</td>
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<td></td>
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<td>Dependency on cooperation partner</td>
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<td></td>
</tr>
<tr>
<td>Different standards for energy and telecommunication demands</td>
<td></td>
<td></td>
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<tr>
<td>Unclear market design</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hurdle</th>
<th>Percentage DSOs</th>
<th>Percentage Telecoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclear regulatory responsibilities</td>
<td>58.2%</td>
<td>56.9%</td>
</tr>
<tr>
<td>Difficult liability and responsibility (data security / data protection)</td>
<td>40.5%</td>
<td>47.1%</td>
</tr>
<tr>
<td>Dependency on cooperation partner</td>
<td>39.2%</td>
<td>43.1%</td>
</tr>
<tr>
<td>Different standards for energy and telecommunication demands</td>
<td>31.6%</td>
<td>41.2%</td>
</tr>
<tr>
<td>Unclear market design</td>
<td>29.1%</td>
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n=79

### Communications providers

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<td></td>
<td></td>
</tr>
<tr>
<td>Higher complexity in ownership structure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n=51
Overall Reasons and Hurdles for co-operation

**Hurdles for cooperation**

- Unclear regulatory responsibilities: 57.8% / 60.2%
- Unclear market design: 42.2% / 46.3%
- Different standards for energy and telecommunication demands: 42.2% / 44.9%
- Difficult liability and responsibility (data security / data protection): 40.8% / 40.5%
- Dependency on cooperation partner: 32.0% / 37.8%
- Higher complexity in ownership structure: 28.2% / 37.1%
- Higher complexity in approval procedures for new infrastructure: 27.6% / 36.4%
- Different lengths of technology lifecycles: 22.1% / 33.0%
- Higher technical complexity: 18.7% / 28.6%
- Existing competitive environment: 18.7% / 20.4%
- Technology availability: 14.6% / 5.4%
- Other: 7.1%

**Reasons for cooperation**

- Faster Implementation of new services / solutions
- Synergy effects during infrastructure deployment
- Financial pressure for cost savings
- Synergy effects during operation
- Strategic strengthening of the market position (be prepared for new markets and competitors)
- Better access to existing know-how
- Possible synergies in approval procedures for new infrastructure
- Increased customer access
- Generate new revenues
- Political demand for more cooperation
- Other: 7.1%

n=294
Co-operation or not? Use case specific responses

Co-operation is assumed for all identified use cases

- Enabling and encouraging stronger and more direct involvement of consumers in their energy usage and management: 58.5% assume cooperation, 24.5% assume no cooperation, 17.0% don't know.
- Improving market functioning and customer service: 56.5% assume cooperation, 26.5% assume no cooperation, 17.0% don't know.
- Enabling better planning of future network investment: 50.7% assume cooperation, 30.3% assume no cooperation, 19.0% don't know.
- Ensuring network security, system control and quality of supply: 63.3% assume cooperation, 23.5% assume no cooperation, 13.3% don't know.
- Enhancing efficiency in day-to-day grid operation: 53.7% assume cooperation, 29.6% assume no cooperation, 16.7% don't know.
- Enabling the network to integrate users with new requirements: 60.9% assume cooperation, 22.4% assume no cooperation, 16.7% don't know.

n=294
Cooperation or not? Use case specific responses

### Communications providers

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Assume Cooperation</th>
<th>Assume No Cooperation</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabling and encouraging stronger and more direct involvement of consumers in their energy usage and management</td>
<td>62.7%</td>
<td>17.6%</td>
<td>19.8%</td>
</tr>
<tr>
<td>Improving market functioning and customer service</td>
<td>51.0%</td>
<td>35.3%</td>
<td>13.7%</td>
</tr>
<tr>
<td>Enabling better planning of future network investment</td>
<td>56.9%</td>
<td>27.5%</td>
<td>15.7%</td>
</tr>
<tr>
<td>Ensuring network security, system control and quality of supply</td>
<td>60.8%</td>
<td>27.5%</td>
<td>11.8%</td>
</tr>
<tr>
<td>Enhancing efficiency in day-to-day grid operation</td>
<td>56.9%</td>
<td>29.4%</td>
<td>13.7%</td>
</tr>
<tr>
<td>Enabling the network to integrate users with new requirements</td>
<td>60.8%</td>
<td>25.5%</td>
<td>13.7%</td>
</tr>
</tbody>
</table>

