DHC Efficiency Check

User manual

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DHC Efficiency Check is a research and preliminary decision-support tool developed at Politecnico di Milano. It helps users explore district heating decarbonisation options and the efficiency criteria implemented from Article 26 of the Energy Efficiency Directive. Feedback is welcome.

Politecnico di Milano and the authors accept no responsibility for the topicality, accuracy, completeness or quality of the tool or its results, or for decisions based on them. Users are responsible for checking their inputs, assumptions and results. The tool does not replace detailed engineering studies or official compliance assessment.

Contact: benedetta.mura@polimi.it

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Abbreviations

DHC = District Heating and Cooling
EED = Energy Efficiency Directive
TES = Thermal Energy Storage
CHP = Combined Heat and Power
HECHP = High Efficiency Combined Heat and Power
HP = Heat Pump
WH = Waste Heat
RES = Renewable Energy Sources
WTE = Waste to Energy
COP = Coefficient of Performance

SOC = State of Charge

LHV = Lower Heating Value

GHI = Global Horizontal Irradiance

TMY = Typical Meteorological Year

Introduction

DHC Efficiency Check helps users assess district heating configurations against the criteria implemented from Article 26 of the Energy Efficiency Directive (EU) 2023/1791 (EED). It reconstructs hourly heat demand, calculates how production units and thermal energy storage (TES) supply it, and reports energy performance, emissions and variable energy economics. Use the manual to set up an existing plant, define future changes and interpret the results. Each annual calculation uses 8,760 one-hour steps. A run covers the Current year and every later EED milestone through 2050, with the plant configuration and prices applicable to each year. The tool supports heat-supply assessment; it does not model cooling networks, design hydraulics or select an optimal investment plan. Screenshots illustrate the workflow, rather than a validated case study.

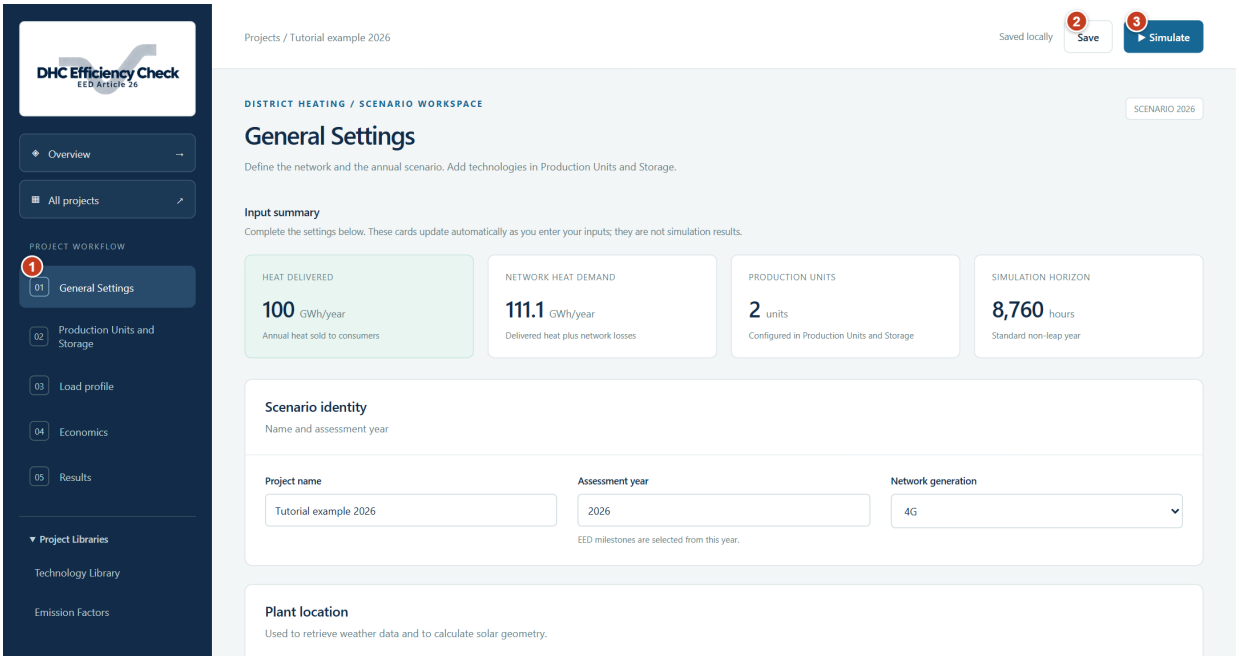


Figure 1. Workspace navigation. 1-Select a workflow section. 2-Save Pending edits. 3-Run the annual simulation.

Step 1: start and manage a project

Open the local application. Launch the supplied desktop application and keep its service window running while you work in the browser. In the project-folder version on Windows, double-click **Start_Dashboard.cmd**. This starts the local service and opens the interface; the usual address is http://127.0.0.1:8765. If a different address opens, use the one selected by the launcher.

From **Overview**, select **Start an assessment**, or open **All projects** and select + **New project**. Enter a meaningful name and select Create project.

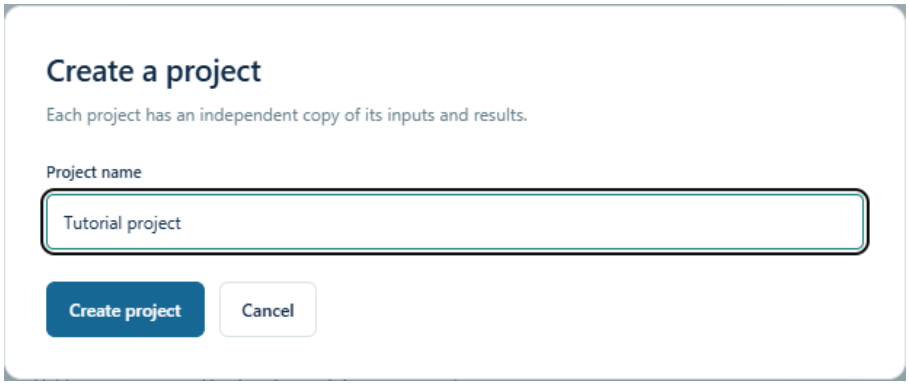


Figure 2. Create a project. Enter a name to start an assessment with an empty plant.

The application starts without any preconfigured projects. Select Start an assessment on Overview, or New project in All projects. Enter a project name to create an empty plant, then add your network inputs and configuration. Review and replace the supplied reference weather and energy-price assumptions before interpreting results for your system.

Use a project to describe one transition plan. To compare alternative plans or different price assumptions, select **Duplicate** on its project card and give each copy a meaningful name. Future equipment changes within one plan are entered under Future Configurations (Step 3). **Delete** permanently removes a project and its saved files; keep a backup when they are needed.

