FWC ESPR – SR5 Professional Dishwashers

Stakeholder Meeting – 10 December 2024

Oeko-Institut, Trinomics, Ecomatters, Fraunhofer IZM,
Fraunhofer ISI, and VITO

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Agenda

Agenda – morning

10:00 – 10:15	**Welcoming / Opening Remarks from DG ENV** *Pierre Henry – Team Leader - ENV B.4 Sustainable Products*
10:15 – 10:30	**The Ecodesign for Sustainable Products: state of play (ESPR)** *Wojciech Sitarz – Policy Officer - ENV B.4 Sustainable Products*
10:30 – 10:45	**Overview of the Preparatory Study** *Kathrin Graulich – Senior Researcher – Oeko-Institut*
10:45 – 11:15	**Task 1: Scope and definitions** *Martin Möller – Senior Researcher – Oeko-Institut*
11:15 – 11:30	**Q&A – Task 1**
11:30 – 12:00	**Task 2 – Market analysis** *Laurent Zibell – Senior Consultant – Trinomics*
12:00 – 12:15	**Q&A – Task 2**
12:15 – 14:00	Lunch break outside the building!

Agenda – afternoon

14:00 – 14:30	**Task 3 – Users** *Kathrin Graulich – Senior Researcher – Oeko-Institut*
14:30 – 14:45	**Q&A – Task 3**
14:45 – 15:15	**Task 4 – Technologies** *Martin Möller – Senior Researcher – Oeko-Institut*
15:15 – 15:30	**Q&A – Task 4**
15:30 – 16:00	Coffee break
16:00 – 16:20	**Under discussion:** **(Extended) EPREL vs. DPP approach for Professional Dishwashers** *Wojciech Sitarz – Policy Officer - ENV B.4 Sustainable Products*
16:20 – 16:40	**Outlook: Task 5 – Base Cases** *Marco Mense – Senior Consultant – Ecomatters*
16:40 – 16:50	**Next steps** *Kathrin Graulich – Senior Researcher – Oeko-Institut*
16:50 – 16:55	**Closing remarks – end of the meeting** *Wojciech Sitarz – Policy Officer - ENV B.4 Sustainable Products*

Welcome &
Ecodesign for Sustainable Products Regulation (ESPR)

Professional Dishwashers

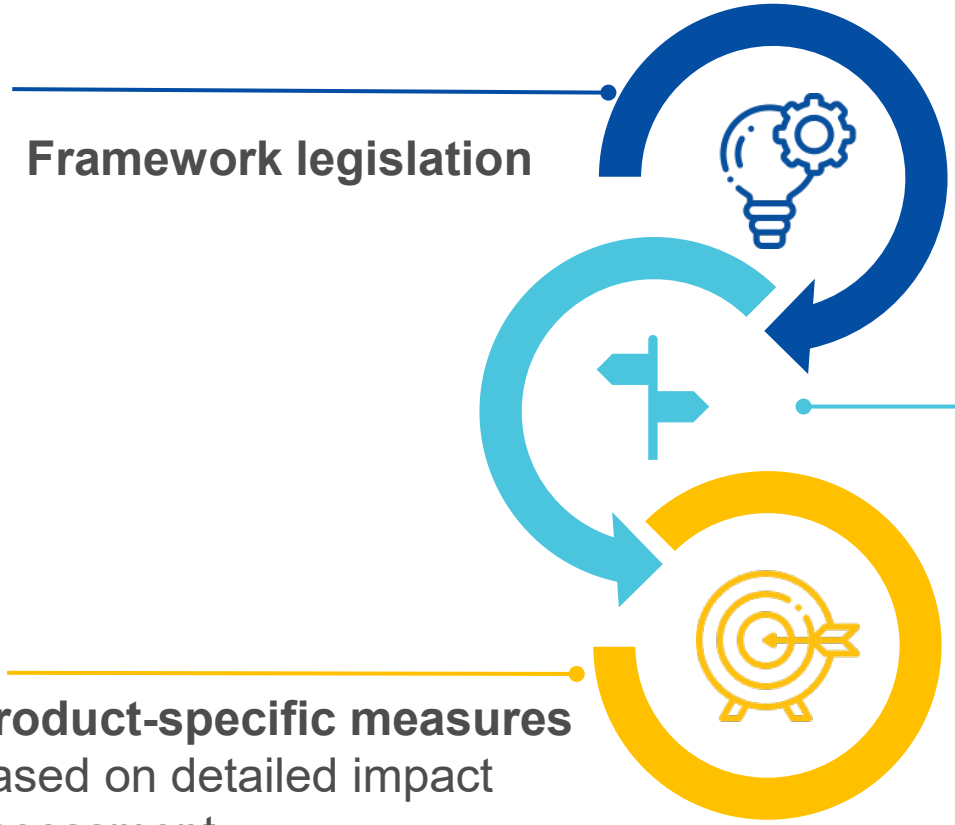
10 December 2024

Wojtek SITARZ
DG ENV B4
Sustainable Products

ESPR establishes a framework legislation

ESPR = framework legislation

It does not set specific measures. Rather, it enables their later adoption

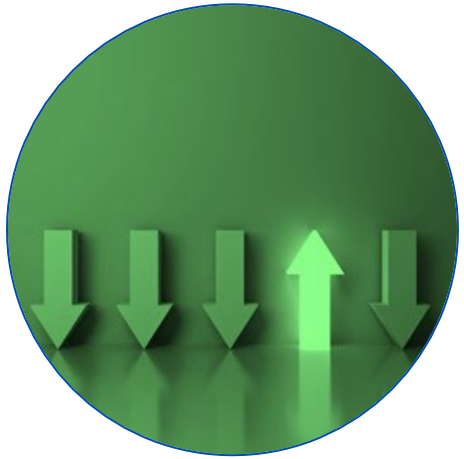


European Commission

ESPR sets a new sustainability & ecodesign approach

Broad scope

Moving beyond energy-related products to a **wide product scope**



New sustainability & ecodesign aspects

e.g. **performance requirements** - durability, CO_2 footprint, recycled content

Horizontal measures

Common ecodesign requirements for products with similarities

Strong focus on product information

Digital Product Passport, labels & **information requirements**

European Commission

Key product aspects under ESPR

Article 5 – Ecodesign requirements

European Commission

ESPR is adding new tools

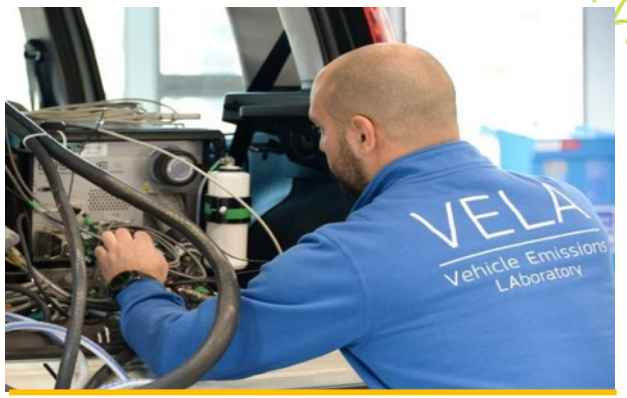
Mandatory Green Public Procurement

Mandatory GPP criteria to be set for contracting authorities or contracting entities

Prevention of destruction of unsold consumer goods

Transparency requirements for those discarding unsold goods, and possibility to ban destruction for relevant product groups

Ban on destruction of **apparel** and **footwear** after 2 years



Market surveillance and customs controls

Strong focus on controls of regulated products, incl. planned market surveillance activities

Support to common projects and investments

European Commission

Preparation of the first **working plan**
Legal text

- WP minimum of 3 years, covering ecodesign requirements, including horizontal requirements, and the possible prohibition of destruction of unsold consumer goods.
- First working plan to be adopted in the first 9 months of ESPR implementation and include:

INTERMEDIATE PRODUCTS

- Iron and Steel
- Aluminum
- Chemicals

FINAL PRODUCTS

- Textiles (in part. garments & footwear)
- Furniture, including mattresses
- Tyres
- Detergents
- Paints
- Lubricants
- Energy related products carried over from 2022-2024 Ecodesign and Energy Labelling Working Plan
- ICT products and other electronics

Justification must be provided for inclusion or exclusion of products.

European Commission

Preparation of the first **working plan**
JRC Study

- Preliminary work by JRC on possible priority products

	WATER	AIR	SOIL	BIODIVERSITY	WASTE	CLIMATE CHANGE	ENERGY USE	HUMAN TOXICITY	STRATEGIC AUTONOMY
Score 30 IRON & STEEL	5	4	2	2	4	5	5	3	5
Score 28 COMMODITY CHEMICALS	4	4	3	3	3	5	4	2	5
Score 27 NON-FERROUS METAL PRODUCTS	3	2	3	2	5	4	5	3	4
Score 26 ALUMINIUM	1	4	4	3	4	4	4	2	3
Score 23 PLASTICS	3	3	2	2	3	4	4	2	3
Score 21 PULP & PAPER	3	2	3	3	2	3	4	1	2
Score 20 GLASS	2	2	2	3	2	4	4	1	3

	WATER	AIR	SOIL	BIODIVERSITY	WASTE	CLIMATE CHANGE	ENERGY USE	HUMAN TOXICITY	MATERIAL EFFICIENCY	LIFETIME EXTENTION	STRATEGIC AUTONOMY
Score 42 TEXTILES and FOOTWEAR	5	3	4	4	5	5	5	3	5	3	1
Score 30 FURNITURE	1	3	3	3	4	3	3	2	3	5	1
Score 30 TYRES	3	4	3	3	3	3	3	2	3	3	4
Score 28 BED MATTRESSES	1	3	1	2	5	3	3	2	5	3	1
Score 26 DETERGENTS	4	2	2	3	3	3	3	2	3	1	1
Score 24 PAINTS	3	3	2	3	3	2	2	2	3	1	1
Score 24 COSMETICS	4	2	1	4	3	2	1	2	3	1	1
Score 23 LUBRICANTS	2	2	2	2	2	3	2	2	3	3	2
Score 23 TOYS	1	1	1	1	4	2	2	3	3	5	1
Score 21 FISHING GEARS	4	1	1	4	3	2	1	1	3	1	1
Score 19 ABSORBENT HYGIENE PRODUCTS	3	1	2	2	4	2	2	1	1	1	1

+ products carried over from 2022-2024 Ecodesign and Energy Labelling Working Plan

European Commission

Source: JRC Preliminary ESPR WP Report

Pending work under the EDEL WP 2022-24

▶Transitional regime

Industrial fans	Cooking appliances
Space and combination heaters	Professional refrigeration equipment
Water heaters	Power transformers
External power supplies	Imaging equipment
Photovoltaic panels	Circulators
Water pumps	Air heating / cooling products
Air conditioners inc. A-A HPs	Ventilation units
Vacuum cleaners	Computers
Solid fuel local space heaters	Servers and data storage products
Solid fuel boilers	

▶ESPR WP

Electronic displays
Light sources and separate control gear
Welding equipment
Electric motors and variable speed drives
Household dishwashers
Household washing machines and washer-dryers
Refrigerating appliances (household)
Refrigerating appliances with sales function
EV charging boxes
Professional laundry
Professional dishwashers

ESPR next steps and process

Multiannual Work Plans

~ 1st WP Q2/25

Preparatory Study & Impact Assessment

1.5-2 years

Consultation of Ecodesign Forum

Adoption of Measure

Adoption first measures 2026
Applicable after 18 months 2027/2028

Measure applies

Stakeholder input collected throughout

European Commission

Ecodesign Forum

Adoption of a Commission Decision legally establishing the Ecodesign Forum:

- Adopted on 24th of October
- Includes horizonal rules governing the Forum (e.g. role, selection of members, operation, transparency, etc.)

Call for membership applications:

- **For non-Member State participants:** Continuous call **published** in the Register of Commission Expert Groups*

* https://ec.europa.eu/transparency/expert-groups-register/screen/home?lang=en

- **For umbrella organisations**

Coexistence CF-ED Forum until 2030

ED EL Consultation Forum

By vertu of the transitional mechanism the current ED EL Consultation Forum will continue to be consulted on energy-related products:

- for which work is already substantially advanced so as to get the necessary 2009/125 measures adopted **until end of 2026***

- **In case** existing 2009/125 measures need some "technical corrections", they could be adopted **until end of 2030.**

Ecodesign Forum

The Ecodesign Forum, also dealing with EL, will be consulted on products/horizontal requirements identified in the ESPR working plans either as:

- **'New' products** (i.e. those outside the scope of the current Ecodesign Directive)
- **Or energy-related products** except those under the transition mechanism for which work is in progress.

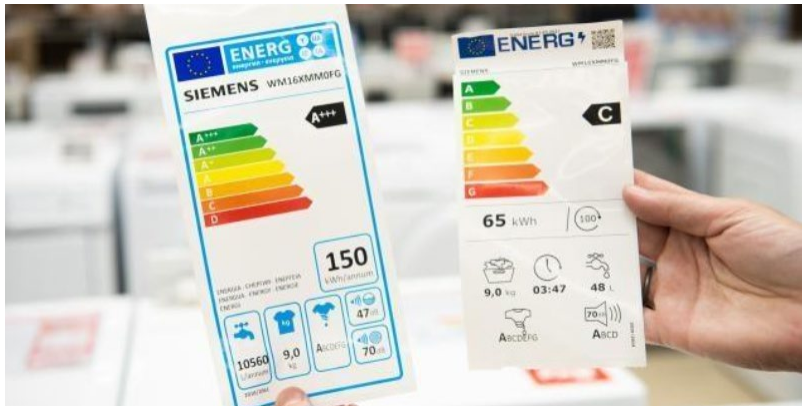
***These include:** *photovoltaic panels, space and combination heaters, water heaters, solid fuel local space heaters, air conditioners including air-to-air heat pumps and comfort fans, solid fuel boilers, air heating and cooling products, ventilation units, vacuum cleaners, cooking appliances, water pumps, industrial fans, circulators, external power supplies, computers, servers and data storage products, power transformers, professional refrigeration, and imaging equipment*

Combined fora for ecodesign and energy labelling

Energy labelling work for products subject to the transitional mechanism

Until the expiry of the transitional period:

- Work will continue to take place under the current framework (i.e. the Consultation Forum and the Energy Labelling Member State Expert Group)



Energy labelling work for products not subject to the transitional mechanism

- Work will need to take place in the new Ecodesign Forum, which will in such cases replace the Consultation Forum referred to in Art. 14(1) of the Energy Labelling Regulation
- For draft delegated acts on energy labelling, the Energy Labelling Member State Expert Group will continue to be consulted

European Commission

Thank you!
Questions?

Overview of the Preparatory Study

Kathrin Graulich – Oeko-Institut e.V

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Professional dishwashers – the “history” of Ecodesign

The **initial preparatory study on professional dishwashers (“Lot 24”)** was completed in 2011 (by Oeko-Institut) and the products were found eligible in 2014 as the energy, carbon and water saving potential was reasonable.

However, **robust test standards were lacking** at that time. Following a standardisation mandate to the ESOs, test standards were developed for some of the dishwasher categories.

In the preparatory study for the **2022-2024 Ecodesign and Energy Labelling Working Plan**, an update of the environmental improvement potential for professional dishwashers was assessed. The benefits were estimated to remain significant in 2030. As a result, the Commission announced its intention to develop measures for professional dishwashers and included this product category in the Ecodesign and Energy Labelling Working Plan 2022-2024.

Ecodesign (for professional dishwashers) under ESPR

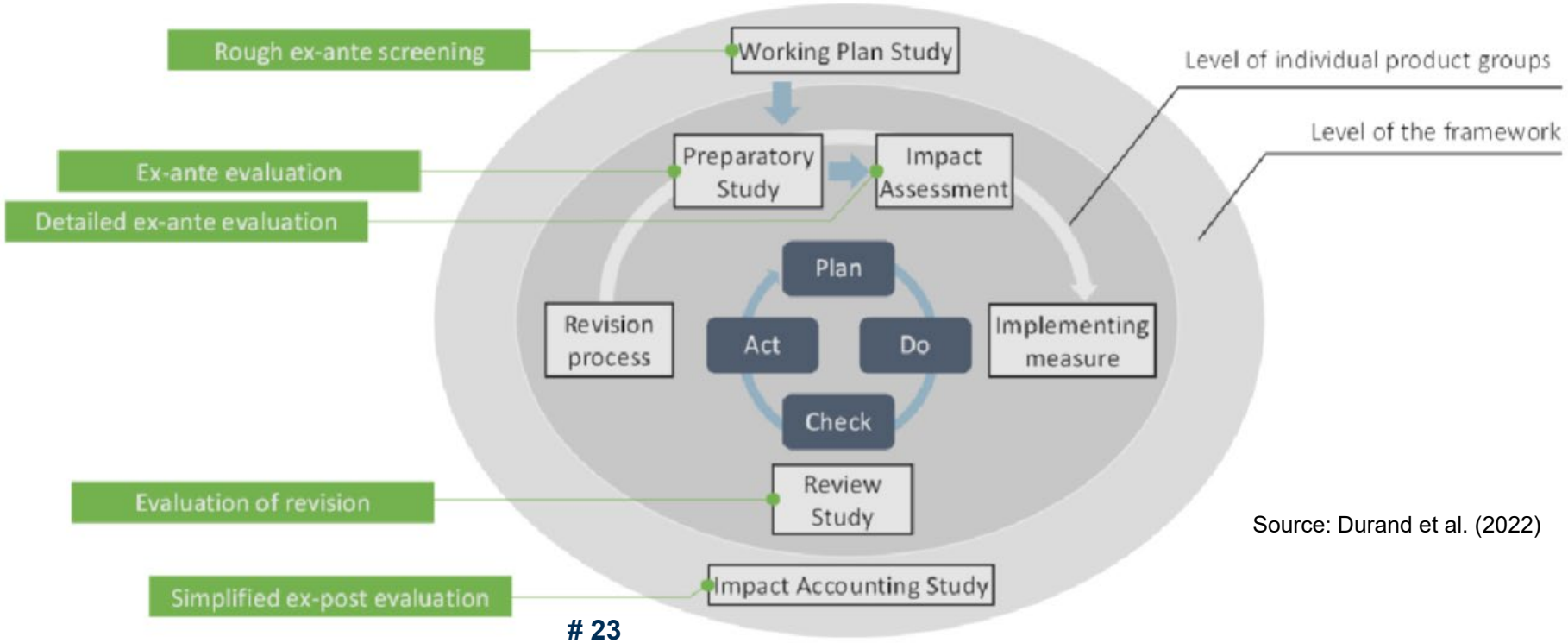
Ecodesign for Sustainable Products Regulation (ESPR) entered into force on 18 July 2024. Professional dishwashers will be dealt under the new framework regulation ESPR.

