


Smart Grids – A must-have?

EU Experiences with integration of IPP  
and their (non-)transferability to SA

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Outlook

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- Personal background -

- 1) Smart Grids: A must-have?**
- 2) The fundamental issue: How much independent & distributed & partl. intermittent generation shall be integrated? (observations from EU/Austria)**
- 3) Relevance for South Africa?**

**=> Discussion!**



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personal background

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**M.A. political sciences/ human geography  
(FR + Berlin)**

**5 yrs regional association for RES/EE  
(funding, proj.dev., lobbying) Freiburg, Germany**

**6,5 yrs applied research, socio-technical systems  
(mainly energy, governance, PhD STS) Graz, Austria**


**1,5 yrs assistant prof, Environmental Governance  
(so far much teaching) Freiburg**




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1) Smart Grids: A must-have?

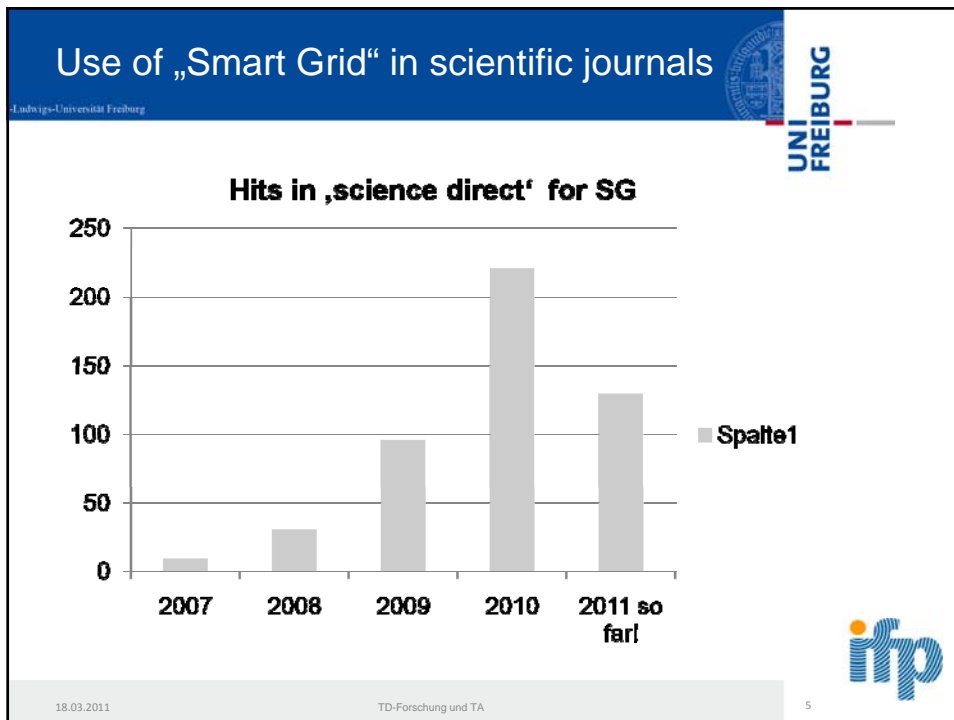
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- everybody talks about SmartGrids.
- term is used abundantly in energy scenarios, energy political statements & as object of R&D



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## 1) Smart Grids: A must-have?

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- everybody talks about SmartGrids.
- term is used abundantly in energy scenarios, energy political statements & as object of R&D.
- **what everybody knows: they are good, enabling a positive change in the energy system.**
- **definitions are very general & abstract**

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## 1) Definitions of „Smart Grid“

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definition by IEC (widely cited, e.g. ETP, E-control):

...an el. network that can *intelligently* integrate the actions of all users connected to it ... in order to *efficiently* deliver sustainable, economic and secure electricity supplies“

Most concrete definition by Austrian NTP- SG:

...that support energy and cost-effective system operation... through coordinated management by means of real time, two-way communication between grid components...” (Gen/Stor/Cons)



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## 1) Smart Grids: Promises

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NTP-SGA/ e-control:

- Security and quality of supply
- Efficient use of resources -> cost saving
- non-discriminatory access for all system users
- Maximisation o.cross-border transmission capacity
- Coordinated planning of national/EU network
- Reduction of CO<sub>2</sub> emissions (optimum integration of DG-RES)



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## Exemplary publications



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**EU com/ DG RES: “Eu. Smart Grids Techn. Platform - Vision and strategy...” 2006**

**Nat. Techn. Platform Smart Grids Austria: Roadmap Smart Grids Austria - Pathway to the future... 2010**

**IEC Smart Grid Standardization Roadmap 2010**



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## 1) Smart Grids: A must-have?