Saved data and offline use

Edits save automatically, including incomplete fields. Select **Save** when needed and wait for **Saved locally**. The app calculates on your computer; location search and PVGIS downloads require internet, while saved weather, simulations and Excel workflows work offline.

The project folder is shown under **All projects**. In desktop packages it normally lies under **Documents/EED DHC Tool/Projects**; the project-folder version uses its own **projects** directory. Back up the complete project folder to retain inputs and run archives. A downloaded results workbook is an analysis export, not a complete workspace backup.

Closing the browser does not delete projects. To stop the service, use **Stop tool** in the desktop launcher, or Ctrl+C in the project-folder terminal. An interrupted simulation is not resumed automatically.

Step 2 define the network and scenario

Open **General Settings**. Enter the **Project name**, **Current year** and **Network generation**. Current year is the year of the baseline plant. The run calculates that year and each later EED milestone separately, using the plant configuration in effect and that year's prices. The same weather and

demand assumptions are shared across the plan; choosing a future year does not supply a forecast climate.

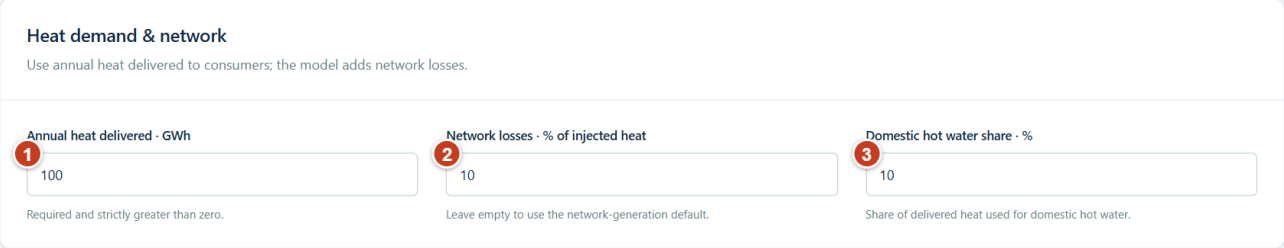


Figure 3. Main inputs in the panel "Heat demand and network": 1 Annual heat delivered to consumers. 2 Losses as a share of injected heat. 3 Domestic hot water share of delivered heat.

Enter **Annual heat delivered · GWh** as the useful annual heat sold to consumers, strictly greater than zero. **Network losses · % of injected heat** is a different energy basis: 10 means 10%, not 0.10%. If left empty, the tool uses its network-generation assumption: **2G 30%, 3G 25%, 4G 10%, 5G 5%**. Use a measured loss value when available.

How annual demand is established. Injected heat equals delivered heat divided by one minus the loss fraction. For example, **100 GWh delivered with 10% losses requires 111.11 GWh injected**, including 11.11 GWh of network losses. With a 10% domestic hot water share, the fixed annual component is 10 GWh of hot water plus 11.11 GWh of losses; the remaining 90 GWh is space heating. The next steps distribute that energy in time.

Set the location

Enter the city and country, select **Find location** and choose the correct result from the ones proposed. Alternatively, use **Enter coordinates manually** and provide latitude, longitude and the **standard UTC offset**. Changing only the place name does not change coordinates. The model uses local standard time throughout the year, without daylight-saving shifts.

Choose generator dispatch

Dispatch is the rule used to decide which available units produce heat in each hour and how much they supply. In General Settings, choose one of two rules:

Heat production cost: the tool starts with the unit that can supply heat at the lowest variable cost. If its available output does not cover demand, the next cheapest unit supplies the remaining demand, and so on. This order is recalculated each hour. Fuel or electricity use, conversion efficiency and revenue from the plant's own CHP electricity affect the heat cost; investment and maintenance costs are excluded.

Mix · fixed rank and hourly cost: use this rule when some technologies should have priority regardless of their hourly cost. Enter a rank for those technology groups under Production Units and Storage: rank 1 is considered before rank 2, followed by groups without a rank. Groups with the same rank, and unranked groups, are ordered by hourly heat cost.

For example, rank a **waste-heat technology 1 and leave a gas boiler unranked to use available waste heat first, then the boiler for the remaining demand. A rank sets an operating priority**; it does not prescribe a percentage of annual heat.

Both rules respect availability, dependencies and technical operating limits. Must-take heat, Must-run settings and the Peak shaving storage strategy can modify the resulting operation, as

explained below. Dispatch is a simplified hourly calculation, not a global optimisation. The input summary cards describe the configured plant; results appear only after a run.

Step 3 configure and add technologies

Open **Production Units and Storage**, select **Add Technology**, choose a technology and enter **Number of machines**, meaning the number of individual production units of that technology. Complete one row for each unit. Throughout this manual, "unit" refers to an individual generator; the interface currently labels its identifier Machine name. Capacity cards add up the active units in each technology group.

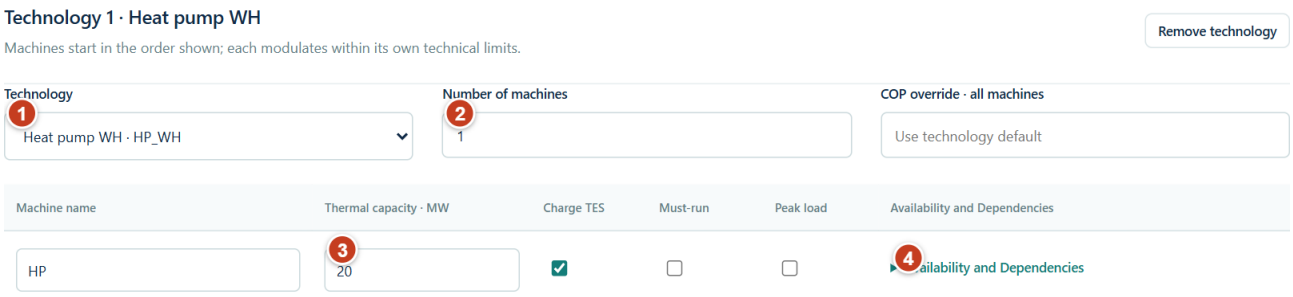


Figure 4 Configure a technology. 1 Select its library entry. 2 Set the machine count. 3 Enter each machine's thermal capacity. 4 Expand availability and dependencies.

Give each unit a unique **identifier in Machine name** and enter its **Thermal capacity · MW**. Units in a group share the library technology and group settings, but have their own capacities, availability and operating flags. Within the group, units are considered in the displayed order and adjust output within their technical limits.

Table 1. Production-unit settings and their effects on operation.

