



Ecodesign preparatory study for Building Automation and Control Systems (BACS) implementing the Ecodesign Working Plan 2016 -2019

Annexes

Reference:

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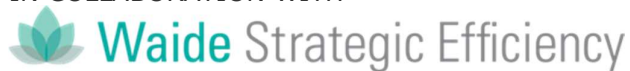
Public



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Project website: <https://ecodesignbacs.eu/>
Client:
European Commission Directorate-General for Energy

SUBMITTED BY:
IN COLLABORATION WITH



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Annexes

Annex A - Lighting control functions defined in EN 15193-1:2017

constant light output CLO (of a road lighting installation)

regulation of the road lighting installation aiming at providing a constant light output from the light sources

Constant illumination control

A sensor measures the real illumination on the task area and fits it to the required minimum value.

Dimmer

A device in the electric circuit for varying the luminous flux from lamps in a lighting installation;

Lighting control 'Auto On / Dimmed'

the control system automatically switches the luminaire(s) on whenever there is presence in the illuminated area, and automatically switches them to a state with reduced light output (of no more than 20 % of the normal 'on state') no later than 15 minutes after the last presence in the illuminated area. In addition, no later than 15 minutes after the last presence in the room as a whole is detected, the luminaire(s) are automatically and fully switched off.

Lighting control 'Auto On / Auto Off'

the control system automatically switches the luminaire(s) on whenever there is presence in the illuminated area, and automatically switches them entirely off no later than 15 minutes after the last presence is detected in the illuminated area.

Lighting control 'Manual On / Dimmed'

the luminaire(s) can only be switched on by means of a manual switch in (or very close to) the area illuminated by the luminaire(s), and, if not switched off manually, is/are automatically switched to a state with reduced light output (of no more than 20 % of the normal 'on state') by the automatic control system no later than 15 minutes after the last presence in the illuminated area. In addition, no later than 15 minutes after the last presence in the room as a whole is detected, the luminaire(s) are automatically and fully switched off.

Lighting control 'Manual On / Auto Off'

the luminaire(s) can only be switched on by means of a manual switch in (or very close to) the area illuminated by the luminaire(s), and, if not switched off manually, is automatically and entirely switched off by the automatic control system no later than 15 minutes after the last presence is detected in the illuminated area.

Occupancy dependent lighting control

The control uses a sensor to switch the luminaire on or off depending on whether any people are present in the room.

Daylight dependent lighting control

The control regulates and shuts down the artificial light output in accordance with the level of natural light.

Manual daylight control

means the users controls the on:off switch.

EN 15193-1:2017 Type I

Automatic On/off daylight control (Type II)

means the electric lighting is automatically switched off when the maintained illuminance is achieved by daylight at the point where the illuminance is measured. The electric lighting is switched on again automatically when the maintained illuminance is no longer achieved by daylight.

EN 15193-1:2017 Type II

On/off in stages daylight control (Type III)

means the electric lighting is switched off in stages until the maintained illuminance is achieved by daylight at the point where the illuminance is measured. The electric lighting is switched on again automatically in stages when the maintained illuminance is no longer achieved by daylight.

EN 15193-1:2017 Type III

Daylight responsive off daylight control (Type IV)

means the electric lighting is switched off when the maintained illuminance is achieved by daylight at the point where the illuminance is measured. The electric lighting has to be turned on again manually.

EN 15193-1:2017 Type IV

Stand-by losses, switch-on, dimmed daylighting control (Type V)

means the electric lighting is dimmed to the lowest level during usage periods (periods with adequate daylight) without being switched off (i.e. it uses electrical power ("stand-by losses")). The electric lighting system is turned on again automatically.

EN 15193-1:2017 Type V

No stand-by losses, switch-on, dimmed daylight control (Type VI)

means the electric lighting is switched off and turned on again ("dimmed, no stand-by losses, switch-on"). The electric lighting is dimmed to the lowest level during usage

periods (periods with adequate daylight) and switched off (i.e. no electrical power is used). The electric lighting system is turned on again automatically.

EN 15193-1:2017 Type VI

Stand-by losses, no switch-on, dimmed daylight control (Type VII)

means as system V, except that the electric lighting system is not turned on again automatically.

EN 15193-1:2017 Type VII

No stand-by losses, no switch-on, dimmed daylighting (Type VIII)

means as system VI, except that the electric lighting system is not turned on again automatically

EN 15193-1:2017 Type VIII

Annex B - Minutes of the stakeholder meeting

Distribution: General



Date : 18/01/2018 Ref. VITO/1710565/PVT
From : Paul Van Tichelen Annex(es): **Powerpoint presentations of the meeting + online survey**
To : Veerle Beelaerts; Stakeholders
Copy : Paul Van Tichelen, Paul Waide, Tatiana Pasquel Garcia

Minutes of stakeholder Meeting for Preparatory study for Building Automation and Control Systems - BACS

VLEVLA, main auditorium, Avenue de Cortenbergh 71, 1000 Brussels, 17th January 2018

Participants

European Commission

DG ENERGY

Veerle Beelaerts (VB)

Project Team

VITO

Paul Van Tichelen (PVT)

Tatiana Pasquel Garcia (TPG)

Waide Strategic Efficiency

Paul Waide (PW)

Registered stakeholders for the meeting

First Name	Surname	Company / organisation name	Acronym	Present
Simone	Alessandri	eu.bac	EUBAC	X
Francesco	Scuderi	Eurovent Association	EV	
Evelyne	Schellekens	AIE	AIE	
Jean Daniel	Napar	eu.bac	EUBAC - DN	X
Yselkla	Farmer	BEAMA	BEAMA	X
Mike	Rimmer	Dept for Business, Energy and Industrial Strategy	BEIS	X
Colin	Timmins	eu.bac	EUBAC - CT	X
Martin	Bergemann	EHI European Heating Industries	EHI	X
Roland	Ullmann	Siemens Building Technologies	SBT - RU	X
Els	Baert	daikin europe	DIK	
Mihai	Scumpieru	Mitsubishi Electric Europe	MEE	
Willem	Strabbing	ESMIG	ESMIG	X
Dominik	Flikweert	LightingEurope	LO	X
Arnaud	Collard	SPW - DGO4 - Energy	SPW	X

Distribution: General



Stefano	Tomasina	Bticino	BT	
Udo	Wasser	E.V.V.E.	EVVE	X
Andre	Wachau	Federal Institute for Materials Research and Testing (Germany)	FIMRT DE	X
Sanne	Goossens	CECED	SG	X
Pierre	Morel	SOMFY	SOMFY	X
Bob	Rivett	Emerson	EMER	
Hannalena	Ivarsson	Kreab	KREAB	X
Christianna	Papazahariou		CP	X
William	Stinissen	Volta	VOL	X
Frank	Vancoppenolle	Daikin	DIK	X
Kirsti Hind	Fagerlund	NVE	NVE	
William Walker	Rode	Norwegian Water Resources and Energy Directorate	NVE	X
Stephan	Kolb	eu.bac	EUBAC - SK	X
Evelyne	Schellekens	AIE	AIE	
Oscar	Deurloo	LightingEurope	LO	X
Samuele	Da Ros	Emerson	EMER	X
Marco	Peter	GFI e.V.	GFI	X
Jens	Schuberth	Umweltbundesamt	UB - JS	X
Chloé	Fayole	ECOS	ECOS - CF	
Edouard	Toulouse	ECOS	ECOS - TL	X
Monica	Marza	LG Electronics	LGE	X
Robert	Richardson	Emerson Retail Solutions Europe	EMER SE	X
Philippe	Carpentier	SCHNEIDER ELECTRIC	SE	
Claire	Grossmann	ESMIG	ESMIG	X
Marina	Guajardo	Orgalime Partnership	OM	X
Spyridon	Pantelis	International Union of Property Owners	IUPO	X
Geert	De Cock	EHI	EHI	X
Ingvill	Nilsen	Norwegian Water Resources and Energy Directorate	NVE	
Chris	Hamlin	Emerson	EME	X
Karen	Andreassen	VELUX A/S	VELUX	
Joachim	Thortzen	VELUX A/S	VELUX	
Hans-Paul	Siderius	Netherlands Enterprise Agency	NL - HPS	X

Rony	Haentjes	NIKO	NIKO	
Paul	Van Tichelen	VITO/EnergyVille	PVT	X
Paul	Waide	WSE	PW	X
Tatiana	Pasquel Garcia	VITO/EnergyVille	TPG	X
Veerle	Beelaerts	EC - DG Energy	EC - VB	X
Joost	Demarest	KNX	KNX	
Hein	Lux	KNX	KNX	
Jan	Verheyen	VITO/EnergyVille	JV	X
Steven	De Bruyne	KNX	KNX	X
George	Paunescu	EC – DG Energy	EC - GP	X
Juergen	Kuhnert	CECAPI	CECAPI	X
Philippe	Vollet	CAPIEL - CECAPI	CECAPI	X

Objective of the meeting

The intention of the meeting was to serve as a stakeholder meeting for the Ecodesign preparatory study for building automation and control systems - BACS. The study commenced in October 2017 and is expected to conclude in March 2018 (5 months). The purpose of this meeting was to discuss the initial findings on the tasks within the project and to hear the views of the stakeholders on the findings so far. A presentation of these initial findings was sent to the stakeholders registered for the meeting through the project website (<https://ecodesignbacs.eu/>). During the meeting an interactive enquire was launched, to get live opinions from both, stakeholders present in the meeting and stakeholders that could not attend the meeting.

The online enquiry was made available at: <https://goo.gl/zTsRJY>.

After the meeting the online was reset and resent to all stakeholders registered at the website.

Note: complementary to this minutes of the meeting the meeting powerpoint presentation can be consulted together with the input comments received from stakeholders by email

Agenda

- » 9h45: Registration desk opens
- » 9h45-10h00: Welcome coffee
- » 10h00-10h20: Presentation of the study team, EC and tour de table
- » 10h20-10h30 Summary of topics and approach for commenting
- » 10h30-12h30 Topics 1-5
- » 12h30-13h30 Lunch Break
- » 13h30-15h30 Topics 6-10
- » 15h30-16h AOB

Minutes

Short presentation of participants (all)

After all participants presented themselves, Paul Van Tichelen & Veerle Beelaerts welcomed the participants.

10h20-10h30 Summary of topics and approach for commenting

10h30-12h30 Topics 1-5

After the presentation from PVT, the floor was open to comments from the audience. Here under we have summarised the inputs from the participants.

abbr.	Comment/answer
WR - NVE	<p>Energy savings is not always compatible with demand response (DR). Example “smart control” in ecodesign requirements, puts an extra load on grid, when additional power is required. On his opinion DR is very important, not only as frequency control FCR, but also bottleneck situations in the local distribution grids. The future with more distributed renewables as well as electric vehicles charging causes more “power and grid” limitations rather than energy limitations.</p> <p>Fortum Finland has a Virtual Power Plant operating with a DR system in place for traditional Electric water heaters. With Fingrid lowering the bid threshold to 0,1 MW for FCR regulations, thousands of connected electric water heaters are switched on and off without consumers noticing it. It is the cheapest “batteries” available. Statnett in Norway operates a 10 MW threshold on FCR bids.</p>
EC - GP	<p>George Paunescu mentioned that it would be a missed opportunity not to look at the demand response function. The winter package gives a priority to this and work on smart appliances will require a CEM to exist (could be in the cloud or BACS within the building). In the smart appliances study also have a use case regarding optimal energy consumption. EV and PV – responding to internal signals from the building.</p>
PVT	<p>Paul Van Tichelen mentioned that self-consumption is straightforward and can be easily embedded.</p>
NL – HPS	<p>Hans Paul Siderius referred to the methodology and product definition and wonder whether the product group presents a challenge to the methodology - Task 0 for Ecodesign (ED). He also referred on how ED and product regulation affects the European product market, this affects the degree to which local situations are taken into account as these can be covered in local EPBD type requirements, however for ED this concerns the European market. This distinction could be used to define what is within control of manufacturers of the product and what isn’t, therefore he advised that we leave out those parts that are not addressable through the ED perspective. Naming what is a short term measure and longer term is not helpful. When mentioning bill of materials (BOM) data he doesn’t think it will be that difficult if there are some examples of the physical product, but will not be a main hurdle. He agreed with the project team, when referring to DR, he thinks the project team should look at DR, but there are limitations because it can’t be localised too much. Also the control level within the building could also be done in the cloud and therefore there is not just the BACS components in the buildings but how data processing elsewhere is taken into account.</p>
PVT	<p>To NL-HPS intervention, PVT replied that the project team should focus on also to the</p>

	lowest level in overview figure (see powerpoint).
EUBAC - SK	Stephan Kolb mentioned that there should be an internal market perspective for ED but we should also have an energy labelling regulations into account (VB confirmed that was the case). For DR the ELR foresees the inclusion of a reference in the label for products that are energy smart. What are the intentions for using this?
NL HPS	- For ELR can get more local information by scanning the QR codes that allow localised tailoring of information, but is a new area. Worth trying out some of these options we have now.
EUBAC - CT	Collin Timmins mentioned that what's really important for the Task 0 study to set boundaries of who the supplier and who the dealer is e.g. as per the installer label – this will set the scope for the full study.
VOLTA	William Stinissen asked for the figure to be aligned with the smart appliances figure to show what can be within and external to the building. Agrees that DR should be included. Are smart meters included in the scope or not?

12h30-13h30 Lunch break**13h30-15h30 Topics 6-10****15h30-16h00 AOB**

abbr.	Comment/answer
WR NVE	- Recommendation to avoid jumping into conclusions regarding the use of electricity for heating purposes, disregard use of electricity for heating purposes in the model as suggested. Not only Norway uses this, and with electrification targets in EU for 2050, the “whole picture” needs to be discussed. In NO modern buildings at “passive house standard level” has twice as high energy demand for Domestic Hot Water (DHW) pr. square meter and year, 30 kWh/(m2*year) compared to the heating demand 15 kWh/(m2*year).
NL HPS	- Hans Paul Siderius referred to one of the functions for the BACS could be the CEM – need some evaluation part. Second part is more crystal ball looking. Screening is not an evaluation of is this an important product or not, but rather to address how can we make it more simple. Should focus on those cases where the BACS could have a significant energy impact.
WR NVE	- The overview diagrams slide 21, 22 and 23 in the presentation show calculations with the use of the PEF for different energy sources. This will make things very complicated. Circular Economy issues are at the moment not taken into the calculations of PEF, which distorts the use of simpler solutions.
EUBAC - DN	Dan Napar tends to agree with the policy summary. He mentioned the importance to link comfort, health, productivity and EE with least energy possible. Also, how standard could be there to link these. When referring to BACS, he states that BACS also enable charging EV, for grid energy, use all energy types inc. RES, tackle new building market and existing buildings (the main market). BACS includes controls in general: choose the right control, for a specific situation. How many buildings in EU are uncontrolled, he asked. He also mentioned the minimum requirements to improve from existing class D. To simplify the study for ED, he recommends to focus on the control loop with negative feedback(as describe by Norbert Wiener , MIT, 1948 Cybernetics or control and communication in the animal and the machine for example page 97 who describe a thermostat). Also, to keep the setpoint to the actual situation. In his opinion, it doesn't matter the technology, but the ability of the control loop to keep the set-point as accurate as possible. Eu.bac thinks that standby is not applicable, because products are always active and must have a programmable control

	<p>loop. PID algorithm is independent of the building and type of energy used.</p> <p>Recommendations:</p> <p>Point 1 – Slide 25, how to handle and describe functions? By using technical definition as it is in the standard.</p> <p>Point 2 – Slide 46, he tends to agree with PW. Eu.bac is in Lot 1 and Lot 2 and take the part of the control that is already in the Lots – so can be used in a complete way. PID algorithms can be completed in one study. Basic case study we see in the market is no control at all (i.e. on/off).</p> <p>Point 3 – eu.bac thanks for the efforts of the study team to give a global overview of the policy where BACS is concerned</p> <p>Point 4 - See Ecodesign study as an holistic approach is perhaps too ambitious; better if the ECODESIGN products are compatible with the holistic approach through BACS and due to BACS</p> <p>EUBAC will prepare written feedback – appreciate that the online survey allow to clarify some decisions for the follow up of the study</p> <p>Tend to agree with PW summary of policy options and asked how this Lot can serve all Ecodesign lots where control system is specified.</p>
ECOS - ET	<p>Regarding screening and scoping, he presented several questions referred to technical aspects. He also mentioned that a complementary approach could be to look more into the barriers (intention is to increase the uptake and use of BACS). He recommended to draw up list of main barriers and map this to where ED/ELR could make a contribution to this. In his opinion, it may not be a need for regulation related to NZEB, as in the RES sector there is a mushrooming of home-boxes, which are not regulated, and may have a higher risk of consumer disappointment.</p>
SBT - RU	<p>Roland Ullman mentioned that one of the things is that installed systems never work the way they are designed. He has never seen an option going towards a installed system as designed. He also pointed out that he imagines that 20-30% of functions that are designed are not implemented, plus the control level within the building could also be done in the cloud and therefore there is not just the BACS components in the buildings but how data processing elsewhere is taken into account.</p>
EC - VB	<p>Veerle Beelaerts replied that she didn't think this could be covered by ED as it is about placing products on the market. Hence it is out of the scope of this project.</p>
SBT - RU	<p>He added that it is not a matter of big or small building (same for both). Added note: he dreams that there was a policy option for installed systems.</p>
PVT	<p>Paul Van Tichelen said that the intention is that BACS could provide proper monitoring to support better installation and thereby reduce the energy gap with EPCs. Improving automation can include monitoring occupancy patterns of the building and therefore make EPCs taking this into account.</p>
UB - JS	<p>He had a number of questions, such as: (i) another study about PV that includes battery storage (that is related to DSM etc.) is ongoing – is the project team aware of that? (PVT, replied: yes, we are also part of the project team for that study). (ii) one of the indirect domains of BACS is not just to reach set-points but to trigger feedback to users that can affect investments, (iii) also BACS are divided into different classes, do all class C BACs get produce the same level of savings? (To this, SBT- RU said: it depends on the usage).</p>
EUBAC - SK	<p>The new EPBD has a bill or renovation passports, database, new requirements on BACS re temperature controls. The ED/ELR scope should be matched to the new EPBD to see the</p>

	potential savings. There are also boundary conditions (enabling standards) e.g. EN15316 – that sets the hydraulic boundary conditions. Should be a complete overview.
NL - HPS	- When dealing with complexity it is useful to keep in mind that this is about BACS – recommends to focus on energy related functions and not security, fire etc. – The screening should look at those functions that have the biggest impact and look at the factors that influence these functions. Then look at which type of buildings could represent these and thereby limit the number of buildings, and say in all other cases the impact is minor.

