EUROPEAN COMMISSION

Brussels, 10.11.2010
SEC(2010) 1356 final

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying document to the

Draft Commission Regulation implementing directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for household dishwashers

TABLE OF CONTENTS

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying document to the

Draft Commission Regulation implementing directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for household dishwashers

Lead DG: TREN

Associated DG: ENTR

Other involved services: COMP, ECFIN, ENV, INFSO, LS, MARKT, RTD, SANCO, SG, TRADE

Agenda planning or WP reference: 2009/TREN/024

EXECUTIVE SUMMARY

Household dishwashers are currently addressed in Commission Directive 97/17/EC implementing Council Directive 92/75/EC with regard to energy labelling of household dishwashers. Unlike, for instance, refrigerating appliances, household dishwashers are not subject to requirements regarding minimum energy efficiency or other performance aspects.

Directive 2009/125/EC of the European Parliament and of the Council (the Ecodesign Directive) lays down a framework for the Commission, assisted by a Regulatory Committee, to set ecodesign requirements for energy-related products. It is one of the priorities of the European Economic Recovery Plan — COM(2008) 800.

The approach to developing the proposed ecodesign implementing measure for household dishwashers and its impact assessment is structured in four steps:

Step 1: assessment of the criteria for an ecodesign implementing measure as set out in Article 15(2)(a)–(c) of the Ecodesign Directive, taking into account the ecodesign parameters listed in Annex I and the method for setting specific requirements laid down in Annex II of the Ecodesign Directive;

Step 2: consideration of relevant EU initiatives, market forces and disparities in the environmental performance of equipment on the market with equivalent functionality, as set out in Article 15(2) of the Ecodesign Directive;

Step 3: establishing policy objectives, including the desirable level of ambition, the policy options to achieve them, and the key elements of the ecodesign implementing measure as required by Annex VII of the Ecodesign Directive;

Step 4: assessment of the impact on the environment, consumers and industry, with a view to the criteria for implementing measures set out in Article 15(5) of the Ecodesign Directive.

Step 1: Legal base for an implementing measure: compliance with the Ecodesign Directive, Article 15

In order to assess the criteria for ecodesign implementing measures as set out in Article 15(2) of the Ecodesign Directive, the Commission carried out a technical, environmental and economic analysis ('preparatory study') of household dishwashers[1] in accordance with Article 15(4)(a) and Annexes I and II of the Ecodesign Directive.

The study has shown, as illustrated in Table A, that (1) household dishwashers are placed on the EU market in large quantities, (2) the environmental impact of household dishwashers is to a large extent related to the consumption of electricity and water during use, and remains significant despite ongoing improvements, and (3) technical cost-effective solutions exist that could lead to significant improvements. The existing disparity in electricity consumption is limited, since the majority of appliances are in the same energy efficiency class. However, the preparatory study identified a substantial potential for improvement (6 % cost-effective energy savings in the short term, 13-15 % in the medium term, and 30-40 % over the longer term).

The economic value and the environmental impacts in 2020 were calculated on the basis of a business-as-usual scenario.

Table A: Total household dishwashers in the EU-27 in 2005 and 2020

Article 15(2)(a):	Annual sales volume in the EU	2005: 6 million units per year, representing an economic value of EUR 3.2 billion
Article 15(2)(b):	Environmental impact: electricity and water consumption of appliances (Business as Usual — BaU — scenario)	Electricity: – 2005: 26 TWh or 13 million t CO_2 equivalent[2] – 2020: 33.7 TWh or 17.5 million t CO_2 equivalent Water: – 2005: 308 million m^3 – 2020: 389 million m^3
Article 15 (2)(c):	Improvement potential for household dishwashers (applying existing cost-effective technology)	Between 1.7 and 2.0 TWh depending on the sub-options in 2020 compared to the BaU scenario (in 2025, the energy-savings potential increases to 3.2-3.5 TWh compared to the BaU scenario). Between 56 to 64 million m^3 water saved in 2020 (use phase).

[1] Preparatory study for ecodesign requirements of EuPs, Lot 14: 'Domestic Dishwashers and Washing Machines'. Available on: www.ecowet-domestic.org.

[2] This represents 1 % of the total EU electricity consumption of about 2760 TWh in 2005.

Step 2: Existing initiatives and capacity of market forces to address the issue

Further to Articles 15(2) and 15(4)(c) of the Ecodesign Directive, relevant EU and national environmental legislation was considered. Related (voluntary) initiatives at both EU and Member State level were taken into account, and barriers leading to market failures and preventing market take-up of technologies with improved environmental performance were analysed.

As a result of energy labelling[3], combined with voluntary commitment by industry between 1999-2004 to phase out the least efficient household dishwashers, household dishwashers have improved their energy efficiency by some 35% in the last ten years, with the EU Energy Label becoming one of the most important market drivers.

However as a consequence of the success of the labelling scheme and the voluntary commitments, 90% of household dishwashers are now in the energy label's highest energy efficiency class. The market mechanism driving forward the energy efficiency of household dishwashers has halted, as no further energy efficiency classes have been defined by the legislator (**regulatory failure**). In addition, the industry has decided not to make new voluntary commitments because market actors have become too scattered for proper and fair implementation.

Furthermore, not all environmental costs are included in electricity and water prices. Consequently, consumer (and producer) choices are made on the basis of lower prices that do not reflect environmental costs for society (**negative externality**).

The total energy consumption of household dishwashers is still increasing, since the unsaturated market means that the growth in sales still exceeds the savings brought about by more efficient appliances. To address this problem, the stagnation in innovation must be overcome, and stakeholders, including the industry and consumer organisations, are now unanimously asking for the combined introduction of ecodesign requirements and a revised labelling scheme for household dishwashers[4].

Therefore, in the absence of voluntary commitments by the sector, the present impact assessment pays particular attention to the rationale for developing new and tighter measures under the Ecodesign and the Energy Labelling Directives as a means to provide consumers with meaningful product information on energy efficiency and to give European manufacturers the long-term security they need to invest in innovative technology. The aim is to maintain the trend towards further efficiency improvements and support the global competitiveness of EU industry.

From the first two steps, it is concluded that the criteria for ecodesign implementing measures as set out in Article 15(2) of the Ecodesign Directive are met, and household dishwashers should be covered by an ecodesign implementing measure in accordance with Article 15(1) of the Ecodesign Directive, complemented by an upgraded energy labelling scheme.

---

3 Commission Directive 97/17/EC amended by Commission Directive 1999/9/EC implementing Directive 92/75/EEC with regard to energy labelling of household dishwashers.

4 In the past, Member States have launched fiscal incentive programmes to foster the market take-up of energy-efficient appliances but the uncertainty surrounding the future of the energy efficiency classes has prevented them from initiating new support programmes. Furthermore, the Ecodesign Directive implies that legislative action on domestic appliances cannot be taken at Member State level.

Step 3: Policy objectives and levels of ambition

Annex II of the Ecodesign Directive provides that the level of ambition for improving the environmental performance and electricity consumption is to be determined by an analysis of the least life-cycle cost for the end-user. Furthermore, benchmarks for technologies yielding best performance, as developed in the preparatory study and the discussions with stakeholders during the meeting of the Ecodesign Consultation Forum[5] on 4 December 2008, are considered. The minutes of this meeting are attached in Annex III of this Impact Assessment. The results are reflected in the objectives that the proposed Regulation aims to achieve.

The objective is to trigger a market transformation to realise the improvement potential. Several policy options were considered, including self-regulation, revision of just the energy labelling and introduction of minimum energy performance requirements alone. Considering the strong interrelationship between the energy labelling scheme and the ecodesign requirements, and given the request by Member States, the industry, consumer organisations and environmental NGOs for a coordinated revision of the existing legislation, this impact assessment considers, in sections 5 and 6, the combined impact of both measures.

Step 4: Environmental, economic and social impact assessment

An assessment of the proposed implementing measure is carried out. Considering that the most significant environmental impact of household dishwashers is their energy consumption during use, sub-options for gradual ecodesign requirements together with revised energy efficiency classes are analysed in section 6. The sub-options considered (along with a business-as-usual scenario) are as follows:

- **BaU:** Business-as-Usual scenario, i.e. continuation of current policy measures at EU level (current labelling scheme only) and no further action at EU level, in scenario analysis referred to as Baseline;

- **Sub-option A:**

    - Introduction of minimum energy efficiency requirements in two stages, i.e. EEI<71 in 2011 and EEI<63 in 2016,

    - Introduction of a minimum cleaning performance requirement, i.e. Cp<1.12 in 2011,

    - Introduction of minimum drying performance requirements, i.e. Dp<1.08 in 2013 for machines with 8 place settings and higher, and Dp<0.86 for machines up to 7 place settings;

- **Sub-option B:**

    - Introduction of minimum energy efficiency requirements in three stages, i.e. EEI<71 in 2011 for all dishwashers (except for dishwashers with 10 ps and width ≤45cm: EEI 80), EEI<63 in 2013 for dishwashers with a rated capacity ≥10 ps

[5] The Consultation Forum is a balanced grouping of Member States representatives and stakeholders such as industry, consumer bodies and environmental NGOs, called upon to express their views.

(except dishwashers with 10 ps and width ≤45cm: EEI<71) and EEI<63 for 8-10ps dishwashers with width ≤45cm as of 2016,

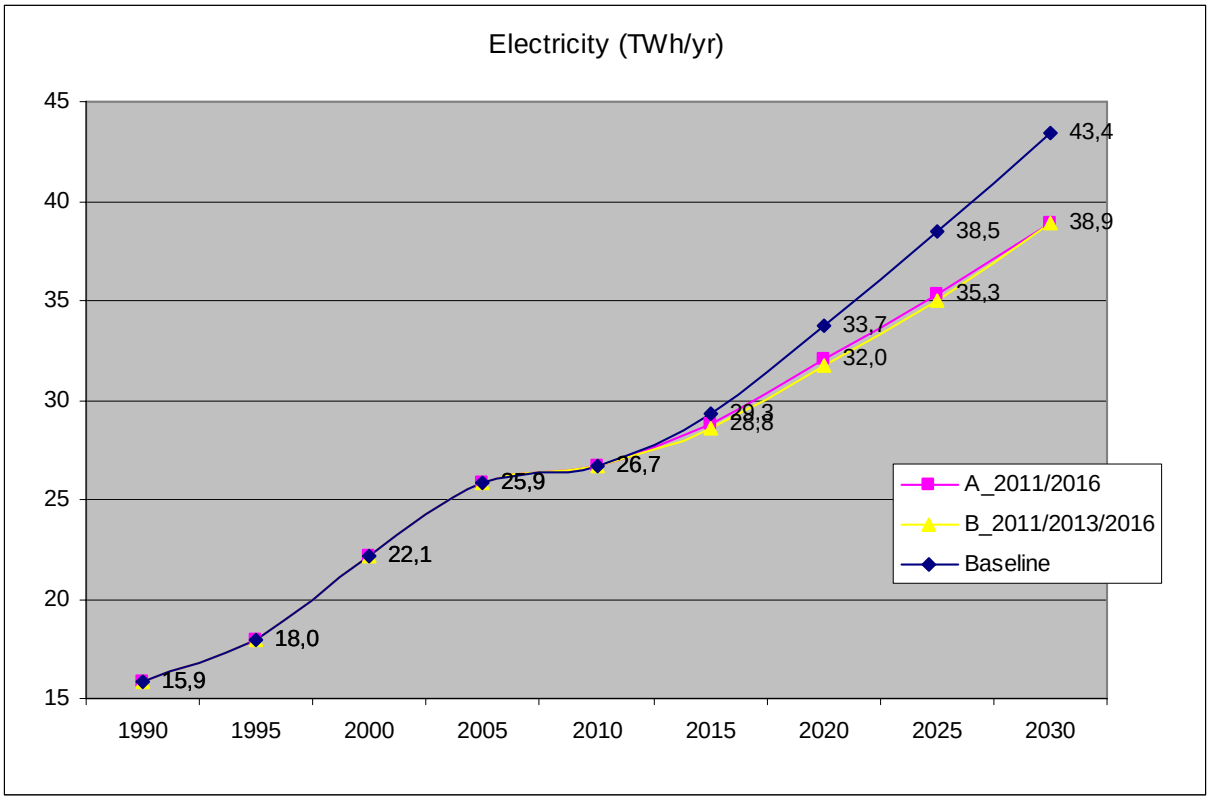
– Introduction of a minimum cleaning performance requirement, i.e. Cp<1.12 in 2011,

– Introduction of minimum drying performance requirements, i.e. Dp<1.08 in 2013 for dishwashers with 8 place settings and higher, and Dp<0.86 for dishwashers up to 7 place settings.

A requirement for maximum water consumption has been considered but not deemed feasible for three main reasons: 1) water consumption is assumed to decrease following the introduction of a requirement for minimum energy efficiency (water consumption and energy consumption are linked to a certain degree); 2) not enough data are available to fully assess the effects of a water consumption requirement; and 3) this option was not discussed thoroughly with all stakeholders involved and therefore may not receive the necessary support.

The following graph illustrates the possible energy savings with each scenario.

Figure A: EU-27 total electricity consumption of household dishwashers under sub-options A and B in TWh/year (electric) (EU-27 demand in 2005: 3106 TWh)



Source: Input to this impact assessment from VHK

The graph shows that the energy consumption of household dishwashers is expected to increase in the business-as-usual scenario. This is due to the fact that this market is not yet saturated and sales outweigh the savings achieved by more efficient appliances. In order to

slow down the increase in energy consumption, while ensuring that measures remain cost-effective, the existing legal framework needs to be upgraded.

Compared with 1990 — the reference year for climate change policy — the annual energy consumption and carbon emissions of household dishwashers in 2020 will be 100 % higher in the BaU scenario (1990: 16 TWh. 2020: 34 TWh). The estimated savings for sub-options A and B are 5.0 and 5.8 %, respectively, with respect to the baseline scenario in 2020. In 2025, savings are projected to be around 10 % per year (compared to BaU 2025).

The biggest threat to further energy efficiency improvements as identified by the industry itself would indeed be failure by the legislator to put in place a legislative framework to support the market dynamics. The fact that the current labelling scheme, i.e. the energy efficiency classes, is outdated has several negative impacts: if the current situation continues, consumers will no longer be able to differentiate between products on the basis of their energy efficiency (all models are in the same labelling class), retailers will lose interest in drawing attention to the energy label, authorities will have difficulties in promoting the most efficient models, and the industry will not be motivated to invest in energy efficiency but might instead invest in other features (possibly more energy-consuming) in order to differentiate their products from those of their competitors.

The analysis demonstrates that the appropriate policy option for realising the environmental improvement potential of household dishwashers is the combined introduction of ecodesign requirements and revision of the labelling scheme in two stages (one year and four years after entry into force). This approach ensures that:

– ongoing energy improvements are maintained and fostered by setting a transparent legislative framework that will provide the industry with the long-term security it needs to invest in innovative technology;

– fair competition and product differentiation continues to operate on energy improvements by providing consumers with an effective and reliable tool to compare the energy consumption of products in the context of strong market demand for energy-efficient appliances;

– by 2020, absolute energy savings of 5-5,8 % can be achieved compared with the business-as-usual scenario in 2020. Due to market inertia (i.e. the full replacement of old models by new ones takes about 15 years), the effects of the new measures up to 2020 will be very limited with respect to the baseline scenario.

– the cost-effective energy-savings potential is achieved, i.e. around 1.7 to 2.0 TWh in 2020 compared to the BaU scenario, increasing to 3.2 to 3.5 TWh in 2025;

– more energy-consuming products are quickly removed from the market, securing electricity and CO_2 savings in the EU while reducing the life-cycle costs of household dishwashers for consumers. Calculated in terms of 'net present value' (EUR 2005), consumer expenditure — i.e. annual purchase and running costs for the EU27 population — will increase from around €8bn today to €10bn in 2020 and approximately €11bn in 2025 (mainly due to increased penetration).

– a level playing field for all manufacturers is guaranteed, ensuring fair competition and free movement of products;

– disproportionate burdens for manufacturers are avoided due to transitional periods that duly take into account redesign cycles.

Finally, SMEs are considered to represent 30% of manufacturers (mainly OEMs, i.e. suppliers of components like thermostats, shelves, etc.) and 80% of retailers. The analysis shows that the policy options will have no negative impact on them. On the contrary, they will benefit from stronger demand for new technologies and higher turnover.

As set out in Section 7, the impacts of the legislation will be monitored mainly through market surveillance by Member State authorities to ensure that the requirements are met, whereas the appropriateness of the scope, definitions and concepts will be monitored through ongoing dialogue with stakeholders and Member States.

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

1.1 Organisation and timing

Unlike refrigerating appliances, domestic dishwashers are only covered by *Commission Directive 97/17/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household dishwashers*. No ecodesign requirements have been set on this product group.

Since recent market transformation calls for a revision of the labelling scheme, the *Action Plan for Energy Efficiency: Realising the Potential*[6] identified 'wet' household appliances (i.e. household washing machines and dishwashers) as one of the 14 priority product groups for which an up-date of the existing labelling together with minimum energy performance standards should be adopted.

This impact assessment considers the adoption of ecodesign requirements in compliance with article 15.4 of Directive 2009/125/EC of the European Parliament and of the Council establishing a framework for the Commission to set ecodesign requirements for energy-related products (hereafter referred to as the Ecodesign Directive)[7]. The option of having only a revised labelling scheme is discussed in section 4.1.

The impact assessment was launched in November 2008 supported by an Interservice Steering Group including COMP, ECFIN, ENTR, ENV, INFSO, LS, MARKT, RTD, SANCO, SG, TRADE.

1.2 Impact Assessment Board

This impact assessment was scrutinised by the Commission's Impact Assessment Board (IAB). In its opinion, the IAB concluded that the impact assessment contains an adequate and proportionate analysis. The analytical steps based on the requirements of the Ecodesign Directive 2009/125/EC have been respected.

This impact assessment integrates the additional recommendations for improvements advocated by the IAB.

---

6 COM(2006) 545

7 Directive 2005/32/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products *OJ L 285, 31.10.2009, p. 10*.

1.3 Transparency of the consultation process

A background preparatory study was carried out in 2007-2008 in order to give input to this impact assessment[8]. The preparatory study provided the European Commission with the technical background supporting the design of eco-design requirements following the methodology defined in Annex I and II of the ecodesign Directive.

The opinion of stakeholders was gathered consistently throughout the process through bilateral meetings and the Consultation Forum which was created in compliance with Article 18 of the ecodesign Directive (see minutes of the Consultation Forum in Annex III). The Commission's minimum standards on public consultation can thus be considered to be met.

- The preparatory study was consulted with manufacturers in bilateral meetings and through their European Federation, CECED. Their input was instrumental in drafting first the life cycle analysis of wet appliances, second in confirming the base case appliances representative of the EU market and third the technological means and costs of ecodesign improvements. CECED in particular provided the consultants with yearly databases on EU dishwasher production which were extremely useful in drafting the policy options and calculating their economic impact. The preparatory study is published and publicly available on the ECOWET website: http://www.ecowet-domestic.org/index.php?option=com_docman&task=cat_view&gid=27&Itemid=40

- An extensive consumer survey was run in 2007 in order to better understand and identify consumer's needs, expectation and daily use of wet appliances. The opinion of 2 497 European households (250 per country in average) was gathered with the aid of an external market research institute ODC Services. The results are available on the ECOWET website quoted above[9] (Task 3 report).

- The Ecodesign Consultation Forum was consulted on 4 December 2008 with the participation of Member States, consumer organisations, environmental NGO's and the industry represented by CECED. The working documents presenting the policy options for ecodesign requirements and implementing Directive 2009/125/EC, together with a revised labelling scheme, was sent one month in advance of the meeting. All replies to the working documents as well as the minutes of the meeting are available on CIRCA website.

- A second Consultation Forum meeting was held on 26 March 2010 to discuss the options for Ecodesign requirements and Energy Labelling of dishwashers under the recast of the Energy Labelling Directive 92/75/EEC (now Directive 2010/30/EU). This recast process has enforced a delay on related measures and the scenario analysis takes this into account by introducing first tier measures from 2011 onwards (at least one year after entry into force assumed for 2010).

1.4 Outcome of the consultation process

All respondents throughout the consultation process supported in general the adoption of ecodesign requirements. The following issues were raised and taken into account within this impact assessment:

---

[8] By ISIS/ENEA , preparatory study for Lot 14 (Task 1-7), Domestic Dishwashers and Washing Machines.

[9] See results of preparatory study, task 3: Economic and Market Analysis

- A number of Member States and environmental NGO's requested the second stage to be implemented earlier than what was proposed in the working document submitted to the Consultation Forum. Industry stakeholders have indicated that certain specific models could not meet the strictest of requirements and asked for a delay or exemption of these specific models. The effects of different implementation dates have been considered in the two sub-options presented in this Impact Assessment.

