MEErP Tasks overview

TASK 1
Scope

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Users

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Technical analysis

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Base cases (environmental & economic)

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Design options

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Task 2 is about:
- Market trends and # smart appliances 2015-2020-2030
- Remuneration mechanisms

TASK 1
Scope

TASK 2
Market & economic analysis

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TASK 1
Scope

TASK 2
Market & economic analysis

TASK 3
Users

Task 3 is about:

Appliance end-user perspective
- Drivers/barriers for uptake
- Comfort constraints and consumer objections
- Load shifting/flexibility potential

Use of DR in energy system perspective
- Flexibility use cases
- Installed capacity per generation technology/predicted RES capacity per MS

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Tasks overview

Task 4 is about:
- Technologies
- Energy impact
  - Consumption
  - Costs
- Product cost

TASK 1
Scope

TASK 2
Market & economic analysis

TASK 3
Users

TASK 4
Technical analysis

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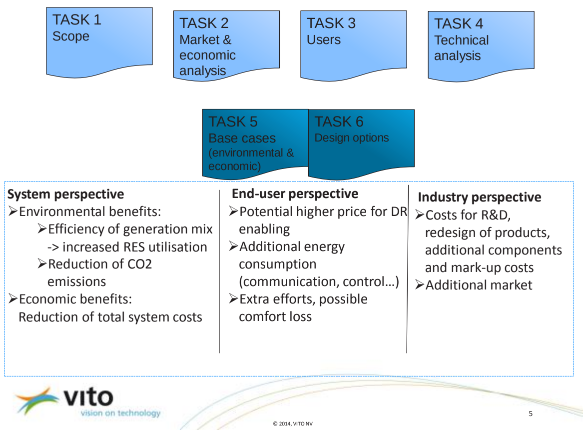

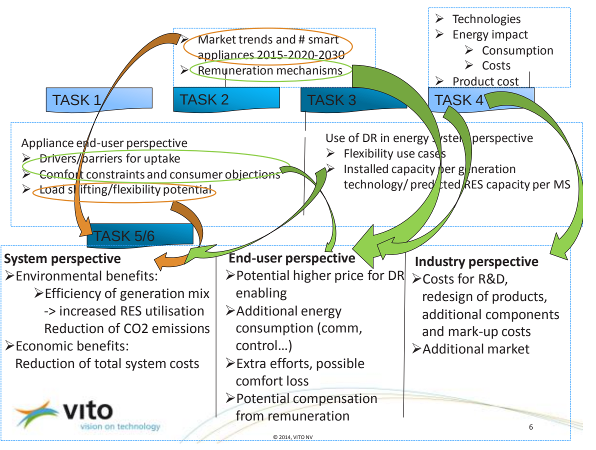

TASK 2: ECONOMIC AND MARKET ANALYSIS

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Goal and structure of Task 2

1. Market trends regarding the general **Internet of Things market** and more specifically the market for **smart home** and **smart appliances**
2. Estimations of stock of smart appliances 2015-2020-2030
3. Economic instruments/remuneration mechanisms -> afternoon presentation

Market trends

- market trends regarding the general **Internet of Things market** and more specifically the market for **smart home** and **smart appliances**
- '**Smart**' in this section = term used by the market = **connected** & **app-enabled**

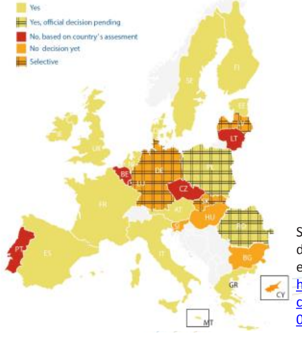
Impression of IFA 2015

- Most appliance manufacturers offer or announced smart appliance lines in 2015. Wi-Fi seems to be the preferred communication technology.
- Some smart appliances are designed in such a way that they can **communicate information directly** to the service operator for efficient and productive use of electricity.
- Some of these appliances have the ability **to measure and control their energy usage**.
- Promoting the added value of smart appliances towards customers is done by emphasizing the **extra comfort** (like remote control or status notifications via an app) and **energy management functions**.
- The global consumer industry overall turnover is forecasted to grow by 14% this year.

