



D4.3 REFEREE Documentation and tutorial

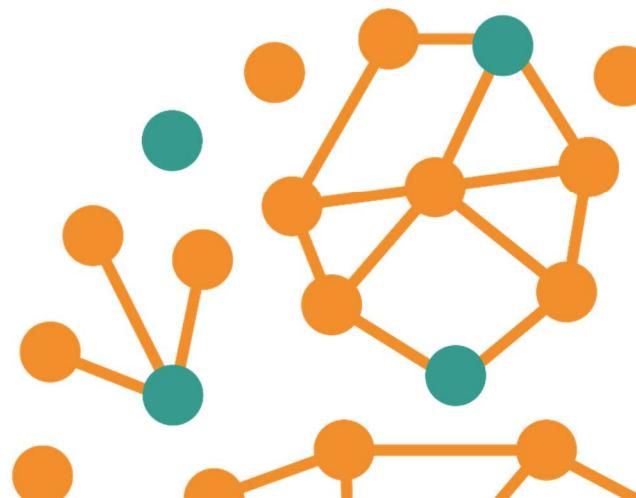


D4.3 –REFEREE Documentation and tutorial



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REFEREE: Real Value of Energy Efficiency

Results from the scoping analysis

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Table of Contents

1	Objectives and activities carried out.....	5
2	Documentation and Guidance for the European tool	6
3	Documentation and Guidance for the Localities tool	14
4	User tutorials.....	55
	Annex: Synthesis of quantitative targets currently in force in the EU.....	56

1 Objectives and activities carried out

This report contains the REFEREE user Manuals and Guidance. It documents the tools and provides tutorials for users.

Complementing this report, Guidance is also available online via the tool platform. All its components are available on the REFEREE Website: <https://refereetool.eu/presentation-referee-tool/>

This report is structured in three chapters:

- a) Documentation and Guidance for the European tool
- b) Documentation and Guidance for the Localities tool
- c) User tutorials for both models, for tool usability step by step

For more information about the offline and online tools, additional information is available in Deliverables D4.1 and D4.2 of the REFEREE project.

2 Documentation and Guidance for the European tool

The documentation of the European Tool is structured in the following chapters:

- A) **Main page.** Once the dashboard is opened, the main page will be displayed to the user. It will show a brief description of the dashboard and the navigation panel with the different sections offered.
- B) **Contextual information.** Historical overview of key indicators spanning from 1990 to 2020 for your selected European. These trends provide a valuable context to complement the results from the REFEREE Tool.
- C) **Benchmark options.** Information on the different reference scenarios that are offered as benchmark options through the REFEREE Tool interface for EU and country level policy assessment. At the bottom of the page, a set of key variables are displayed to provide a quantitative overview of the modelling differences associated with using each reference scenario.
- D) **Policy options.** Which are offered through the REFEREE interface. Users should have this page open when designing a policy package. The information provided in this page will be valuable to users who need to better understand how the different policy options are introduced to the modelling framework, and what the policy scaling factor "intensity" means for each policy choice.
 - **Policy type.** The REFEREE interface allows users to design a policy package by defining a certain set of policies. The first selection that users are requested to make for each policy is the policy type. For a given policy type, the intensity selection is associated to an appropriate unit. The page offers information on the definition of the selected policy type, an example, and the way the intensity input is interpreted by the EU and country level policy assessment tool.
 - **Policy focus.** For each policy type selected, users are requested to select a valid model and subdivision option. The Model selection refers to the Future Technology Transformation model that will need to be called to assess technology deployment in response to the policy intervention. Some of the Technology Transformation models require users to select a subdivision, which determines the

technology target. The page offers information on the definition of the selected model or subdivision.

- **Policy package.** The REFEREE interface allows users to decide whether they would like to investigate the impacts of a single policy measure or a set of policy measures, introduced in the form of a policy package. The interface allows this by simply adding new policy inputs. The tool has only two limitations with respect to policy package design:
 - o The tool does not permit stacking of policy measures.
 - o All measures need to target the same geographic area.

E) Indicators. This page offers information on the different impact indicators reported by the REFEREE tool as the multiple benefits of energy efficiency. For each indicator, information is provided with respect to its definition, relationship with energy efficiency and the mechanism through which the selected impact indicators is affected (impulse response mechanism).

F) FAQ. This section presents key information relating to the simulation capabilities of the country policy assessment tool.

Guidance of the European model can also be consulted through an online **interactive dashboard** available at:

<https://refereetool.eu/landing-page-referee-tool-national/>



Interactive guide for the EU & country policy assessment tool

This dashboard offers supporting information for users of the EU and country policy assessment tool. Tool users are encouraged to consult this dashboard during the design of policy packages for simulation through the tool. Below you will find a navigation panel that will allow you to access the various pages of the dashboard.

Dashboard data



Contextual Information

Reference Scenarios

Policy options

Indicators

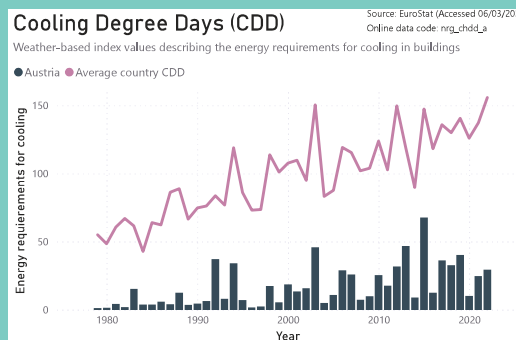
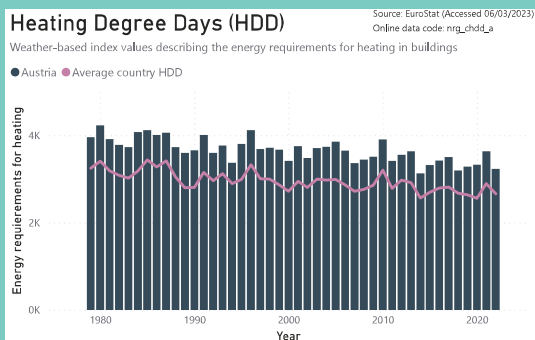
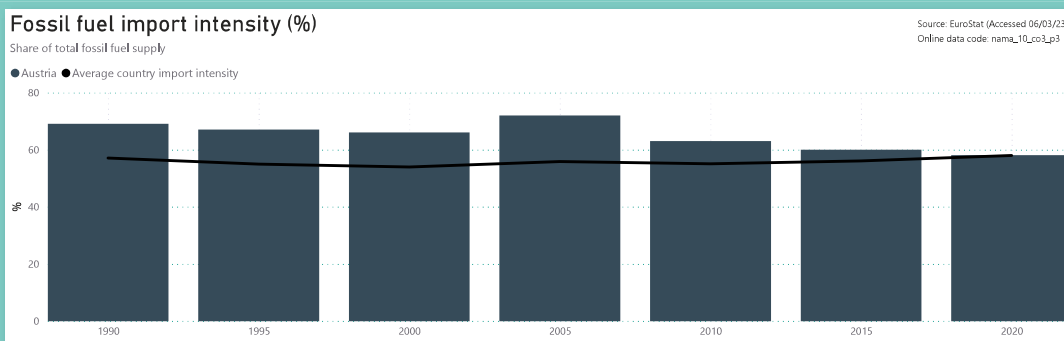
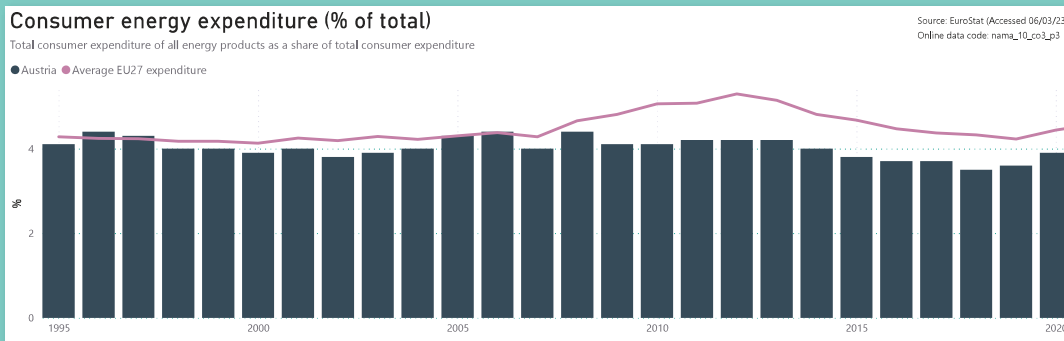
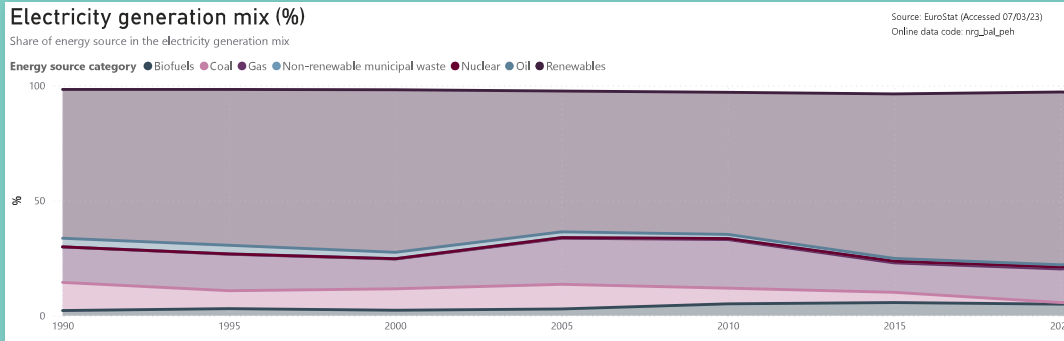
FAQ



Contextual information

This page offers a historical overview of key indicators spanning from 1990 to 2020 for your selected Member State. These trends provide a valuable context to complement the results from the REFEREE Tool. Please make your country selection from the menu below and then scroll down to explore the charts.

Austria	Cyprus	Finland	Hungary	Lithuania	Poland	Slovenia
Belgium	Czech Republic	France	Ireland	Luxembourg	Portugal	Spain
Bulgaria	Denmark	Germany	Italy	Malta	Romania	Sweden
Croatia	Estonia	Greece	Latvia	Netherlands	Slovakia	





Benchmark options

This page offers information on the different reference scenarios that are offered as benchmark options through the REFEREE Tool interface for EU and country level policy assessment. At the bottom of the page, a set of key variables are displayed to provide a quantitative overview of the modelling differences associated with using each reference scenario.

EU27	Croatia	Estonia	Greece	Latvia	Netherlands	Slovakia
Austria	Cyprus	Finland	Hungary	Lithuania	Poland	Slovenia
Belgium	Czech Republic	France	Ireland	Luxembourg	Portugal	Spain
Bulgaria	Denmark	Germany	Italy	Malta	Romania	Sweden

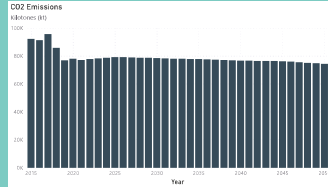
- List of indicators
- CO2 Emissions
 - Coal fuel consumption
 - Oil consumption
 - Gas fuel consumption
 - Coal prices
 - Gas prices
 - Oil prices
 - Petro prices
 - Electricity prices



For the models employed in developing the time series data for the 4 reference scenarios, 2020 is taken as the first year of projection. The years before 2020 are hence not part of the simulation but rather actual observations.

Reference 1

The Reference 1 scenario is aligned with the EU Reference Scenario 2020 (Primes Reference Scenario 2020).



Scenario description

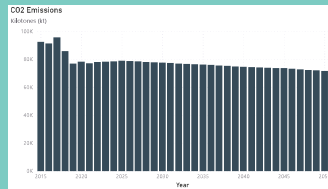
The EU 2020 Reference Scenario is a comprehensive assessment of the future of the European Union's (EU) energy system, transport sector, and greenhouse gas (GHG) emissions. It projects the impact of various macroeconomic, fuel price, technology trends, and policies on the evolution of these sectors. The scenario covers the 27 EU Member States collectively and individually.

Key features of the EU 2020 Reference Scenario include:

Energy consumption: Total energy consumption in the EU is projected to increase by around 10% between 2020 and 2030, primarily driven by the growth in the transport sector. However, energy intensity (energy consumption per unit of GDP) is expected to decrease by about 30%, reflecting

Reference 2

The Reference 2 scenario builds on Reference 1 by adding a set of measures that are identified as relevant and key in driving energy sector developments in Europe. These policies have been identified following a detailed review of the EPBD, Fit for 55 and RePowerEU. The Reference 2 calibration is limited by knowledge availability (Sept 2023) and the type of measures that can be simulated through the REFEREE Tool.



Scenario description

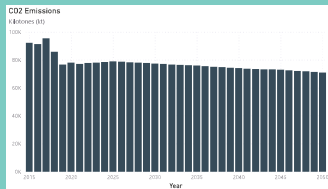
Energy Performance of Buildings Directive (EPBD): The Energy Performance of Buildings Directive (EPBD) is a key piece of EU legislation that sets minimum energy performance requirements for new and existing buildings. The revised EPBD, which entered into force in 2020, aims to achieve nearly zero-

Reference 2 policies

Policy	Policy Instrument	Energy Carrier	Start year	End year
Road transport	Fuel tax	Gas	2023	2050
Road transport	Fuel tax	Oil	2023	2050
Road transport	Technology phase-out	EE + Hybrid vehicles	2025	2050
Power	Fuel subsidy	Onshore Wind	2023	2050
Power	Fuel subsidy	Onshore Wind	2023	2050
Power	Fuel tax	Coal	2023	2050
Power	Fuel tax	Gas	2023	2050
Power	Fuel tax	Oil	2023	2050

Reference 3

The Reference 3 scenario builds on Reference 2 by adding the expected ETS2 cost. The ETS2 cost is introduced to transport and household heating and is set at approximately 45 EUR/ton CO2 (in 2022 prices).