ESPR setting of a wide range of requirements, including:

- product durability, reusability, upgradability and reparability
- presence of substances that inhibit circularity
- energy and resource efficiency
- recycled content
- remanufacturing and recycling
- carbon and environmental footprints
- information requirements, including a Digital Product Passport

Policy cycle in the Ecodesign context

- The Commission is preparing for the addressing of specific measures for professional dishwashers by means of **Delegated Act**.
- The **Preparatory Study** to be conducted in this project is the first step towards the development of a ESPR Delegated Act for this product group.



Source: Durand et al. (2022)

Objectives of the Preparatory Study

The overall objective of the preparatory study is stated as follows: “Conduct an ecodesign preparatory study analysing the technical, economic, environmental, market and societal aspects of professional dishwashers following the **MEErP Methodology Tasks 1-7**.”

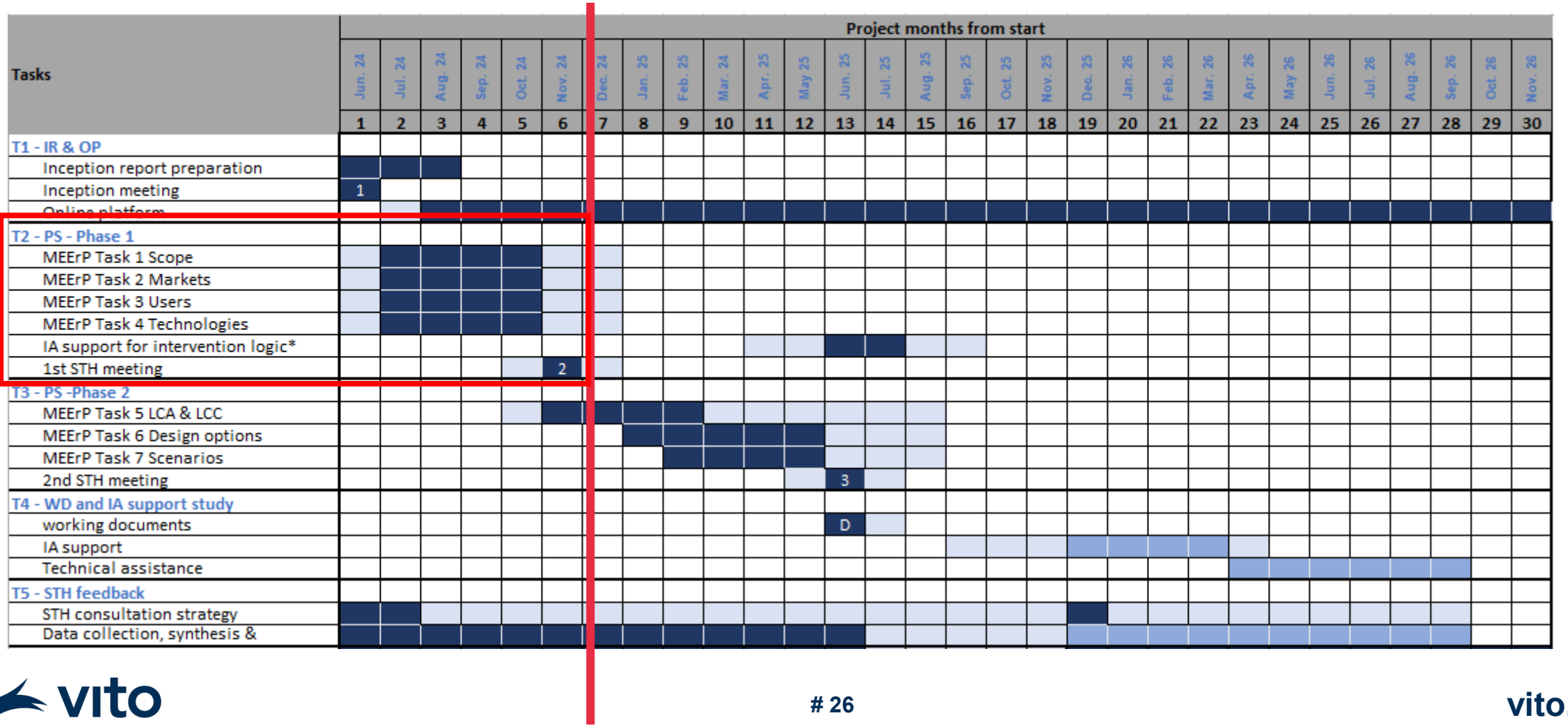
- This study shall provide the necessary information to **identify the policy options** to be considered in the **subsequent impact assessment**.
- Specific challenges of the preparatory study:
  - Distinction to household dishwashers is somewhat arbitrary
  - Distinction of commercial dishwashers to industrial (dish)washers not yet clear
  - Consumption data based on the existing standards?

MEErP methodology: revised for the purposes of the ESPR

- Revised methodological guideline for Preparatory Studies under ESPR has been published recently (September 2024): https://op.europa.eu/en/publication-detail/-/publication/03ac5f5a-eb3b-11ee-bf53-01aa75ed71a1
- **MEErP phase 1 (Tasks 1 – 4):** No methodological changes
- MEErP phase 2 (Tasks 5 – 7): Some changes of the methodology
  - Task 5: Environmental assessment … rules and indicators
  - Task 6: Life cycle costs assessment
  - Task 7: Scenarios

Study schedule

Overall project duration: 04.06.2024 – 03.12.2026



Short introduction of the study team

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Tour de Table

- Flemish Institute for Technological Research
- > 1000 employees
- HQ in Belgium
- Energy research embedded in the EnergyVille research collaboration
- Coordinated several Ecodesign FWC for DG ENER and DG GROW

VITO:
Coordinator of the Ecodesign FWC under which the study has been contracted

Gabriela Espadas Aldana
Researcher – Quality Assurance, Expert

Frank Meinke-Hubeny
Programme Manager: Sustainability & Circularity Assessment

Tour de Table

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

- Founded in 1977, > 200 employees, based in Germany
- Research on sustainable products & material flows, resources, Circular Economy & global value chains, energy & climate, chemicals, environmental law & governance, ...
- Lead of 2011 Ecodesign preparatory study on Professional Dishwashers
- Methodological experts (MEErP/ERT, PEF/PEFCR, LCA/LCC, evaluations, impact assessments, Substances of Concern)

OEKO:
Technical project lead
Lead of Preparatory Study;
responsible for MEErP Tasks
1 (scope), 3 (users), 4 (technologies),
6 (design options) and
Working documents

Kathrin Graulich
SR5 Project Manager & Senior Researcher

Martin Möller
Senior Researcher

Carl-Otto Gensch
Senior Researcher

Tour de Table

Trinomics

- Founded 2012, ca. 60 employees
- HQ in the Netherlands (Rotterdam), offices in Brussels + Paris
- Circular Economy, environment, climate and energy consultancy
- >95% of turnover with public entities or non-profit foundations
- Extensive track record of policy support to European Commission (ENV, CLIMA, ENER, GROW, REFORM) and EEA: Evaluations, IAs, studies
- Led IA study for Ecodesign for Sustainable Products Regulation (ESPR)

Trinomics:

Lead of Impact Assessment support Study; responsible for MEErP Task 2 (markets)

Dr. Laurent Zibell
Senior consultant

Lucia van den Boogaart
Junior consultant

Tour de Table

ecomatters

- Sustainability consultancy with 15-years of experience in LCA
- 20 team members and located in Utrecht, the Netherlands
- Specialised in LCA, applying PEF method & PEFCR development, EPD development, corporate reporting (incl. CSRD), and carbon calculations using GHG-protocol
- Our expertise on LCA and PEF is supported by work on chemical safety covering REACH, SVHC, Restriction of Microplastics, WFD, and SCIP.

Ecomatters:

Responsible for MEErP Task 5 (Environment, Substances of Concern)

Marco Mense
Senior expert

Mieke de Jager
Expert

Tour de Table

Fraunhofer ISI

- Fraunhofer ISI (Institute for Systems and Innovation Research)
- Belongs to the Fraunhofer-Gesellschaft (world's leading applied research organization)
- Founded in 1972, > 300 employees, based in Karlsruhe (Germany)
- Research on energy/climate/innovation policies, sustainability & material flows, resources, Circular Economy & global value chains...
- Methodological experts (MEErP/ERT, LCA/LCC, evaluations, IA, scenarios/modelling)

Fraunhofer ISI:

Responsible for
MEErP Task 7 (Scenarios)

Antoine Durand
Senior expert

Tour de Table

Fraunhofer IZM

Fraunhofer Institute for Reliability and Microintegration IZM

- Fraunhofer IZM (Institute for Reliability and Microintegration) / Department Environmental and Reliability Engineering
- Belongs to the Fraunhofer-Gesellschaft (world's leading applied research organization)
- Fraunhofer IZM has been involved in various ecodesign related studies, including preparatory and impact assessments studies.
- In recent years Fraunhofer IZM takes a leading role in the development of the digital product passport for the European Commission.

Fraunhofer IZM:

Responsible for DPP aspects

Eduard Wagner
Senior expert

Theresa Aigner
Junior Researcher

MEErP Task 1
Scope and definitions

Martin Möller - Oeko-Institut

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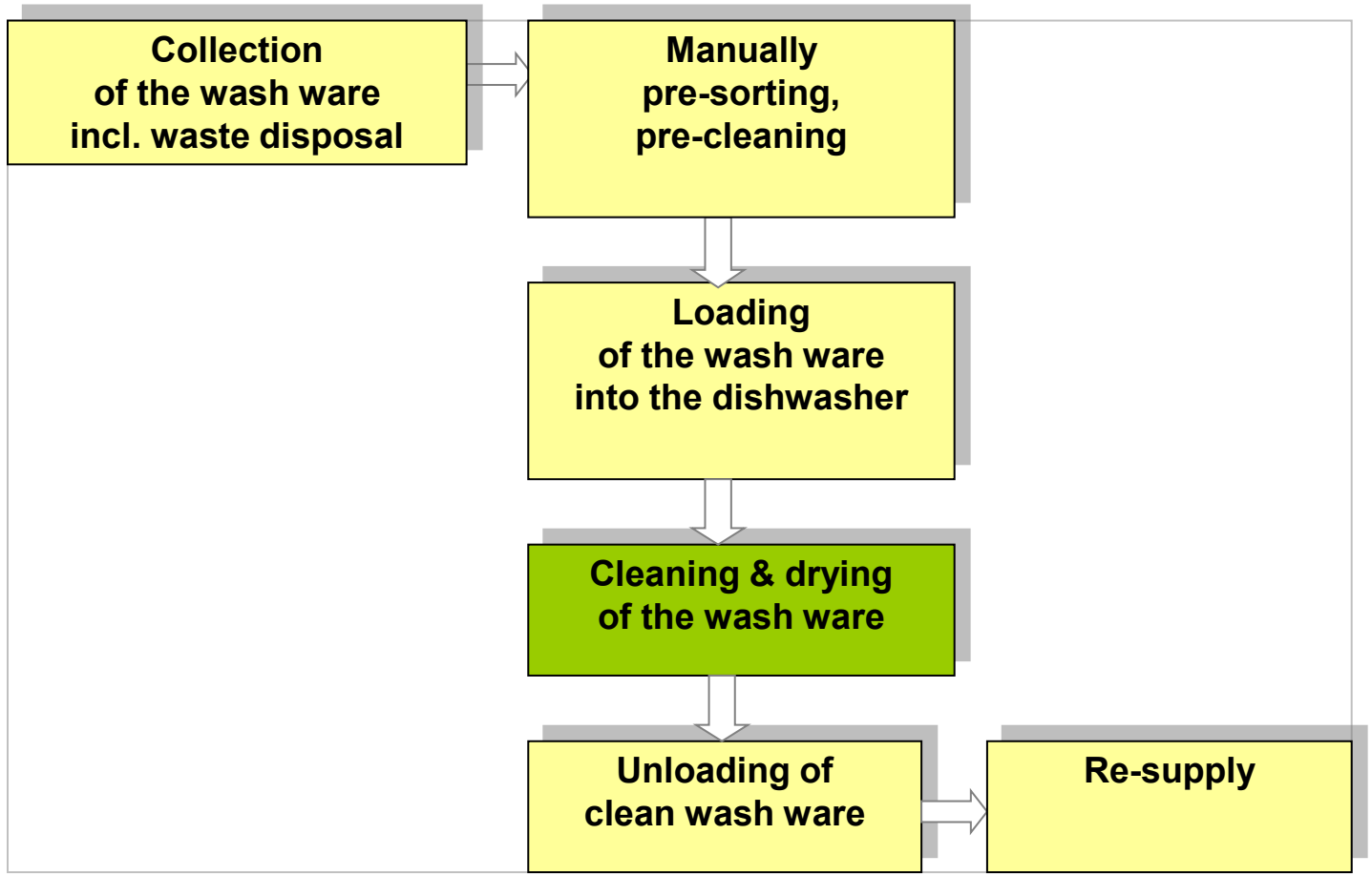
The objective of MEErP Task 1

Defining the **product category** and the **system boundaries** of the 'playing field' for ecodesign and ESPR Legislation

- Definition of the **functional unit** of the product group and **scope** of a potential regulation
- Determination of **definitions** and **categories**
- **Delimitation** of the scope of appliances covered versus household dishwashers
- Provide an overview of **relevant standards** and **legislation**

The professional dishwashing process

Different steps of a professional dishwashing process (Rüdenauer et al. 2011)



Out of scope:

- Different water quality
- External accessories kits (e.g. clearing station, admission table, external baskets)

'Wash ware' as superordinated term for the different items to be cleaned

2011 Definition for professional dishwashing machines

'Professional dishwasher' *means a machine which cleans, rinses, and dries wash ware like dishware, glassware, cutlery, and other utensils connected to the preparation, cooking, arrangement or serving of food (including drinks) by chemical, mechanical, and thermal means; which is connected to electric mains and which is designed to be used principally for commercial and industrial purposes as stated by the manufacturer in the Declaration of Conformity (DoC).*

- 'Professional' includes commercial and industrial appliances
- Declaration of Conformity relates to intended use / Machinery Directive

Categorisation of the 2011 preparatory study

Professional dishwashing machines:

- Category 1: Undercounter water-change dishwashers
- Category 2: Undercounter one-tank dishwashers
- Category 3: Hood-type dishwashers
- Category 4: Utensil / Pot dishwashers
- Category 5: One-tank conveyor-type dishwashers (belt/basket)
- Category 6: Multi-tank conveyor-type dishwashers (belt/basket)

Investigation of categorisation

Possible approaches investigated

- PRODCOM categories (Eurostat) → categorisation too rough
- European customs classification → categorisation too rough
- International Patent Classification → detailed graduation by product design and applications
- Categories according to ISO, IEC and EN standards → following slides
- Labelling categories (USA Energy Star) → detailed graduation by product design and applications

Existing categorisations: ISO / IEC standards (1)

- **No ISO standards covering professional or commercial dishwashers**
- **IEC 60335-2-58 distinguishes commercial dishwashers between**
  - **batch dishwasher**: ‘appliance in which the various processes are carried out sequentially on a single load’ and
  - **conveyor (rack or flight) dishwasher**: ‘appliance in which the various processes, e.g. washing, rinsing etc., are carried out, the load being moved through the various operations automatically’.
- **Industrial appliances are excluded from the scope (according to note 104):**
  - ‘appliances **designed** exclusively for **industrial purposes**, for example machines used in the food industry for cleaning receptacles that serve as packaging for final products (e.g. bottle-cleaning machines), and machines used in manufacturing processes’

Existing categorisations: ISO / IEC standards (2)

- **IEC 63136 is limited to under-counter and hood-type dishwashers and therefore only provides a distinction between two categories:**
  - **under-counter one-tank dishwasher**: ‘manually loaded, programmable, undercounter front loader with typically one detergent circulating zone and a fresh-water rinsing process’;
  - **hood-type dishwasher**: ‘manually loaded, programmable, hood-type, pass-through machine with typically one detergent-circulating zone and a fresh-water rinsing process’.

Existing categorisations: EN standards

- **EN 17735** distinguishes **commercial dishwashing machines** between:
  - **batch dishwashing machine**: ‘dishwashing machine, in which the wash ware carrier loaded with wash ware stays in the same treatment zone during the cleaning process’ and
  - **conveyor dishwashing machine**: ‘dishwashing machine in which the wash ware carriers loaded with wash ware are automatically conveyed through the machine during the cleaning process’.

Coverage of categories by existing standards

2011 preparatory study	2024 preparatory study	IEC EN 63136	EN 17735	IEC EN 60335-2-58	Energy Star
Professional dishwashers		Commercial dishwasher	Commercial dishwashing machines	Commercial electric dishwashing machines	Dishwashing machine
Category 1: Undercounter water-change dishwashers (semi-professional)	Category 1: Undercounter water-change dishwashers	-	Batch dishwashing machine	Batch dishwashing machine	-
Category 2: Undercounter one-tank dishwashers		Under counter one tank dishwasher			Under counter dishwasher
Category 3: Hood-type dishwashers		Hood-type dishwasher			Stationary rack, single tank, door type dishwasher including subcategories: single and multiple wash tank, double rack, pot, pan and utensil washers
Category 4: Utensil/pot dishwashers		-			
Category 5: One-tank conveyor-type dishwashers (belt/basket)		-	Conveyor dishwashing machine: rack conveyor dishwashing machine; flight conveyor dishwashing machine	Conveyor (rack or flight) dishwasher	Single tank conveyor dishwasher
Category 6: Multi-tank conveyor-type dishwashers (belt/basket)		-			Multiple tank conveyor dishwasher

Source: Own illustration based on stakeholder input

Standardisation screening

International, European and MS level, see section 3.3 of the Task 1 report

- **Performance**: **IEC 63136**, (ASTM Standards)
- **Safety**: IEC 60335-1, **IEC 60335-2-58**, EN 50416, UL 921
- **Hygiene**: ISO 15883, NSF/ANSI 3 & 29, **EN 17735**, DIN 10522, DIN 10544
- **Noise**: IEC 60704, ISO 3744, ISO 3746, ISO 4871, ISO 9614, ISO 11204
- **Electromagnetic fields and compatibility:** IEC 62233, EN 50366, EN 55014
- **Gas:** UL 921

- Are any **relevant standards missing** in the Task 1 report?
- Are any aspects that need to be considered in **future standardisation** missing or misunderstood?