The study will be finalized by end March

PVT informed on the dates when an updated version of the online inquire is going to be sent (end of January 2018). Stakeholders will have a month(< to send comments/inquires to both the presentation and the online inquiry.

16h00 the meeting was closed

Additional, explanatory comment made after the meeting by NVE

WR - Energy calculations and energy savings with PEF are complicated (1st hand experience from EPBD calculations), as the renewables with a lot of DER (Distributed Energy resources) may have production profiles that are not compatible with the demand profiles. To get this right, one would need PEF with a resolution of max 1 hour, to cater for the dynamic complexity. Use of PEF may mask inefficiencies and losses. PEF are good for overall statistics for a region or country (EED, RES), but should not be used on building and product level. The introduction of PEF risks long fruitless discussions where stakeholders fight for market share influencing the PEF rather than what is good for energy supply or the climate.

Annex

The powerpoint presentation of the meeting is available.

Annex C - Powerpoint presentation of the stakeholder meeting



27/06/2018

Ecodesign preparatory study for Building Automation and Control Systems (BACS) implementing the Ecodesign Working Plan 2016 - 2019

Stakeholders Meeting

Paul Van Tichelen, Paul Waide, Tatiana Pasquel Garcia

Brussels, VLEVA

17th of January 2018

Agenda

- » 9h45: Registration desk opens
- » 9h45-10h00: Welcome coffee
- » 10h00-10h20: Presentation of the study team, EC and tour de table
- » 10h20-10h30 Summary of topics and approach for commenting
- » 10h30-12h30 Topics 1-5
- » 12h30-13h30 Break
- » 13h30-15h30 Topics 6-10
- » 15h30-16h AOB



**Note: there will be voice recording in the meeting to elaborate minutes afterwards,
your name and organisation will be in the minutes of meeting**

Study Team

- » Tatiana Pasquel Garcia (VITO), framework contract manager

Technical Team Leader and Project manager	Paul Van Tichelen	Technical Team leader and Project manager Expert in Ecodesign studies and BACS
Quality Manager	Paul Waide	Quality control and BACS expert
Expert	Dominic Ectors	Smart appliances and ICT
Expert	Koen Vanthournout	Smart appliances and smart grids
Expert	Stijn Verbeke	Building modelling and SRI/EPBD expert
Expert	Ma Yixiao*	Building TBS/HVAC expert

EC policy officer & Study Team

- » EC policy officer: Veerle Belaerts
- » Study Team:
 - » Team leader: **Paul Van Tichelen (VITO)**
 - » **Paul Waide (Waide Strategic)**, Energy efficiency policies
 - » **Tatiana Pasquel Garcia (VITO)**, Framework Contract Manager
- » **Use of voice recording & present your name and organisation before speaking**
- » Table round

Summary of topics to be addressed

- » Topic 1: Explanation of the general context of the study
- » Topic 2: Linkages with other policy instruments e.g. EPBD, SRI, Smart Appliances etc.
- » Topic 3: Challenges due to a heterogeneous product group and the applicability of the MEerP
- » Topic 4: The role of a functional unit in the MEerP and LCA
- » Topic 5: Clearly defining BACS
- » Topic 6: The role of screening for significance
- » Topic 7: The differentiation needed in the impact screening for later studies and policy options
- » Topic 8: Sources of data for the screening and later study(ies)
- » Topic 9: Policy options and the best ways to go ahead with a full study
- » Topic 10: Project planning

Topic 1: explanation of the general context for the study

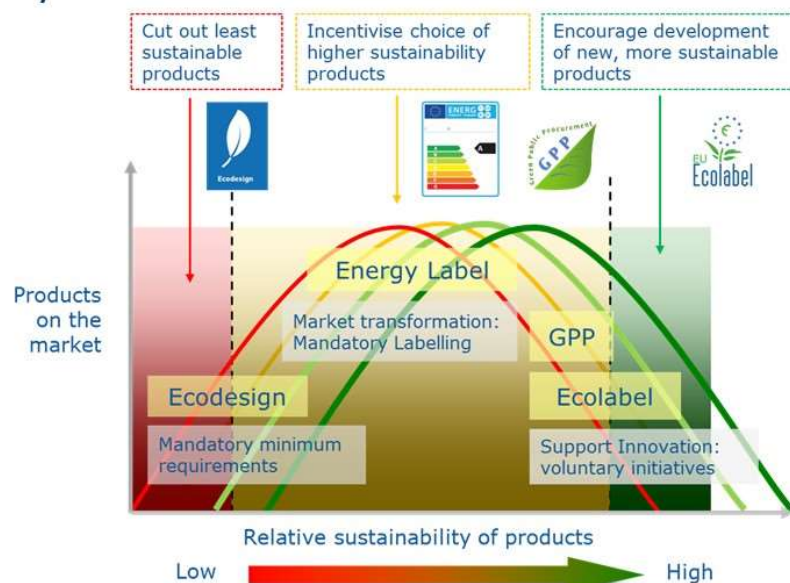
- » What is the policy context for BACS which we're working within?
- » What is the aim of this scoping study?

Overview of the main policy context

- » **Ecodesign Directive (ED)** (Directive 2009/125/EC) = **Framework** to set mandatory minimum requirements on performance or information via **implementing measures** specified in EU Regulation
- » **Energy Labelling Regulation (ELR)** (Regulation (EU) 2017/1369): Energy labels help consumers choose energy efficient products
- » **Energy Efficiency Directive (EED)** (2012/27/EU)
 - » EU countries make energy efficient renovations to at least 3% of buildings owned and occupied by central government
 - » EU governments should only purchase buildings which are highly energy efficient
 - » EU countries must draw-up long-term national building renovation strategies which can be included in their National Energy Efficiency Action Plans
- » **Energy Performance of Buildings Directive (EPBD)** (2010/31/EU):
 - » energy performance certificates are to be included in all advertisements for the sale or rental of buildings
 - » EU countries must establish inspection schemes for heating and air conditioning systems or put in place measures with equivalent effect
 - » all new buildings must be nearly zero energy buildings by 31 December 2020 (public buildings by 31 December 2018)
 - » EU countries must set minimum energy performance requirements for new buildings, for the major renovation of buildings, and for the replacement or retrofit of building elements (heating and cooling systems, roofs, walls and so on)
 - » EU countries have to draw up lists of national financial measures to improve the energy efficiency of buildings

Overlay of all EU product policy instruments

(source: EC JRC – note this excludes some instruments applying to installed systems)



Scope of BACS to be included in this study

- » This study **builds on** the **Ecodesign working plan 2016-2019** which **identified building automation control systems (BACS)** in non-residential buildings but will also cover the residential buildings.
- » The working plan study already identified **the indirect energy savings that can be achieved with BACS** as an important potential impact of ED, was **based on** Study of 2014 (Paul Waide): **“The scope for energy and CO2 savings in the EU through the use of building automation technology”**
- » Aims to **complement** the development of a **smart readiness indicator** for buildings and **smart appliances**

Scope of BACS to be included in this study

- » Key issues for this scoping study are:
 - » BACS cover a wide range of **heterogeneous products**
 - » it may be **difficult to clearly define product boundaries** and to apply the MEErP to the letter
 - » the **large number of possible applications and functionalities** of BACS creates additional complexity
- » **Primary aim** of this study is to **define** the product **scope**, to **identify** the **focus areas** & approach for the **subsequent full preparatory study**
- » **Secondary aim**: identify potential **policy options** that could be implemented **via and in conjunction with the Ecodesign Directive**

Topic 2: linkages with other policy instruments

- » What policy measures and related work is ongoing?
- » How does the BACS Ecodesign study cross-link with EPBD, EED and SRI and Smart Appliances?
- » What is the general overview picture and where is the Central Energy Management function located?
(note – this term pertains to Demand Response)

Energy Performance of Buildings Directive (EPBD) (2010/31/EU)

- » Related to EPCs and minimum performance standards
 - » BACS can be taken into account by EN 15232 via a simplified method or a detailed method the referred individual standards per TBS
- » Smart Readiness Indicator is elaborated in a separate study:
<https://smartreadinessindicator.eu/>
- » Article 8 on Technical building systems (2010/31/EU): §2: ‘.. encourage the introduction of intelligent metering systems whenever a building is constructed or undergoes major renovation, encourage, .., the installation of active control systems such as automation, control and monitoring systems that aim to save energy.’
- » Article 14 on Inspection of heating systems: §1. ‘..regular inspection..
- » Article 15 on of air-conditioning systems: §1: ‘..regular inspection

EPBD proposed amendment (winter package 2016)

- » Article 8 amendment: ‘..definition of ‘smartness indicator’...
- » Article 10 on financial incentives and market barriers amendment: When Member States put in place a database for registering EPCs it shall allow tracking the actual energy consumption of the buildings covered, regardless of their size and category.
- » Article 14 new proposal for heating systems: §2: As an alternative to paragraph 1 Member States may set requirements to ensure that non-residential buildings with total primary energy use of over 250 MWh per year are equipped with building automation and control systems
- » .. To be concluded, process ongoing



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Some ED + ELR examples of BACS related products

- » Regulations (EU) No 811 & 812/2013 with regard to energy labelling of space heaters, combination heaters, packages of space heater, temperature control and solar device and packages of combination heater, temperature control and solar device, and of water heaters, hot water storage tanks and packages of water heater and solar device
- » Requires dealers to:
 - » Provide a package label when selling a space heater and combining it with a control
 - » Provide a package label when selling a water heater and combining it with a solar device
- » For example: defines correction factor for Class VI - Weather compensator and room sensor, for use with modulating heaters
- » Regulations (EU) No 813 & 814/2013 for space heaters and combination heaters, and for water heaters and hot water storage tanks



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ED or ELR of Smart appliances

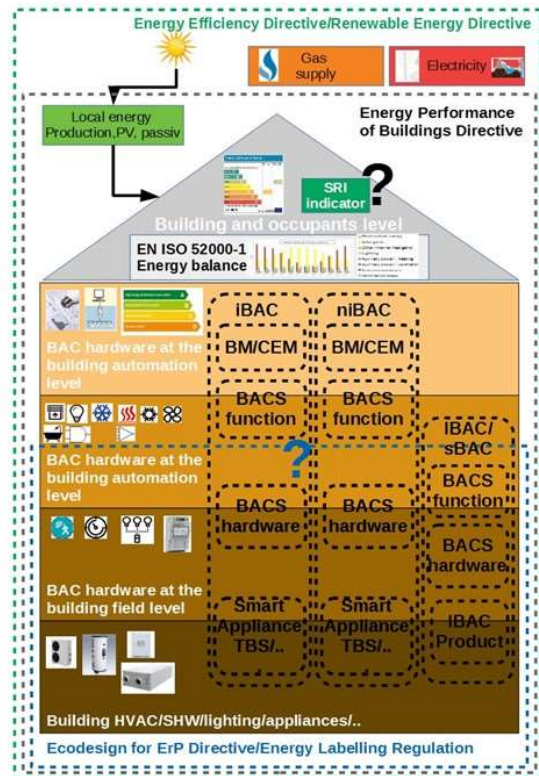
- » Study is ongoing: <http://www.eco-smartappliances.eu/>
- » Study is focused on Demand Response functions, hence facilitating more DER with PV/Wind and avoidance of storage in the future
- » Energy Labelling Regulation (2017/1369/EU) says:
 - » in (9) that 'This Regulation contributes to the development, recognition by customers and market uptake of energy smart products, which can be activated to interact with other appliances and systems, including the energy grid itself, in order to improve energy efficiency or the uptake of renewable energies, reduce energy consumption and foster innovation in Union industry.
 - » Article 16:
 - » The Commission is empowered to adopt delegated acts..
 - » ..where appropriate, the inclusion of a reference in the label allowing customers to identify products that are energy smart..

What are typical energy related domains of BACS (see also SRI study)

- » heating control, e.g.: emission control, control of distribution pumps, generator control ..
- » domestic hot water (DHW) supply, e.g.: reduce stand by losses by forecasted demand..
- » For cooling, e.g.: emission control, interlock between heating and cooling, ..
- » For air supply or ventilation (if any): -demand driven, free air night time cooling, ..
- » Lighting controls: occupancy, daylight, ..
- » Blind control: prevent overheating and reduce glare,...
- » Technical Building Management (TBM) system, i.e.:
 - » set point management, e.g. night time set back temperature
 - » run time management, e.g. schedule
 - » manage local DER or CHP
 - » control of thermal storage (if any)
 - » Smart Grid integration / Central Energy Management (CEM)
 - » detect faults in the Technical Building System (TBS)
 - » Reporting regarding energy consumption relative to indoor conditions

The context of BACS - overview

- » .. Quite **complex**
- » **B**uilding **A**utomation and **C**ontrol = BAC
- » Different **building levels**:
 - » **F**unctions..
 - » **H**ardware..
- » BACS = **integrated System**
- » niBACS = **non integrated**
- » sBAC = **stand alone?**
- » **Smart appliances?**
- » .. **Building types**
- » Reasons to **focus study?**



The context of BACS

- » Stakeholders are invited to:
 - » **comment on the completeness of the overview picture?**
 - » (can be made available in LibreOffice DraW format)
 - » **supply relevant examples? How much examples are needed for a study (see later on Base Cases for MEErP)?**

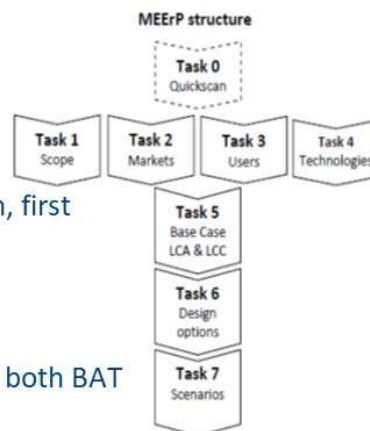


Topic 3: challenges due to a heterogeneous product group and the applicability of the MEErP

- » The **Methodology for Ecodesign of Energy-using products (MEErP)**
- » developed to allow **evaluation** of whether and to which extent various **energy-related products fulfil** certain criteria according to **Article 15 and Annex I and/or II** of the Ecodesign Directive that **make them eligible for implementing measures**
- » **Article 15 defines a criterion of “significant environmental improvement potential”**
- » It uses the **Ecoreport tool** (spreadsheet) to calculate environmental impact
- » Information available at:
http://ec.europa.eu/growth/industry/sustainability/ecodesign_nl

