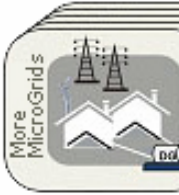




Integration of Renewable Energy Sources and Distributed Generation into the European Electricity Grid



Microgrids in European Electricity Networks

Montréal 2006 – Symposium on Microgrids

June 23, 2006

Britta Buchholz, MVV Energie
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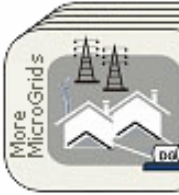
<http://microgrids.power.ece.ntua.gr>
<http://www.ired-cluster.org>

Montreal 2006 – Symposium on Microgrids
June 23, 06



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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**



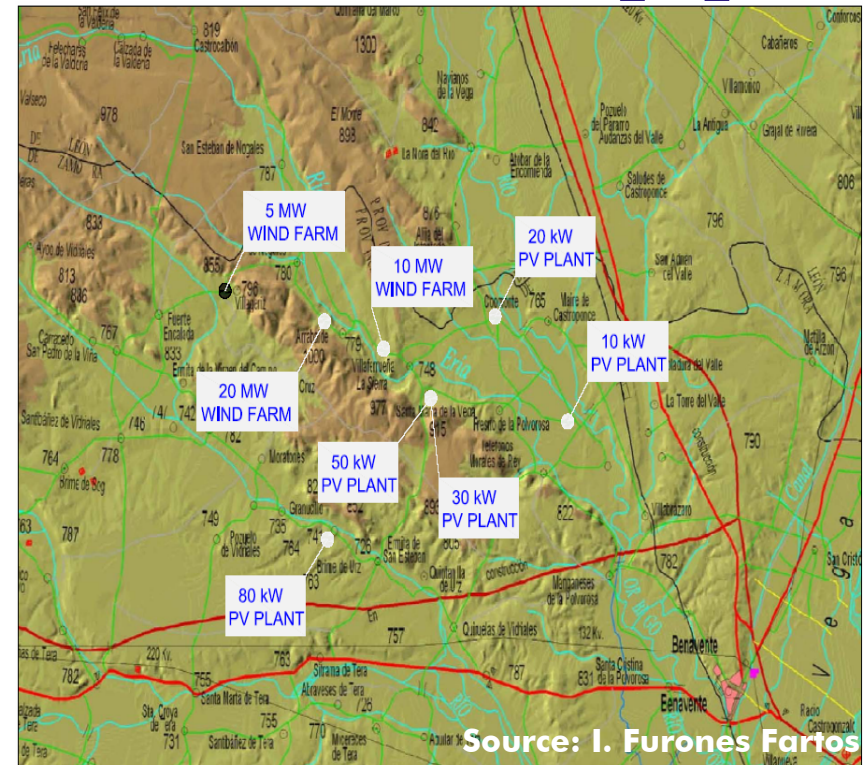


Two European examples: Increasing distributed generation in low and medium voltage grids



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



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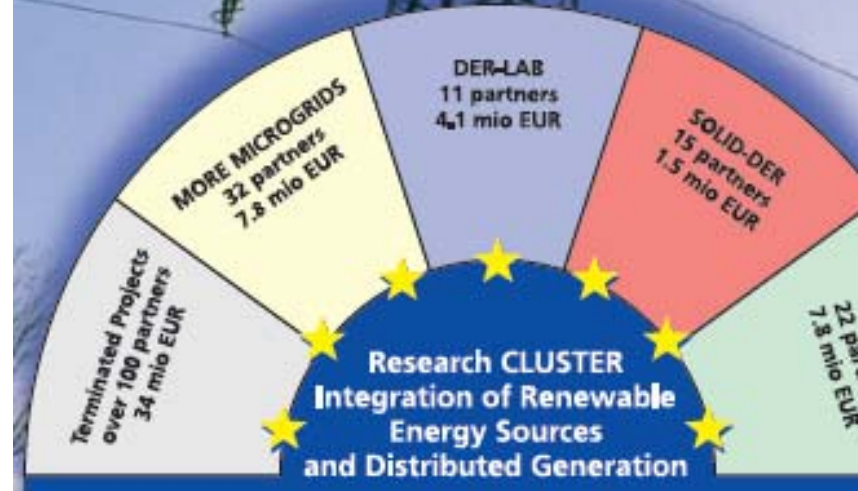
European Research Cluster IRED: Area „Pilot Installations and field tests“