- The approach on low power modes (including off mode and left-on mode, see definition in box 1) appeared to be controversial. While the preparatory study considered the inclusion of the consumption of low power modes into the calculation of the annual energy consumption of the appliances (which would influence the ranking of the appliances, hence give incentives to manufacturers to reduce the consumption of low power modes), other stakeholders, advocated the implementation of the horizontal requirements laid down in the standby Regulation. This impact assessment addresses the issue in section 2.2.3.2.

- The adoption of minimum requirements on noise emissions and water consumption was advocated by several stakeholders. This impact assessment thus assesses whether there is scope for the setting of minimum requirements and possibly for a ranking of these performances. Since more and more households have an open kitchen, a measure related to noise might be indeed a relevant parameter.

- The working document submitted to the consultation forum proposed to reduce the allowed measurement uncertainty in the second step of verification from the 15% laid down in the current energy labelling Directive on dishwashers to 10%. Some stakeholders asked for the verification limit to be further tightened to 3 or 5%. This impact assessment assesses the scope for further reduction in section 5.2.

- The formula used within the current labelling Directive on Dishwashers for the calculation of the energy efficiency index was contested, especially the difference between 9 and 10 place settings which favours larger machines. This impact assessment discusses the issue and proposes an adaptation to the presented policy option that better reflects the technical possibilities and constraints. The effects of different requirements for specific models have been considered in the two sub-options presented in this Impact Assessment

Box 1: Definition of low power modes (or stand-by modes)[10]

off mode: is where the product is switched off using appliance controls or switches that are accessible and intended for operation by the user during normal use to attain the lowest power consumption that may persist for an indefinite time while connected to a main power source. It is a common understanding, supported by the results of the preparatory study, that in dishwashers the off mode supports active sensor based protection function(s) to protect the user from for example accidental water leakage. The presence of such active function(s) is promoted to insure the highest level of consumer protection.
left on mode: is the lowest power consumption mode that may persist for an indefinite time after the completion of the programme and unloading of the machine but not switched off by a user intervention or automatically; again sensor based protection function(s) are in general active. In some products this mode may be an equivalent power to off mode.

[10] Definition provided in the preparatory study, task 7, p. 89

2. PROBLEM DEFINITION

Until recently household dishwashers have shown an impressive continuous improvement in energy efficiency, driven in general by a strong market demand for energy efficient products and more specifically by two initiatives: (1) the labelling directive 1997/17/EC[11] and (2) the voluntary commitment of the industry to phase out the least efficient models from the market.

These two measures/initiatives resulted in an energy saving of some 35%[12] between 1995 and 2005. Part of these savings were also rendered possible by the detergent industry who helped by developing detergents that work effectively on lower cleaning temperatures, thus decreasing the energy consumption necessary to heat water.

However, in the most recent years the improvement of energy efficiency seems to have halted. The highest energy efficiency class is now populated by an extremely large proportion of available models (in major categories over 90% to 100% of models), leaving fewer options for consumers to identify the more efficient appliances and robbing manufacturers of options to highlight their best performing products. The preparatory study identified that further energy savings are possible and economical for consumers, but the existing measures and initiatives are not able to unlock this potential.

The following sections describe in more details the issues mentioned above.

2.1 Existing legislation and other relevant initiatives

2.1.1 Energy labelling of dishwashers Directive 1997/17/EC

The current Directive 97/17/EC implementing Council Directive 92/75/EEC *with regard to energy labelling of household dishwashers* provides consumers with the following information (see layout of the label in Annex I):

- Ranking of the energy consumption by means of seven energy efficiency classes (A-G scale) and energy consumption per cycle (kWh/cycle);
- Ranking of cleaning performance by means of seven energy efficiency classes (A-G scale);
- Ranking of drying performance by means of seven energy efficiency classes (A-G scale);
- Water consumption (litre per cycle);
- Noise emissions (dB(A)).

The introduction of the label helped consumers in identifying the most efficient models on the market and weigh energy efficiency against the other performance aspects. At the same time, the label benefited manufacturers who could state the energy efficiency of their appliances through a neutral (and mandatory) informative label which spurred a competitive race in achieving the highest energy efficiency scores. The preparatory study shows indeed that the appliances on which the benefit margin is the highest are those which are in the upper classes.

---

[11] Including amendments: Commission Directives 1999/9/EC and 2006/80/EC

[12] Based upon an average energy consumption of 1,65kWh/cycle in 1995 and 1,07 kWh/cycle in 2005.

2.1.2 Voluntary commitment

The dishwasher manufacturing industry represented by CECED, the European Committee of Domestic Equipment Manufacturers, agreed upon a Voluntary Commitment in 1999 which also proved to be very successful in driving energy efficiency of dishwashers[13]. The participants of the agreement agreed to remove from the market the least efficient dishwashers in two steps:

- *Step one by December 2000:* commitment to stop producing for or importing in the EU Market dishwashers which belong to the energy efficiency classes E to G for dishwashers with 10 or more place settings and classes F to G for dishwashers with 9 or less place settings

- *Step two by December 2004:* commitment to stop producing for or importing in the EU Market dishwashers which belong to the energy efficiency class D for dishwashers with 10 or more place settings and classes E for dishwashers with 9 or less place settings

This Voluntary Commitment was completed successfully in 2004 but the Industry did not consider appropriate to renew it.

Although there is a high concentration of sales among EU producers, voluntary agreements are becoming more difficult in practice because of the growing share of imports from non-EU based manufacturers (e.g. Japan, China and South Korea). As a consequence the European industry association fears not to be able to capture important actors on the EU market for a voluntary agreement to be effective and foresees difficulties in avoiding free riders. The industry therefore has called instead for legally binding energy efficiency requirements[14].

In addition, consumer organisations are sceptical about the value of such voluntary agreements and favour a harmonised ecodesign and labelling scheme[15].

2.2 Market failures

2.2.1 Clustering of products in highest energy efficiency classes

Energy efficiency

By 2005 the success of the label (and the voluntary agreement) led to a situation that most of the dishwashers carried the same energy efficiency class A. The label's primary function of identifying the more efficient models is therefore considered lost.

The figure 1 below illustrates the development of the market between 1998 and 2005.

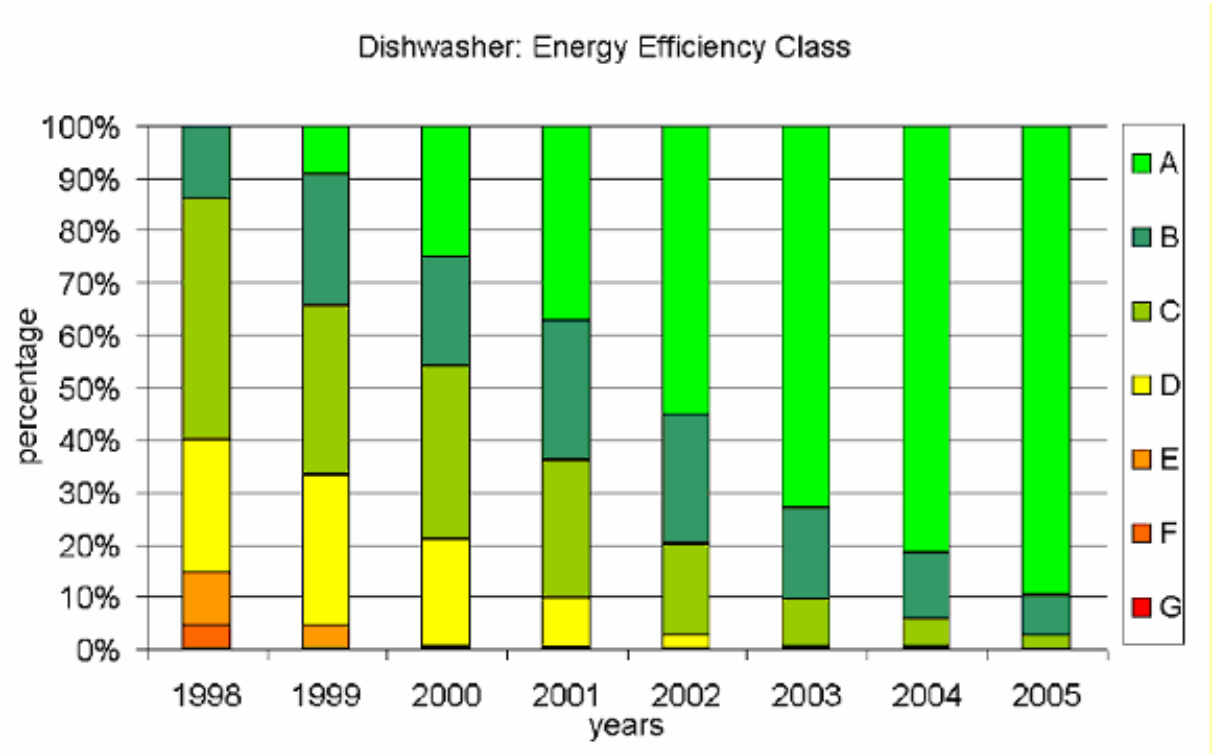
---

13 CECED Voluntary Commitment on Reducing Energy Consumption of Household Dishwashers – November 1999, downloadable from www.ceced.org

14 See CECED press release on 21 March 2007, "Top executives Discontinue Voluntary Energy Efficiency Agreements for Large Appliances", downloadable from http://www.ceced.org.

15 See among others ANEC/BEUC contribution to the revision of the Energy-using Products Directive (Dir. 2005/32/EC), *Consumer interests in Eco-design (of energy-using products),* Sylvia Maurer, 2008

Figure 1: Market distribution of dishwashers by energy efficiency classes



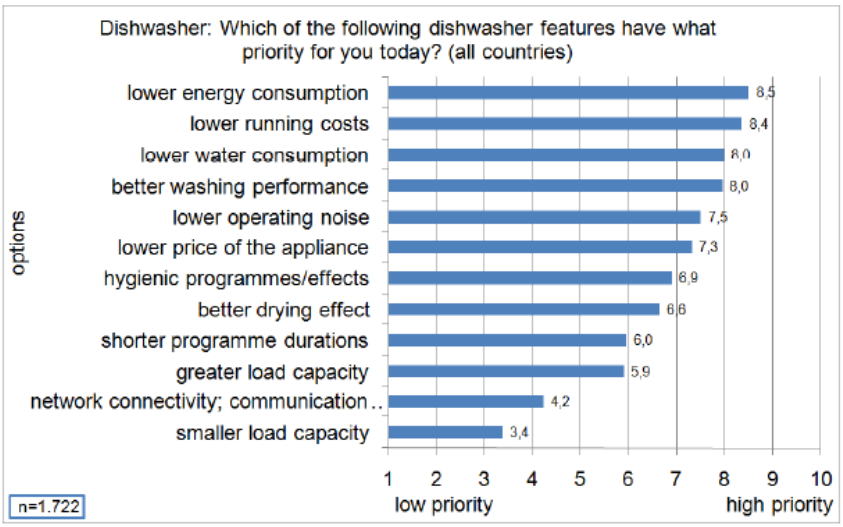
Source: Preparatory study, task 2, p.88

When assessed per size category it becomes apparent that already in 2005 in almost[16] every category half or more of the appliances are energy class A. In the 9 and 12 place settings categories (that make up over 94% of the market in 2005) nine out of ten machines are class A. This can be called a **regulatory failure** as due to an outdated labelling scheme there are no market incentives to further improve energy efficiency of dishwashers and there is no comprehensive label for consumers when choosing their dishwasher. There is indeed in the current system, limited means for manufacturers to claim higher energy performances than current class A, hence convince consumers to pay more for lower energy using products (energy savings imply higher purchase costs). In this situation, it appears rationale for manufacturers not to place dishwashers on the market above the threshold necessary to be classified in energy efficiency class A.

The stand-still in development of energy efficiency of dishwashers is undoubtedly a sub-optimal situation since consumer surveys reveal that energy consumption is one of the main criteria in consumers purchasing decision (Figure 2).

[16] The only exception is the 5 place settings machines, a machine with extremely low sales (in 2005).

Figure 2: purchasing criteria of consumers



Source: Preparatory study, task 2, p.104

Other performance aspects

Although less pronounced, the clustering of dishwashers in energy efficiency class A appeared also for cleaning and drying performances. Technological improvements led to the situation in 2005, where 90% of the appliances were in cleaning performance class A, and 95% in drying performance class A or B (60% were in drying performance class A).

Trade-offs may exist between energy improvements and other performances of dishwashers. The inclusion of a ranking of cleaning and drying performances partly responded to this problem but no ranking was initially provided for noise emission thus giving it less visibility. In a situation where energy improvements become increasingly difficult to achieve, the current labelling scheme seems to deprive manufacturers from a valuable differentiation criterion. As illustrated in Figure 2 above, lower operating noise was indeed given a high priority by consumers.

Finally, no ranking of water consumption was initially provided on the ground that there is a positive relationship between water and energy consumption (lower energy consumption is directly related to lower water consumption, because there is less water to heat for the washing cycles). In addition, improvements on water consumption may be achieved at costs of the cleaning performance of dishwashers which may have negative impacts on health.

However not all water consumption is linked to energy consumption, e.g. cold rinses add significantly to the total water consumption but have little impact on energy consumption. A market survey performed by the UK Market Transformation Programme showed indeed that there is a great variability in water consumption of dishwashers in the same energy efficiency class A. This appears to be a sub-optimal situation since water consumption is one of the main purchasing criteria of consumers as highlighted in Figure 2 above.

2.2.2 Negative externality

Negative externality related to energy use: not all environmental costs are included in electricity prices. That is why consumer (and producer) choices are made on the basis of lower electricity price not reflecting environmental costs for the society.

2.3 Grounds for an implementing measure

Taking into account on one hand the strong market demand for more efficient appliances and on the other hand the rejection of a new Voluntary Commitment as an alternative to address the environmental impact of dishwashers, Member States, the industry and consumer organisations have asked for both, a revision of the labelling directive and the adoption of eco-design requirements.

The ecodesign framework Directive sets in Article 15 §1 and 2 the criteria upon which a new implementing measure on ecodesign may be adopted:

(1) the energy using product shall "represent a significant volume of sales and trade, indicatively more than 200 000 units a year";

(2) it shall "have a significant environmental impact within the EU";

(3) it shall "present significant potential for improvement in terms of its environmental impact without entailing excessive costs, taking into account in particular:

- the absence of other relevant EU legislation or failure of market forces to address the issue properly;
- a wide disparity in the environmental performance of energy using products available on the market with equivalent functionality."

2.3.1 Dishwasher volume of sales & trade

The total sales of domestic dishwashers in the EU-27 is close to 6 million units in 2005, which is far beyond the indicative threshold of 200 000 units set by the ecodesign framework Directive to define whether the sales volume are significant. With an average product price of 544 EUR (incl. VAT, 2005) the total annual trade represents a value of 3264 million EUR (3.2 billion).

As illustrated in table 1, the majority of dishwashers' model placed on the market in 2005 had a capacity of 12 and 9 place settings[17].

[17] See definition of 'place settings' in box 2

Table 1: Models by energy efficiency class and place settings

Place settings	% of models in energy class			number of models	% of models
	A	B	C	technical database	
(number)					
4	48%		52%	25	0.58%
5		100%		7	0.16%
6	84%	16%		19	0.44%
8	47%	53%		17	0.39%
9	86%	9%	5%	530	12.21%
10	90%		10%	59	1.36%
12	91%	7%	2%	3552	81.81%
14	100%			27	0.62%
15	100%			106	2.44%
Overall	89,8%	7,6%	2,6%	4342	100%

Source: Task 5, table 5.8 (p.18)

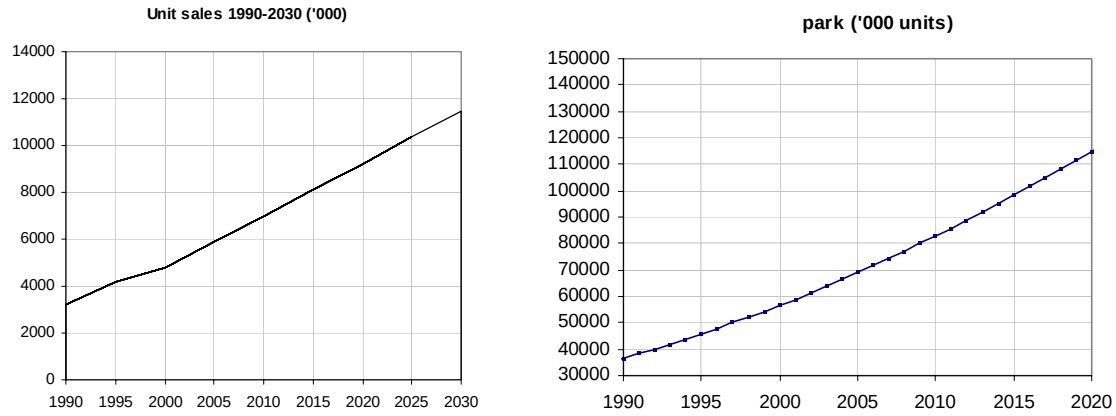
The sales show a continuing growth, indicating that the EU27 market for dishwashers has not met its saturation point yet. In Western-Europe penetration rates of 40 to 50 and even 60% are not uncommon and still rising (albeit at a somewhat slower pace). In Eastern-Europe there is still a large untapped potential with lower penetration rates starting at 2-3% for some countries. The sales are therefore a mix of replacement sales and new installations, depending on which country is considered[18].

[18] See preparatory study, task 2, p. 33-40.

Baseline scenario (BAU)

For the Baseline scenario-analysis (results in Chapter 5) the sales are assumed to grow with the same factor as between 2000 and 2005, contributing to a stock or installed base of around 115 million appliances in the EU 27 in 2020. This calculation of stock is aligned to that of the preparatory study. The stock calculation is thereby based on an average product life of 15 years.

Figure 3: Baseline sales ('000) and installed stock ('000)



2.3.2 Dishwasher environmental impact

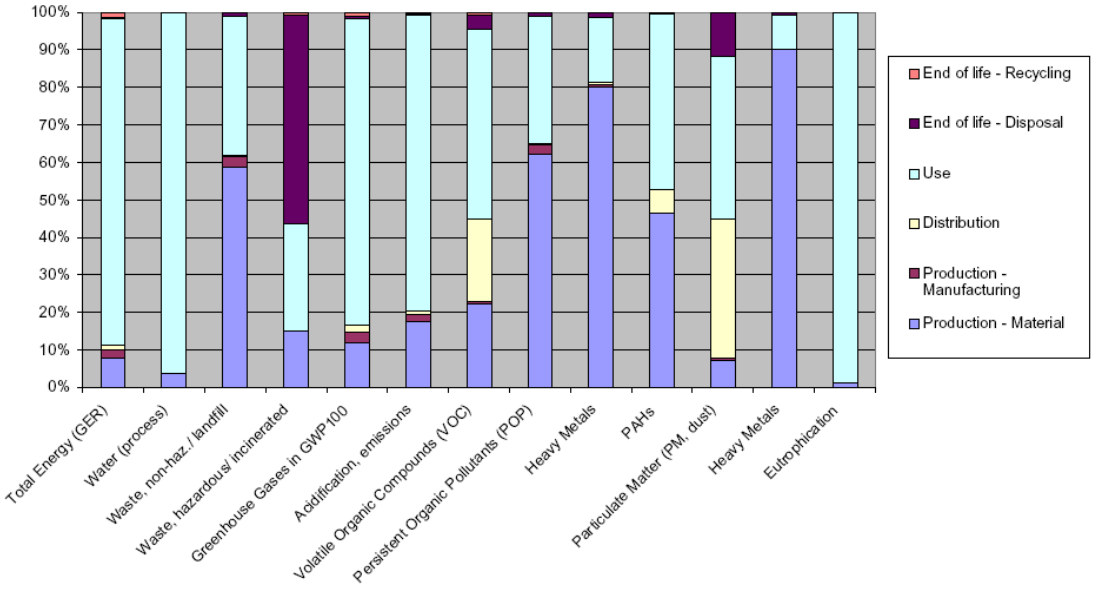
A life-cycle analysis (LCA) was run within the preparatory study to identify the environmental impact of dishwashers following the methodology defined in the ecodesign framework Directive, annex I, part 1. The life cycle analysis was based upon:

- the definition of 2 bases cases representative of the most common dishwashers on the market: a 9 place settings (ps) machine and a 12 ps machine;
- inventory tables received from manufacturers that include data on raw material, manufacturing, transport, distribution, use and end-of-life of the base case appliances;
- aggregation of the results using the EuP EcoReport and the SimaPro software.

The analysis illustrated in figure 4 shows that for most environmental impact categories the most dominant phase is the use-phase, except for the emissions of hazardous substances and waste which are mainly production related (production of raw materials and manufacturing).

The use-phase is characterised by high (over 90% of total) energy related emissions (such as greenhouse gas and acidifying emissions). Water consumption over the lifecycle is also highest in the use-phase (95% of total).