MEErP in a nutshell

- » Tasks in MEErP:
- » Task 1 - Scope (definitions, standards and legislation, first screening);
- » Task 2 – Markets (volumes and prices);
- » Task 3 – Users (product demand side);
- » Task 4 - Technologies (product supply side, includes both BAT and BNAT);
- » Task 5 – Environment & Economics (Base case LCA & LCC);
- » Task 6 – Design options;
- » Task 7 – Scenarios (Policy, scenario, impact and sensitivity analysis).
- » Tasks 1 to 4 can be performed in parallel
- » Task 0 is a quick scan to better define the scope



Topic 4: MEERp and LCA work around a functional unit and use an Ecoreport tool to model impacts

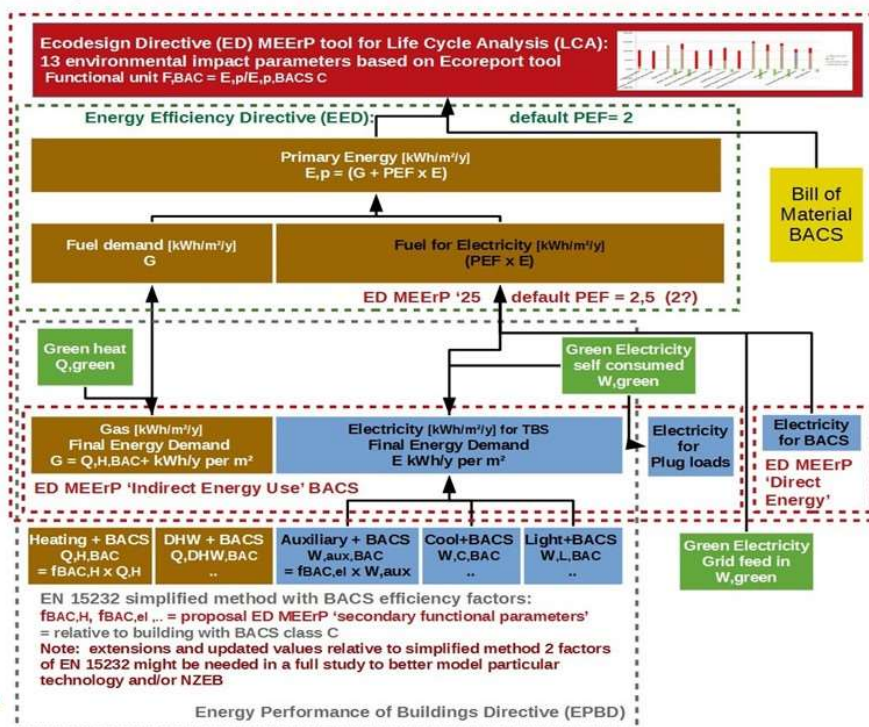
- » **LCA = Life Cycle Analysis** = tool for assessing the environmental impacts of a product from its origin through to disposal across its entire lifecycle
- » **Primary Functional Unit** in LCA = “the quantified performance of a product system for use as a reference unit in life cycle assessment study” .. in order to compare different BACS options in MEERp Task 4 and 6
- » Functional Unit proposal:
 - » Similar to EN 15232 (but **broader**): “**The BAC factor (fbac)** measured annual energy expressed in primary **energy (Ep)** as supplied to the technical building systems and plug loads to satisfy the uses **relative to a reference BACS class C** in EN 15232-1:2017 ($E_{ref,C}$)” ($E_p = f_{BAC} \times E_{ref,C}$) ‘satisfies uses’ = minimum EN ISO 17772-1:2017 quality)
 - » + a whole set of secondary parameters, a.o. to calculate the primary.
- » ED LCA according to MEERp are **done with** a standardised spreadsheet tool called **Ecoreport tool** (calculates 13 environmental parameters relative to production, use and EoL)



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Concept of the Potential BACS MEERp model



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Topic 4: within MEErP the role of a functional unit in MEErP and LCA

- » The previous approach **can** clearly cover **Energy Efficiency** (EE) via its **indirect energy impact** (Task 3) where savings on in kWh/m²/y final energy demand of buildings and via the **direct energy** (Task 3) which is the self consumption of BACS but:
 - » Which other energy performance aspects should be considered to address DER (DR, self consumption, ..)?
 - » What about non-energy related functions?
 - » **The role of the PEF and should it be adapted for DR or self consumption of local DER (e.g. PV)?**

MEErP: what can be concluded

- » It is **not evident** that the MEErP can be applied on a **heterogeneous product group with multiple functions** .. This is a challenge for a full study
- » It **can take a serious amount of time**
- » **Could result in delay**
- » **Splitting the study into different parts could** result in **speeding up short term Tier 1 implementing measures** and keeping long term Tier 2 implementing measures for later, for example:
 - » **focus** on more simple BACS retrofitted in **the average building stock versus the new/renovated NZEB/LEB buildings** with added complexity, therefore postpone the complexity of DER with DR/self consumption?
 - » Postpone the added complexity of airtight buildings and their ventilation?
 - » **To model in MEErP we need a representative set of Base Cases .. How many are needed will also depend on the scope?**

Topic 5: how to clearly define BACS (Task 1) for scoping and future policy measures?

- » **Why is it important?**
 - » a broad product group **might conflict with a consistent study**
 - » It is an **essential** requirement (e.g. smart appliances) that products can be clearly defined in **any future Regulation** without creating confusion or loopholes in the market
- » Due to the broad scope an evaluation should be conducted of how far we have to go into the details in which stage of the study, because **analysing in too much detail could result in serious delay**
- » **Different approaches exist:**
 - » **Based on technical definitions** from standards (= requirements for products according to functional definitions)
 - » **Specifications by end application** (= requirements for products declared suitable for .. applications)

BACS technical definitions

BACS as defined in European Standard EN ISO 16484-2 and EN 15232-1:

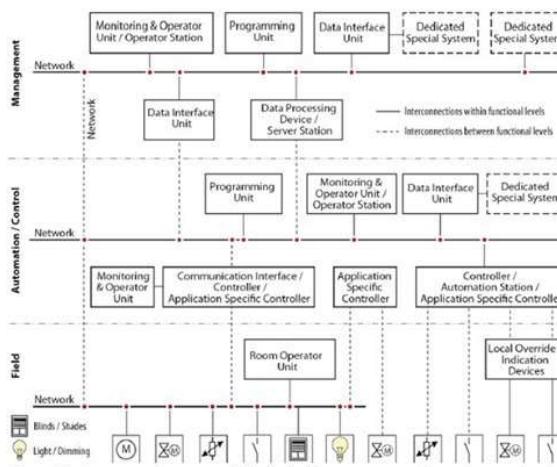
- » **BACS:** 'BACS comprising all products and engineering services for automatic controls (including interlocks), monitoring, optimization, for operation, human intervention and management to achieve energy – efficient, economical and safe operation of building services. Controls herein do also refer to processing of data and information'.
- » **BAC:** 'products, software, and engineering services for automatic controls, monitoring and optimization, human intervention, and management to achieve energy-efficient, economical, and safe operation of building services equipment'
- » **Integrated BACS (iBAC):** 'BACS designed to be interoperable and with the ability to be connected to one or more specified 3rd party building automation and control devices/systems through open data communication network or interfaces performed by standardized methods, special services and permitted responsibilities for system integration.
- » The opposite of iBACS could be defined as **non integrated BACS (niBACS)**

BACS technical definitions

- » Not in the standard but one can define complementary:
 - » **non integrated BACS (niBACS)** as BACS which are not iBACS
 - » The draft ED standby regulation also defines **local building controls (IBAC)** as *'products that move or rotate access elements and/or climatic control elements used in buildings. The products incorporate electric motors or actuators and the control unit as one entity and are operated by the end user through wired and/or wireless controls or via a network, or controlled automatically with the use of sensors.'* (current status?)

BACS technical definitions

- » BACS generic hardware and levels EN 12464-2: building management, automation/control, field level



BACS technical definitions

- » **For this range of hardware: What are the prodcom codes for BACS =** generic data Eurostat, **stakeholders please provide input? Is this useful or too diverse?**
- » **BAC functions (as defined in EN 15232):**
- » **Integrated BAC function (iBAC function) (EN15232):** is the BAC effect of programs and parameters. BAC functions are referred to as control functions, I/O (input/output), processing, optimization, management and operator functions. They are listed in the BAC FL (function list) for a specification of work
- » **An integrated BAC function (EN 15232-1:2017)** refers to the effect of programs, shared data points and parameters for multi-disciplinary interrelationships between various building services and technologies

BACS technical definitions

BAC functions (EN 15232, it is an EPBD standard addressing the energy used by TBS):

- » for heating control, e.g.: emission control, pump control, sequencing of heat generators, ..
- » for Domestic Hot Water (DHW), e.g.: reduction of standby losses with demand forecasting, pump control, etc.
- » For cooling control, e.g.: emission control, interlock between cool/heat, ..
- » For air supply & ventilation, e.g.: demand driven ventilation, free air night time cooling, humidity control, ..
- » Lighting controls (see Lot 37)
- » Blind/Shading controls, e.g.: to prevent overheating, glare

BACS technical definitions

- » **Technical Building Management (TBM)** (see EN 16947 for more details):
 - » Set point management
 - » Run time management, e.g. predefined schedule
 - » Manage local renewable sources or CHP and self consumption
 - » Control of Thermal Energy Storage (if available)
 - » Smart Grid integration
 - » Detect faults in the Technical Building System (TBS), e.g. read out alarms, verify COP, verify maximum power output, check power consumption (e.g. clogged filter), ..
 - » Reporting regarding energy consumption relative to indoor conditions, e.g. show actual and logged trends, calculate EPBD performance parameters (e.g. EN ISO 52003-1 & -2), ..

BACS technical definitions

BACS TBM can act as the **Central Energy Management** in the context of **Smart Grids**. For appliances or plug loads an Ecodesign preparatory study on smart appliances is already ongoing, however, this does not include the building and TBSs as a whole. Within this:

- » **Implicit Demand Response (iDR BACS)** refers to BACS services to participate in the wholesale energy market - it is mostly price driven with variable tariffs or peak load tariffs
- » **Explicit Demand Response (eDR BACS)** refers to BACS services to support the grid operators for balancing or congestion management. It can be, for example, curtailment based on the line voltage or grid frequency
- » In practice this is **still BNAT (Best Not yet Available Technology)**, thus it might be premature to attempt to apply it within policy measures

BACS technical definitions

BACS could also be classified according to their impact

e.g. the SRI study defined the impact categories: Energy savings on site, Flexibility for the grid and storage, Self-generation, **Comfort, Convenience, Health, Maintenance & fault prediction, Information to occupants**

Apart from these multiple other BACS functions can be found:

- » **To detect fire according to EN 54 standard family.**
- » **Intruder alarm according to EN50131.**
- » **Support video access control**
- » **Support multi-room audio**
- » ..

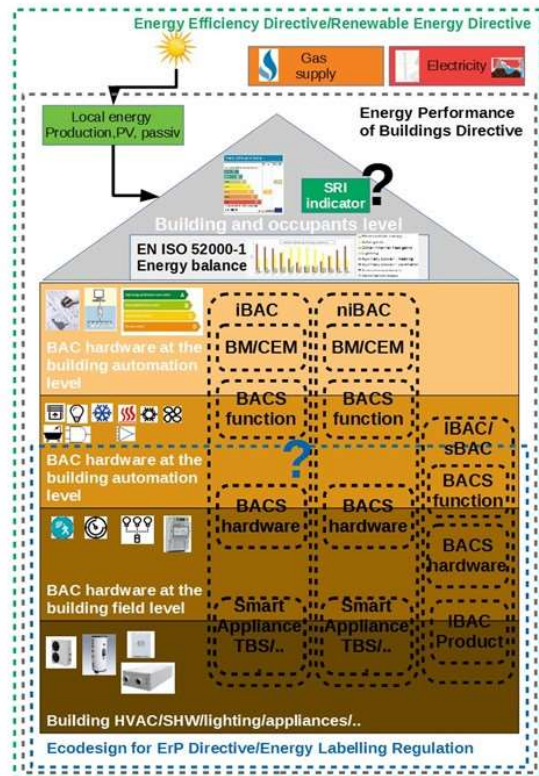
BACS technical definitions

Other non-energy and non-EN 15232 technical definitions related to **Life time and interoperability (as might be relevant for LCA)** are:

- » **interoperability** (ISO ISO/IEC 2382-01): "The capability to communicate, execute programs, or transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units"
- » **Reparability**, this means that spare parts are available also in the event of a manufacturer bankruptcy? **(definition needed)**
- » **Upgradability**, this means that the installed system can be adapted to future services from the manufacturer or third party solutions? **(definition needed)**
- » BACS single source provider versus BACS multiple source providers
- » Public standard I/F BACS (e.g. DALI), for which a public interface standard is available (e.g. KNX), versus closed I/F BACS (e.g. Opentherm)

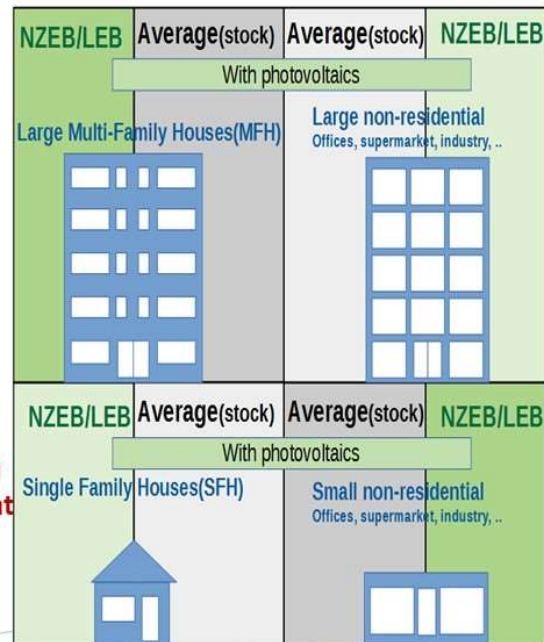
BACS technical definitions – summary

- » Should we include functions that have no indirect impact on building energy? (this was not in the ED working plan)
- » Keep the lifetime related technical definitions and aim for a full MEerP LCA (includes BOM data)? If so, can we have typical BOM data?
- » Is this complete? Any opinions for adding definitions?



Specification of end application

- » According to building type:
 - » NZEB (net zero energy) or LEB (low energy) vs average stock
 - » Residential vs non residential
 - » Large versus small (e.g. EPBD)
- » Potential rationales for considering such a segmentation are:
 - » Differences in market and uptake
 - » Differences in user, e.g. large vs small (DIY)
 - » Differences in expected impact
 - » Timing and scope of policy measures
- » **Keep the focus on non-residential? Which types (offices..)? Residential is different market? Separate NZEB/LEB due to complexity/impact/urgency? Any opinions? Multiple MEerP BCs?**

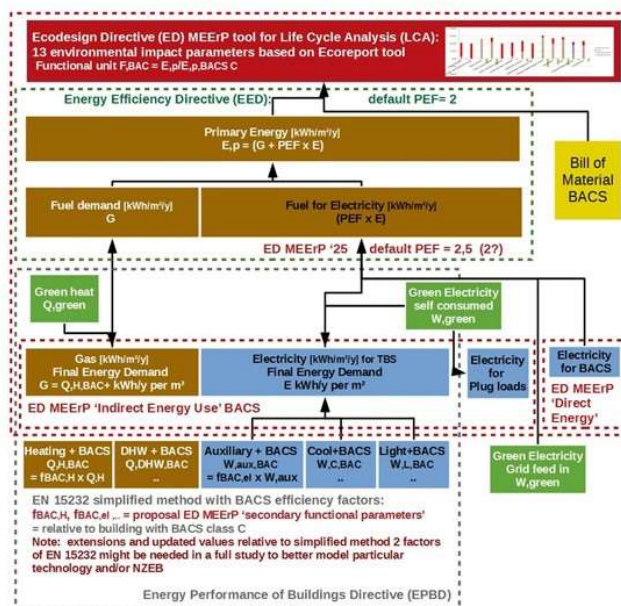


Topic 6: the role of screening for significance (Task 0)?

- » According to the MEErP: “Task 0 is an optional task for the case of large or inhomogeneous product groups, where it is recommended to carry out a first product screening, considering the environmental impact and potential for improvement of the products as referred to in Article 15 of the Ecodesign Directive. **The objective is to re-group or narrow the product scope, as appropriate from an ecodesign point of view, for the subsequent analysis in Tasks 1-7.**”
- » Note that the Article significance is already proven in the ED working plan thus, **the issue is rather to consider an optimal focus without loosing significance and/or to split the study into two or more parts**

Topic 6: The screening model could be the MEErP tool..

- » **Complex** to run in the short term and not necessary already the aim of Task 0
- » **Other options are assessments in the literature**, simple estimates, and...?
- » **Relevant suggestions are highly welcome**



Topic 7: what differentiation is needed in the screening process?