- 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

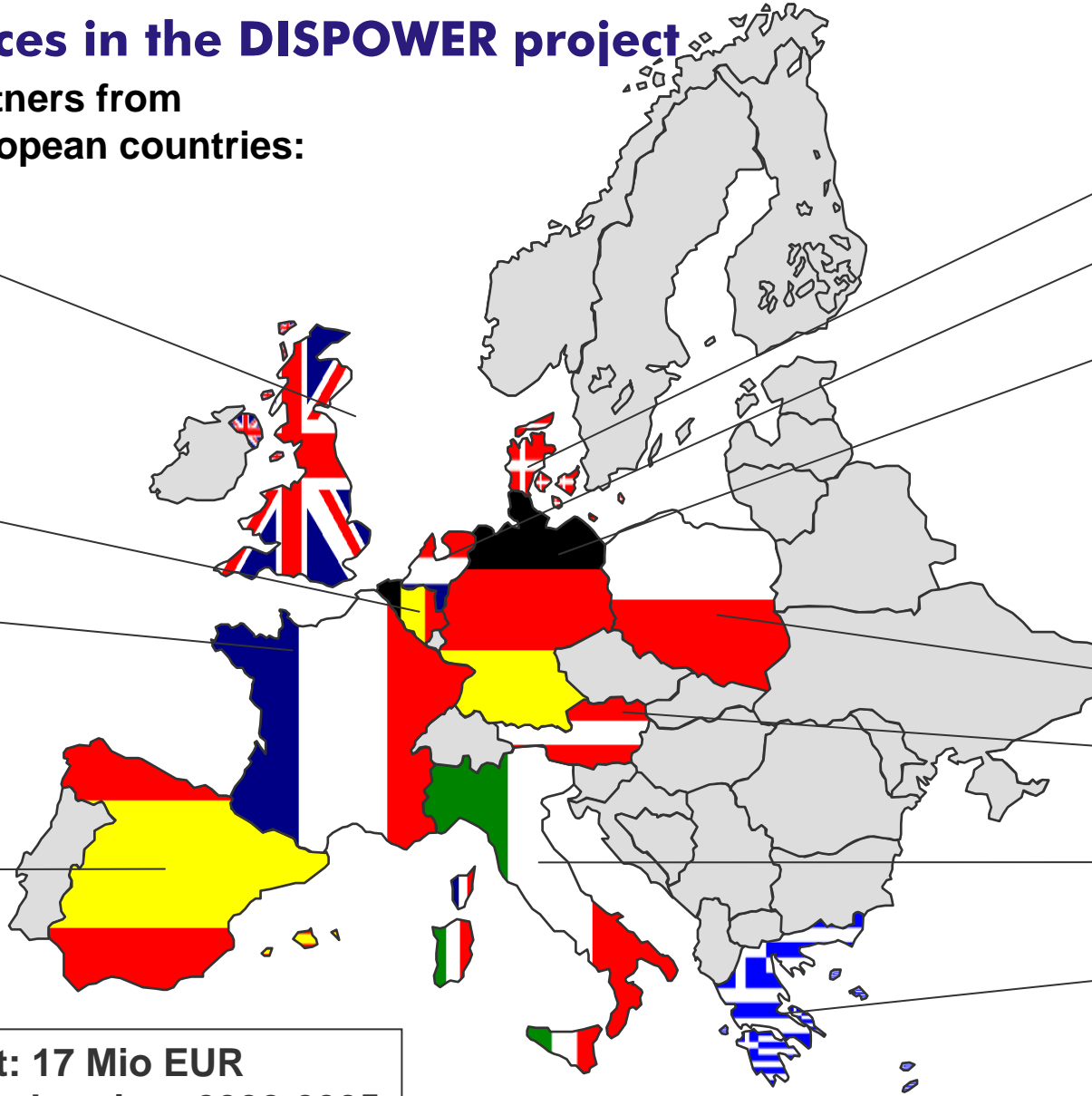
Exchange of knowledge:
www.der-journal.org