Figure 4: Life cycle impacts of 12 place settings dishwasher



Source: Task 5, p.55

The use of (product related) hazardous substances during the production phase is dealt with by Directive 2002/95/CE on the Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS Directive).

The end-of-life phase is addressed in the Waste of Electrical and Electronic Equipment Directive 2002/96/CE (WEEE Directive). Since dishwashers comprise many materials that are recyclable and have a very high economical value (e.g. stainless steel, aluminium, copper), the majority of materials are recycled at the end-of-life. The WEEE Directive states that entities responsible for bringing onto the market of dishwashers are also responsible for adequate take-back.

Considering the total scope of product policies already in place, covering many aspects of lifecycle emissions (RoHS and WEEE), it appears appropriate to focus ecodesign requirements on energy consumption and possibly water.

Baseline scenario

The baseline scenario indicates that the total energy and water consumption of dishwashers will respectively grow by 40% and 25% in 2020, due to a growing stock (see detailed assessment in section 5). The scenario is based upon average 220 cleaning cycles per year[19] and includes a correction for real-life energy consumption of 1,06 (from 2005 on).

- Electricity: in 2005 26 TWh (equivalent to 233 PJ primary energy), in 2020 34 TWh (307 PJ primary energy);

- CO_2 Emissions: in 2005 13 mton, in 2020 18 mton;

[19] Which corresponds to the real life behaviour of end-users. The preparatory study identified an average of 4,1 cycles/week (see task 3, p. 68).

- Water consumption (use phase only): in 2005 308 million m^3, in 2020 389 million m^3.

2.3.3 Potential for improvement

Energy consumption

With 90% of products in energy efficiency class A (see tables 1 and 2), there is a limited disparity in the energy performance of dishwashers currently available on the market. This may imply that the third criterion of the Ecodesign Directive is not met.

The identified market failure(s) indicate however that this situation may in fact result from outdated energy efficiency classes.

Water consumption

In water consumption certain disparity also exists: the range in water consumption of dishwashers within the same size (same number of place settings) clearly indicates room for improvements.

Table 2: Energy and water consumption of dishwashers by size in 2005

Place settings (n)	Energy consumption (kwh/cycle)			Water consumption (lire/cycle)			% model share
	average	min	max	average	min	max	
4	0,609	0,510	0,700	10,8	9,5	12,0	0,58
5	0,680	0,680	0,680	12,0	12,0	12,0	0,16
6	0,649	0,630	0,750	7,3	7,0	9,0	0,44
8	0,814	0,740	0,880	12,1	11,0	13,0	0,39
9	0,828	0,800	1,100	13,7	10,0	19,0	12,2
10	1,050	1,010	1,400	13,5	12,0	19,5	1,36
12	1,070	1,010	1,450	15,2	9,0	20,0	81,8
14	1,081	1,080	1,090	13,1	11,0	15,0	0,62
15	1,100	1,100	1,100	14,4	13,0	15,0	2,44
average/total	1,035			14,9			100

Source: Preparatory study, task 5, p.14

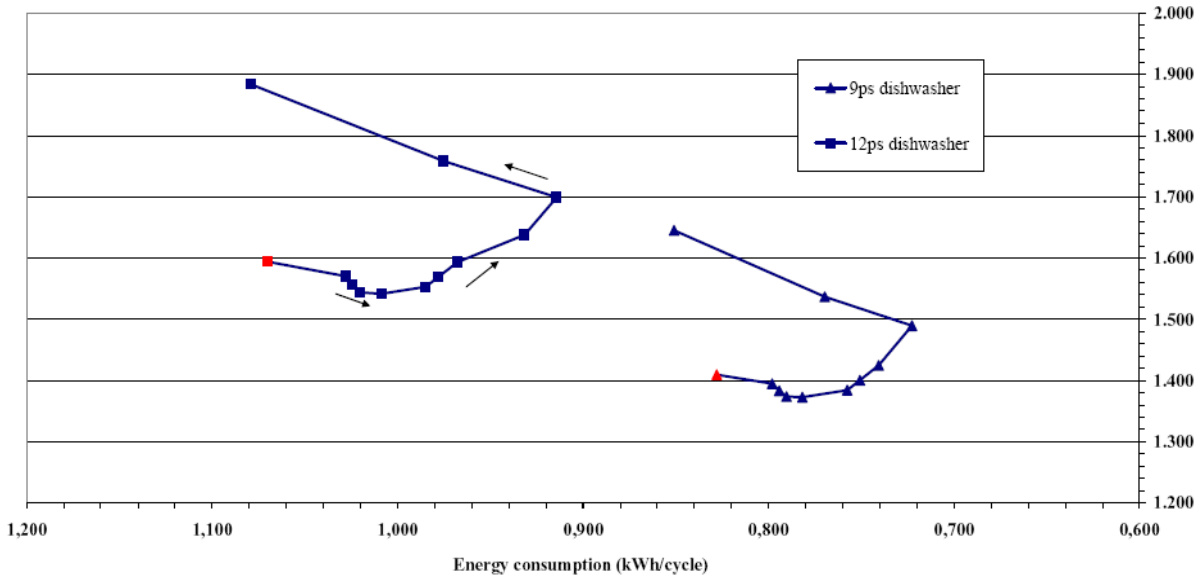
2.3.3.1 Life cycle cost analysis

A list of possible technological innovations (already applicable and/or estimated to be available in the future) that improve energy consumption of dishwashers has been gathered in

close cooperation with manufacturers, together with the price increase and environmental impact of each of the identified technological option[20].

Applied to the 9 and 12 ps standard base cases, which represent the average dishwashers on the market, it is possible to identify the lifecycle costs (LCC) for each (combination of) options that reduce the energy consumption. The following graph illustrates the results of the analysis[21].

Figure 5: Life cycle costs of options by energy consumption (kWh/cycle)



Source: Preparatory study, task 6, p.42

– The first point on the left of the life cycle cost curves represents the base case appliances with current life cycle costs;

– The lowest point on each curve indicates the least life cycle cost point (LLCC);

– The points at the furthest right indicate consumption values at which the life cycle costs have increased beyond that of the original base case applying the best available technologies (BAT) on the market in 2005;

– Above the BAT level, technological options are applied to reduce noise emissions. Since there is a trade-off between noise reduction and energy efficiency, noise reductions results in an increase in the energy consumption.

The preparatory study did not assess in-depth the effects of reducing energy consumption on cleaning and drying performance, but possible detrimental effects of energy saving options on overall product performance have been considered while selecting technological options that

[20] See results in the preparatory study, task 6, p.52-59.

[21] Key economic assumptions: product life: 15 years; cycles per year: 280; discount rate: 5%/year; electricity price: 0,17 €/kWh; water price: 3,7€/m3; detergent, softener, rinsing agent: 2,34 €/kg, 0,6 €/kg and 2,4 €/kg respectively; maintenance and repairs: 5,5€/year; disposal and recycling: 61 €/life (at end of life); average 12 ps machine price: 548,4 €; average 9 ps machine price: 520 €.

make up the LLCC and BAT levels. In doing so, the LLCC and BAT levels represent machines with equivalent performances as the base case machines. The market has also proven to be able to raise both energy efficiency and cleaning/drying performances (see Task 2, figure 2.84, 2.85 and 2.86).

According to the methodology laid down in the Ecodesign Framework Directive Annex II, minimum energy efficiency requirements should aim at the point of LLCC for end-users, provided there are no significant negative impacts on the parameters listed in article 15 (5)[22].

The life cycle costs which include the purchase price together with the operating costs of the appliance (assuming a 15 years product life) confirm that the $LLCC_{av}$ level is cost-effective with a relatively short payback time, between 3 and 4 years. It is assumed in addition that the combined effect of the labelling scheme (together with the ecodesign requirements) will drive innovation and progressively reduce the costs of technological options, hence the purchase price and the marginal payback time for consumers. Section 6.4 discusses the aggregated impact of policy options on consumers.

The sensitivity analysis performed within the preparatory study - with different assumptions for the electricity price, at 0,10 €/kWh and 0,25 €/kWh (compared to 0,17 €/kWh in the scenario presented above); water price at 3,7 €/m3, 4,8 €/m3 and 2,6 €/m3; product life of 10, 12 and 17 years (compared to 15 years assumed in the scenario presented above) and the number of cleaning cycles per year at 208 and 220 in addition to the 280 assumed - confirms the validity of the point of Least Life Cycle Cost identified[23].

LLCC level

Table 3 gives an overview of the levels achieved at LLCC with an average noise emission of 50 dB. The cost-effective level of energy improvement is 6% for both base cases. The energy consumption levels of the base cases correspond to the current threshold of energy efficiency class A.

This consumption level will be the target for the ecodesign implementing measures. Note that the water consumption at LLCC level has also been reduced by up to 28% because many design options aim to reduce the hot water consumption, thereby reducing both energy and water consumption.

Table 3: Energy and water consumption at LLCC level (on average standard base case)

	Energy consumption (kWh/cycle)			Water consumption (L/cycle)			Purchase price (EUR)		
Standard average base case	Base case	$LLCC_{av}$	Change	Base case	$LLCC_{av}$	Change %	Base case	$LLCC_{av}$	Change %

[22] "Concerning energy consumption in use, the level of energy efficiency or consumption will be set aiming at the life-cycle cost minimum to end-users for representative EuP models, taking into account the consequences on other environmental aspects".

[23] Preparatory study, task 6, p. 91

			%						
9ps	0,828	0,782	-6%	13,7	10,3	-25%	520,0	542,7	+4,4%
12ps	1,070	1,009	-6%	15,2	11,0	-28%	548,4	571,1	+4,1%

Source: preparatory study, task 6, table 56.13, p.40

BAT level

Additional energy savings can be reached by applying energy saving technologies beyond the point of LLCC. The design of the energy efficiency classes of the labelling scheme should reflect these levels so as to give incentives for further innovations.

Table 4 indicates the level of energy consumption achievable applying the best available technologies (BAT) on the market (i.e. technologies already commercialised) assuming a level of noise emissions at 50 dB.

The BAT level represents savings of 13% to 15% when compared to the base cases and 10-11% when compared to the LLCC levels.

This consumption level should be the short-term target for labelling of efficiency classes above the LLCC/ecodesign target level.

Table 4: Energy and water consumption at BAT level (on average standard base case)

	Energy consumption (kWh/cycle)			Water consumption (L/cycle)			Purchase price (EUR)		
Standard average base case	Base case	BAT_{av}	Change %	Base case	BAT_{av}	Change %	Base case	BAT	Change %
9ps	0,828	0,723	-12,7%	13,7	9,9	27,7%	520,0	692,6	+33,2
12ps	1,070	0,914	-14,6%	15,2	10,6	30,3%	548,4	779,5	+42,1

Source: preparatory study, task 6, table 6.14, p.40

The price increase for the BAT-products appears for the time being detrimental to expect a quick take-up of these products on the market due to a very long marginal payback time (> 19 years, Task 6, table 6.27, p.66). The level of BAT is however the level towards which the market may be progressively driven if a revised, more effective, labelling scheme were introduced. In addition, the purchase price of the BAT_{av} should decrease over time with maximum probability, once the new technologies become mass production.

BNAT level

BNAT (acronym for Best Not Yet Available technologies) is used to indicate the energy efficiency level by applying technologies that are known, but have not yet been commercialised.

Various levels of BNAT have been identified, depending on the technological pathway (mutually exclusive technologies lead to different 'pathways') and the noise emission levels achieved. Table 5 shows the BNAT level with the least life cycle costs.

Table 5: Energy and water consumption at BNAT level (average standard base case)

	Energy consumption (kWh/cycle)			Water consumption (L/cycle)		Purchase price (EUR)		
Standard average base case	Base case	$BNAT_{av}$	change %	Base case	BAT_{av}	Base case	BNAT	change %
9ps	0,828	0,522	-36,9%	13,7	9,9	520,0	692,6	+33,2
12ps	1,070	0,700	-30,5%	15,2	10,6	548,4	779,5	+42,1

Source: preparatory study, table 6.63, p.128

2.3.3.2 Low power modes

Low power modes have not been taken into account in the current labelling scheme. Although few data are currently available on the actual energy consumption of low power modes, it is known that that there is a wide range of performances of left-on power consumption varying, for example for 12 ps dishwashers, between 0,5 and 3.2 W (see section 5.2.4 for further analysis)[24].

2.3.4 Conclusion

The scrutiny of criteria enshrined in Article 15 (2) of the ecodesign framework Directive shows that dishwashers qualify for the adoption of an implementing measure setting new ecodesign requirements:

– sales and trade of dishwashers in the EU is significant (6 million units in 2005, value of 3.2 billion EUR).

– the environmental impacts are significant (25 TWh of electricity used in 2005, CO_2 emissions of 13 mton, water consumption of 308 million m3);

[24] Data collected on the German "ecotopten"-website (http://www.ecotopten.de/prod_spuelen_prod.php) for appliances listed in March 2008..

– the potential for improvement is significant (6% cost effective energy savings in the short term, 13-15% in the medium term, 30-40% for the longer term) and can be realised without compromising overall product performance.

2.4 Legal basis for EU action

Article 16 of the ecodesign framework Directive provides the legal basis for the Commission to adopt an implementing measure on this product category.

3. OBJECTIVES

3.1 General, specific and operational objectives

As laid out in Section 2, the preparatory study has confirmed that a cost-effective potential for reducing energy consumption of dishwashers exists. There is potential for water savings as well, but it should be assessed in light of other performance requirements such as the cleaning performance. This potential is not realisable with the current market measures and initiatives, as outlined above.

The **general objective** is therefore to develop a policy which corrects the market failures, and which:

– reduces energy consumption and related CO_2 and pollutant emissions by domestic dishwashers following EU environmental priorities, such as those set out in Decision 1600/2002/EC or in the Commission European Climate Change Programme (ECCP);

– promotes energy efficiency hence contribute to security of supply in the framework of the EU objective of saving 20% of the EU's energy consumption by 2020.

The **specific objectives** are to:

– remove least efficient products from market;

– promote market take-up of more energy efficient dishwashers for domestic use;

– maintain and support the past market trend towards more energy efficient dishwashers in addressing the current regulatory failure;

– drive further investments in new technologies towards environmental friendly dishwashers;

– support improvements on the energy consumption of low power modes.

The **operational objectives** are to address some of the problems resulting from the current labelling scheme (no classes present for more efficient machines, discontent with measurement uncertainty, calculation method of the energy efficiency index etc.) and comply with the requirements laid down in the Ecodesign Directive, Article 15 (5):

– there shall be no significant negative impacts, from the perspective of the user, on the functionality of the product such as cleaning and drying performances or noise emissions;

– health, safety and the environment shall not be adversely affected;

– there shall be no significant negative impact on consumers in particular as regards affordability and life cycle cost of the product;

– there shall be no significant negative impacts on industry's competitiveness;

– in principle, the setting of an ecodesign requirement shall not have the consequence of imposing proprietary technology on manufacturers;

– no excessive administrative burden shall be imposed on manufacturers.

– Section 4 describes which policy options have been validated to meet these objectives.

3.2 Consistency with other EU policies

Increased market take up of energy efficient dishwashers, through the introduction of new energy efficiency requirements and possibly a revised energy labelling scheme will contribute to reach the 20% energy savings potential identified by 2020 in the Energy Efficiency Action Plan (COM(2006) 545). The European Economic Recovery Plan (COM(2008) 800)[25] in addition mentions energy efficiency as one of the key priorities, in particular the promotion of the rapid take-up of "green products".

Interrelation with product specific ecodesign implementing measures

This product specific implementing measure has relation with the Commission Regulation N° 1275/2008 of 17 December 2008 *implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment*, since it deals with two low power modes, namely 'off mode' and 'left on mode' (see box 1 above).

It was decided to exclude dishwashers equipped with a sensor based safety function (designed to avoid water leakages) from the horizontal requirements on stand-by which are laid down in that Regulation[26]. The proposed new algorithm developed for the ecodesign measure on dishwashers considers the overall annual energy consumption including the energy consumption of the two most important low power modes (the "off mode" and "left on mode"). The measurement method referred into the standby Regulation is the basis for the evaluation of the duration and the power consumption of the two modes.

In addition, if the machine does not provide in such protection function(s), it is proposed to declare the standby Regulation applicable so that the two modes are subject to the specific requirements of the standby Regulation.

4. POLICY OPTIONS

This Chapter describes the policy options, both discarded and proposed, that have been considered in the context of this Impact Assessment.

---

25 Published in 26.11.2008

26 OJ L 339, 18.12.2008, p. 45.

4.1 Policy options discarded

- **No EU action**

This option would have the following implications.

– The regulatory and market failures would persist. The impact of this option is described in more detail in Section 2, as the Baseline scenario.

– It is to be expected that Member States would want to take individual, non-harmonized action on wet-appliances such as dishwashers. This would hamper the functioning of the internal market and lead to high administrative burdens and costs for manufacturers, in contradiction to the goals of the Ecodesign Framework Directive.

– There is a risk of competitive disadvantages, in particular for very price sensitive products, for those manufacturers designing their products to good standards vis-à-vis competitors not using technology leading to such low energy consumption.

– The specific mandate of the Legislator (Article 15.1) would not be respected despite the fact that: all criteria of Article 15.2 setting the rationale for an implementing measure are met.

Therefore this option is discarded from further analysis.

The "Business-as-usual" scenario is based upon this option and provides the reference or baseline for the proposed other scenarios.

- **A new Voluntary Commitment**

This option is discarded for the following reasons.

– Relevant voluntary initiatives have been terminated in 2004 by industry (see section 2.1). No new initiative for self regulation has been brought forward by the relevant industrial sector. The sector advocated against such an initiative.

– The industry expressed a need for a clear legal framework ("level playing field") ensuring fair competition, while voluntary agreements could lead to competitive advantages for free-riders and/or non-participants to the "self-commitment" (large share of the actors in "fragmented" markets like household products).

– The specific mandate of the Legislator (Article 15.1) would not be respected despite the fact that: all criteria of Article 15.2 setting the rationale for an implementing measure are met.

- **New ecodesign requirements only (without revising the labelling scheme)**

This option is discarded for the following reasons:

– The adoption of new ecodesign requirements will ban from the market the most energy consuming appliances but will not provide for a dynamic framework for further investments in energy improvements while the arguments to do so still persist (consumer demand for visibility of more efficient appliances, competitive advantages for industry).

– The industry, consumer organisation and Member States, in the consultation forum have repeatedly asked for a combined revision of both measures (labelling and ecodesign).

- **Revised labelling scheme only (with no new ecodesign requirements)**

In general the two main objectives of labelling schemes are to increase the market penetration of, in this case, energy efficient products by providing incentives for innovation and technology development, and to help consumers to make cost effective purchasing decision by addressing running costs. Energy labelling pursuant to the Energy labelling Directive creates market transparency, fosters awareness of consumers and creates incentives for manufacturers for innovation.

This option is however discarded for the following reasons:

– A labelling scheme alone does not ensure that cost effective improvement potentials are realised quickly for all products on the market, implying that the full energy and cost savings potential is not captured.

– The speed of the market transformation is entirely determined by the voluntary take-up of labelled products. The market transformation due to the implementation of the labelling scheme will not be driven forward by the 'pushing' effect from ecodesign requirements setting minimum energy efficiency thresholds.

– The industry, consumer organisation and Member States, within the impact assessment and the consultation forum have repeatedly asked for a combined revision of both measures (labelling and ecodesign).

– Member States could set minimum requirements individually, and the administrative burdens for manufacturers would be higher when compared with the burdens associated to ecodesign requirements.

– The specific mandate of the Legislator (Article 15.1) would not be respected despite the fact that: all criteria of Article 15.2 setting the rationale for an implementing measure are met.

4.2 Policy option proposed

The policy option which is most recommended and advocated by a majority of stakeholders is the following.

- **Revise simultaneously the labelling scheme and introduce ecodesign requirements in a harmonised approach**

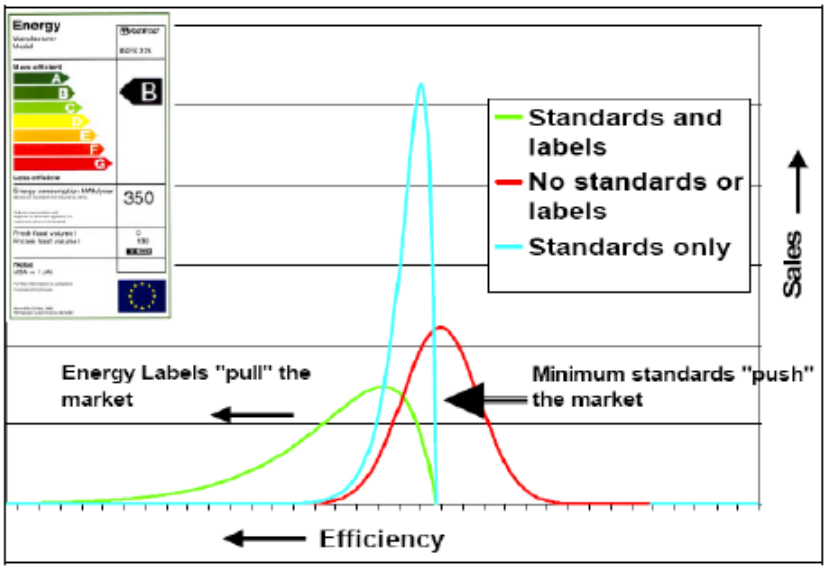
The simultaneous introduction/revision of both measures (ecodesign and labelling) will ensure that:

– the introduction of ecodesign measures will have the effect that the least efficient models are removed from the market. The simultaneous revision of the labelling scheme ensures that the revised scheme is adapted to the impacts of proposed ecodesign measures on the market and should ensure that the label is able to function as a market tool to drive dishwasher efficiency;

– a synergic effect of the pushing effect of the eco-design specific requirements and the pulling effect of the new labelling energy efficiency scale, according to the qualitative but well experienced relation illustrated in figure 5;

– complies with the demand of stakeholders for a harmonisation/rationalisation of both measures.