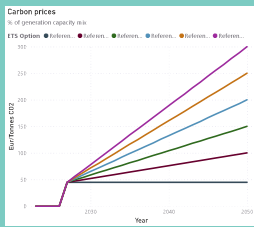
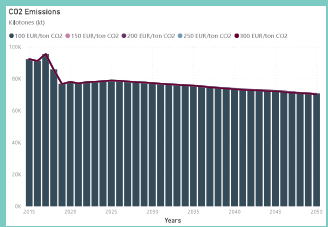
Scenario description

The Emissions Trading System (ETS) is a cap-and-trade system established in 2005 to reduce greenhouse gas (GHG) emissions in the European Union (EU). It is a cornerstone of the EU's climate policy and is the world's first and largest emissions trading system.

The ETS works by setting an overall limit on the total amount of GHG emissions allowed from participating installations and then allowing companies to trade emission allowances. Each installation is allocated a certain number of allowances, which represent the right to emit a certain amount of GHG. Companies that can reduce their emissions below their allowance can sell their surplus allowances on the ETS market. Conversely, companies that exceed their allowances must purchase additional allowances to cover their overage.

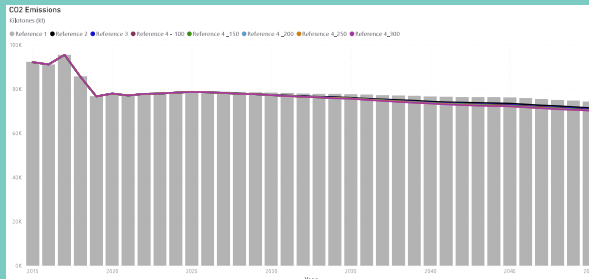
Reference 4

The Reference 4 set of scenario build on Reference 3 by allowing the user to select one out of five possible fossil fuel price trends. All scenarios have the same starting point: 45 EUR/ton CO2 (in 2022 prices), but different end point. The following alternatives are presented: 100, 150, 200, 250, and 300 EUR/ton CO2 (in 2022 prices).



Reference scenario comparison

This graph represents in comparative terms the first three reference scenarios presented in this page.





Policy options

This page offers information relating to the policy options offered through the REFEREE interface. We recommend that users have this page open when designing a policy package. The information provided in this page will be valuable to users who need to better understand how the different policy options are introduced to the modelling framework, and what the policy scaling factor "intensity" means for each policy choice.

Policy type

The REFEREE interface allows users to design a policy measure by defining a set of parameters. The first selection that users are requested to make for each policy is the policy type (left hand side Policy selection box). For a given policy type, the intensity selection (right hand side slider) is associated to an appropriate unit. By clicking on one of the six tiles below, you can access information on the definition of the selected policy type, an example, and the way the intensity input is interpreted by the EU and country level policy assessment tool.

Energy efficiency improvement in domestic buildings	Tax
Mandated change in generation capacity mix	Subsidy
Technology phase out	

Definition Energy efficiency improvements in domestic buildings are treated as changes in the renovation rate. Domestic building renovations refer to a wide range of activities aimed at improving, updating, or altering the fabric infrastructure of the dwelling stock, hence speeding up its energy efficiency.	Definition of Intensity % change in the renovation rate of the whole dwelling stock
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Example A 50% intensity value with end date at 2040 and starting date at 2030 indicates a 50% increase in the renovation rate of the domestic dwelling stock between the start and the end date. If the baseline renovation rate for the given country is 5% in 2029, then a 50% intensity value would lead to a 7.5% renovation rate that would remain fixed between 2030 and 2040. In 2041 the renovation rate would return to its 2041 baseline value for the given country.

Policy focus

For each policy type selected, users are requested to select a valid model and subdivision option. The Model selection refers to the Future Technology Transformation model that will need to be called to assess technology deployment in response to the policy intervention. Some of the Technology Transformation models require users to select a subdivision, which determines the technology target. By clicking on the relevant tiles below users will access information on the definition of the selected model or subdivision.

Model
Subdivision

Building Stock	Passenger road transport
Domestic heating	Power sector
Industrial heating processes	Road freight transport

Explanation A stock model that assesses the economic impacts of different net-zero transitions of the EU building stock. Uses an iterative process based on renovation rate targeted to demolition of old buildings, construction of new buildings, and renovations (of varying depth), until convergence to the target weighted renovation rate.

Developing a policy package

The REFEREE interface allows users to decide whether they would like to investigate the impacts of a single policy measure or a set of policy measures, introduced in the form of a policy package. The interface allows this by simply adding new policy inputs. The tool has only two limitations with respect to policy package design:

- 1 The tool does not permit stacking of policy measures.
- 2 All measures need to target the same geographic area.

No stacking has the following practical implications:

- If a policy measure is introduced twice, the second entry will cancel the first.
- If two policy measures with the same type and focus have overlapping dates, the second entry will cancel the first as soon as they overlap. To preserve the principle of no stacking, the change will be calculated with respect to the baseline value rather than the value assigned by the first policy measure.

Contextual Information	Reference Scenarios	Policy options	Indicators	FAQ
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Multiple benefits of energy efficiency

This page offers information on the different impact indicators reported by the REFEREE tool as the multiple benefits of energy efficiency. The information provided in this page will be valuable to users who are not familiar with the definitions of the indicators employed or users who would like to obtain a better understanding of the mechanism that describes the relationship between energy efficiency and impact indicators.

A positive value indicates that higher energy efficiency may result in a higher value of the impact indicator. A negative value indicates that higher energy efficiency may result in a lower value of the impact indicators. An uncertain value indicates that higher energy efficiency may result to a lower or higher value, subject to country socioeconomic characteristics, the effective policy mix and the policy scope/design.

Air pollution & Emissions	Employment	Energy Intensity	Gross Value Added (GVA)	Manufacturing industries: heating demand by fuel	Public budget as share of GDP
Air pollution Damage Costs	Energy Cost Impact	Fossil Fuel Consumption	Household heating: heat demand by fuel and technology	Material Use	Road freight transport: fleet share by technolo...
Demand for skills	Energy demand by dwelling archetype	Fuel imports	International competitiveness	Passenger road transport: fleet share by technolo...	Water used in electricity generation
Electricity generation	Energy expenditure as a percentage of total expenditure ...	Gross Domestic Product (GDP)	Labour Productivity	Power generation capacity by source	

Definition

Air pollution & Emissions is defined as the volume CO2 emissions and air-born pollutants. This indicator is typically expressed as million gallons, but in this report assessment Air Pollution & Emissions is presented as % difference from the chosen reference scenario.

Relationship between energy efficiency and impact indicator

Negative

Mechanism through which the selected impact indicator is affected

Energy demand reductions, including a shift away from fossil fuel-reliant generation, will reduce the creation and release of air pollutants and GHG emissions through requiring less fossil fuel to be burnt.

Contextual Information

Reference Scenarios

Policy options

Indicators

FAQ

What are the effects captured by the model?

The modeling framework presents a lite version of the Cambridge Econometrics modelling suite. Due to processing constraints of an online, automated interface some compromises had to be made with respect to the simulation framework.

- The simulation toolkit reports the impact of up to second degree effects.
- The simulation does not account for cross-country spillovers.

What are the user input guidelines?

- **Mandated change in generation capacity mix:** Please ensure that the total intensity of all mandated changes in generation capacity mix in your policy package do not exceed 100%. Additionally, please be aware that high intensities may cause instability in the results.
- **Mandated change in generation capacity mix:** Please be aware that if a technology already has a high share of the power generation mix, then adding a policy to boost it to an even high percentage may not have dramatic results, as the trajectory of that technology was already trending upwards.
- **Technology phase out:** Please be aware that if a technology is already on a downwards trajectory, then targeting it with a phase out may not have a dramatic effect in the results, as the technology was already being reduced.
- **Technology phase out:** Please be aware that phase outs only prevent new items from being built/produced. Dramatic reduction in the item may not be seen in the results until the lifespan of the product has ended.

Why is the policy showing reduced effects?

Some or all elements which make up the subdivisions below have zero market share in their respective countries and models. That means that policies applied to them may have reduced effects.

Zero market share list		
Countries	Model	Categories
Austria	Industrial heating processes	Biofuel, Electricity, Gas, Heat, Oil, Coal, Heat Pumps, Electricity
Austria	Passenger road transport	Oil, Gas, ICE Vehicles
Austria	Power	Solar, Gas, Nuclear, Offshore Wind, Hydro
Austria	Road freight transport	Oil, Hybrid Vehicles, Gas, Electricity, ICE Vehicles, Biofuel, Biofuel Vehicles, Electric Vehicles
Belgium	Industrial heating processes	Biofuel, Electricity, Gas, Heat, Coal, Heat Pumps, Electricity
Belgium	Passenger road transport	Oil, Hybrid Vehicles, Gas, Electricity, ICE Vehicles
Belgium	Power	Hydro, Geothermal, Gas, Solar
Belgium	Road freight transport	Oil, Hybrid Vehicles, Gas, Electricity, ICE Vehicles, Biofuel, Biofuel Vehicles, Electric Vehicles
Bulgaria	Domestic heating	Electricity, Heat Pumps
Bulgaria	Industrial heating processes	Biofuel, Electricity, Heat, Oil, Coal, Heat Pumps, Electricity
Bulgaria	Passenger road transport	Oil, Hybrid Vehicles, Gas, Electricity, ICE Vehicles, Electric Vehicles
Bulgaria	Power	Solar, Geothermal, Gas, Offshore Wind, Hydro
Bulgaria	Road freight transport	Oil, Hybrid Vehicles, Electricity, ICE Vehicles, Biofuel, Biofuel Vehicles
Croatia	Domestic heating	Electricity, Heat Pumps
Croatia	Industrial heating processes	Biofuel, Electricity, Gas, Heat, Coal, Coal, Heat Pumps

Why are the results showing no effects?

The following energy carriers have no recorded fuel price for their respective model and country. As such, taxes and subsidies placed on them may show no effect.

- Bulgaria – Industrial Heating Processes – Biofuel
- All countries – Power – All renewables (Gas, Hydro, Offshore Wind, Onshore Wind, Solar, Geothermal)

Other questions

For any other questions, please refer to the online documentation on the Building Stock, FTT, and E3ME models available through the Cambridge Econometrics [website](#).

3 Documentation and Guidance for the Localities tool

The documentation of the Localities Tool is structured in the following chapters:

A) Overview of the Tool. This section provides relevant information about the tool. In concrete, it has three chapters:

1. **Purpose of the tool.** It explains the main objectives and gives a quick overview of the tool, providing more information to the user on why it is relevant and how REFEREE can be useful to municipalities and their local governments.
2. **Defining inputs and outputs.** It contains information on how the tool is organized and how the tool is fed relative to E3ME model inputs and user inputs. It furthermore explains the different outputs obtainable with the Localities Tool.

B) Tool Guidance. Provides relevant information about the inputs that the user is going to be asked and how to obtain the results. This section is recommended to be consulted during the design of policy packages which will be simulated with the tool.

1. **Introduction.** Introduces the user to the online interface that runs the Policy Support System, including all tabs (parameters, model, results). It also explains what the model requires to the user and provides detailed explanation with examples of the different inputs to provide.
2. **Step-by-step guide.** Practical tutorial about how to provide the inputs and all the steps that user should follow. It also has a Frequent Errors page to make sure that the user is able to solve any problems it might face during the design process.

C) How to implement policies? The European context. Relevant information about European regulation and targets, which localities might be interested to be in touch with. It's a good idea to use the tool to simulate policies to comply with both aspects.

1. **European regulation.** It provides an overview of historical and current EU energy frameworks with relevant information to be considered during the local policy-making process.
2. **European targets.** Localities might be willing to comply with energy-related targets (i.e. GHG reductions). Further information for policy-makers related to European targets are provided in a separate document synthesizing quantitative targets currently in force in the EU. This PDF file is annexed here and can also be downloaded from the guidance.

Guidance of the Localities model can also be consulted through an online **interactive dashboard** available at:

<https://refereetool.eu/landing-page-referee-tool-local/>

TOOL GUIDANCE - LOCALITIES

Press any chapter to navigate directly to it

REFEREE Tool

R1. Purpose of the Tool

R2. Defining Inputs and Outputs

Guidance

G1. Introduction

G2. Step-by-step guide

European context

E1. European regulation

E2. European targets

R1

Purpose of the Tool

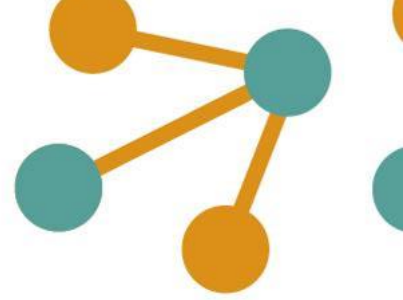
Overarching objectives

REFEREE strongly advocates the principle that energy efficiency measures will be key for delivering the [European Green Deal](#).

The project aims to **make energy efficiency more appealing** to policy makers at all levels of governance by:

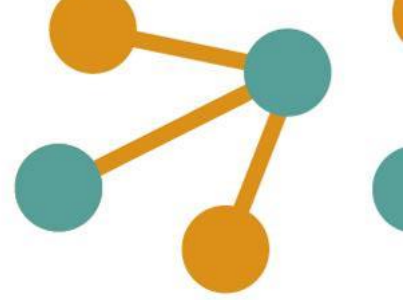
- (1) Delivering insightful and reliable** information on the **multiple benefits** that energy efficiency measures can provide.
- (2) Offering user-friendly tool** to make this information immediately operational for decision makers.





Overview on the Policy Assessment tool

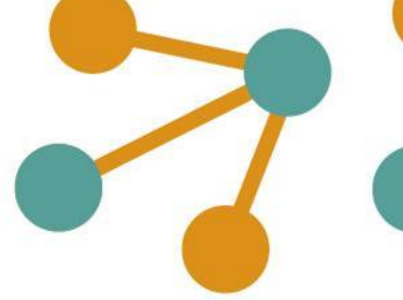
- The REFEREE tool simulates policies both at the level of Member states and at the level of localities (municipalities, counties, small regions...).
- **This guidance document will help you navigate the tool dedicated to the localities.** *(To know more about the Member State tool, consult the [REFEREE national tool Dashboard](#))*
- REFEREE quantifies **the multiple benefits of energy efficiency policies**, including direct impacts (energy savings) and indirect impacts (benefits on the environment, citizens' health, public finances, etc.)