Market research forecast reports (some figures)

- Consumer spending on smart home products and services:
  - €90.90 billion globally by 2018
  - €15.46 billion annually by 2019 in the EU
  - 29.7 million smart homes in the EU by 2019 (from 2.7m end 2014)
- Smart thermostat
  - Estimated revenue of $2,57 billion (€2,41 billion) in 2019 globally
  - Estimated installed base in 2019 in the EU: 13.6 million homes
- BAT/EMS penetration
  - Residential: 2% of homes in 2014 to 40% by 2034
  - Non-residential: 26% of all service sector floor area in 2014 to 40% by 2028

Deployment of smart electricity meters in EU Member States by 2020



Estimation of 200 million smart meters for electricity by 2020, representing approximately 72% of all European consumers

Source: Benchmarking smart metering deployment in the EU-27 with a focus on electricity, COM(2014) 356 final, http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0356&from=EN

Trends conclusion

- Market research reports are forecasting **double digit** CAGR in smart appliances units/shipments and revenues for the next 5 years
- Although DR is not the focus, this trend will provide **communication functionality** to new appliances by 2020
- **Smart thermostats** are the most popular category
  - Several sales channels: utilities/energy retailer & HVAC & off-the-shelf
  - Already part of DR programs in some countries
- The IoT trend will have a significant **impact** on
  - business models, roles, sales channels and service channels
  - Instead of a one-time contact (sales) with the customer the manufacturer/vendor/service provider will in the IoT scenario have a **permanent link** with the customer for the lifetime of the product

Stock of smart appliances 2015-2020-2030

- Smart appliances as defined in the study have not yet (fully) seized the market
- No hard figures available – only trend estimates

- Starting point: current stock of available appliances
- Per appliance type: expert estimations of current share of DR enabled stock and forecasts

Your input is welcome to check and refine estimations

Periodical appliances - Dishwashers

Installed units of dishwashers in 2010 (reference) and 2015, 2020, 2030 (estimates)

Appliance group	Dishwashers			
Reference Year	2010	2015	2020	2030
Installed base	82,799,000	98,345,000	115,036,000	148,553,000
Source	Kemna, 2014	Kemna, 2014	Kemna, 2014	Kemna, 2014
Number of smart appliances		0	575,180	29,710,600
Source		Conservative estimation of 0% of installed base	Educated estimation of 5% of installed base	Educated estimation of 20% of installed base
Reference countries		EU28	EU28	EU28

- For periodical appliances, educated estimations were made of the share of smart appliances for 2020 and 2030

Periodical appliances – Washing machines

Installed units of washing machines in 2010 (reference) and 2015, 2020, 2030 (estimates)

Appliance group	Washing machines			
Reference Year	2010	2015	2020	2030
Installed base	185,828,000	196,821,000	200,805,000	204,744,000
Source	Kemna, 2014	Kemna, 2014	Kemna, 2014	Kemna, 2014
Number of smart appliances	0	252,335	10,040,250	40,948,800
Source	Estimation of 0% of installed base	Extrapolation based on 0.13% penetration of German market (Gfk, 2015)	Educated estimation of 5% of installed base	Educated estimation of 20% of installed base
Reference countries	EU28	EU28	EU28	EU28

- Estimation of 0,13% penetration rate for smart appliances in 2015 in EU
  - based on estimation of 50,000 smart washing machine sold in 2014/2015 compared to total sales in Germany of 39,000,000 washing machines (GfK, 2015)
  - to be considered as a maximum amount (considering progress of German market)
  - source: GfK presentation by Christiane Schoenwetter during the symposium "Die Vision der 2000-Watt-Gesellschaft" on 20/10/2015

Periodical appliances – Tumble dryers

Installed units of tumble dryers in 2010 (reference) and 2015, 2020, 2030 (estimates)