Figure 6: Cumulative impact of ecodesign and labelling



Source: IEA, P. Waide, International use of policy instruments: country comparisons, Copenhagen, 05 April 2006

5. ANALYSIS OF IMPACTS

This section discusses the appropriate levels of ecodesign requirements and labelling.

5.1 Policy Proposal

A proposal following the lines set out in the preparatory study was presented and discussed in the Consultation Forum meeting which was held on 4 December 2008. Comments were received and considered by the Commission to form a refined calculation method for the Energy Efficiency Index which is presented in Annex IV. The proposal below is based on that revised calculation methodology.

5.1.1 Ecodesign requirements

As highlighted in preceding sections, the minimum energy efficiency requirements should be set at the point of LLCC which was identified at 0,782 kWh per cycle for 9ps dishwashers and 1,009 for 12 ps dishwashers (see table 3 above). Including the low power modes consumption (estimated at 12 kWh/year) and using the new EEI formula, this means an EEI at 63.

Since the setting of mandatory requirements should obviously not set "significant negative impacts on industry's competitiveness" as underlined in Article 15 (5), the time line set for the application of the energy efficiency requirements should take into account the design cycle and production platform change of the industry (between 4 and 5 years).

The LLCC could therefore be set as mandatory requirements either 6 years after the entry into force of the implementing measure or after 3 years (which put greater pressure on the industry but appears realistic given the starting date of the preparatory study in 2006 and the finalisation of the measures in 2010). Assuming the implementing measure is adopted in 2009, this would mean that the implementation date for the second stage could be set in 2013 or 2016.It is proposed to set a transitory mandatory requirement one year after entry into force. Such a tight timing (far below the 4 to 5 years platform production changes of the industry) does not allow banning out of the market a great number of products, but would aim at facilitating the transition between the current labelling scheme and the new one, especially with the new EEI formula. It would harmonise in particular the documentation ('technical file') to be provided by manufacturers for market surveillance purposes and ensure that the same calculation method for the EEI is used at the same time for both legislative initiatives (labelling and ecodesign). It would also guarantee that no products below that level are placed on the market. The most important effect of the combination of stage 1 and introduction of revised energy labelling classes would be to put again into motion the market mechanism of energy labelling, because classes beyond the current class A could become available already one year after entry into force. The market thus can develop like it did before - through the energy labelling mechanism - and prepare itself for the second stage.

Since a harmonised approach was advocated by all stakeholders, the second stage (EEI=63) should define the threshold of one energy efficiency class, and the first stage of the requirements should be aligned to the threshold of the preceding energy efficiency class. The analysis below on the design of the energy efficiency classes of the proposal concludes that this level should be set at EEI=71, which is 11% higher than EEI 63 (63/(1-0,11)=71) and in conformity with the proposed bandwidth of labelling classes.

This first stage requirement would phase out around 15% of the models available in 2005 (assuming 1 W (off) and 2 W (left on) low power modes). These are mainly models that are currently labelled energy class B and C (or worse).

The two sub-options analysed in this Impact Assessment differ as regards the measures for dishwashers of 10 ps and a width of less than 45 cm and for really small dishwashers (less than 8 place settings) since stakeholders have argued that these specific models (with a market share too small to warrant a separate base case definition) would not be able to meet the EEI 63.

Table 8 summarizes the ecodesign requirements of the proposal with the different timelines for the implementation of stage 2 and a third stage 3 (A/B). The limited scope for energy efficiency improvement above the level of LLCC, indicates that no tighter requirements appear cost-effective. The labelling scheme will provide the necessary incentives for further improvements.

Table 8: Ecodesign requirements in proposal

Proposal A		Proposal B	
Stage 1	2011: All dishwashers EEI < 71	Stage 1	2011: All dishwashers EEI < 71, except for dishwashers with 10 ps and width <45 cm : EEI <80
		Stage 2	2013: All dishwashers of >10 ps/>45 cm: EEI <63, 10ps/<45cm: EEI <71.
Stage 2	2016: All dishwashers EEI < 63	Stage 3	2016: 8-9 ps dishwashers and 10 ps dishwashers with width <45cm : EEI < 63

5.1.2 Energy labelling proposal

This section considers only the thresholds of the energy efficiency classes, it is not in the scope of this impact assessment to discuss their name nor the layout of the label in general. Table 9 shows the current labelling scheme.

Table 9: Energy efficiency classes as set out in Directive 97/17/EC

class	G	F	E	D	C	B	class A
threshold (EEI)	more than 1,24	less than 1,24	less than 1,12	less than 1,00	less than 0,88	less than 0,76	less than 0,64
	kWh/cycle						
4	>1,004	<1,004	0,907	0,810	0,713	0,616	0,518
5	1,116	1,116	1,008	0,900	0,792	0,684	0,576
6	1,228	1,228	1,109	0,990	0,871	0,752	0,634
8	1,451	1,451	1,310	1,170	1,030	0,889	0,749
9	1,562	1,562	1,411	1,260	1,109	0,958	0,806
10	1,984	1,984	1,792	1,600	1,408	1,216	1,024
11	2,015	2,015	1,820	1,625	1,430	1,235	1,040
12	2,046	2,046	1,848	1,650	1,452	1,254	1,056
14	2,108	2,108	1,904	1,700	1,496	1,292	1,088
15	2,139	2,139	1,932	1,725	1,518	1,311	1,104
17	2,201	2,201	1,988	1,775	1,562	1,349	1,136

The current labelling scheme applied a constant reduction of EEI of 0,12 index points per class. This means however that the absolute step of 0,12 points becomes a relative larger step when the EEI becomes smaller (when the machine is more efficient). This stands in contradiction with the fact that the amount of investments necessary for a given energy efficiency gain becomes increasingly high the higher the classes become (rising marginal cost curve). This approach is sustainable as long as the energy efficiency improvements are not too ambitious, but at one point the relative improvement of energy efficiency may become so high, so that the gain to go up one class loses its attractiveness for manufacturers: the technological investments necessary to achieve a higher class become disproportionate compared to the expected gain (of winning market share thanks to the gain of one class). In other words, going from current class D to C corresponds to an investment needed for (1-(0,88/1,00)*100) 12% efficiency improvement, whereas going from current class B to A corresponds to an investment needed for (1-(0,64/0,76)*100) 15,8% improvement of energy efficiency. In the current system the more efficient one gets, the 'higher' the step is to the next label class.

The revision of the labelling scheme therefore could consider the revision of the bandwidth of the energy efficiency classes to take into account this parameter.

The analysis performed in section 2.2.3 identified the BAT and BNAT levels which are summarised in table 10 below. Those levels designate the energy efficiency performance of dishwashers towards which the market may be reasonably driven in the short to long-run. The design of the energy efficiency classes should therefore reflect these levels.

Table 10: BAT and BNAT energy consumption levels of dishwashers per cycle

	Energy consumption (kWh/cycle)		
Standard average base case	Base case	BAT_{av}	$BNAT_{av}$
9ps	0,828	0,723	0,522
12ps	1,070	0,914	0,700

For the purpose of this impact assessment, a possible classification for the energy efficiency classes is discussed (Table 11). Other thresholds may be considered depending on the outcome of the comitology procedure provided that they are in line with the potential for long-term improvements identified above and with the proposed levels of minimum energy efficiency requirements. Table 11 presents the proposed new energy efficiency classes together with the reference consumption values as applied in proposal A/B and the derived energy consumption per cycle (assuming 12 kWh per year low power energy consumption). The EEI threshold of the current labelling scheme can not be compared with the EEI threshold of this proposal; this is why the corresponding energy consumption (per annum and per cycle) is given.

The bandwidth of the label classes is now set at a continuous 11% improvement per class (a small error is allowed for a two decimal resolution of EEI). This means that the necessary investments to gain a class are evenly spread with a continuous pace of improvement of 11%.

The classes are spaced more than 10% apart, because 10% is the verification limit and a higher label class width avoids discussions of appliances being declared two label classes too high.

The classes are indicated by characters (A-D).

Table 11: Energy efficiency classes of the Proposal and corresponding energy consumption by size category

Energy efficiency class	D	C	B	A	D	C	B	A
EEI	71 stage 1	63 stage 2	56	50	71 stage 1	63 stage 2	56	50
settings	Annual consumption				Cycle consumption (indicative) (Low power assumed to be 12 kWh/year)			
4	161	143	127	113	0,53	0,47	0,41	0,36
5	179	159	141	126	0,60	0,52	0,46	0,41
6	197	175	155	139	0,66	0,58	0,51	0,45
8	233	206	183	164	0,79	0,69	0,61	0,54
9	**250**	**222**	**198**	**176**	**0,85**	**0,75**	**0,66**	**0,59**
10	318	282	251	224	1,09	0,97	0,85	0,76
11	323	287	255	228	1,11	0,98	0,87	0,77
12	**328**	**291**	**259**	**231**	**1,13**	**1,00**	**0,88**	**0,78**
14	338	300	267	238	1,16	1,03	0,91	0,81
15	343	304	270	242	1,18	1,04	0,92	0,82
17	353	313	278	249	1,22	1,08	0,95	0,84
AVERAGE ref.cons.	**317**	**281**	**250**	**223**	**1,09**	**0,96**	**0,85**	**0,75**
cycles:	280							
low power:	12 kWhyear							
SAEc:	gradient	constant						
≤ 9	25,2	126						
≥10	7	378						

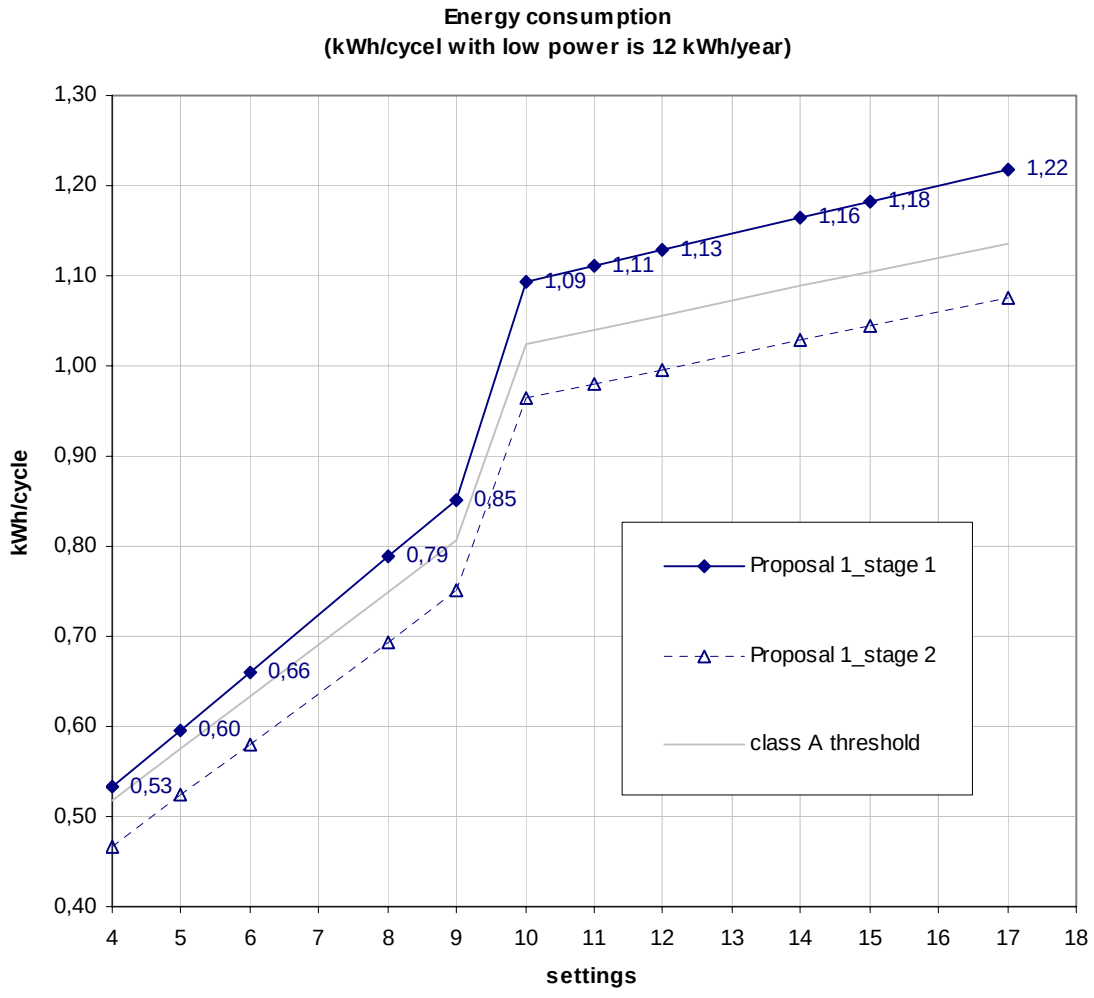
Real consumption	**274**	**243**	**216**	**193**	The real consumption is the average annual consumption for 220 cycles per year (scenario basis) and corrected with +10% for the difference between declared and real average of appliances.

The number of classes is now limited to four (A-D), because the foreseeable improvements in energy efficiency indicate a limited range (from base case to BNAT level). When considering that label classes are spaced 11% apart, four classes remain. The reason is that, unlike the previous labelling scheme, the new proposal is combined with minimum energy efficiency requirements, phasing out the least efficient appliances from the market. Therefore it is logical that fewer classes than before remain on the market.

Further classes may be added, but given the analysis of the Preparatory Study these classes will not be populated in the near future.

Figure 7 presents the indicative energy consumption per cycle (assuming 12 kWh per year in low power mode) for the proposal at stage 1 and 2. Also the current class A values are shown.

Figure 7: Indicative energy consumption per cycle for the proposed energy efficiency requirements stage 1 (EEI 71) and 2 (EEI 63) compared to current class A thresholds



5.2 Other performance aspects

5.2.1 Water consumption

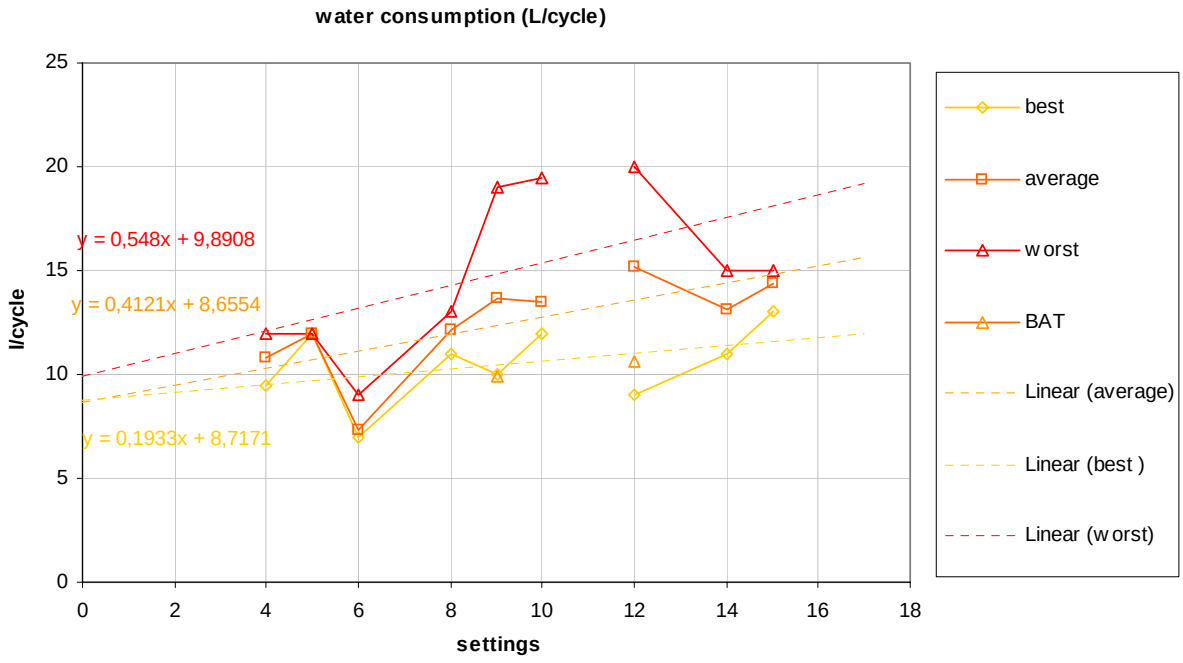
The life cycle analysis performed on dishwashers (see section 2.2.2) highlighted that water consumption over the lifecycle is the highest in the use-phase. The large variation in water consumption of similar sized machines, even in the same energy efficiency class, seems to indicate that there is scope for the setting of minimum requirements.

The figure below shows the water consumption of the 'worst', 'average' and 'best' dishwashers from the 2005 model database, combined with their respective trend lines and the water consumption of the two base cases at BAT level. The Preparatory Study did not investigate the effects of reduced energy consumption on water consumption in size classes other than for the two base cases, nor did it consider options to reduce water consumption (without link to energy consumption, e.g. in the cold rinse cycles).

The overall impression from the figure below is that water consumption is basically linked to the size of the machine (see the trend lines), but that many exceptions to average water consumption trends occur (the 6 ps machines appears very water efficient, the 9, 10 and 12 ps machines have an exceptionally large range, the BAT levels have been surpassed by the best models of 2005, etc.).

Most importantly however is the effect on water consumption of increasing the energy efficiency: As can be concluded from the LLCC analysis (section 2.3.3.1) a reduction of energy consumption simultaneously reduces water consumption. Therefore any measure aiming to reduce the energy consumption towards LLCC levels will have the effect of reducing water consumption as well.

Figure 8: Water consumption per cycle



Considering that any measure regarding water consumption will be combined with measures regarding energy consumption the following three options are possible, each with different advantages and disadvantages (pro's and con's):

Option 1: include water consumption as information on the label (current practice),

– *pro*: no distortion of current practice, consumers have the possibility to include water consumption in their assessment of dishwashers. Water savings: The historical trend shows a reduced water consumption which can be attributed to the effects of the energy labelling scheme (see figure 9 below). This trend is expected to continue once the energy labelling mechanism is back in motion.

– *con*: Water savings will predominantly be induced by energy savings

Option 2: option 1 plus introduction of a maximum water consumption level

– *pro*: extremely high water consumption levels will no longer occur. The combination with the minimum performance for 'cleaning' should avoid a deterioration of appliance performance when water consumption is reduced.

– *con*: although water savings will predominantly occur due to energy measures, there is no direct incentive to reduce non-energy related water consumption (cold rinses etc.). The likelihood of the current variability in water consumption is however expected to reduce .

– *con*: the introduction of a maximum water consumption requirement is briefly discussed in the Preparatory Study but not considered appropriate by the stakeholders involved in that study, the reasons being the uncertainty of side effects on other performance aspects (in particular cleaning and rinsing performance). A 'last minute' introduction of a water consumption requirement could be met by opposition of stakeholders.

– *con*: There is no information on how many appliances would be phased out through a certain threshold (the threshold would probably be positioned above average but there is no data available to link this to a number of machines affected).

Option 3: option 1 plus introduction of a ranking of water consumption performance (based on A-G classes approach)

– *pro*: this option will very likely increase competition on water consumption values, beyond that of option 1 and option 2, because a ranking allows fast comparison of appliance 'water performance'. The combination with the minimum performance for 'cleaning' should avoid a deterioration of appliance performance.