Control	Effect and when to use it
COP override	For a heat pump, the coefficient of performance (COP) is heat output divided by electricity input: COP 3 means 3 MWh of heat per MWh of electricity. Leave the override blank to use the library value, or enter a justified value for the technology group. It applies to every unit in that group.
Charge TES	Tick this box to allow the unit to produce heat for storage as well as the network. Storage must be enabled for the permission to have an effect. It does not force charging: the selected storage strategy, available capacity and storage limits determine when charging occurs.
Must-run	Tick this box to request operation at least at the unit's technical minimum when there is demand, even if earlier units could cover it. Availability, dependencies and start/stop constraints still apply. Any unavoidable surplus is stored when permitted and possible; the rest is dissipated. Must-run does not guarantee operation in every hour.
Peak load	Tick this box to identify a unit as a peak supplier, such as a backup boiler. With storage enabled and Peak shaving selected, non-Peak units are considered first and the marked unit covers the remaining demand. Stored heat then aims to reduce its daytime output. This flag does not impose a peak-only schedule under Economic arbitrage or without storage. Must-run and Peak load cannot both be selected.

Control	Effect and when to use it
Availability and Dependencies	Use availability to exclude a recurring period, such as maintenance. Both boundary dates are included; a period may run from December into January. A dependency links two units in the same hour: for example, unit B may run only when unit A produces heat, or only when A is off. A unit cannot depend on itself, and dependencies cannot form a loop.

For CHP, enter Installed electrical capacity · MWe at the same operating point as thermal capacity. A blank field uses the library power-to-heat ratio where available. The electrical rating affects electricity sales and the CHP emissions credit. For solar thermal, open **Solar collector field and** enter collector area, tilt and azimuth; and the ground-albedo value. Maximum thermal output is an optional cap, not the field-sizing input; the displayed reference power is calculated at 1,000 W/m².

Use Project Libraries → Technology Library to edit shared efficiencies, minimum output, minimum on/off times, must-take rules and EED energy shares. Must-take **means available heat is accepted before ordinary cost-based dispatch, subject to operating constraints**. Changing technology reapplies its defaults, so recheck overrides. Removed groups or units set aside by reducing the count can be restored; they are excluded from calculations while inactive.

Define future configurations

Select Future Configurations, choose a later EED milestone and select Customise [year] configuration. This copies the plant in effect at that date. Add, remove or replace units, change their settings, and configure external heat or storage as needed. The resulting snapshot takes effect on 1 January of that milestone and remains in use until the next configured change.

An Inherited milestone has no new equipment snapshot: the preceding configuration is used, but the year is still simulated with its own prices. Each Configured milestone stores a complete snapshot. Later saved configurations do not automatically inherit subsequent edits to an earlier snapshot, so review them after changing the baseline or an earlier stage. Use previous configuration removes that milestone's custom snapshot; Restore saved configuration can recover it.

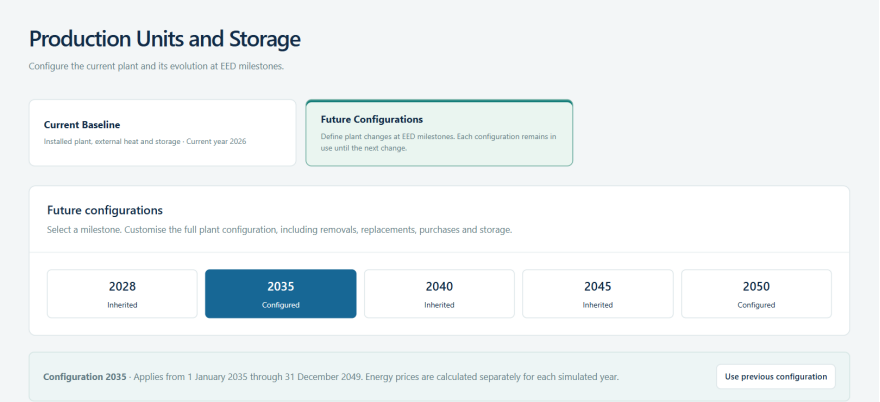


Figure 5. Future Configurations. Select a milestone and customise the complete plant snapshot for that stage.

Step 4 configure thermal storage and external heat

In **Production Units and Storage**, you can also configure a shared thermal store and heat purchased from other operators. Enable only the options used in your plant. For storage, enter energy capacity in MWh and separate charging and discharging power limits in MW, then select one of the two operating strategies, the choice is between economic arbitrage and peak shaving.

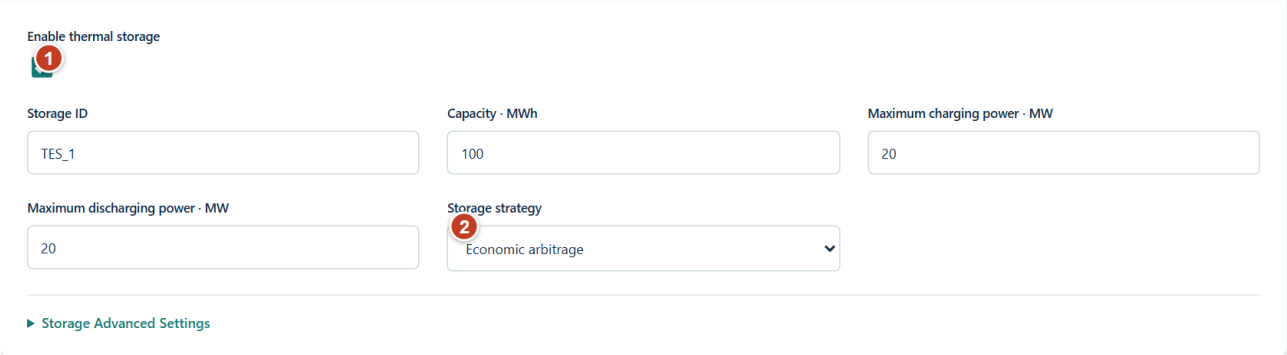


Figure 6. Thermal storage configuration. 1 Enable the store. 2 Select its operating strategy. Enter energy capacity in MWh and the two power limits in MW.

Economic arbitrage aims to shift heat production from higher-cost to lower-cost hours. The tool checks the cost of charging now against the cost of heat that storage could replace over the selected look-ahead period (24 hours is the default value of the look-ahead period, ideally reproducing operators checking the Day-Ahead Market). It charges when the difference between higher-cost and lower-cost hours is sufficient and discharges when stored heat can avoid sufficiently expensive production (based on the selected high and low percentiles of marginal heat production costs within the look-ahead period, also taking storage losses and the minimum price spread into account). These hourly rules do not optimise the whole year.

Peak shaving aims to reduce the daytime use of units marked Peak load. During **22:00–06:00**, the tool estimates how much heat those units would otherwise produce during the next **06:00–22:00** period. It charges from permitted non-Peak units, then discharges to replace that daytime production. If no Peak production is expected, it does not schedule an extra charging cycle. The times use local standard time; price differences do not trigger this strategy.

