



MIDAS includes the descriptions of models in use by the Commission in support to the policy cycle. MIDAS is developed and managed by the **Competence Centre on Modelling** of the European Commission.

Find out more at https://ec.europa.eu/knowledge4policy/modelling_en

Contact: EU-MIDAS@ec.europa.eu

Factsheet

SWD/2019/0341 final

Impact assessment accompanying the document COMMISSION REGULATION (EU) .../... : laying down ecodesign requirements for refrigerating appliances pursuant to Directive 2009/125/EC of the European Parliament and of the Council and repealing Commission Regulation (EC) No 643/2009 and COMMISSION DELEGATED REGULATION (EU) .../... supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to energy labelling of refrigerating appliances and repealing Commission Delegated Regulation (EU) No 1060/2010

Supporting model(s)

EIA

Impact assessment SWD/2019/0341 final

Fact sheet on model contributions

Source: Commission modelling inventory and knowledge management system (MIDAS)

Date of Report Generation: 05/11/2020

© European Union, 2020

The Commission's reuse policy is implemented by the [Commission Decision of 12 December 2011 on the reuse of Commission documents](#). Unless otherwise indicated (e.g. in individual copyright notices), content owned by the EU on this website is licensed under the [Creative Commons Attribution 4.0 International \(CC BY 4.0\) licence](#). This means that reuse is allowed, provided appropriate credit is given and changes are indicated. You may be required to clear additional rights if a specific content depicts identifiable private individuals or includes third-party works. To use or reproduce content that is not owned by the EU, you may need to seek permission directly from the rightholders. Software or documents covered by industrial property rights, such as patents, trade marks, registered designs, logos and names, are excluded from the Commission's reuse policy and are not licensed to you.

Disclaimer: The Commission accepts no responsibility or liability whatsoever with regard to any and all information made available on or accessible through MIDAS website. The information, including but not limited to models, impact assessments, models' input and output data, and metadata, modelling exercises and policy contributions, is of a general nature only and is not intended to address the specific circumstances of any particular individual or entity, and may not be regarded as comprehensive, complete, accurate or up-to-date. The Commission furthermore does not assume any responsibility for content of any external websites to which links maybe provided on this website. Any and all information provided may not be regarded as professional or legal advice. Information available through the website may not be referenced as officially adopted text of European Union regulatory or policy documents or sources. Their authentic versions can only be accessed through the Official Journal of the European Union (the printed edition or, since 1 July 2013, the electronic edition on the EUR-Lex website).

Overview

Title

Impact assessment accompanying the document COMMISSION REGULATION (EU) .../... : laying down ecodesign requirements for refrigerating appliances pursuant to Directive 2009/125/EC of the European Parliament and of the Council and repealing Commission Regulation (EC) No 643/2009 and COMMISSION DELEGATED REGULATION (EU) .../... supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to energy labelling of refrigerating appliances and repealing Commission Delegated Regulation (EU) No 1060/2010

Document ID

SWD/2019/0341 final

Year of publication

2019

Led by

ENER

Model(s) used

EIA

EIA

Full title

Ecodesign Impact Accounting model

Run for this impact assessment by

VHK Van Holsteijn en Kemna BV

Contributed to

Baseline and assessment of policy options

Helped to assess the following impacts

<i>Impact area</i>	<i>Impact category</i>	<i>Impact subcategory</i>
Economic impacts	Operating costs and conduct of business	Cost/availability of essential inputs (raw materials, machinery, labour, energy, ..)
Economic impacts	Operating costs and conduct of business	Market & marketing
Economic impacts	Operating costs and conduct of business	Opening/closing down of business
Economic impacts	Trade and investment flows	Investment flows & trade in services
Economic impacts	Competitiveness (sectoral) of business	Cost of doing business
Economic impacts	Innovation and research	Stimulation of research and development
Economic impacts	Innovation and research	Markets for Innovation
Economic impacts	Public authorities	Budgetary consequences for public authorities
Economic impacts	Consumers and households	Prices, quality, availability or choice of consumer goods and services
Economic impacts	Consumers and households	Safety or sustainability of consumer goods and services