The potential scoping options identified so far are BACS for:

- » 'NZEB/LEB + BACS' vs 'the existing stock + BACS'
- » Residential (which?) vs non residential
- » Small versus large buildings (see EPBD, 1000 m²)?

And that include:

- » direct energy consumption (self consumption) as well as indirect energy consumption (energy used by TBSs)?
- » or neglect product life time and the Bill-of-Materials?
- » Non-energy related impacts?
- » How to deal with BNAT for iDR/eDR BACS functions or self consumption? Is this typically related to NZEB/LEB?



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Topic 7a: impact screening of iDR/eDR BACS and the role of NZEB/LEB in Smart Grid DR

- » **Difficult to model in MEErP** because the BACS solution is still uncertain and depends on: (requires using) **electricity as the heat source (existing stock?), high share of PV & Wind, low share of biofuels, smart meters roll out, competitiveness with DR in industry, curtailment cost of PV&Wind and any storage solution (hydro-stations, batteries, power to gas, etc.)**
- » **Using electricity as the heat source is potentially an uncommon practice in the older building stock and therefore iDR and eDR BACS is not relevant to them?**
- » **However NZEB/LEB most often use heat pumps .. but it is low energy for iDR or eDR? .. It is an issue for the long term but might be relevant over the long life time of these buildings?**
- » **Hence it is more likely to be an issue for new buildings (LEB/NZEB) with heat pumps? Also it's impact is over the long term? .. Any more data for reference NZEB/LEB? Could be part of a separate study or part of SRI**



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Topic 7b: impact screening EE in NZEB/LEB

- » **EN 15232-1:2017** contains a simple method with factors (see functional unit). In our opinion this **can** simply be **applied to the average building stock**. The data **did not** discriminate or model **new NZEB or LEB buildings**. The **savings that can be achieved with BACS on electrical energy for cooling, ventilation and lighting are potentially underestimated** in the opinion of the study team. .. Hence this would minimize the impact of BACS on the relative low energy of NZEB/LEB and lead to inappropriate conclusions. Do we have more data on this? Can we rely on performance gap data for this type of buildings in a screening exercise? Any more opinion on NZEB in homes versus the non-residential building stock
- » **Split the study into two parts? Due to the complexity the part on NZEB/LEB could require longer timing?**

Topic 7c: impact screening residential vs non residential applications

- » In the **non-residential sector** the **users are also professionals** and therefore anything that can be automated offers a **faster pay back on labour cost**. In the residential sector some BACS installations can be done by the occupants themselves (DIY) which will offer them cost savings
- » Many **non-residential buildings** (offices, schools, supermarkets, hospitals, ..) can be characterised by much **higher internal heat gains per m²** resulting from metabolism and other activities. This will influence the building energy balance e.g. heat replacement effect. Also **due to this cooling and mechanical ventilation are often required** in these buildings. In **some sectors** (supermarkets, office buildings, industry, ..) the **renovation rate** is linked to their continuous business transformation process and is **faster** compared to the residential sector. **Therefore > expect a larger share of advanced TBS in the non-residential building sector & possibly also NZEB?**
- » **A detailed assessment of BACS impacts will need to encompass sufficient differentiation for the distinct types of non-residential buildings? .. Different study?**

Topic 7d: impact screening Large vs Small buildings

How these BACS are brought to the market:

- » **Large** non-residential and/or large residential BACS are **assembled on site often with standardized components**.
- » **Small** residential BACS come often **pre-assembled and sometimes form part of the TBS** (boiler, ventilation unit). They are easy to install but often lack some features such as interoperability between different TBS (e.g. cooling and ventilation). The **installation cost is a relatively more important factor**.
- » Also **larger** buildings with **multiple occupants are more complex to operate** and automation can therefore render useful service, e.g. set point management.
- » **Split the study? Which data is available?**

Topic 8: additional data needed for screening

- » **Note: Direct Energy or self consumption – can be easily done? Is it relevant? The same for impact of non energy or resources – will need a typical Bill of Material and MEErP tool to be completed?**
- » EN 15232-1:2017 can be used but more data is especially needed for NZEB/LEB and large versus small building applications
- » **Note, for a full study: all data & real life evidence of impact from BACS on indirect energy consumption of buildings is highly welcome! This can also support the elaboration of a set of representative Base Cases for the MEErP modelling process!**

Topic 9: policy options and the best ways to go ahead with a full study

- » BACS are not yet subject to **ED or ELR** requirements hence the study will **focus on these**
- » **Also combinations of policy options** will be considered, for example recognising that Ecodesign Requirements for BACS products or combinations thereof can complement EPBD-related policy instruments such as minimum TBS requirements (e.g. as specified within Article 8) or the proposed building Smart Readiness Indicator (SRI)

Topic 9: policy options and the best ways to go ahead with a full study

Policy measures in ED or ELR:

- » Product level measures, such as: minimum eco-design performance limits (e.g. control accuracy), minimum ecodesign compatibility requirements, information requirements or product labelling
- » System level measures, such as: a system labelling similar to an installer label and compatibility requirements for products installed within TBS systems

Policy measures in EPBD:

- » Recommendations for any future EPBD review, or implementation into local regulations or decrees, such as the mandatory use of Ecodesign compliant or labelled BACS
- » Potential input for a new and common approach for evidence based energy performance certificates (EPC) under Article 11 and potentially closing a performance gap between measured data and the EPC

Topic 9: policy options and the best ways to go ahead with a full study

In relation to the EED:

- » Potential linkages to energy efficiency obligation schemes (EEOS) and related incentives;
- » Linkages with training, certification and accreditation articles.
- » **Relationship with between study scope and potential policy timing:**
 - » More complex BCs and analysis can require a larger and more detailed study .. This could delay short term policy measures which aim short term impact (e.g. simple retrofits on existing buildings). **Split the study?**

Topic 10: project planning chart

		project months from start assumption: 1 Sep 2017											
		Oct	Nov	Nov	Dec	Dec	Dec	Jan	Jan	Feb	Feb	Mar	
		16-30	1-15	16-30	1-15	16-22	25-31	2-15	16-30	1-15	15-28	1-21	
	Task Definition												
	Task Screening & MEER recommendations												
	Task Policy												
	Deliverables	D1				D2		D3				D4	
	Meeting	M1				M2		M2		M3			
Deliverable	D1	Minutes of kick off meeting/inception report											
Deliverable	D2	Minutes of the stakeholder meeting											
Deliverable	D3	Draft final report											
Deliverable	D4	Final report											
Meeting	1	Kick-off meeting											
Meeting	2	Stakeholder meeting											
Meeting	3	Interim meeting EC to discuss final update											

Questions & Conclusion

- » **Proposed timing:**
 - » **Minutes of Meetings will be sent for review (<16/2)**
 - » **Position papers on the scope, splitting into parts (<16/2)**
 - » **Other input and evidence for a full study**
 - » **<16/3 help us to plan a full study**
 - » **.. Always welcome**
- » **Scope: any comments? Provision of data? AOB?**

- » **Thank you for coming!**

Annex D - Details of the stakeholder survey

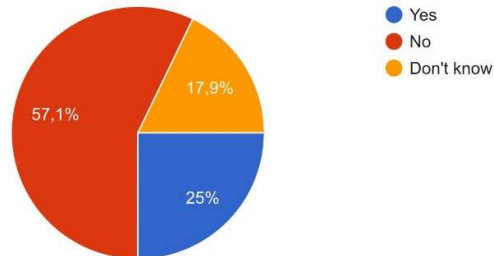


Scoping questionnaire on the preparatory study for BACS

28 reacties

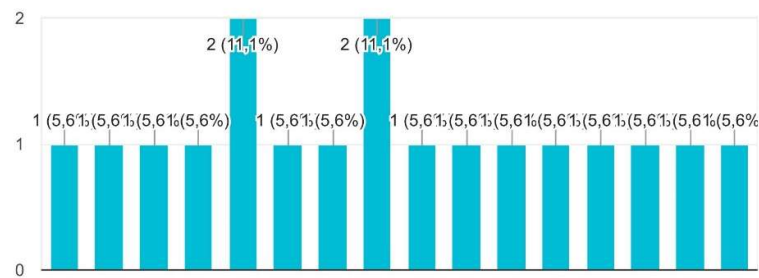
1a. I think that the study should be split between BACS as retrofits for existing buildings with poor or average energy performance versus new built low energy buildings?

28 reacties



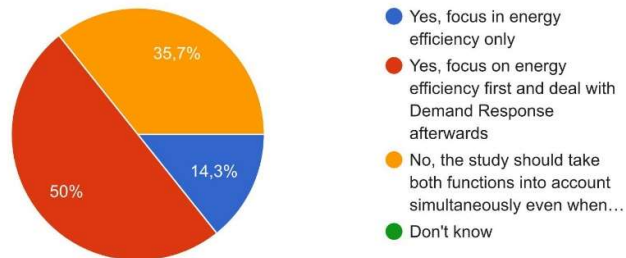
1b.Optional: motivation for the answer above

18 reacties



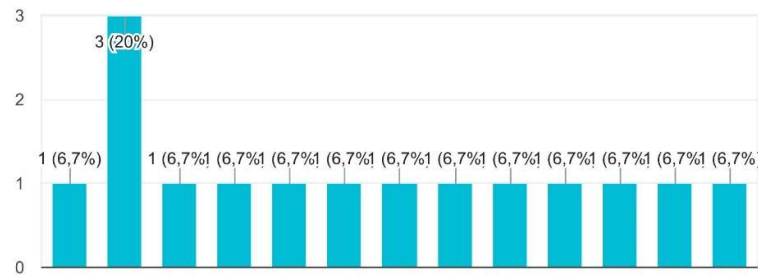
2a. I think that the study should focus on energy efficiency and postpone or ignore Demand Response functions in a future Smart Grid context with increased share of unpredictable PV/Wind in electricity production:

28 reacties



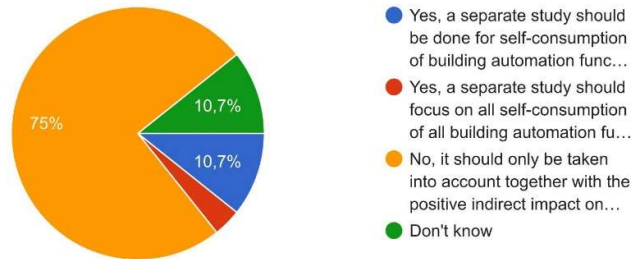
2b. Optional: motivation for the answer above

15 reacties



3a. I think that a separate study should focus on direct energy use or self-consumption:

28 reacties



3b.Optional: motivation for the answer above

11 reacties

BACS are saving energy in largest amount than their power consumption.

I'm in favor of not doing a study since the relation of non-EE related consumption to the savings shows 'no significance'

The consumption of BACS systems is a small fraction of the services it is controlling.

The goal must be to have as efficient use of the energy as possible in the building, regardless of the energy source

It does not affect lighting functionality.

Ignes considers that there is no need for a study concerning BACS under Ecodesign regulation. It should be reported to EPBD in which BACS are clearly defined. Indeed Ecodesign regulation applies to a product and BACS is a system not a stand alone product which objective is to increase the energy efficiency of a building. Therefore the study should be carried out under EPBD.

Under ecodesign, both direct and indirect energy consumption (and its environmental impacts) can be covered. So the study should investigate both. Prioritization should follow the potential impact.

BACS consumption is negligible. The huge amount of savings that can be achieved through BACS are indirect savings reached through the system, this should be the main focus of the study.

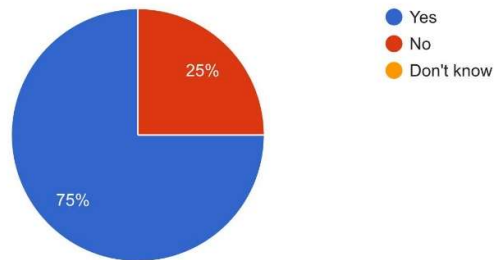
The proposals to choose from are not clear enough for us to decide. Yet, focusing on all building automation functions would require a much wider study. Also the objectives would need to be broadened. It might also require some tricky extrapolation regarding the potential impact on energy demand of non-energy related building automation functions.

For the moment, we believe that the study should be all-inclusive, to make sure that all possible scenarios and solutions are investigated. However, if - at the final stages of the study - measures are deemed necessary, it could be beneficial to make the distinction, as the routes to market are going to be quite different for different types of buildings, systems, and technologies.

BACS consumption is negligible. The huge amount of savings that can be achieved through BACS are indirect savings reached through the system, this should be the main focus of the study.

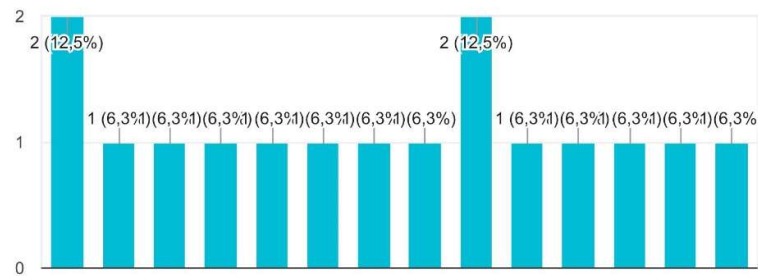
4a. I agree that building automation and control systems that are not energy related, such as fire alarms, access control, etc., can be left out of scope

28 reacties



4b.Optional: motivation for the answer above

16 reacties

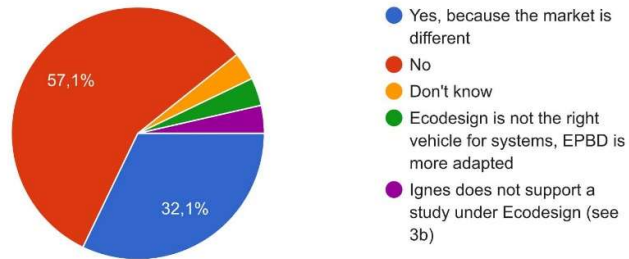


5a. I think we should split the study between residential and non-residential buildings:

<https://docs.google.com/forms/d/12SBY6jfvnmDdx5bupRSnPtYkZIZiVt6c9y4u4kfuNI4/viewanalytics>

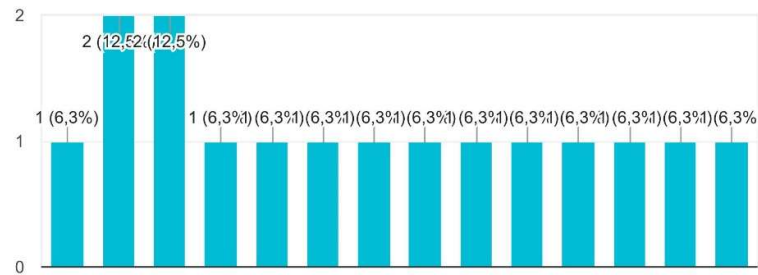
4/9

28 reacties



6b.Optional: motivation for the answer above

16 reacties



7a. I think we should split the study between large buildings (>1000 m²) and small buildings

28 reacties

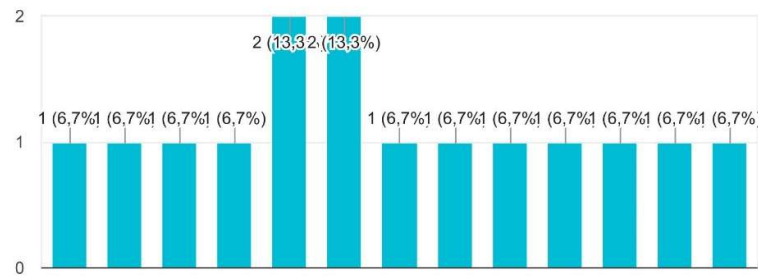
9-3-2018

Scoping questionnaire on the preparatory study for BACS



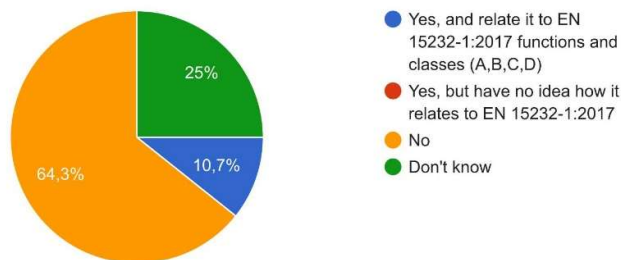
7b.Optional: motivation for the answer above

15 reacties



8. I can supply or contribute to examples of NZEB residential buildings with BACS that save energy

28 reacties

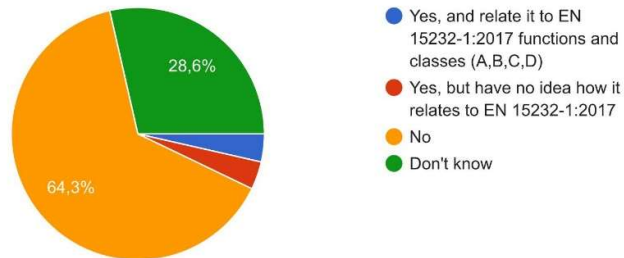


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6/9

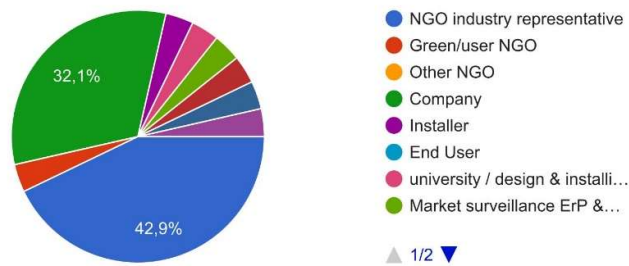
9. I can supply or contribute to examples of NZEB nonresidential buildings with BACS that save energy

28 reacties



10. Which stakeholder are you? (if other: please specify)

28 reacties



Optional: provide name, email and affiliation

22 reacties

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Geert De Cock, Regulatory Affairs Manager, EHI, association of the European Heating Industry

Optional: comments to the study team with regard to this questionnaire

6 reacties

LightingEurope is currently working with its members to find examples of NZEB, in the residential and non residential sectors, with BACS that save energy, as asked in questions 8 and 9.