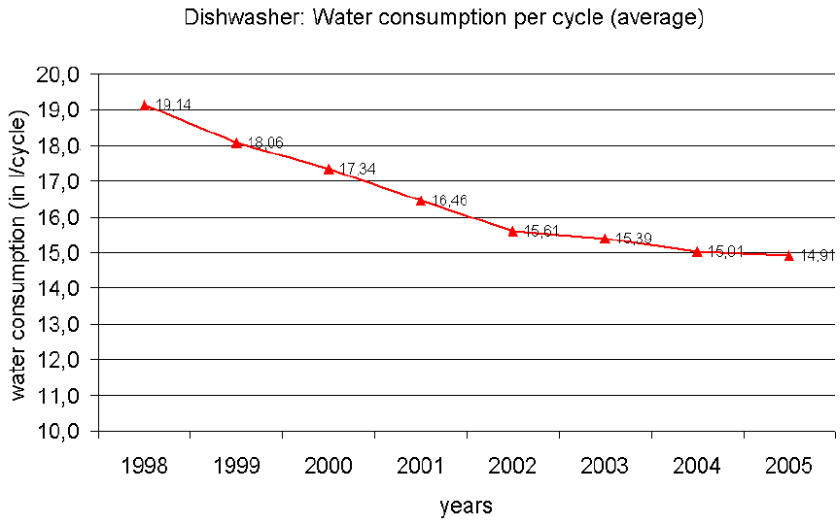
– *con*: the ranking of water consumption is not discussed in the Preparatory Study and apparently not considered appropriate by the stakeholders involved in that study, the reasons being the uncertainty of side effects on other performance aspects. A 'last minute' introduction of a water consumption ranking could be met by opposition of stakeholders.

– *con*: There is no information available on the number of models in certain water performance classes, if these were introduced.

Option 1, the current information on the label has had the effect of reducing average water consumption by 22% between 1998 and 2005 (from 19,1 L/cycle in 1998 to 14,9 L/cycle in

2005 - see figure below), part of which is linked to simultaneous reduction of average energy consumption. There are no indications that this effect will cease once the new labelling scheme is in place.

Figure 9: Historic development in water consumption per cycle



Source: Task 2, p.89

The proposal therefore does not consider water consumption requirements other than existing labelling efforts (option 1). The combined effect of increasing energy efficiency and reducing verification tolerances will most likely help to reduce water consumption like before. Unknown effects on other performance aspects and uncertainty of water consumption performance of other size classes than the base cases make it seem appropriate not to include such requirements.

5.2.2 Cleaning and drying performance

The setting of ecodesign requirements should not adversely impact other performance aspects of products as highlighted in the Ecodesign Directive (Article 15 (5)). In order to avoid that the setting of tighter energy efficiency requirements result in negative impacts on cleaning and drying performances (given the trade-off between these performances), it is proposed to set minimum performance requirements on these two parameters.

The minimum level is proposed to be set at the level which is now attainable by average machines. This coincides with cleaning performance class A and drying performance class A or B. Since, in 2005, already 90% of all dishwashers were in class A with regard to cleaning performance and 60% in class A with regards to drying performance, it seems proportionate to set the current class A as the norm within the ecodesign implementing measure with an allowance of several years for compliance with the drying performance requirement.

Table 12: Minimum requirements on cleaning and drying performances

	Cleaning performances	Drying performances
Stage 1	One year after entry into force: class A	/
Stage 2	(above applies)	Three or six years after entry into force: – drying index higher than 1,08 (class A for machines of 8 place settings and higher) – drying index higher than 0,86 (class B/C for machines of 7 place settings and lower)

The more lenient drying performance requirement for smaller dishwashers takes into account the technical constraints for these machines[27]. For this reason the proposal requires a less stringent drying performance for smaller machines (drying index 0,86) than originally proposed to the Consultation Forum (the original requirement for drying performance was drying index 1,08 for all sizes, but this would phase out all smaller machines in stage 2.

5.2.3 Noise emissions

Despite the strong disparity of dishwashers in noise emissions, it seems relevant not to adopt specific requirements on noise considering the trade-off between noise emissions and energy efficiency.

The display of noise emissions into the labelling scheme could however provide consumers with an instant assessment of noise performance and might give the industry stronger incentives to further optimize this parameter.

5.2.4 Low power modes

Few data are currently available on the actual energy consumption of low power modes. It is considered to be between 1W off mode / 2W left-on mode and 2W off mode / 3W left-on mode depending on the efficiency of the appliance.

The Preparatory Study presented the following values for low power modes (for both washing machines and dishwashers) (Task 7, p.135).

[27] Because of the limited space available in small dishwashers the resulting air flow is lower and condensation at the outer walls is limited. There is also no space available for additional components for improving the drying, such as a fan and heat exchangers. The foreseen evolution of the product does not allow for a cost effective removal of these obstacles.

Table 6: Low power consumption by CECED and Consumer Organisations

Modes (definitions)	Average real life power consumption [W]	
	CECED	Consumer Organisations
delay-start	2.5	4.3
left-on mode (1)	1.6	3.3
off mode with functions (2)	1	2
off-mode no functions (3)	0.5	0.6
(1) considered equal to end-of-cycle mode power consumption		
(2) Lot 14 estimates		
(3) as defined in EuP Lot 6 study, i.e. without (safety) functions		

An assessment of current dishwashers listed on the German "ecotopten"-website (http://www.ecotopten.de/prod_spuelen_prod.php) reveals the following data (appliances listed March 2008). Note that these data are applicable to the most efficient machines on the market today.

Table 7: Low power consumption from measurements

left-on power consumption	12 place settings	9-10 place settings
average	1.77 W	1.17 W
lowest power	0.5 W	0.1 W
highest power	3.2 W	3.0 W
% below 2 W	44%	83%
% above 2 W	34%	8%
% unknown	22%	8%
number of appliances in assessment (n=)	92 records	49 records

The data from ecotopten and consumer organisations show that a significant portion of the current market does not comply with a standby requirement of less than 2W (here interpreted as left-on mode) or off-mode of 1W (even though the CECED data seems to indicate it is possible). The conclusion is that an ecodesign-requirement for low power modes at stage 1 should be considered not feasible.

The introduction of an requirement for low power at stage 2 (minimum 4 to 6 years after entry into force) could be considered since many appliances today already meet the foreseen requirement - i.e. the technology is proven. The effects on purchase price have not been assessed.

However, the inclusion of low power modes in the calculation of the annual energy consumption is an effective solution to achieve improvements right after stage 1 and provides manufacturers with incentives to address cycle energy consumption together with low power consumption. It is to be expected that the inclusion of low power consumption in the calculation of the EEI in stage 1 thus renders the introduction of low power requirements at stage 2 less effective since progress in reducing low power consumption are likely to occur.

The preparatory study assumed an average of 12 kWh/year for the energy consumption of low power modes. This would increase the total annual energy consumption (at 220 cycles per

year) of the 12 ps base case by 5%[28] and the 9 ps base case by 6,5% (the effect of the low power mode on total annual consumption is larger if the dishwasher is smaller).

5.3 Overview

Table 14: summary of Ecodesign requirements of the proposals

	Proposal			
Energy	A		B	
	Stage 1	2011: All dishwashers EEI < 71	Stage 1	2011: All dishwashers EEI < 71, except for dishwashers with 10 ps and width <45 cm : EEI <80
			Stage 2	2013: All dishwashers of >10 ps/>45 cm: EEI <63, 10ps/<45cm: EEI <71.
	Stage 2	2016: All dishwashers EEI < 63	Stage 3	2016: 8-9 ps dishwashers and 10 ps dishwashers with width <45cm : EEI < 63
Verification	step 1. max. +10% above declared for single appliance step 2: max. +10% above declared for average of three			
Water	(no ecodesign requirement)			
Cleaning	at stage 1: minimum class A at stage 2 (see above)			
Drying	at stage 2: for ps $\geq$ 8: minimum index 1,08 (current drying class A) for ps < 7: minimum index 0,86 (between current drying class B and C)			
Noise	(no ecodesign requirement)			

[28] Explanation: The 12 ps base case uses 1 kWh/cycle, at 220 cycles/year this is 220 kWh/year. Adding the 12 kWh for low power consumption gives 232 kWh/year. The low power consumption is thus 12/232 = 5% of the total annual consumption (12 ps base case).

Table 15: Overview of label information (information requirements)

		kWh/cycle (indicative)			kWh/cycle (indicative)	
Label classes	EEI	9 ps	12 ps	EEI	9 ps	12 ps
A	50	0.59	0.78	73	0.61	0.79
B	56	0.66	0.88	81	0.68	0.88
C	63	0.75	1.00	90	0.76	0.99
D	71	0.85	1.13	100	0.85	1.10

Water consumption	shown as before in litres per cycle
Cleaning performance	(removed from label, deemed unnecessary)
Drying performance	show as before (for smaller machines more classes possible)
Noise emission	new introduced (ranking as shown in text) Verification: (to be confirmed)

6. COMPARING THE OPTIONS

This section looks into the impacts of the proposed policy options (the two variants of two different stage 2 implementation dates) for a combined revision of the ecodesign and labelling scheme.

The assessment is done with a view to the criteria set out in Article 15(5) of the Ecodesign Directive, and the impacts on manufacturers including SMEs. The aim is to find a balance between the quick realization of the appropriate level of ambition and the associated benefits for the environment and the user (due to reduction of life cycle costs) on the one hand, and potential burdens related e.g. to unplanned redesign of equipment for achieving compliance with ecodesign requirements on the other hand, while avoiding negative impacts for the user, in particular as related to affordability and functionality.

In order to assess the impact of the policy options, the following factors are taken into account:

1. Economic impacts

Savings:

– annual electricity cost savings in 2020

– accumulated electricity cost savings

Costs:

– possible additional costs related to the improved technology, e.g. for additional and/or more expensive components (not depending on sub-option)

– assessment of conformity with ecodesign requirements and re-assessment of conformity with further requirements (safety etc.; depending on sub-options)

– possible reorganization of the supply chain (depending on sub-options)

2. Social impacts

– jobs related to the production/sales of affected equipment (depending on sub-options)

– affordability of equipment (not depending on sub-options, see below)

3. Environmental impacts

– annual electricity savings and reduction of CO_2 emissions in 2020

– accumulated electricity savings and reductions of CO_2 emissions

– water savings

The impacts of the proposals are assessed against a baseline scenario which describes the impacts in case the Commission decides not to put forward any measures.

Since 90% of appliances were already in class A in 2005, no further energy improvement are expected beyond that class. It is thus assumed in the baseline scenario that no new technologies will penetrate the market and that 97% of appliances will be in class A in 2009 and 3% in class B.

Real life use of modern day dishwashers leads to higher electricity consumption than tested. A correction factor of 1,06 (see Task 5, p. 39) is therefore applied to the standardised measured energy consumption of the stock model in order to reflect real life consumption of dishwashers[29].

6.1 Economic impact

6.1.1 Energy savings

Section 4.2 identified the following scenarios for the setting of energy efficiency requirements and the redesign of energy efficiency classes.

Some stakeholders during the consultation forum asked for the second step (proposed in 2015) to be set earlier. Taking into account the design cycle and production platform change of the industry (between 4 and 5 years), it seems possible to set the second step 4 years after the adoption of the legislative proposals. Two sub-scenarios are therefore considered for an earlier implementation of the second step **from 2015 to 2013** (assuming the proposal is adopted in 2009).

[29] The overall factor is +9%, but that includes +3% low power consumption as well, which in the scenario analysis is already contained in the annual unit energy consumption.

Table 16: Proposal - timing for stage 1, 2 and 3

Energy	A		B	
	Stage 1	2011: All dishwashers EEI < 71	Stage 1	2011: All dishwashers EEI < 71, except for dishwashers with 10 ps and width <45 cm : EEI <80
			Stage 2	2013: All dishwashers of >10 ps/>45 cm: EEI <63, 10ps/<45cm: EEI <71.
	Stage 2	2016: All dishwashers EEI < 63	Stage 3	2016: 8-9 ps dishwashers and 10 ps dishwashers with width <45cm : EEI < 63

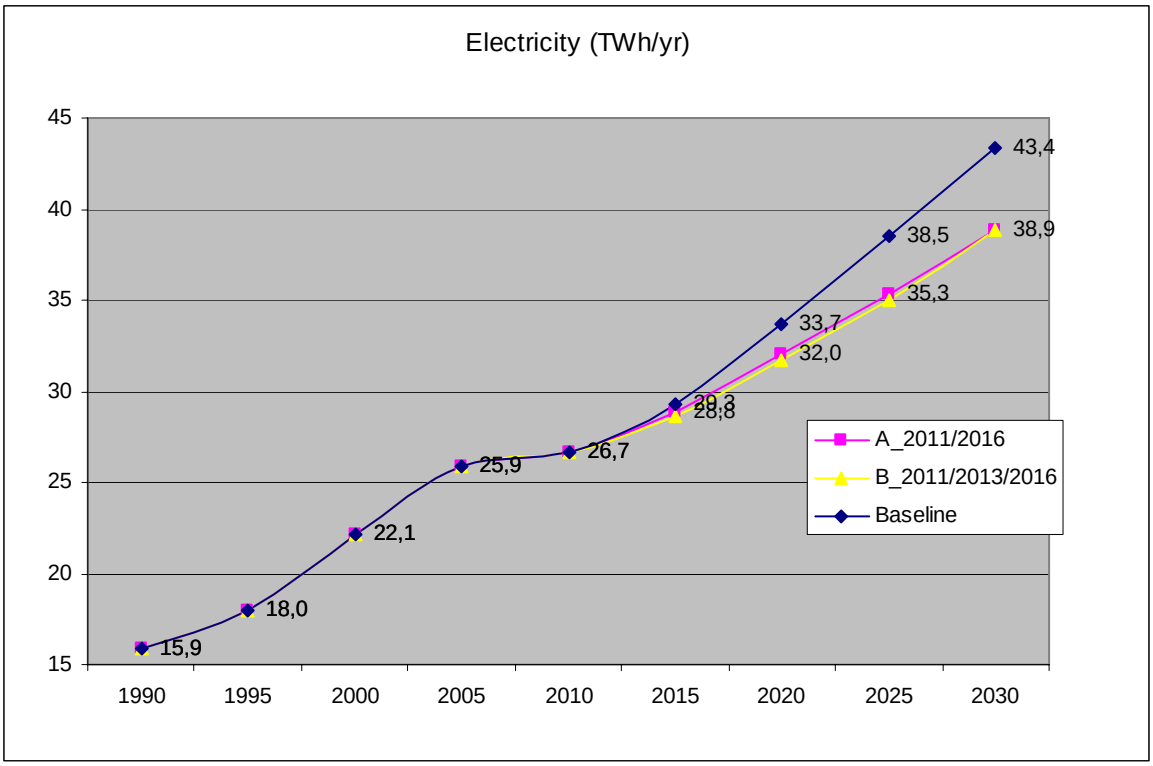
The table and graphs below show the electricity consumption of the two sub-scenarios compared with the baseline scenario. The savings in 2020 and 2025 will be reached by reducing both the cycle energy consumption and the low power consumption (lower total annual energy consumption).

Table 17: Stock model electricity consumption and savings vs. BaU

Scenario	Total electricity consumption (stock)						Savings 2020 vs BaU		Savings 2025 vs BaU	
	Unit	2005	2010	2015	2020	2025	TWh	%	TWh	%
BaU	TWh/y	25,9	26,7	29,4	33,8	38,6	ref	ref	ref	ref
Proposal A	TWh/y	25,9	26,7	28,8	32,0	35,3	-1,7	-5,0%	-3,2	-8,3%
Proposal B	TWh/y	25,9	26,7	28,6	31,7	35,0	-2,0	-5,8%	-3,5	-9,0%

Source: input to this impact assessment by VHK

Figure 10: Electricity consumption according the scenario's



The most important conclusions are that:

- the impact of the BaU scenario, going from an electricity consumption of 25.9 TWh in 2005 to 33.7 TWh in 2020 (+50%) is the most significant influence on the overall energy consumption of dishwashing appliances[30]. This increasing trend is due to growing sales (maximum penetration rate not yet reached).

- the policy variants A and B are fairly close to each other and offer a saving of up to 5.0% and 5.8% in 2020 respectively. From the graph it is shown that their main merit appears to be slowing down the expected growth in energy consumption;

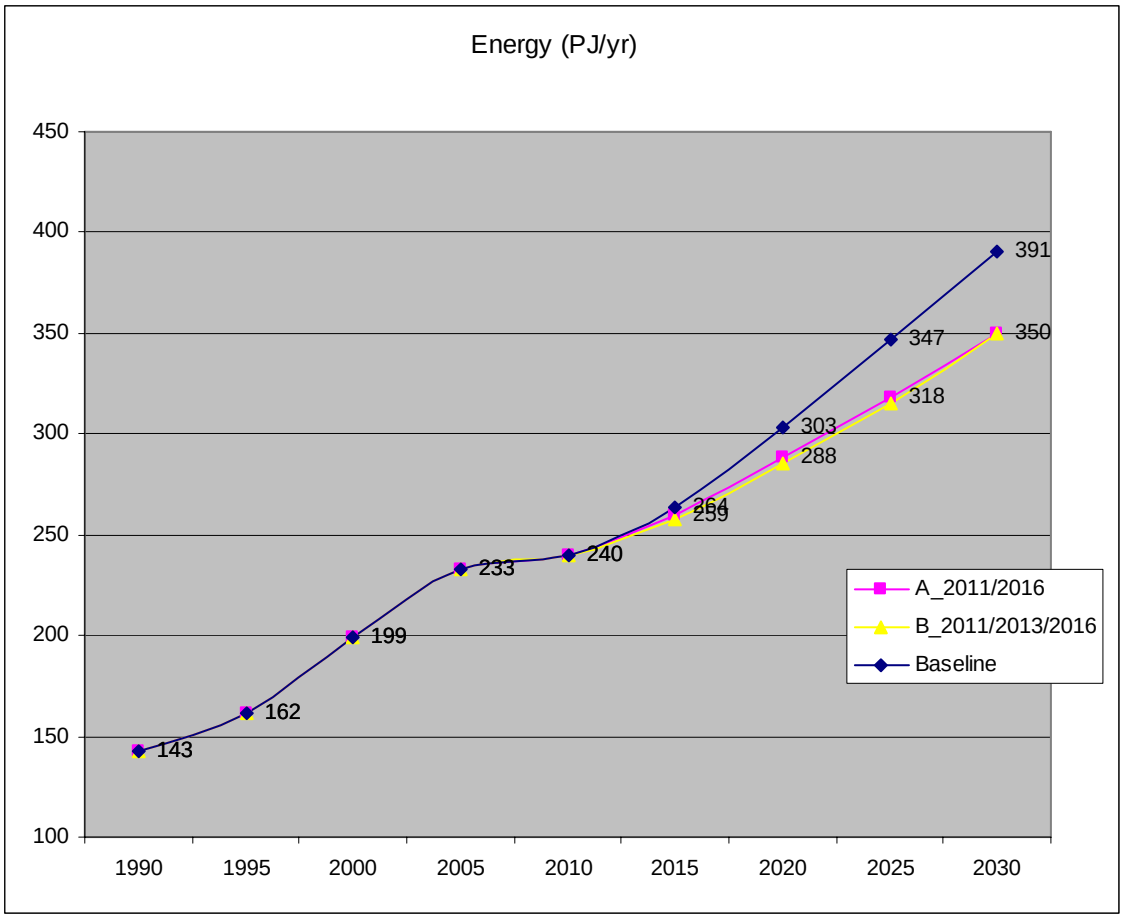
- the scenario based on Proposal B brings the highest savings, but the difference with proposal A1 is limited (-0.8% in 2020).

Annual electricity cost-savings in 2020 and the accumulated savings over the 2010-2020 period as well as the 2010-2025 period are given in the summary tables 18 to 21 at the end of this chapter.

The graph below presents the electricity consumption as primary energy equivalents (9 PJ = 1 TWh electric). This is a more common unit for Security of Energy Supply considerations and enables a direct comparison with the impacts of non-electric appliances (e.g. fossil fuel fired boilers, water heaters, etc.).

[30] EU-27 electricity final demand without the energy sector was 2755 TWh in 2005. With distribution losses, final demand was 3106 TWh in the same year.

Figure 11: Energy consumption (primary) according to the scenarios



6.1.2 Impact on consumers

Table 18 shows the annual EU-27 total expenditure on domestic cold appliances, i.e. in purchase costs and discounted running costs (more than 95% of which are electricity costs and the rest repairs and maintenance). Water costs are listed separately.

The electricity rate is calculated on the basis of an annual price increase of 2% and the water rate is calculated on the basis of an annual price increase of 1%. All costs listed (purchase, electricity, water) take into account a discount rate of 2%, where the discount rate equals the annual interest rate (4%) minus inflation (2%).

For purchase price and maintenance costs, the data from the preparatory study are used as starting values for the BaU scenario (anchor year 2005). The average weighted purchase price (incl. VAT) is € 544/unit. For the average annual price decrease a figure of 2.2% was applied (Task 7, par. 7.4.2.1).