REFEREE Local Model GUIDANCE

- **REFEREE Website (tool access):** <https://refereetool.eu/presentation-referee-tool/>





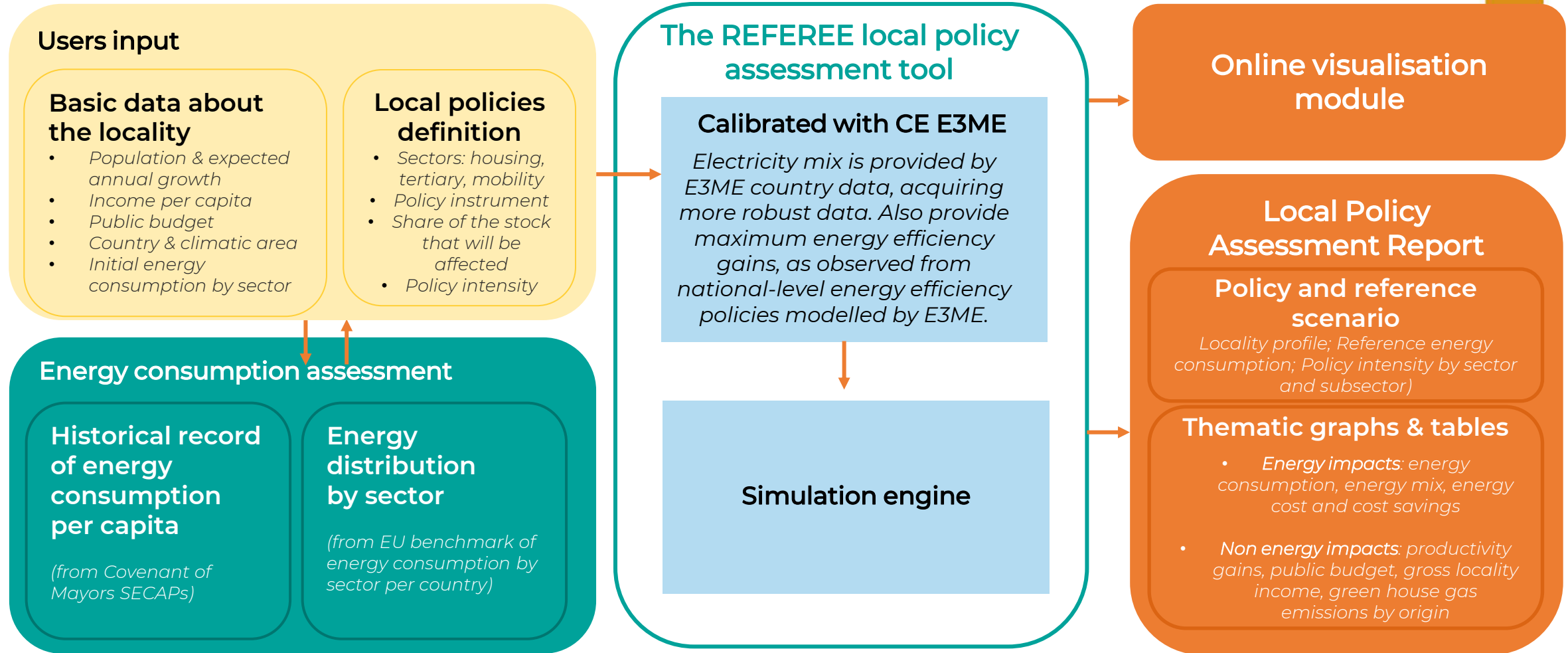
How can REFEREE be useful to localities?

- **A fast-changing policy area:** Local administrators often have limited tools and resources to adapt to a rapidly evolving energy landscape.
- **Easy-to-use:** The tool is aimed to assist local policy-makers in making energy efficiency decision by providing them with detailed information in an easy-to-use interface.
- **Beyond energy impacts.** In addition to assessing energy efficiency impacts such as consumption, emissions, and cost savings, the tool will offer innovative insights into non-energy impacts, like effects on public budgets or citizen income.
- **SECAP plans.** The tool is intended to help design local SECAP plans (Sustainable Energy and Climate Action Plans). It assists localities estimate energy consumption data and identify areas where impacts are expected to yield significant returns. The model provides estimations of data that may be hard to obtain in small localities, allowing an easier execution of such plans.
- **Sensitivity analysis.** The tool enables sensitivity analysis of key policies, allowing for comparison of results under different scenarios with varying policy intensities.

R2

Defining Inputs and Outputs

How is the tool organised?

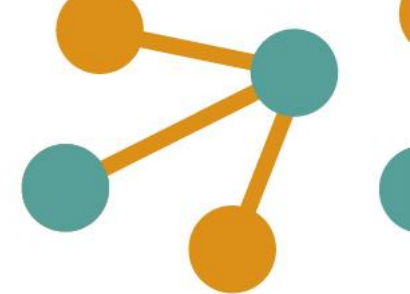


Exogenous input data

Data processing

Endogenous input/output data

Output data



E3ME Engine

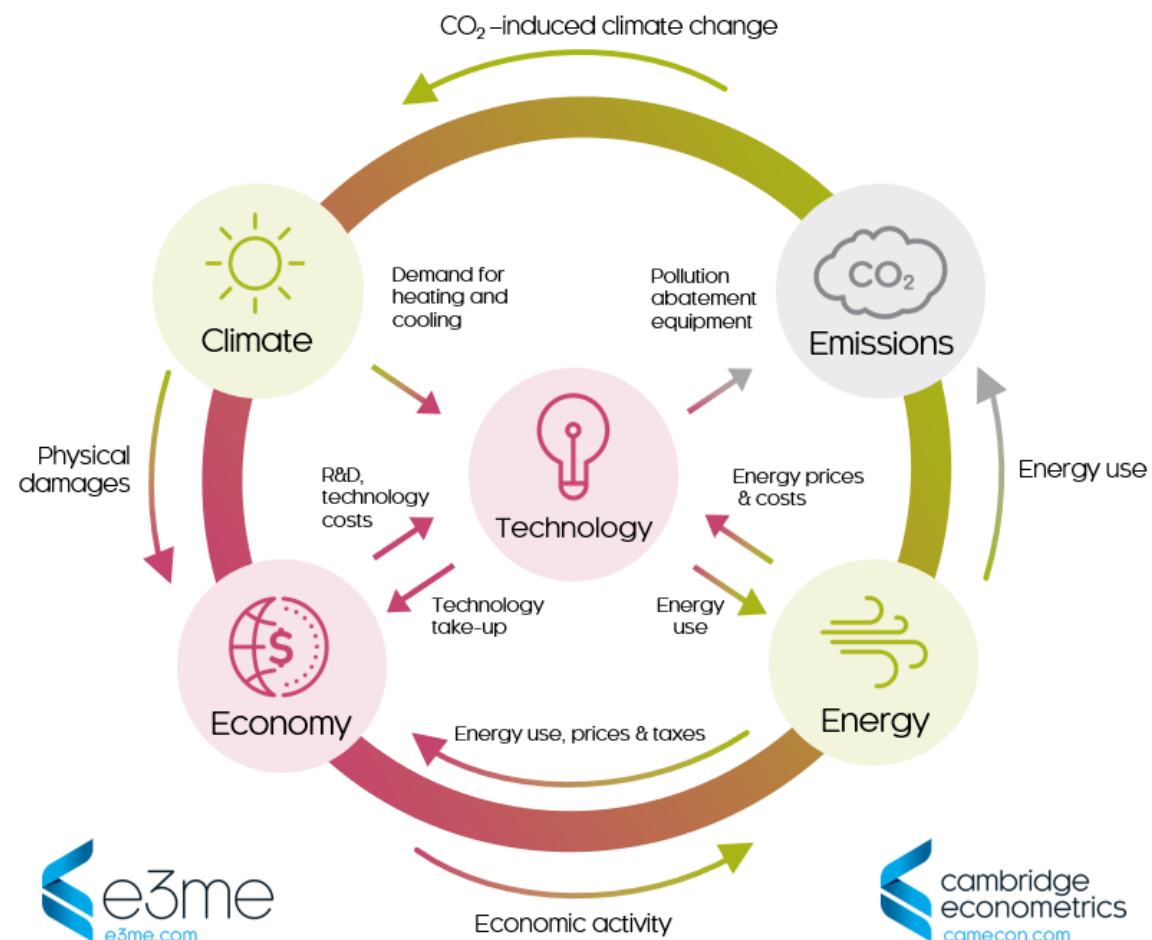
The Localities Tool is powered by E3ME Lite model

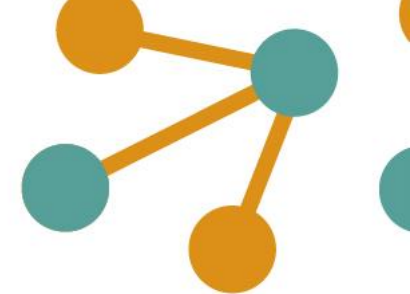
E3ME

- A global, non-equilibrium macro-econometric model designed to address **major economic and economy-environment policy challenges**.
- Econometric specification provides a strong empirical basis for analysis, allowing to fully assess **short and long-term impacts**.
- Endogenously captures linkages and feedbacks between the world's economies, energy systems, emissions.

E3ME Lite

- **Online version of the E3ME model**, based on parameters for each direct impact from the FTT models that feed into E3ME.
- Parameters are assessed for each model feedback channel and country in EU27 & UK, leading to more than 3k runs.
- Captures **net economic impacts from changes in the energy system** based on estimated parameters from E3ME.





Inputs for the local policy tool

Inputs in the REFEREE Local Policy tool required inputs in relation to the profile of locality to be assessed, and on the energy efficiency policies to be tested.

Socioeconomic Profile of locality

- Income per capita
- Population and population growth
- Locality public budget

Policies for Energy Efficiency

- Housing, tertiary and mobility sectors are considered, as well as subsectors such as climatization, water heating, public transport or private transport.
- Policy intensities and targeted stock can be adjusted.

Energy Profile of locality

- Total energy consumption (tool provides for climatic area proxies based on Covenant of Mayors benchmark)
- Local energy consumption abatement by sectors (tool provides for country-based proxies based on Member States reporting to Eurostat)

Internal assumptions (E3ME parameters)

- Historical electricity mix and 2035 projection
- Historical energy costs and 2035 projection
- Housing energy profile by sources
- Tertiary energy profile by sources
- Mobility energy profile by sources

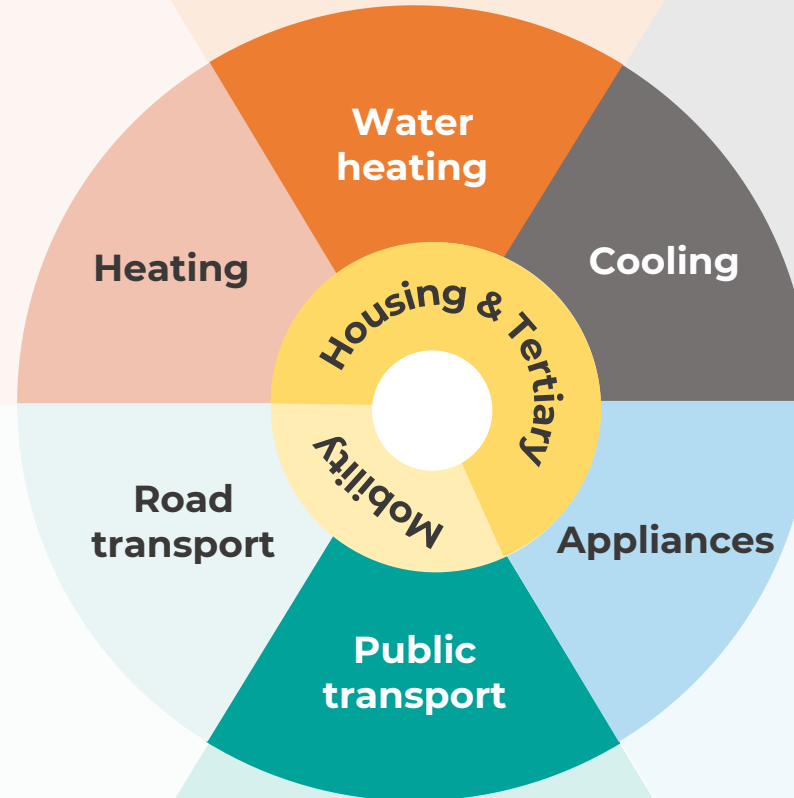
Local policy measures to be simulated

[Back to main](#)

- Smart heating energy management
- Consideration of user behavior
- More efficient heating technologies
- Energy renovation of buildings

- Water saving equipment
- Consideration of user behaviour
- Thermal water collectors

- Smart cooling energy management
- Consideration of user behavior
- More efficient cooling technologies
- Nature-based cooling strategies



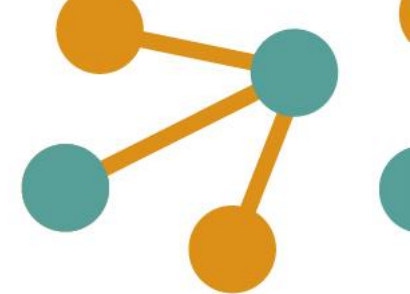
- Increase mean vehicle occupation
- Reduce travel rate
- Transfer road users to public transport
- Increased vehicle efficiency

- Support for household appliance renovation
- Renewal of building lighting
- Awareness-raising for the rational use of appliances

- Fleet renovation
- Better fleet management

Outputs

Impact areas	Results
Expected energy consumption and energy savings	Energy consumption and energy savings (total & by sector) <ul style="list-style-type: none">• Housing: heating, cooling, water heating, appliances• Tertiary: heating, cooling, water heating, appliances• Mobility: public transport, road transport
Cost savings (pre-tax)	Costs and cost savings (total & by sector) <ul style="list-style-type: none">• Housing: heating, cooling, water heating, appliances• Tertiary: heating, cooling, water heating, appliances• Mobility: public transport, road transport
	Magnitude of savings contrasted to locality aggregated income (Proxy to locality GDP)
Climate Change	CO2 emission savings (total & by sector) <ul style="list-style-type: none">• Housing: heating, cooling, water heating, appliances• Tertiary: heating, cooling, water heating, appliances• Mobility: public transport, road transport
	Contrast with existing policy targets for greenhouse gas emission reduction
Socioeconomic impacts	Increase of available income per capita
	Increase of available local aggregated income
	Locality public budget impacts
Governance (transformation capacity of public policies)	Impact of public policies derived from citizen behaviour
	Impact of public policies derived from cleaner technology (cleaner energy mix)
	Exogenous gains not deriving from local policies (derived from cleaner electricity mix)



Outputs. Energy Efficiency Impacts

Total Energy Savings (in MWh)

MWh of the Expected energy consumption and energy savings for different sectors and subsectors.