Relationship to other regulations: Please follow recent developments in EPBD and in the ecodesign standby regulation, as well as findings from the preparatory study on smart appliances.
It may be worth to analyse how to increase the energy saving impact (indirect effect) both for residential and for non-residential BACS. BACS make energy consumption easy to understand so that users can take appropriate actions to reduce energy consumption: What information do users need? etc.
Please consider interoperability between BACS of different manufacturers: As a benefit, this would decrease installation costs for upgrades and increase material efficiency as not the complete BACS had to be changed if once proprietary spare parts may be unavailable.

We have submitted a more detailed response which tackles much of what is raised in this inquiry

For the questions 8 and 9 we need more time to give an appropriate answer. eu.bac reference list are acceptable? Dan Napar

General Statement about BACS:

BACS is a system which exists of sensors, actors, functions, services and interactions between different elements in the network.

When considering the scope of the study of BACS, we would also like to raise the issue in regards to the installation of BACS in existing residential multi-family buildings, when there are several apartment owners. When BACS should be applied in the common areas of the buildings, in what extend the consensus of the separate landlords will be required? In case of not agreement between them, how this will affect the functionality, comfort and safety of the building? Being aware that the comment is not quite relevant with the scope of the study, we do hope that the presented issue will be taken into account sometime in the next study of BACS.

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Annex E - List of potential PRODCOM codes for BACS

PRODCOM List 2013

The PRODCOM List is a list of products based on the Statistical classification of products by activity in the European Economic Community (the CPA) and linked with the Combined Nomenclature (the CN).

Code	Label
26.12.20.00	Network communications equipment (e.g. hubs, routers, gateways) for LANs and WANs and sound, video, network and similar cards for automatic data processing machines
26.20.13	Digital automatic data processing machines, comprising in the same housing at least a central processing unit and an input and an output unit, whether or not combined
26.20.14	Digital automatic data processing machines presented in the form of systems
26.20.14.00	Digital data processing machines: presented in the form of systems
26.20.15	Other digital automatic data processing machines, whether or not containing in the same housing one or two of the following types of units: storage units, input units, output units
26.20.15.00	Other digital automatic data processing machines whether or not containing in the same housing one or two of the following units: storage units, input/output units
26.20.16	Input or output units, whether or not containing storage units in the same housing
26.20.16.60	Other input or output units, whether or not containing storage units in the same housing
26.20.17	Monitors and projectors, principally used in an automatic data processing system
26.20.17.00	Monitors and projectors, principally used in an automatic data processing system
26.30.50.20	Electrical burglar or fire alarms and similar apparatus (excluding of a kind used for motor vehicles or buildings)
26.51.43.30	Electronic instruments and apparatus for measuring or checking voltage, current, resistance or electrical power, without recording device (excluding multimeters, and oscilloscopes and oscillographs)
26.51.43.55	Voltmeters
26.51.45.30	Instruments and apparatus, with a recording device, for measuring or checking electric gains (excluding gas, liquid or electricity supply or production meters)
26.51.45.55	Electronic instruments and apparatus, without a recording device, for measuring or checking electric gains (excluding gas, liquid or electricity supply or production meters)
26.51.51	Hydrometers, thermometers, pyrometers, barometers, hygrometers and psychrometers
26.51.51.35	Electronic thermometers and pyrometers, not combined with other instruments (excluding liquid filled)
26.51.52	Instruments for measuring or checking the flow, level, pressure or other variables of liquids and gases
26.51.52.35	Electronic flow meters (excluding supply meters, hydrometric paddle-wheels)

26.51.63.30	Gas supply or production meters (including calibrated)
26.51.63.50	Liquid supply or production meters (including calibrated) (excluding pumps)
26.51.63.70	Electricity supply or production meters (including calibrated) (excluding voltmeters, ammeters, wattmeters and the like)
26.51.65	Automatic regulating or controlling instruments and apparatus, hydraulic or pneumatic
26.51.65.00	Hydraulic or pneumatic automatic regulating or controlling instruments and apparatus
26.51.66.70	Other electronic instruments, appliances,... for measuring or checking
26.51.70.15	Electronic thermostats
26.51.70.19	Non-electronic thermostats
26.51.85.50	Parts and accessories for automatic regulating or controlling instruments and apparatus
26.52.14	Clocks with watch movements; alarm clocks and wall clocks; other clocks
26.52.14.00	Clocks with watch movements; alarm clocks and wall clocks; other clocks
26.52.28	Time registers, time recorders, parking meters; time switches with clock or watch movement
26.52.28.10	Time-registers and time-recorders
26.52.28.40	Time of day recording apparatus and apparatus for measuring, recording or otherwise indicating intervals of time, with clock or watch movement or with synchronous motor (excluding clocks of HS 9101 to 9105, time registers and time recorders)
27.12.24	Relays, for a voltage ≤ 1000 V
27.12.24.33	Relays for a voltage ≤ 60 V and for a current ≤ 2 A
27.12.24.35	Relays for a voltage ≤ 60 V and for a current > 2 A
27.12.24.50	Relays and contactors for a voltage > 60 V but ≤ 1 kV
27.12.31	Boards and other bases, equipped with electrical switching or protecting apparatus, for a voltage ≤ 1000 V
27.12.31.30	Numerical control panels with built-in automatic data-processing machine for a voltage ≤ 1 kV
27.12.31.50	Programmable memory controllers for a voltage ≤ 1 kV
27.12.31.70	Other bases for electric control, distribution of electricity, voltage ≤ 1000 V
27.12.32	Boards and other bases, equipped with electrical switching or protecting apparatus, for a voltage > 1000 V
27.12.32.03	Numerical control panels, 1000 V $<$ voltage $\leq 72,5$ kV
27.12.32.05	Numerical control panels, voltage $> 72,5$ kV
27.12.40	Parts of electricity distribution or control apparatus
27.12.40.30	Boards, panels, consoles, desks, cabinets and other bases for apparatus for electric control or the distribution of electricity (excluding those equipped with their apparatus)
27.40	Manufacture of electric lighting equipment
27.51.15	Fans and ventilating or recycling hoods of the domestic type
27.51.26	Electric space heating apparatus and electric soil heating apparatus
27.90.20	Indicator panels with liquid crystal devices or light-emitting diodes; electric sound or visual signalling apparatus
27.90.20.20	Indicator panels incorporating liquid crystal display (LCD)
27.90.20.50	Indicator panels incorporating light emitting diodes (LED)
27.90.20.80	Electrical apparatus for sound or visual signalling, n.e.c.
28.13.14	Other centrifugal pumps for liquids; other pumps
28.14.11	Pressure-reducing, control, check and safety valves
28.14.12.53	Central heating radiator thermostatic valves

28.14.12.55	Central heating radiator valves, other
28.14.13	Process control valves, gate valves, globe valves and other valves
28.21.11	Furnace burners; mechanical stokers and grates; mechanical ash dischargers and the like
28.25.12	Air conditioning machines
28.25.20	Fans, other than table, floor, wall, window, ceiling or roof fans
28.29.39.60	Levels

PRODCOM List 2013

The PRODCOM List is a list of products based on the Statistical classification of products by activity in the European Economic Community (the CPA) and linked with the Combined Nomenclature (the CN).

Code	Label
26.11	Manufacture of electronic components
26.12	Manufacture of loaded electronic boards
26.12.10	Loaded printed circuits
26.12.20	Sound, video, network and similar cards for automatic data processing machines
26.12.20.00	Network communications equipment (e.g. hubs, routers, gateways) for LANs and WANs and sound, video, network and similar cards for automatic data processing machines
26.12.30	Smart cards
26.20	Manufacture of computers and peripheral equipment
26.20.11	Portable automatic data processing machines weighing ≤ 10 kg, such as laptop and notebook computers; personal digital assistants and similar computers
26.20.11.00	Laptop PCs and palm-top organisers
26.20.12	Point-of-sale terminals, ATMs and similar machines capable of being connected to a data processing machine or network
26.20.12.00	Point-of-sale terminals, ATMs and similar machines capable of being connected to a data processing machine or network
26.20.13	Digital automatic data processing machines, comprising in the same housing at least a central processing unit and an input and an output unit, whether or not combined
26.20.13.00	Desk top PCs
26.20.14	Digital automatic data processing machines presented in the form of systems
26.20.14.00	Digital data processing machines: presented in the form of systems
26.20.15	Other digital automatic data processing machines, whether or not containing in the same housing one or two of the following types of units: storage units, input units, output units
26.20.15.00	Other digital automatic data processing machines whether or not containing in the same housing one or two of the following units: storage units, input/output units
26.20.16	Input or output units, whether or not containing storage units in the same housing
26.20.16.40	Printers, copying machines and facsimile machines, capable of connecting to an automatic data processing machine or to a network (excluding printing machinery used for printing by means of plates, cylinders and other components, and machines performing two or more of the functions of printing, copying or facsimile transmission)
26.20.16.50	Keyboards
26.20.16.60	Other input or output units, whether or not containing storage units in the same housing
26.20.17	Monitors and projectors, principally used in an automatic data processing system
26.20.17.00	Monitors and projectors, principally used in an automatic data processing system
26.20.18	Units performing two or more of the following functions: printing, scanning, copying, faxing

Code	Label
26.20.18.00	Machines which perform two or more of the functions of printing, copying or facsimile transmission, capable of connecting to an automatic data processing machine or to a network
26.20.21	Storage units
26.20.21.00	Storage units
26.20.22	Solid-state non-volatile storage devices
26.20.22.00	Solid-state, non-volatile data storage devices for recording data from an external source (flash memory cards or flash electronic storage cards), unrecorded
26.20.30	Other units of automatic data processing machines
26.20.30.00	Other units of automatic data processing machines (excluding network communications equipment (e.g. hubs, routers, gateways) for LANs and WANs and sound, video, network and similar cards for automatic data processing machines)
26.20.40	Parts and accessories of computing machines
26.20.40.00	Parts and accessories of the machines of HS 8471; parts and accessories equally suitable for use with machines of two or more of HS 8469 to 8472
26.30	Manufacture of communication equipment
26.30.11	Transmission apparatus incorporating reception apparatus
26.30.11.00	Transmission apparatus for radio-broadcasting and television, with reception apparatus
26.30.12	Transmission apparatus not incorporating reception apparatus
26.30.12.00	Transmission apparatus for radio-broadcasting and television, without reception apparatus
26.30.13	Television cameras
26.30.21	Line telephone sets with cordless handsets
26.30.22	Telephones for cellular networks or for other wireless networks
26.30.22.00	Telephones for cellular networks or for other wireless networks
26.30.23	Other telephone sets and apparatus for transmission or reception of voice, images or other data, including apparatus for communication in a wired or wireless network (such as a local or wide area network)
26.30.30	Parts of electrical telephonic or telegraphic apparatus
26.30.40	Aerials and aerial reflectors of all kind and parts thereof; parts of radio and television transmission apparatus and television cameras
26.30.50	Burglar or fire alarms and similar apparatus
26.30.50.20	Electrical burglar or fire alarms and similar apparatus (excluding of a kind used for motor vehicles or buildings)
26.30.50.80	Electric burglar or fire alarms and similar apparatus for buildings
26.40	Manufacture of consumer electronics
26.40.11	Radio broadcast receivers (except for cars), capable of operating without an external source of power
26.40.12	Radio broadcast receivers not capable of operating without an external source of power
26.40.20	Television receivers, whether or not combined with radio-broadcast receivers or sound or video recording or reproduction apparatus
26.40.31	Turntables, record-players, cassette-players and other sound-reproducing apparatus
26.40.32	Magnetic tape recorders and other sound recording apparatus
26.40.33	Video camera recorders and other video recording or reproducing apparatus
26.40.34	Monitors and projectors, not incorporating television reception apparatus and not principally used in an automatic data processing system
26.40.41	Microphones and stands thereof
26.40.42	Loudspeakers; headphones, earphones and combined microphone/speaker sets
26.40.43	Audio-frequency electric amplifiers; electric sound amplifier sets
26.40.44	Reception apparatus for radio-telephony or radio-telegraphy n.e.c.

Code	Label
26.40.51	Parts and accessories of sound and video equipment
26.40.52	Parts of radio receivers and transmitters
26.40.60	Video game consoles (used with a television receiver or having a self-contained screen) and other games of skill or chance with an electronic display
26.51	Manufacture of instruments and appliances for measuring, testing and navigation
26.51.11	Direction-finding compasses; other navigational instruments and appliances
26.51.12	Rangefinders, theodolites and tachymetres (tachometers); other surveying, hydrographic, oceanographic, hydrological, meteorological or geophysical instruments and appliances
26.51.20	Radar apparatus and radio navigational aid apparatus
26.51.31	Balances of a sensitivity of 5 cg or better
26.51.32	Drafting tables and machines and other drawing, marking-out or mathematical calculating instruments
26.51.33	Instruments for measuring length, for use in the hand (including micrometers and callipers) n.e.c.
26.51.41	Instruments and apparatus for measuring or detecting ionising radiations
26.51.42	Cathode-ray oscilloscopes and cathode-ray oscillographs
26.51.43	Instruments for measuring electrical quantities without a recording device
26.51.43.10	Multimeters
26.51.43.30	Electronic instruments and apparatus for measuring or checking voltage, current, resistance or electrical power, without recording device (excluding multimeters, and oscilloscopes and oscillographs)
26.51.43.55	Voltmeters
26.51.43.59	Non-electronic instruments and apparatus, for measuring or checking voltage, current, resistance or power, without a recording device (excluding multimeters, voltmeters)
26.51.44	Instruments and apparatus for telecommunications
26.51.45	Instruments and apparatus for measuring or checking electrical quantities n.e.c.
26.51.45.20	Instruments and apparatus for measuring or checking semiconductor wafers or devices
26.51.45.30	Instruments and apparatus, with a recording device, for measuring or checking electric gains (excluding gas, liquid or electricity supply or production meters)
26.51.45.55	Electronic instruments and apparatus, without a recording device, for measuring or checking electric gains (excluding gas, liquid or electricity supply or production meters)
26.51.45.59	Non-electronic instruments and apparatus, without a recording device, for measuring or checking electrical gains (excluding multimeters, voltmeters)
26.51.51	Hydrometers, thermometers, pyrometers, barometers, hygrometers and psychrometers
26.51.51.10	Thermometers, liquid-filled, for direct reading, not combined with other instruments (excluding clinical or veterinary thermometers)
26.51.51.35	Electronic thermometers and pyrometers, not combined with other instruments (excluding liquid filled)
26.51.51.39	Thermometers, not combined with other instruments and not liquid filled, n.e.c.
26.51.51.50	Barometers, not combined with other instruments (including barometric altimeters, sympiesometers)
26.51.51.75	Electronic hydrometers, hygrometers and psychrometers
26.51.51.79	Non-electronic hydro-, hygro-, psychrometers (including hygrographs, thermo-hygrographs, baro-thermo-hygrographs, actinometers, pagoscopes; excluding radio-sondes for atmospheric soundings)
26.51.52	Instruments for measuring or checking the flow, level, pressure or other variables of liquids and gases