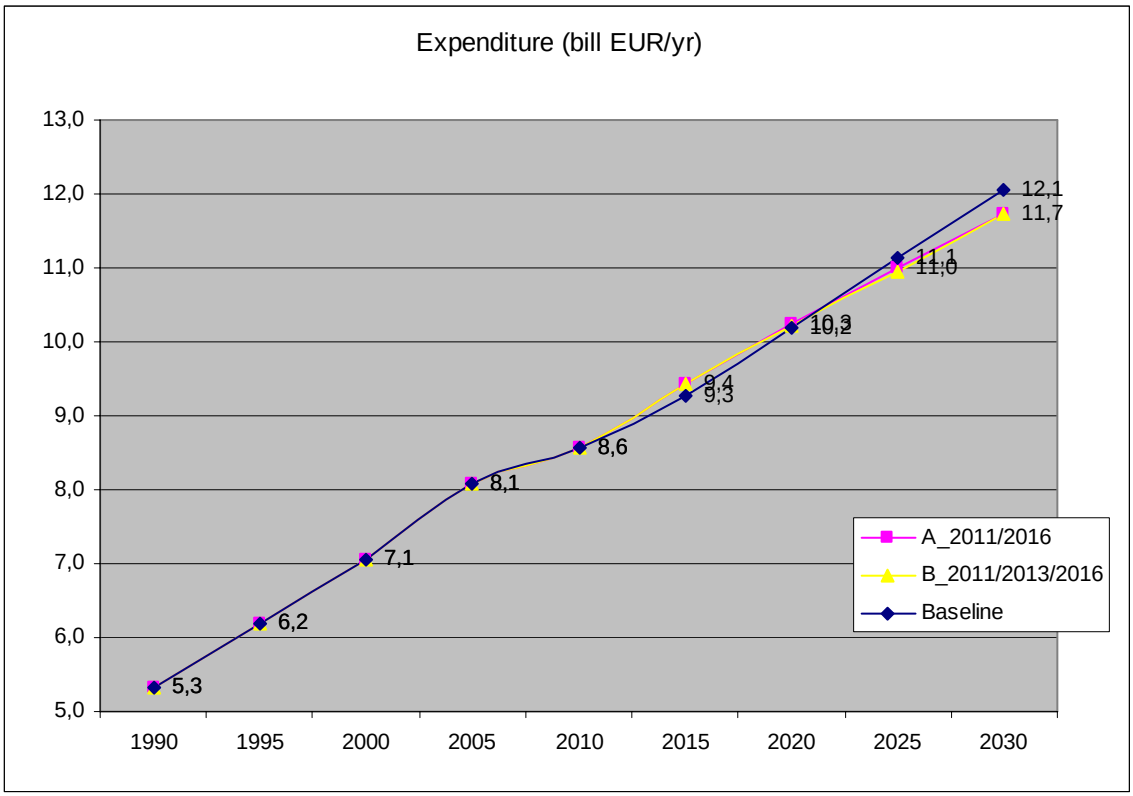
On average the cost of saving 1 kWh/yr translates in an average consumer purchase cost increase of €1,62 between the Base Case and the LLCC point.

The product life of dishwashers is on average 15 years. The electricity rate is € 0,17/kWh (household tariff including taxes) with an annual increase of 2% over the scenario-period.

In accordance with the MEEUP study, the discount rate was set at 2%, derived from interest rate (4%) minus inflation (2%).

Annual maintenance and repair costs were set at €5,5/unit per year, equivalent to one or two repairs over product life (Task 6, par. 6.4.3.1).

Figure 13: Expenditure according the scenario's (electricity only)



The trend in consumer expenditure (inflation corrected) shows a steady increase due to increase of the stock. The policy options show on the short run, i.e. until maximum 2020 for Proposal A and B, a somewhat higher expenditure because of higher purchase prices.

If the price decrease through rationalisation is included then the projected average purchase price in the scenario Proposal B in 2020 is estimated to be 8.6% higher than in the business as usual scenario (€ 592 vs. € 544)[31]; for this money the consumer should get an appliance that uses -11% less energy (241 versus 268 kWh/year) in 2020.

Between 2018 and 2021 the Policy scenarios start to catch up on the baseline and the EU households as a whole will feel that the extra energy saving also pays off economically. This effect will even be stronger in 2030.

6.1.3 Impact on manufacturers

Impact on turnover

[31] Calculated in Euro 2005, corrected for inflation, interest, production cost reduction through rationalisation. Prices are consumer prices including VAT.

The impact of BaU and Policy scenarios on the turnover of stakeholders has been calculated from the (increase in) product prices and partitioned as follows:

– The manufacturing selling price (MSP, excl VAT) is estimated to be 33.3% of the consumer price (incl VAT).

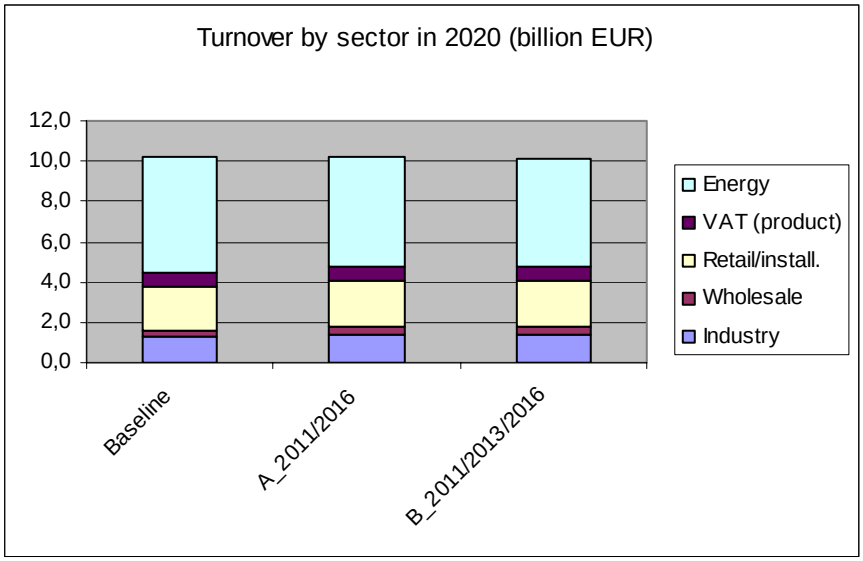
– Wholesalers add a mark-up of 26% on the MSP.

– Retail margin is estimated at 100% on the wholesale price.

– VAT (Value Added Tax) is estimated at 19%.

This is a rapid estimate but currently the best available and –for BaU- checked against other sources. Local levies and recycling contributions were not taken into account for lack of specific data. The turnover of the total dishwasher market per sector is presented below.

Figure 14: Turnover according the scenarios



Costs of testing

Energy efficiency will be tested according to EN 60436, based on current practice of a system of self-declaration in combination with spot-checks by the authorities. Since dishwashers already have to be tested because of the labelling scheme, no extra costs are expected to occur.

6.1.4 Impact on trade

The requirements proposed are based on a technical, environmental and economic analysis, which was carried out in preparation of the draft regulation in full transparency with participation of stakeholders from around the world (reports available on http://www.ecowet-domestic.org). In addition, the most important EU-manufacturers are global players so that their consultation has ensured that EU ambition is in line with global developments. Before the proposed Regulation on ecodesign is adopted by the Commission a notification under WTO-TBT will also be issued.

Competitive disadvantages for EU manufacturers exporting wet appliances to third countries are not expected (on the contrary, leadership in efficient appliances would be reinforced). The revised labelling Directive, which is proposed for adoption simultaneously to the ecodesign requirements, will improve the competitiveness of the industry by giving value to more energy efficient appliances on the market: it will enable the industry to get better return on their investments on energy efficiency. In addition, the dates set for the implementation of mandatory requirements take into account the design cycle of the appliances and transition period are set to leave manufacturers enough time to adapt their production to the requirements.

The foreseen requirements seem a logical step considering a history of Voluntary Commitments by industry that served similar purposes (removing least efficient models from the market). In that sense the requirements are no new "barriers" or burden on the EU industry. The Voluntary Commitments were signed by many manufacturers and importers active in the EU market, including many that have production facilities outside the EU borders.

The requirements of the regulation apply to all equipment independent from the origin of the equipment, thus ensuring that a level-playing field is achieved.

6.1.5 Administrative burden

The form of the proposed ecodesign legislation is a Regulation which is directly applicable in all Member States. The costs for national and EU administrations for transposition of the implementing legislation into national legislation is therefore limited. The Regulation also ensures timely and a harmonized entry into force in the internal market.

Awaiting the adoption of the proposed recast of the 1992/75/EEC Directive, the revision of the labelling scheme has to take the form of a Directive.

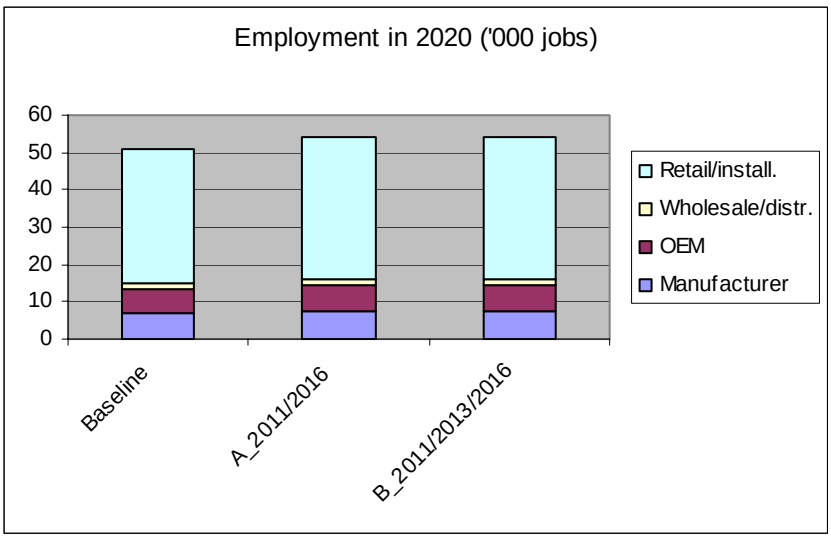
In terms of conformity assessment, there are no extra costs with respect to the current situation, where market surveillance has already to be performed to check compliance with the labelling Directive 97/17/EC. Proposal A or B entails a different calculation of the reference consumption of the most popular dishwashers and may require some extra market surveillance in the first years after entry into force to ensure that the market follows the new rules correctly, but they should remain marginal compared to the current situation.

6.2 Social impact

Employment impacts were calculated on the basis of the average turnover per employee in the sector and the order of magnitude of the outcomes was checked against annual reports from individual companies. The applicable rate for industry is €188.000/employee in manufacturing and an OEM share (Original Equipment Manufacturer, i.e. the suppliers of compressors, foam, etc) that is equal to manufacturing.

In the wholesale sector a rate of €250.000,-/employee was applied and for white good retailers €60.000 per employee was taken as a basis. The number of jobs creation then follows from the expected product price increase and resulting increase in turnover due to the policy measures.

Figure 15: Employment according the scenarios

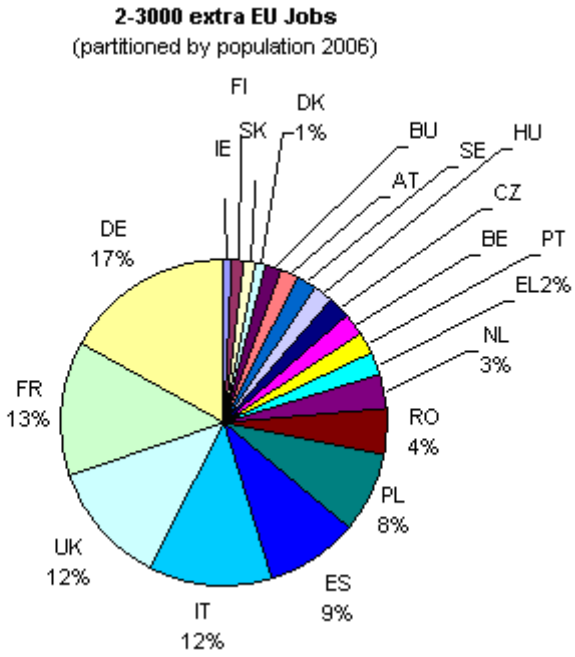


Overall, the graph shows –especially taking into account a margin of uncertainty of say ±10%- that the difference in employment between the two variants is small.

The BaU scenario itself keeps employment at its current level, i.e in line with population growth but with strict pressure on prices. In this scenario the 2020 dishwasher industry would employ around 14.000 persons (50/50 in manufacturing and OEM) and the wholesale/retail sector would employ around 36.000 persons.

The policy scenarios all give an employment increase of around 6%, creating some 3 thousand new jobs with respect of the BaU scenario. Considering that half of the OEM-jobs and 20% of manufacturing jobs would be outside the EU27, the EU employment would be at the most around 2.500 jobs. Figure 16 shows a job distribution partitioned by population. In reality, although we have no exact data to make a quantitative estimate, Eastern European Member States –with their relatively higher retail and production plant density—will profit relatively more from any job creation for this product group. Job creation results from the application of design options needed to reach LLCC levels (and beyond) which require more R&D efforts as well as more labor- and capital intensive production. Furthermore job creation is expected in the sales/retail sectors due to increase of sales.

Figure 16: EU distribution employment

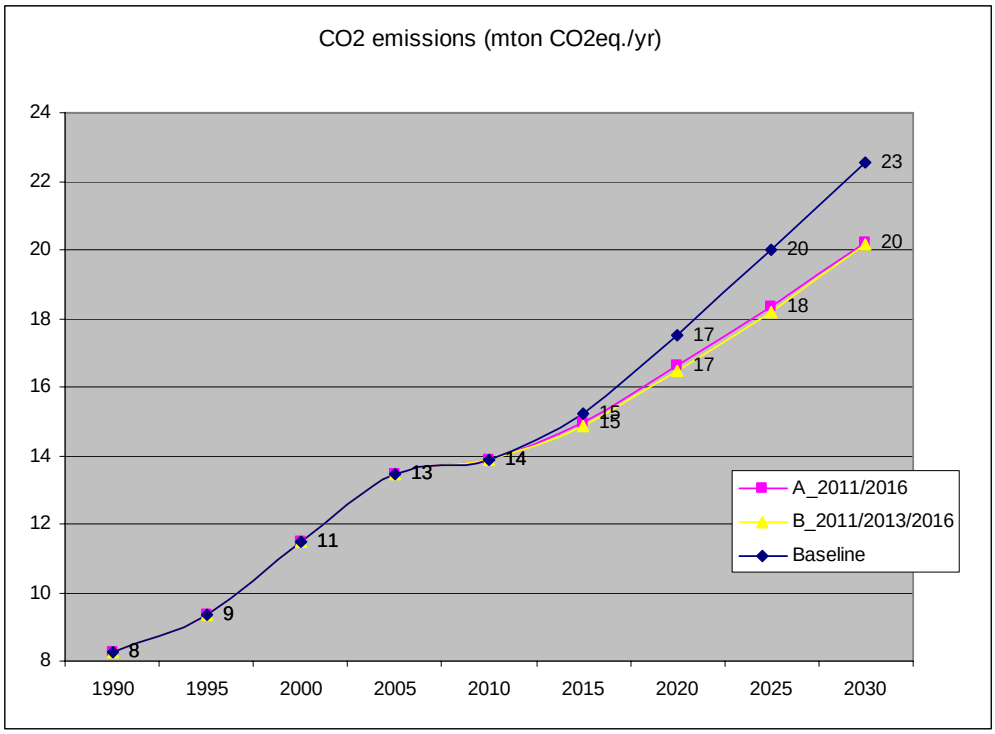


6.3 Environmental impact

6.3.1 Greenhouse gas emissions

The environmental impact in terms of greenhouse gas emissions is illustrated in the figure below.

Figure 12: Environmental impact (CO2 emissions) according to the scenarios



The reduction of carbon emissions is reflecting the reduction in electricity consumption, as the latter determines over 98% of carbon emissions.

The most effective scenario (proposal B with stage 2 in 2013) reaches a saving of around 1.0 Mt CO_2 equivalent with respect to the business as usual scenario in 2025 (6% saving) [32].

Annual carbon emission savings in 2020 and the accumulated savings over the 2010-2020 as well as the 2010-2025 periods are given in the summary tables 18 to 21 at the end of this chapter.

6.3.2 Water consumption

The water consumption according the Baseline scenario was 308 million m3 in 2005, rising to 389 million m3 in 2020 (+26% of 2005) and 502 million m3 in 2025 (+45% of 2005). Proposal A reduces this to 332 million m3 in 2020 (-14% of Baseline 2020) and proposal B reduces this to 325 million m3 (-16% of Baseline 2020). In 2025 the reductions compared to Baseline are respectively -24% and -26%.

The Matrices below (tables 18 to 21) give an overview of impacts versus objectives and boundary conditions. The first two matrices show the annual impacts of the BaU scenario and the two sub-options for 2020 and 2025. The last two matrices show the accumulative impacts and savings of the BaU scenario and the two sub-options for the periods 2010-2020 and 2010-2025 respectively.

Conclusion

Sub-options B lead to additional savings compared to sub-option A. However, it leads to higher compliance costs due to an earlier introduction of phase 2.

The analysis demonstrates that the appropriate policy options for realizing the environmental improvement potential of dishwashers is the combined introduction of ecodesign requirements and a revision of the labelling scheme in two stages (one year and four years after entry into force). This approach ensures that:

– on-going energy improvements are maintained and fostered by setting a transparent legislative framework that will provide the industry with the long-term security they need to invest in innovative technology;

– fair competition and product differentiation continues to operate on energy improvements by providing consumers with an effective and reliable tool to compare energy consumption of products in a contest for strong market demand for energy efficient appliances;

– by 2020, a 5-6 % absolute electricity saving can be achieved versus the Business-as-usual scenario in 2020. Due to the market inertia (i.e. full replacement of old models by new types takes about 15 years), the effects of the new measures up to 2020 will be very limited with respect to the baseline scenario.

– the cost-effective level of energy consumption is reached, with a savings potential of some 1.7 to 2 TWh in 2020 compared to the BaU scenario increasing to 3.2 to 3.5 TWh in 2025;

[32] At 0,458 kg CO2 eq/kWh electricity (source: VHK, MEEUP Report, Nov. 2005)

– more energy consuming products are quickly removed from the market securing electricity and CO_2 savings in the EU, while reducing the life-cycle costs of these devices for consumers. Calculated in Net Present Value (Euro 2005) the consumer expenditure –i.e. the annual purchase and running costs of the EU27 population- will increase from around € 8 bln. today to € 10 bln. in 2020 and approximately € 11 bln. in 2025 (mainly due to increased penetration).

– a level playing field for all manufacturers is guaranteed, ensuring fair competition and free circulation of products;

– disproportionate burdens for manufacturers are avoided due to transitional periods which duly take into account redesign cycles.