Appliance group	Tumble dryers			
Reference Year	2010	2015	2020	2030
Installed base	62,723,000	68,018,000	71,801,000	77,778,000
Source	Kemna, 2014	Kemna, 2014	Kemna, 2014	Kemna, 2014
Number of smart appliances	0	0	3,590,050	31,111,200
Source	Estimation of 0% of installed base	Conservative estimation of 0% of installed base	Educated estimation of 5% of installed base	Educated estimation of 40% of installed base
Reference countries	EU28	EU28	EU28	EU28

Periodical appliances – Washer-dryers

Installed units of washer-dryers in 2010 (reference) and 2015, 2020, 2030 (estimates)

Appliance group	Washer-dryers		
Reference Year	2015	2020	2030
Installed base	8,640,000	10,800,000	17,300,000
Source	Estimated based on Euromonitor International, 2014		
Number of smart appliances	0	540,000	3,460,000
Source	Conservative estimation of 0% of installed base	Educated estimation of 5% of installed base	Educated estimation of 20% of installed base
Reference countries	EU28	EU28	EU28

- Estimation of 4% penetration rate for washer-dryers in 2015 in EU
  - applied to the total number of households instead of the total washing machine market (conservative assumption)
  - source: Euromonitor International, 2014
  - 216,13 million households in EU-28 (Eurostat, 2014)

Continuous appliances – Household refrigerators & freezers

Installed units of household refrigerators and freezers in 2010 (reference) and 2015, 2020, 2030 (estimates)

Appliance group	Household refrigerators and freezers			
Reference Year	2010	2015	2020	2030
Installed base	297,800,000	303,200,000	308,000,000	317,600,000
Source	Kemna, 2014	Kemna, 2014	Kemna, 2014	Kemna, 2014
Number of smart appliances		147,810	15,400,000	63,520,000
Source		Extrapolation based on 0.06% penetration of German market (Gfk, 2015)	Educated estimation of 5% of installed base	Educated estimation of 20% of installed base
Reference countries		EU28	EU28	EU28

- Estimation of 0,06% penetration rate for smart appliances in 2015 in EU
  - based on estimation of 25,000 smart household refrigerators sold in 2014/2015 compared to total sales in Germany of 40,000,000 refrigerators
  - to be considered as a maximum amount (considering progress of German market)
  - source: GfK presentation by Christiane Schoenwetter (20/10/2015)

Continuous appliances – Commercial refrigerators & freezers (1)

Installed units of commercial refrigerators and freezers in 2010 (reference) and 2015, 2020, 2030 (estimates)

Appliance group	Commercial refrigerators and freezers			
Reference Year	2010	2015	2020	2030
CF open vertical chilled multi deck	1,328,000	1,492,000	1,672,000	2,033,000
CF open horizontal frozen island	180,000	196,000	219,000	268,000
CF Plug in one door beverage cooler	6,378,000	6,833,000	7,240,000	8,040,000
CF Plug in horizontal ice cream freezer	2,725,000	2,928,000	3,013,000	3,447,000
CF Spiral vending machine	1,157,000	1,382,000	1,674,000	2,341,000
Total installed base	11,768,000	12,831,000	13,907,000	16,129,000
Source	Kemna, 2014	Kemna, 2014	Kemna, 2014	Kemna, 2014
Reference countries	EU28	EU28	EU28	EU28

Continuous appliances – Commercial refrigerators & freezers (2)

- Around 70% of remote display cabinets sold in FR, GE and IT are connected to tele-monitoring systems (to be considered communication-enabled?)
  - Source: personal communication Eurovent
- 2 families of monitoring systems :
  1. System dedicated only to monitoring of temperatures/pressures
     - covers 100% of the cabinets under tele-monitoring
  2. System dedicated to monitoring, fine-tuning (in terms of energy consumption) of the performance of cabinets and cooling packs, including the forecasting of possible failures
     - covers about 40% of the cabinets that are included in the first system
- **More information will be gathered** to match the figures with the two monitoring system families

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Continuous appliances – Electric storage water heaters