Code	Label
26.51.52.35	Electronic flow meters (excluding supply meters, hydrometric paddle-wheels)
26.51.52.39	Electronic instruments and apparatus for measuring or checking the level of liquids
26.51.52.55	Non-electronic flow meters (excluding supply meters, hydrometric paddle-wheels)
26.51.52.59	Non-electronic instruments and apparatus for measuring or checking the level of liquids
26.51.52.71	Electronic pressure gauges, sensors, indicators and transmitters
26.51.52.74	Non-electronic spiral or metal diaphragm type pressure gauges
26.51.52.79	Other instruments for measuring or checking pressure: others
26.51.52.83	Electronic instruments and apparatus for measuring variables of liquids/gases (including heat meters; excluding for measuring pressure/flow/level of liquids)
26.51.52.89	Non-electronic instruments for measuring or checking variables of liquids or gases (including heat meters; excluding for measuring or checking pressure/flow/level of liquids)
26.51.53	Instruments and apparatus for physical or chemical analysis n.e.c.
26.51.61	Microscopes (except optical microscopes) and diffraction apparatus
26.51.62	Machines and appliances for testing the mechanical properties of materials
26.51.63	Gas, liquid or electricity supply or production meters
26.51.63.30	Gas supply or production meters (including calibrated)
26.51.63.50	Liquid supply or production meters (including calibrated) (excluding pumps)
26.51.63.70	Electricity supply or production meters (including calibrated) (excluding voltmeters, ammeters, wattmeters and the like)
26.51.64	Revolution and production counters, taximeters; speed indicators and tachometers; stroboscopes
26.51.65	Automatic regulating or controlling instruments and apparatus, hydraulic or pneumatic
26.51.65.00	Hydraulic or pneumatic automatic regulating or controlling instruments and apparatus
26.51.66	Measuring or checking instruments, appliances and machines n.e.c.
26.51.66.20	Test benches
26.51.66.30	Optical instruments, appliances and machines for measuring or checking, n.e.c. in HS 90
26.51.66.50	Electronic instruments, appliances and machines for measuring or checking geometrical quantities (including comparators, coordinate measuring machines (CMMs))
26.51.66.70	Other electronic instruments, appliances,... for measuring or checking
26.51.66.83	Other instruments, appliances,... for measuring or checking geometrical quantities
26.51.66.89	Non-electronic measuring machines and instruments (excluding test benches, optical instruments and appliances as well as machines and instruments for balancing mechanical parts or for measuring or checking geometrical quantities)
26.51.70	Thermostats, manostats and other automatic regulating or controlling instruments and apparatus
26.51.70.15	Electronic thermostats
26.51.70.19	Non-electronic thermostats
26.51.70.30	Manostats
26.51.70.90	Instruments and apparatus, regulating or controlling, n.e.c.
26.51.81	Parts of radar apparatus and radio navigational aid apparatus
26.51.82	Parts and accessories for the goods of 26.51.12, 26.51.32, 26.51.33, 26.51.4 and 26.51.5; microtomes; parts n.e.c.
26.51.83	Parts and accessories of microscopes (other than optical) and of diffraction apparatus
26.51.84	Parts and accessories for the goods of 26.51.63 and 26.51.64
26.51.85	Parts and accessories of instruments and apparatus of 26.51.65, 26.51.66 and 26.51.70

Code	Label
26.51.85.20	Parts and accessories of instruments, appliances and machines of HS 9031
26.51.85.50	Parts and accessories for automatic regulating or controlling instruments and apparatus
26.51.86	Parts and accessories of instruments and apparatus of 26.51.11 and 26.51.62
26.52	Manufacture of watches and clocks
26.52.11	Wrist watches, pocket watches, with case of precious metal or of metal clad with precious metal
26.52.12	Other wrist watches, pocket watches and other watches, including stop watches
26.52.13	Instrument panel clocks and clocks of a similar type for vehicles
26.52.14	Clocks with watch movements; alarm clocks and wall clocks; other clocks
26.52.14.00	Clocks with watch movements; alarm clocks and wall clocks; other clocks
26.52.21	Watch movements, complete and assembled
26.52.22	Clock movements, complete and assembled
26.52.23	Complete watch movements, unassembled or partly assembled; incomplete watch movements, assembled
26.52.24	Rough watch movements
26.52.25	Complete, incomplete and rough clock movements, unassembled
26.52.26	Watch and clock cases and parts thereof
26.52.27	Other clock and watch parts
26.52.28	Time registers, time recorders, parking meters; time switches with clock or watch movement
26.52.28.10	Time-registers and time-recorders
26.52.28.40	Time of day recording apparatus and apparatus for measuring, recording or otherwise indicating intervals of time, with clock or watch movement or with synchronous motor (excluding clocks of HS 9101 to 9105, time registers and time recorders)
26.52.28.70	Time switches, with clock or watch movement or with synchronous motor (including switches for making and breaking the circuit supplying electrical apparatus)
26.60	Manufacture of irradiation, electromedical and electrotherapeutic equipment
26.70	Manufacture of optical instruments and photographic equipment
26.80	Manufacture of magnetic and optical media
27.11	Manufacture of electric motors, generators and transformers
27.12	Manufacture of electricity distribution and control apparatus
27.12.10	Electrical apparatus for switching or protecting electrical circuits, for a voltage > 1000 V
27.12.21	Fuses, for a voltage ≤ 1000 V
27.12.22	Automatic circuit breakers, for a voltage ≤ 1000 V
27.12.23	Apparatus for protecting electrical circuits n.e.c., for a voltage ≤ 1000 V
27.12.24	Relays, for a voltage ≤ 1000 V
27.12.24.33	Relays for a voltage ≤ 60 V and for a current ≤ 2 A
27.12.24.35	Relays for a voltage ≤ 60 V and for a current > 2 A
27.12.24.50	Relays and contactors for a voltage > 60 V but ≤ 1 kV
27.12.31	Boards and other bases, equipped with electrical switching or protecting apparatus, for a voltage ≤ 1000 V
27.12.31.30	Numerical control panels with built-in automatic data-processing machine for a voltage ≤ 1 kV
27.12.31.50	Programmable memory controllers for a voltage ≤ 1 kV
27.12.31.70	Other bases for electric control, distribution of electricity, voltage ≤ 1 000 V
27.12.32	Boards and other bases, equipped with electrical switching or protecting apparatus, for a voltage > 1000V
27.12.32.03	Numerical control panels, 1 000 V < voltage ≤ 72,5 kV
27.12.32.05	Numerical control panels, voltage > 72,5 kV
27.12.40	Parts of electricity distribution or control apparatus

Code	Label
27.12.40.30	Boards, panels, consoles, desks, cabinets and other bases for apparatus for electric control or the distribution of electricity (excluding those equipped with their apparatus)
27.12.40.90	Other parts of apparatus of 8535, 8536, 8537
27.20	Manufacture of batteries and accumulators
27.31	Manufacture of fibre optic cables
27.32	Manufacture of other electronic and electric wires and cables
27.33	Manufacture of wiring devices
27.40	Manufacture of electric lighting equipment
27.51	Manufacture of electric domestic appliances
27.51.11	Refrigerators and freezers, of the household type
27.51.12	Dish washing machines, of the household type
27.51.13	Cloth washing and drying machines, of the household type
27.51.14	Electric blankets
27.51.15	Fans and ventilating or recycling hoods of the domestic type
27.51.15.30	Table, floor, wall, window, ceiling or roof fans, with a self-contained electric motor of an output ≤ 125 W
27.51.15.80	Ventilating or recycling hoods incorporating a fan, with a maximum horizontal side ≤ 120 cm
27.51.21	Electro-mechanical domestic appliances, with self-contained electric motor
27.51.22	Shavers, hair-removing appliances and hair clippers, with self-contained electric motor
27.51.23	Electro-thermic hair-dressing or hand-drying apparatus; electric smoothing irons
27.51.24	Other electro-thermic appliances
27.51.25	Electrical instantaneous or storage water heaters and immersion heaters
27.51.25.30	Electric instantaneous water heaters
27.51.25.60	Electric water heaters and immersion heaters (excluding instantaneous water heaters)
27.51.26	Electric space heating apparatus and electric soil heating apparatus
27.51.26.30	Electric storage heating radiators
27.51.26.50	Electric radiators, convection heaters and heaters or fires with built-in fans
27.51.26.90	Other electric space heaters
27.51.27	Microwave ovens
27.51.28	Other ovens; cookers, cooking plates, boiling rings; grillers, roasters
27.51.29	Electric heating resistors
27.51.30	Parts of electric domestic appliances
27.52	Manufacture of non-electric domestic appliances
27.90	Manufacture of other electrical equipment
27.90.11	Electrical machines and apparatus having individual functions
27.90.12	Electrical insulators; insulating fittings for electrical machines or equipment; electrical conduit tubing
27.90.13	Carbon electrodes and other articles of graphite or other carbon for electrical purposes
27.90.20	Indicator panels with liquid crystal devices or light-emitting diodes; electric sound or visual signalling apparatus
27.90.20.20	Indicator panels incorporating liquid crystal display (LCD)
27.90.20.50	Indicator panels incorporating light emitting diodes (LED)
27.90.20.80	Electrical apparatus for sound or visual signalling, n.e.c.
27.90.31	Electrical machinery and apparatus for soldering, brazing or welding; electric machines and apparatus for hot spraying of metals or sintered metal carbides
27.90.32	Parts of electrical machinery and apparatus for soldering, brazing or welding; electric machines and apparatus for hot spraying of metals or sintered metal carbides

Code	Label
27.90.33	Parts of other electrical equipment; electrical parts of machinery or apparatus n.e.c.
27.90.40	Other electrical equipment n.e.c. (including electro-magnets; electro-magnetic couplings and brakes; electro-magnetic lifting heads; electrical particle accelerators; electrical signal generators)
27.90.51	Fixed capacitors for 50/60 Hz circuits having a reactive power handling capacity $\geq 0,5$ kvar
27.90.52	Other fixed capacitors
27.90.53	Variable or adjustable (pre-set) capacitors
27.90.60	Electrical resistors, except heating resistors
27.90.70	Electrical signalling, safety or traffic control equipment for railways, tramways, roads, inland waterways, parking facilities, port installations or airfields
27.90.81	Parts of electrical capacitors
27.90.82	Parts of electrical resistors, rheostats and potentiometers
28.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
28.12	Manufacture of fluid power equipment
28.13	Manufacture of other pumps and compressors
28.13.11	Pumps for fuel, lubricants, cooling-medium and concrete
28.13.12	Other reciprocating positive displacement pumps for liquids
28.13.13	Other rotary positive displacement pumps for liquids
28.13.14	Other centrifugal pumps for liquids; other pumps
28.13.14.13	Submersible motor, single-stage rotodynamic drainage and sewage pumps
28.13.14.15	Submersible motor, multi-stage rotodynamic pumps
28.13.14.17	Glandless impeller pumps for heating systems and warm water supply
28.13.14.20	Rotodynamic pumps ≤ 15 mm discharge
28.13.14.30	Centrifugal pumps with a discharge outlet diameter > 15 mm, channel impeller pumps, side channel pumps, peripheral pumps and regenerative pumps
28.13.14.51	Centrifugal pumps with a discharge outlet diameter > 15 mm, single-stage with a single entry impeller, close coupled
28.13.14.53	Centrifugal pumps with a discharge outlet diameter > 15 mm, single stage with a single entry impeller, long coupled
28.13.14.55	Centrifugal pumps with a discharge outlet diameter > 15 mm, single-stage with double entry impeller
28.13.14.60	Centrifugal pumps with a discharge outlet diameter > 15 mm, multi-stage (including self-priming)
28.13.14.71	Rotodynamic single-stage mixed flow or axial pumps
28.13.14.75	Rotodynamic multi-stage mixed flow or axial pumps
28.13.14.80	Other liquid pumps, liquid elevators
28.13.21	Vacuum pumps
28.13.22	Hand or foot-operated air pumps
28.13.23	Compressors for refrigeration equipment
28.13.24	Air compressors mounted on a wheeled chassis for towing
28.13.25	Turbo-compressors
28.13.26	Reciprocating displacement compressors
28.13.27	Rotary displacement compressors, single-shaft or multi-shaft
28.13.28	Other compressors
28.13.31	Parts of pumps; parts of liquid elevators
28.13.32	Parts of air or vacuum pumps, of air or gas compressors, of fans, of hoods
28.14	Manufacture of other taps and valves
28.14.11	Pressure-reducing, control, check and safety valves
28.14.11.20	Pressure-reducing valves of cast iron or steel, for pipes, boiler shells, tanks, vats and the like (excluding those combined with lubricators or filters)
28.14.11.40	Pressure-reducing valves for pipes, boiler shells, tanks, vats and the like (excluding of cast iron or steel, those combined with filters or lubricators)

Code	Label
28.14.11.60	Check valves for pipes, boiler shells, tanks, vats and the like
28.14.11.70	Valves for pneumatic tyres and inner-tubes
28.14.11.80	Safety or relief valves for pipes, boiler shells, tanks, vats and the like
28.14.12	Taps, cocks, valves for sinks, wash basins, bidets, water cisterns bath and similar fixtures; central heating radiator valves
28.14.12.33	Mixing valves for sinks, wash basins, bidets, water cisterns etc. excluding valves for pressure-reducing or oleohydraulic/pneumatic power transmissions, check valves, safety/relief valves
28.14.12.35	Taps, cocks and valves for sinks, wash basins, bidets, water cisterns etc. excluding valves for pressure-reducing/oleohydraulic transmissions, check, safety, relief and mixing valves
28.14.12.53	Central heating radiator thermostatic valves
28.14.12.55	Central heating radiator valves, other
28.14.13	Process control valves, gate valves, globe valves and other valves
28.14.13.13	Other process control valves, temperature regulators
28.14.13.15	Process control valves for pipes, boiler shells, tanks etc. excluding valves for pressure-reducing or oleohydraulic/pneumatic power transmissions, check, safety/relief valves, temp. regulators
28.14.13.33	Other gate valves, of cast iron
28.14.13.35	Other gate valves, of steel
28.14.13.37	Other gate valves, other
28.14.13.53	Globe valves, of cast iron
28.14.13.55	Globe valves, of steel
28.14.13.57	Other globe valves
28.14.13.73	Ball and plug valves
28.14.13.75	Butterfly valves
28.14.13.77	Diaphragm valves
28.14.13.80	Other appliances
28.14.20	Parts of taps and valves and similar articles
28.15	Manufacture of bearings, gears, gearing and driving elements
28.21	Manufacture of ovens, furnaces and furnace burners
28.21.11	Furnace burners; mechanical stokers and grates; mechanical ash dischargers and the like
28.21.12	Industrial or laboratory furnaces and ovens, non-electric, including incinerators, but excluding bakery ovens
28.21.13	Industrial or laboratory electric furnaces and ovens; induction or dielectric heating equipment
28.21.14	Parts of furnace burners, furnaces and ovens
28.22	Manufacture of lifting and handling equipment
28.23	Manufacture of office machinery and equipment (except computers and peripheral equipment)
28.24	Manufacture of power-driven hand tools
28.25	Manufacture of non-domestic cooling and ventilation equipment
28.25.11	Heat exchange units and machinery for liquefying air or other gases
28.25.12	Air conditioning machines
28.25.12.20	Window or wall air conditioning systems, self-contained or split-systems
28.25.12.40	Air conditioning machines of a kind used in motor vehicles
28.25.12.50	Air conditioning machines with refrigeration unit (excluding those used in motor vehicles, self-contained or split-systems machines)
28.25.12.70	Air conditioning machines not containing a refrigeration unit; central station air handling units; vav boxes and terminals, constant volume units and fan coil units
28.25.13	Refrigeration and freezing equipment and heat pumps, except household type equipment
28.25.14	Machinery and apparatus for filtering or purifying gases n.e.c.

