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/2019/0345 final

COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT Accompanying the document Commission Regulation laying down ecodesign requirements for external power supplies pursuant to Directive 2009/125/EC of the European Parliament and of the Council repealing Commission Regulation (EC) No 278/200

Supporting model(s)

VM Model

Impact assessment
SWD/2019/0345 final

Fact sheet on model contributions

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

Date of Report Generation: 05/11/2020

Overview

Title
COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT Accompanying the document Commission Regulation laying down ecodesign requirements for external power supplies pursuant to Directive 2009/125/EC of the European Parliament and of the Council repealing Commission Regulation (EC) No 278/200

Document ID
SWD/2019/0345 final

Year of publication
2019

Led by
ENER

Model(s) used
VM model

VM model

Full title

VM stock and policy scenario model

Run for this impact assessment by

Viegand Maagøe A/S

Contributed to

Baseline and assessment of policy options

Helped to assess the following impacts

Impact area	*Impact category*	*Impact subcategory*
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	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

VM stock and policy scenario model

Fact sheet

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

Date of Report Generation: 05/11/2020

Overview

Acronym VM model
Full title VM stock and policy scenario 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 VM stock and policy scenario model in the current form has been used for approximately 5 years for preparatory studies, review studies and impact assessments. These include the technical assistance carried out for amended ecodesign requirements for external power supplies (ENER) and new ecodesign requirements for servers and data storage products (GROW).

The model is based on previous VM models, which have been further developed and optimised.

It is based on the MEErP methodology (https://ec.europa.eu/growth/industry/sustainability/ecodesign_en) and uses also the modelling in the EcoReport Tool with adaptation where necessary, mainly regarding the calculation of the Life Cycle Costs, which are included in the VM stock and policy scenario model, and regarding the future energy price development, where data from the Commission based on the PRIMES model have been used as agreed with ENER.

The main objective of the model is to assess the impact of future policy scenario options in a structured and transparent manner in spite of assessing several base cases and policy options in order to be able to select the preferred option.

All VM preparatory and review studies carried out over the last 5 years use the model for the scenario analysis (Task 7 of the MEErP).

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

Model category (thematic)
Environment, Energy

Model home page
No information provided

Ownership & license

Ownership

Sole copyright [3rd party]

Ownership details

The model has been developed by Viegand Maagøe A/S ('VM') for the European Commission. The European Commission can use all the results from the model.

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

VM model structure and approach

The VM stock and policy scenario model models the technical potential and associated socio-economic impacts for a variety of EU policy options including a baseline (no action) 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 modules in the model are:

- Stock model: It contains the established base cases and sales data and average lifetimes from sources and/or estimates. The sales data will be extrapolated to cover historical years (typically from 1990, but may be earlier) and future years (typically to 2050). From the sales data and the average lifetimes, the stock for all base cases is calculated using a normal distribution of product lifetimes.

- Scenario options and assumptions: It contains the scenario options with the requirements to be analysed and compared with the baseline scenario (no action i.e. Business As Usual (BAU))

- Scenario development: It contains the modelling of each scenario regarding impact on sales, energy, environment, economy and employment. The scenario requirements are in most cases very specific to the products assessed and this module therefore needs to be adapted to these requirements. For each scenario, penetration rates for products placed on the market in the various energy and environmental performance classes are established the impact assessed in the model.

- EcoReport Tool: The EcoReport Tool made available by the European Commission calculates the lifecycle impact (production, distribution, use and end of life) on material use and environmental impact based on the bill of materials (BOM) for one product unit and the total sales. The EcoReport Tool is used for each scenario and the net impact can be calculated as the difference between a policy scenario and the baseline scenario.

The model follows the Methodology for Ecodesign of Energy-related Products (MEErP) for preparatory and review studies in Ecodesign, which includes the data structure from the EcoReport Tool (https://ec.europa.eu/growth/industry/sustainability/ecodesign_en) 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 [1]. Generic (default) input parameters on historical and future rates are periodically updated and taken as much as possible from EU-related sources: (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 (NOx, SO2, PM, etc.), GWP-100 factors for electricity production (reworked), conversions following UNFCC (c) Using latest PRIMES

reference scenario for energy price projections, (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 and energy labelling preparatory and review studies. The model is periodically updated following the results of new preparatory, review and IA studies.

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 more detailed price-efficiency relationships, to add energy effects of related products, etc.

[1] 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

Input and parametrization
Generic input parameters include:

- Historical energy prices, typically from Eurostat
- Future energy prices diversified per usage sector (residential, tertiary, industry, other) and type of energy, provided by the Commission
- Electricity to primary energy conversion coefficient (CC=1/PEF)
- Global warming potential for energy sources (GWP-100)
- Rates (EUR/unit) for consumables (water, paper/filters/ detergents/toner/electrodes/etc. as appropriate)
- Average maintenance/repair costs (EUR/year)
- 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 and adapted to the specific product and policy option analysed:

- 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 baseline, Least Life Cycle Cost (LLCC) and Best Available Technology (BAT) products for the base cases assessed
- Learning curve effect (percentage acquisition cost reduction per year after implementing policy option, up to previous level)
- Penetration rates of environmentally optimised products for each year assessed

Main output

- Scenarios: the BAU ('Business-As-Usual') and a number of ECO scenarios
- Derived variables and constants: Stock (volume installed), environmental impacts of stock (energy, emissions), installation, maintenance, auxiliary inputs and end-of-life unit costs
- Consumer expenditure: Total acquisition and running costs and LCC (life cycle costs)
- Business revenue: Total turnover for industry, wholesale, retail, and 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	yearly

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	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?	no	No, not the model itself, but the results have been used for the impact assessments passing the Regulatory Scrutiny Board in addition to be commented on by the Commission and by stakeholders.
Has model validation been done? Have model predictions been confronted with observed data (ex-post)?	yes	The model has undergone internal review by Viegand Maagøe staff where validations with other sources has been done as much as possible including by industry, experts, stakeholders etc.

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 and published in the preparatory and review studies usually with their own public project website, 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
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	VM model contributed to the Impact assessment called	Led by	By providing input to the	The model was run by	Details of the contribution
2019	COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT Accompanying the document Commission Regulation laying down ecodesign requirements for servers and data storage products pursuant to Directive 2009/125/EC of the European Parliament and of the Council and amending Commission Regulation (EU) N°617/2013 SWD/2019/0106 final	GROW	Baseline and assessment of policy options	*Viegand Maagøe A/S*	The model helped to assess the following impacts: - 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 - Sustainable production and consumption - Relative prices of environmental friendly and unfriendly products - Energy intensity of the economy
2019	COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT Accompanying the document Commission Regulation laying down ecodesign requirements for external power supplies pursuant to Directive 2009/125/EC of the European Parliament and of the Council repealing Commission Regulation (EC) No 278/200 SWD/2019/0345 final	ENER	Baseline and assessment of policy options	*Viegand Maagøe A/S*	The model helped to assess the following impacts: - 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 - Sustainable production and consumption - Relative prices of environmental friendly and unfriendly products - Energy intensity of the economy

Bibliographic references

- *No references provided in MIDAS*