Legislation screening (1)

European Legislation, see section 3.4.1 of the Task 1 report

- **Machinery Directive (MD)** 2006/42/EC→ to be repealed by Regulation (EU) 2023/1230
- **Low Voltage Directive (LVD)** 2014/35/EU
- Electromagnetic Compatibility (EMC) 2014/30/EU
- Restriction of Hazardous Substances Directive (RoHS) 2011/65/EU *IA
- Waste Electrical and Electronic Equipment Directive (WEEE) 2012/19/EU *E
- Critical Raw Materials Act – Regulation (EU) 2024/1252
- Packaging Directive 94/62/EC *Pr
- Biocide Directive 528/2012/EU
- Gas Appliances Directive 2016/426/EC
- Water Framework Directive (WFD) 2000/60/EC
- Commission Regulation (EC) No. 648/2004 – Detergents
- Commission Regulation (EC) No. 517/2014 – Fluorinated GHG *Pr
- Commission Regulation (EC) No. 1275/2008 – Standby
- REACH Regulation (EC) No. 1907/2006 *IA
- Radio Equipment Directive (RED) 2014/53/EU

** Pending reviews, stage: Evaluation (E), Impact Assessment (IA), Proposal (Pr)*

Legislation screening (2)

MS legislation and European / MS labelling schemes, see section 3.4.2 – 3.4.4 of the Task 1 report

- French Code de la Consommation, Art. L111-4 on information about the availability of spare parts: not relevant
- French Code de la Consommation, Article L441-2 on planned obsolecence: not relevant
- French Circular Economy Law: not relevant

- European labelling: no label
- Nordic Swan: no label
- German Blue Angel: no label

- Irish **SEAI Scheme** for accelerated capital allowance:
  - Tax benefit
  - Maximum water consumption
  - Heat recovery system

- European consumer association tests and consumer information portals: not relevant

Legislation screening (3)

Third country legislation and labelling schemes, see section 3.4.5 of the Task 1 report

- **Swiss Federal Energy Efficiency Ordinance** (2024): declaration of the energy and water consumption as well as the cleaning performance in accordance with IEC 63136

- Australia Energy Rating: not applicable
- US Appliance and Equipment Standards Program: not applicable
- US Energy Star Label: energy and water efficiency requirements, not relevant for the European market

- Are any relevant **legislations or labelling schemes missing** in the Task 1 report?
- Are any aspects that need to be considered for **future regulation** missing or misunderstood?

Stakeholder input on the definition

- **Commercial dishwashers** are generally **not designed for industrial use**, such as machines used in the food industry for cleaning receptacles/containers used as packaging for final products (e.g. bottle-cleaning machines), and machines used in manufacturing processes.
- Appliances for **industrial use** were described by stakeholders as **highly individual** and **very different** from commercial use.
- 'Appliances designed exclusively for industrial purposes' are explicitly **excluded from the scope of IEC 60335-2-58**.
- Taking all of the above into account, many stakeholders argue that **industrial equipment** should be **excluded** from the scope of this preparatory study
- Consequently, '**professional**' would have to be replaced by '**commercial**' in the definition.

Stakeholder input on the delimitation from household appliances

- Would the term '**non-household**' be a feasible way of unambiguously delimiting professional / commercial / industrial dishwashers from household dishwashers?
- Following their argumentation on the definition, many stakeholders pointed out that the term 'non-household' alone would be **not sufficient** for the delimitation as it does not exclude the industrial appliances.
- In all **standards** '**commercial**' is used to differentiate from household dishwashers, hence stakeholders consider introducing an additional wording as not being purposeful.
- In order to avoid overlapping, misunderstanding or misuse of the definition the term '**commercial (non-household, non-industrial) dishwashing machines**' was proposed by stakeholders.

Stakeholder input on classification

- High level of **approval for categorisation** from Lot 24 Task 1 report
- Categorisation generally **appropriate** for the forthcoming tasks in the ongoing preparatory study
- Please note: current categorisation does not include a category for industrial appliances.
- Detailed comments on **category 1** (undercounter water-change dishwasher)
  - Some stakeholders considered category 1 to be **less relevant** for professional sector
  - Addition '**semi-professional**' not correct / misleading ➡ removed

Stakeholder input on functional and performance parameters

	Category 1 Undercounter water-change dishwasher	**Category 2** Undercounter one-tank dishwasher	**Category 3** Hood-type dishwasher	**Category 4** Utensil / Pot dishwasher	**Category 5** One-tank conveyor-type dishwasher	**Category 6** Multi-tank conveyor-type dishwasher
Main properties						
Water supply	water-change operation	tank system / one-tank	tank system / one-tank	tank system / one-tank	tank system / one-tank	tank system / multi-tank
Operating principle of dishwashing machine	program automat	program automat	program automat	program automat	conveyor-type dishwasher	conveyor-type dishwasher
Type of loading	front loading	front loading	pass through	front loading or pass through	n.a.	n.a.
Type of wash ware to be cleaned	dishes, glasses, cutlery, pots and pans, utensils	mainly plates, glasses, cups, cutlery	mainly plates, glasses, cups, cutlery	black cookware, large utensils	mainly plates, glasses, cups, cutlery, trays	mainly plates, glasses, cups, cutlery, trays
Further properties						
Means of transport	n.a.	n.a.	n.a.	n.a.	basket transport or conveyor belt	basket transport or conveyor belt
Number of baskets to be cleaned at the same time	two or three (on two or three levels)	one (on one level) or two (on two levels)	one or two (on one or two levels)	one or two (on one level)	n.a.	n.a.
Size / format	undercounter	undercounter	cupboard size	undercounter or cupboard size	large conveyor-type dishwashers	large conveyor-type dishwashers
Way of utilisation	stationary	stationary ~~or mobile~~	stationary ~~or mobile~~	stationary	stationary	stationary
Heat sources	electricity	electricity	electricity	electricity, low pressure steam or hot water	electricity, low pressure steam or hot water, (natural gas - negligible)	electricity, low pressure steam or hot water, (natural gas - negligible)
Variants	freestanding, built-under, integrated and fully integrated models	freestanding and built-under models		granulate dishwasher for black cookware	dishwasher for cleaning of reusable boxes and containers	dishwashers for cleaning of reusable boxes and containers

Definition: aspects for discussion

- Do you **agree with the provided definition** for the purposes of the analytical steps of this preparatory study or should **industrial appliances** be **excluded** from its scope?
- Are **commercial dishwashers** (i.e. all six categories) generally **not designed and used for industrial purposes** (e.g. bottle-cleaning machines or machines used in manufacturing processes)?
- Which **explicit legal definition** can be used for **industrial appliances** instead of the formulation ‘appliances designed exclusively for industrial purposes’ as provided in note 104 of IEC 60335-2-58?

Classification: aspects for discussion

- Do you **agree with the provided classification** as well as the updated overview on corresponding **functional and performance parameters** professional dishwashers?
- How **relevant** would you consider **category 1** for the market segment of professional dishwashers? Shall it be kept in the scope of potential ecodesign measures for professional dishwashers? If not, how can regulatory loopholes be avoided (i.e. neither covered by household nor professional dishwashers)?
- Should the **definition of category 1** be amended, excluding from the category those appliances that provide both water-change washing programme and classical professional programmes?
- How should **categories 4, 5 and 6** be included in the **scope of potential ecodesign measures**, given their relatively lower market relevance and the (current) lack of (performance) standards?
- Would it be more suitable to **introduce other / further categories** in light of their effect on performance (e.g. differentiating between categories based on the energy source used for heating of water / air)?

MEErP Task 2 Markets

Laurent Zibell - Trinomics

vito

The objective of MEErP Task 2

MEErP Task 2 aims to provide:

- market and cost inputs for the calculation of EU-wide environmental impacts of professional dishwashers
- insights on the latest market trends
- a practical data set of prices and rates to be used in a Life Cycle Cost (LCC) calculation
- indications for the development on Base Cases in MEErP Task 5, by assessing the most relevant product categories from the economic perspective.

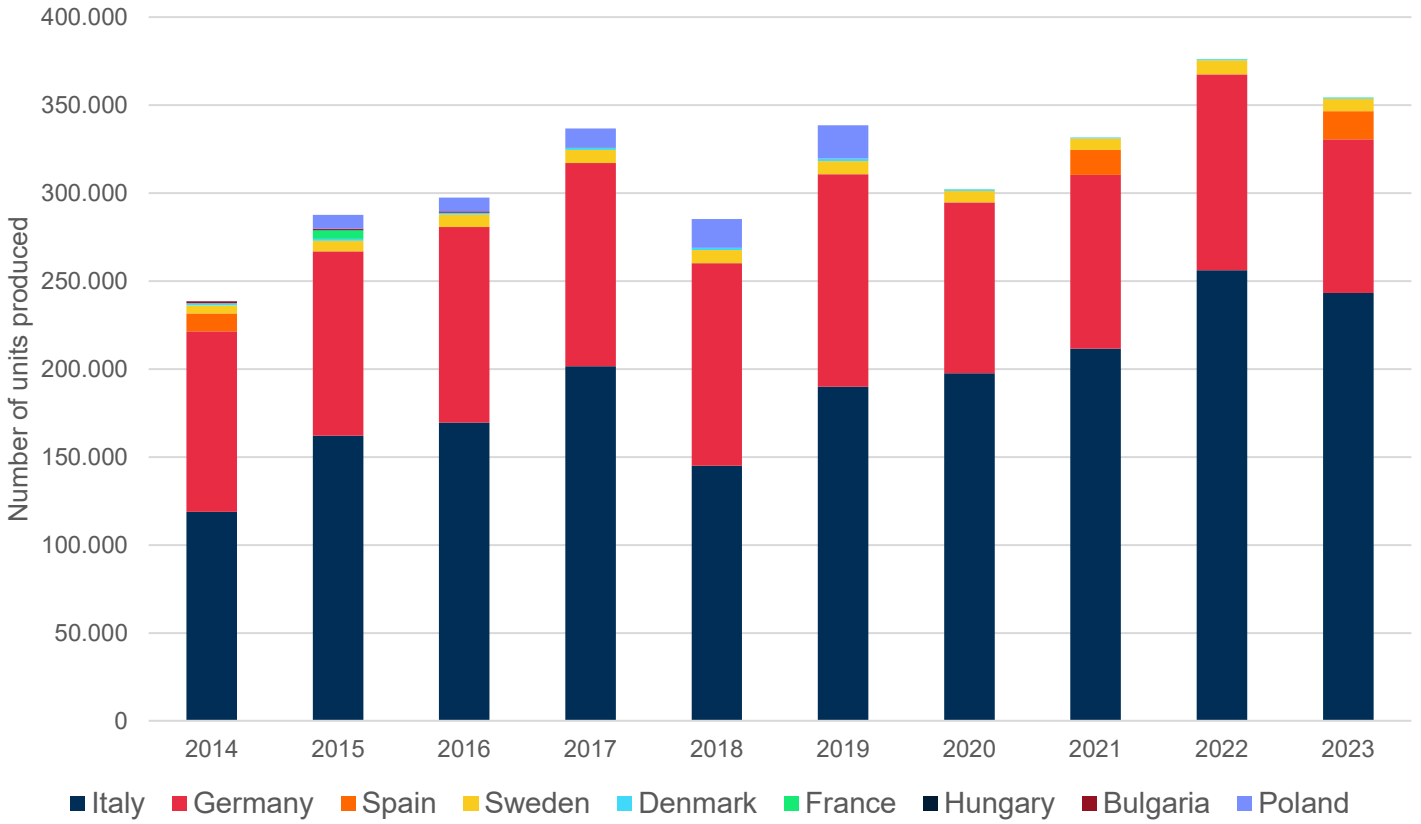
MEErP Task 2 also aims to facilitate the potential Impact Assessment support study, i.e. data also needs to be collected on public markets (relevant for GPP), international markets, competition issues and competitiveness of relevant EU sectors.

MEErP Task 2 - Market

Official PRODCOM data – Number of units (total and per Member State)

- **2023 production** in EU27 of professional dishwashers = 380,000 units/year
- **Rise** in production volume over 2014-2023. CAGR = 4,3%

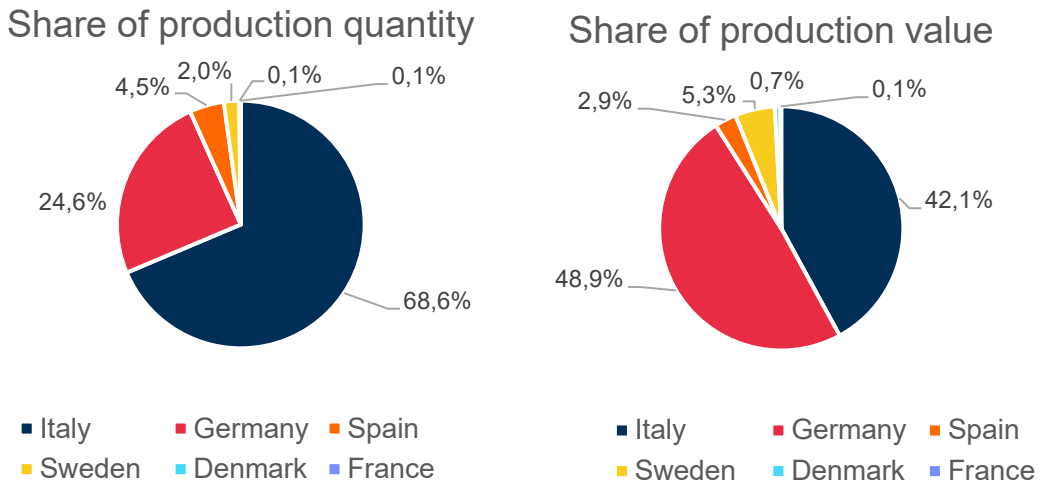
- **Germany** and **Italy** dominate the market of professional dishwashers
- Spain and Sweden playing lesser roles
- In 2023, the share of unaccounted units was 6,7%
- Data from Poland likely not available anymore after 2020

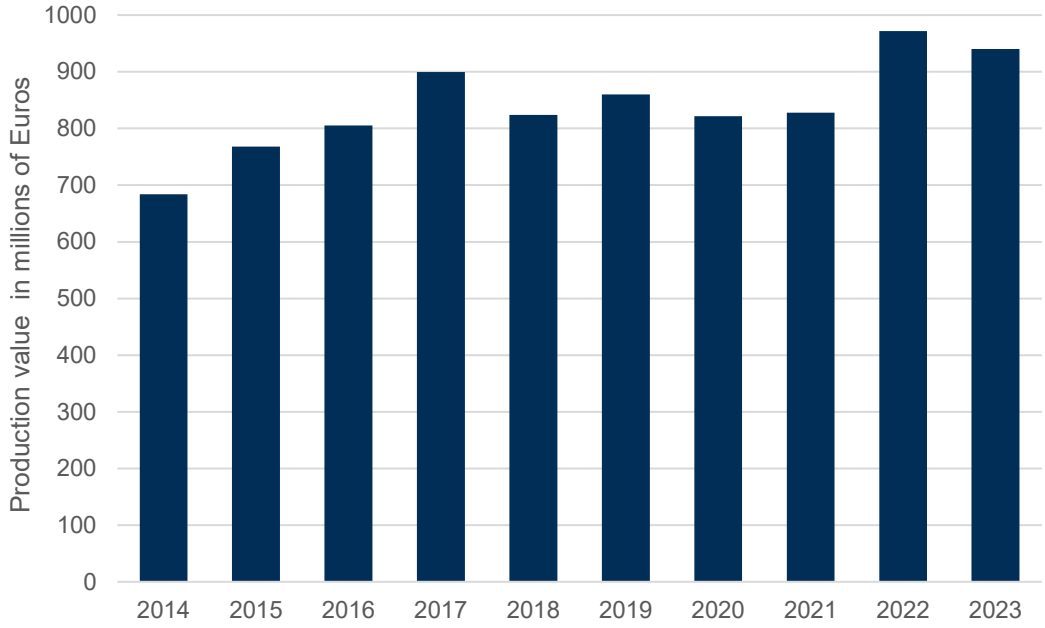


MEErP Task 2 - Market

Official PRODCOM data – Production value

- The **production value** of professional dishwashers in the EU27 was ~940 million Euro in 2023
- In 2023:
  - **Italy** produces almost 3 times as many professional dishwashers as Germany
  - However, **Germany** has a higher production value

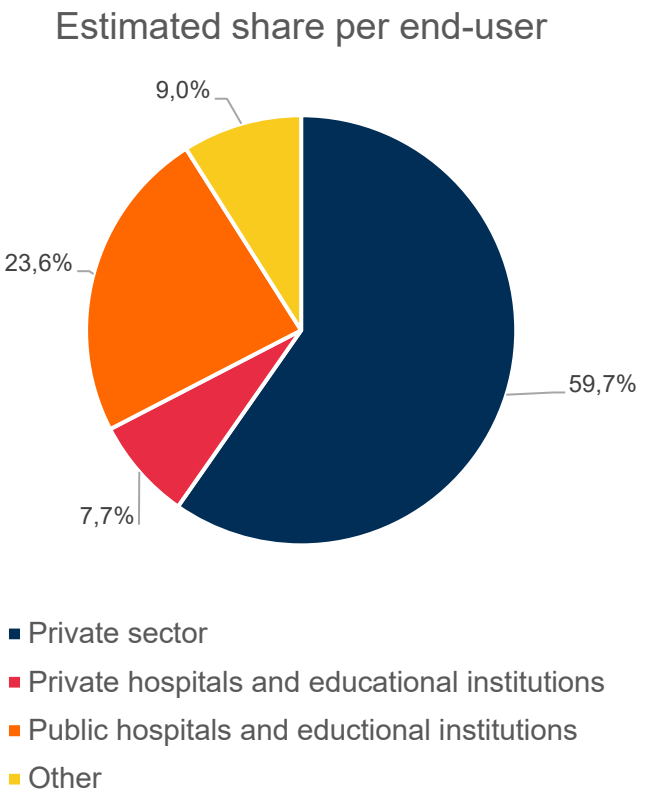




MEErP Task 2 - Market

Estimated share of market represented by **public sector customers**

- Very scarce feedback obtained from stakeholders with contrasting figures
- External data is also scarce: some info on end-user
- Assumptions made on public sector share of hospitals and educational institutions
- “Other” is likely to be private sector, but could also partly be public
- Estimated public sector share is 23,6%, which is close to 25% which one of the stakeholders indicated.



MEErP Task 2 - Market

Official PRODCOM data – Estimates of unit prices

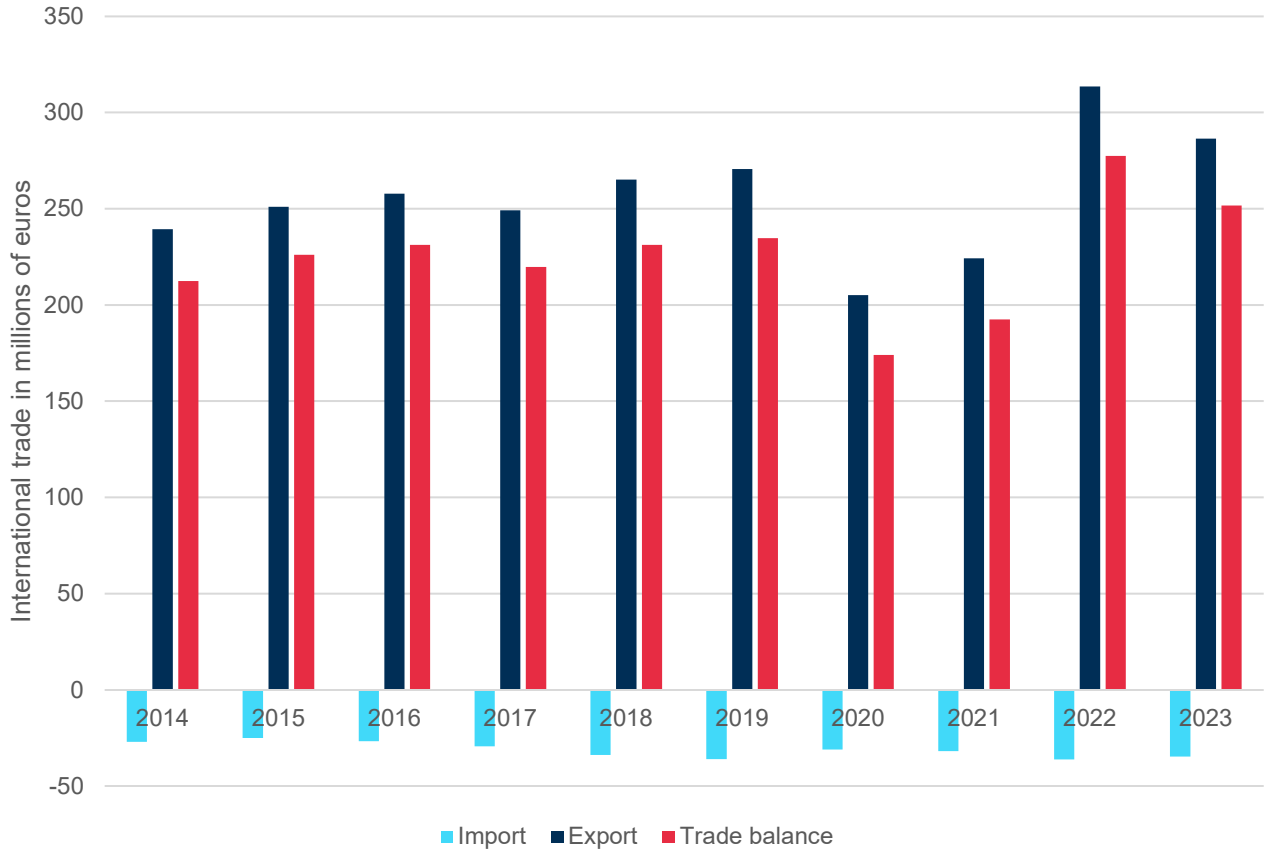
- Average unit value in 2023 is €2.474
- Differences per country could be attributed to the types of dishwashing machines predominantly manufactured in each country

Country	Unit value (in Euros)
Germany	5.127
Italy	1.582
Spain	1.647
Sweden	6.841
EU27 Total	2.474

MEErP Task 2 - Market

Official COMEXT data – International trade

- Dip during the Covid pandemic
- Import remains relatively stable and marginal
- Slight decline in export from 2022 to 2023
- Extra-EU trade balance in a very favourable position



MEErP Task 2 - Market

Official PRODCOM data – EU apparent consumption

- Exact data is not available
- Estimation based on production + import – export
- Many uncertainties: some values per Member State show negative results
- **Growth rate 2022 - 2023**: -0,9%
- **CAGR 2014 – 2023**: 3,9%.

	Value (in M€)	Quantity (in units)
EU27 Total	688.3	275,016

MEErP Task 2 - Market

Lifetime

Category	Product type	Estimated lifespan in years (2024) in brackets: range of answers
Category 1	Undercounter water-change	**12** (7-15)
Category 2	Undercounter one-tank	**8** (7-10)
Category 3	Hood-type	**8** (7-10)
Category 4	Utensil/Pot	**9** (8-10)
Category 5	Conveyor-type one-tank	**11** (10-15)
Category 6	Conveyor-type multi-tank	**15** (10-17)

Source: Median value of stakeholders' responses

MEErP Task 2 - Market

Share of sales per category

Category	Product type	Share of sales (2011 study)	Share of sales (DoE report 2016*)
Category 1	Undercounter water-change	9%	43%
Category 2	Undercounter one-tank	59%	
Category 3	Hood-type	28%	36%
Category 4	Utensil/Pot	1%	N/A
Category 5	Conveyor-type one-tank	3%	19%
Category 6	Conveyor-type multi-tank	1%	2%

(*) DOE (2016) Energy Savings Potential and RD&D Opportunities for Commercial Building Appliances (2015 Update)

MEErP Task 2 - Market

Share of sales per category

Both documents claim to rely on the same source NAFEM “Sizes & shapes study 2010”!

Category	Product type	Share of sales (2011 study)	Share of sales (DoE report 2016*)
Category 1	Undercounter water-change	9%	43%
Category 2	Undercounter one-tank	59%	
Category 3	Hood-type	28%	36%
Category 4	Utensil/Pot	1%	N/A
Category 5	Conveyor-type one-tank	3%	19%
Category 6	Conveyor-type multi-tank	1%	2%

(*) DOE (2016) Energy Savings Potential and RD&D Opportunities for Commercial Building Appliances (2015 Update)

MEErP Task 2 - Market

Official PRODCOM data – Estimated installed base ('stock'), estimated new sales & estimated replacement sales

- Actual numbers are unknown
- Estimation based on **lifespan** and **share of sales** per **category**
- Lifespan based on average expected initial lifetime as indicated by stakeholders
- Share of sales based on 2011 Preparatory Study
- Estimated **stock** in in de EU27 in 2023 is 2,077,125 units
- Estimated **replacement sales** in 2023: 185,700 units
- Estimated **new sales** in 2023: 89,316 units

Category	Product type	Estimated lifespan in years (2024)	Share of sales
Category 1	Undercounter water-change	12	9%
Category 2	Undercounter one-tank	8	59%
Category 3	Hood-type	8	28%
Category 4	Utensil/Pot	9	1%
Category 5	Conveyor-type one-tank	11	3%
Category 6	Conveyor-type multi-tank	15	1%

MEErP Task 2 - Market

Identified manufacturers

Name of the company	Large company	Member State of headquarters
Miele & Cie. KG	Y	DE
Meiko	Y	DE
Hobart GmbH	Y	DE
Winterhalter Gastronom GmbH	Y	DE
Onnera S.Coop	Y	ES
ALI Group	Y	IT
Electrolux Professional AB	Y	SE
Nor:disk Clean Solutions AB	Y	SE
EKU Grossküchentechnik GmbH		DE
PALUX AG		DE
Stierlen GmbH		DE
Jemi S.A.		ES
Sammic S.L.		ES
Angelo Po Grandi Cucine s.p.a. (part of Marmon Retail Technologies Company)		IT – USA
Adler s.p.A.		IT
Aristarco S.p.A.		IT
BSD S.p.A		IT
Elframo S.p.A		IT
InoxBim		IT
Omniwash s.r.l.		IT
Silanos s.r.l		IT
SMEG S.p.A.		IT
Wexiödisk AB		SE

sandoro GmbH, a subsidiary of Winterhalter, has been identified as performing **refurbishment** services

MEErP Task 2 - Market

Customer requirements as evidenced by communication by manufacturers

- **Functionality**
  (speed, hygiene, cleanliness and aspect of the washed crockery and utensils),

- **Economic and environmental** aspects of the **use** phase
  (i.e. costs of energy and water consumption),

- **Comfort / ergonomics** for the personnel using the machine.

MEErP Task 2 - Market

Technical evolutions of market

- **Appliances**: reduction in energy and water needs
  - Heat recovery from wastewater
  - Heat recovery from condensation of process steam and from exhaust air
  - Heating using a heat pump instead of an electric resistor
  - Double-skinned construction
  - Water nozzle geometry
- **Detergents**:
  - Adaptation to the water ‘hardness’ (= concentration in calcium carbonate)
  - Higher concentration
  - Recyclable plastic containers
  - Biodegradability
  - Avoidance of chlorine, of phosphates and of EDTA (Ethylenediaminetetraacetic acid, a chelator of calcium criticised as poorly biodegradable, bio-accumulative and toxic)

MEErP Task 2 - Market

Identified innovations

- **Granule dishwashing** (Nor:disk) for cooking utensils: cylinder-shaped granules with the adequate shape, density and hardness, in 2 versions (fossil-based plastics, ‘bio’ version based on calcium salt, rapeseed oil and biodegradable polyesters claimed to be biodegradable in soils). Specific appliances to use them

MEErP Task 2 - Market

Observed end-user price

Product category	Minimum observed price (EUR excl. VAT)	Maximum observed price (EUR excl. VAT)	Member State and reseller
1: Undercounter water-change	1,632.00	4,290.00	FR (Pro-Electro)
1: Undercounter water-change 2: Undercounter one-tank °	975.74	6,798.00	FR (Metro)
	1,556.00	5,249.00	DE (Gastro Hero)
	1,486.13	4,167.00	EE (FourniResto)
	995.99	6,527.99	UK* (Industrial Warewashers.com)
	1,319.52	2,778.19	PL (GastroProdukt)
2: Undercounter one-tank	1,770.00	9,547.00	FR (Pro-Electro)
3: Hood-type	1,640.27	10,921.00	FR (Metro)
	2,727.00	11,298.00	DE (Gastro Hero)
	1,799.99	16,799.99	UK* (Industrial Warewashers.com)
	5,679.00	18,434.00	FR (Pro-Electro)
4: Utensil/pot dishwashers	2,346.00	15,497.99	UK* (Industrial Warewashers.com)
	3,609.00	16,679.00	DE (Gastro Hero)
	8,069.00	18,929.00	FR (Pro-Electro)
5: One-tank conveyor-type	10,679.99	15,899.99	UK* (Industrial Warewashers.com)
	11,249.00	15,749.00	DE (Gastro Hero)
6: Multi-tank conveyor-type	17,299.99	28,649.99	UK* (Industrial Warewashers.com)
	13,069.00	32,449.00	DE (Gastro Hero)

MEErP Task 2 - Market

Repair & maintenance cost

- UK study of 2006: total maintenance costs are **44%** of the initial purchase costs

MEErP Task 2 - Market

Detergent cost

Type of product	Minimum observed price (EUR excl.VAT / litre)	Maximum observed price (EUR excl.VAT / litre)	Member State and reseller
Washing detergent	3.90	3.90	FR (Best-Hygiene.com)
	4.09	6.67	DE (Gastro-Hero)
	1.87	5.82	FR (RueDeLHygiene.fr)
	3.40	4.10	DE (Intergastro.de)
Rinsing agent	2.80	2.80	FR (Best-Hygiene.com)
	3.90	4.91	FR (RueDeLHygiene.fr)
	2.15	7.00	DE (Intergastro.de)

MEErP Task 2 - Market

Detergent cost

Type of product	Minimum observed price (EUR excl.VAT / litre)	Maximum observed price (EUR excl.VAT / litre)	Member State and reseller
Washing detergent	3.90	3.90	FR (Best-Hygiene.com)
	4.09	6.67	DE (Gastro-Hero)
	1.87	5.82	FR (RueDeLHygiene.fr)
	3.40	4.10	DE (Intergastro.de)
Rinsing agent	2.80	2.80	FR (Best-Hygiene.com)
	3.90	4.91	FR (RueDeLHygiene.fr)
	2.15	7.00	DE (Intergastro.de)

What quantity of detergent / dish or cycle?

MEErP Task 2 - Market

Presence of sustainability features (1/3)

Technical feature	Category of feature	Number of manufacturers citing the feature as present	
		in their products	in all products of the market
Heat exchanger	Energy saving	7	5
Automatic dosing of detergents	Detergent saving	7	5
Improved thermal insulation	Energy saving	7	5
Improved rinsing systems	Customer satisfaction	7	3
Improved maintainability / repairability / capacity to be upgraded or refurbished (ease of dis-assembly and re-assembly, ease of access to servicing area, modular design)	Circular Economy	6	5
Additional warm/hot water connection	Energy saving	6	4
Waste water heat recovery	Energy saving	6	4

MEErP Task 2 - Market

Presence of sustainability features (2/3)

Technical feature	Category of feature	Number of manufacturers citing the feature as present	
		in their products	in all products of the market
Improved ergonomics of operation (load carrying, temperature, humidity, noise)	Working conditions	6	3
Heat pump	Energy saving	4	2
Steam-operated heating	Energy saving	4	2
Recovery of wash water	Water saving	3	3
Wash process with lower temperature	Energy saving	3	2
Electronic stop controls (disconnect the machine from the mains supply at programme end or after last user activity)	Energy saving	3	2

MEErP Task 2 - Market

Presence of sustainability features (3/3)

Technical feature	Category of feature	Number of manufacturers citing the feature as present	
		in their products	in all products of the market
Reduced wear and stress imposed on dishes / utensils	Circular Economy	3	0
Use of recycled metals	Circular Economy	2	2
Improved recyclability (avoidance or clear marking of substances of concern, separability of parts made of different materials)	Circular Economy	2	1
Automatic adaptation of programme to load and to soiling level of dishes / utensils	Energy + water + detergent saving	2	0
Automatic weigthing system/ automatic load control	Energy + water + detergent saving	1	1
Gas-operated heating	Energy saving	0	1
Use of recycled plastics	Circular Economy	0	0

MEErP Task 2 - Market

Main opportunities for Ecodesign requirements – initial reflections

- **Consolidating the already dominant features** to ensure that they are the **norm** for **all** products present on the market:
  - Wastewater heat or steam heat recovery using a heat exchanger
  - Automatic dosing of detergents
  - Improved thermal insulation
  - Improved maintainability / repairability / capacity to be upgraded or refurbished (ease of dis-assembly and re-assembly, ease of access to servicing area, modular design)
  - Additional warm/hot water connection

- Introducing some features that would provide a **clear environmental benefit**, even if they still are rarely present:
  - Use of recycled metals
  - Improved recyclability (avoidance or clear marking of substances of concern, separability of parts made of different materials)

MEErP Task 2 - Market

Refined product scope from the economical/ commercial perspective

- No market has been identified as ‘niche’ in the study

- The larger the appliances (typically: categories 5 and 6 – conveyor dishwashers), the smaller their numbers
- **But** higher processing capacity per unit and duration of operation per year result in an annual throughput that is also ca. 10 times larger
- => Need to assess environmental impact of the whole stock of these appliances to assess inclusion in / exclusion from scope

MEErP Task 2 - Market

Open questions to stakeholders

- What is the **split**, in number of units, between the production of **each category** of professional dishwashers?
- What is the share of sales made (directly or indirectly) to **public sector** customers?
- What are the **installation costs**, in absolute value or as share of the price of the dishwashing machine itself?
- What are the recent figures for **repair and maintenance costs**, in absolute value or as share of the price of the dishwashing machine itself?

MEErP Task 3
Users

Kathrin Graulich - Oeko-Institut e.V.

vito

The objective of MEErP Task 3 (Users):

Objectives:

- Overview of the identification, retrieval, and analysis of data on user behaviour during the use phase of professional dishwashers.
- Attempt to quantify relevant user-parameters that influence the environmental impact of a product throughout its lifetime
- Identify obstacles to possible ecodesign measures, that relate to consumer behaviour, social, cultural or infrastructural factors.

MEErP Task 3 - Users

Main applications and market segments of professional dishwashers

Dishwasher category	Applications / Market Segments	Main operator / User type	Spatial requirements
No 1 Undercounter water-change	Bars, bistros, (small) restaurants, offices, community centres, clubhouses, motorway service areas, hospitals, hotels, bed & breakfasts, institutional kitchens, Kindergartens & pre-schools, schools, supermarkets	Mainly non trained personnel (with few exemptions)	Rather limited space available / required
No 2 Undercounter one-tank	(Small) restaurants, hotels, conference centres, bars, clubhouses, gas filling stations, motorway service areas, day-care-homes, bakeries, butcheries, old age homes	Non and trained personnel	Rather limited space available / required
No 3 Hood-type	Institutional kitchens, care homes, bars, school and small company canteens, filling stations, motorway service areas, restaurants, bakeries, butcheries	Non and trained personnel	Requires a medium amount of space. Used in separate kitchen or dishwashing rooms
No 4 Utensil/Pot	Institutional kitchens, bread and bakery, industry butcheries, hypermarkets	Trained personnel	Requires a medium amount of space
No 5 Conveyor-type one-tank	Medium company canteens, hospitals, cafeterias, caterers, hotels	Trained personnel	Requries a medium to large amount of space
No 6 Conveyor-type multi-tank	Large company canteens, hospitals, cafeterias, caterers	Trained personnel	Requires a large amount of space

MEErP Task 3 - Users

Capacity range and typical capacities (2011 and 2024 data)

Dishwasher category	Capacity range (in brackets: typical capacity); values 2011 [dishes/hour]	Capacity range (in brackets: typical capacity); updated values 2024 [dishes/hour] [1]
No 1 Undercounter water-change	80-300 **(200)**	285-500 **(285)**
No 2 Undercounter one-tank	300-800 **(550)**	220-850 **(550)**
No 3 Hood-type	500-1,300 **(860)**	180-2,160 **(1,080)**
No 4 Utensil/Pot	10-30 cycles/ hour **(20 cycles/ hour)**	4-40 cycles/hour **(15 cycles/hour)** [2]
No 5 Conveyor-type one-tank	1,500-2,000 **(1,750)**	800-2,520 **(1,800)** [3]
No 6 Conveyor-type multi-tank	1,700-6,000 **(3,600)**	900-8,000 **(3,600)** [4]

Observations:

- Capacity range increased both at the lower and upper limits
- Can you confirm the typical capacities compared to 2011 (category 1: higher; category 4: lower)?

[1] **According to the analysed product datasheets, capacity is mostly given in 'racks per hour' with 18 dishes (standard plates) per rack (categories 2, 3, 5 and 6). For category 1, a conversion factor of 19 dishes per rack was found in the datasheets.**

[2] **The capacity of utensil/pot dishwashers is measured in cycles per hour as no dishes but large cooking utensils are cleaned that considerably vary in size.**

[3] **Some dishwashers of category 5 on the market use extreme high capacity of up to 5,000 dishes per hour. This is however not considered as 'typical' capacity range.**

[4] **Some dishwashers of category 6 on the market use extreme high capacity of up to 14,000 dishes per hour. This is however not considered as 'typical' capacity range.**

MEErP Task 3 - Users

Annual number of dishes washed

Dishwasher category	Typical capacity	Number of cycles per day	Time in active mode per day[77]	Working days per year	Typical workload of basket/belt[78]	Number of dishes / cycles per year
No 1 Undercounter water-change	50 dishes/cycle (stakeholder feedback)	5	1h 00 to 1h 30	200	75%	37,500 dishes
No 2 Undercounter one-tank	550 dishes/hour (see Table 5-2)	--	2h 00	300	80%	264,000 dishes
No 3 Hood-type	1,080 dishes/hour (see Table 5-2)	100	2h 40	300	80%	691,200 dishes
No 4 Utensil/Pot	15 cycles/hour (see Table 5-2)	60	4h 00	300	60%	10,800 cycles
No 5 Conveyor-type one-tank	1,800 dishes/hour (see Table 5-2)	not applicable	9h 00	330	80%	4,276,800 dishes
No 6 Conveyor-type multi-tank	3,600 dishes/hour (see Table 5-2)	not applicable	9h 00	330	80%	8,553,600dishes

Text in red: updated data compared to 2011 values

For comparison: 2011 data

Dishwasher category	Average capacity per cycle or per hour[73]	Number of cycles per day	Time in active mode per day[74]	Working days per year	Typical workload of basket/belt[75]	Number of dishes / cycles per year
No 1 Undercounter water-change	30 dishes/cycle[76]	5	1h 30	200	80%	24,000 dishes
No 2 Undercounter one-tank	18 dishes/cycle	55	1h 50	300	80%	237,600 dishes
No 3 Hood-type	18 dishes/cycle	80	2h 40	300	80%	345,600 dishes
No 4 Utensil/Pot	not applicable	30	2h 08	300	60%	9,000 cycles
No 5 Conveyor-type one-tank	1,750 dishes/hour	not applicable	3h 30	330	75%	1,515,900 dishes
No 6 Conveyor-type multi-tank	3,600 dishes/hour	not applicable	4h 30	330	75%	4,009,500 dishes

For discussion:

- Annual number of dishes or cycles per year (especially their increase to 2011 study) reasonable?
- Time in active mode reasonable? There may be a discrepancy when comparing data on total time switched on and time in 'ready to use' mode (see slide 96)

MEErP Task 3 - Users

Concentration of detergents and rinse aids

- During this preparatory study, no new information could be obtained regarding the actual use of detergents and rinsing aids in professional dishwashers in the EU.

- For the purposes of this study and the subsequent calculations, the following concentration values for detergents and rise aids, have been assumed (slight decrease of rinse aid concentration compared to the 2011 study):
  - Concentration of detergent: 3.00 g/litre,
  - Concentration of rinse aid: 0.30 g/litre
  - => integrated detergent and rinse aid concentration of **3.30 g/litre** (2011: 3.35 g/litres)

  - Are there any additional consumables? If so, please specify their consumption in grams per litre for the different dishwasher categories.

MEErP Task 3 – Users

Energy, water and detergent consumption under ideal conditions

- **Specific** energy, water and detergent consumption of an average device to clean 100 dishes under **ideal conditions**

Dishwasher category	Energy consumption (in brackets: range)	Water consumption (in brackets: range)	Detergent / rinse aid consumption (in brackets: range)
	kWh/100 dishes[82]	litre/100 dishes	g/100 dishes
No 1 Undercounter water-change	2.25 (2.0-2.5)	42 (35-50)	268
No 2 Undercounter one-tank	2.0 (1.5-2.5)	12.2 (11-13.3) (equals 2.2 l per cycle)	37 (34-40)
No 3 Hood-type	2.0 (2.02-2.1)	12.5 (11-14)	39 (34-44)
No 4 Utensil/Pot	0.85 (0.7-1.0) kWh per cycle	6.0 (5.0-7.0) litre per cycle	17 (15-20) g per cycle
No 5 Conveyor-type one-tank	2.0 (1.8-2.3)	12 (11-13)	36
No 6 Conveyor-type multi-tank	2.0 (1.6-2.3)	8 (7-9)	24

Source: Stakeholder feedback from the 2024 survey; text in red: updated data compared to 2011 values

Dishwasher category	Energy consumption (in brackets: range)	Water consumption (in brackets: range)	Detergent / rinse aid consumption (in brackets: range)
	kWh/100 dishes[80]	litre/100 dishes	g/100 dishes
No 1 Undercounter water-change	4.3[81]	80	268
No 2 Undercounter one-tank	1.6 (1.2-2.0)	16 (equals 2.9 l per cycle)	54
No 3 Hood-type	1.7 (1.5-2.0)	16	54
No 4 Utensil/Pot	0.5 kWh per cycle	5.2 litre per cycle	17 g per cycle
No 5 Conveyor-type one-tank	2.0 (1.8-2.3)	13 (11-15)	44
No 6 Conveyor-type multi-tank	2.0 (1.6-2.3)	12 (11-13)	40

For comparison: 2011 data

For discussion:

- Changes compared to 2011 study reasonable (tendency: higher energy consumption, lower water and detergent consumption)?

MEErP Task 3 - Users

Energy, water and detergent consumption under ideal conditions

- **Annual** energy, water and detergent consumption of an average device under **ideal conditions**

Dishwasher category	Number of dishes or cycles per year	Energy consumption kWh/year	Water consumption litres/year	Detergent/rinse aid consumption kg/year
No 1 Undercounter water-change	37,500 (24,000)	844 (1,032)	15,750 (19,200)	101 (64)
No 2 Undercounter one-tank	264,000 (237,600)	5,280 (3,802)	32,208 (38,016)	98 (128)
No 3 Hood-type	691,200 (345,600)	13,824 (5,875)	86,400 (55,296)	270 (187)
No 4 Utensil/Pot	10,800 cycles (9,000) cycles	9,180 (4,500)	64,800 (46,800)	184 (153)
No 5 One-tank conveyor-type	4,276,800 (1,515,900)	85,536 (30,318)	513,216 (197,067)	1,540 (667)
No 6 Multi-tank conveyor-type	8,553,600 (4,009,500)	171,072 (80,190)	684,288 (481,140)	2,053 (1,604)

Source: Calculated based on stakeholder inputs from the 2024 survey; text in red: updated data compared to 2011 values

In brackets: 2011 data

MEErP Task 3 - Users

User behaviour in real life practice (i.e. not “ideal”)

- **Increase of** energy, water and detergent consumption of an average device **due to partial workload**

Dishwasher category	Average workload	Increase of … due to partial workload		
		specific energy consumption	specific water consumption	specific detergent / rinse aid consumption
No 1 Undercounter water-change	75% (80%)	10% (15%)	20% (25%)	25% (25%)
No 2 Undercounter one-tank	80% (80%)	20% (7.5%)	20% (25%)	20% (25%)
No 3 Hood-type	80% (80%)	20% (7.5%)	20% (25%)	20% (25%)
No 4 Utensil/Pot	60% (60%)	40% (7.5%)	40% (30%)	40% (30%)
No 5 Conveyor-type one-tank	80% (75%)	25% (10%)	25% (10%)	25% (10%)
No 6 Conveyor-type multi-tank	80% (75%)	30% (10%)	30% (10%)	30% (10%)

Source: Stakeholder feedback from the 2024 survey; text in red: updated data compared to 2011 values

For discussion:
Some stakeholder suggestions for new specific values differ significantly from the 2011 values (highlighted in yellow)

MEErP Task 3 - Users

User behaviour in real life practice (i.e. not "ideal")

- **Influence of programme selection on** energy, water and detergent consumption

Type of programme		Duration of programme	Share of programme	Relative consumption of		
				Energy	Water	Detergent
No 1: Undercounter water-change						
A	Basic setting	7 min (16 min)	45% (80%)	-	-	-
B	Short running cycle	5 min (6 min)	45% (10%)	-54%	-35%	0%
C	Long running cycle	35-60 min (20 min)	10% (10%)	+16%	+31%	0%
Average consumption in comparison to standard consumption				*77%*	*87%*	*87%*
No 2: Undercounter one-tank						
A	Basic setting	120 sec	70%	-	-	-
B	Short running cycle	60-90 sec (60 sec)	25%	-10%	0%	0%
C	Long running cycle	240 sec (180 sec); up to 630 sec for hygiene-focused programmes	5%	+10%	0%	0%
Average consumption in comparison to standard consumption				*98%*	*100%*	*100%*

For discussion:
Should further programmes be included in the calculation of actual use as they seem to have an additional impact that is not yet sufficiently captured?

- For category 1 the short running cycle?
- For the other categories the very long running programmes for hygiene purposes?

MEErP Task 3 - Users

User behaviour in real life practice (i.e. not “ideal”)

- **Influence of programme selection on** energy, water and detergent consumption

Type of programme		Duration of programme	Share of programme	Relative consumption of		
				Energy	Water	Detergent
No 3: Hood-type						
A	Basic setting	84-120 sec (120 sec)	80%	-	-	-
B	Short running cycle	45-60 sec (60 sec)	15%	-10%	0%	0%
C	Long running cycle	150-210 sec (180 sec); up to 630 sec for hygiene-focused programmes	5%	+10%	0%	0%
Average consumption in comparison to standard consumption				*99%*	*100%*	*100%*
No 4: Utensil / Pot dishwashers						
A	Basic setting	150-360 sec	60%	-	-	-
B	Short running cycle	90-180 sec	10% (5%)	-10%	0%	0%
C	Long running cycle	300-540 sec, up to 1,200 sec	30% (35%)	+10%	0%	0%
Average consumption in comparison to standard consumption				*102%*	*100%*	*100%*

MEErP Task 3 - Users

User behaviour in real life practice (i.e. not “ideal”)

- **Influence of programme selection on** energy, water and detergent consumption

Type of programme		Duration of programme	Share of programme	Relative consumption of		
				Energy	Water	Detergent
No 5: One-tank conveyor-type						
A	Basic setting	40-120 sec (120 sec)	80% (90%)	-	-	-
B	Short running cycle	90 sec	10%	-25%	-25%	-25%
C	Long running cycle	180 sec	10% (0%)	+50%	+50%	+50%
Average consumption in comparison to standard consumption				*103%*	*103%*	*103%*
No 6: Multi-tank conveyor-type						
A	Basic setting	24-120 sec (120 sec)	80%	-	-	-
B	Short running cycle	12-90 sec (90 sec)	10%	-25%	-25%	-25%
C	Long running cycle	40-180 sec (180 sec)	10%	+50%	+50%	+50%
Average consumption in comparison to standard consumption				*103%*	*103%*	*103%*

MEErP Task 3 - Users

Other parameters in real life practice (i.e. not "ideal")

- **Influence of initial filling and heating of wash tanks**

Dishwasher category	Number of working days per year[85]	Number of working shifts per day	Volume of wash tank(s)[86] (in brackets: assumed average)	Operating temperature of wash tank(s)[82] (in brackets: assumed average)
No 1 Undercounter water-change	200	n.a.	n.a.	n.a.
No 2 Undercounter one-tank	300	2	8-25 litres **(15)**	55-65°C **(60°C)**
No 3 Hood-type	300	2	14-60 litres **(40)**	55-65°C **(60°C)**
No 4 Utensil / Pot	300	2	60-130 litres **(100)**	55-65°C **(60°C)**
No 5 One-tank conveyor-type	330	2	70-130 litres **(120)**	55-65°C **(60°C)**
No 6 Multi-tank conveyor-type	330	2	130-750 litres, with an average of 100-400 litres per single tank (a machine can have multiple tanks) **(250)**	55-65°C **(60°C)**

n.a. not applicable

Initial tank filling:
the 2011 preparatory study indicated 2 shifts per day, but only 1 shift was included in the additional impact calculations. Please confirm the typical number of initial fills per day for each of the categories

MEErP Task 3 - Users

Other parameters in real life practice (i.e. not "ideal")

- **Influence of low power modes consumption**

Dishwasher category	Average use time (switched on) in hours per day	Time in low power modes in hours per day: Ready to use mode	Time in low power modes in hours per day: Left-on-mode	Standby consumption (range in kWh/h)	Time in active mode per day[77]
No 1 Undercounter water-change	4,0	n.a.	2.6	0.01	1h 00 to 1h 30
No 2 Undercounter one-tank	10 | 14 (10,0)	6 | 12 (8.4)	n.a.	0.1-0.2 (0.25)	2h 00
No 3 Hood-type	10 | 14 (10,0)	7 | 10 (7.5)	n.a.	0.1-0,40 (0.35)	2h 40
No 4 Utensil / Pot	10 | 12 (10,0)	7 | 11 (7.4)	n.a.	0.1-1.00 (1.00)	4h 00
No 5 One-tank conveyor-type	10 | 15 (10,0)	7 | 8 (6.5)	n.a.	0.80-2.10 (0.80)	9h 00
No 6 Multi-tank conveyor-type	10 | 15 (10,0)	6 | 8 (5.5)	n.a.	1.5-2.2 (2.00)	9h 00

Source: Stakeholder feedback from the 2024 survey; text in red: updated data compared to 2011 values

n.a. not applicable

For discussion:

- Time in active mode reasonable? There may be a discrepancy when comparing data on total time in active mode (slide #87) and time in 'ready to use' mode

MEErP Task 3 - Users

Summary: **Annual consumption parameters** per appliance under **real-life use** conditions

Dishwasher categories	Number of dishes or cycles per year	Annual energy consumption per appliance (kWh)	Annual water consumption per appliance (litres)	Annual detergent consumption per appliance (kg)
No 1 Undercounter water-change	37,500 (24,000)	826 (1,254)	18,483 (25,920)	124 (87)
No 2 Undercounter one-tank	264,000 (237,600)	7,685 (5,253)	49,260 (55,822)	152 (188)
No 3 Hood-type	691,200 (345,600)	19,599 (8,258)	132,000 (86,650)	417 (292)
No 4 Utensil / Pot	10,800 cycles (9,000) cycles	19,938 (8,913)	153,960 (89,520)	465 (294)
No 5 One-tank conveyor-type	4,276,800 (1,515,900)	125,166 (37,703)	772,042 (255,686)	2,340 (865)
No 6 Multi-tank conveyor-type	8,553,600 (4,009,500)	253,951 (102,229)	1,123,003 (643,645)	3,419 (2,146)

MEErP Task 3 - Users

Local infrastructure: Types of water heating in professional dishwashers

Dishwasher category	Electricity in %	Low pressure steam and hot water in %	Natural gas in %
No 1 Undercounter water-change	100	-	-
No 2 Undercounter one-tank	100	-	-
No 3 Pass through ('hood type')	100	-	-
No 4 Utensil / Pot dishwashers	98-100 (90-95)	0-2 (5-10)	-
No 5 One-tank conveyor-type	90-100 (~80)	0-10 (20)	0 (0-1)
No 6 Multi-tank conveyor-type	85-90 (~70)	10-15 (30)	0 (0-1)

Source: Stakeholder feedback from the 2024 survey; text in red: updated data compared to 2011 values

MEErP Task 3 - Users

Maintenance and repair practice

Category	Estimated average frequency of maintenance actions (numbers per year) (median; in brackets: range)	Estimated average frequency of repair actions (numbers during lifetime) (median; in brackets: range)
Category 1 Undercounter water-change	1.5 (1-10)	12 (1-15)
Category 2 Undercounter one-tank	4.5 (1-15)	55 (1-60)
Category 3 Hood-type	4.5 (1-15)	55 (1-60)
Category 4 Utensil/Pot	2 (1-18)	4 (1-50)
Category 5 Conveyor-type one-tank	3 (1-30)	4 (1-75)
Category 6 Conveyor-type multi-tank	3 (1-30)	4 (1-75)

Source: Stakeholder consultation 2024

MEErP Task 3 - Users

Maintenance and repair practice: Priority parts in terms of repairs

- For all categories:
  - Parts of the dosing system are maintenance parts.
  - Parts related to the water circulation system e.g. circulation pump, piping.
  - Electronics and dosing pumps.
  - Pumps, heating elements, printed circuit boards (PCBs)
- In addition:
  - Category 2: Thermostats and temperature sensors
  - Category 3: Boiler thermostats and boiler pressure switches.
  - Category 2 and 3: chemical dispensers
  - Category 4: Pump contactors and boiler pressure switches.
  - Category 5 and 6: Temperature sensors and boiler heating elements, conveyor belts, curtains

Further stakeholder input welcome:

- Specify the parts / terms if the same components are meant

MEErP Task 3 - Users

Second life use / End-of-life

- Most dishwashers do not have a second life in this sense. They are repaired for as long as it is economically viable and then scrapped. For example, in categories 5 and 6, heavily used dishwashers are scrapped after 8 - 10 years when they are no longer repairable.