- everybody talks about SmartGrids.
- term is used abundantly in energy scenarios, energy political statements & as object of R&D.
- what everybody knows: they are good, enabling a positive change in the energy system.
- definitions are very general & abstract
- **few people think & talk about possible effects, preconditions for implementation and costs.**
- **However: controversy over the particular vision featuring in wikipedia (see: SG/'talk')**

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## Summary: the discourse on Smart Grids

### **Discourse on SG is typical for “promising technologies” (van Lente) in an early phase:**

- Techn. Vision hyped by R&D and industry to get public funding (here: IT industry needs new market).
- promises are very abstract, not specified.
- costs & side effects are not spoken about.
- obvious alternatives are not mentioned (here: an increase in network and/or storage capacity).

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## strong vs. weak conceptualisation of SG

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**Weak:**  
 enable the network to cope with given share of RES  
 by cheapest means (LCP)

**Strong:**  
 manage network on DNO level,  
 enable islanding,

**Science fiction:**  
 - DSM/ smart meters in HH, ‚smart homes‘ (privacy!),  
 - Vehicle to grid (V2G)

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## Distributed Generation (DG) in Europe

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- Significant share of DG in some EU countries (DK)
- Rel. low in some countries with high potentials (Austria, Greece)

Country	Controllable (%)	Non-controllable (%)	DG total (%)
Austria	8	5	13
Belgium	5	2	7
Denmark	25	13	38
Finland	14	1	15
France	2	0	2
Germany	19	1	20
Greece	0	0	0
Ireland	4	3	7
Italy	3	2	5
Luxembourg	5	4	9
Netherlands	15	6	21
Portugal	13	8	21
Spain	10	13	23
Sweden	17	0	17
UK	4	7	11

Share of DG in EU-15 (prelim. Figures, from DG-Grid EU Proj. 2007)

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## The struggle over the future of electricity systems

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b1

**The fundamental conflict:**  
**The political strive to promote RES (partly intermittent) vs. the techn. + institutional lock-in conserving the centralised structure**  
 (e.g. interests of incumbents to prolonge instit. arrangements in their favour)


**Context: outstanding challenges after decades of stability**

**Liberalisation (EU: late 90s),**  
 - introduction of (some) competition (generation & supply), unbundling

**Technological development**  
 - flexibilisation of eff. generation: RES, VPP, CHP!, comb.cycle gas  
 - cheaper storage??  
 - new, cheap communication technologies

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## Research: DG in Austria (2006-07)

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**The questions:**


- **Framework conditions for & practice of DG integration?**
- > **'Incentives structure' for cooperative integration?**

**a) Scope for sub-legal improvements** (institutions & strategies)

**b) Needs to reform legal framework** (incl. RES support schemes, regulation of 'use of system charges', etc.)

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## Folie 15

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**b1** Inwiefern wird hier ein Trend beschrieben?

bauknecht; 04.10.2005

**b2** Evtl. unten bei Regime Dynamcis einsortieren. Auf Folie 8 wird es dann auch ähnlich wiederholt.

bauknecht; 04.10.2005

Research: DG in Austria (2006-07)

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**The context:**

- traditionally high share of hydro (up to 78% RES)
- FiT -> wind parks to be integrated (concentrated in NE)
- big potential of (wood fuel) CHP
- strong resistance against new high voltage cables

**Effects:**

- High interest in DG (partic. for the south)
- RES support (FiT) highly controversial.
- Technical (un-)feasibility of integration disputed.
- Feed-in tariff partly ineffective due to tricks by incumbants

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**The approach**

- Study incentive structures in A and compare with international examples (UK, DK, GER)
- Interview DSO, TSO, IPP and regulator about problems with integration and incentives structure
- Get them all on one table and identify dissent & consensus


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## Integration of DG in Austria: Results

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- Regulation of UoS-Charges of crucial importance
- Coordinated network development unlikely (unbundling, IPP, no political interest)
- Undifferentiated RES-support (feed-in tariff, priority dispatch) problematic for higher shares of RES
- Potential f. locational signals & (peak/ non-) capacity
- Renumeration of ancilliary services? (reactive e...)
- Need to reform basic prescriptions (roles of DSO/TSO, mandate of regulator, ...)
- Many path dependencies inscribed in norms and rules (e.g. capacity of cables/ temperature+wind)




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## 3) differences in contexts EU/SA

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- 1) **Policy objectives** (%-RES/ CO<sub>2</sub>)
- 2) **Electricity mix** (foresighted)
- 3) **Actor constellation** (DNO/TSO, Gen, regulation)
- 4) **Network structure**



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## SA: Smart grids from bottom-up?

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### Micro-grids

- already in operation
  - supply crisis looming
  - interest in islanding
  - political/ legal support for that ? !
  - ESKOM to be aligned?
- ⇒ **privately funded modules,**
- controlling & aggregating gen+cons+storage,
  - large enough to enter markets?



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