Code	Label
28.25.20	Fans, other than table, floor, wall, window, ceiling or roof fans
28.25.20.30	Axial fans (excluding table, floor, wall, window, ceiling or roof fans with a self-contained electric motor of an output ≤ 125 W)
28.25.20.50	Centrifugal fans (excluding table, floor, wall, window, ceiling or roof fans with a self-contained electric motor of an output ≤ 125 W)
28.25.20.70	Fans (excluding table, floor, wall, ceiling or roof fans with a self-contained electric motor of an output ≤ 125 W, axial fans, centrifugal fans)
28.25.30	Parts of refrigeration and freezing equipment and heat pumps
28.29	Manufacture of other general-purpose machinery n.e.c.
28.29.11	Producer gas or water gas generators; acetylene gas generators and the like; distilling or rectifying plant
28.29.12	Filtering or purifying machinery and apparatus, for liquid
28.29.13	Oil filters, petrol filters and intake air filters for internal combustion engines
28.29.21	Machinery for cleaning, filling, packing or wrapping bottles or other containers
28.29.22	Fire extinguishers, spray guns, steam or sand blasting machines and similar mechanical appliances, except for use in agriculture
28.29.23	Gaskets of metal sheeting; mechanical seals
28.29.31	Weighing machines for industrial purposes; scales for continuous weighing of goods on conveyors; constant weight scales and scales for discharging a predetermined weight
28.29.32	Personal and household weighing machines and scales
28.29.39	Other weighing and measuring machinery
28.29.39.10	Automatic catchweighing machines and checkweighers, of a maximum weighing capacity $\leq 5\,000$ kg
28.29.39.30	Weigh/price labelling machines, weighbridges and other weighing machinery (excluding shop-scales, personal and household scales, scales for continuous weighing of goods on conveyors, constant weight scales and balances of a sensitivity ≤ 5 cg)
28.29.39.50	Non-automatic retail weighing machines, maximum weighing capacity ≤ 30 kg
28.29.39.60	Levels
28.29.39.75	Measuring rods and tapes and divided scales
28.29.39.79	Other measuring instruments, for use in the hand, others
28.29.41	Centrifuges n.e.c.
28.29.42	Calendaring or other rolling machines, excluding metal or glass
28.29.43	Automatic goods-vending machines
28.29.50	Dish washing machines, of the industrial type
28.29.60	Machinery n.e.c. for the treatment of materials by a process involving a change of temperature
28.29.70	Non-electrical machinery and apparatus for soldering, brazing or welding and parts thereof; gas-operated surface tempering machines and appliances
28.29.81	Parts of gas or water gas generators
28.29.82	Parts of centrifuges; parts of filtering or purifying machinery and apparatus for liquids or gases
28.29.83	Parts of calendaring or other rolling machines; parts of spraying machinery, weights for weighing machines
28.29.84	Machinery parts, not containing electrical connectors n.e.c.
28.29.85	Parts of dish washing machines and machines for cleaning, filling, packing or wrapping
28.29.86	Parts of non-electrical machinery and apparatus for soldering, brazing or welding; gas-operated surface tempering machines and appliances

Annex F - Stakeholder position papers EU.BAC

eu.bac suggestions on Ecodesign Study on BACS

Focus on “Functional approach”

1. INTRODUCTION

a. General role of BACS

The role of BACS in a building is to maintain the desired comfort, health and productivity level for the occupants while using the minimum amount of energy and with minimum CO₂ gas emission. Furthermore, BACS enable electrical vehicle charging and provide “flexibility” in electrical loads either to optimize the use of own generated energy or driving the operation towards another parameter (e.g. minimizing cost) while maintaining above mentioned comfort parameters (so called “smart controls”). BACS also manage communication with e.g. the grid and exchange information on pricing, demand information and estimations of those parameters according to the actual contract with the supplier or e.g. aggregator.

What are the major functional elements of a BACS?

a) Automation / digitalization

Automation and digitalization means that equipment / “things” that are connected to the BACS (digitalization) are either scheduled (e.g. switched depending on time) or switched depending on conditions (digitalized information of condition and status of e.g. environmental parameters (e.g. brightness, temperature))

b) Control tasks

One of the major elements of a BACS is the “control loop” with feedback, using control functions or algorithms or model based predictive controls (MPC). From this angle, BACS are independent from the type of energy used and from the type of the building where it is installed. This means also that BACS are already in a position to handle renewable energy, in order to obtain the above goals. The basis of the control loop is to keep the set point of the process-controlled loop for the physical variables of the building (all types –temperature, humidity, CO₂, pressure, flows, etc....). Examples of the performance of the control loop (Control Accuracy) and further energy-performance relevant control characteristics are described in several standards (EN15500-1, EN 15316-2,...). Using the control loop as basis, we described in our standards (EN 15232-1, EN 16947-1, ISO EN 16484-x...) the BACS functions. Based in functions we described our strategies and optimizations.

c) **Monitoring and reporting**

When a building with its technical building systems is used, a number of parameters need to be monitored and reported in order to keep them in their optimal positions and supervised e.g. state of filters while operated. Another aspect is the predicted maintenance schedule for things that need maintenance e.g. depending on “use time”.

d) **Demand/response applications**

Buildings that have access to their own energy generation and/or different energy sources / storage shall be optimized against each other and/or signals from the grid (e.g. dynamic price / CO₂ footprint). BACS can forecast required energy sources in advance of the next “in use time” of the building together with own generation, signals and storage charge situation. This automation together with new algorithms enables to include not only the comfort requirements but as well include signals from the entire energy systems (e.g. grid).

b. Selection, categorization and performance assessment of functions

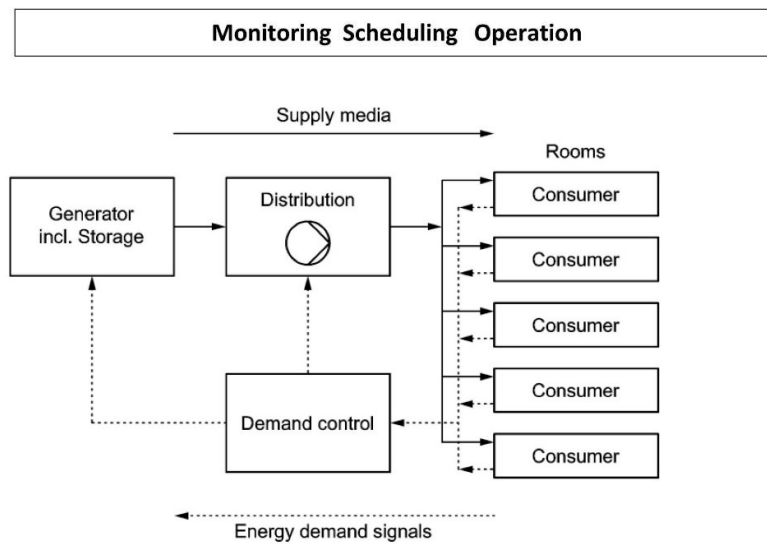
It is suggested to scope the preparatory study with a functional approach, using those BACS functions that are most relevant for the energy efficiency of a building. An appropriate starting point for defining the scope is EN15232, as it provides a suitable structure for function description, together with a first indication of the “spread” of the level of sophistication with which functions can be provided. In general, these descriptions will not be sufficient for the purposes of eco-design and energy labelling. Suitable expressions, e.g. for the energy efficiency index, need to be developed in subsequent stages of the preparatory work.

The following table contains a selection of the most relevant functions for energy efficiency: functions related to control of space heating, domestic hot water, cooling, ventilation and lighting. These functions are clustered into functional spaces; generation, distribution, emission of energy for hydronic efficiency, monitoring and scheduling.

In EN15232 the functions are categorized in terms of their level of sophistication. These levels are binary “yes/no”. The set of functions and definitions provided by EN15232 is not exhaustive, however. Furthermore, for some functions the “quality” of function performance is essential, e.g. “control accuracy” used e.g. in EN15316-2 and EN15500. Hence the approach of EN15232 can be used to structure and guide tasks 1-7 within a functional approach. But it needs to be reviewed and complemented in the subsequent steps of the preparatory study.

2. FUNCTIONAL SPACES AND FUNCTION ASSIGNMENTS (based on EN 15232)

a. Functional spaces (grouping of functions in “spaces”)



The relevant functions (mainly addressed in EN 15232) are grouped among the spaces indicated in the above figure (Generation, distribution, emission and Monitoring/Scheduling/Operation).

b. Relevant control functions evaluated

- Minimum: Defines Current approach
 - Maximum: “Best practice”
- Functions are mostly equipment-independent, subsets of functions apply to hydronic, refrigerant, air, direct electric heating/cooling systems

Product Group	Function	Minimum Level for purposes of EN15232	Maximum Level for purposes of EN15232	CA***
Emission				
	1.1	1	4	yes
	3.1	1	4	yes
	4.1	0	2	
	4.2	0	2	yes
	4.3	0	1	
	5.1	0	3	
	6.1	0	3	
Distribution				
	1.3	0	2	yes
	1.4	1, 2*	3, 4	yes
	3.5	1	3, 4	
	3.6	0	2	
Generation				
	1.6	0	2	
	1.7	0	2	
	4.5	1	4	
	4.8	1	3	
	4.9	1	3	
Hydronic efficiency				
	EN15316-2**	Non (0.6 K)	Dynamic (0.0 K)	
DHW				
	2.4	0	1	
Monitoring Scheduling Operation				
	7.1	0	3	
	7.2	0	2	
	7.3	0	2	
	7.4	0	2	

*) Ecodesign regulations for pumps?

**) EN15316-2 considers impacts partially only

***) CA = Control Accuracy

3. FUNCTIONAL UNIT AND ENERGY EFFICIENCY INDEX

Definition of the functional unit and energy efficiency index applying to products needs to be guided by:

- the functions
- typical products placed on the market, providing certain sets of functions with a certain energy performance quality, for typical typologies of heating/cooling/ventilation systems.

a. Energy efficiency index

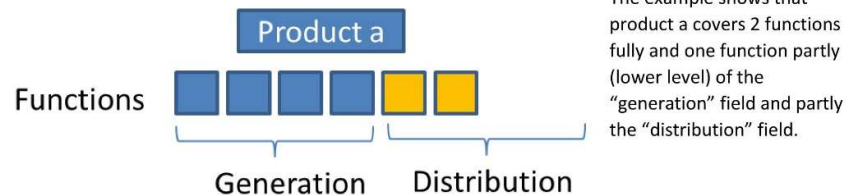
The basic formula looks like without setting detail parameters and unit. The result – EEI (Energy Efficiency Index) – looks like:

$EEI = f(1.1, level, CA) \dots$

This means that the EEI will describe the performance of function fields for suitably chosen configurations – e.g. typical products – and suitable chosen units (e.g. dimensionless).

b. Mapping of the approach to “real” products

BACS-products from market – respectively their functions stand alone or in a system – can be characterized by the provided functions falling into the functional spaces.



In another case where a product contains functions not modeled in the 4 spaces those functions would not be taken into account in the EEI calculation.

c. Using BACS EEIs/labels in the EPBD (2018-version) MS implementation

The new buildings directive requires BACS to be implemented / used for specific purposes (e.g. §8, system performance requirements for technical building systems including their control with new provisions for compliance documentation; Art 14/15 mandatory BACS for non-residential buildings >290 kW delivered energy; electronic monitoring and effective controls for residential buildings as alternative to inspections for heating/airco output > 70 kW). Mapping of relevant functionalities into harmonized labelling instruments can facilitate their implementation, while reducing market fragmentation. Appropriately formulated EEIs can be used to set e.g. a minimum “number” that would need to be achieved (e.g. for “Emission” the EEI shall be $\geq x$ for a certain situation such as building and/or heat/cool emission type).

The MS-legislation on buildings can then base their formulation on the Ecodesign definition. This means for the industry – and the customers – a transparent minimum definition throughout the community.

Annex G - Stakeholder position papers EHI

EHI replies to questions on Lot 38 BACS scoping study

1. Definition of the product group(s) and system boundaries with options for scoping a full preparatory study.

The website, accompanying the scoping study, clearly states that BACS “cover a wide range of heterogeneous products for which the significant energy saving potential is due to their interaction with other products/systems”.

EHI understands that BACS within the scope of Lot 38 are being dealt with as ‘products’. This means that BACS are supposed to be rated and labelled for the moment of placing a BACS on the market. The installation and operational aspects would rather be part of the building performance.

EHI: BACS rating only for the product as it is being placed on the market

2. Links with other policy instruments.

A BACS typically builds a control loop which has to be assessed in its entirety. Many of the control loops are applications in the field of heating or cooling. These applications are already being assessed as part of other Ecodesign Lots, e.g. Lot 1 for space heating and Lot 2 for water heaters. In these Ecodesign Lots, requirements for controls are already included. To avoid double regulation – with different requirements – for the products, there should be no additional rating applied under Ecodesign Lot 38 for e.g. functions of controls that are already rated under Lot 1 and 2.

EHI: Keep controls that are assessed as part of an ErP application out of scope for BACS

3. BACS in relation to different buildings

A BACS is designed to perform a certain control function. The functional requirement may be almost identical for residential or commercial buildings. On a product level, it may not be possible to determine whether the control will go into a residential or a commercial building. Looking at product-related energy efficiency factors, when the product is being placed on the market, introducing different ratings (labels) may be possible by differentiating between different building sizes (e.g. using the building floor space as a proxy). This would lead to a separate label for each class of building size.

EHI: BACS as a product are not related to a certain building type. However, the same BACS products that go into different buildings can still be covered by different labels (e.g. differentiated on the basis of floor space).

4. BACS and Smart Appliances

In Lot 33, smart appliances are being studied to determine their contribution to get the electric power supply balanced. This approach is also aiming at the smart appliance as a product which receives signals and responds with certain flexibility. Signal transmission and the response of the appliance are evaluated at the level of the product. A BACS may be used to relay signals and to process them before addressing individual smart appliances. In this kind of application, a BACS becomes an information broker between different smart appliances, whose smartness is already evaluated under Lot 33 smart appliances.

EHI: Demand flexibility of smart appliances is a product-related feature of the appliances and is already evaluated under Lot 33.

5. BACS linking different domains

The key benefit of a BACS is to optimize performance between technical building domains, which are related and may influence each other, e.g. heating, cooling, ventilation, shading, presence detection etc. However, which of these domains are getting connected via BACS and what the individual contributions are and how much of the energy saving can actually be attributed to the BACS is certainly difficult to determine. BACS are placed on the market, not knowing how they will be used. This is where the study will have to find a suitable approach.

EHI: The focus of the Ecodesign Lot 38 study on BACS should be on how BACS can manage the interplay of all relevant above-mentioned (sub-) systems inside a building.

6. Identifying the areas where the MEERP might need deviations, including producing proposals for alternative approaches that follow the MEERP as closely as possible, e.g. how & where the MEERP needs to be adapted for this product group.

The usual Task 2 'markets statistics' in the MEERP will encounter the difficulty to provide reliable estimates on the volumes of BACS for the purpose of this study. Controls that are integrated heating and cooling appliances account for ~90% of the market. Most heating manufacturers produce their own heating controls or collaborate with OEM suppliers. The remaining 10% of the market concern BACS that are sold separately. Given the relatively small share of BACS in the overall heating market, EHI is unable to provide estimates on the volumes of BACS sold.

7. Delivering an overview of suitable policy options in light of the Ecodesign Directive, but also in view of the complementarity with the work on the EPBD, smartness indicator and smart appliances (i.e. demand side flexibility from BACS).

EHI proposes an energy-labelling approach that would rate the ability of BACS to facilitate the interoperability of the technical building (sub-) systems inside a building. This is a key function that BACS can play in a building, regardless of the surface of the building, its purpose (residential or commercial) or the output of the different technical building systems that are installed in the building. This will require the study to also include a focus on how standardisation bodies can develop an interoperability rating for BACS system.

Annex H - Stakeholder position papers BEAMA

Position Paper on lighting systems

Introduction

Since its establishment, LightingEurope has always supported initiatives from the EU that benefit consumers, the environment, and the economy. LightingEurope therefore promotes lighting systems, as they create significant energy savings, while at the same time increasing comfort and performance levels of building users.

LightingEurope urges the European Commission to:

- Maintain a regulatory environment in which lighting systems can operate both independently and as part of a Building Automation and Control System (BACS);
- Consider and proceed with implementing the policy proposals from the ENER Lot 37 Preliminary study on lighting systems;
- Align the recently initiated ENER Lot 38 study on requirements for BACS with the policy proposals from the ENER Lot 37 study wherever possible and include the policy proposals from the ENER Lot 37 study in ENER Lot 38, while driving adoption of the recommendations outlined by the Smart Readiness Indicator;
- Include requirements on functionalities that are technology neutral, and do not impose a burden on the industry by creating requirements on (control) devices;
- Ensure operation with BACS while keeping flexibility for the needs of lighting;
- Achieve compliance with the overarching CEN/TS 17165 about specifications on the Lighting System Design Process, in order to fulfil the needs of both building users and investors; and
- Focus on energy savings by the use of (lighting) control systems, independent from the building's demand-side energy load.

Energy savings through lighting systems

Depending upon the scenario, lighting accounts for around 20 % of the total cost-effective energy savings potential in non-residential buildings towards 2030.¹ Properly designed and well-coordinated lighting systems are one of the most cost-efficient ways to reduce energy consumption and CO₂-emissions.