Both strategies are limited by generator availability, Charge TES permissions, storage power and available stored energy. They can recover unavoidable surplus heat and discharge to help cover a remaining demand shortfall. Under **Storage Advanced Settings**, review charging/discharging efficiencies and the initial, minimum and maximum state of charge (SOC), expressed as shares of

energy capacity. Blank fields use displayed defaults. Initial and final stored energy affect the annual balance.

To model purchased heat, enable **External heat purchases**, set the number of supplies and give each contract a unique Supply ID. Enter its capacity, base-year thermal purchase price, supplier energy source and supplier technology. Set availability, dependencies and storage-charging permission where relevant. A plant may rely entirely on purchased heat.

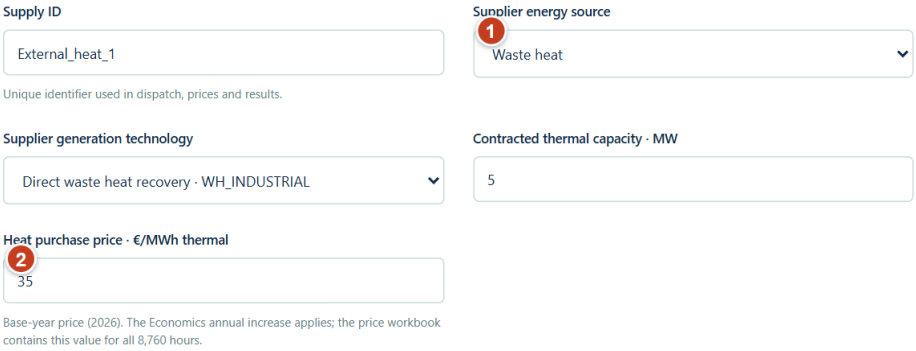


Figure 7. External heat contract fields. 1 Choose a source and compatible supplier technology. 2 Enter the base-year thermal purchase price

The tool purchases heat up to each contract's available capacity; it does not simulate the supplier plant. Supplier attributes determine heat classification and emissions, while the entered thermal price determines purchase cost. The project receives **no supplier electricity revenue or CHP credit**. The contract price is expressed in €/MWh thermal at the Economics price base year. Its own Annual variation in Economics applies in each simulated year.

Step 5: apply weather and heating dates

Open **Load profile**. In **Heating season**, set the recurring start and end day/month, or select **Heating active all year**. Both boundary dates include all 24 hours and may span December–January. This switches the weather-dependent space-heating component; domestic hot water and losses retain their model treatment.

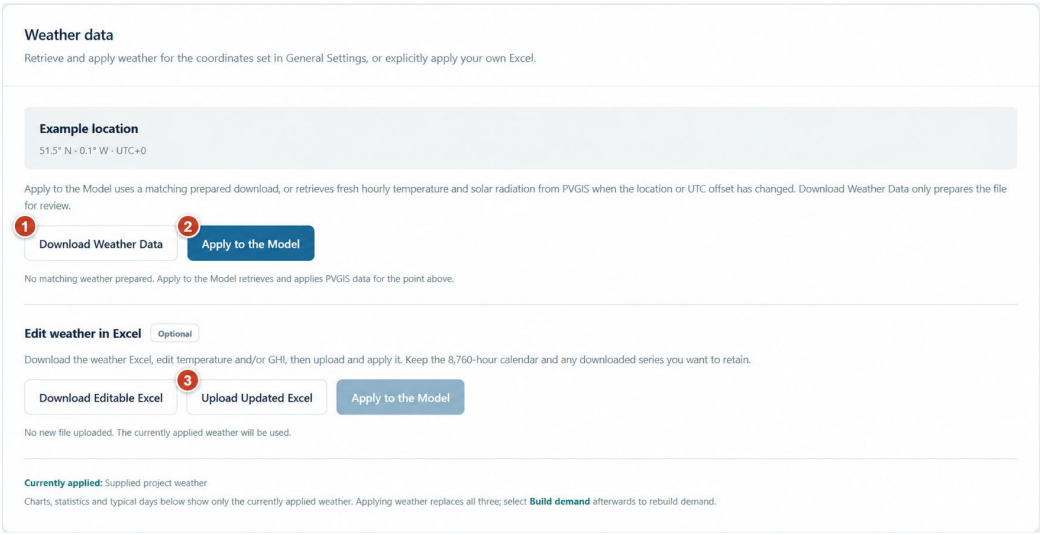


Figure 8. Weather workflow. 1 Optional download for review. 2 Apply PVGIS weather for the current coordinates. 3 Upload edited Excel, then use Apply to the Model in that same Excel row.

PVGIS is the weather source integrated into the application; other suitable hourly data can be supplied through Excel. Check the plant coordinates and select **Apply to the Model** in the location-weather section. The tool retrieves hourly temperature and solar radiation, or reuses a matching prepared download. Confirm the **Currently applied** label before building demand.

PVGIS supplies a **Typical Meteorological Year** (TMY) assembled from historical months, not observations for the assessment year. The tool aligns it to local-standard hourly intervals. Charts show active data; **Typical day** averages each clock hour across the selected month, without replacing the simulation's hourly series.

Excel route. Select **Download Editable Excel**, edit the **LoadProfile** sheet, save, choose **Upload Updated Excel**, then select **Apply to the Model** beside the uploaded file. The uploaded location is an operator assumption and is not checked against coordinates.

After applying weather or changing heating dates, rebuild demand. Imported files must preserve worksheet names and column headers. Saving an external Excel file by itself does not update the active project.

Step 6: reconstruct and check heat demand

Within **Load profile → Demand construction**, select a method and complete its settings. All three methods preserve annual injected heat from General Settings. They reconstruct the timing of demand; the current interface does not import a measured heat-demand series directly.



Figure 9 Select one demand method. Choose a method that represents the available evidence on daily operation.

Table 2. Description of the three alternative methods to distribute daily energy demand along the hours of the day.

Method	Construction and settings
Flat daily demand	These method is based on degree-hours. For each heating-season hour, the tool measures how far outdoor temperature is below a reference temperature of 15 °C; this means that an hour at 5 °C contributes 10 degree-hours, while an hour at or above 15 °C contributes zero. These values distribute the annual space-heating energy towards colder hours. The tool adds the constant hot-water and network-loss components, sums each day, then divides that total equally over 24 hours. Days can have different totals, but each day is flat. Monthly profile weights are ignored.
Automatic degree-hour profile	The tool distributes annual space-heating energy towards hours below the selected day or night reference temperature, with larger temperature differences receiving more energy. Hot water and network losses remain a constant hourly base. Set the two temperatures and whole-hour daytime boundaries. The daytime start is included and its end excluded; night covers the remaining hours. Monthly profile weights are ignored.
Monthly daily profiles	The same 15 °C temperature method establishes each day's total. The tool then distributes that whole total, including hot water and losses, according to the selected month's 24 hourly weights in DailyProfiles. Larger weights create higher-demand hours. The daily total is preserved; only its distribution within the day changes.

