



SEESGEN-ICT

An Introduction to WP2

SEESGEN-ICT General Meeting
Paris - 14th April 2011
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WP2 Team

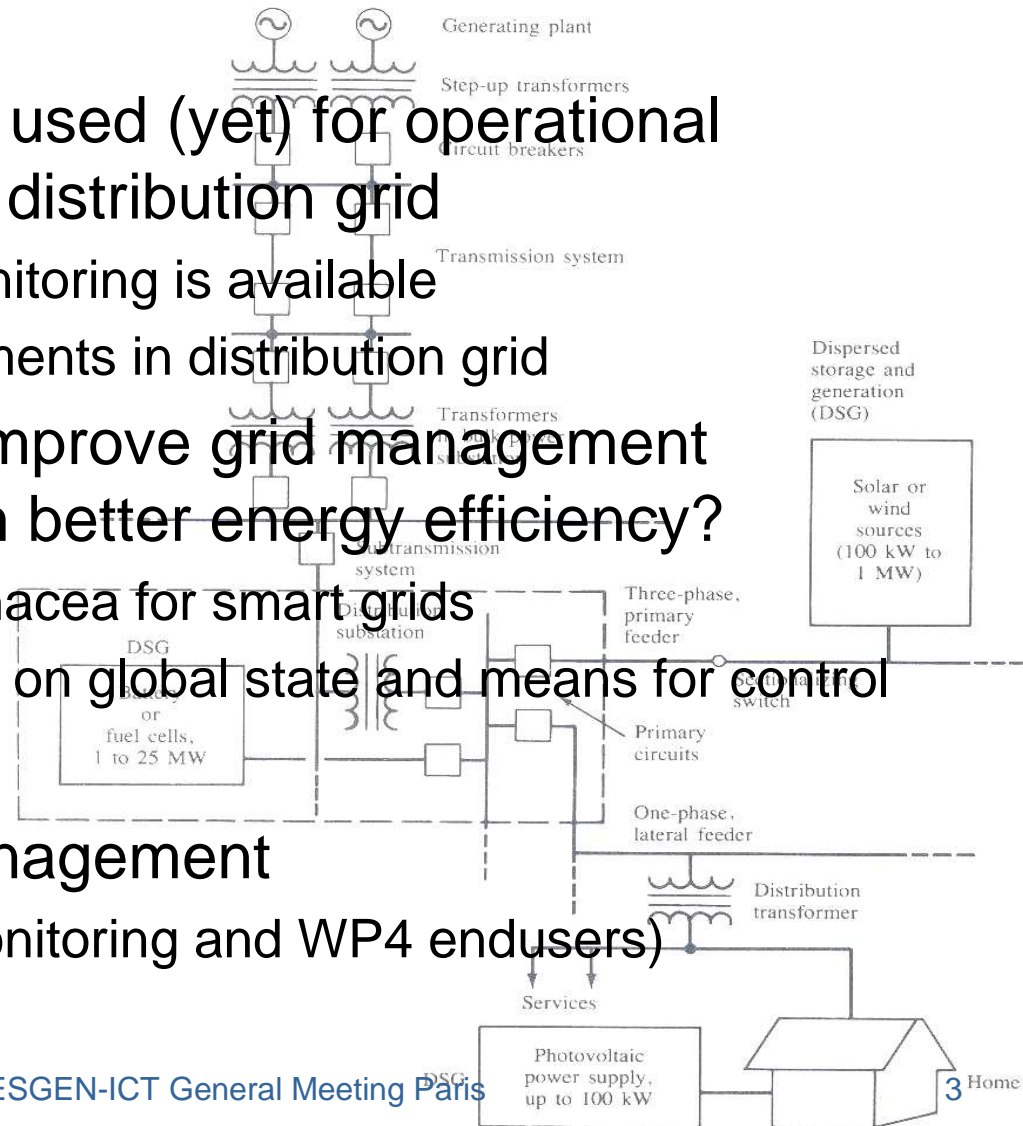
- K.U.Leuven: University of Leuven
 - Belgium
- BTH: Blekinge Institute of Technology
 - Sweden
- AIT: Austrian Institute of Technology
 - Austria
- CU: Centre for Integrated Renewable Energy Generation and Supply of Cardiff University
 - United Kingdom
- ECPE: European Center for Power Electronics e-V
 - Germany
- UL: University of Lodz
 - Poland
- ENEL DIST: ENEL Distribuzione S.p.A.
 - Italy
- PPC: Public Power Corporation S.A.
 - Greece
- + *seesgen-ict consortium at large*