Table 18: Main annual impacts by 2020

MAIN IMPACTS 2020			Scenario's 2020		
			1	2	3
IMPACTS (as Art. 15, sub. 4.e. of 2005/32/EC)			Baseline	A_2011/2016	B_2011/2013/ 2016
ENVIRONMENT					
	ELECTRICITY	TWh/a	**34**	**32,0**	**31,7**
	ENERGY	PJ/a	**303**	**288**	**286**
	GHG	Mt CO2 eq./a	**17**	**16,6**	**16,5**
	WATER (use phase)	million m3	**389**	**332**	**325**
CONSUMER					
EU totals	expenditure	€ bln./a***	**10,2**	**10,3**	**10,2**
	purchase costs	€ bln./a	3,9	4,2	4,2
	running costs	€ bln./a	6,3	6,1	6,0
	water costs (use phase)	€ bln./a	1	1	1
per product	product price	€	394	425	425
	install cost	€	0	0	0
	energy costs	€ /a	48	43	43
	payback(SPP)	years	reference	**6,5**	**6,5**
BUSINESS					
EU turnover	manuf	€ bln./a	**1,3**	**1,4**	**1,4**
	whole-sale	€ bln./a	**0,3**	**0,4**	**0,4**
	instal / retail / maintenance	€ bln./a	**2,2**	**2,3**	**2,3**
EMPLOYMENT					
employ-ment (jobs)	industry EU (incl OEM)	'000	10,2	11,0	11,0
	industry non-EU	'000	3,4	3,7	3,7
	whole-sale	'000	1,3	1,4	1,4
	installers	'000	36,0	38,1	38,1
	TOTAL	'000	**50,9**	**54,2**	**54,2**
	of which EU	'000	48	51	50
	EXTRA EU jobs	'000	reference	**3,01**	**2,99**
	of which SME		reference	2	2
***=all money amounts in Euro 2005 (inflation corrected)					

BOUNDARY CONDITIONS ("should be no negative impacts")

	Scenario's 2020		
	1	2	3
IMPACTS "No negative impacts" following Art. 15, sub 5 of 2005/32/EC	**Baseline**	**A_2011/2016**	**B_2011/2013/ 2016**
functionality of product		**+**	**+**
health, safety and environment		**+**	**+**
affordability and life cycle costs		**+**	**+**
industry competitiveness		**+**	**+**
no proprietary technology		**+**	**+**
no excessive administrative burden		**+**	**+**

Table 19: Main annual impacts by 2025

MAIN IMPACTS 2025			Scenario's 2025		
			1	2	3
IMPACTS (as Art. 15, sub. 4.e. of 2005/32/EC)			**Baseline**	**A_2011/2016**	**B_2011/2013/ 2016**
ENVIRONMENT					
	ELECTRICITY	TWh/a	**39**	**35,3**	**35,0**
	ENERGY	PJ/a	**347**	**318**	**315**
	GHG	Mt CO2 eq./a	**20,0**	**18,3**	**18,2**
	WATER (use phase)	million m3	**445**	**339**	**331**
CONSUMER					
EU totals	expenditure (excl. water)	€ bln./a***	**11,1**	**11,0**	**10,9**
	purchase costs	€ bln./a	3,9	4,2	4,2
	running costs (excl.water)	€ bln./a	7,2	6,7	6,7
	water costs (use phase)	€ bln./a	1	1	1
per product	product price	€	353	383	383
	install cost	€	0	0	0
	energy costs	€ /a	48	43	43
	payback(SPP)	years	reference	**5,8**	**5,8**
BUSINESS					
EU turnover	manuf	€ bln./a	**1,3**	**1,4**	**1,4**
	whole-sale	€ bln./a	**0,3**	**0,4**	**0,4**
	retail	€ bln./a	**2,2**	**2,4**	**2,4**
EMPLOYMENT					
employ-ment (jobs)	industry EU (incl OEM)	'000	10	11	11
	industry non-EU	'000	3	4	4
	whole-sale	'000	1	1	1
	retail	'000	37	40	40
	TOTAL	'000	**52**	**56**	**56**
	of which EU	'000	49	52	52
	EXTRA EU jobs	'000	reference	**3**	**3**
	of which SME**		reference	2	2
***=all money amounts in Euro 2005 (inflation corrected)					
BOUNDARY CONDITIONS ("should be no negative impacts")					
			Scenario's 2025		
			1	**2**	**3**
IMPACTS "No negative impacts" following Art. 15, sub 5 of 2005/32/EC			**Baseline**	**A_2011/2016**	**B_2011/2013/ 2016**
functionality of product				**+**	**+**
health, safety and environment				**+**	**+**
affordability and life cycle costs				**+**	**+**
industry competitiveness				**+**	**+**
no proprietary technology				**+**	**+**
no excessive administrative burden				**+**	**+**

Table 20: Accumulative main impacts 2010-2020

Totals			**Scenario's 2020**		
			1	**2**	**3**
IMPACTS (as Art. 15, sub. 4.e. of 2005/32/EC)			**Baseline**	**A_2011/2016**	**B_2011/2013/ 2016**
ENVIRONMENT					
	ELECTRICITY	TWh/a	**326**	**319**	**317**
	GHG	Mt CO2 eq./a	**169**	**166**	**165**
	WATER (use phase)	million m3	**3786**	**3545**	**3492**
CONSUMER					
EU totals	expenditure (excl.water)	€ bln./a***	**102,5**	**103,5**	**103,5**
	purchase costs	€ bln./a	41,1	43,1	43,5
	running costs (excl.water)	€ bln./a	61,3	60,4	60,0
	of which electricity	€ bln./a	55	54	54
	water costs (use phase)	€ mln./a	13	12	12
BUSINESS					
EU turnover	manuf	€ bln./a	**13,8**	**14,5**	**14,6**
	whole-sale	€ bln./a	**3,6**	**3,8**	**3,8**
	retail	€ bln./a	**22,5**	**23,4**	**23,5**
Savings vs. Baseline			**Scenario's 2020**		
			1	**2**	**3**
IMPACTS (as Art. 15, sub. 4.e. of 2005/32/EC)			**Baseline**	**A_2011/2016**	**B_2011/2013/ 2016**
ENVIRONMENT					
	ELECTRICITY	TWh/a	**ref**	**7**	**9**
	GHG	Mt CO2 eq./a	**ref**	**4**	**5**
	WATER (use phase)	million m3	**ref**	**241**	**294**
CONSUMER					
EU savings	expenditure	€ bln./a***	**ref**	**-1**	**-1**
	purchase costs	€ bln./a	**ref**	**-2**	**-2**
	running costs	€ bln./a	**ref**	**1**	**1**
	of which electricity	€ bln./a	**ref**	**1**	**2**
	water (use phase)	€ bln./a	**ref**	**1**	**1**
BUSINESS					
EU savings	manuf	€ bln./a	**ref**	**-1**	**-1**
	whole-sale	€ bln./a	**ref**	**0**	**0**
	retail	€ bln./a	**ref**	**-1**	**-1**
***=all money amounts in Euro 2005 (inflation corrected)					

Table 21: Accumulative main impacts 2010-2025

Totals			**Scenario's 2025**		
			1	**2**	**3**
IMPACTS (as Art. 15, sub. 4.e. of 2005/32/EC)			**Baseline**	**A_2011/2016**	**B_2011/2013/ 2016**
ENVIRONMENT					
	ELECTRICITY	TWh/a	**509**	**489**	**486**
	GHG	Mt CO2 eq./a	**264**	**254**	**252**
	WATER (use phase)	million m3	**5899**	**5231**	**5139**
CONSUMER					
EU totals	expenditure (excl.water)	€ bln./a***	**156,3**	**157,1**	**156,8**
	purchase costs	€ bln./a	60,6	64,2	64,6
	running costs (excl.water)	€ bln./a	95,7	92,8	92,3
	of which electricity	€ bln./a	87	83	83
	water costs (use phase)	€ bln./a	19	17	17
BUSINESS					
EU turnover	manuf	€ bln./a	**20,2**	**21,4**	**21,5**
	whole-sale	€ bln./a	**5,3**	**5,6**	**5,6**
	retail	€ bln./a	**33,6**	**35,1**	**35,3**
Savings vs. Baseline			**Scenario's 2025**		
			1	**2**	**3**
IMPACTS (as Art. 15, sub. 4.e. of 2005/32/EC)			**Baseline**	**A_2011/2016**	**B_2011/2013/ 2016**
ENVIRONMENT					
	ELECTRICITY	TWh/a	**ref**	**20**	**23**
	GHG	Mt CO2 eq./a	**ref**	**10**	**12**
	WATER (use phase)	million m3	**ref**	**669**	**761**
CONSUMER					
EU savings	expenditure	€ bln./a***	**ref**	**-1**	**-1**
	purchase costs	€ bln./a	**ref**	**-4**	**-4**
	running costs	€ bln./a	**ref**	**3**	**3**
	of which electricity	€ bln./a	**ref**	**3**	**4**
	water (use phase)	€ bln./a	**ref**	**2**	**2**
BUSINESS					
EU savings	manuf	€ bln./a	**ref**	**-1**	**-1**
	whole-sale	€ bln./a	**ref**	**0**	**0**
	retail	€ bln./a	**ref**	**-2**	**-2**
***=all money amounts in Euro 2005 (inflation corrected)					

7. MONITORING AND EVALUATION

The main monitoring element will be the tests carried out to verify correct rating and labelling. Monitoring of the impacts on appliances should be done through market surveillance carried out by Member State authorities ensuring that the rating declared is truthful. Effective market shift towards upper labelling band will be the main indicator of progress towards market take-up of more efficient refrigerators and freezers.

The appropriateness of scope, definitions, concept and possible trade-offs will be monitored by the ongoing dialogue with stakeholders and Member States. The main issues for a possible revision of the proposed labelling scheme are:

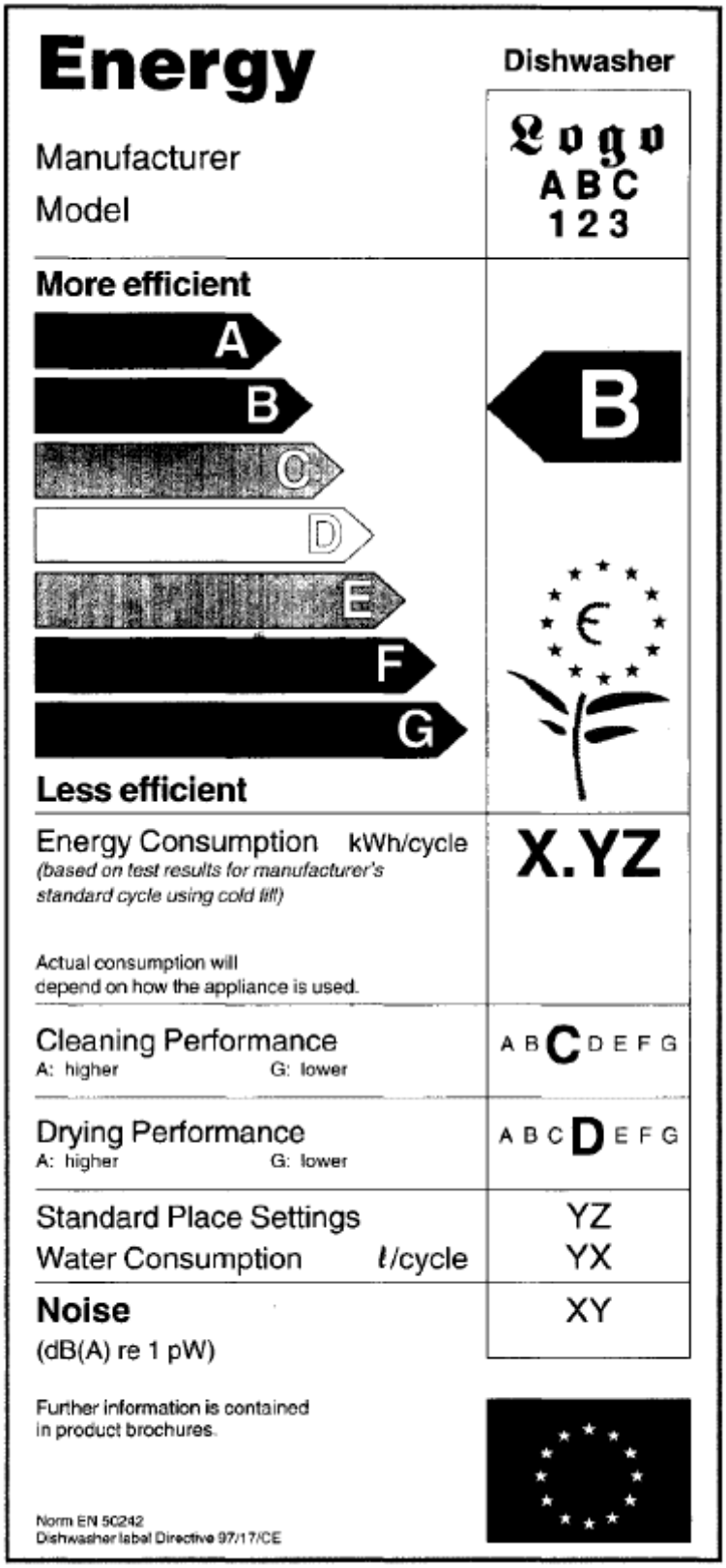
– improved test standards (mandate CEN/ CENELEC) and measurement accuracy;

– necessity to revise the energy efficiency classification scheme according to technological improvements;

– implementation of more demanding minimum requirements.

Taking into account the time necessary for collecting, analysing and complementing the data and experiences related to the implementation of the labelling scheme and assess technological progress, a review of the main elements of the framework could be presented five years after entry into force of a labelling scheme.

Annex I: Dishwasher Energy Label (97/17/EC)



Annex II: Baseline scenario

The Baseline scenario describes the impacts of the 'no action' policy. The Baseline scenario however shares a lot of main input values with the other policy scenario's. This Annex describes these shared assumptions and values.

Table 22: Sales and resulting stock

	1990	1995	2000	2005	2010	2015	2020	2025	2030
Sales ('000)	3200	4200	4800	5880	7000	8116	9233	10351	11467
Stock ('000, rounded to nearest 500)	36500	46000	56500	69000	83000	98500	115000	132000	148500

The calculation of the stock is based on a product life of 15 years.

Table 23: Historical and expected energy and water consumption (new appliances, 12 place settings).

	1990	1995	2000	2005	2010	2015	2020	2025	2030
	Historical	BAU							
Energy (kWh/cycle)	1,9	1,65	1,24	1,07	1,06	1,06	1,06	1,06	1,06
Water (L/cycle)	26,7	22	17,3	15	14,8	14,8	14,8	14,8	14,8

The historical energy values are based on 12 place settings machines (since historical data for other appliances is rarely available) but are deemed typical for the average new appliance accross that range. The error introduced by this is limited.

The stock consumption values are approximately the same as new appliances of 7,5 years old (at half product life of 15 years).

The main economic parameters used in the baseline (and other scenario) calculations are:

Table 24: Economic parameters for the calculation of baseline and other scenarios

ECONOMICS		
Base price	544	Consumer product price incl. VAT in year 2005 [€] (15% 9 ps baese case 520 EUR and 85% 12 ps base case 548,8 EUR, source Task 6, p.36)
PriceInc	1,62	Price increase EUR per kWh annual elec.cons. decrease (reallife consumption) [€ / kWh/a] (Task 6, p.39)
(empty)		
Rel	0,17	Electricity rate 2005 [€/ kWh electric] (Task 6)
(empty)		
(empty)		
Rmaint	5,5	Annual maintenance costs EUR per unit per year [€/unit,a] (Task 6, par. 6.4.3.1)
Rwater	3,7	Water rate 2005 ([€/ m3] - use phase only
Relinc	2%	Annual price increase electricity [%/ a]
(empty)		
(empty)		
Rmaintinc	2%	Annual cost increase maintenance [%/ a]
Rwaterinc	1%	Annual price increase water [%/ a]
PriceDec	2,19%	Annual product price decrease [%/ a] (Task 7, par. 7.4.2.1)
InstallDec	2,00%	Annual installation cost decrease [%/ a]
ManuFrac	33,3%	Manufacturer Selling Price as fraction of Product Price [%]
WholeMargin	26%	Margin Wholesaler [% on msp]
RetailMargin	100%	Margin RETAILER on product [% on wholesale price]
VAT	19%	Value Added Tax [in % on retail price]
ManuWages	0,188	DW manufacturer turnover per employee [mln €/ a]
OEMfactor	1	OEM personell as fraction of WH manufacturer personell [-]
WholeWages	0,25	DW wholesale turnover per employee [mln €/ a]
RetailWages	0,060	DW retail (?) turnover per employee [mln €/ a]
ExtraEUfrac	0,5	Fraction of OEM personell outside EU [% of OEM jobs]
Inflation	2%	Inflation rate [%/ a]
ProductLife	15	Product Life [years]

Energy consumption - Baseline and other scenarios

The Baseline energy consumption value for 2010 is based upon 97% of appliances in class A and 3% in class B (Task 7 report). The next reference year 2015 assumes 100% class A appliances.

The energy consumption values for new appliances are based upon the stage 1 and 2 target values as presented in section 5.1.4 (table 9, ('real' values). Although the Proposal sets stage 1 limits that are more lenient than the average of models in 2005 the scenario-analysis assumed it was not realistic to use these somewhat higher values from section 5.1.4, since the market is confronted with more stringent requirements at a later stage. New models will essentially be more efficient, not less. Therefore the stage 1 values of the proposal are kept identical to those of the baseline. The table below presents an overview. All intermediate years are interpolated on a linear basis. The energy consumption after stage 2 is assumed to decrease further with a rate of 1% per 5 year to emulate ongoing increase in efficiency and/or effects of labelling (this rate is less than in the period 1995-2005, but most of the 'easy' savings have been reached).

Table 25: Annual energy consumption (in kWh/year) of new appliances by year and policy option (includes correction for 'higher than declared' real value, does notinclude 1.06 correction for higher temperatures applied by households).

SCENARIO	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2025	2030	savings per 5 years
Baseline	271	269	268	268	268	268	268	267,6	267,6	267,6	267,6	268	268	268	
A_2011/2016	271	269	264	260	256	251	247	243	242,4	241,9	241,4	241	239	236	1%
B_2011/2013/2016	271	269	261	254	247	245	244	243	242,6	242,1	241,6	241	239	236	1%

In the tables showing overall EU impacts the consumption values relate to the stock (not new appliances) and are therefore corrected for a real-life consumption that is 1,06 higher than calculated on the basis of appliance specifications (mainly due to higher temperature settings than used in test standard). The effect of low power consumption is not included in this 1,06 factor - see also Task 5, p.39.

Water consumption - Baseline and other scenarios

The water consumption values are:

– For 2005: 15 L/cycle (based upon 15% of 13.7 L/cycle for the 9 ps base case and 85% of 15.2 L/cycle for the 12 ps base case)

– at stage 1 (2010): Equal to Baseline scenario which is the 2005 value multiplied by one minus half the efficiency increase: 14,98 * (1-(0.5 * 2%) = 14,8 L/cycle.

– at stage 2 (2013/2016): LLCC level with 10.9 L/cycle (based upon 15% of 10,3 L/cycle for the 9 ps base case and 85% of 11 L/cycle for the 12 ps base case).

After the last implementation year the water consumption is expected to decrease further with half of the percentage of decrease in energy.

Table 26: Annual water consumption (in L/cycle) of new appliances by year and policy option.

	2005	2010	2013	2016	after last stage
BAU	15	14,9		14,8	
Proposal A	15	14,9		10,9	0.5% saving per 5 year
Proposal B	15	14,9	10,9		0.5% saving per 5 year

Annex III: Minutes of the Consultation Forum Ecodesign and Labelling for Dishwashers - 04/12/2008

Centre Albert Borschette (CCAB), Brussels

Participants: see Annex A

The Chairman opened the meeting by recalling the aim of the proposed two implementing measures for dishwashers (DW) which is to improve their energy efficiency, hence contribute to the 20% energy efficiency target set for 2020. The *working document on a possible Commission Regulation implementing Directive 2009/125/EC with regard to household dishwashers* (published on CIRCA) proposes to set new minimum requirements phasing out the less efficient models from the market, while the proposed *working document on a possible Commission Directive implementing Directive 1992/75/EC with regard to household dishwashers* (published on CIRCA) is foreseeing the revision of the labelling scheme in order to drive the market towards more energy efficient models.

The Chairman highlighted that the two working documents tabled for discussion were presented exceptionally in the format of a draft legislative proposal so as to give a clear view of those provisions meant to be included respectively in the Eco-design or in the Labelling measure. Although the labelling does not fall under the competence of the Consultation Forum, it was considered appropriate to cover both measures to ensure coherence.

The layout of the label was not addressed during the meeting, since it is the object of a specific discussion and decision within the EELEP in its labelling formation.

In general, there was a consensus among stakeholders that the combined approach between the two proposals (ecodesign and labelling) setting common definitions, measurement methods and algorithm for the calculation of the Energy Efficiency Index is a very positive approach which will simplify and facilitate the implementation of both measures.

The debate was concentrated on 3 major issues: the level of ambition of the specific requirements together with the low power mode issue, the possibility of additional specific requirements as well as labelling of performances regarding noise emissions and water consumption, and the revision of the proposed energy efficiency classes.

Specific requirements on energy efficiency

The working document considers the following minimum energy efficiency requirements (hereafter also referred to as thresholds):

- First stage, one year after entry into force of the implementing measure: EEI<71
- Second stage, six years after entry into force of the implementing measure: EEI<63

TREN introduced the discussion by underlying that these thresholds cannot be compared with the current levels of the energy efficiency classes because of the new formulae which is proposed for the calculation of the EEI[33]: the combined inclusion of the low power mode consumption into the calculation and the reduction of measurement uncertainty (from 15% to

[33] See working document on ecodesign, annex IV

10%) will have the effect to increase the EEI for a given DW (i.e. decrease its efficiency) compared to the level achieved with the current formulae and which were analysed during the preparatory study. Depending on the assumed annual consumption of low power modes, the new energy efficiency requirements will have the effect of removing at the first stage between 15 and 98% of the models, while at the second stage it is likely to remove 100% of the models currently on the market[34].

Since the argumentation on the level of ambition of the energy efficiency requirements is the same as for washing machines, the consultation forum did not discuss it in-depth again (see minutes of the CF on washing machines). The same cleavage was found on dishwashers with NL, UK, ANEC/BEUC and environmental NGOs[35] asking for more ambitious and/or earlier targets (removed from 6 years to 4 years) together with the application of the horizontal stand-by Regulation on all DW (with no exemption for sensor based models), and on the other side CECED stressing that the proposed thresholds, with the effect to phase out 100% of the DW six years after entry into force of the implementing measure, were even more ambitious than the front-runner approach advocated by the NL.

TREN replied that the low power modes power consumption of DW would be always accounted for in the proposed revised EEI formula. In addition, the standby Regulation thresholds will be applied to DW with no sensor based protection function(s). The higher is the power consumption in low power modes, the more difficult it will be for manufacturers to comply with ecodesign minimum requirements and to achieve high efficiency classes in labelling. The new formula proposed will therefore put strong incentives on manufacturers to reduce low power mode energy consumption and/or reduce energy consumption in the other phases of the washing cycle.