Why temperature matters. Colder hours receive more of the weather-sensitive energy, but annual energy remains the value you entered. Automatic-method reference temperatures therefore alter the allocation and peak, rather than calculate annual building demand. They are scenario parameters, not a building control simulation.

For **Monthly daily profiles**, use **Download Editable Excel**, edit **DailyProfiles** with **Hours 0–23** and **Jan–Dec** columns, then **Upload Updated Excel**. Alternatively, edit the exposed project workbook and select **Reload Project Excel**. Each month needs 24 finite non-negative weights with a positive sum; relative weights or percentages are automatically normalised to 100%.

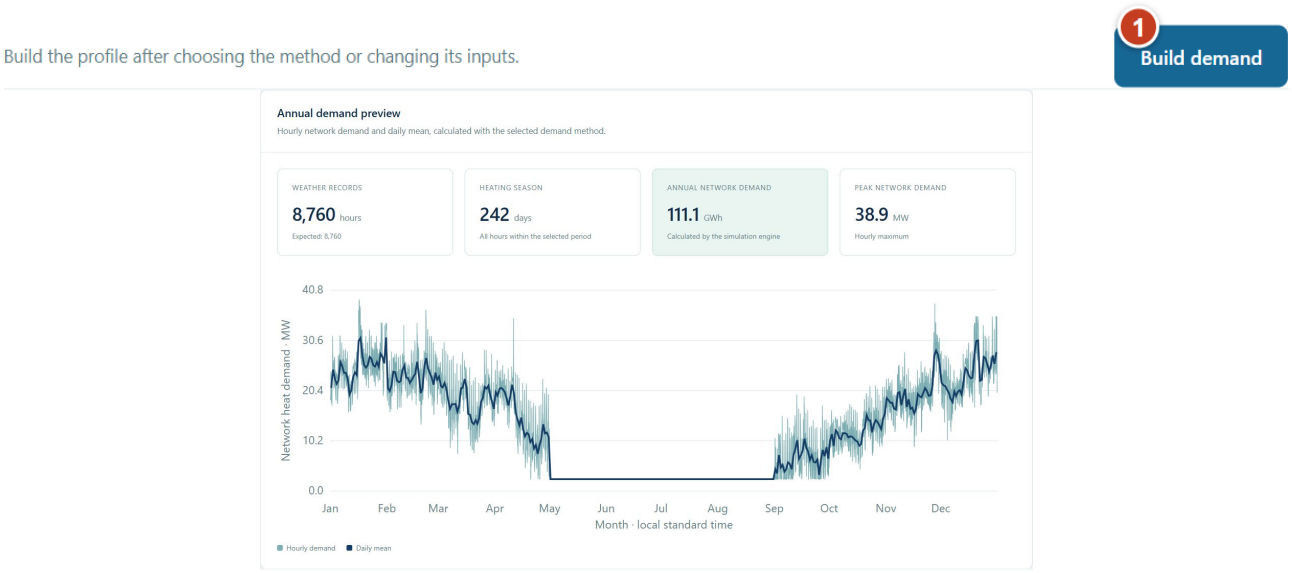


Figure 10. Build demand after changing its inputs, then review annual energy, hourly peak and the demand curve.

Check **Annual network demand**, **Peak network demand** and the curve against bills, metering and known operating peaks. Matching annual energy does not ensure that the hourly peaks are realistic. If no hour is colder than its reference temperature during the heating season, the weather method has no basis for distributing space-heating energy. The tool warns and uses a uniform daily fallback, with monthly weights still applied if selected. Check weather, heating dates and reference temperatures before using that profile.

Step 7: set energy prices and sales assumptions

Open **Economics**. Set **Price base year**, **Electricity purchase–sale price gap · %** and **Heat sales tariff · €/MWh sold**. In Energy prices, enter an Annual variation · % / year separately for each resource and external-heat contract. Positive values increase prices, negative values reduce them and 0 keeps them constant; values must exceed −100%. Electricity sales follow the electricity purchase price: a 10% gap means selling at 90% of the purchase price. The heat sales tariff and TES minimum price spread remain as entered.

For each energy resource, choose **Constant value**, **Monthly series** or **Hourly series**. Enter constant prices in the table; monthly and hourly prices come from the consolidated workbook. Monthly prices repeat through the hours of their month. Fuel prices are per MWh of lower heating value (LHV), electricity per MWh electrical and purchased heat per MWh thermal. Set contract base prices in Production Units and Storage; their annual variations remain editable in Economics. Minimum, mean and maximum describe source-workbook prices before annual variation, rather than prices in every future year.

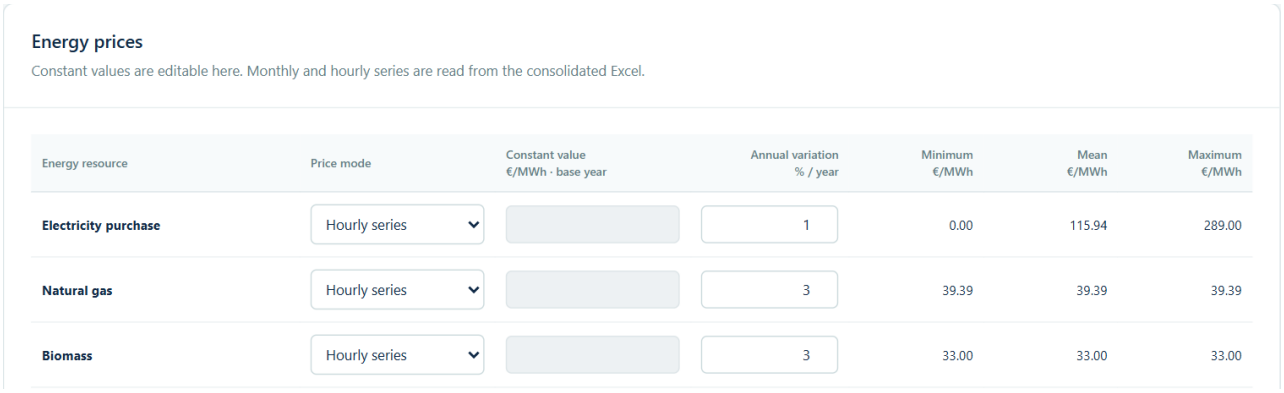


Figure 11. Energy price table.

To apply your own prices: download the workbook, retain **MonthlyPrices** and **HourlyPrices**, edit the intended series and save. Select **Update Excel**, choose the revised file, then **Consolidate Prices**. A selected file waiting for consolidation is not yet active. The workbook supports 12 monthly rows and 8,760 hourly rows with resource columns; preserve its calendar/year identifiers and headers.