- End-of-life treatment for all categories of professional dishwashers:
  - Recycling: 85%
  - Incineration: 12%
  - Landfill: 3%

Further stakeholder input welcome:

- Task 2 identified sandoro GmbH, a subsidiary of Winterhalter, as performing refurbishment services => for which appliances / components? Market share?

MEErP Task 3 - Users

Open questions to stakeholders

- Typical usage intensity of the different dishwasher categories, i.e. time in active mode, annual number of dishes per year. There may also be a discrepancy when comparing data on total time in active mode and time in 'ready to use' mode.
- Detergent consumption: Are there other consumables / ‘chemical treating agents’ besides detergents and rinse aids? If so, please specify their consumption in grams per litre for the different dishwasher categories.
- Increased consumption due to partial workload; the suggested values from the 2024 stakeholder consultation are significantly higher than the 2011 data.
- Use of other programmes: Should further programmes be included in the calculation of actual use? In particular, the short programme (for category 1) and very long running programmes for hygiene purposes seem to have an additional impact that is not yet sufficiently captured.
- Initial tank filling: the 2011 preparatory study indicated 2 shifts per day, but only 1 shift was included in the additional impact calculations.

MEErP Task 4 Technologies

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The objective of MEErP Task 4 (Technology)

Objectives:

- Task 4 deals with the technical analysis of **existing products** as well as **Best Available Technologies (BAT)** and **Best Not yet Available Technologies (BNAT)**
- The aim is to provide general inputs for the **definition of the base cases** for the Tasks 5 and 6
- Moreover, collection of **inventory data** for the Task 5 (Life Cycle Assessment)

Approach to data collection:

- Based on data established in the 2011 preparatory study
- Stakeholder consultation (September / October 2024)
- Phone interviews with various stakeholders
- This workshop

Existing products - main characteristics (1)

Category 1: Undercounter water-change dishwashers

Main characteristics	Data from 2011 preparatory study, Task 4 report	Data from 2nd stakeholder consultation
Programme		
Number of dishwashing programmes	10 (dishwashing process can be adjusted to task)	10-13 (dishwashing process can be adjusted to task)
Washing capacity, ideal	2–20 racks/h (depending on programme)	2–24 racks/h (depending on programme, 2 racks per cycle)
Cycle time	6–27 minutes (depending on programme)	5-60 minutes (depending on programme)
Programme temperature	Depending on programme (between 20–60°C, rinsing temperature up to 93°C)	Depending on programme (between 20–60°C, rinsing temperature up to 93°C)
Construction details		
Height/width/depth	820/600/600 mm	820/600/600 mm
Weight (without packaging)	ca. 50 kg	ca. 50 kg
Tank volume	not applicable	not applicable (rinsing system without a tank)
Electricity and water connection		
Voltage	Normal (230 V) or high-load connection (400 Volt) possible	Normal (230 V) or high-load connection (400 Volt) possible
Total load	9 kW	9 kW
Power of pump	0.4 kW	0.4 kW

- The weight (without packaging) of approx. 50 kg was judged to be up to date by stake-holders. However, in current product sheets for this category, up to 75 kg could be found.
- What is the **average weight** of a typical **category 1** dishwasher?

Existing products - main characteristics (2)

Category 2: Undercounter one-tank dishwashers

Main characteristics	Data from 2011 preparatory study, Task 4 report	Data from 2nd stakeholder consultation
Programme		
Number of dish-washing programmes	3	1-10
Washing capacity, ideal	40 racks/h (with 400 Voltage) 25 racks/h (with 230 Voltage)	Theoretical maximum capacity: 40 racks/h, the capacity is not related to the input voltage; taking into account loading and unloading, in real life a maximum of 20 racks/h is possible
Cycle time	60-360 sec (with 400 Voltage) 140 / 180 / 360 sec (with 230 Voltage)	60-240 sec. (with 400 Voltage) 90-140 / 120-180 / 240-360 sec. (with 230 Voltage) Hygiene-focused-programmes may have duration up to 10 minutes
Tank temperature	usually between 55°C and 65°C	usually between 55°C and 65°C
Boiler temperature	usually between 80°C and 85°C (glasswashers: also 60-65°C possible)	usually between 80°C and 85°C (glasswashers: also 60-65°C possible)
Construction details		
Height/width/depth	820/600/650 mm (glasswashers: 415-475 mm width)	820/600/600-650 mm (glasswashers: 725 mm height, 415-475 mm width)
Weight (without packaging)	ca. 70 kg (glasswashers: ~ 50 kg)	ca. 55-95 kg (glasswashers: ~ 50 kg), depending on model, variants and chosen options
Tank volume	7-20 litres, average 15 litres	8-25 litres, average 15 litres
Electricity and water connection		
Voltage	230 Volt or 400 Volt	220-230 Volt or 380-415 Volt
Total load	With 400 Voltage: 7.7 kW With 230 Voltage: 3.6 kW	With 400 Voltage: 6.0-11 kW With 230 Voltage: 1.8-4.1 kW
Power of pump	0.2-0.8 kW, typical 0.6 kW	0.2-0.8 kW, typical 0.5-0.75 kW

- According to stakeholder input, the maximum capacity **40 racks/h** is only theoretical. When taking into account loading and unloading, in real life only a maximum of 20 racks/h is possible.
- Can this **value** be **confirmed** by all stakeholders?

Existing products - main characteristics (3)

Category 3: Hood-type dishwashers

Main characteristics	Data from 2011 preparatory study, Task 4 report	Data from 2nd stakeholder consultation
Programme		
Number of dishwashing programmes	3	3-9
Washing capacity, ideal	60 racks/h	Theoretical maximum capacity: 60-80 racks/h Taking into account loading and unloading, in real life a maximum of 40 racks/h is possible
Cycle time	60-180 sec	45-180 sec; hygiene-focused-programmes may have duration up to 10 minutes
Tank temperature	usually between 55°C and 65°C	usually between 55°C and 65°C
Boiler temperature	usually between 80°C and 85°C	usually between 80°C and 85°C (glasswashers also 60-65°C possible)
Construction details		
Height/width/depth (with open door)	2 000/760/820 mm	1,550-2,000/746-760/755-820 mm, different dimensions possible depending on chosen model and options
Weight (without packaging)	ca. 120 kg	100-200 kg, depending on chosen model and options
Tank volume	16-60 litres, average 40 litres	14-60 litres, average 40 litres
Electricity and water connection		
Voltage	400 Volt	400 Volt, also 230 V and multiple supply is available
Total load	7 kW	7-14 kW
Power of pump	0.75-1.5 kW, typical 0.9 kW	0.75-1.5 kW, typical 0.9 kW

- According to stakeholder input, the maximum capacity **60-80 racks/h** is only theroretical. When taking into account loading and unloading, in real life only a maximum of 40 racks/h is possible. Can this **value** be **confirmed** by all stakeholders?
- According to stakeholder input, a relatively **wide range concerning weight** (100-200 kg) has been reported, depending on chosen model and options. What is a **typical / average value** in this respect to dishwashers in this category?

Existing products - main characteristics (4)

Category 4: Utensil / pot dishwashers

Main characteristics	Data from 2011 preparatory study, Task 4 report	Data from 2nd stakeholder consultation
Programme		
Number of dishwashing programmes	3	3-4
Washing capacity, ideal	20 racks/h	20-40 racks/h
Cycle time	90–540 sec	90–540 sec, longer cycle times are possible
Tank temperature	usually between 55°C and 65°C	usually between 55°C and 65°C
Boiler temperature	usually between 80°C and 85°C	usually between 80°C and 85°C
Construction details		
Height/width/depth (with open door)	2 000/876/900 mm	1,991-2,000/876/900 mm for small models, larger dimensions are possible
Weight (without packaging)	ca. 200 kg	200-280 kg
Tank volume	60-130 litres, average 100 litres	60-130 litres, average 100 litres
Electricity and water connection		
Voltage	400 Volt	400 Volt
Total load	13.0 kW	13.0-18.0 kW
Power of pump	typical 1.6 kW	typical 2.2-2.5 kW, 2 x 2.5 kW is possible

- Can the current data set be confirmed by stakeholders?

Existing products - main characteristics (5)

Category 4: Utensil / pot dishwasher **with granulate**

Main characteristics	Data from 2011 preparatory study, Task 4 report	Data updated with current data sheets
Programme		
Number of dishwashing programmes	3	3-6
Cycle time	120–310 sec	30-45 racks/h
Tank temperature	usually between 55°C and 65°C	usually between 55°C and 65°C
Boiler temperature	usually between 80°C and 85°C	usually between 80°C and 85°C
Construction details		
Loading volume	190 litres	190 litres
Height/width/depth (with open door)	2,400/850/900 mm	1,700-2 400/850-950/900-1,160 mm
Weight (without packaging)	413 kg	350-413 kg
Tank volume	83 litres	83-90 litres
Electricity and water connection		
Voltage	400 Volt	400 Volt
Total load	15 kW	15 kW
Power of pump	2.6 kW	2.2-2.6 kW

- Since the main characteristics of a dishwasher with granulate have not been covered in the 2nd stakeholder consultation, values from the 2011 Task 4 report have been updated with current product data sheets of manufacturers.
- Can the current **data set** be **confirmed** by stakeholders?

Existing products - main characteristics (6)

Category 5: One-tank conveyor-type dishwashers

Main criteria	Data from 2011 preparatory study, Task 4 report	Data from 2nd stakeholder consultation
Programme		
Number of dishwashing programmes	2–3	1–5
Washing capacity, ideal	70–110 racks/h	70–110 racks/h
Cycle time -> Programme time	90–180 sec.	40–180 sec.
Tank temperature	usually between 55°C and 65°C	usually between 55°C and 65°C
Boiler temperature	usually between 80°C and 85°C	usually between 80°C and 85°C
Construction details		
Width/depth/height	1,300/800/1,420 mm (without preparing zone)	1,120-1,300/800-920/1,420-1,785 mm (without preparing zone)
Depth/height of passage height	500/460 mm	500-720/450-490 mm
Weight (without packaging)	ca. 900 kg	200-900 kg
Tank volume	110-130 litres, average (120 litres)	70-130 litres, average (120 litres)
Electricity and water connection		
Voltage	400 V	400 V
Power of pump	typical 1.5 kW	typical 1.2-1.7 kW

Existing products - main characteristics (7)

Category 6: Multi-tank conveyor-type dishwashers

Main criteria	Data from 2011 preparatory study, Task 4 report	Data from 2nd stakeholder consultation
Programme		
Number of dishwashing programmes	3	3-10
Washing capacity	1,700–6,000 dishes/h	1,700–6,000 dishes/h
Cycle time -> Programme time	90–180 sec.	18–180 sec.
Tank temperature	usually between 55°C and 65°C	usually between 55°C and 65°C
Boiler temperature	usually between 80°C and 85°C	usually between 80°C and 85°C
Construction details		
Width (without packaging)	4,700–7,400 mm (without preparing zone)	3,500–7,400 mm (without preparing zone), the dimensions can also be beyond that range since the variety of options is very high
Depth/height of passage height	Different modules available	530-720/450-490 mm, different modules available
Weight	ca. 1,300 kg	660-1,300 kg
Tank volume	130-750 litres, average 230 litres	130-750 litres, average 100-400 litres per single tank, a machine can have multiple tanks
Electricity and water connection		
Voltage	400 Volt	230-400 Volt
Total load	39–51 kW	33–51 kW, depending on models and options
Power of pump	no data available	0.3-3.0 kW, a machine can have multiple pumps

Existing products - main characteristics

Questions to stakeholders on **all categories**

- The **number of programmes** seems to have **increased** in recent years, especially in the high-end segment. Can this trend of diversification of programmes be confirmed by all stakeholders**?**
- Has the **washing capacity** been measured according to EN 17735?
- Do you have any **further questions or comments** on the main characteristics not covered in the previous slides?

Products with standard improvement (design) options

- **Different types of heat exchangers**
  - Heating of cleaning and rinsing water / recovery of waste heat from the wastewater flow / vapours
  - Recuperators / regenerators (zeolite technology?)
  - Simple plate heat exchangers / water-pocket heat exchangers / tube bundle heat exchangers
  - Counterflow / co-current flow / cross-flow
- **Improved thermal insulation**
  - Better energy efficiency by reducing heat losses
  - Better working conditions in the dishwashing area (scullery)
- **Alternatives for electric heating of operating fluids for cleaning and rinsing**
  - Additional warm/hot water connection
  - Steam-operated heating
  - (Gas-operated heating)

- Generally: Can you **verify the device features** assigned to standard improvement (design) options?
- What **types of heat exchangers** are used in each category and which energy savings can be achieved?
- Is **improved thermal insulation** used in all categories and which energy savings can be achieved?
- Could recycling be hampered by **composite materials** used for thermal insulation?
- Would the use of local supply with **steam or hot water provide** advantages over electric heating of operating fluids for cleaning and rinsing from a holistic energy point of view?

Best Available Technology (BAT)

- **Heat recovery**
  - Waste heat from wastewater
  - Waste heat from vapours
  - Systems with and without heat pumps
  - Systems with (?) and without zeolite technology
- **Automatic adaptation of programme to load and to soiling level of dishes / utensils**
- **Water treatment**
  - Demineralisation
  - Reverse osmosis systems
- **Cleaning at lower temperature**

- Generally: Can you **confirm** that the presented **technological features** are BAT?
- Can you provide further information on the **proportion of the waste heat** and the **cost-efficiency** of the heat recovery options?
- What **automatic adjustments** to load and soiling level of dishes / utensils are available for each dishwasher category and how much **energy, water and detergent** can be **saved**?
- Which environmental advantages and **disadvantages are associated** with the different water treatment systems?
- Do you see lower temperature dishwashing and related technological developments as a **sensible direction of development**, and how do you view the **use of chemicals** for chemical sanitisation assessed in this context?

Best Not yet Available Technology (BNAT)

Results of a patent screening

- **Supercritical carbon dioxide cleaning (China /2016)**
  - Supercritical carbon dioxide as a cleaning medium
  - High cleanliness and environmental benefits
- **Combined ultrasonic and spray cleaning (South Korea / 2023)**
  - Integration of ultrasonic cleaning in traditional spray methods
  - Enhances cleaning efficiency and reduce water and energy consumption
- **Closed loop heat pump drying (Europe / 2023)**
  - Drying system with heat pump assembly operating with a primary fluid
  - Connected to multiple heat sources and sinks
  - Improves the energy efficiency of drying processes
- **Enzyme cleaning agents (Germany / 2014)**
  - Detergent for dishwashers comprising enzymes, phosphorus-free complexing agents, non-ionic surfactants, propylene glycol and other components
  - Increases cleaning efficiency while being environmentally friendly

- Generally: Can you confirm that the presented **technologies or technological features** have a relevant potential for **significant improvements in environmental performance** but are **currently not used** in existing products on the market?
- Generally: Are you aware of **further relevant innovation** that should be classified as BNAT?

Product weight and Bills-of-Materials

Questions to stakeholders on the BOM as presented in section 6.3.1 of the Task 4 report

- **Categories 2-6:** It was noted by stakeholders that the **proportion of stainless steel** has increased (up to 80% - 95%, depending on dishwasher category). Can this **trend be confirmed** by all stakeholders? Which materials are used to a lesser extent in return?
- **Categories 2-6:** According to stakeholder input, **epoxy** is considered to be already included in the electronics (control). But this is contradicted by the fact that the electronics have a much lower mass than that of epoxy and therefore cannot contain it. Can this assessment be confirmed by all stakeholders?
- **Category 2:** One manufacturer provided a BOM for a category 2 dishwasher with a **lower weight and a different material composition** (less stainless steel, more polymers in return). Does this material composition reflect an existing market trend for category 2?
- **Category 3:** One manufacturer provided a BOM for a category 3 dishwasher with a significantly **higher weight** and a **different material composition** (less stainless steel, more polymers in return). It needs to be reviewed whether this material composition reflects an existing market trend for category 3?

Assessment of the energy use of manufacturing

Professional dishwasher category	energy use of manufacturing (kWh / unit)
Category 1: Undercounter water-change dishwashers	no data available
Category 2: Undercounter one-tank dishwashers	30
Category 3: Hood-type dishwashers	36
Category 4: Utensil/pot dishwashers	40
Category 5: One-tank conveyor-type dishwashers (belt/basket)	250
Category 6: Multi-tank conveyor-type dishwashers (belt/basket)	300

- Can the **existing data set** for manufacturing energy use be **confirmed** by stakeholders?
- Are the presented values **representative**?
- Can the **data gap for category 1** be filled?

Packaging materials

Professional dishwasher category	EPS (weight in g)	PE-Foil (weight in g)	Polystyrene (weight in g)	Wood (weight in g)	Cardboard (weight in g)	Other materials (weight in g)
Category 1: Undercounter water-change	724	172	-	1,011	635 – 19,000	
Category 2: Undercounter one-tank	-	250	500 - 600	3,000 – 6,000	2,750 – 13,500	500 – 1,000 (PP plastic strip)
Category 3: Hood-type	-	-	500 - 600	12,250	4,750 – 13,500	500 – 1,000 (PP plastic strip)
Category 4: Utensil/pot	-	-	500 - 600	13,500 - 16,000	3,500 – 10,500	500 – 1,000 (PP plastic strip)
Category 5: One-tank conveyor-type dishwashers	-	90 – 6,000	2,940	63,500 – 98,000	0 – 15,500	11,000 (iron)
Category 6: Multi-tank conveyor-type dishwashers	-	150 – 8,000	5,290	125,000 - 270,000	0 – 33,530	15,000 (iron)

- Can you **confirm** the **updated data set** on packaging materials?