The ENER Lot 37 Preliminary study on lighting systems proposes policy measures for lighting systems, which can be assessed by applying EN 15193-1 (LENI measured in [kWh/(y/m²)]). An estimation of the energy savings potential of lighting systems is demonstrated in Figure 1.

¹ European Commission, *Impact Assessment accompanying the proposal for a Directive on the energy performance of buildings* (Brussels, 30 November 2016), p. 54-55.

	2030	2050
Annual energy savings	20 – 29 TWh/y	48 – 56 TWh/y
Lighting electricity consumption (EU28)	9 %	18 %
Cumulative energy savings	110 – 180 TWh	900 – 1,000 TWh
Cumulative GHG reduction	40 – 60 MtCO ₂ eq	270 – 300 MtCO ₂ eq
Energy expenditure reduction	€ 3 – 5 B/y	€ 21 – 25 B/y

Figure 1: Energy savings for optimised lighting systems with controls²

LightingEurope encourages the European Commission to act on the policy recommendations set out in the final ENER Lot 37 study and to work towards achieving energy savings via lighting systems by mandating functionalities, such as presence and daylight lighting control in addition to existing legislation for lighting components.

In addition to large energy savings, lighting systems offer significant benefits to the building users as regards their visual comfort, wellbeing, and performance. The primary purpose of lighting is to illuminate and to provide the correct conditions for the user. Indoor lighting requirements that ensure a minimum of visual comfort and performance are elaborated in EN 12464-1. It mainly focusses on workplaces and goes hand in hand with EN 15193-1:2017 on the energy requirements for buildings. The aforementioned aspects are referred to in the overarching CEN/TS 17165 specification on the Lighting System Design Process, which fulfils the needs of both building users and investors.

Lighting systems are part of the management of a building. This is facilitated by the operation of lighting systems within BACS without restrictions, so that light scene results can be realised according to the visual and non-visual needs of the end-user. This requires measures that focus only on the functionality of BACS and are technology neutral. ENER Lot 37 study shows how large energy savings can be obtained, provided that technologies are not fixed (i.e. technology neutral requirements). Introducing requirements on (lighting) control devices (i.e. not technology neutral requirements) will limit the development of further energy savings technologies. Therefore, the technology neutral approach is a prerequisite to obtain smart buildings, as envisaged by the Smart Readiness Indicator.

Risks of demand-side flexibility

While lighting has properties that are interesting for participation in future demand-side flexibility (considerable load, fast response, and no delayed consumption), it should be noted that there are legal requirements for the provision of light, e.g. at work, streets, underground tunnels, etc., which complicate the connection to demand-side flexibility. Therefore, the focus should be on the energy savings by the use of controls in lighting systems, and the renovation of old lighting installations by using controls is the recommended way forward. More information can be found in the LightingEurope [Position Paper on lighting in the smart grid](#) (dated 13 November 2014).³

² *Ibid.*, p. 331.

³ LightingEurope, *Position Paper on lighting in the smart grid* (Brussels, 13 November 2014). < www.lightingeurope.org/images/publications/position-papers/Lighting_in_the_Smart_Grid.pdf >.

Healthy Buildings by Human Centric Lighting supported by BACS

The real potential of lighting systems lies in how they can improve the quality of lighting and the wellbeing and performance of the occupants of a building by enabling Human Centric Lighting (HCL) (see Figure 2). In short, this means that the right light is realised at the right place and at the right time. HCL is based on dynamic changes of light spectrum and light intensity during the day, balancing both daylight and electric light.



Figure 2: Benefits for people due to higher wellbeing and performance⁴

The CIE 222 Report forms the basis of lighting strategies that enable HCL. LightingEurope has identified the features of lighting system that contribute to the uptake of HCL (information in development).

LightingEurope urges the European Commission to set minimum requirements for functionality of lighting systems in buildings and no requirements for the technology (incl. systems components), since it is expected that lighting systems/BACS technology will see major innovations in the coming years.

More information can be found in the LightingEurope [infographic on Healthy Buildings](#) (dated 4 October 2017).⁵

Contact

For further information on this topic, please contact Dominik Flikweert, Policy Officer, through dominik.flikweert@lightingeurope.org.

LightingEurope is the industry association that represents the lighting industry in Europe. We are the voice of more than 1,000 lighting companies that employ more than 100,000 Europeans and create an annual European turnover of over € 20 billion. Our daily mission is to advocate and defend the lighting industry in Brussels, while reconciling it with ongoing EU policy aims. In doing so, we are dedicated to promoting efficient lighting practices for the benefit of the global environment, human comfort, and the health and safety of consumers. More information is available on: www.lightingeurope.org.

⁴ Source: EcoDesign Consultants, *Healthy Buildings* (February 2016). See: < www.ecodesignconsultants.co.uk/healthy-buildings/ >; University of Twente and CBRE, *Healthy Offices Research* (2016). See: < www.cbre.nl/en/healthy-offices-research >.

⁵ LightingEurope, *Infographic on Healthy Buildings* (4 October 2017). < www.lightingeurope.org/images/focus-areas/LED/11_LE_HealthyBuilding_Infog.pdf >.

Annex I - Stakeholder position papers LE



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16th February 2018

VITO NV
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Dear Pasquel

BEAMA is the trade association for the UK Electro-technical industry, representing over 200 companies in the power, electrical and building services sectors. Our members, who range from multinationals to SMEs, manufacture the wide range of equipment required for end-to-end electrical systems.

BEAMA therefore represents a wide range of manufacturers in the controls and building automation sector, as well as manufacturers of heating and ventilation systems for buildings and associated management systems. This study is therefore highly relevant to our members, for control manufacturers, but also due to the potential affect any regulatory measure may have on the systems that integrate with BACS within a building (namely heat, hot water and ventilation systems). Many of our members also provide component parts to BACS manufacturers, including actuators, sensors.

We are writing to VITO at this early stage in the preparatory study to outline our views on scope, and also to express more broadly how we feel the routes to market for BACS and similar system based products should evolve. Increasingly eco design and energy labelling are addressing systems, and in this case, we need to consider new routes to market and the evolution of associated product regulation. Here we reflect on some precedents that have been set for other control products and package labels. We attended the meeting on the 17th of January and hope to continue close engagement with this work. We have therefore reflected on some of the questions raised at this meeting.

Scope

The initial task for the preparatory study in determining the defined scope of the product group(s) and system boundaries is a real challenge given the heterogeneous nature of BACS. The energy saving nature of BACS is also due to their interaction with other products / systems, therefore the ability to determine an efficiency/ performance rating prior to installation will be difficult. This is further amplified by the nature of BACS being tailored to a building and their performance being specific to the nature and characteristics of that building. The preparatory study for the 2016-2019 eco design working plan identified that the

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main energy savings for BACS are not achieved in reducing the standalone energy consumption of the BACS themselves, but are driven by the coordination of several controlled products with BACS e.g. preventing heating and cooling in the same zone at the same time. We fully agree with this. Furthermore, we are aware that the performance of BACS is highly dependent on the continued maintenance of the system. All of these system challenges will have important implications for the scope and system boundaries set as well and the appropriate route to market that should be chosen.

BEAMA agree with the defined scope of a BACS product being broadly as a control loop that consists of a sensor, an actor (valves or actuators) and a controller that executes the logics. The main components considered so far in the work plan are

- Duct temperature sensors/ immersion temperature sensors
- Automation stations/ controllers
- Valves and actuators

We have concerns over using EN15232 as the product boundary. For non-residential systems with Building Management Systems (BMS) its fine but we don't believe its appropriate for residential. For residential a wider evidence base will be required to ensure that systems comparisons can be made robustly.

In the initial review in the workplan and the communications since the launch of the study we are under the impression VITO will be considering the following elements in the study:

- Minimum requirements for the sensitivity and permitted tolerances of control products
- Improving the user friendliness of BACS to aid installation and maintenance.
- Improvement the re-commissioning / maintenance of the system
- Interoperability and communication platforms for integration with other product/systems.

While it may be easy enough to draw a boundary around the BACS product at point of sale (based on existing standards EN15232), we know the system boundary of this will be very different once installed. Furthermore, any regulatory decision made on the communication elements will have knock on affects for any product/systems integrating with a BACS product on installation. Therefore, it is inevitable a wide range of sectors and product manufactures may need to be consulted on in the process of this study.

We agree the scope of this study should be broadened to consider the role BACS play in demand management/ flexibility, as well as demand reduction / energy efficiency. This would



ensure consistency with the work that is ongoing under Lot 33 as well as the Smart Readiness Indicator and EPBD objectives. There is so much value to the energy system of being able to manage demand that to miss the opportunity to put it firmly onto the map for product design would be a real loss. BACS must evolve rapidly if Zero Carbon by 2050 is to be achieved, and therefore it is essential that BACS solutions grow to include an interface with the energy supplier or intermediary to enable the development of all forms of demand management and demand reduction.

From a demand reduction/management perspective there is a real risk of sub-optimising at the component level through regulations like eco design and energy labelling. BACS components operate as part of a wider system, so the real value comes from thinking at the system level, not the component level. To do this well it needs to be done at the building level and how its designed and operated (ongoing operating procedures are as important as construction), then once this is established it is possible to drill down into how the components operate, and interoperate, to achieve the building level efficiency and performance. We therefore see some scope to ensure the work being undertaken for the Smart Readiness Indicator links with any measure recommended through this study. We have seen from recent communications from VITO that this seems to be case and we hope in the initial scoping discussions this is acknowledged. However, we do believe a solid understanding of the building level system design needs to be established first before regulating at the product/ system component level.

We agree the study should be combined and cover both residential and non-residential. It is likely that residential and non-residential BACS solutions will learn from and inform each other, so that the border between BACS applications for the two markets becomes blurred. However, the Zero Carbon by 2050 initiative has identified the greatest challenge to be the required revolutions in domestic heating and the domestic energy markets. For this reason, it is most important that BACS applications are effectively extended into the residential market, with the non-residential market being of secondary importance. At the meeting VITO discussed the options to potentially split the study in order to refine the scope and ensure this is manageable. One option was to split the study into two tiers, and this could be separated by building size or type (residential and non-residential). While we can see why this may need to be done to make the work manageable, following discussions at the stakeholder meeting we believe the two need to be reviewed together. We do know the market for non-residential BACS is more advanced, so while the products themselves may not differ substantially the routes to market might, and those applying any label (specifiers, producers?) will also vary. We therefore think the two should be included in the study but we



expect differing delivery mechanisms for the two sectors for BACS. It may also be too early to set a regulatory measure for the residential sector.

We expect the preparatory study to also review opportunities for material efficiency, reusability, recyclability of component elements of a BACS product. As outlined in the introductory information in the study this could include, but may not be limited to, the following:

- Setting minimum requirements on the sensitivity and permitted tolerances of control products (sensors and actuators)
- Increasing the user friendliness and helping BACS to be better installed and operated (as this is known to affect their efficiency). This could include measures for the display, using alerts related to check lists for installations, or alerts when extreme energy losses occur.
- Increasing the re-commissioning of the system; e.g. an alarm could alert the user that the efficiency of the system needs to be reassessed.
- Strengthening the interoperability; communication protocols can be different from one system to another which effect the capability of all systems to work together.

With regards to increasing the user friendliness of BACS to aid installation and operation of the system. In a lot of cases this is already being done (more so in non-residential). Guidance of what is required to deliver this would be useful for the market and ensure consistency. Again, with regards to improvements in the re-commissioning of systems, this is also already being implemented for a lot of devices (e.g. service interval timers).

Routes to Market

The last comment regarding system level thinking brings us onto important points regarding suitable routes to market. This preparatory study and others (e.g. Lot 33 smart appliances, Lot 1 controls), raise some fundamental challenges with regards to the suitability of eco design and energy labeling for new system requirements in the market. We are seeing increasing emphasis on system functions being considered under these frameworks and considering this we need to be open to new ideas and approaches for market delivery.

Going back to the work on Lot 1, and attempts to introduce bundling of controls under eco design, EU trade bodies, specifically eu.bac, have been campaigning for a number of years for the Commission to treat Building Automation and Controls as one product group. This preparatory study is the outcome of these discussions and what we see as an evolution in the use of Eco-design and Energy Labelling regulation to apply measures to systems and packages



of products. This study therefore has significant implications for a range of BEAMA member product groups, including, but not limited to, heating controls.

In the case of package labels and bundling of products for systems, this has come up in the past for space heaters and controls under the Energy Labelling Regulation. This has been handled to ensure the efficiency rating of combined products can be evaluated at point of installation, and a label applied to the package. This has come up again, more recently, under Lot 33 and the preparatory study for smart appliances where BEAMA are campaigning to keep products with external 'controllers' in scope of this study. Although in the case of Lot 33 the issue is slightly different as we are considering the enabled functionality of Demand Side Flexibility by the 'controller', and therefore are not considering energy efficiency, the principle of market deliver is however the same. In the case of the BACS study similar discussions will arise and we foresee the need to consider options along the lines of a package/ system label, if deemed appropriate for the specific needs of a BACS product. As with the case of Lot 33 and the decision by VITO to exclude products with an external controller, if we continue to apply Eco Design and Energy Labeling regulation as we have done in the past for singular product groups, without tackling the component needs of new systems on the market, we will create a regulation that limits market development of systems better suited to customer needs. We would therefore see Eco Design and Energy Labelling regulation as it stands as wholly unsuitable for the products/ systems being considered. We therefore strongly urge VITO to consider the options for routes to market while outlining the system boundaries for the scope of this study.

It is easy enough to handle single products at source, but as with previous experience it is a challenge to understand who is responsible for the labelling and bundling of products. Is this done by the wholesaler, the contractor or by the installer on-site? BACS and Smart Control Systems are evolving fast and must continue to do so if Zero Carbon by 2050 is to be achieved. The most successful BACS solutions are likely to include combinations of "hardware" products and application-based distributed software systems. Any regulatory framework must keep pace with the developing technology and must not stifle, disadvantage or penalise such an approach. The level of sophistication achieved by current regulation for systems and products is limited and falls a long way short of what will be required if it is extended to cover BACS.

The first step for VITO needs to be to clarify who in the supply/ installation chain can meet the defined roles in the legislations (e.g. 'supplier', 'dealer'). Getting to grips with how far the regulatory framework can deliver something for these defined roles should be done at task 0.



It is fundamental VITO clarify what is possible (the 'can we') before determining how this is done.

Additional Comments from the meeting

The relevance to the EPBD was raised at the stakeholder meeting and related measures now written into the final Directive. This should also include the requirement for room temperature controls. This will provide significant energy saving benefits and in the assessment of whether a measure under Eco Design and Energy Labelling is needed for BACS we need to consider the additional benefit the new requirements in the EPBD will be adding. A lot could be achieved by this and it may be deemed less necessary for a BACS measure under Eco Design or Energy labelling.

Furthermore, we can see strong ties with the work to develop a standard Smart Readiness Indicator. There could be opportunity to complement the SRI with a potential BACS measure, however, we need to be careful both mechanisms are not trying to deliver the same thing or conflict with each other.

Conclusion

Fundamentally, should a package label or something similar be considered for BACS we strongly agree this should not be pursued unless better market surveillance of the installation process is achieved at member state level. It would be a big failure for industry if we end up with manufacturers having to comply with regulation but this is then ignored by installers and market surveillance authorities. We know from our members that the package label requirements under lot 1 are not policed effectively and therefore the benefits hoped from such a measure are not being achieved. Product regulation under Eco Design or Energy Labeling for BACS should only be implemented if there are clear energy saving benefits and it can be suitably monitored. Unsuccessful regulation will be damaging to the BACS market. With such regulation the goal originally was to give the consumer certain energy-related information at the point-of-sale, in order that the consumer could make an informed choice, based on impartial data relevant to an EU-wide level playing field. At the time of introduction those products and technologies (e.g. cylinders, thermostats, boilers, heat pumps etc) already existed and were relatively stable, and broadly speaking the goal has been achieved. However, the market place for BACS is evolving rapidly and we are dealing with a complex system of components and singular products. This could create a state of tension between regulation and product development that if not carefully managed could be very damaging to the market, without benefitting the consumer.



Splitting the study may not be an option due to the close links with the BACS products sold on the residential and non-residential market. We do however expect routes to market for each sector to vary based on the delivery mechanism and stage of technology development for each sector. The residential market is still evolving and this needs time, we would also expect any label to be applied at point of installation for such a complex system, this is likely to be done by the installer for the residential market. For non-residential this may be done at design/ specification stage (although we are aware the efficiency of systems like this as specified do not always realise their initial estimated efficiency rating) and there are different routes to market.

We hope our feedback is useful and we are very happy to review further options going forward. BEAMA will continue to engage at the stakeholder meetings and look forward to seeing the work develop.

Kind regards
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