



ESSnet Big Data II

WPD Smart Energy

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Participants

Workpackage number	WPD	Start Month:			M1
		End Month:			M24
Title	Smart Energy				
Partner (leader in bold)	EE	DK	NO	SE	
Person-days	300	140	93	82	
Objectives					
<p>The aim of the WP is to develop functional production prototypes including setting up procedures and developing technical solutions, to promote and support the collection, processing and analysis of smart meter data for statistical production in the participating NSIs related to statistics on measuring electricity consumption and identifying energy consumption patterns.</p>					

ESSnet Big Data II WPD

- Continuing Project
- Work is based on previous ESSnet results

Smart meter data:

- Develop procedures, technical solutions
- Collection, processing and analysis
- Develop functional production prototypes
- Electricity consumption/ identifying energy consumption patterns

ESSnet Big Data II WPD outputs

- Developing methodology for geo-spatial linking.
- Defining common quality measurements for linking.
- Developing standard visual outputs for electricity data.
- Validate the methods selected during the ESSNet big data defining requirements for classifying households as vacant or seasonally vacant.
- Other developments to fit the requirements of official statistics.

Previous ESSnet results

- **Data access**

 - Data owners/holders, legal aspects, technological requirements

- **Data handling**

 - Data description (structure, records attributes)

- **Methodology and techniques**

 - Linking meter data with administrative data

 - Methodologies for statistics regarding businesses, households and vacant living spaces

All participating countries have different starting points

Norway data access

- Data is received from Elhub
- Current data aggregated at a monthly level
- Future prospects to get finer granularity (hourly)

- For a future full scale production system the infrastructure must be adapted.

Norway main goals

Identifying vacant or seasonally vacant dwellings

- Elhub data can be linked to:
 - Register of addresses (administrative)
 - Register of buildings (administrative)
 - Dwelling register (statistical)
- The ESSnet BD1 models will be validated and further improved

Norway risks and mitigation scenarios

- No finer granularity data
- Substantial amount of data cannot be uniquely linked

Sweden data access

- Cooperation with the Swedish Energy Agency
- Swedish electricity data hub will be up and running in 2021
- No real hub data yet
- Small set of test data

Sweden main goals

Planned statistical products

- Yearly and Monthly energy consumption
- National accounts
- Enviromental accounts
- Consumer- and producer price index
- New housing statistics
- New statistics on type of production

Sweden workflow

Register for energy consumption and production

- Cooperation with energy companies to ensure quality of data
- What is the relevant info that needs to be extracted from the hub
- Define an architecture for the process
- Design methods for linking with:
 - Business register
 - Population register
 - Building register
 - Property tax register etc.

Sweden risks and mitigation scenarios

- Legal aspects are not fully identified
- Lack of resources
- No real hub data
- Conclusions and assumptions will not hold for real data
- Not making use of the full potential of the hub

Denmark data access

- Data from Energinet
- Around 4 million electricity meters
- Both manual and automatic meters
- Granularity – quarter of an hour and hour
- Background info for every meter
 - Address info
 - Consumer info
 - Subscription info

Denmark main goals

Planned statistical products

- Total annual consumption broken down to sectors
- Mean consumption of households broken into household consumption
- Mean consumption of business broken down to size and sectors
- Visual outputs on a webpage (maps, gifs etc.)

Denmark workflow

- Regular data transfer from Energinet servers to ORACLE database
- Use address info for generating unique deidentified geocodes
- Automatically calculate hourly consumption
- Remove duplicates (automatically and manually read)

Estonia data access

- Data from Elering
- Around 750k smart meters
- Data from 2013 - 2017

- Data transfer currently once per year on a harddrive
- From 2019 automatic data transfer

Estonia main goals

- Total annual consumption broken down to sectors
- Electricity consumption of businesses broken down to sectors
- In 2020 no manual data inquiries – all info from smart meter data
- Identifying vacant, seasonally vacant dwellings
- Household statistics – energy consumption patterns
- Evaluating the quality of the outputs

Estonia workflow


























- Data from Elering to HDFS (storage)
- Data into PostgreSQL database
- Linking data with other data sources (business-, population-, building registers)
- EIC codes
- Specify algorithms to produce variables of interest
- Estimation and computing outputs
- Visualization