**n=51**

### DSOs

<table>
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<tr>
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<th>Assume Cooperation</th>
<th>Assume No Cooperation</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabling and encouraging stronger and more direct involvement of consumers in their energy usage and management</td>
<td>48.1%</td>
<td>22.8%</td>
<td>29.1%</td>
</tr>
<tr>
<td>Improving market functioning and customer service</td>
<td>51.9%</td>
<td>24.1%</td>
<td>22.8%</td>
</tr>
<tr>
<td>Enabling better planning of future network investment</td>
<td>56.9%</td>
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<td>Ensuring network security, system control and quality of supply</td>
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<td>Enhancing efficiency in day-to-day grid operation</td>
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<tr>
<td>Enabling the network to integrate users with new requirements</td>
<td>45.6%</td>
<td>20.3%</td>
<td>34.2%</td>
</tr>
</tbody>
</table>

**n=79**

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*Genau. Richtig.*
# Reasons for dedicated and shared infrastructure

## Top 5 – Reasons for dedicated infrastructure

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<thead>
<tr>
<th></th>
<th>DSOs</th>
<th>Communications providers</th>
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</thead>
<tbody>
<tr>
<td>Criticality of infrastructure</td>
<td>53.2%</td>
<td>47.1%</td>
</tr>
<tr>
<td>Data security</td>
<td>48.1%</td>
<td>47.1%</td>
</tr>
<tr>
<td>Existing (own) communications infrastructure</td>
<td>39.2%</td>
<td>33.3%</td>
</tr>
<tr>
<td>Clear liability and responsibility</td>
<td>39.2%</td>
<td>29.4%</td>
</tr>
<tr>
<td>Concentration on core business</td>
<td>21.5%</td>
<td>27.5%</td>
</tr>
</tbody>
</table>

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Faster implementation of new services/solutions

n=51
### Top 5 – Reasons for shared infrastructure

<table>
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<tr>
<th>DSOs</th>
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<th>Percentage Communications providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better utilization of existing infrastructure</td>
<td>43,0%</td>
<td>52,9%</td>
</tr>
<tr>
<td>Synergy effects during operation</td>
<td>35,4%</td>
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Assumptions regarding shared / dedicated infrastructure

Criticality of infrastructure and data security are the most important reasons for dedicated infrastructure

- Enabling and encouraging stronger and more direct involvement of consumers in their energy usage and management: 58.2% assume shared infrastructure, 22.1% assume dedicated infrastructure, 19.7% don't know.
- Improving market functioning and customer service: 54.1% assume shared infrastructure, 22.1% assume dedicated infrastructure, 22.8% don't know.
- Enabling better planning of future network investment: 46.6% assume shared infrastructure, 28.9% assume dedicated infrastructure, 24.5% don't know.
- Ensuring network security, system control and quality of supply: 35.7% assume shared infrastructure, 50.3% assume dedicated infrastructure, 13.9% don't know.
- Enhancing efficiency in day-to-day grid operation: 46.3% assume shared infrastructure, 35.4% assume dedicated infrastructure, 18.4% don't know.
- Enabling the network to integrate users with new requirements: 58.8% assume shared infrastructure, 21.1% assume dedicated infrastructure, 20.1% don't know.

n=294
Does co-operation imply shared networks and vice versa?

Use Cases:
1. Enabling and encouraging stronger and more direct involvement of consumers in their energy usage and management
2. Improving market functioning and customer service
3. Enabling better planning of future network investment
4. Ensuring network security, system control and quality of supply
5. Enhancing efficiency in day-to-day grid operation
6. Enabling the network to integrate users with new requirements

All respondents
Distribution System Operators
Grid operation related Use Cases
Thank you very much for your attention!

Questions?