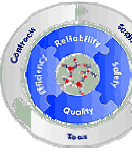
Europe joined forces in the DISPOWER project

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



- EMD
- APX
- ECN
- ISET
- Dutrain
- Uni-Duisburg
- GhK
- Kirsch
- SMA
- FHG ISE
- SWK-DE
- MVV Energie
- Uni Lodz
- Arsenal
- VPL
- CESI
- UGDIE
- CRES
- Germanos
- ICCS



Budget: 17 Mio EUR
Project duration: 2002-2005

Quelle: MVV Energie



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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



Fraunhofer Institut Solare Energiesysteme



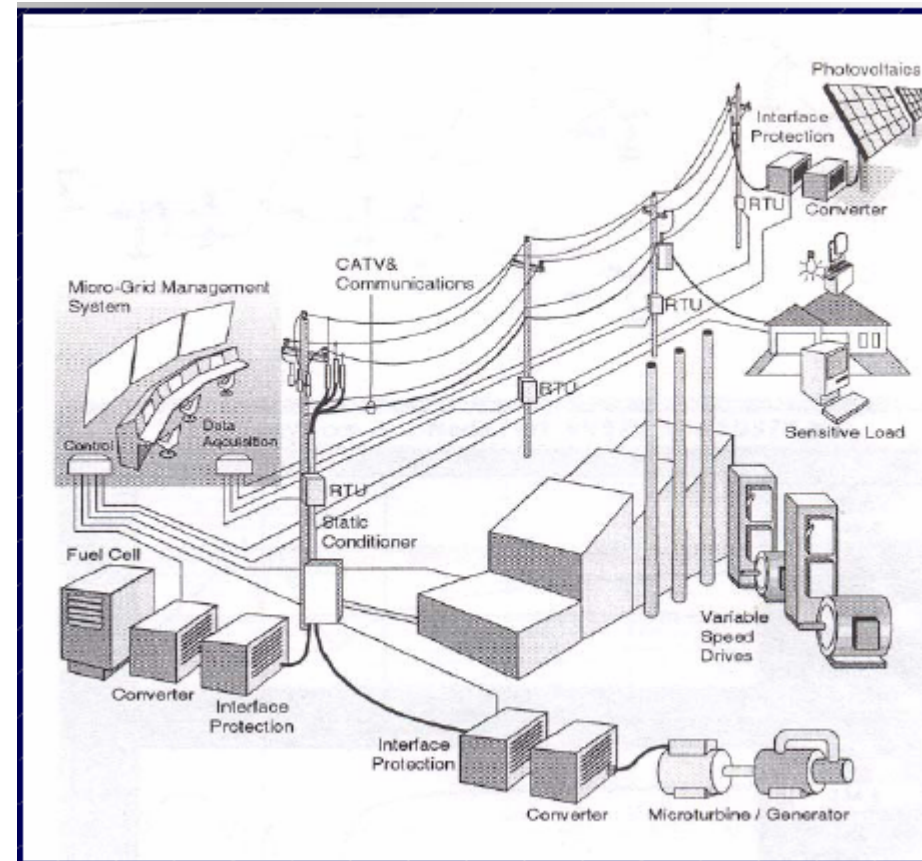
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What are MICROGRIDS?