- Electric storage and instantaneous water heaters, gas-and oil fired storage and instantaneous water heaters and solar-assisted water heaters
  (note: instantaneous water heaters are part of behavioural appliances)

Installed units of water heaters in 2010 (reference) and 2015, 2020, 2030 (estimates)

Appliance group	Water heaters			
Reference Year	2010	2015	2020	2030
Installed base	157,293,000	161,740,000	165,192,000	172,268,000
Source	Kemna, 2014	Kemna, 2014	Kemna, 2014	Kemna, 2014
Reference countries	EU28	EU28	EU28	EU28

- Installed stock of **electric storage water heaters** in EU-27 in 2007: 90 million units (estimates by JRC)
- **No data available** on the share of **smart water heaters**
  - Swedish study investigating the flexibility of water heaters
    → not possible to extrapolate these data for EU-28

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Behavioural appliances

- Installed stock of **instantaneous water heaters** in EU-27 in 2007: 29 million units (estimates by JRC)
- **Electrical hobs**, **electrical ovens**, **range hoods** and **vacuum cleaners** only have an emergency flexibility potential.

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HVAC (1) - Estimated share of installed base that is used in a smart way

HVAC Technology	% Stock			
	2010	2015	2020	2030
Air conditioning	0%	0,50%	5%	20%
Electric Radiators	0%	0,10%	0,10%	0,10%
Heat Pumps	0%	0,50%	5%	20%
Electric Boilers	0%	0,10%	5%	10%
Circulator Pumps	0%	0,10%	5%	10%
Electric Radiators (inertia)	0%	0%	0%	0%
Ventilation	0%	0%	n/a	n/a

Smart ready figures are larger

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HVAC (2) - Assumptions

- Important growth for **air conditioners** and **heat pumps**, given growing stock trends
- Smaller growth for **boilers** and **circulator pumps**, given decreasing trend from 2015 (but assumed that new technologies will be communication-enabled)
- Constant growth for **electric radiators** following the line of little interest on investing and the decreasing trend
- No information available for **ventilation**, but assumed not really significant, due to low energy consumption of ventilation units (ca. 10x smaller than for cooling and heating)

Battery operated rechargeable appliances

- **Worldwide** sales :
  - Smartphones :
    - 300 million in 2010
    - 650 million in 2012
    - expected to grow > 1 billion in 2016

  The estimated total installed base for smartphones only will exceed 2 billion
  - Tablets :
    - 200 million in 2013
    - expected 350 million in 2016.
  - Laptop estimated at 167 million worldwide in 2015.
- **Europe:** Smartphone subscriptions
  - 475 million in 2014
  - Expected to grow to 815 million in 2020

Residential energy storage systems

- Only figures available for the German market :
  - 25,000 home batteries have been installed up to 2015

Lighting

- Estimated stock in 2013
  Source: Ecodesign Preparatory Study on Light Sources (ENER Lot 8/9/19 (VITO, 2015)
  - LFL: Linear fluorescent lamp: 2209 million units
  - CFL: Compact fluorescent light: 4406 million units
  - Tungsten: 2569 million units
  - GLS: General lighting service ('incandescent'): 561 million units
  - HID: High intensity discharge lamp: 84 million units
  - LED: Light emitting diode: 144 million units
- Separately, the estimated number of street lighting luminaires in EU-25 is about 60 million (2004 figures) (VITO, 2007)
- Some automated building systems in residential/tertiary sector, no figures available

Conclusion

- For **periodical** appliances educated estimations were made of the share of smart appliances for 2020 and 2030
- For **commercial refrigerators and freezers** more information will be gathered regarding the share of smart appliances
- For continuous appliances no data are available on the share of **electric storage water heaters**
- For ventilation (HVAC) there is no information available, but it is assumed not to be really significant
- Battery operated rechargeable appliances: WW sales available tablets/laptops, # smartphone subscriptions Europe
- Residential energy storage systems: only DE data available
- Lighting: automated building systems in residential/tertiary sector

Your input is welcome to check data and refine estimations

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