WP 2 - context

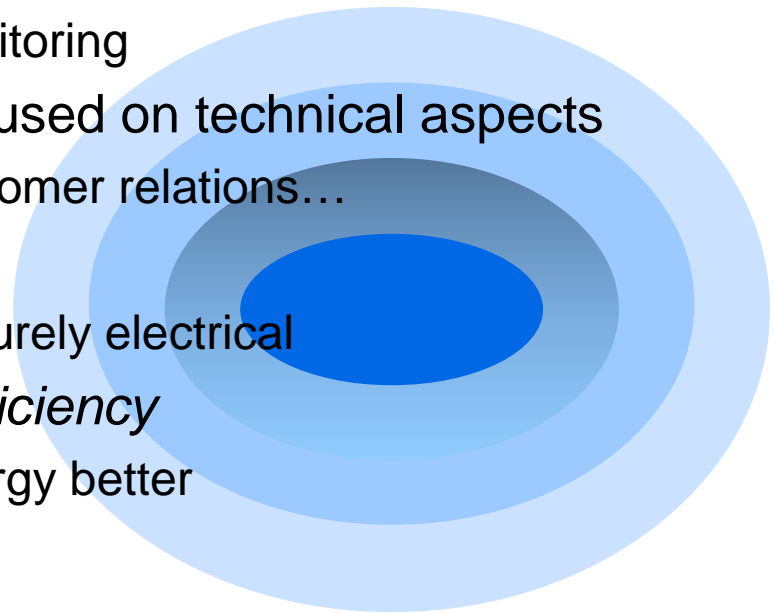
- ICT is not much used (yet) for operational management of distribution grid
 - only limited monitoring is available
 - few control elements in distribution grid
- (how) can ICT improve grid management in order to reach better energy efficiency?
 - ICT is not a panacea for smart grids
 - *only* better view on global state and means for control
- → intra grid management
 - (link to WP3 monitoring and WP4 endusers)





Scope: intra-grid management

- specific focus of work
 - to *smart* applications
 - not possible/used in current grids
 - that *manage* the grid
 - not end user, not monitoring
 - at *distribution* level, focused on technical aspects
 - not business, not customer relations...
 - that really require *ICT*
 - not purely local, not purely electrical
 - that *improve energy efficiency*
 - save energy, use energy better





Three intra-grid management applications

■ based on 3 **representative** specific applications

- voltage control
 - not purely electrical, but where ICT provides specific opportunities
- adaptive protection
 - if it is distributed and based on ICT solutions
- distribution grid reconfiguration
 - proactively and reactively

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- Voltage control
 - Adaptive Protection
 - Grid reconfiguration

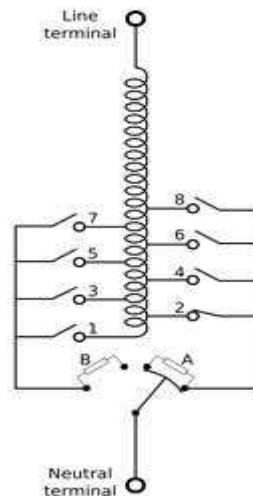


Voltage Control

- Keeping voltage within specified limits
- Entities involved

Controller

OLTC



DGs



chosen points in the distribution grid





Adaptive Protection

- A protection philosophy

- Altering the settings of protective devices to best suit the prevailing conditions
 - Preventive and emergency control
 - Positions the system to be robust
 - Responds to failure events -modifying protection system
 - Identifies developing emergency - responds to diminish its impact



Adaptive Protection Contd...

■ Entities involved

Sensors

Breaker &
actuating
circuitry

Substation
Coordination
Controller

Lines and
busbar at the
substation



Grid Reconfiguration

- minimizes the power losses
 - normal operating conditions

- prevent the whole or part of the system
 - from going into unsafe conditions- under abnormal operating conditions

- grid reconfiguration – proactively and reactively

- Implemented with the help of ICT
 - ICT to open and close various switches



Grid Reconfiguration Contd...

■ Entities involved

Relays

Breaker &
actuating
circuitry/
relays

Controllable
loads and
Distributed
generators

Switches



Contribution by WP2 –in terms of deliverables & publications

| Deliverable No | Deliverable name | Dissemination level | Delivery date (project month) as per SA | Actual Delivery date (project month) |
|----------------|--|---------------------|---|--------------------------------------|
| D2-1 | Detailed Workplan (SA) of WP2 | Restricted | Month 3 | Month 4 (Oct 2009) |
| D2-2 | Report on ICT requirements, offers and needs for managing Smart Grids with DER | Public | Month 8 | Month 8 (Feb 2010) |
| D2-3 | Report on Technical and non-Technical Barriers and Solutions for managing Smart Grids with DER | Public | Month 12 | Month 13 (July 2010) |
| D2-4 | Policy actions and recommendations for intra-grid control applications in smart grids | Restricted | Month 18 | Month 19 (January 2011) |

Publications:

1.P.C. Ramaswamy, G. Deconinck, "Classification of Intra-Grid Management Applications Based on ICT," *Proc. 5th Joint IEEE IAS, PELS & PES Benelux Chapter Young Researchers Symp. in Electrical Power Engineering (YRS-2010)*, Leuven, Belgium, 29-30 Mar. 2010, 4 pages.

2.P. Chittur Ramaswamy, G. Deconinck, "Relevance of Voltage Control, Grid Reconfiguration and Adaptive Protection in Smart Grids and Genetic Algorithm as an Optimization Tool in Achieving their Control Objectives" , *IEEE ICNSC 2011, Apr 11 to 13, 2011, Delft*

3.P. Chittur Ramaswamy, G. Deconinck, M. Stifter, "Barriers and Recommendations for Enabling ICT Based Intra-grid Control Applications in Smart Grids", **submitted for IEEE smart grid communication conference 2011, Oct, Brussels**



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12