SEESGEN-ICT
An Introduction to WP2

SEESGEN-ICT General Meeting

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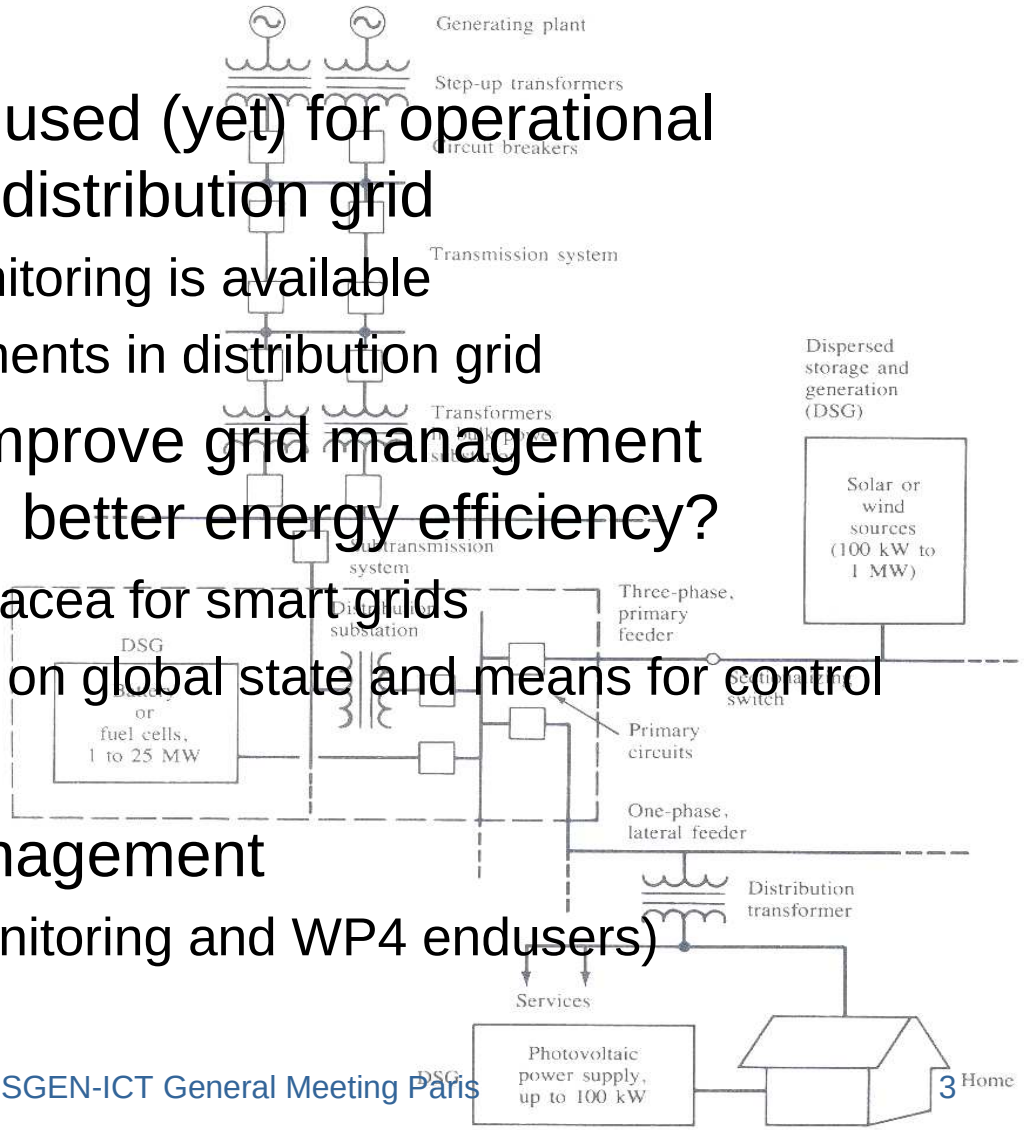
Parvathy Chittur Ramaswamy