Volume and weight of the packaged product

Professional dishwasher category	Average volume of the final packaged product 2011 values	Average volume of the final packaged product 2024 values	Average weight of the final packaged product 2011 values	Average weight of the final packaged product 2024 values
Category 1: Undercounter water-change dishwashers	0.40 m^3	0.40 m^3	ca. 50 kg	ca. 50 kg
Category 2: Undercounter one-tank dishwashers	0.48 m^3	0.47 - 0.60 m^3	ca. 80 kg	50 - 110 kg, depending on model, variants and chosen options
Category 3: Hood-type dishwashers	1.03 m^3	1.03 – 2.4 m^3	ca. 135 kg	135 - 255 kg, depending on model, variants and chosen options
Category 4: Utensil/pot dishwashers	4.95 m^3	1.6 – 4 m^3	ca. 225 kg	320-420 kg, depending on model, variants and chosen options
Category 5: One-tank conveyor-type dishwashers (belt/basket)	12.25 m^3	2 - 12.25 m^3	ca. 975 kg	ca. 975 kg other values possible depending on model, variants and chosen options
Category 6: Multi-tank conveyor-type dishwashers (belt/basket)	16.58 m^3	16.58 - 22 m^3	ca. 1,465 kg	ca. 1,465 kg other values possible depending on model, variants and chosen options

- Can you **confirm** the **updated data set** on product volume and weight?

MEErP Task 4 – Technology

Notes and questions regarding further aspects

- The analysis and consideration of **DPP-induced requirements** will be covered in the **supplementary session**.

- Do you have any **questions or comments** on aspects of the Task 4 report not covered by this presentation?
  - E.g., assessment of the **primary scrap production** during sheet metal manufacturing
  - E.g., analysis of **critical raw materials and substances** of concern
  - (…)

Under discussion: (Extended) EPREL versus Digital Product Passport for Professional Dishwashers?

Eduard Wagner – Fraunhofer IZM

vito

DPP Requirements in ESPR

Requirements for the Digital Product Passport (DPP) in Chapter III, Articles 9 to 15:

- Article 9 Digital product passport
- Article 10 Requirements for the digital product passport
- Article 11 Technical design and operation of the digital product passport
- Article 12 Unique identifiers
- Article 13 Digital product passport registry
- Article 14 Web portal for data in the digital product passport
- Article 15 Customs controls relating to the digital product passport

Exemptions from the DPP requirements

Two exceptions are specified in the ESPR 2024/1781, Article 9, paragraph 4, regarding cases when a DPP is not required:

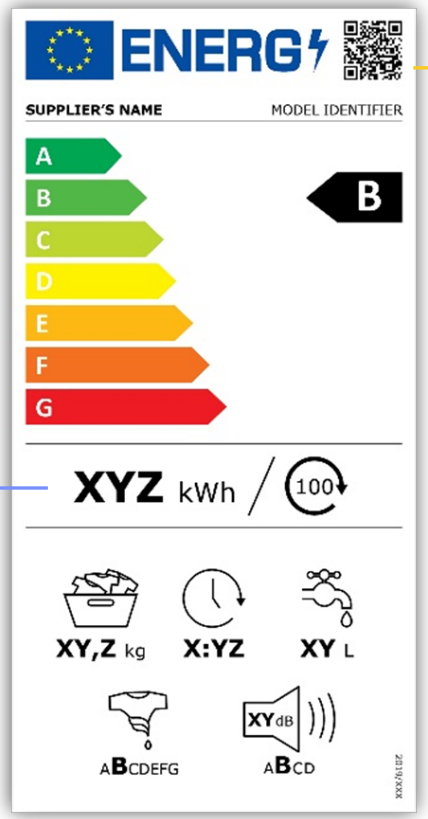
- 4. When setting the **requirements related to the digital product passport**, the Commission **may exempt product groups from the requirement to have a digital product passport** :
  - where technical specifications of the digital product passport are not available in relation to the essential requirements included in Articles 10 and 11; or
  - **where other Union law includes a system for the digital provision** of information related to a product group which the Commission considers achieves the objectives referred to in paragraph 3, points (a) and (b).'

If a product group is covered by EPREL, it may be exempted from the DPP requirements

Product Groups	EPREL registration	WEEE Category	Ecodesign Dir. / Energy Labelling Regulation
Air Heating and Cooling Products	Air Conditioners	1. Temperature Exchange Equipment	Heating, Cooling and Ventilation
Water Heaters	Water Heaters	1. Temperature Exchange Equipment	Heating, Cooling and Ventilation
Air Conditioners and Comfort Fans	Air Conditioners	1. Temperature Exchange Equipment	Heating, Cooling and Ventilation
Local Space Heaters	Local Space Heaters	1. Temperature Exchange Equipment	Heating, Cooling and Ventilation
Solid Fuel Boilers	Not Listed in EPREL	1. Temperature Exchange Equipment	Heating, Cooling and Ventilation
Space Heaters	Local Space Heaters	1. Temperature Exchange Equipment	Heating, Cooling and Ventilation
Commercial Refrigerators	Refrigerating Appliances	1. Temperature Exchange Equipment	Refrigeration
Fridges and Freezers	Refrigerating Appliances	1. Temperature Exchange Equipment	Refrigeration
Professional Refrigerated Storage Cabinets	Refrigerating Appliances	1. Temperature Exchange Equipment	Refrigeration
TV and Electronic Displays	Electronic Displays	2. Screens, Monitors, and Equipment with Screens >100 cm²	Electronic Products
Light Sources	Lighting	3. Lamps	Light Sources
Circulators	Not Listed in EPREL	4. Large Equipment >50 cm	B2B Products
Electric Motors	Not Listed in EPREL		ducts
Industrial Fans	Not Listed in EPREL		ducts
Power Transformers	Not Listed in EPREL		ducts
Water Pumps	Not Listed in EPREL		ducts
Welding Equipment	Not Listed in EPREL		ducts
Household Dishwashers	Dishwashers	4. Large Equipment >50 cm	Cleaning and Drying
Professional dishwashers	**Not Listed in EPREL**	4. Large Equipment >50 cm	Cleaning and Drying
Professional laundry	Not Listed in EPREL	4. Large Equipment >50 cm	Cleaning and Drying
Tumble Dryers	Tumble Dryers	4. Large Equipment >50 cm	Cleaning and Drying
Washer Dryers	Washer Dryers	4. Large Equipment >50 cm	Cleaning and Drying
Washing Machines	Washing Machines	4. Large Equipment >50 cm	Cleaning and Drying
Domestic Ovens	Domestic Ovens	4. Large Equipment >50 cm	Cooking
Hobs	Hobs	4. Large Equipment >50 cm	Cooking
Range Hoods	Range Hoods	4. Large Equipment >50 cm	Cooking
Photovoltaic panels	Not Listed in EPREL	4. Large Equipment >50 cm	Electronic Products
EV charging boxes	Not Listed in EPREL	4. Large Equipment >50 cm	Electronic Products
Imaging equipment	Not Listed in EPREL	4. Large Equipment >50 cm	Electronic Products
Servers and Data Storage Products	Not Listed in EPREL	4. Large Equipment >50 cm	Electronic Products
External Power Supplies	Not Listed in EPREL	5. Small Equipment <50 cm	Electronic Products
Ventilation Units	Not Listed in EPREL	5. Small Equipment <50 cm	Heating, Cooling and Ventilation
Vacuum Cleaners	Vacuum Cleaners	5. Small Equipment <50 cm	Cleaning and Drying
Computers	Not Listed in EPREL	6. Small IT and Telecommunication Equipment	Electronic Products
Game Consoles	Not Listed in EPREL	6. Small IT and Telecommunication Equipment	Electronic Products
Smartphones and Tablets	Not Listed in EPREL	6. Small IT and Telecommunication Equipment	Electronic Products
Standby	Not Listed in EPREL	6. Small IT and Telecommunication Equipment	Horizontal
Tyres	Not Listed in EPREL	Not covered by WEEE Directive	Tyres

Prof. dishwashers are not covered by EPREL
→ legally not exempted from DPP, but…

… EPREL might still be sufficient
Important differentiation: System and Data



2. Information requirements

1. Technical requirements

Unique identifiers
Data carries
Interoperability
Access rights management
Data storage
APIs
Data authentication, reliability, integrity
Data processing, exchange protocols, data formats

…… EPREL might still be sufficient

There are 3 pathways: EPREL / EPREL extended / DPP

	System			Data / Information		
	EPREL system	EPREL system extended	DPP System	EPREL	EPREL extended	DPP
Household dishwashers	x			x	x	
Professional dishwashers	x	x	(x)		x	x

…… EPREL might still be sufficient

There are 3 pathways to consider for DPP system and DPP data

	System			Data / Information		
	EPREL system	EPREL system extended	DPP System	EPREL	EPREL extended	DPP
Household dishwashers	x			x	x	
Professional dishwashers	x	x	(x)		x	x

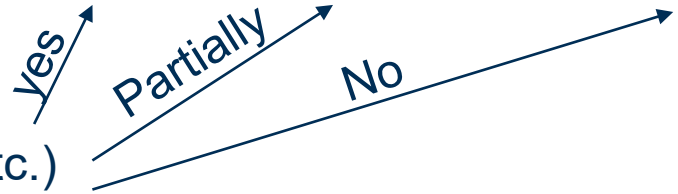
Is EPREL (platform, QR code, etc.) sufficient for all stakeholder?

…… EPREL might still be sufficient

There are 3 pathways to consider for DPP system and DPP data

	System		
	EPREL system	EPREL system extended	DPP System
Household dishwashers	x		
Professional dishwashers	x?	x	(x)

Data / Information		
EPREL	EPREL extended	DPP
x	x	
	x	x



Is EPREL (platform, QR code, etc.) sufficient for all stakeholder?

Use-case based approach to determine if “full” DPP is necessary
Exemplary use cases from CIRPASS / Battery Pass (under revision)

DPP use case for EEE	Stage	Rating (generic EEE)
Reliable communication of ESG data	Business	High
Informed purchasing decisions	Consumer	High
Eased servicing	Business / Repair	Medium
Precise risk assessment for transport	Transport	None
More efficient recycling processes	Recycling / Reuse	Low
Simplified residual value determination	Reuse	Medium
Streamlined trade of waste	Recycling	Medium
Efficient data exchange and reporting	Business	Low
Increased end-of-life collection	Consumer	Low
Industry benchmarking	Business	High
Accurate market overview	Business	Low
Informed policy design	Business	High

Outlook: MEErP Tasks 5 and 6

Marco Mense - Ecomatters

vito

Understanding of the assignment

MEErP Task 5

- Environmental Impact by LCA
- Life Cycle Costs by LCC
- This task is to provide insights on the environment impact and lifetime costs of Professional Dishwashers
- This should enable the systemic assessment of design options (Task 6) related to material efficiency aspects such as
  - increased reparability,
  - increased durability,
  - increased recyclability or
  - aimed at promoting the reuse of secondary raw materials and/or components.

Understanding of the assignment

MEErp Task 5: Environment & Economics

- **Life Cycle Assessment (LCA)**: calculate the environmental impact of each base case of professional dishwashers
- **Life Cycle Costing (LCC):** calculate costs of each base case over the life cycle including possible repair/refurbishment actions
- Provides an overview of the environmental impact of each base case including the costs that serves as input to Task 6

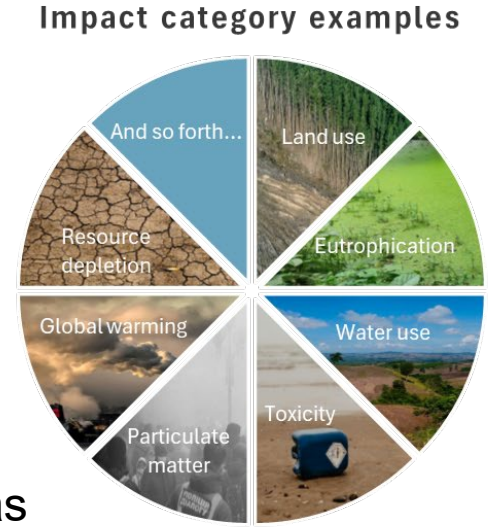
MEErp Task 6: Design options

- Identification of ecodesign options
- Determine the environmental impact (through LCA) and the costs (through LCC) of each design option

LCA and LCC

Life Cycle Assessment (LCA)

- Calculates the environmental performance of a product or process over its entire life cycle
- Typically takes into consideration the full life cycle of a product, from material extraction through manufacturing, product use, and until end of life
- Impact categories are a way to quantify the potential negative effect on the environment, e.g. global warming (CO_2-eq emissions) or water use

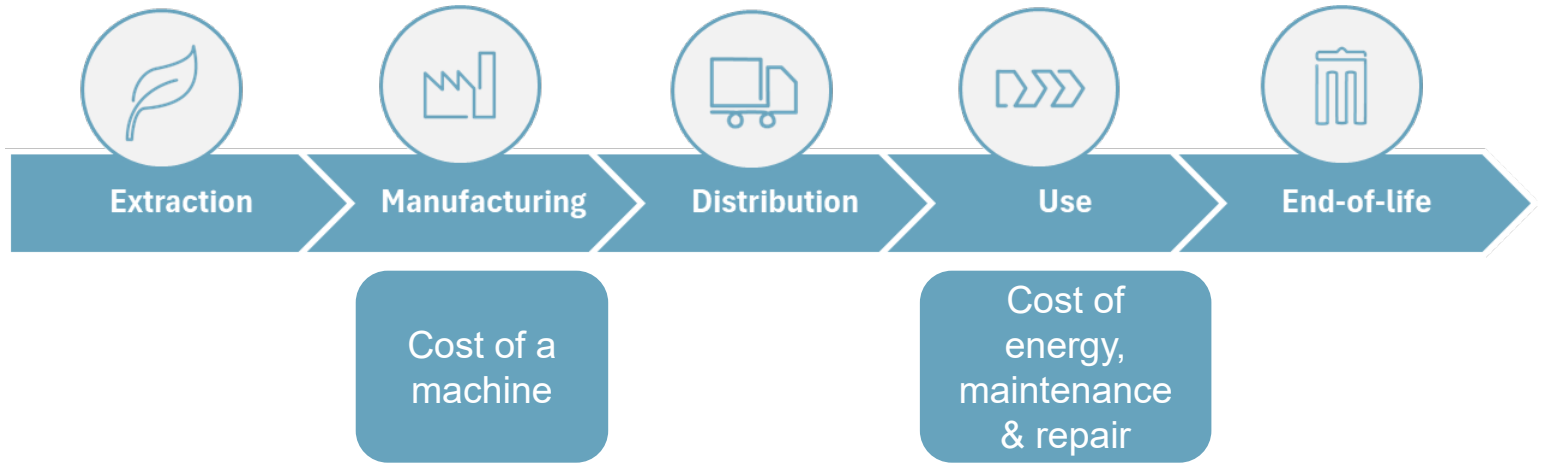


Compared to a product with the same function, a more sustainable product has a smaller overall environmental impact

LCA and LCC

Life Cycle Costing (LCC)

- LCC calculates all costs (e.g., purchase, operation, maintenance, disposal) over the product's life cycle
- LCA and LCC share the same life cycle stages, allowing integration for sustainability assessments that consider both environmental and economic factors.



- LCA and LCC combined makes more informed decisions possible by balancing environmental and financial sustainability.

Methodology

- The LCA /LCC will be conducted per base case of professional dishwashers (Task 5) and the potential ecodesign options (Task 6)
- **The Ecoreport tool** will be used: simplified tool to perform full LCA

- Updated 2024 version to include also (least) LCC, and impact of repair/refurbishment actions
  - Updated impact categories aligned with the 16 EF life cycle impact categories;
  - Updated database based on EF 3.1 datasets;
  - End-of-Life modelling updated according to the EF method by using the Circular Footprint Formula (CFF).