**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. Hatziargyriou



MORE MICROGRIDS

Advanced Architectures and Control Concepts for More Microgrids

Proposal/Contract no.: PL019864

RESEARCH INSTITUTES & UNIVERSITIES (6)

ICCS/NTUA (GR)
UMIST (UK)
INESC Porto (PT)
ISET (D)
LABEIN (ES)
ARMINES (F)
Un. Of LODZ (PL)



MANUFACTURERS (8)

SIEMENS (D)
ABB (S)
SMA (D)
EMforce (NL)
GERMANOS (GR)
ANCO (GR)
ZIV (ES)
I-Power (UK)

UTILITIES & MICROGRID OPERATORS (7)

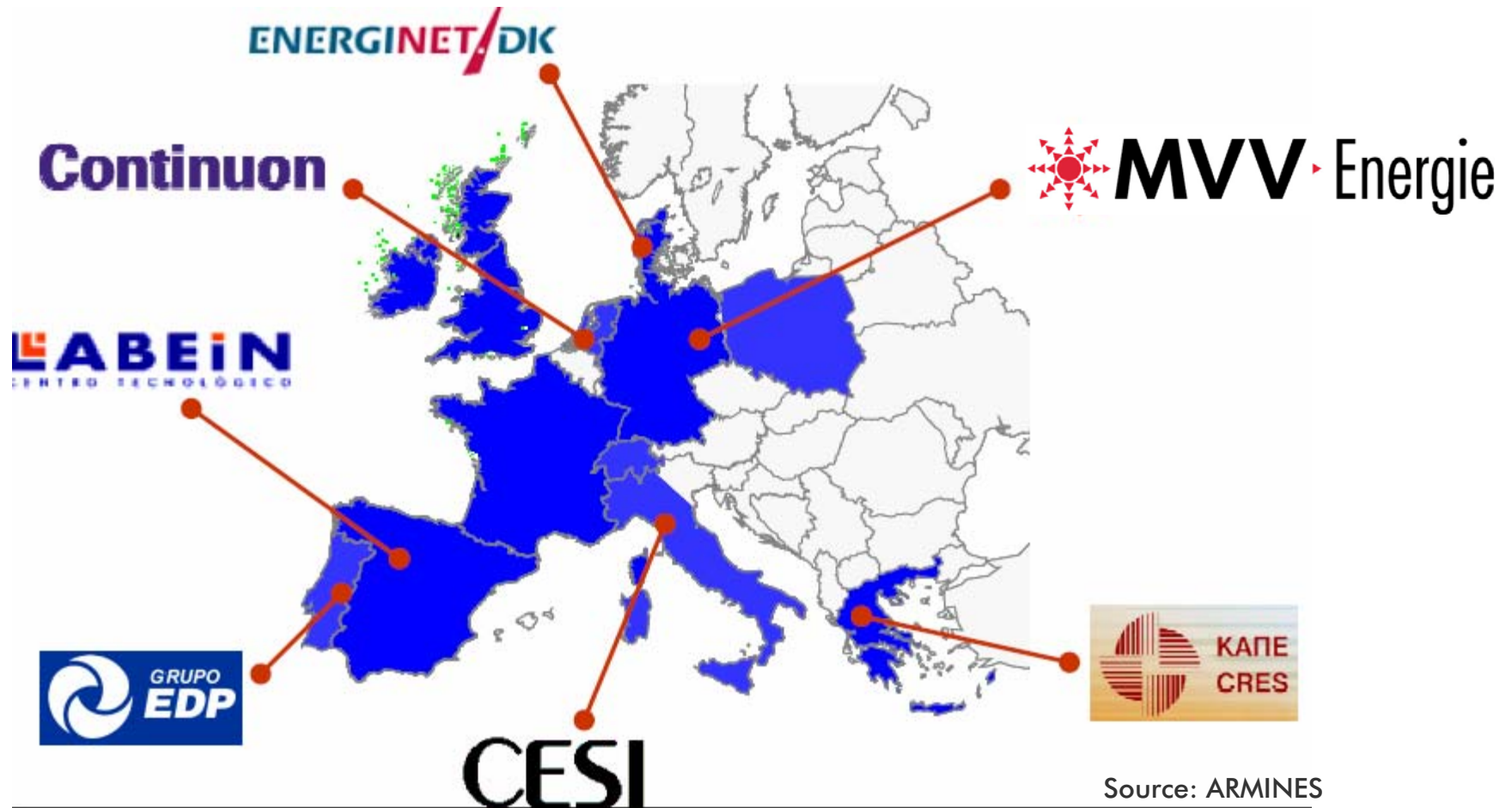
EDP (PT)
CRES (GR)
CONTINUON (NL)
MVV (D)
CESI (I)
ELTRA (DE)
LRPD (PL)