For each resource, price in a simulated year = source price × (1 + annual variation)^(simulation year − source year). Constants and contract prices use Price base year; imported series retain their source year. For example, 50 €/MWh in 2026 becomes about **65.24 €/MWh in 2035** at +3% per year. A different electricity variation can change the relative cost of heat pumps and boilers and therefore their heat shares. Solar thermal has no energy purchase cost; investment and maintenance are outside this calculation.

Step 8: check libraries and emission factors

Open **Project Libraries → Technology Library** to inspect the catalogue. **Download Editable Excel**, edit **TechCatalog**, then **select Update Excel**. If you edited the displayed project file directly, select **Reload Project Excel**. Copy an entry to a unique **tech_id** when different defaults are needed. Library changes affect all baseline and future units using that entry; recheck efficiencies, energy shares and operating limits after import.

Then open **Emission Factors**. Review each source factor in **gCO_2/kWh** and its stated energy basis before selecting **Consolidate Emission Factors**. Fuel factors refer to fuel LHV, electricity to electrical input and fixed-zero thermal sources to direct heat. Mixed waste and Mixed fuel factors refer to the LHV of the non-biogenic fraction; the model separately applies the non-renewable fuel share. Pre-populated editable values are starting assumptions, not universal recommendations. Review and, where appropriate, replace them with documented data reflecting the plant, technologies, fuel composition and local energy supply. **Edit Emission Factors** reopens the fields; **Discard Edits** restores the applied values. Consolidate or discard pending edits before a run.

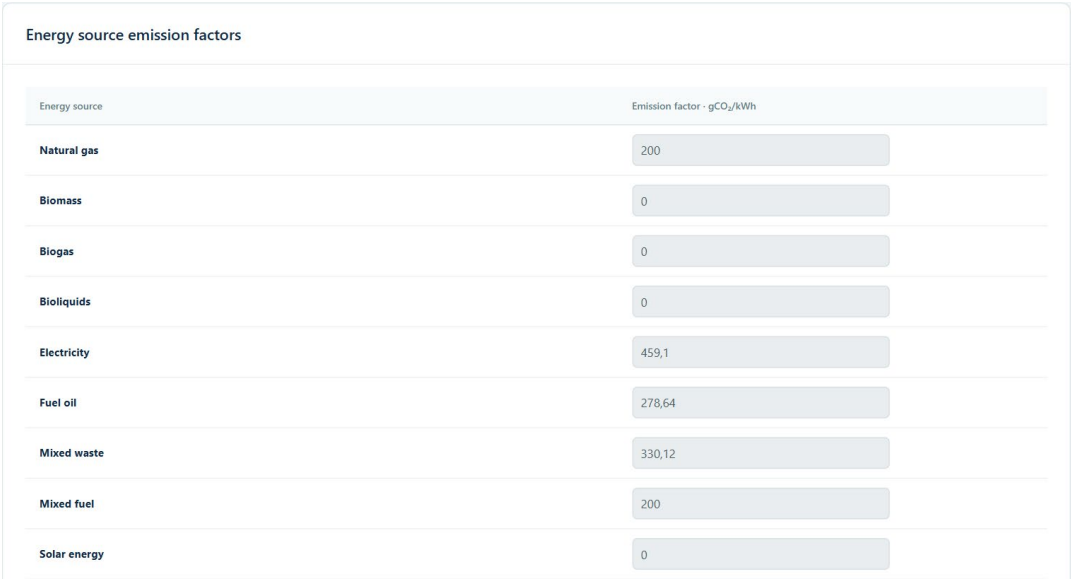


Figure 12. Applied emission factors by energy source (excerpt). The text explains the energy basis and fixed-zero sources.

Solar, waste heat, geothermal and ambient heat have zero **direct** factors under the tool's accounting convention because these entries represent the heat source, rather than electricity or fuel consumed to recover it. A heat pump still causes electricity-related emissions: the model calculates electricity use from heat output and COP, then applies the electricity factor. Do not set electricity to zero merely because a heat pump is used. Purchased-heat factors are derived from supplier technology and the same source factors.

These are the tool's direct-CO_2 conventions. Library RES, WH and HECHP entries encode qualification assumptions. The tool does not independently prove waste-heat status, renewable sustainability, SPF eligibility or high-efficiency cogeneration.

Step 9: simulate and read thermal-share results

Check that weather, prices and emission factors are applied and the demand preview is plausible. Select **Simulate** at the top right to run the assessment. The app validates all saved configurations, calculates the Current year and each later EED milestone through 2050, and archives the complete input snapshot with the results. Each annual run starts independently; storage energy is not carried from one simulated year to the next. Editing is locked during the calculation. If validation fails, correct the named input and run again.

Under **Results → Compliance Outcomes**, check **Current result**, project name and Current year. The overview cards refer to the baseline year. Select a milestone separately within Option 1 and Option 2 to read that year's detailed assessment; selecting one route's year does not change the other route. Previous results remain visible after edits but must be recalculated before export.

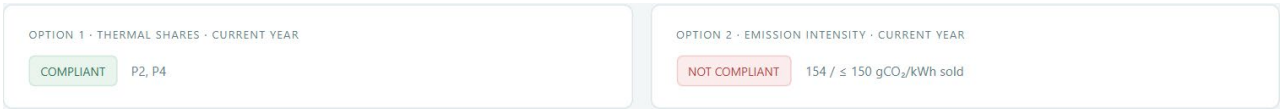


Figure 13. Baseline overview cards show independent outcomes for the thermal-share and emission-intensity routes.

Option 1 · Thermal shares compares the simulated qualifying heat shares with the implemented pathways for that year. One complete alternative pathway is sufficient; every condition within a combined pathway must be met. **P1–P23** are tool identifiers. Read actual share, required share and each condition, rather than only the highlighted doughnut.

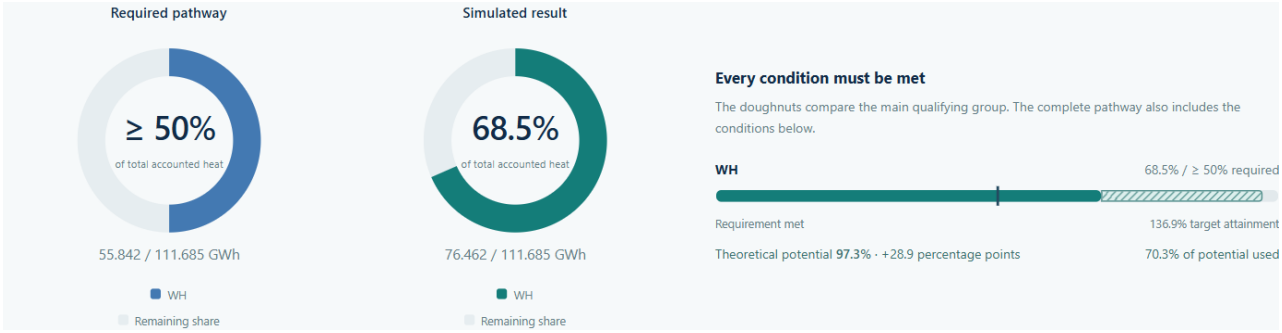


Figure 14. Required and simulated shares in Option 1. Solid bars show actual shares; hatching shows additional theoretical potential.