Data needs

- The results of the LCA/LCC are only as good as the data used to perform the study.
- The main data-needs include the following per base case

LCA
- Bill of materials
- Manufacturing information
- Transport information
- Energy uses during service live
- Repair & maintenance parts
- Maintenance and repair parts
- Product life-time

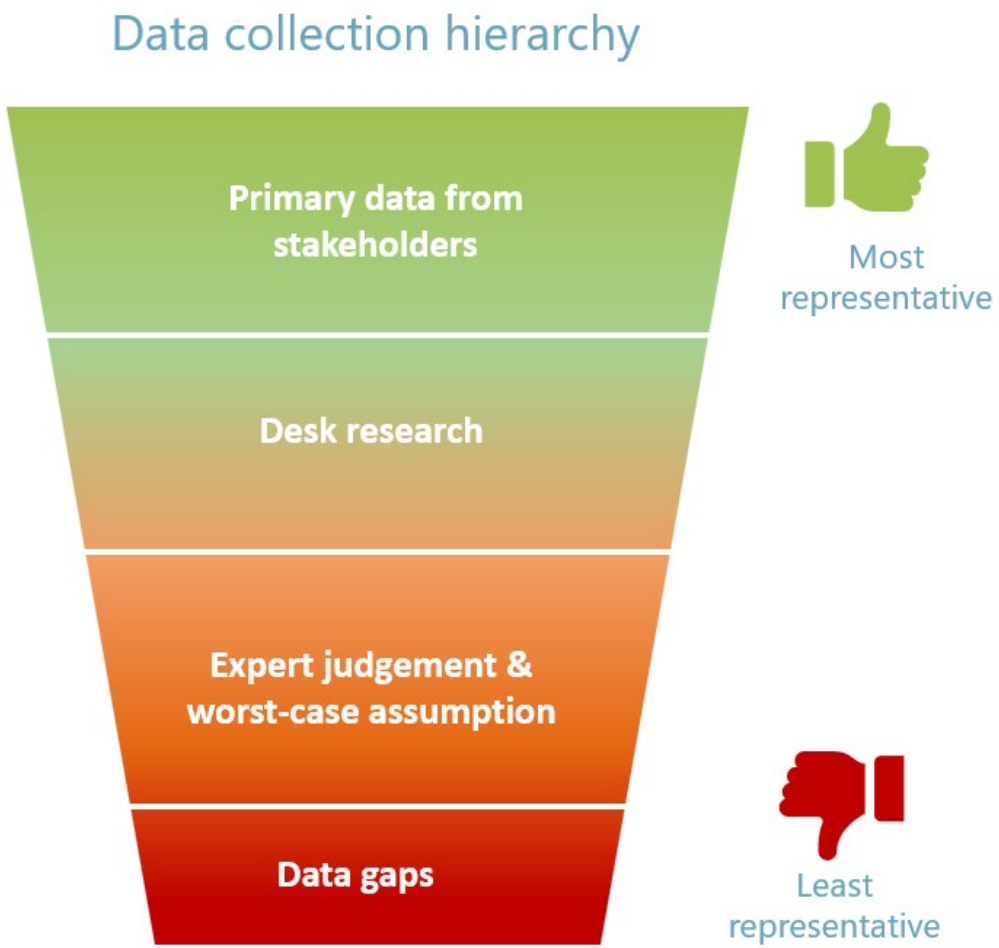
LCC
- History of annual sales
- Yearly EU production volumes
- Product prices
- Repair & maintenance costs
- Weibull shape parameter

In bold, the main drivers of the environmental impact, discussed on next slide

A good LCA need good

Data collection

- The data for the study will be obtained through
  - stakeholder consultation,
  - earlier collected data (e.g. 2011 study),
  - desk research and
  - expert judgement



LCA inputs (Category 1)

Material / component	Weight in grams
Stainless Steel	24,560
Steel Sheet galvanized	403
Cast Iron	2,303
Polypropylene (PP)	4,980
Polyamid (PA)	399
Polymethylmetacrylate (PMMA)	6
Acrylonitrile Butadiene Styrene (ABS)	751
Polystyrene (PS)	512
Styropor expandable polystyrene (EPS)	40
Polybutylene Terephthalate (PBT)	35
Polyvinylchlorid (PVC)	403
EPDM-rubber	524
POM	230
PE	187
Plastics others	268
Aluminium	273
Cu wire	1,006
CuZn38 cast	23
Chrom	71
Epoxy	609
Electronics (control)	448
Total net	**38,031**

LCA	Optimal use	real life conditions
Production energy	No data	
Energy use / year	844 kWh	826 kWh
water use / year	15,750 L	18,483 L
detergent use	101 kg	124 kg
Number of dishes per year	37,500	
Dishes per cycle	50	
Number of cycles per year	1000	
Unit value (€)	975.74 - 6,798.00	
Estimated lifespan	12	
Maintenance actions / year	1.5	
Repair actions / lifetime	12	
End of life treatment of machines	Recycling: 85% Incineration: 12% Landfill: 3%	

- Category 1: undercounter water-change dishwasher
  - Updated with 2024 stakeholder data

LCA inputs (Category 2)

Cat. 2: Undercounter one-tank dishwasher	
Material / component	**Weight in grams**
Stainless steel	49,760
Polypropylene (PP)	4,565
Polyamide (PA)	500
Epoxy	1,000
Acrylonitrile Butadiene Styrene (ABS)	70
Pumps (copper)	2,500
Pumps (stack of sheets)	2,500
Pumps (stainless steel wave)	2,250
Pumps (Al)	2,250
Cable (copper)	1,100
Cable sheath (PVC)	600
Cable sheath (silicone, EDPM)	300
Electronics (control)	500
Gaskets (EDPM)	2,040
Total	**69,935**

LCA	Optimal use	real life conditions
Production energy	30 kWh	
Energy use / year	5,280 kWh	7,685 kWh
water use / year	32,208 L	49,260 L
detergent use	98 kg	152 kg
Number of dishes per year	264,000	
Dishes per hour	550	
Number of cycles per year	18,000-74,500	
Unit value (€)	975,74 -9,547.00	
Estimated lifespan	8	
Maintenance actions / year	4.5	
Repair actions / lifetime	55	
End of life treatment of machines	Recycling: 85% Incineration: 12% Landfill: 3%	

- Category 2: Undercounter one-tank dishwasher
  - BOM not changed from 2011 but confirmed not to have changed by SH
  - Performance data updated with 2024 stakeholder data

LCA inputs (Category 3)

Cat. 3: hood-type dishwasher	
Material / component	**Weight in grams**
Stainless steel	93,090
Polypropylene (PP)	4,310
Polyamide (PA)	1,000
Epoxy	800
Acrylonitrile Butadiene Styrene (ABS)	70
Pumps (copper)	3,000
Pumps (stack of sheets)	3,000
Pumps (stainless steel wave)	2,500
Pumps (Al)	3,000
Cable (copper)	1,700
Cable sheath (PVC)	1,000
Cable sheath (silicone, EDPM)	500
Electronics (control)	600
Gaskets (EDPM)	3,085
Total	**117,655**

LCA	Optimal use	Real life conditions
Production energy	36 kWh	
Energy use / year	2,765 kWh	19,599 kWh
water use / year	86,400 L	132,000 L
detergent use	270 kg	417 kg
Number of dishes per year	691,200	
Dishes per hour	1,080	
Number of cycles per year	25.500-44.700	
Unit value (€)	1,640.27 - 18,434.00	
Estimated lifespan	8	
Maintenance actions / year	4.5	
Repair actions / lifetime	55	
end of life	Recycling: 85% Incineration: 12% Landfill: 3%	

- Category 3: Hood-type dishwasher
  - BOM not changed from 2011 but confirmed not to have changed by SH
  - Performance data updated with 2024 stakeholder data

LCA inputs (Category 4)

Cat. 4: utensil / pot dishwasher	
Material / component	**Weight in grams**
Stainless steel	165,000
Polypropylene (PP)	3,000
Polyamide (PA)	4,000
Epoxy	0
Ethylene Propylene Dien M-class rubber (EPDM)	4,000
Acrylonitrile Butadiene Styrene (ABS)	0
Pumps (copper)	5,000
Pumps (stack of sheets)	4,000
Pumps (stainless steel wave)	3,000
Pumps (Al)	5,000
Cable (copper)	2,400
Cable sheath (PVC)	1,400
Cable sheath (silicone, EDPM)	1,100
Electronics (control)	2,100
Gaskets, etc. (EDPM)	6,000
Total	**206,000**

LCA	Optimal use	Real life conditions
Production energy	40 kWh	
Energy use / year	9.180 kWh	19,938 kWh
water use / year	64.800 L	153,960 L
detergent use	184 kg	465 kg
Number of cycles per year	10,800	
Cycles per hour	15	
Number of cycles per year	9.000-12.000	
Unit value (€)	2,346.00 - 18,929.00	
Estimated lifespan	9	
Maintenance actions / year	2	
Repair actions / lifetime	4	
end of life	Recycling: 85% Incineration: 12% Landfill: 3%	

- Category 4: Utensil / pot dishwasher
  - BOM not changed from 2011 but confirmed not to have changed by SH
  - Performance data updated with 2024 stakeholder data

LCA inputs (Category 5)

Cat. 5: one-tank conveyor-type dishwasher	
Material / component	**Weight in grams**
Stainless steel	642,250
Polypropylene (PP)	55,500
Polyamide (PA)	6,140
Polyvinyl chloride (PVC)	4,600
Polystyrene (PS)	4,430
Acrylonitrile Butadiene Styrene (ABS)	5,000
Pumps (copper)	16,825
Pumps (stack of sheets)	15,625
Pumps (stainless steel wave)	12,335
Pumps (Al)	17,470
Condenser (AL)	4,720
Condenser (Cu)	7,080
Ventilator, fan (AL)	17,440
Ventilator, fan (Cu)	10,160
Drive motor (AL)	4,000
Drive motor (Cu)	5,000
Cable (copper)	16,300
Cable sheath (PVC)	8,640
Cable sheath (silicone, EDPM)	5,170
Electric contactor (copper)	10,000
Electronics (control)	9,800
Gaskets (EDPM)	12,800
Total	**891,285**

LCA	Optimal use	Real life conditions
Production energy	250 kWh	
Energy use optimal	85,536 kWh	125,166 kWh
water use optimal	513,216 L	772,042 L
detergent use	1,540 kg	2,340 kg
Number of dishes per year	4,276,800	
dishes / hour	1,800	
Number of cycles per year	2.700 hrs	
Unit value (€)	10,679.99 - 15,899.99	
Estimated lifespan	11	
Maintenance actions / year	3	
Repair actions / lifetime	4	
end of life	Recycling: 85% Incineration: 12% Landfill: 3%	

- Category 5: One-tank conveyor-type dishwasher
  - BOM not changed from 2011 but confirmed not to have changed by SH
  - Performance data updated with 2024 stakeholder data

MEErP Task 1-4 report, p171

LCA inputs (Category 6)

Cat. 6: multi-tankconveyor-type dishwasher	
Material / component	**Weight in grams**
Stainless steel	980,000
Polypropylene (PP)	58,000
Polyamide (PA)	18,660
Epoxy	0
Ethylene Propylene Dien M-class rubber (EPDM)	12,000
Acrylonitrile Butadiene Styrene (ABS)	0
Pumps (copper)	39,020
Pumps (stack of sheets)	37,070
Pumps (stainless steel wave)	25,370
Pumps (Al)	44,880
Condenser (AL)	4,720
Condenser (Cu)	7,080
Ventilator, fan (AL)	17,440
Ventilator, fan (Cu)	10,160
Drive motor (AL)	4,000
Drive motor (Cu)	5,000
Cable (copper)	19,800
Cable sheath (PVC)	11,440
Cable sheath (silicone, EDPM)	8,360
Electric contactor (copper)	10,000
Electronics (control)	15,400
Gaskets, etc. (EDPM)	15,000
Total	**1,343,400**

LCA	Optimal use	Real life conditions
Production energy	300 kWh	
Energy use optimal	171,072 kWh	253,951 kWh
water use optimal	684,288 L	1,123,003 L
detergent use annual	2,053 kg	3,419 kg
Number of dishes per year	8,553,600	
dishes / hour	3,600	
Number of cycles per year	2.700 hrs	
Unit value (€)	17,299.99 - 32,449.00	
Estimated lifespan	15	
Maintenance actions / year	3	
Repair actions / lifetime	4	
end of life	Recycling: 85% Incineration: 12% Landfill: 3%	

- Category 6: multi-tank conveyor-type dishwasher
  - BOM not changed from 2011 but confirmed not to have changed by SH
  - Red BOM input reflects materials for heat recovery equipment based on Cat. 5 values
  - Performance data updated with 2024 stakeholder data

Data overview

LCA stage	Level of importance	Stakeholder data	2011 data extrapolation	Online information / Desk research	Data gap
Bill of materials	High	x	x		
Manufacturing	Medium	x			
Packaging	Low	x	x		
Distribution	Low			x	
Use phase	High	x		x	
Maintenance and repair	High		x		

Missing data – further stakeholder inputs valued

LCA data:

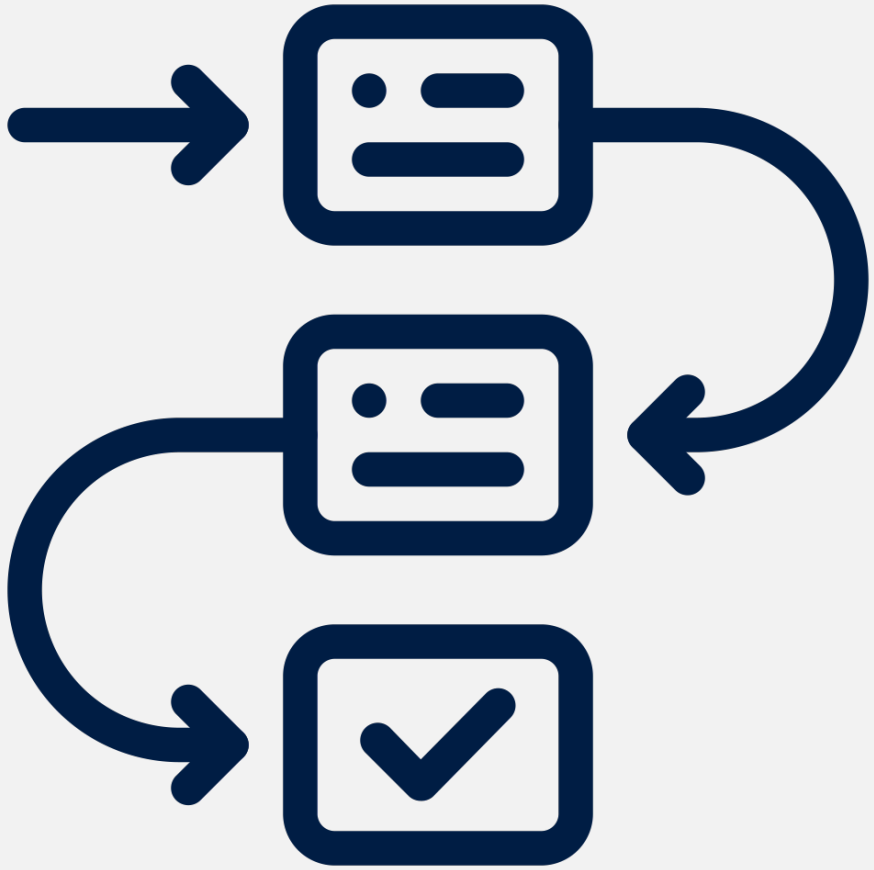
- Recycled content of component materials from Bill of Materials and Packaging materials
- Materials used in manufacturing / assembly of the professional dishwashers or manufacturing processes
- Energy use in the packaging process of the product
- Energy use during the use phase: some use of low-pressure steam / hot water: produced with natural gas?
- **Direct emissions from refrigerant use (cat. 5 + 6): 1.5 kg filling, how much fugitive emissions per year?**

LCC data:

- Product price per base case (only high-over available)
- Installation costs (cat. 5 + 6)
- EU sales for last 30 years: last 10 years available, but not per base case
- Discount and escalation rates
- Weibull shape parameter (β)
- Elasticity of demand
- Yearly production / sales & trade volumes only as totals, not per base case
- Total time to carry out a repair / upgrade activity

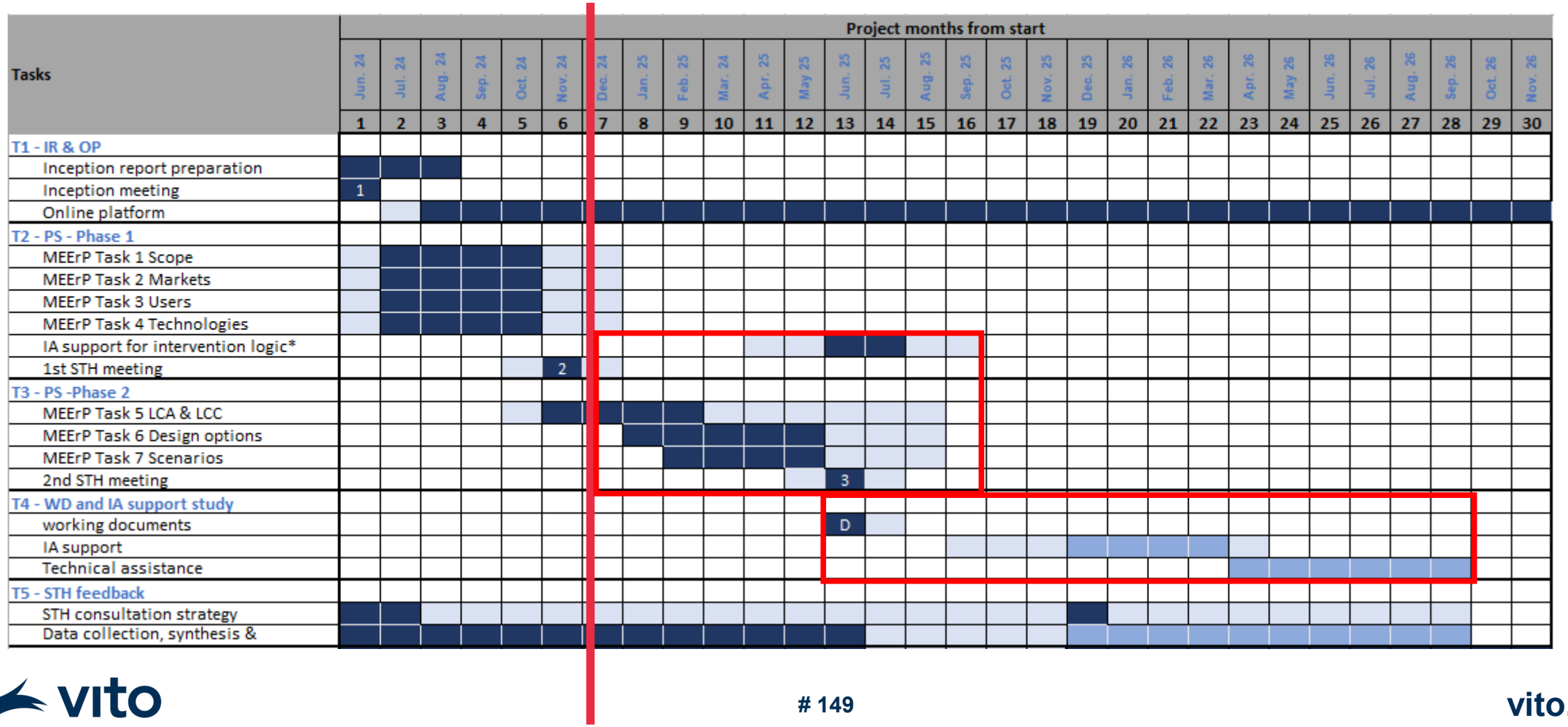
Outlook: Next steps

Kathrin Graulich, Oeko-Institut



Study schedule

Overall project duration: 04.06.2024 – 03.12.2026



Next steps

- **Draft MEErP Task 1-4 report** available for download under https://ecodesign-commdishwashers.eu/en/documents
- **Stakeholder feedback to Draft final MEErP Task 1-4 report the latest by 7 January 2025**: Please send the **feedback template**: https://ecodesign-commdishwashers.eu/sites/ecodesigncommdishwashers/files/downloads/ESPR_Feedback_Form_Task1-4.xlsx back to ecodesign-commdishwashers@oeko.de.
- **Revised MEErP Task 1-4 report** by end of January 2025
- **MEErP Tasks 5 and 6** starting now – Stakeholder consultation on proposed Base Cases and further information details around second half of January (registered stakeholders will be informed!)
- **Stakeholder registration** still possible, please inform your network: https://ecodesign-commdishwashers.eu/en/register

Thank you very much for your contribution!