Economic impacts	Specific regions or sectors	Significant effects on sectors
Economic impacts	Third countries and international relations	EU foreign policy and EU development policy
Economic impacts	Macroeconomic environment	Economic growth and employment
Social	Employment	Impact on jobs
Social	Employment	Impact on jobs in specific sectors, professions, regions or countries
Social	Effects on income, distribution and social inclusion	Households income and at risk of poverty rates
Social	Public health and safety and health systems	Health and safety of individuals/populations
Social	Public health and safety and health systems	Health risks due to substances harmful to the natural environment
Social	Public health and safety and health systems	Health due to changes energy use and/or waste disposal
Environmental	Climate	Emission of greenhouse gases
Environmental	Climate	Emission of ozone-depleting substances
Environmental	Air quality	Emissions of acidifying, eutrophying, photochemical or harmful air pollutants
Environmental	Water quality and resources	Availability or quality of Fresh- or ground water
Environmental	Waste production / generation / recycling	Waste production, treatment, disposal or recycling
Environmental	Efficient use of resources (renewable & non-renewable)	Use of non-renewable resources
Environmental	Sustainable consumption and production	Sustainable production and consumption
Environmental	Sustainable consumption and production	Relative prices of environmental friendly and unfriendly products
Environmental	Transport and the use of energy	Energy intensity of the economy

Ecodesign Impact Accounting model

Fact sheet

Source: Commission modelling inventory and knowledge management system (MIDAS)

Date of Report Generation: 05/11/2020

Overview

Acronym EIA

Full title Ecodesign Impact Accounting model

Main purpose

To model environmental and socio-economic impacts of environmental product policy options, as part of preparatory and impact assessment studies for ecodesign and energy labelling and similar end-use instruments.

Summary

The VHK stock-model, since 2013 better known as the EIA-model (Ecodesign Impact Accounting model), has been used by VHK in its current form since 2008 in 25 official Impact Assessments (IA) reports. These include the IA for the review of the Energy Labelling Framework Directive in 2015 and the IAs for 24 Ecodesign Commission Regulations, in 15 cases also covering Energy Labelling Commission Delegated Regulations for the same product group.

VHK has developed, optimised and used (proprietary) stock models for preparatory studies on energy labels under the 92/75/EC framework directive since the 1990s. Based on that experience, the model was further developed for application in preparatory studies and impact assessments under the Ecodesign and Energy Labelling framework legislation. As such, it uses inputs defined in the MEERP methodology (https://ec.europa.eu/growth/industry/sustainability/ecodesign_en), including those in the EcoReport tool.

The main focus of the model is on transparency to obtain stakeholder acceptance/involvement. The stock-model is extensive, i.e. covering many output-categories, but uses straightforward intuitive calculations implemented in Excel.

From 2013 the EIA tool is used to harmonise and aggregate all Ecodesign preparatory and impact assessment study results in a comprehensive Ecodesign Impact Accounting study, published in principle annually. This also marks the transfer of exclusive distribution rights for the tool to the European Commission. The deliverables of the study include a 40 Mb Excel file covering 50 product-groups with 300 subgroups ('BaseCases') for more than 30 outputs over a timeframe from 1990 to 2050 with a yearly timestep. The Commission then publishes the 300-page pdf of in- and outputs and the model description.

Apart from the use in Commission impact assessments, the EIA model is also employed for external scrutiny of the Ecodesign and Energy Labelling programme, most recently by the European Court of Auditors, which --apart from relatively minor corrections-- found the EIA model adequate for that purpose. Outcomes of the EIA study are used for EC press releases on the achievements of the Ecodesign and Energy Labelling programme.

Keywords

stock model , sustainable consumption , ecomodelling , eco-design , energy label

Model category (thematic)

Environment, Energy

Model home page

<https://ec.europa.eu/energy/en/studies/ecodesign-impact-accounting-0>

Ownership & license

Ownership

Sole copyright [European Union]

Ownership details

The model has been developed by Van Holsteijn en Kemna BV ('VHK') for the European Commission in its current form 2013. It has been implemented using Microsoft Excel.

Licence type

Non-Free Software licence. The license has one or more of the following restrictions: it prohibits creation of derivative works; it prohibits commercial use; it obliges to share the licensed or derivative works on the same conditions.

Details

EIA structure and approach

The *EIA*-tool models the technical potential and associated socio-economic impacts for EU policy options regarding resource efficiency improvement and emission abatement (including for greenhouse gases) for consumer- and professional products. The resulting EU-level scenarios typically cover a 1990 to 2050 time-horizon.

The main focus of the model is on transparency to obtain stakeholder involvement and acceptance as much as possible. The stock-model is extensive, i.e. covering many output-categories, but uses straightforward intuitive calculations and is easily accessible in Excel.

The *EIA*-tool follows the *Methodology for Ecodesign of Energy-related Products (MEErP)* for preparatory (review) studies in Ecodesign, which includes the data structure from the *EcoReport* tool [1] as well as calculation procedures for the assessment of environmental and socio-economic impacts etc.. It takes into account the relevant requirements of the European Commission's *Better Regulation* impact assessment guidelines [2]. Generic (default) input parameters on historical and future rates are periodically updated and taken as much as possible from EU-related sources, such as (a) Eurostat for historical energy rates, conventions on calorific values per fuel, etc., (b) EEA (<https://www.eea.europa.eu/>) for air pollution conversion factors (NO_x, SO₂, PM, etc.), GWP-100 factors for electricity production (reworked), conversions following UNFCC, (c) the latest PRIMES reference scenario for energy price projections, and (d) *Energy Efficiency Directive amendment (EU)2018/2002. OJ L 328, 21.12.2018.* used for primary energy factor (2.1 instead of 2.5 at transition).

Product-specific inputs are taken typically from Ecodesign preparatory studies and/or for aggregated studies, like the periodical overall Ecodesign impact accounting, from the IA reports. The model is periodically updated following the results of new preparatory, review and IA studies. The calculation model updates usually are the result of product specific peculiarities involving double counting, double impacts, lifetime peaks/lows, etc. that require an adjustment for that product. The latest model description can be found on the Commission website. [3]

For some product groups, model variants exist to handle product-specific analysis needs. Typically these variants contain additions to derive the input required by the main methodology, i.e. to derive average loads or efficiencies from detailed distributions, to correctly manage the shift in sales from less to more efficient base cases, to relate product sales to the stock of buildings and dwellings, to include more complex lifetime-distributions in the stock calculations, to simulate the effect of hydrogen as a fuel instead of natural gas, to simulate more detailed price-efficiency relationships (e.g. LEDs), to add energy effects of related products (variable speed drives, lighting control gears, PFHRDs), etc.. In this sense, in particular the Model for European Light Sources Analysis (MELISA) is a further detailed variant of the *EIA*-model, even if the main analysis methodology remains the same.

References

[1] https://ec.europa.eu/growth/industry/sustainability/ecodesign_en

[2] <https://ec.europa.eu/info/sites/info/files/better-regulation-guidelines-impact-assessment.pdf>
and <https://ec.europa.eu/info/sites/info/files/better-regulation-guidelines-evaluation-fitness-checks.pdf>

[3] Wierda, L., Kemna, R. et al. (VHK), Ecodesign Impact Accounting, VHK for EC DG ENER C.3, 2013-2018. <https://ec.europa.eu/energy/en/studies/ecodesign-impact-accounting-0>

Input and parametrization

Generic parameters: historical energy prices, future energy price escalation (growth rate corrected for inflation), electricity to primary energy conversion coefficient (CC=1/PEF), global warming potential for energy sources (GWP-100); rates (€/unit) for consumables (water, paper/filters/detergents/toner/electrodes/etc. as appropriate) and average maintenance/repair costs (€/yr.). Energy rates diversified per usage sector (residential, tertiary, industry, other).