- Housing: heating, cooling, water heating, appliances
- Tertiary: heating, cooling, water heating, appliances
- Mobility: public transport, road transport

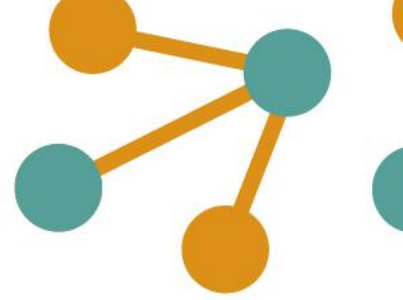
Cost savings (Million euros)

This is, euros saved by changes in energy consumption, in euros (countries with other currencies, will need to make their own transformations if needed). Two main drivers: (1) Total energy consumption (less energy mean less costs); (2) Energy mix (different energy carriers have different costs). Sectors considered, again **Housing, Tertiary and Mobility**.

Climate Change Impacts (in tCO₂)

This is CO₂ emissions tons reduced because of less energy consumed (MWh), and because of cleaner energy mixes. Sectors considered, again **Housing, Tertiary and Mobility**.

Contrast with existing policy targets. In addition, REFEREE provides guidance for reducing greenhouse gas emissions and increasing energy efficiency allowing to compare simulation results with the EU objectives in force (for example, 55% reduction in CO₂ by 2030 compared to the reference year). *(To know more about this, check [Chapter 3 European targets more in deep.](#))*



Outputs. Non-energy impacts

Increase of available local aggregated income (in %)

- The Model estimates the increase in aggregate income available to citizens of a given locality based on the savings obtainable in the energy bill. This result is intended as a proxy to the locality productivity indicator (municipal GDP) estimating a potential increase of the local economy resulting from lower energy costs. This result is presented as the % of the € variation from the initial year (which will be 100%) to the final (100%+X).

Increase of available income per capita (in %)

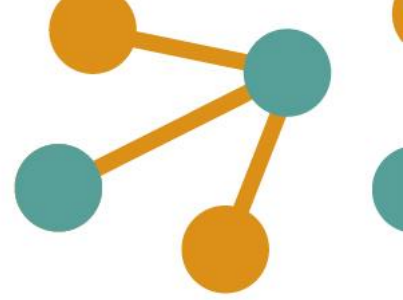
- The Model estimates the impact of economic savings on individual households by evaluating, for the duration of the simulation, the energy savings per capita in relation to the income per capita of the locality. The model only considers energy costs pre-tax, so there will be an additional income available to families also arising from the taxes saved. This additional savings will depend on the tax levels of each country and/or the locality', which can be of important additional magnitude (up to 100% increase). This result is presented as a % of the € variation from the initial year (which will be 100%) to the final (100%+X).

Locality public budget impacts (in %)

- The model assumes that with the increase in disposable income for citizens and businesses in a locality (and the increase in population), public budgets will also have a positive impact. This indicator is calculated basing upon the initial public budget declared in the parameters section, population growth, available income per capita as well as available local aggregated income variations. This result shows a % of the € variation from the initial year (which will be 100%) to the final (100%+X).

G1

Introduction



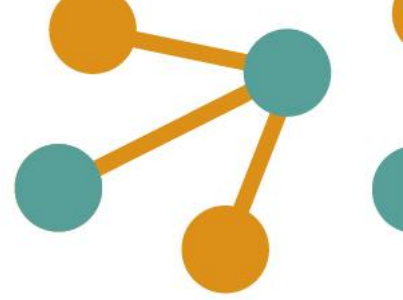
Introduction

This guide shows the necessary input data for the tool, explains how to input this data using dialog masks, and describes the corresponding types of results generated. The tool is structured into three sections:

Parameters | Model | Results

1. **Parameters** → Enter details about the locality.
2. **Model** → Add policies by combining pre-defined policy measures.
3. **Results** → View the effects of the policies in the model output.

Note: Users can freely navigate through the sections and revise any data in the Parameter or Model sections as needed.



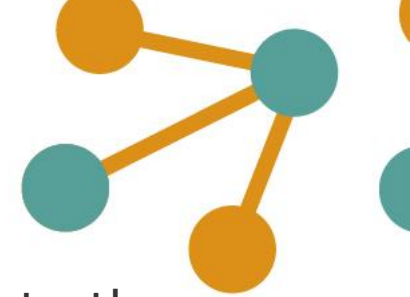
Parameters: Locality Data

The model requires some basic parameters to establish the **baseline for modelling** the subsequent **policy effects**. All required information about the locality is inserted in the first section (more detailed guidance in chapter 8, our “step-by-step guide”).

Besides basic information such as **population**, **public budget** and **income per capita**, the user is asked to select the country of the locality. Once all the information is filled in, the tool proposes **realistic but imperfect values** for the **energy consumption** of the locality in each sector.

If **more accurate data** on energy consumption are available for each sector, these **should be used**. Otherwise, users can copy and paste the proposed values from the tool.

If data on the energy consumption are only available from **historical sources** but not for the initial year of simulation, users can copy only the tool’s proposals for the **initial year of simulation** (when policies are implemented; most likely the **present year**).



Model: Sectors & Policy Types

Once the model has all the necessary data from the locality, the user can move to the second section, designed for **inserting policies**. Main **sectors** (Housing, Tertiary and Mobility) are divided into several **subsectors**. Within each subsector, various policy types are available for selection. Policies of the same type need to be **combined** and inserted only once. For instance, both a **funding scheme** to support homeowners in improving energy efficiency and a **communication strategy** aimed at ensuring the effective use of these funds by homeowners should be inserted as a **combined policy package** belonging to the same policy type (e.g. refurbishment).

Each **policy type** produces a **maximum possible energy efficiency impact** for the share of sector stock that is targeted. The value for this impact is **predefined** based on the best available benchmarks for each policy type, located in the upper right corner of each policy bar. The efficiency impacts of the locality's policy package for any policy type should only be edited if more accurate data are available than the benchmark provided by the tool. Examples for better understanding are provided in the following slides.

The screenshot shows a policy configuration interface. The policy name is "Funding and workforce development for refurbishment of buildings". The interface includes several dropdown menus and sliders. The "Sector" dropdown is set to "Housing", the "Subsector" dropdown is set to "Heating", and the "Policy type" dropdown is set to "Refurbishment of buildings/". The "Sector stock targeted" slider is set to 20%, and the "Policy Intensity" slider is set to 50%. The "Maximum possible EE impact" is displayed as 40. Below the configuration, there are two rows of energy mix values.

Policy name	Funding and workforce development for refurbishment of buildings					Trash	+
Sector	Subsector	Policy type	Sector stock targeted: 20%	Policy Intensity: 50%	Maximum possible EE impact: 40		
Housing	Heating	Refurbishment of buildings/	<input type="range"/>	<input type="range"/>			
New energy mix values	Natural gas: 27.56	Electricity: 34.98	Fuels: 19.59	Renewable: 17.87	Other: 0		
Current energy mix values	Natural gas: 27.56	Electricity: 34.98	Fuels: 19.59	Renewable: 17.87	Other: 0		



Model: Sector Stock Targets

The input factor "sector stock targeted" determines the % of the total stock that should be more energy efficient by the end of the policy simulation. Here, "stock" always refers to the total of each subsector.

Example I → Mobility sector

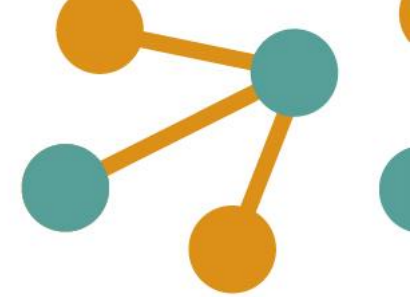
Let's consider a municipality planning to **replace its current buses** with more efficient ones. This change is projected to yield a maximum energy efficiency (EE) improvement of 50%. While this figure is based on internal calculations, users can edit the percentage if they possess more concrete data, although this is not typically recommended due to its complexity to obtain. In this case, the sector stock pertains to the **entire public transport fleet**.

Suppose the municipality operates **200 buses** and plans to replace 60 of them; thus, **30% of the sector stock** is targeted. Consequently, the tool assumes that efficiency gains apply to 30% of the sector stock, namely the public transport fleet.

If data related to the **mileage** of each bus exists, then sector stock should refer to mileage. A replacement of 30% of buses could lead to the policy affecting 45% of the mileage, if new buses run 50% more frequently ($30 * 1,5 = 45$; where we add to the 30% the 50% of increased mileage multiplying it by 1,5).

The screenshot shows a user interface for configuring a policy. The policy name is "Bus replacement scheme". The sector is set to "Mobility", the subsector to "Public transport", and the policy type to "Fleet Renovation". The "Sector stock targeted" is set to 30%, which is highlighted with a yellow box and a blue circle. The "Policy Intensity" is set to 66%. The "Maximum possible EE impact" is set to 50. Below these settings, there are two rows of energy mix values: "New energy mix values" and "Current energy mix values". Both rows show the same values: Natural gas: 0.04, Electricity: 0.15, Fuels: 99.1, Renewable: 0, and Other: 0.71.

Policy name	Bus replacement scheme					🗑️ +
Sector	Subsector	Policy type	Sector stock targeted	Policy Intensity	Maximum possible EE impact	
Mobility	Public transport	Fleet Renovation	30%	66%	50	
New energy mix values	Natural gas: 0.04	Electricity: 0.15	Fuels: 99.1	Renewable: 0	Other: 0.71	
Current energy mix values	Natural gas: 0.04	Electricity: 0.15	Fuels: 99.1	Renewable: 0	Other: 0.71	





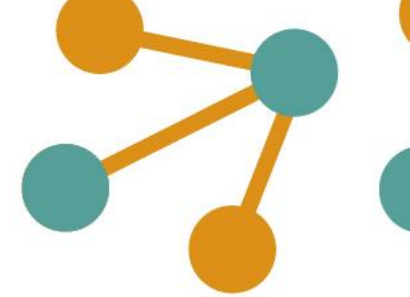
Model: Sector Stock Targets

Example II → Housing sector

A municipality plans to increase efforts to **refurbish buildings** for better insulation and **more efficient heating**. This will likely yield a maximum EE improvement of 40%. Here, the sector stock refers to **all buildings within the municipality**.

If there are **4000 buildings** in the municipality and it plans to refurbish 800 of those, **20% of the sector stock is targeted**. If data related to the **floor space** of each building is available, then sector stock should refer to the floor space that is refurbished. Floor space is a **more accurate value** for calculating the efficiency gains in heating than buildings, as the **size of buildings vary significantly**. A refurbishment of 20% of all buildings could lead to the policy affecting 40% of the sector, if those 20% renovated make up 40% of the floor space.

Policy name: Funding and workforce development for refurbishment of buildings						 
Sector: <input type="text" value="Housing"/>	Subsector: <input type="text" value="Heating"/>	Policy type: <input type="text" value="Refurbishment of buildings/"/>	Sector stock targeted: 20%	Policy Intensity: 50%	Maximum possible EE impact: 40	
New energy mix values	Natural gas: 27.56	Electricity: 34.98	Fuels: 19.59	Renewable: 17.87	Other: 0	
Current energy mix values	Natural gas: 27.56	Electricity: 34.98	Fuels: 19.59	Renewable: 17.87	Other: 0	











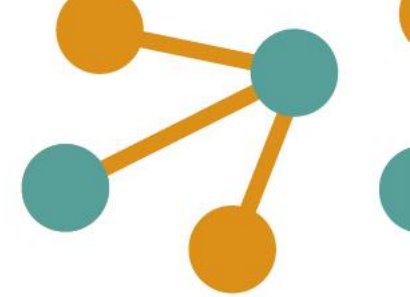
Model: Sector Stock Targets

Example III → Tertiary sector

A municipality plans to equip half of the tertiary sector with efficient building lighting. This will likely yield a maximum EE improvement of 20%. Here, the total sector stock refers to all appliances connected to the electricity network.

When estimating the sector stock target, it is important to consider that besides lights there are many more appliances in the tertiary sector. If 30% of the electricity consumed by all appliances is used by lighting systems and 50% of lights should be replaced with more energy efficient ones, the sector stock target will be 15% ($30\% * 50\% = 0,3 * 0,5 = 0,15 = 15\%$).

Policy name: Equip half of the tertiary sector with efficient building lighting						 
Sector: Tertiary (services) 	Subsector: Appliances 	Policy type: More energy efficient user b... 	Policy stock targeted: 15% 	Policy Intensity: 40% 	Maximum possible EE impact: 20 	
New energy mix values	Natural gas: 0	Electricity: 100	Fuels: 0	Renewable: 0	Other: 0	
Current energy mix values	Natural gas: 0	Electricity: 100	Fuels: 0	Renewable: 0	Other: 0	



Model: Policy Intensity

The input value for **policy intensity** provides a useful way to include an estimation of the **success of the policy** in the calculation of the model. Success primarily hinges on **available resources** for this policy as well as some external factors. These resources may include the amount of public funding, administrative personnel overseeing policy implementation and monitoring its success, workforce and skills required to achieve the goals within the desired timeframe, and communication campaigns to engage non-municipal actors.

Policy intensity should only approach 100% if the policy is guaranteed to succeed in both targeting the desired sector stock and achieving the maximum possible EE impact. For instance, if 30% of the public transport fleet is slated for replacement, but the policy package cannot ensure that each new bus will be 50% more efficient, both factors —along with the resources allocated to achieve the goals— must be considered when estimating the policy intensity.

Policy name: <input type="text" value="Bus replacement scheme"/>						
Sector: <input type="text" value="Mobility"/>	Subsector: <input type="text" value="Public transport"/>	Policy type: <input type="text" value="Fleet Renovation"/>	Sector stock targeted: 30% <input type="range" value="30"/>	Policy Intensity: 66% <input type="range" value="66"/>	Maximum possible EE impact: <input type="text" value="50"/>	
New energy mix values	Natural gas: 0.04	Electricity: 0.15	Fuels: 99.1	Renewable: 0	Other: 0.71	
Current energy mix values	Natural gas: 0.04	Electricity: 0.15	Fuels: 99.1	Renewable: 0	Other: 0.71	

G2

Step-by-step guide

Parameters

Model

Results



Parameters section

REFEREE Tool, the real value of energy efficiency

Local level policy assessment

Parameters Model Results

Fill in the information for your municipality below. To receive proposals for the estimation of the local energy consumption, you need to add details such as country and population. If you have accurate values on the energy consumption of the housing, tertiary, and mobility sectors, please use those figures rather than those suggested by the tool.