Total Budget 7.9 M

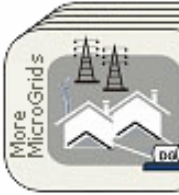
EC Contribution 4.5



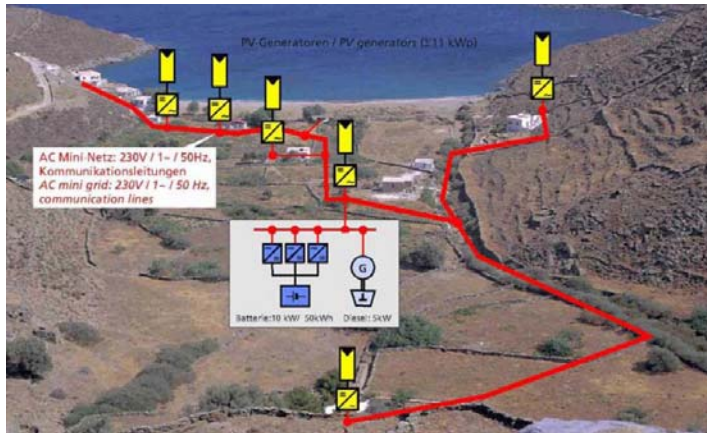
Demonstration Sites in the MoreMICROGRIDS project:



Source: ARMINES



Pilot installation: Bay of Gaidouromandra, Kythnos Island, Greece



Duration

Since 2003

Pilot profile

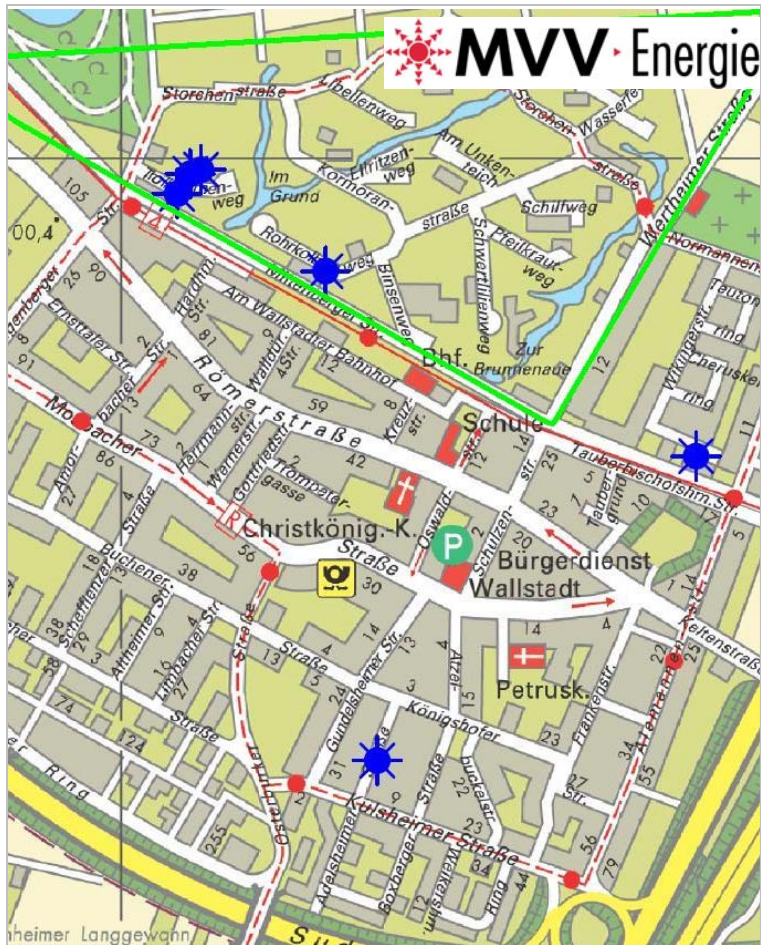
- **DG capacity el.** 22 kWp
- **DG Technology** PV, battery, diesel-gen
- **Classification** rural, off-grid
- **Grid Operator** CRES