Input data quality

- Not all metering points have link to contract/customer
- Erroneous starting and ending time of the contracts (very few cases)
- Among customers are unidentified units e.g. foreigners, houses.
- Not all businesses have existing business ID
- Validate the results with other data sources

Energy Identification Codes (EICs)

- EIC codes for metering points
- EIC code for the client
- EIC code for the producing unit

LIO CODE	NAME	COUNTRY	WEBSITE	EIC WEBSITE	EMAIL	OPERATES IN ELECTRICITY	OPERATES IN GAS
37	DVGW	DE			Email		✓
38	Elering	EE			Email	✓	✓
39	FGSZ	HU			Email		
40	EPIAS	TR			Email	✓	
41	LITGRID UAB	LT			Email	✓	
42	EU-STREAM	SK			Email		
43	AST	LV			Email	✓	
44	Fingrid Oyj	FI			Email	✓ (except X codes)	
45	Energinet	DK			Email	✓	
46	SVK	SE			Email	✓	✓
47	Eirgrid	IE, NI			Email	✓	✓
48	NationalGrid	UK			Email	✓	
49	Tennet NL	NL			Email		
50	Statnett	NO			Email	✓ (except X codes)	
51	Plinovodi	SI			Email		✓
52	GTS	NL			Email		✓

Representativity

- Statistical units: enterprises, households ...
- Observed units: metering points

- Statistical variable: final consumption
- Observed variable: amount of electricity recorded by the metering point incl. electricity for trading, distributing, transport, import, consumption.

Linking

- Matching units using
 - business IDs
 - Address ID
 - Address object ID

Results so far: 1-1 matching rates 92% (business ID), 77% (address ID), 44 % (address object ID).

Data processing

- Aggregation by metering point, customer, time period
- Differentiate private persons among businesses (situation of apartment associations) – machine learning methods by looking daily patterns
- Determine dwelling's vacancy by looking monthly consumption, daily average, daily variability etc.

Estonia risks and mitigation scenarios

- Elering does not give us data
- Poor data quality for producing statistical products

Scalability of the project

Smart grids and meters

> Smart Grids Task Force

The Smart Grids Task Force advises the European Commission on the development and deployment of smart grids.



Smart grids are energy networks that can automatically monitor energy flows and adjust to changes in energy supply and demand accordingly. When coupled with smart metering systems, smart grids reach

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Smart grid task force

- The EU aims to replace at least 80% of electricity meters with smart meters by 2020.
- Smart metering and smart grids rollout can reduce emissions in the EU by up to 9% and annual household energy consumption by similar amounts.
- Standard for smart grids and smart meters is being developed

Large-scale roll-out (at least 80% of consumers by 2020)	Metering points in the Country by 2020	Expected Diffusion rate by 2020 (%)	Total Number of Smart Metering Points to be installed up to 2020
Austria	5700000	95%	5415000
Denmark	3280000	100%	3280000
Estonia	709000	100%	709000
Finland	3300000	100%	3300000
France	35000000	95%	33250000
Greece	7000000	80%	5600000
Ireland	2200000	100%	2200000
Italy	36700000	99%	36333000
Luxembourg	260000	95%	247000
Malta	260000	100%	260000
Netherlands	7600000	100%	7600000
Poland	16500000	80%	13200000
Romania	9000000	80%	7200000
Spain	27768258	100%	27768258
Sweden	5200000	100%	5200000
United Kingdom — GB	31992000	99.5%	31832040
Total	192469258	95.3%	183394298

Member States	Metering points in the Country by 2020	Expected Diffusion rate by 2020 (%)	Total Number of Smart Metering Points to be installed up to 2020
EU-23 (for which data are available)	263858367	74.0% (~72% for EU-27)	195322543

WPD deliverables

Larger impact of the deliverables

- Take into account EU commissions smart grid task force standard
- Technical reports should be like handbooks for countries that want to produce statistics from smart meter data
- What are the minimal requirements for the data, hardware, software
 - Client name
 - Client code
 - EIC code
 - Etc ...

Thank you

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