Accounted heat is direct network supply plus heat charged to TES. It excludes generated heat that is neither supplied nor stored, called dissipated heat or spillage. Charging counts once, including storage conversion losses and closing stock; discharge is not counted again. This convention can differ from heat measured after storage at the network inlet. Costs and emissions still use actual gross production.

RES means renewable energy; WH waste heat; CHP combined heat and power; HECHP high-efficiency CHP. Renewable and cogeneration attributes may overlap, while combined pathways count each MWh once. Review **Technology classification under the EED**, **EED heat allocation** and **Assumptions & model diagnostics** to check the selected technologies and qualifications.

A reported RES/WH replacement gap assumes replacement at constant total accounted heat. It is an energy shortfall for a pathway, not a required installed capacity. A specific CHP/HECHP deficit requires the stated cogeneration contribution and cannot automatically be replaced by generic RES/WH.

Where a share bar has a hatched extension, the solid part is the simulated share and the hatching is additional theoretical potential from installed capacity. The potential includes availability and solar resource, but ignores costs, minimum loads, start/stop limits, dependencies and operating obligations while holding the TES schedule fixed. It is an optimistic guide: category potentials cannot be added together. Try different Mix priorities and run again to verify whether an entire pathway can actually be met.

Read emission intensity and future years

Option 2 · Emission intensity divides net annual emissions by actual heat sold after network losses, then compares the result with the applicable implemented threshold. Expand **Emission balance and accounting method** to inspect the balance.



Figure 15. Option 2 compares simulated net emissions per kWh of heat sold with the limit for the selected year.

The model includes direct fuel/source emissions, grid-electricity consumption and purchased heat, then subtracts a credit for the plant's own CHP electricity. The same project electricity factor is used for consumption and that credit. Purchased heat receives no supplier credit. Gross production, including dissipated heat, determines energy consumption and emissions.

Option 2 uses the research emission-accounting convention described above, which is **different from Appendix B of Recommendation (EU) 2024/2395**. The dashboard compares this model intensity with Article 26 limits; it does not certify a statutory GHG inventory. Confirm the applicable national route and supporting eligibility evidence before using the result in a formal compliance procedure.

When above the threshold, read the intensity deficit and required reduction in tCO_2/year. The **Zero-emission heat equivalent** assumes proportional replacement of the simulated mix by zero-emission heat at constant heat sold. It is illustrative and neither identifies a retrofit nor sizes one. Negative net intensities can arise from the CHP credit; inspect the balance before interpreting them.

Read and compare temporal scenarios



Figure 16. Selectable EED milestones. Each available year uses its own annual calculation and applicable plant configuration.

With Current year set to 2026, Simulate calculates 2026, 2028, 2035, 2040, 2045 and 2050. Each year uses the baseline or latest future configuration already in effect, its own resource prices and its applicable EED criteria. Weather, annual demand, dispatch mode, source emission factors and other shared assumptions remain common to the plan. Even an inherited plant can produce a different mix when relative energy prices change. For a Current year between milestones, the current regulatory-period card represents the actual baseline year; earlier milestones are unavailable.

In Plant Performance, select Current Baseline or a scenario with a configured plant change to read its dispatch and economics. A year with an inherited plant remains available in Compliance Outcomes but is not a separate Plant Performance choice. Duplicate the project for a different demand, weather, emission-factor or price-variation trajectory.

Step 10: inspect performance and export results

Open **Results → Plant Performance** and select the baseline or a future plant-change scenario. Check **Unmet network demand**, **Dissipated heat**, actual heat delivered and the unit balances. Dissipated heat is generated heat that is neither supplied to the network nor stored; it excludes storage conversion losses. An EED result alone does not show whether hourly demand is covered: inspect any shortfalls, storage limits and unavoidable surplus.

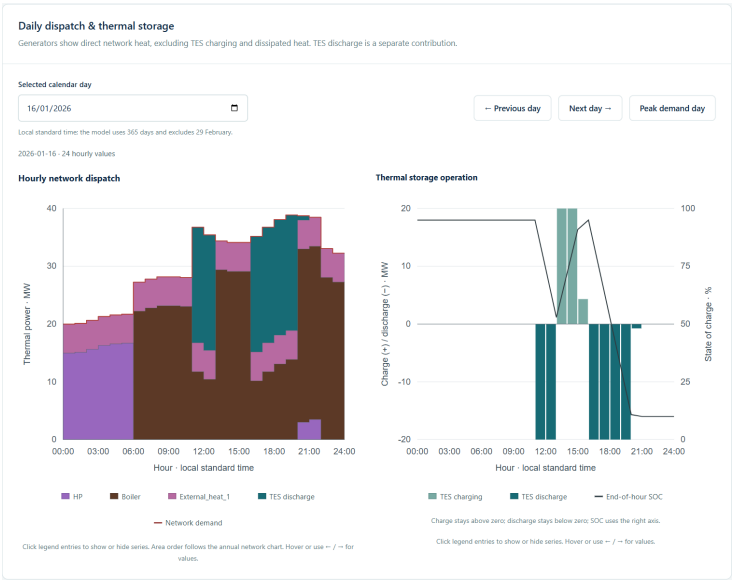


Figure 17. Daily dispatch and storage for the selected scenario. Choose a calendar day or select Peak demand day.

The annual network-supply chart shows daily energy totals; select a point to inspect that day. Daily generator layers show heat supplied directly to the network, with TES discharge shown separately. Charging and dissipated heat are excluded from those layers. Read each layer's thickness as the unit contribution. In the storage chart, charging is positive, discharge negative and SOC uses the right axis.

Heat Production Mix and monthly production show gross generation, including heat later stored or dissipated. The **Daily load duration curve** ranks 365 daily means, each representing 24 hours; it preserves annual energy but does not show hourly peaks. Hover, click legend entries or use arrow keys to inspect the charts.



Figure 18. Detailed output tables. Download a complete selected table or the dataset for the selected simulation year.

Download Selected Table exports every row of the chosen table, beyond the 100-row preview. Download Selected Year Dataset exports the selected year's outputs and archived inputs, including Energy_Checks, hourly operation, heat allocation and applied factors. Plan_Scenarios, Plan_Plant_Units and Plan_Storage record the plan overview and configured equipment. Use the scenario selector before downloading a future plant-change year. Downloads require results matching the current inputs and do not rerun calculations.