Tasks

- **Microgrid operation**
- **Multi master control method for improvement of available peak power and system reliability**



Pilot installation: Residential Area „Mannheim-Wallstadt“, Germany

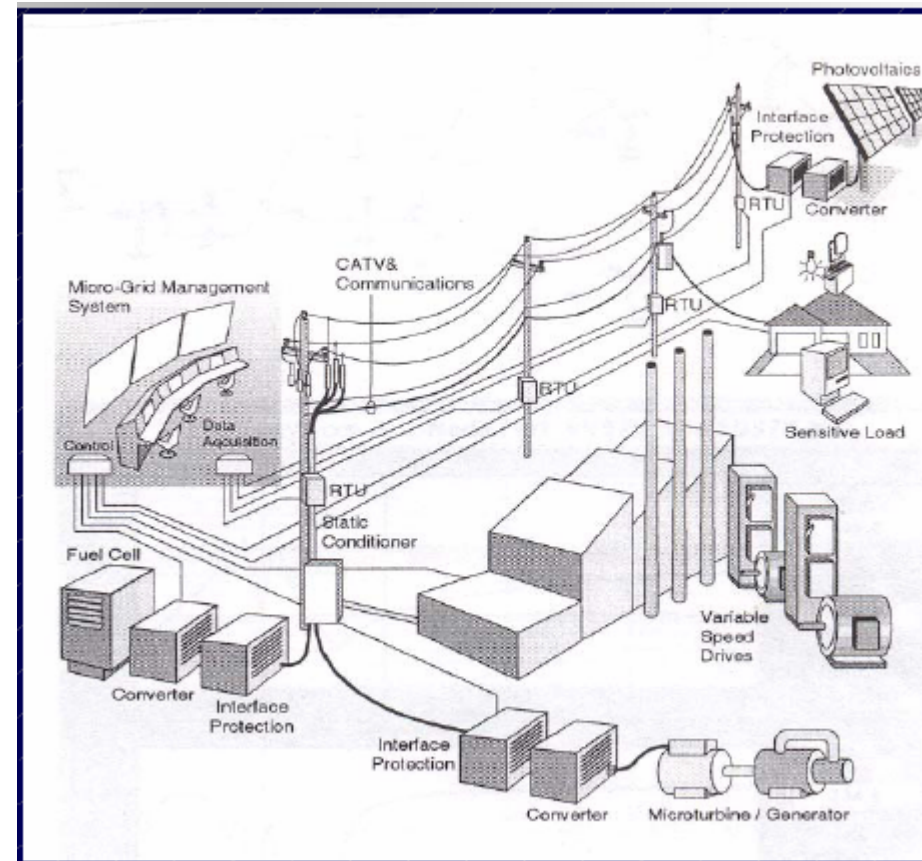


Duration	Starting August 2006	
Pilot profile	<ul style="list-style-type: none"> ■ DG capacity el. ■ DG Technology ■ Classification ■ Grid Operator 	<p>ca. 20 kWp</p> <p>PV, CHP</p> <p>residential</p> <p>MVV Energie</p>
Tasks	<ul style="list-style-type: none"> ■ Microgrid operation ■ Socio-Economic evaluation 	



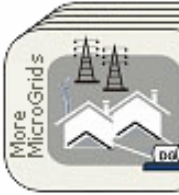
Conclusion and Outlook

- Transition from laboratory tests to pilot installations
- Variety of representative European applications
- Standards
- Important element of the European SmartGrids vision and strategy





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Sources and Distributed Generation
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Thank you for your attention!

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