Business-sector-specific parameters: typical revenue-split OEM/industry/ wholesale/ retail/ installer/ VAT, average revenue per direct job.

For each new product analysed, the Inputs are given for the EU (currently the EU27-2020) and the period 1990-2050:

- Definition of product and product-subtypes ('Base Cases');
- Unit sales per Base Case, EU 1990-2050;
- Acquisition costs (in fixed euros, i.e. inflation-corrected for the reference year);
- Service life of the product (average lifetime or lifetime array where needed);
- Unit load, average user demand for product output;
- Unit environmental impact (energy efficiency, GHG, NOx, CO, PM emissions) of average new products sold per year over the 1990-2050 period;
- Annual unit consumable consumption (e.g. water, paper) and maintenance costs;
- Improvement environmental impact and associated costs, given as arrays of values for inter- and extrapolation, at least for Base Case (BC), Least Life Cycle Cost (LLCC), Best Available Technology (BAT) products;
- Learning curve effect (percentage acquisition cost reduction per year after implementing policy option, up to previous level).

Main output

- Scenarios: the BAU ('Business-As-Usual') and ECO scenario;
- Derived variables and constants: Stock (volume installed), environmental impacts of stock (energy, emissions), installation, maintenance, auxiliary inputs, end-of-life unit costs;
- Consumer expenditure: Total acquisition and running costs;
- Business revenue: Total turnover for industry, wholesale, retail, installation sectors;
- Social parameters: Direct employment (number of jobs)

Spatial - temporal extent

The output has the following spatial-temporal resolution and extent:

Parameter	Description
Spatial Extent / Country Coverage	European Union
(Spatial) resolution	European Union
Temporal extent	Up to 2050
Temporal resolution	Up to 2050

Quality & transparency

Quality

Question	Answer	Details
Models are by definition affected by uncertainties (in input data, input parameters, scenario definitions, etc.). Have the model uncertainties been quantified? Are uncertainties accounted for in your simulations?	yes	Models are by definition tainted with uncertainties (in input data, input parameters, scenario definitions, etc.). Have the model uncertainties been quantified? Are uncertainties accounted for in your simulations? [If not, why? (e.g. too demanding, don't know how to do it, other reasons).] As much as is possible To a limited extent. Most uncertainty is typically not in the model but in the input data. At the low aggregation level of commercial, economic and environmental data for consumer- and professional products the uncertainty is often high, and the model is typically used to reach consensus amongst stakeholders of what are acceptable data.
Sensitivity analysis helps identifying the uncertain inputs mostly responsible for the uncertainty in the model responses. Has the model undergone sensitivity analysis?	yes	As mentioned, sensitivity analyses with the model are used in preparatory studies and impact assessments to reach consensus. In the final reporting, sensitivity analysis may also be presented to give policy makers an impression of the uncertainty.
Has the model undergone external peer review by a panel of experts, or have results been published in peer-reviewed journals?	yes	The model has been used by the European Court of Auditors to evaluate the Ecodesign and Energy Label program and, apart from minor modifications to which the EC agreed and which have now been incorporated, found adequate for the purpose (see https://www.eca.europa.eu/Lists/ECADocuments/SR20_01/SR_Ecodesign_and_energy_labels_EN.pdf). Apart from that, the stock model is scrutinised by stakeholders (industry, NGOs, Member States, EU institutions) every time it is used in impact assessments. As such it has been used in the review of the Ecodesign and Energy Label Framework Directives in 2015 and 24 product-specific IA and preceding preparatory studies by VHK over the past 15 years, relating to 24 Ecodesign Commission Regulations and on 15 occasions combined with Energy Label. Annually the outcomes of all Ecodesign studies are aggregated in the Ecodesign Impact Accounting studies, using the EIA-tool for harmonisation of the calculation procedure. Outcomes of these aggregated studies with the model have been used in EC press releases and internal communications to communicate the impact of Ecodesign and Energy Label.
Has model validation been done? Have model predictions been confronted with observed data (ex-post)?	yes	Yes, model validation by industry, experts, stakeholders has been done, see above. In the context of the review of regulations a comparison between the projected saving from the first IA versus what actually happened ex-post is a mandatory part of the analysis (following REFIT in Better Regulation Toolbox).