Calculation of the energy consumption

The UK contested the relevance of having two different formulae for the calculation of the standard annual energy consumption (SAE_C) for DW with 10 or more place settings (ps), and DW with 9 or less place settings. This distinction makes it easier for larger DW (with 10ps or more) to have a better EEI, while no technological ground justifies it anymore. This may mislead consumers who could think that a 12ps is less energy consuming (because better ranked on the energy efficiency scale) than a 9ps which is not reflecting reality.

TREN replied that the two DW types (larger or "standard" and smaller or "compact") have different construction constraints due to their physical dimensions ("standard" machines have dimensions 85x60x60cm, while "compact" 9ps DW have dimensions 85x45x60cm and lower place settings machines even lower) which prevents some technological solutions to be installed. For this reason, already in 1999, two baselines were defined to describe the two machine clusters. The same baselines have been maintained in the working document since the mentioned technological constraints are still present today.

Noise emissions

---

34 See power point presentation discussed during the meeting and available on CIRCA, slides 24 to 27.

35 INFORSE (International Network for Sustainable Energy), EEB (European Environmental Bureau), CAN (Climate Action Network Europe), Greenpeace European Unit, WWF-Europe, ECOS (European Environmental Citizens' Organisation for Standardisation).

A discussion took place as to the relevance of including minimum requirements on noise emissions together with a ranking of noise emissions for the label. The preparatory study rejected this scenario on the ground that after the optimisation of the water circulation elements (pipes, pump, etc.) the way to reduce noise is to increase the insulation of the machine (for example by adding bitumen), hence increasing its mass. Since heavier DW consume more energy due to the necessity to heat a heavier machine together with the load, the setting of ambitious minimum requirements on energy efficiency will be somehow hindered by the reduction of noise since part – if not all – energy efficiency gain due to technology improvement will be lost due the additional energy indirectly caused by the reduction of noise emissions. It was agreed that there is the need to gather more evidence on this issue as well as collect more recent data: the preceding statement is mainly based on the technological analysis developed within a SAVE project run in 1995. CECED confirmed that there exist several ways to reduce noise, such as acting on the draining pump or on the insulation. The issue is rather a matter of costs than energy efficiency. CECED offered to send more information to TREN on the technology behind noise reduction, the possible trade-off between noise reduction and energy consumption as well as the range of noise performance of DW on today's market. The aim is to assess whether there is scope for a ranking of noise performance of DW. Since more and more households leave in open kitchen, this might be indeed a relevant selling point (TREN, CECED).

Water consumption

AT and UK requested for a minimum requirement on water consumption. TREN recalled that the preparatory study seems to show that there is a positive correlation between energy efficiency and water consumption, the less water consumed, the more energy efficient the DW. By phasing out less energy efficient DW, higher water consuming DW will indirectly also be phased out. There is however still a great room for improvement since DW in the class A prove to have a variation in water consumption between 8 and 19 litres (UK).

CECED agreed to provide TREN with more input in order to evaluate within the impact assessment whether there is room for a ranking of water consumption.

Drying performance

A problem was raised by CECED as to the feasibility of the target on drying performance for DW (set 6 years after entry into force of the IM at 1.08) with a rated capacity below 7 place settings. A solution needs to be found for these specific models if the regulator does not want to phase out completely these niche products.

Generic requirement

The working document proposes to clearly identify the standard washing cycle which was used for the calculation of the energy efficiency index, to name it the "eco-programme" and set it as the default cycle. CECED expressed its concerns about this approach on the ground that this programme, depending for example on the load of the dishwasher or on the extent of soil of dishes, may not always be the most energy efficient one.

Measurement accuracy

The NL expressed their concern about the accuracy of measurements. A round of tests run on WM and DW showed that contrary to WM, DW were found in most cases to consume more than the declared value.

Labelling scheme

As for washing machines, some stakeholders (ECOS, ANEC/BEUC) stressed the need to have a labelling scheme that offer a real differentiation between products and do not leave consumers in front of the choice between one or two classes. The NL highlighted that the energy class number 10, with EEI<45 seemed unrealistic since the preparatory study showed that even using the BNAT, the best EEI achievable would be at 49.

AT and BE underlined that TREN should consider to remove the labelling scheme once DW will have reached the technological limit where no more energy efficiency improvements are feasible. CECED confirmed that this were not yet the case for DW.

Other issues

Hot fill: The issue of hot fill was touched upon with the same arguments as for washing machines raised (see minutes of the CF on WM, page 3).

Benchmark: Concerning the benchmark, TREN asked stakeholders what is their preferred approach: to quote the level of performances of DW according to the EEI formula in the current labelling scheme or to give indicative values using the revised EEI formula. The same question is valid for washing machines.

Standardisation: Since a new revision of the International Standard EN 50242 / EN 60436 is expected within the next two years, a statement was added by CECED to urge the Commission to incorporate it in the legal text at the earliest possible time. The chairman confirmed that the IM has to clarify which are the measurement methods applicable as long as the newest standard is not available, but includes a clear provision stating that when a new suitable standard is ready and published in the official journal, it will supersede the relevant measurement method defined in the IM.

Annex A: List of participants

Member States or company/organisation's name
Norway
Austria
Belgium
Bulgaria
Czech Republic
Denmark
Estonia
France
Germany
Hungary
Ireland
Italy
Latvia
Lithuania
Luxemburg
Malta
Netherlands
Portugal
Romania
Slovakia
Spain
Sweden
United Kingdom
ANEC/BEUC
CECED
CENELEC
ECOS
EEB
Grayling Global

Annex IV: Minutes of the Consultation Forum – 26/03/2010

Centre Albert Borschette (CCAB), Brussels

Participants: see Annex A

The Chairman opened the meeting by recalling the agenda addressing draft regulations on labelling for fans and draft regulations on ecodesign and labelling for household washing machines (WM) and dishwashers (DW) circulated to the members of the Consultation Forum (CF) prior to the meeting. Furthermore, a draft document on Voluntary agreements (VA) has been transmitted for discussion.

(…)

Energy labelling: Horizontal issues relevant for household refrigerating appliances (RF), televisions (TVs), household washing machines (WM) and dishwashers (DW)

Timing of the requirements applicable to advertisement (Articles 3 and 4)

On the timing of advertisement, the **Commission Staff** stated that 16 months after publication in the Official Journal is a necessary transitory period for suppliers and distributors to adapt their technical promotional material such as printed catalogues. That transitory period is especially important for distributors as they will only get the information on the classification of appliances 12 months after publication in the OJ; it would leave them only 4 months to adapt their promotional material for publication including printing.

BE questioned the necessity to display the energy efficiency class of the appliance only in those advertisements disclosing energy-related or price information. **The Chairman** explained that this was the agreement which was reached in the recast (Article 4 (2a)).

Timing of the display of the label in shops (Article 4)

The **Commission Staff** explained the rationale of the proposal to display the new label 16 months after publication in the OJ of the delegated regulation for every appliance independent of their date of placing on the market. The intention was to avoid that the new label is displayed close to the old label at the point of sale, and that distributors continue to display the old label for appliances below A+++ so as to benefit from a more advantageous label format.

This proposal met strong opposition by some MS and stakeholders (**DE , IT, PT, RO, CECED, EUROCOMMERCE, ORGALIME**) arguing that requesting the display of the new label on products placed on the market at the time of application of the current labelling Directives would lead to a retroactive effect of the new labelling delegated Regulations. They advocated instead that the new labelling requirements apply only to those appliances placed on the market 12 months after publication in the OJ of the related delegated Regulations and that appliances placed on the market before that date may continue to be displayed with the old label.

IE and **ANEC/BEUC** asked for a shorter transitory period.

Energy efficiency classes (Annex I)

On the energy efficiency classes, the **Commission Staff** proposed that the classifications for RF, DW and WM remain unchanged compared to the drafts agreed at the last Regulatory committee in March 2009. However the class A+++ would be introduced for RF, DW and WM from the start since market data shows that class A+++ could be populated and that this would provide a similar layout for the label across white goods at point of sale.

(…)

The Label (Annex V)

The Commission Staff pointed out that the reference period will be taken out from the label of WM, DW as well as RF as the full scale up to A+++ will be shown from the very start.

(…)

Horizontal issues relevant for household washing machines and dishwashers (ecodesign and energy labelling)

Timing of the ecodesign requirements (Annex 1)

On the timing of the ecodesign requirements, the **Commission Staff** explained that the 1st step for both WM and DW is set one year after publication in the OJ so as to leave suppliers sufficient time to test their products. The one year time line of the 1st step could not be reduced taking into account in particular that the ecodesign and labelling Regulations on WM introduce a new test method and formulas (the 3+2+2 approach) which will require from suppliers to test all washing machines for the 60°C half load and 40°C half load standard cotton programs in addition to the 60°C full load standard cotton program currently tested under the labelling Directive 95/12/EC.

The date of the application of the 2nd step is set three years and four years after entry into force for WM and DW respectively. On WM, the **Commission Staff** explained that market data show that it is possible to keep the date of application of the 2nd step unchanged compared to the dates of application agreed at the Regulatory Committee in March 2009, i.e. around October 2013. On DW, the **Commission Staff** explained that a transitory period is given for DW with 10 place settings of 45 width, as they are compared to 9 place settings and below, whereas larger 10 place settings DW are compared to other DW of the same size.

CECED and **IT** informed that small DW between 7 and 10 place settings do not have the same potential of improvement as larger 12 to 16 place settings DW. They requested on this ground an exemption for 7 to 10 place settings DW from the second step of the energy efficiency requirements (EEI<63). **The Commission Staff** stated that 9 place settings DW represent 12% of market share so that an exemption of these appliances from the second step should be substantiated. It asked CECED to provide for more evidence to demonstrate the need to exempt those appliances from the second step.

ECOS requested that the level of the energy efficiency requirements be strengthened.

The Label and the Fiche (Annex V, Annex III)

ECOS supported by **ANEC/BEUC** requested that washing and cleaning efficiency of WM and DW are declared, on the label and the fiche. ANEC/BEUC emphasized the need to reward improvements on this parameter wherever possible.

The Commission Staff stressed that due to minimum requirements for washing and cleaning efficiency, all machines would be in class A (except for a very small market share of small machines where class B is required due to technology constrains arising from their size). There will be no more scope for differentiation among appliances on that specific parameter, so that it will not be anymore relevant for consumers to get information on this regard.

ANEC/BEUC expected the electricity and water consumption to be given in the fiche for all programmes available to the machine, not only for the 'main washing programmes' (point c of Annex I, point 1 (2)).

The Commission Staff underlined the importance of being proportionate on what to request from the suppliers, as some machines may have up to 100 programs combinations.

Rinsing efficiency

On rinsing efficiency, the **Commission Staff** confirmed that the draft mandate for standardization includes the request to develop a test method for rinsing efficiency within 30 months. This will allow consideration of new requirements on rinsing efficiency and water consumption by the time of revision of the ecodesign and labelling Regulations.

Revision Clause (Article 7)

On the revision clause, the **UK** called on the revision to start within three or maximum four years after entry into force, and not five as stated today.

On DW, the **UK** requested that requirements on water consumption be added in the revision clause.

Test methods (Annex VII labelling, Annex III ecodesign)

On test methods, **CECED** asked the Commission to publish the new test methods as early as possible for the industry to be ready by the first dates of application of the ecodesign and labelling Regulations. **CECED** emphasized that the early implementation of the label is dependent on the availability of the test methods.

The Commission Staff confirmed its commitment to speed up the adoption process of the test methods as much as possible including by considering ways to publish a transitory test standard in the OJC. The chairman emphasized however that the publication of a 100 pages full test method in the OJC is not possible due to translation constrains (any publication in the OJ must be translated in all EU official languages).

Verification tolerances (Annex VII labelling, Annex III ecodesign)

On the verification tolerances, **RO** suggested that the 2nd round for the verification procedure for energy consumption of WM should have the same tolerance level as the first round.

The Commission Staff explained that this had already been debated and voted for by a qualified majority at the last Regulatory Committee in March 2009. A new discussion on this topic should therefore preferably be avoided.

(…) **The Chairman** closed the meeting.

Annex A: List of participants

MEMBER STATES OR COMPANY/ORGANIZATION'S NAME
AUSTRIAN ENERGY AGENCY (AT)
CECED
CEN/CENELEC
DANISH ENERGY AUTHORITY (DK)
DEFRA (UK)
DELEGATION FRANCAISE (FR)
DIGITALEUROPE
ECEEE
ECOS
EFTA
EGMF
ENEA (IT)
ENTRERPRISE IRELAND (IE)
EPEE
EUNITED CLEANING
EUROCOMMERCE
EUROPUMP
EUROVENT
FEDERACION ESPANOLA COMERCIANTES DE ELECTRODOMESTICOS
FEDERAL ENVIRONMENT AGENCY (DE)
FEDERAL INSTITUTE FOR MATERIALS RESEARCH AND TESTING (DE)
FEDERAL MINISTRY FOR ECONOMICS & TECHNOLOGY (DE)
FEDERAL MINISTRY OF THE ENVIRONMENT (DE)
FEDERAL PUBLI SERVICE HEALTH 1 ENVIRONMENT (BE)

FEDERAL PUBLIC SERVICE ECONOMY (BE)
GERMAN ENERGY AGENCY (DE)
IKEA, EUROCOMMERCE
ILNAS (LU)
MALTA STANDARDS AUTHORITY (MT)
MINISTERO DELLO SVILUPPO ECONOMICO (IT)
MINISTRY OF ECONOMICS AFFAIRS & COMMUNICATION (EE)
MINISTRY OF ECONOMY (PL)
MINISTRY OF ECONOMY (SI)
MINISTRY OF ECONOMY ENERGY & TOURISM (BG)
MINISTRY OF ECONOMY TRADE & BUSIN ESS ENVIRONMENT (RO)
MINISTRY OF EMPLOYMENT AND THE ECONOMY (FI)
MINISTRY OF THE ECONOMY (SK)
MITYC (ES)
NORWEGIAN WATER RESSOURCES AND ENERGY DIRECTORATE (N)
ORGALIME
SENTERNOVEM
STATE ENERGY INSPECTION (CZ)
SWEDISH ENERGY AGENCY (SE)
WWF

Annex V
Calculation methodology for the Energy Efficiency Index

General methodology

The methodology for calculating the energy efficiency of dishwashers is based on the identification of an energy efficiency index (EEI) on which target levels (for stage 1 and stage 2) are based. As for other appliances, the aim of the EEI is to compensate for the differences in sizes of dishwashers so as to allow a fair comparison between products.

The proposal introduces three major changes from the current methodology of Directive 97/17/EC.

– It is proposed to include the energy consumption of low power modes into the calculation of the energy consumption so as to give manufacturers incentives to improve this criterion in addition to the energy consumption of cleaning cycles. The inclusion of low power modes into the EEI (on which the energy efficiency classes are based) will also convey more transparent information to end-users on real energy performances of dishwashers.

– The inclusion of low power modes into the formula obliges to shift from the current calculation of the EEI which is based on the energy consumption per cycle, to a ratio based on the annual energy consumption. Thus, it is proposed to base the annual energy consumption of dishwashers on a predefined number of cleaning cycles per year which reflects real use of consumers.

– In order to address the problem with 10 ps dishwashers (see box 2 below), it is proposed to adapt the divide in place settings in the formula used for the calculation of the reference consumption.

The energy efficiency index is shall be calculated as:

$$EEI = (AEc/SAEc) * 100$$

where:

AEc = annual energy consumption of a dishwasher, based on measurements

SAEc = standard annual energy consumption of a dishwasher (based on reference consumption)

The annual energy consumption AEc of a dishwasher, in kWh/year rounded to two decimal places is therefore calculated as:

$$AEc = Et * cycles + \frac{\left[Po * \frac{525600 - (Tt*cycles)}{2} \quad Pl * \frac{525600 - (Tt*cycles)}{2} \right]}{60 * 1000}$$

where:

Et = energy consumption for the standard cycle in kWh and recorded to three decimal places

Pt = is the power in 'left-on' mode for the standard cycle, in W and recorded in two decimal places

Po = is the power in 'off' mode for the standard cycle, in W and recorded in two decimal places

Tt = is the programme time for the standard cycle, in minutes and recorded in whole minutes

cycles = is the annual number of cycles per year (= 280 cycles/year)

(The number 525600 is the number of minutes in one year)

Box 2: 10 place settings

An ongoing trend for dishwashers is the increase of their capacity within the same outer dimensions. Most machines of 45 cm in width used to have 8, maximum 9 place settings[36] (see box 2). In the meantime, machines of 45 cm width with 10 place settings have appeared on the market[37].This has rendered the current divide (in Directive 97/17/EC) between 9 and 10 place settings in the calculation of reference consumption for energy efficiency obsolete. Especially for the current 45 cm / 10 place settings models the technical effort needed to reach class A is smaller than that for 9 settings machines (because the efficiency is based on a relatively larger reference consumption –see section 5.1 for a description of the calculation methodology of the energy efficiency index).

Reference Consumption

The proposal describes a calculation of a reference annual energy consumption based upon 280 cleaning cycles per year. For the different capacities of dishwashers the following calculation of reference consumption applies:

For dishwashers with a rated capacity of maximum 9 place settings or less, and including 10 place settings if the machine is not wider than 45 cm, the reference consumption is calculated as:

SAEc = 25.2 * ps + 126 (kWh/year)

For dishwashers with a rated capacity of 11 place settings or more, and including 10 place settings if the machine is wider than 45 cm, the reference consumption is calculated as:

SAEc = 7.0 * ps + 378 (kWh/year)

The result is that the former EEI levels used in 97/17/EC are not comparable anymore with the EEI levels achieved with this formula. The inclusion of low power modes for instance

[36] One 'place setting' is a defined set of crockery, glass and cutlery for use by one person (described in EN 60436). The (whole) number of place settings a dishwasher can accommodate defines the rated capacity of dishwashers.

[37] The same has happened for machines of 60 cm width where earlier machines used to have 10 place settings, but are now surpassed in popularity by 12 place settings machines (and 14, 15, 16, even 17 place settings are also available).

raises the annual consumption, so that for a specific dishwasher cycle consumption the corresponding EEI will increase.

Verification procedure for market surveillances purposes

In order to respond to the problem highlighted in section 2.1.2.6 on measurement uncertainties, this proposal includes, in line with the preparatory study (Task 7, p. 142), a reduction of the tolerance of the first step of the verification test (for a single appliance) from 15% to 10%. This value of 10% has been selected taking into account that a revised dishwasher test standard is in preparation and the reproducibility of this test revised standard has not been verified yet (a mandate to CENELEC for a round robin test to define the standard deviation of the results from the revised test standard is in preparation). A further reduction in the allowed tolerance is deemed not appropriate without knowing the standard deviation of the revised test.

In 2003, CECED performed together with CENELEC a round robin test to verify the reproducibility of testing using the existing standard EN 50242:2003- equivalent to EN 60436 [38]. They concluded that the standard deviation in reproducibility for energy measurements by 19 laboratories (outliers eliminated) is 5,8%. The expanded uncertainty (twice the standard deviation) is not relevant since the verification only applies to values that are higher than declared (if the measured value is lower than declared there is no issue regarding the verification).

RRT2003 19 labs outliers eliminated		S_R in %	Expanded Uncertainty
cleaning performance	ratio	4,8%	10%
drying performance	ratio	9,5%	19%
energy consumption	kWh	5,8%	12%
water consumption	l	3,3%	7%

Calculation: University Bonn (Dr. Stamminger)

Source: Extract from presentation by CENELEC "TC 59X validation of E-labels" BT133/DG7414/DV, August 2008

If the appliance shows a deviation of more than +10% a further three appliances are tested of which the arithmetic mean must be equal to or less than the declared value plus 10%. The impact of the proposed decrease of tolerance of the first step in the verification procedure will be that those appliances that are on average between the +15% and +10% and have remained unchallenged (passed the first step) will now be put under greater "pressure" and will have to comply to the second step "average max. +10%".

How many appliances actually use this 'freedom' between the 15% and 10% is unknown, but an analysis of the energy consumption of 22 dishwashers, tested by the Swedish test institute[39], revealed that the average appliance is some 9,6% 'above declared' which indicates

[38] Downloadable from *www.landtechnik.uni-bonn.de/ifl_research/ht_2/**ringtest**.pdf*

[39] Ten Years of Energy Labelling of Domestic Appliances 1995–2005 (ER 2006:18), Swedish Energy Agency, March 2006

that even if such appliances exists (with an average above +10%, but no exceeding +15%), their presence is not enough to influence the average of 22 random selected appliances.

The conclusion is that although the measure may have an impact on specific appliances, the average 'real' energy consumption of dishwashers (which deviates from 'declared' by +10%) will not change drastically. The proposed energy efficiency indexes are based upon the LLCC/BAT analysis which does not consider this +10% verification tolerances. The values used in the calculation of the EU impacts for this proposal however are corrected for the +10% deviation (from the year 1995 and beyond).