Use **Print / save PDF** to print the currently selected Results view: Compliance Outcomes, Plant Performance or Decarbonization Roadmap. To retain all three, print them separately and check

the year or scenario shown in each report. **Net energy sales margin** means heat and electricity revenue minus energy purchases. It excludes investment and non-energy operating costs, so it is not profit, LCOH or a full investment appraisal.

Read the decarbonization roadmap

Open Results → Decarbonization Roadmap to see how the heat supply associated with your planned plant changes evolves towards 2050. The timeline identifies the Current Baseline and milestones with equipment changes. Select a milestone to inspect the recorded plant snapshot; hover over a coloured area to see its heat amount and share.

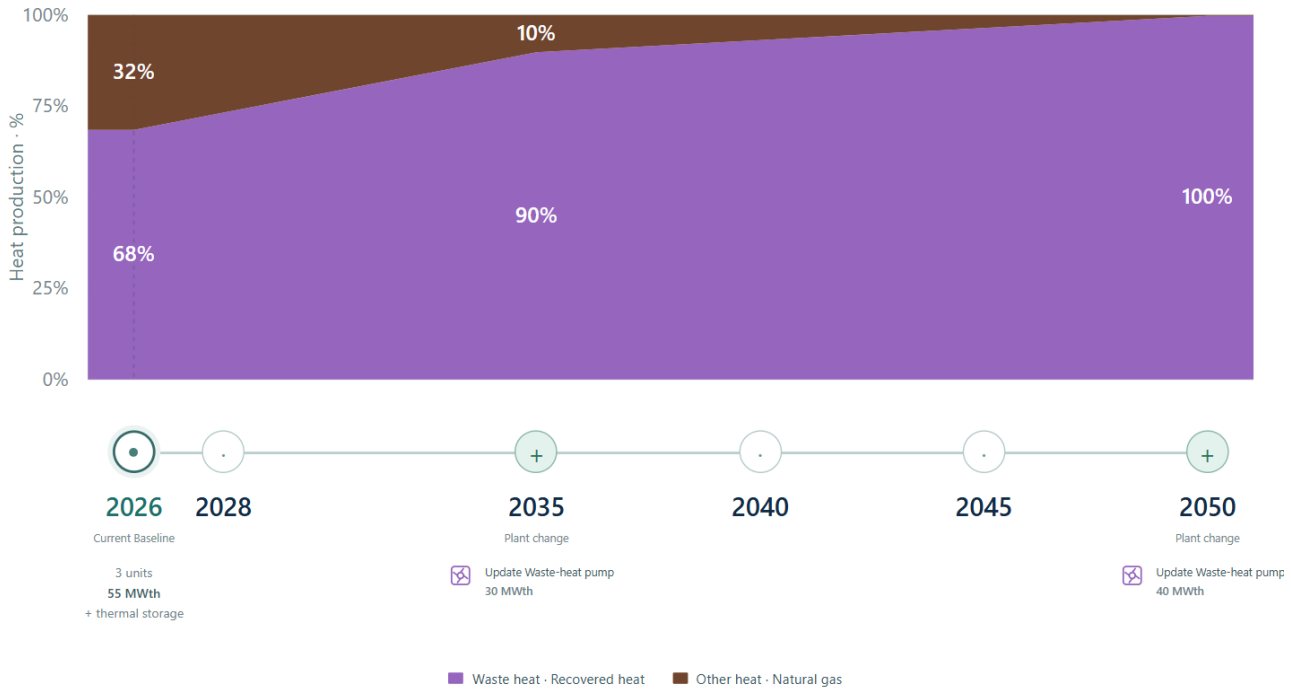


Figure 19. Decarbonization Roadmap showing indicative heat shares and planned plant-change milestones.

At the baseline and modelled plant-change dates, the chart uses the recorded production mix. Between those dates, shares are connected by straight lines according to elapsed calendar years, then held constant after the final change. These intermediate chart values are illustrative, not the separately simulated milestone results. The plant table identifies the recorded snapshot it represents; it does not interpolate equipment. Check Compliance Outcomes for the actual annual result and year-specific eligibility.

The chart assigns renewable energy and waste heat first, then the remaining cogenerated heat to HECHP or other CHP, so each MWh appears once. Accounted heat is direct network supply plus TES charging, excluding dissipated heat; storage discharge is not added again. Equivalent hours in the plant table instead use gross annual production divided by installed thermal capacity. The roadmap visualises the plan you define and does not choose investments or demonstrate that a complete transition is technically or financially feasible.

Resolve common issues and document assumptions

Table 3. Summary of solutions to common issues

What you see	What to check or do
Cannot connect to the local service	Keep the launcher/service open. Restart it and use the browser address it opens. Closing only the browser does not stop the service.
Save failed or a version conflict	Keep the page open and preserve any unsaved values. Avoid concurrent editing of the same project; reopen its latest saved state after resolving the conflict.
No matching weather or a location mismatch	Recheck coordinates and standard UTC offset. Apply PVGIS data for that point or explicitly apply suitable uploaded weather. Then Build demand.
Weather or daily-profile import rejected	Start from the downloaded template. Retain sheet names, headers and complete row counts. Do not include 29 February, duplicate hours or invalid numeric values.
Unexpected peak or flat demand	Check heat/loss units, heating dates, demand method and reference temperatures. For monthly patterns check the normalised weights. Read any zero-degree-hour fallback warning.
TES does not cycle	Check generator Charge TES permissions, SOC and power limits. For Peak shaving, mark Peak suppliers and verify forecast daytime Peak production. For arbitrage, check price spread, efficiency and available charging headroom.
Unmet demand or excessive dissipated heat	Check available capacity, maintenance periods, dependencies, minimum output, Must-run, must-take supply and storage limits. Review the affected hours in Dispatch_Hourly and Storage_Hourly. Dissipated heat is also called spillage in some detailed output columns.
Old results or disabled exports	Input edits make previous results stale. Complete pending consolidations and select Simulate again; waiting or switching tabs does not update the saved result.

Keep a reproducible assessment

Record the plan year, equipment changes, heat sales/losses, weather and demand methods, technology qualifications, operating strategies, prices with their individual variations, and emission-factor sources. Retain selected-year exports and a complete project-folder backup. Compare consistent heat bases and check **Energy_Checks**. Duplicate the project when shared assumptions must differ between plans.

Further reading

About the Tool → Background & Purpose explains the research origins and assessment framework at Politecnico di Milano within LIFE SupportDHC and the associated doctoral research. References & Resources provides regulatory documents and scientific papers; Development Team identifies contributors. This manual covers interface 0.33.0 and engine 0.16.2.