References related to external peer-review and publication in scientific journals:

- No references provided in MIDAS

Transparency

Question	Answer	Details
Is the model underlying database (i.e. the database the model runs are based on) publicly available?	yes	Data are directly visible in the model. The Commission publishes the annual EIA updates on its website in the form of a status report (with model description), a background overview report with product information, and sometimes a special report e.g. on material resources use. All these documents can be downloaded by the general public. The main product-specific data sources are preparatory studies, usually with their own public project website, run by the contractor, where intermediate and final results (data inputs in the model) are given. The final reports of these studies stay available on the Commission website for the general public.
Can model outputs be made publicly available?	yes	Follows the same availability rules as IAs from the Commission
Is the model transparently documented (including underlying data, assumptions and equations, architecture, results) and are these documents available to the general public?	yes	Partly. Data and calculations are directly visible in the model. See also https://ec.europa.eu/energy/en/studies/ecodesign-impact-accounting-0
Is the model source code publicly accessible or open for inspection?	yes	Partly. The Commission has full access to the files and code. It also has the rights –if it so decides– to grant third party access for the whole or part of the model.

References related to documentation:

- No references provided in MIDAS

The model's policy relevance and intended role in the policy cycle

The model is designed to contribute to the following policy areas

- Energy
- Environment
- Consumers
- Business and industry

The model is designed to contribute to the following phases of the policy cycle

- Formulation
- Evaluation

The model's potential

The model is designed for use in policy formulation, specifically for economic and technical characterisation of policy options, and for impact assessments. The model can also be used (after a review study) for post evaluation of the impacts of policies.

Impact types that can be assessed with the models include:

Environmental impacts

- Energy efficiency (energy use per unit of performance)
- Energy consumption
- GHG emissions
- Other air pollution (NOx)

Economic impacts Sales (units, price)

- Stock (units)
- Acquisition costs
- Running costs
- Consumer expenditure
- Revenues market actors

Social impacts

- Employment (jobs)

Previous use of the model in ex-ante impact assessments of the European Commission

Use of the model in ex-ante impact assessments since July 2017.

In the Year	EIA contributed to the Impact assessment called	Led by	By providing input to the	The model was run by	Details of the contribution
2019	Impact assessment accompanying the document COMMISSION REGULATION (EU) .../... : laying down ecodesign requirements for refrigerating appliances pursuant to Directive 2009/125/EC of the European Parliament and of the Council and repealing Commission Regulation (EC) No 643/2009 and COMMISSION DELEGATED REGULATION (EU) .../... supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to energy labelling of refrigerating appliances and repealing Commission Delegated Regulation (EU) No 1060/2010 SWD/2019/0341 final	ENER	Baseline and assessment of policy options	VHK Van Holsteijn en Kemna BV	The model helped to assess the following impacts: <ul style="list-style-type: none"> - Cost/availability of essential inputs (raw materials, machinery, labour, energy, ..) - Market & marketing - Opening/closing down of business - Investment flows & trade in services - Cost of doing business - Stimulation of research and development - Markets for Innovation - Budgetary consequences for public authorities - Prices, quality, availability or choice of consumer goods and services - Safety or sustainability of consumer goods and services - Significant effects on sectors - EU foreign policy and EU development policy - Economic growth and employment - Impact on jobs - Impact on jobs in specific sectors, professions, regions or countries - Households income and at risk of poverty rates - Health and safety of individuals/populations - Health risks due to substances harmful to the natural environment - Health due to changes energy use and/or waste disposal - Emission of greenhouse gases - Emission of ozone-depleting substances - Emissions of acidifying, eutrophying, photochemical or harmful air pollutants - Availability or quality of Fresh- or ground water - Waste production, treatment, disposal or recycling - Use of non-renewable resources - Sustainable production and consumption - Relative prices of environmental friendly and unfriendly products - Energy intensity of the economy