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*

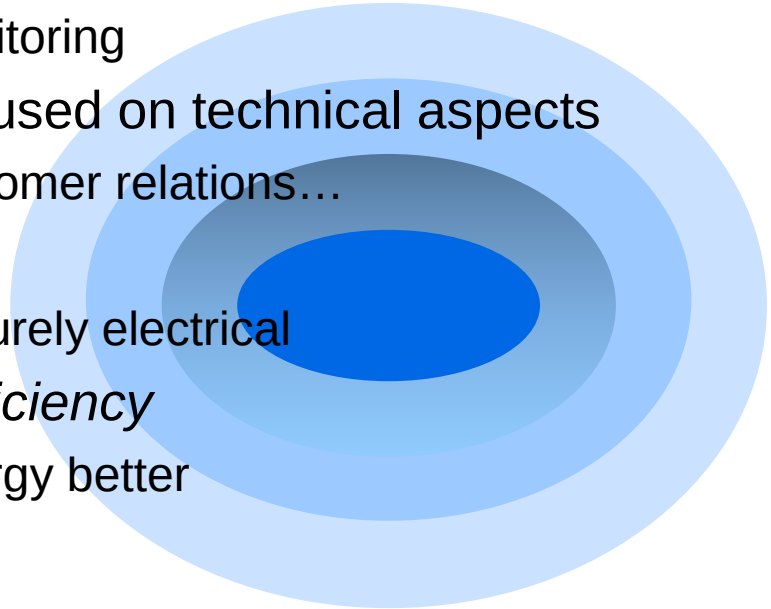
WP 2 - context

- 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)



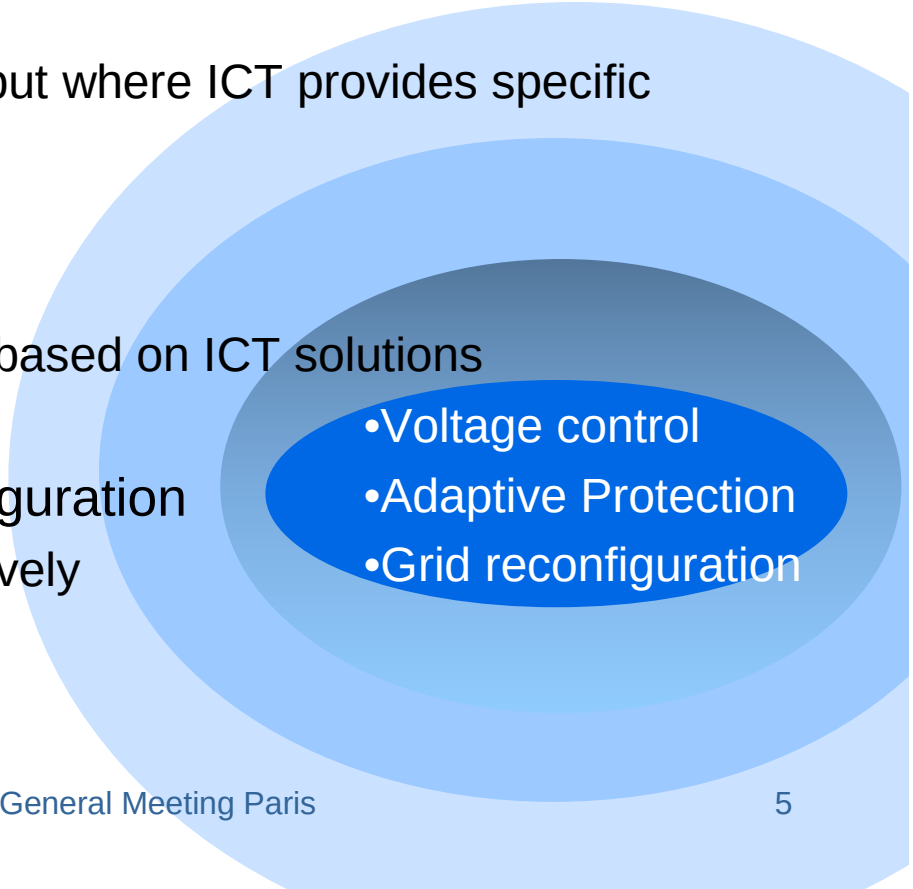
Scope: intra-grid management

- 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

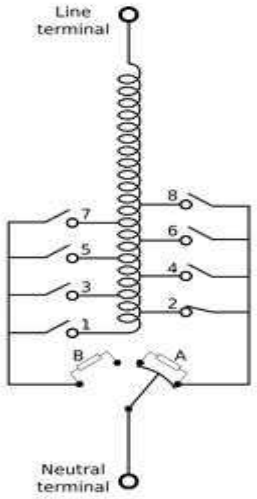


Voltage Control

- 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**


Thank you!