Municipality	Pozuelo de Alarcón ¹
Country	Spain ² ▼
Climatic area	Mediterranean ³
Population (initial year, inhabitants)	83844 ⁴
Annual population growth (%)	0.2 ⁵
Income per capita (initial year, €)	26367 ⁶
Public budget (municipality, M€)	127 ⁷
Reference year (available historic data)	2012 ⁸ ▼
Initial year of simulation	2019 ⁹ ▼
Final year of simulation	2030 ¹⁰ ▼

Energy consumption (Initial year of simulation)

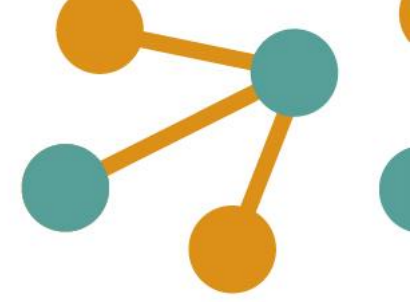
Housing (MWh)	432530 ¹¹	proposal:	276950
Tertiary (MWh)	275148 ¹²	proposal:	197644
Mobility (MWh)	494818 ¹³	proposal:	631645

Energy consumption (Reference year, available historic data)

Housing (MWh)	453338 ¹⁴	proposal:	287116
Tertiary (MWh)	302622 ¹⁵	proposal:	204900
Mobility (MWh)	486463 ¹⁶	proposal:	654832

- 1 Insert the name of the municipality.
- 2 Select the country of the municipality from the dropdown.
- 3 This is updated automatically once you select the country.
- 4 Insert the population of the municipality.
- 5 Insert the annual population growth in % of the municipality.
- 6 Insert the income per capita of the municipality.
- 7 Insert the public budget of the municipality (total €).
- 8 Select the reference year from the dropdown.
→ This will be the year from which historical data will be used as a reference
- 9 Select the initial year from the dropdown.
→ This will be the year from which current data will be used as a starting point; must be after the reference year.
- 10 Select the final year from the dropdown.
→ This will be the year at which estimates will conclude/end, so it will be the ending point for forecasting purposes; must be after the initial year.
- 11 Insert the energy consumption in MWh of the municipality, for the
- 12 initial year for each sector – Housing (11), Tertiary (12) and Mobility (13)
- 13 → If the breakdown of total energy consumption is not available, please refer to our suggestion and adapt it accordingly.
- 14 Insert the energy consumption in MWh of the municipality, for the
- 15 reference year for each sector.
- 16 → If the breakdown of total energy consumption is not available, please refer to the tool proposal and adapt it accordingly.
- 17 Optional buttons to copy and paste the proposals automatically

Model section



- 0 Brief comment on this section.
- 1 Type the name of the policy (optional).
- 2 Choose the municipal **sector** (housing, tertiary, mobility) in which the policy is directed from the dropdown.
- 3 Choose the municipal **subsector** in which the policy is directed from the dropdown.
→ For housing and tertiary sectors, there are 4 subsectors (heating, cooling, water heating, appliances) and for mobility sector, there are 2 subsectors (public transport and road transport).

- 4 Choose the policy type that best fits the policy to be implemented from the drop-down.
- 5 Determine a percentage of stock targeted with the horizontal scrollbar.
→ The stock targeted determines the policy penetration rate in the addressed stock, that is how many items (people, buildings, vehicles...) are going to be affected by the policy.
- 6 Determine a percentage of policy intensity with the horizontal scrollbar.
→ The policy intensity determines in which level does a policy wants to be implemented, being a 100% the maximum energy efficiency gains from the policy. Shrinking this level reduce its implementation costs.
- 7 Automatically determines a percentage of the total sector of the expected Energy Efficiency impact by that policy.
The suggested value can be modified, so it can be adjusted to another value if wanted.
→ For example, if the policy intensity is set at 100%, then the policy will have the full impact.
→ Otherwise, a policy with a policy intensity of a 50% with a 10% expected EE impact, will have an impact of a 5%, for the X% of the stock targeted.

REFEREE Tool, the real value of energy efficiency

Local level policy assessment

Parameters Model Results

0 Add up to 34 energy efficiency policies in the housing, tertiary, and mobility sectors. All policies targeting one aspect of a specific subsector need to be aggregated into one input policy. For each policy, state which part of the existing sector stock will be addressed (e.g., affected share of total housing stock or share of mileage by private cars) and how likely the policy is to reach its full EE potential (policy intensity). For each sector and subsector, you may also alter current energy mix. For more details, check the [Guidance handbook](#).

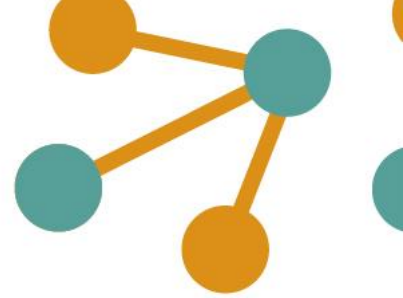
[Guidance](#)

The screenshot shows the 'Policy1' configuration interface. It includes a 'Policy name' field with 'Policy1' and a trash icon. Below are several dropdown menus: 'Sector' (Housing), 'Subsector' (Heating), and 'Policy type' (Smart heating energy mana...). There are two horizontal sliders: 'Sector stock targeted' (35%) and 'Policy Intensity' (33%). A 'Maximum possible EE impact' field is set to 10. At the bottom, there are two rows of energy mix values: 'New energy mix values' and 'Current energy mix values', each with columns for Natural gas, Electricity, Fuels, Renewable, and Other.

Category	Natural gas	Electricity	Fuels	Renewable	Other
New energy mix values	27.56	34.98	19.59	17.87	0
Current energy mix values	27.56	34.98	19.59	17.87	0

Model section

[Back to main](#)



- 8 Erase this policy.
- 9 Create a new empty policy.
- 11 Run the model.
- 12 Open this Guidance

- 10 Adjust the energy carriers for that policy, to establish the energy mix (EM).
 - Numbers represent the fractioned energy mix percentage, so the **total of them must sum 100%**. Energy carriers allowed by the model are natural gas, electricity, fuels (diesel, gasoline...), renewables (solar, wind, water force, waste...) and other. Model won't run if there is some policy for which the energy mix does not sum 100. It will tell which policy is not complaining with a pop-up advise when trying to run it.
 - For the **same subsector of the same sector, the energy mix must be the same**. If energy mix is changed from one policy, it is instantly updated to all other policies from the same subsector from the same sector.
 - Predetermined values are **given/suggested by national data (it vary by country), but they are expected to be changed**. If they are not modified, model will run with the same energy mix from the initial (**current EM**) and final year (**new EM**). I.e. for "Policy2" the policy would shift some energy from electricity to renewable energy (solar panels, wind turbines...) from the initial year to the final, for the cooling of the tertiary sector.

Parameters Model Results

Add up to 34 energy efficiency policies in the housing, tertiary, and mobility sectors. All policies targeting one aspect of a specific subsector need to be aggregated into one input policy. For each policy, state which part of the existing sector stock will be addressed (e.g., affected share of total housing stock or share of mileage by private cars) and how likely the policy is to reach its full EE potential (policy intensity). For each sector and subsector, you may also alter current energy mix. For more details, check the Guidance handbook.

12

[Guidance](#)



Policy name

Sector: <input type="text" value="Housing"/>	Subsector: <input type="text" value="Heating"/>	Policy type: <input type="text" value="Smart heating energy mana"/>	Sector stock targeted: <input type="text" value="35%"/>	Policy Intensity: <input type="text" value="33%"/>	Maximum possible EE impact: <input type="text" value="10"/>
New energy mix values	Natural gas: <input type="text" value="27.56"/>	Electricity: <input type="text" value="34.98"/>	Fuels: <input type="text" value="19.59"/>	Renewable: <input type="text" value="17.87"/>	Other: <input type="text" value="0"/>
Current energy mix values	Natural gas: <input type="text" value="27.56"/>	Electricity: <input type="text" value="34.98"/>	Fuels: <input type="text" value="19.59"/>	Renewable: <input type="text" value="17.87"/>	Other: <input type="text" value="0"/>

10

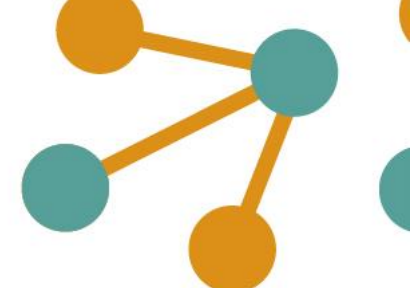
Policy name

Sector: <input type="text" value="Tertiary (services)"/>	Subsector: <input type="text" value="Cooling"/>	Policy type: <input type="text" value="More efficient cooling techno"/>	Sector stock targeted: <input type="text" value="14%"/>	Policy Intensity: <input type="text" value="53%"/>	Maximum possible EE impact: <input type="text" value="30"/>
New energy mix values	Natural gas: <input type="text" value="0"/>	Electricity: <input type="text" value="90"/>	Fuels: <input type="text" value="0"/>	Renewable: <input type="text" value="10"/>	Other: <input type="text" value="0"/>
Current energy mix values	Natural gas: <input type="text" value="0"/>	Electricity: <input type="text" value="100"/>	Fuels: <input type="text" value="0"/>	Renewable: <input type="text" value="0"/>	Other: <input type="text" value="0"/>



11

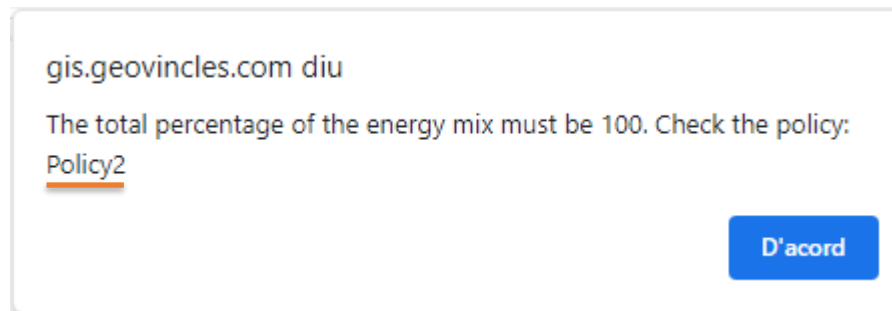
Run



Frequent Errors

1. “Total percentage must be 100”

Find the policy the pop-up indicates and correct the percentages of the energy carriers.



90+30=120

Policy name	Policy2					
Sector	Subsector	Policy type	Sector stock targeted:	Policy Intensity:	Maximum possible EE impact	
Tertiary (services)	Cooling	Nature based cooling strateg	21%	45%	40	
New energy mix values	Natural gas: 0	Electricity: 90	Fuels: 0	Renewable: 0	Other: 30	
Current energy mix values	Natural gas: 0	Electricity: 90	Fuels: 0	Renewable: 0	Other: 30	

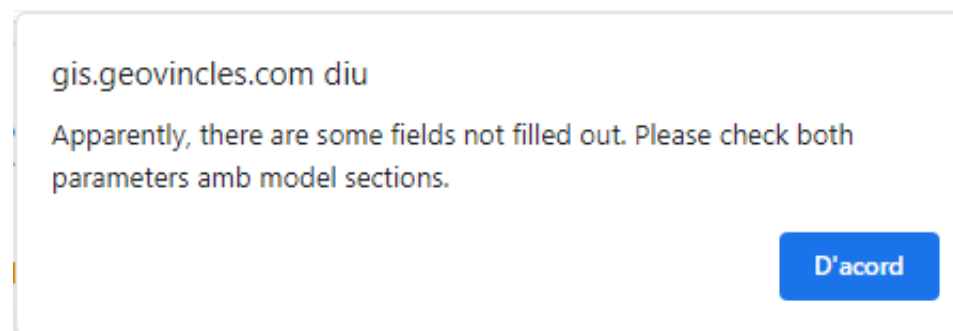


2. “Field/s not filled out”

Go back to the **parameters section** and check that you did not miss any input. Then, check the **model section** in the same way.

90+10=100

Policy name	Policy2					
Sector	Subsector	Policy type	Sector stock targeted:	Policy Intensity:	Maximum possible EE impact	
Tertiary (services)	Cooling	Nature based cooling strateg	21%	45%	40	
New energy mix values	Natural gas: 0	Electricity: 90	Fuels: 0	Renewable: 0	Other: 10	
Current energy mix values	Natural gas: 0	Electricity: 90	Fuels: 0	Renewable: 0	Other: 10	



Results section

- 1 Select values to see simple charts in the online interface. There are three dropdowns. The first one, shows different values. The other dropdowns vary in function of the selected variable, according on what is willed to see.
→ For some combination, the third dropdown does not show a value, because the combo does not need it. In any case, user **needs to press the “-” option** to see the graphic, since it is uploaded when the three dropdowns are filled.
- 2 Graphic generated in the online interface.
→ In this case, we see a chart of the energy consumption for the heating subsector of the housing sector.
→ Data for the reference, initial and final year are displayed for a quick view comparison.
- 3 Units of the chart generated.
- 4 Legend of the chart.
- 5 Target line to be achieved (based on EU framework).
→ In this example, the 2030 (final year) column, surpass the red target line, meaning that target is not achieved in energy reduction. More efforts should be forecasted to end up below the line.
- 6 Click to download the Excel file of the model, where results are presented in a more elaborated and structured format.
- 7 Brief description

[Back to main](#)

REFEREE Tool, the real value of energy efficiency

Local level policy assessment

Parameters Model Results

Select single key trends and results for visualization

1

3

4

5

[Download the full assessment report \(xlsx\)](#)

Select single key trends and results for visualization

Expected energy consumption and energy savings

Housing

Absolute

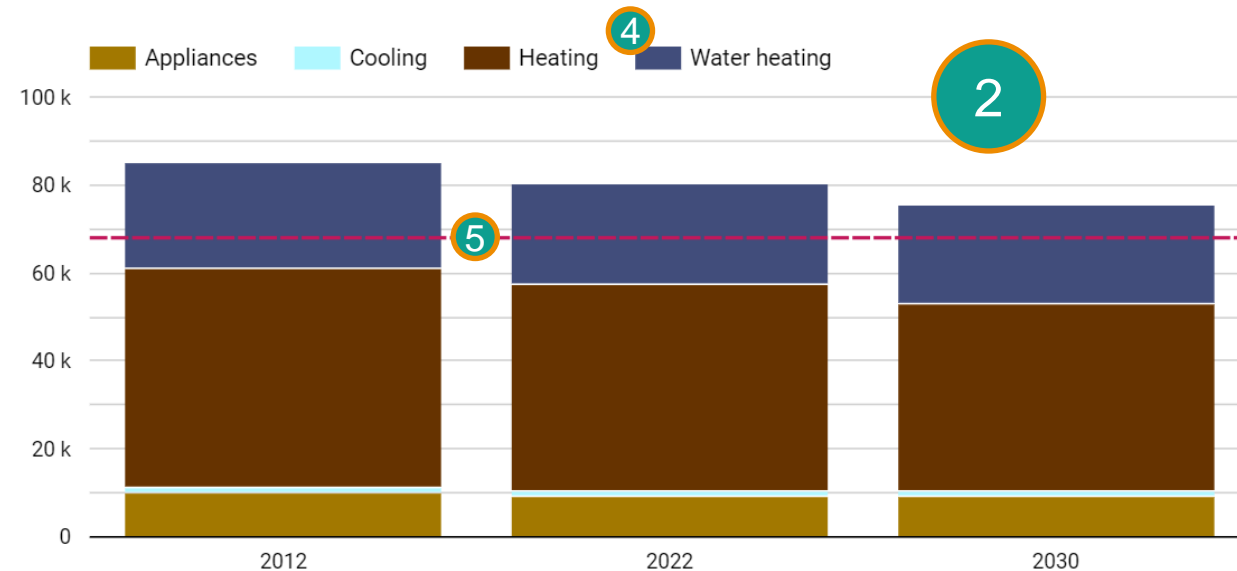
[Download the full assessment report \(xlsx\)](#)

6

The figure shows MWh of energy consumed, by sector or subsector. The red threshold indicates existing policy target:
- For all sectors: 32,5% energy efficiency increase by 2030 (Source: EED)
- For housing and tertiary: 1,9% annual energy efficiency increase by 2030, ie. 11,9% between 2024 and 2030 (Source: EED – Fit For 55)

7

Results of the model (MWh)



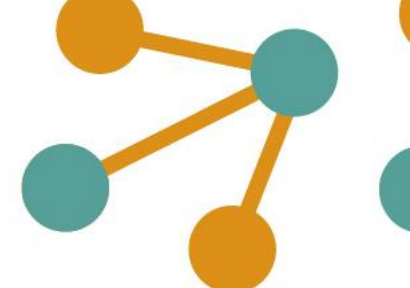
Local Policy Assessment Report

- Once downloaded and opened the Excel File, it will show the Main Page Menu. It allows to navigate through its different pages, which they have a "Go to Main Page button" to return to the beginning.

LOCALITY POLICY SUPPORT SYSTEM TOOL

Scenario Definition			
Pathways for the housing sector	Pathways for the tertiary sector	Pathways for mobility	
Energy price evolution pre tax European Countries graphs		Energy price evolution pre tax European Countries tables	
Thematic graphs and tables			
Energy consumption graphs		Energy consumption tables	
CO2 Emission graphs		CO2 Emission tables	
Expected costs from energy graphs		Expected costs from energy tables	
Economic outputs graphs		Economic outputs tables	
Governance graphs		Governance tables	
Full result reports			
Synthesis policy report	Housing report	Tertiary report	Mobility report



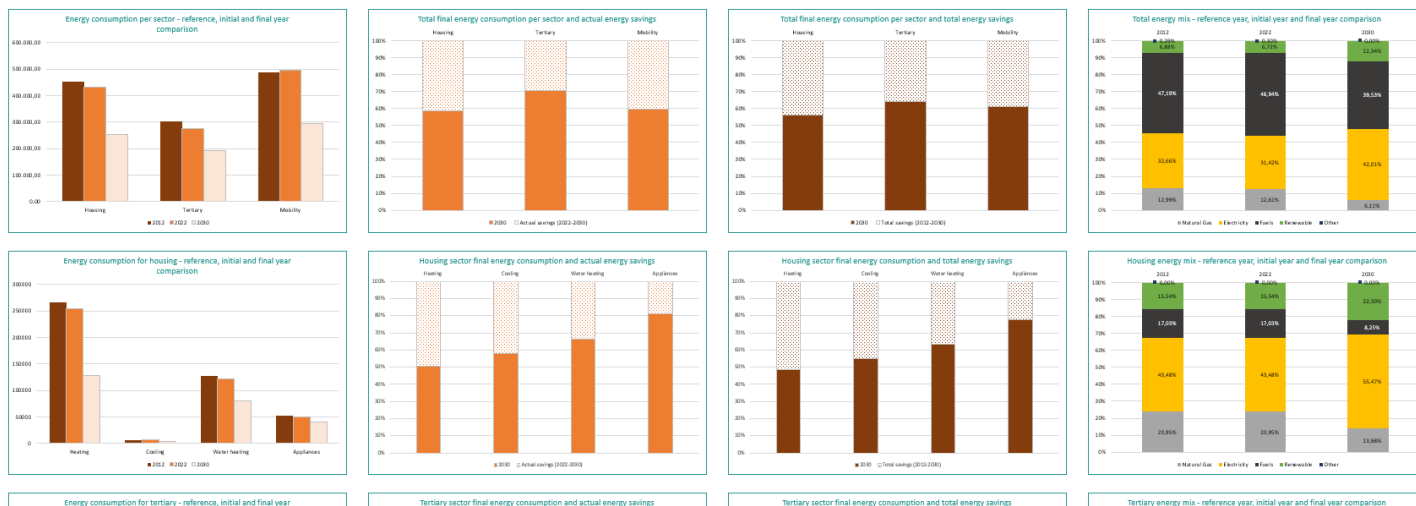


Local Policy Assessment Report

- Report shows predefined charts from the different sections.
- Also, users will have tables for each section with the results of the run, so they have also the option to create their own charts if they wish to.



Energy consumption (MWh) graphs



[Go to main page](#)

Emissions (tCO2) tables

By sectors and subsectors

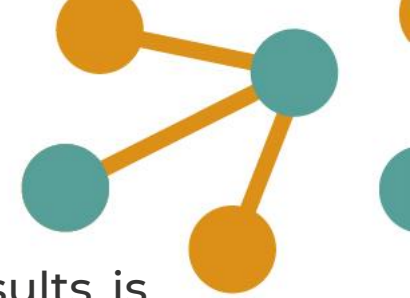
Total	Housing	Tertiary	Mobility
2012	20.177,67	17.430,00	50.023,44
2022	16.602,98	12.329,30	47.096,16
Actual savings (2022-2030)	8.740,08	4.573,66	28.154,22
2030	7.862,90	7.755,64	18.941,94
Total savings (2012-2030)	12.314,77	9.674,36	31.081,49

Housing	Heating	Cooling	Water heating	appliances
2012	12.124,78	333,30	5.136,77	2.582,82
2022	9.976,74	274,25	4.226,73	2.125,25
Actual savings (2022-2030)	7.467,89	82,75	548,23	641,21
2030	2.508,86	191,51	3.678,50	1.484,04
Total savings (2012-2030)	9.615,92	141,79	1.458,27	1.098,79

Tertiary	Heating	Cooling	Water heating	Appliances
2012	5.396,89	5.536,65	15,42	6.481,03
2022	3.817,55	3.916,41	10,91	4.584,43
Actual savings (2022-2030)	150,42	3.039,64	0,43	1.383,17
2030	3.667,13	876,77	10,48	3.201,26
Total savings (2012-2030)	1.729,76	4.659,88	4,94	3.279,78

Mobility	Public transport	Road Transport
2012	5.683,34	44.340,10
2022	5.350,76	41.745,40
Actual savings (2022-2030)	2,14	28.152,08
2030	5.348,62	13.593,32
Total savings (2012-2030)	334,71	30.746,78

Local Policy Assessment Report



- By clicking into “Synthesis policy report”, a summary of the different simulation results is shown. The user can freely explore the document to see the different results that are offered. Also, they can see if their policy pack comply with the different relevant European targets.



Integrated Policy Selector

AGGREGATED IMPACTS

Global Key Impacts

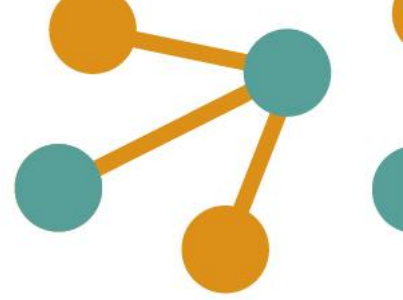
Total policy intensity by sectors		Energy		Emissions		Economic costs and savings	
	12,74	Reference energy consumption (MWh)	339.915,00	Reference CO2 emissions (tCO2)	87.631,10	Initial cost of energy (without tax, €)	48.541.336,90
Housing	9,97	Initial energy consumption (MWh)	320.213,00	Initial CO2 emissions (tCO2)	76.028,44	Final cost of energy (without tax, €)	22.367.980,96
Tertiary	3,89	Final energy consumption (MWh)	204.773,25	Final CO2 emissions (tCO2)	34.560,48	Total € savings	26.173.355,94
Mobility	16,72	Total energy savings (MWh)	115.439,75	Total CO2 savings (tCO2)	41.467,95	% € saved	53,92
		% energy saved	36,05	% CO2 reduction	60,56		

Global Policy Targets

	Target	Simulated impacts		Target	Simulated impacts		
Energy consumption efficiency (Source: EED)	32,50%	39,76%	complies	Increase of renewable heating (Source: RED)	8,80%	21,04%	complies
Yearly energy savings increase (Source: EED – Fit for 55)	1,90%	4,97%	complies	Increase of renewable cooling (Source: RED)	8,80%	46,73%	complies
CO2 Emissions (Source: EED – Fit for 55)	55,00%	60,56%	complies	Less emissions intensity of transport fuels or Share of renewables in transport (Source: RED)	-14,50% 29,00%	-30,23% 26,59%	complies NOT OK. Review values obtain ← (minimum one of both should comply)

E1

European regulation



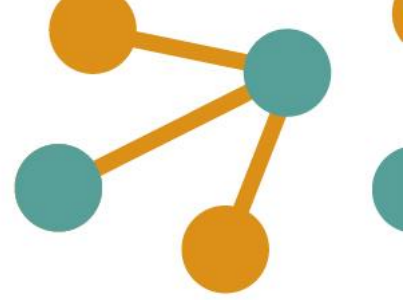
Current framework: 2030 targets

The **European Green Deal** was adopted in December 2019. This European strategy aims to "transform the EU economy towards a more sustainable future", and responds to the challenges posed by the fight against climate change based on **six main areas of action**: (1) energy efficiency through a transformation of industry and sources to more sustainable ones; (2) transformation towards a circular economy based on recycling and reuse processes of both products and their packaging; (3) efficiency in the construction sector with respect to construction processes and materials; (4) energy efficiency of buildings; (5) mobility aiming for a 90% reduction in emissions; and (6) sustainability in the food sector and a framework for biodiversity protection. With the approval of the European Green Deal, the process of updating the European **Circular Economy Action Plan 2015 begins**.

The European Union agreed in 2021 in **The European Climate Law** to increase the **reduction in emissions to 55% by 2030**, compared to emissions in 1991. In this way, efforts must be intensified to achieve the proposed objective. In addition, Europe has achieved the commitment to become the first climate-neutral continent by 2050 (emissions equal to or less than those eliminated through the planet's natural absorption).

The "**Fit for 55**" **package (COM 2021/550)** was proposed in 2021 to update the EU regulatory framework to achieve these objectives and realize the EU Green Deal. The proposals cover areas related to climate, land use, energy, transport, etc.

Due to the Russia-Ukraine war and the difficulties and disruptions in the global energy market, in mid-2022 the European Commission implemented the **REPowerEU Plan**. Its main objectives are to (1) save energy; (2) produce clean energy; and (3) diversify its energy supplies. This plan has impacted directives, such as the RED or the EED, increasing their overall level of ambition.



Current framework: 2030 targets

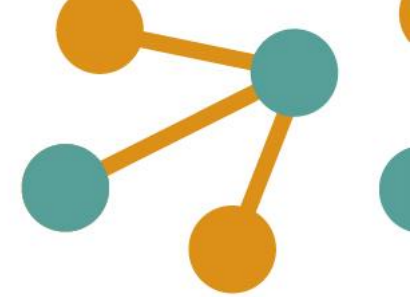
The **Renewables Energy Directive (2009/28/EC)** was revised as part of the Fit for 55 package and the REPowerEU plan, given the need to accelerate the transition to clean energy in the EU. Since the introduction of the RED (2009/28/EC), the share of renewable energy sources in the EU's energy consumption has increased from 12.5% in 2010 to 21.8% in 2021. The revised Directive set a new increased target of 42.5% renewable energy by 2030, aiming for 45% and introduced sectorial targets. The directive also lays down common principles and standards for renewable energy support schemes, sustainability criteria for biomass, provisions to facilitate and accelerate permitting, and the right to produce and consume renewable energy and to establish renewable energy communities. It establishes rules to remove barriers, stimulate investments, and drive cost reductions in renewable energy technologies and empowers citizens and businesses to participate in the clean energy transformation.

The **Energy Efficiency Directive (2012/27/EU)** was also revised as part of the Fitfor55 package and further enhanced (Directive **(EU) 2023/1791**) as part of the REPowerEU plan, presented by the Commission in May 2022, which aims to decrease the EU's dependence on fossil fuel imports from Russia. The EU legislation establishes the "energy efficiency first" principle as a fundamental principle of EU energy policy. This means that EU countries must consider energy efficiency in all relevant policies and in all major investment decisions taken in the energy and non-energy sectors.

On top of regulatory progress, the EU also launched **NextGenerationEU**, a historical temporary recovery instrument to address the socio-economic consequences of the covid pandemic and support investment for a cleaner and more resilient future. It thus includes a **minimum of 37% spending on climate investments and 20% on support for the digital transition**. The funds focus on financing initiatives to promote clean energy, sustainable mobility and green vehicles, smart construction and building renovation, digital infrastructure, modernisation of public administration and human capital formation.

E2

European targets



Energy targets

In the previous chapter, some of the main goals relevant for this topic were presented, as a part of the European background and framework. This chapter aims to go deeper on more concrete targets. The plans and strategies established at European level define binding and non-binding policy targets.

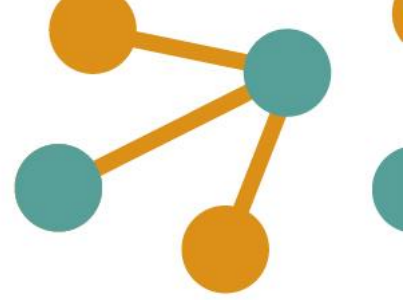
The Energy Efficiency Directive (2018/2002) established a headline EU energy efficiency target for 2030 of at least 32,5% (compared to projections of the expected energy use in 2030). The revised EED (2023/1791) establishes a new, and for the first time, **binding, energy efficiency target of reducing final energy consumption by at least 11.7%** compared to projections of the expected energy use for 2030

The Renewable Energy Directive is the legal framework for the development of renewable energy across all sectors of the EU economy, supporting clean energy cooperation across EU countries. It establishes the following targets:

- Reduce emissions intensity of **transport fuels by a 14,5% by 2030**, or ensure a share of **renewable in transport of at least 29%**;
- **Binding annual increase of 1.6% in the use of renewable energy in the industry sector**, with specific targets for hydrogen use from non-biological sources (42% by 2030 and 60% by 2035).
- (Indicative) Energy used in buildings should be **by 2030 of renewable origin in at least 49%**. Increase of the **renewable energy used for heating and cooling to 0.8% annually by 2025 and 1.1% by 2030**;

The European Climate Law (July 2021) establishes the following key targets in relation to GHG emissions:

- **Net zero greenhouse gas emissions by 2050**;
- **At least 55% GHG reduction by 2030** in relation to 1990;
- An **average 1,49% yearly energy savings** gradually **reaching 1,9%** by the end of **2030**.



Municipal Planning

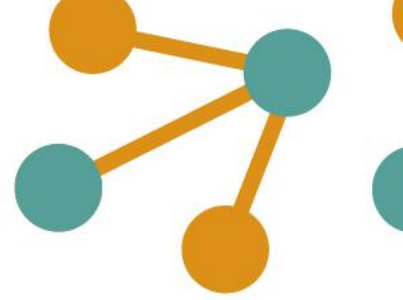
According to the [recast EED](#) detailed planning will also be mandatory for heating and cooling, in the context of the National Energy and Climate Plans. Art 25 (1) mentions:

"As part of its integrated national energy and climate plan and its updates pursuant to Regulation (EU) 2018/1999, each Member State shall submit to the Commission a comprehensive heating and cooling assessment. That comprehensive assessment shall contain the information set out in Annex X to this Directive and shall be accompanied by the assessment carried out pursuant to Article 15(7) of Directive (EU) 2018/2001"

More importantly, all municipalities of 45000 inhabitants or more will have to adopt a municipal plan too:

"Member States shall ensure that regional and local authorities prepare local heating and cooling plans at least in municipalities having a total population higher than 45 000".

This plan will be based, among others, on the figures of the national one and abide to the energy efficiency first principle. It will have to take into consideration criteria such as low-temp district heating readiness, waste heat availability and renewable energy in heating and cooling. Among other things the municipal plans will have to address "how to finance the implementation of policies and measures and identify financial mechanisms allowing consumers to shift to renewable heating and cooling"



More info regarding EU targets

The countries of the EU are working individually on new legislation to reach these objectives at national level.

The REFEREE tool provides information whether the targets are accomplished or not, as an addition information provided, so policymakers can be aware if the policies applied are useful to comply the European targets.

To know more on policy targets in force in the EU and at Member State level, access the following brief:



TOOL GUIDANCE - LOCALITIES

Press any chapter to navigate directly to it

REFEREE Tool

R1. Purpose of the Tool

R2. Defining Inputs and Outputs

Guidance

G1. Introduction

G2. Step-by-step guide

European context

E1. European regulation

E2. European targets

4 User tutorials

Two tutorial videos are available to users, one per each tool. They help the user to input the data required from the online interface and navigate through the different sections, step by step.

Both videos are available on the website of the project. In concrete:

- National: <https://refereetool.eu/landing-page-referee-tool-national/>
- Local: <https://refereetool.eu/landing-page-referee-tool-local/>

In particular, they:

- Show what is going to be displayed to the user, i.e., different options, capacities of the tool.
- Explain what the user is required to do in each case, and which are the steps to follow.
- Remind the availability of the guidance, which can be used in parallel during the simulation process.
- Provide tips to make a more accurate simulation.
- Allow to download the Policy Assessment Report from the online interface and briefly show the MS Excel files.

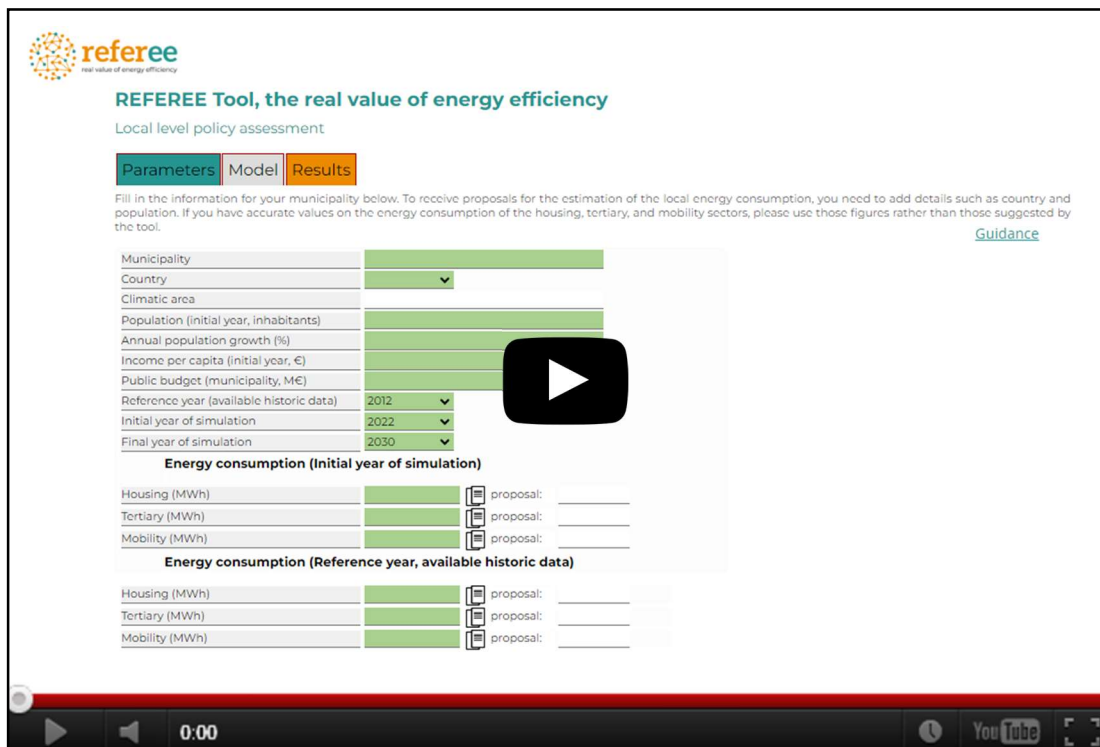


Figure 1. Screenshot of the tutorial video preview.

Annex: Synthesis of quantitative targets currently in force in the EU

Synthesis of quantitative targets currently in force in the EU

Sector	Year	Target	Source
Health	2030	Improving the health and quality of life of Europeans with a focus on older people	European Innovation Partner-ship on Active and Healthy Ageing
	2030	Supporting the long-term sustainability and efficiency of health and social care systems	European Innovation Partner-ship on Active and Healthy Ageing
	2030	Enhancing the competitiveness of EU industry through business and expansion in new markets	European Innovation Partner-ship on Active and Healthy Ageing
Education	2025	At least 47 % of adults aged 25-64 should have participated in learning in the previous 12 months	EU2030
	2025	60 % of vocational education and training students should take part in work-based learning	EU2030
	2030	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Millennium Development Goals Target 4A
	2030	The share of low achieving 15-year-olds in mathematics, reading and science should be less than 15 %	EU2030
	2030	The share of low-achieving students in their eighth year of schooling in computer and information literacy should be less than 15 %	EU2030
	2030	96 % of children aged between three and the compulsory school age should participate in early childhood education	EU2030
	2030	The share of early school leavers should be less than 9 %	EU2030
	2030	The share of 25–34-year-olds with tertiary education attainment should be at least 45%	EU2030
Poverty/Social exclusion	2030	The number of people at risk of poverty or social exclusion should be reduced by at least 15 million, including at least 5 million children, compared to 2019.	European Pillar of Social Rights
Europe's Digital Decade	2030	20 million employed ICT specialists, more graduates + gender balance 80% of adults can use tech for everyday	Digital Decade Policy Programme 2030
	2030	Gigabit connectivity for everyone, high-speed mobile coverage (at least 5G) everywhere EU produces 20% of world's semiconductors 10000 cloud edge nodes = fast data accesses EU quantum computing by 2025	Digital Decade Policy Programme 2030
	2030	75% of companies using Cloud AI or Big Data Double the number of unicorn startups 90% of SMEs taking up tech	Digital Decade Policy Programme 2030
	2030	Key Public Services – 100% online Everyone can access health record online Everyone can use eID	Digital Decade Policy Programme 2030
Employment	2030	78% of the 20/64-year-olds to be employed	European Pillar of Social Rights
	2030	At least 60% of all adults should participate in training every year	European Pillar of Social Rights
R&D / innovation	2030	From 1.8% in 2005 to 3% of the EU's GDP (public and private combined) to be invested in R&D	EU2030
Inflation (Eurozone)	always	Maximum 2%	ECB
Inflation (Member States in the eurozone)	always	Maximum 1.5% above that of, at most, the three best performing MS in terms of price stability	Convergence criteria
Government deficit (Member States in the eurozone)	always	Maximum 3.0% of GDP	Convergence criteria

Sector	Year	Target	Source
Government debt (Member States in the eurozone)	always	Maximum 60% of GDP	Convergence criteria
Interest rate (Member States in the eurozone)	always	Maximum 2.0% above that of, at most, the three best performing MS in terms of price stability	Convergence criteria
Energy sources	2025	Flaring will be banned from 1 January 2025 and venting will be banned in coal mines emitting more than 5 tonnes of methane per kiloton of coal mined,	Fit for 55
	2030	Member States shall raise the share of renewable energy in the EU's overall energy consumption to 42.5% by 2030 with an additional 2.5% indicative top up that would allow to reach 45%	RED
	2030	Member States shall raise the share of renewable energy in transport to 20% in 2030	RED
	2025	Flaring in coal mines will be banned from 1 January 2025	Fit for 55
	2027	Venting will be banned in coal mines emitting more than 5 tonnes of methane per kiloton of coal mined from 1 January 2027	Fit for 55
	2031	Venting will be banned in coal mines emitting more than 5 tonnes of methane per kiloton of coal mined from 1 January 2031	Fit for 55
Energy consumption	2030	49% renewable Energy Use in buildings	RED
	2030	-11.7% new energy efficiency targets for both final and primary energy consumption compared with PRIMES 2020	EED – Fit for 55
	2030	1.1% increase in renewable energy in the industrial sector annually	RED
	2030	35% increase renewable hydrogen in industry of total consumption	RED
	2030	An average of 1.49% yearly energy savings gradually reaching 1.9 by the end of 2030	EED – Fit for 55
	2030	From 2024 for larger municipalities (>50000) and from 2026 for smaller municipalities, energy consumption of public buildings must decrease by 1.9%/year	EED – Fit for 55
	2030	3% of the floor area of all public buildings must be renovated every year from 2024 (social housing, military, historical and religious buildings are out of scope)	EED – Fit for 55
	2030	1.1% increase of renewable heating and cooling annually	RED
	2025	0.8% increase of renewable heating and cooling annually	RED
	2030	14.5% reduced emissions intensity of transport fuels or to ensure a share of renewables in transport of at least 29%	RED
	2030	5.2% increase in the share of renewable fuels of non-biological origin	RED
	2030	1% increase in the share of advanced biofuels by 2025 and 4.4% by 2030	RED
	2035	50% increase renewable hydrogen in industry of total consumption	RED

Sector	Year	Target	Source
Total GHG emissions	2025	From 2019 to 2025, Member States must ensure that emissions from land use and forestry are balanced, hitting the target for net removals of 249 Mt (Million tonnes of CO2 equivalent)	Fit for 55
	2030	55% reduction of greenhouse gas emissions in the ESR (effort sharing regulation) sector compared to 1990	Fit for 55
	2030	62% reduction of emissions from the EU ETS compared to 2005 levels	Fit for 55
	2030	EU Countries committed to reduce their methane emissions by 30% compared to 2020 levels.	Global Methane Pledge
	2030	4.3% reduction annually (2024-2027) and 4.4% (2028-2030) instead of the current 2.2%	Reform of the EU emissions trading system
	2030	At least 100 cities will be climate-neutral in Europe	Sustainable and Smart Mobility Strategy
	2030	From 2026 to 2030, Member States must ensure that the emissions from land use and forestry are compensated by an equivalent removal of CO2, hitting the target for net removals of 310 Mt (Million tonnes of CO2 equivalent)	Fit for 55
Transport emissions and energy consumption	2025	15% reduction of emissions from cars compared to 2021 levels	Fit for 55
	2025	15% reduction of emission from vans compared to 2021 levels	Fit for 55
	2025	application of a zero- and low-emission vehicles' benchmark equal to a 25 % share of the fleet of new passenger cars	Fit for 55
	2025	Application of a zero- and low-emission vehicles' benchmark equal to a 17 % share of the fleet of new vans	Fit for 55
	2030	Member States could choose between a 14.5% reduction of greenhouse gas intensity in transport from the use of renewables or a binding share of at least 29% of renewables within the final consumption of energy in the transport sector.	RED
	2030	A binding combined sub-target of 5.5% for advanced biofuels (generally derived from non-food-based feedstocks) and renewable fuels of non-biological origin (mostly renewable hydrogen and hydrogen-based synthetic fuels) in the share of renewable energies supplied to the transport sector.	RED
	2030	A minimum requirement of 1% of renewable fuels of non-biological origin (RFNBOs) in the share of renewable energies supplied to the transport sector in 2030.	RED
	2030	55% reduction of emissions from cars by 2030 compared to 2021 levels	Fit for 55
	2030	50% reduction of emissions from vans compared to 2021 levels	Fit for 55
	2030	0 Emissions from new cars	Fit for 55
	2030	Scheduled collective travel of under 500 km should be carbon neutral within the EU	Sustainable and Smart Mobility Strategy
	2030	30 million zero-emission cars and 80,000 zero-emissions lorries will be in operation on European roads.	Sustainable and Smart Mobility Strategy
	2035	Average emissions of new cars to come down by 100% compared to 2021 levels	Fit for 55

Sector	Year	Target	Source
	2050	90% emissions reduction in the transport sector's	Sustainable and Smart Mobility Strategy
	2050	Phasing out fuel powered cars by 2050	Transport White Paper 2011
Trans European Networks TEN-T	2030	Multi-modal TEN-T core network operational by 2030	Transport White Paper 2011
	2050	Multimodal Trans-European Transport Network (TEN-T) equipped for sustainable and smart transport with high-speed connectivity will be operational for the comprehensive network.	Sustainable and Smart Mobility Strategy
	2050	All core network airports connected to rail network by 2050, preferably by high-speed rail	Transport White Paper 2011
	2050	All core seaports sufficiently connected to the rail freight and, where possible, inland waterway system.	Transport White Paper 2011
Urban transport	2025	Recharging stations at least every 60 km on main roads for passenger cars and trucks below 3.5 tonnes	Fit for 55
	2030	Recharging stations at least every 60 km on main roads for trucks above 3.5 tonnes	Fit for 55
	2030	Hydrogen refuelling stations: - every 200 km on main roads - one in every urban node with a capacity to provide 1 tonne of hydrogen per day, at 700 bars (per day)	Fit for 55
	2030	50 % reduction of conventionally fuelled cars in urban transport by 2030	Transport White Paper 2011
	2030	CO2 free logistics in cities by 2030	Transport White Paper 2011
	2030	50% fatalities in road transport by 2030	Transport White Paper 2011
	2030	Car emissions: 95 g CO2/km Vans emissions: 147 g CO2/km	Regulation (EU) 2019/631 (Included in the Fit for 55 Package) Regulation 443/2009
	2030	30% of road freight over 300km should shift to other modes such as rail or waterborne transport by 2030 and more than 50% by 2050	Transport White Paper 2011
	2030	Seamless multimodal passenger transport will be facilitated by integrated electronic ticketing	Sustainable and Smart Mobility Strategy
	2030	To triple the length of high-speed rail network by 2030	Transport White Paper 2011
	2050	50% of road freight over 300km should shift to other modes such as rail or waterborne transport	Transport White Paper 2011
	2050	To complete a European high-speed rail network by 2050.	Transport White Paper 2011
	2050	Close to zero fatalities in road transport.	Transport White Paper 2011
Aviation	2030	Electricity supply to be ensured for: all aircraft stands next to the terminal by 2025 and all remote stands by 2030	Fit for 55
	2035	Zero-emission large aircraft will become ready for market	Sustainable and Smart Mobility Strategy
	2050	The minimum share of supply of sustainable aviation fuels will be as follows: 2025: 2% 2030: 6% 2035: 20% 2040: 32% 2045: 38% 2050: 63%	Fit for 55: towards more sustainable transport
	2050	Low-carbon sustainable fuels in aviation to reach 40% by 2050	Transport White Paper 2011
	2050	Achieve net zero carbon emissions by 2050	IATA

Sector	Year	Target	Source
Maritime	2030	In the busiest seaports at least 90% of container ships and passenger ships to have access to shore-side electricity supply.	Fit for 55
	2030	In most of the inland waterway ports at least one installation providing shore-side electricity	Fit for 55
	2030	Zero-emission ocean-going vessels will become market ready by 2030	Sustainable and Smart Mobility Strategy
	2030	Transport by inland waterways and short sea shipping will increase by 25% by 2030	Sustainable and Smart Mobility Strategy
	2025 // 2050	to reduce the greenhouse gas intensity of the energy used on board as follows: 2025: 2% 2030: 6% 2035: 13% 2040: 26% 2045: 59% 2050: 75%	FuelEU maritime regulation
	2050	Transport by inland waterways and short sea shipping will increase by 50% by 2050	Sustainable and Smart Mobility Strategy
	2050	CO2 emissions from maritime transport should be cut by 40% (if feasible 50%) by 2050, compared to 2005 levels	Transport White Paper 2011
Freight Transport	2030	In freight transport, (rail + IWW) modal share of 30%	Transport White Paper 2011
	2050	Rail freight traffic will double	Sustainable and Smart Mobility Strategy
	2050	All external costs of transport within the EU will be covered by the transport users at the latest by 2050	Sustainable and Smart Mobility Strategy
	2050	In freight transport, (rail + IWW) modal share of 50%	Transport White Paper 2011
Transport management	2020	SESAR, Modernised air traffic management infrastructure.	Transport White Paper 2011
	2020	To establish the framework for a European multi-modal transport information, management and payment system	Transport White Paper 2011
	2050	Move towards full application of “user pays” and “polluter pays” principles	Transport White Paper 2011
Land use and forestry regulation	2027	Reach good ecological and chemical status in surface waters and good chemical and quantitative status in groundwater by 2027	EU Soil Strategy for 2030
	2030	310 Mt reduce for carbon removals (Mt=Million tonnes of CO ₂ equivalent).	Fit for 55
	2030	The EU aims to increase forest coverage by 3% by 2030 compared to 2010 levels.	New EU forest strategy for 2030
	2030	EU Members shall improve the size and biodiversity of forests, including by planting 3 billion new trees by 2030	New EU forest strategy for 2030
	2030	EU Members shall reduce nutrient losses by at least 50%, the overall use and risk of chemical pesticides by 50% and the use of more hazardous pesticides by 50% by 2030	EU Soil Strategy for 2030
	2050	EU Members shall combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world (Sustainable Development Goal 15.3)	EU Soil Strategy for 2030
	2050	Significant areas of degraded and carbon-rich ecosystems, including soils, shall be restored	EU Soil Strategy for 2030

Sector	Year	Target	Source
Air pollution	2029	Member States shall, as a minimum, limit their annual anthropogenic emissions of sulphur dioxide, nitrogen oxides, non-methane volatile organic compounds, ammonia and fine particulate matter in accordance with the national emission reduction commitments applicable from 2020 to 2029, and from 2030 onwards	National Emission Reduction Commitments Directive
	2030	Improving air quality to reduce the number of premature deaths caused by air pollution by 55% compared with 2005 levels.	Zero pollution action plan
	2030	Reducing by 25% the EU ecosystems where air pollution threatens biodiversity	Zero pollution action plan
	2030	Reducing the share of people chronically disturbed by transport noise by 30%	Zero pollution action plan
	2030	Significantly reducing waste generation and by 50% residual municipal waste	Zero pollution action plan
	2050	Improving soil quality by reducing nutrient losses and chemical pesticides' use by 50%	Zero pollution action plan
Water	2027	Member States shall implement the necessary measures to prevent deterioration of the status of all waterbodies (surface, groundwater, transitional, coastal)	Water Framework Directive
	2027	Member States shall implement the necessary measures to attain 'Good Water Status' (assessed based on ecological, chemical and quantitative (for groundwater) criteria	Water Framework Directive
	2030	Member States shall improve water quality by reducing waste, plastic litter at sea (by 50%) and microplastics released into the environment (by 30%)	Zero pollution action plan
Biodiversity	2030	Legally protect a minimum of 30% of the EU's land area and a minimum of 30% of the EU's sea area, and integrate ecological corridors, as part of a true Trans-European Nature Network	EU Biodiversity Strategy for 2030
	2030	Strictly protect at least a third of the EU's protected areas, including all remaining EU primary and old-growth forests	EU Biodiversity Strategy for 2030
	2030	Effectively manage all protected areas, defining clear conservation objectives and measures, and monitoring them appropriately.	EU Biodiversity Strategy for 2030
	2030	Habitats and species show no deterioration in conservation trends and status; and at least 30% reach favourable conservation status or at least show a positive trend.	EU Biodiversity Strategy for 2030
	2030	Improving knowledge, tackling the causes of pollinator decline, engaging society at large and promoting collaboration. In 2030, the decline of pollinators shall be reversed.	EU Biodiversity Strategy for 2030
	2030	The risk and use of chemical pesticides is reduced by 50%, and the use of more hazardous pesticides is reduced by 50%.	EU Biodiversity Strategy for 2030 / Farm to Fork / Sustainable Use of Pesticides Regulation in co-decision
	2030	At least 10% of agricultural area is under high-diversity landscape features.	EU Biodiversity Strategy for 2030
	2030	At least 25% of agricultural land is under organic farming management, and the uptake of agro-ecological practices is significantly increased.	EU Biodiversity Strategy for 2030
	2030	Three billion additional trees are planted in the EU, in full respect of ecological principles.	EU Biodiversity Strategy for 2030
	2030	Significant progress in the remediation of contaminated soil sites.	EU Biodiversity Strategy for 2030

Sector	Year	Target	Source
	2030	At least 25,000 km of free-flowing rivers are restored.	EU Biodiversity Strategy for 2030
	2030	There is a 50% reduction in the number of Red List species threatened by invasive alien species.	EU Biodiversity Strategy for 2030
	2030	The losses of nutrients from fertilisers are reduced by 50%, resulting in the reduction of the use of fertilisers by at least 20%.	EU Biodiversity Strategy for 2030
	2030	Cities with at least 20,000 inhabitants have an ambitious Urban Greening Plan.	EU Biodiversity Strategy for 2030
	2030	The negative impacts on sensitive species and habitats, including on the seabed through fishing and extraction activities, are substantially reduced to achieve good environmental status.	EU Biodiversity Strategy for 2030
	2030	The by-catch of species is eliminated or reduced to a level that allows species recovery and conservation.	EU Biodiversity Strategy for 2030
Waste & recycling	2020	The preparing for re-use and the recycling of waste materials (such as paper, metal, plastic and glass) from households shall be increased to a minimum of overall 50 % by weight	Waste Framework Directive
	2020	The preparing for re-use, recycling and other material recovery, including backfilling operations using waste to substitute other materials, of non-hazardous construction and demolition waste shall be increased to a minimum of 70 % by weight	Waste Framework Directive
	2020	Member States shall monitor the re-use on the basis of the methodology established by the European Commission by the end of March 2019. They will then have to start reporting on these indicators from 2020 onwards	Waste Framework Directive
	2020	Member States shall stop burning or landfilling separately collected waste	Waste Framework Directive (Art.10,4) Landfill Directive (Art. 5,3)
	2021	Ban on single-use plastic cutlery, cotton buds, straws and stirrers.	Waste Framework Directive
	2021	Member States shall report the implementation of article 10 of WFD (including separate collection)	Waste Framework Directive
	2022	Member States are required to collect data and set a baseline on the consumption of food containers and cups for beverages by 2022, so that they can use it to assess if they have achieved their national target that they should set by 2026	Waste Framework Directive (Single-Use Plastics Directive)
	2022	Member States to submit a first report on food waste generation	Waste Framework Directive
	2023	Member States to introduce, via new rules for implementing Extended Producer Responsibility (EPR), information for consumers about re-use and repair options for their products	Waste Framework Directive
	2023	Obligation to not burn or landfill Biowaste	Waste Framework Directive
	2024	All beverage bottles must have tethered caps.	Waste Framework Directive
	2024	Every packaging must contain information about EPR	Waste Framework Directive (Single-Use Plastics Directive)
	2025	Member States will have to separate collection of textiles and hazardous waste	Waste Framework Directive

Sector	Year	Target	Source
	2025	Member States will have to ensure that beverage bottles with a capacity of up to three litres (including their caps and lids) are collected separately for recycling, with a 77% target	Waste Framework Directive (Single-Use Plastics Directive)
	2025	Member States will have to provide a separate collection of at least 77% of plastic bottles	Waste Framework Directive (Single-Use Plastics Directive)
	2025	The preparing for re-use and the recycling of municipal waste shall be increased to a minimum of 55 %	Waste Framework Directive
	2025	The adoption of measures ensuring that the annual consumption level does not exceed 40 lightweight plastic carrier bags per person or equivalent targets set in weight. Very lightweight plastic carrier bags may be excluded from national consumption objectives;	Packaging and packaging Waste Directive
	2025	Member States shall take the necessary measures to recycle a minimum of 65 % by weight of all packaging waste. In this regard, the following targets by weight for recycling will be met regarding the following specific materials contained in packaging waste 50 % of plastic; 25 % of wood; 70 % of ferrous metals; 50 % of aluminium; 70 % of glass; 75 % of paper and cardboard:	Packaging and packaging Waste Directive
	2027	Member States must report biowaste as recycling only if it comes from separately collected waste. Mechanical biological treatment will no longer count towards recycling targets	Waste Framework Directive
	2029	Member States will have to ensure that beverage bottles with a capacity of up to three litres (including their caps and lids) are collected separately for recycling, with a 90% target	Waste Framework Directive (Single-Use Plastics Directive)
	2030	The preparing for re-use and the recycling of municipal waste shall be increased to a minimum of 60 %	Waste Framework Directive
	2030	Plastic bottles to contain at least 30% of recycled plastic in PET Bottles	Waste Framework Directive
	2030	A minimum of 70 % by weight of all packaging waste will be recycled. In this regard, the following minimum targets by weight for recycling will be met regarding the following specific materials contained in packaging waste: 55 % of plastic; 30 % of wood; 80 % of ferrous metals; 60 % of aluminium; 75 % of glass; 85 % of paper and cardboard.	Packaging and packaging Waste Directive
	2035	The preparing for re-use and the recycling of municipal waste shall be increased to a minimum of 65 %	Waste Framework Directive
	2035	Member States to put a 10% cap on landfill	Landfill Directive