2019	<p>Impact assessment accompanying the document COMMISSION REGULATION (EU) .../... laying down: ecodesign requirements for electric motors and variable speed drives pursuant to Directive 2009/125/EC of the European Parliament and of the Council and repealing Commission Regulation (EC) No 640/2009</p> <p>SWD/2019/0343 final</p>	ENER	<p>Baseline and assessment of policy options</p>	<p><i>VHK Van Holsteijn en Kemna BV</i></p>	<p>The model helped to assess the following impacts:</p> <ul style="list-style-type: none"> - Cost/availability of essential inputs (raw materials, machinery, labour, energy, ..) - Market & marketing - Opening/closing down of business - Investment flows & trade in services - Cost of doing business - Stimulation of research and development - Markets for Innovation - Budgetary consequences for public authorities - Prices, quality, availability or choice of consumer goods and services - Safety or sustainability of consumer goods and services - Significant effects on sectors - EU foreign policy and EU development policy - Economic growth and employment - Impact on jobs - Impact on jobs in specific sectors, professions, regions or countries - Households income and at risk of poverty rates - Health and safety of individuals/populations - Health risks due to substances harmful to the natural environment - Health due to changes energy use and/or waste disposal - Emission of greenhouse gases - Emission of ozone-depleting substances - Emissions of acidifying, eutrophying, photochemical or harmful air pollutants - Availability or quality of Fresh- or ground water - Waste production, treatment, disposal or recycling - Use of non-renewable resources - Sustainable production and consumption - Relative prices of environmental friendly and unfriendly products - Energy intensity of the economy
2019	<p>Impact assessment accompanying the document Commission Regulation (EU) .../...laying down: ecodesign requirements for electronic displays pursuant to Directive 2009/125/EC of the European Parliament and of the Council, amending Commission Regulation (EC) No 1275/2008, and repealing Commission Regulation (EC) 642/2009 and Commission Delegated Regulation (EU) .../... supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to energy labelling of electronic displays and repealing Commission Delegated Regulation (EU) No 1062/2010</p>	ENER	<p>Baseline and assessment of policy options</p>	<p><i>VHK Van Holsteijn en Kemna BV</i></p>	<p>The model helped to assess the following impacts:</p> <ul style="list-style-type: none"> - Cost/availability of essential inputs (raw materials, machinery, labour, energy, ..) - Market & marketing - Opening/closing down of business - Investment flows & trade in services - Cost of doing business - Stimulation of research and development - Markets for Innovation - Budgetary consequences for public authorities - Prices, quality, availability or choice of consumer goods and services - Safety or sustainability of consumer goods and services - Significant effects on sectors - EU foreign policy and EU development policy - Economic growth and employment

SWD/2019/0354 final

- Impact on jobs
- Impact on jobs in specific sectors, professions, regions or countries
- Households income and at risk of poverty rates
- Health and safety of individuals/populations
- Health risks due to substances harmful to the natural environment
- Health due to changes energy use and/or waste disposal
- Emission of greenhouse gases
- Emission of ozone-depleting substances
- Emissions of acidifying, eutrophying, photochemical or harmful air pollutants
- Availability or quality of Fresh- or ground water
- Waste production, treatment, disposal or recycling
- Use of non-renewable resources
- Sustainable production and consumption
- Relative prices of environmental friendly and unfriendly products
- Energy intensity of the economy

Bibliographic references

- *No references provided in MIDAS*