Microgrids in European Electricity Networks
Montréal 2006 – Symposium on Microgrids

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http://microgrids.power.ece.ntua.gr
http://www.ired-cluster.org
AGENDA

- Increasing distributed generation asks for enhanced research

- Results of energy management in „Am Steinweg“-Estate: Film

- MoreMICROGRIDS: transition from laboratory tests to pilot installations
Integration of Renewable Energy Sources and Distributed Generation into the European Electricity Grid

Funded by the European Commission, Contract no.: SES6-CT-2004-503770

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Two European examples:
Increasing distributed generation in low and medium voltage grids

Over 100 power plants in residential, commercial and industrial grids

City of Mannheim (Germany) as of July 2005

Over 60 small and medium PV Plants in residential, commercial and industrial grids

Region of Benavente (Zamora, Spain) as of September 2005

Source: I. Furones Fortos
European Research Cluster IRED:
Area „Pilot Installations and field tests“

- Status in 2005:
  Overview of 23 Pilot Installations in Germany, Spain, Greece, The Netherlands, Austria and Europe

Observation:
- Tendency from connect and forget philosophy towards integration
- Virtual power plants versus Microgrids

Exchange of knowledge:
www.der-journal.org
Europe joined forces in the DISPOWER project

38 partners from 11 European countries:

- Econnect
- IC
- IT Power
- Met
- Uni Manchester
- USTRAT
- KUL
- Cogen Europe
- AREVA
- ARMINES
- EdF
- Vergnet
- NSMP.CENERG
- CEA-GENEC
- Labein
- CEHN
- IBIC
- Iberdrola

Budget: 17 Mio EUR
Project duration: 2002-2005
Integration of Renewable Energy Sources and Distributed Generation into the European Electricity Grid

Energy Flow Optimisation in the low voltage grid

Experiences of energy management in the „Am Steinweg estate“

www.mvv.de > company > innovation > Film „Energy Management in Distribution Grids“

www.dispower.org
What are MICROGRIDS?

Interconnection of small, modular generation to low voltage distribution systems forms a new type of power systems: The MICROGRID.

Microgrids can be connected to the main power network or be operated islanded, in a coordinated, controlled way.

Source: N. Hatzigioryiou
Demonstration Sites in the MoreMICROGRIDS project:

- ENERGINET/DK
- Continuon
- LABEIN
- GRUPO EDP
- CESI
- MVV Energie

Source: ARMINES
# Integration of Renewable Energy Sources and Distributed Generation into the European Electricity Grid

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## Pilot installation: Bay of Gaidouromandra, Kythnos Island, Greece

<table>
<thead>
<tr>
<th>Duration</th>
<th>Since 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pilot profile</strong></td>
<td></td>
</tr>
<tr>
<td>DG capacity el.</td>
<td>22 kWp</td>
</tr>
<tr>
<td>DG Technology</td>
<td>PV, battery, diesel-gen</td>
</tr>
<tr>
<td>Classification</td>
<td>rural, off-grid</td>
</tr>
<tr>
<td>Grid Operator</td>
<td>CRES</td>
</tr>
<tr>
<td><strong>Tasks</strong></td>
<td></td>
</tr>
<tr>
<td>Microgrid operation</td>
<td></td>
</tr>
<tr>
<td>Multi master control method for improvement of available peak power and system reliability</td>
<td></td>
</tr>
</tbody>
</table>
Pilot installation: Residential Area „Mannheim-Wallstadt“, Germany

<table>
<thead>
<tr>
<th>Duration</th>
<th>Starting August 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pilot profile</strong></td>
<td></td>
</tr>
<tr>
<td>DG capacity el.</td>
<td>ca. 20 kWp</td>
</tr>
<tr>
<td>DG Technology</td>
<td>PV, CHP</td>
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<tr>
<td>Classification</td>
<td>residential</td>
</tr>
<tr>
<td>Grid Operator</td>
<td>MVV Energie</td>
</tr>
<tr>
<td><strong>Tasks</strong></td>
<td></td>
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<td>Microgrid operation</td>
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</tr>
<tr>
<td>Socio-Economic evaluation</td>
<td></td>
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</tbody>
</table>
Conclusion and Outlook

- Transition from laboratory tests to pilot installations
- Variety of representative European applications
- Standards
- Important element of the European SmartGrids vision and strategy
Thank you for your attention!

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