

Is smart efficient? Assessing energy consumption of network products with the example of smart meters.

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SMART METERING consumption

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Motivation





Project: SMART METERING consumption



BMVIT/BFE: AT – CH (2010 – 2012)



Methodology in 3 Steps





Step 1 – Mapping of Technologies





Step 2 – Performing Measurements





Step 2 – Performing Measurements

PLC

Power Consumption Curve over 24 hrs. - Meter SS02



Step 3 – Deriving Roll Out Scenarios







Aktive Komm. 22:51 - 5:42 (alle Vorgänge)

411

4,46 10



Conversion to Metering Point



TSZ A_2 – Liste technischer Komponenten

Die Durchschnittswerte für die Zähler wurden aus den vom Hersteller erhaltenen Angaben (vgl. Tabelle 11) sowie in Ergänzung Datenblattangaben abgeleitet.

Techn. Komp.	Beschreibung (Referenz)	P (W)	Daten- sorte	Quelle	
Einphasiger Zähler	Einphasiger, modularer Zähler mit Breaker. Annahme, dass in 20% der Betriebszeit das KommModul aktiv kommuniziert (SL05-SM-1ph)	2,33	I	Messungen durch Hersteller (2012), Hersteller- Datenblatt (2009)	
Dreiphasi- ger Zähler	Dreiphasiger, modularer Zähler mit Breaker. Annahme, dass in 20% der Betriebszeit das KommModul aktiv kommuniziert (SL05-SM-3ph)	2,88	I	Messungen durch Hersteller, Aussa- ge von Hersteller (2012)	
Datenkon- zentrator	Datenkonzentrator inkl. Netzteil und mit integ- riertem Modem. GPRS-Anbindung am Head- End	7,00	1	Hersteller- Datenblatt (2010)	

1.) List of all Technical Components (TC) used to describe system-wide energy consumption of infrastructure.

Conversion to Metering Point



Technische Szenarien A

Schmalband-PLC Anbindung an Datenkonzentrator

Tabelle 26: Zählpunktbezogene	Wirkleistungen für die	TSZ aus Anbindungsart A
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Szenario	Annahmen	Zählpunkttyp	$\overline{P_{ZP}}$ (W)
A_2 – 200ZP	200 Zählnunkta in Datankanzantzatar	einphasig	2,40
	200 Zanipunkie je Datenkonzentrator	dreiphasig	2,95
A_2 – 100ZP	100 Zählnunkta in Datankanzantzatar	einphasig	2,44
	Too Zanipunkie je Datenkonzentrator	dreiphasig	2,99
A 0 257D	25 Zähleuslite is Deterskonsenteeter	einphasig	2,58
A_2 - 352P	35 Zanipunkte je Datenkonzentrator	dreiphasig	3,13

2.) Conversion to active power demand per metering point – categorized by number of phases, and optional further parameters (e. g., meters per data concentrator for PLC).

System-wide Comparison



Annual Energy Consumption (kWh) per Metering Point According to Technical Scenarios A-D



Switzerland – Yearly Consumption



Annual Energy Consumption (GWh/a) According to Assumed Roll Out Scenarios for Switzerland



Roll Out Scenarios - Austria					Jung		
					8		
5.804.625 Zählpunkte	→ 73% TSZ A			11% TSZ B		16% TSZ C	
	50% TSZ /	% A_1	50% TSZ A_2		50% TSZ B_1	50% TSZ B_2	100% TSZ C_1
Ļ	85% 100ZP	15% 35ZP	85% 100ZP	15% 35ZP			
29% einphasig	522.257	92.163	522.257	92.163	92.584	92.584	269.335
Verbrauch (GWh/a)	15,3	3,0	11,2	2,1	2,3	1,5	2,3
71% dreiphasig	1.278.628	225.640	1.278.628	225.640	226.671	226.671	659.405
Verbrauch (GWh/a)	54,9	10,4	33,5	6,2	6,1	4,7	8,5

17

4
3
2

Austria – Annual Overall Consumption

Annual Energy Consumption (GWh/a) According to Assumed Roll Out Scenarios for Austria

4 3 2



Key Findings



- Assessment methodology for the own energy consumption of smart metering infrastructure has been developed.
 Flexible, broadly applicable, refinable, and prepared for objectoriented data-handling.
- Considerable differences in efficiency performance of meters 1,4 to 4,6 W (3-phase meter).
- Smart meter itself shows largest contribution to overall energy consumption.
 76 to 98 %, depending on roll out scenario.
- A significant reduction to one third could be achieved through the use of the most efficient metering and communication technology.

Considerations for future work



- This assessment did not include any in-home display devices, nor home monitoring / home automation and their associated (additional) energy consumption!
- Scenarios could also be evaluated with:



Contact and Further Information



UPCOMING EVENT – May 28th in Nice (France):

IEA-4E Experts Workshop: *Energy Consumption of Domestic Energy Monitoring Systems*.

See: www.ecodesign-company.com and www.iea-4e.org

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Download SMc project report (in German):

<u>http://www.bfe.admin.ch/dokumentation/energieforschung/</u> <u>index.html?lang=de&publication=10937</u>



Project partners:



