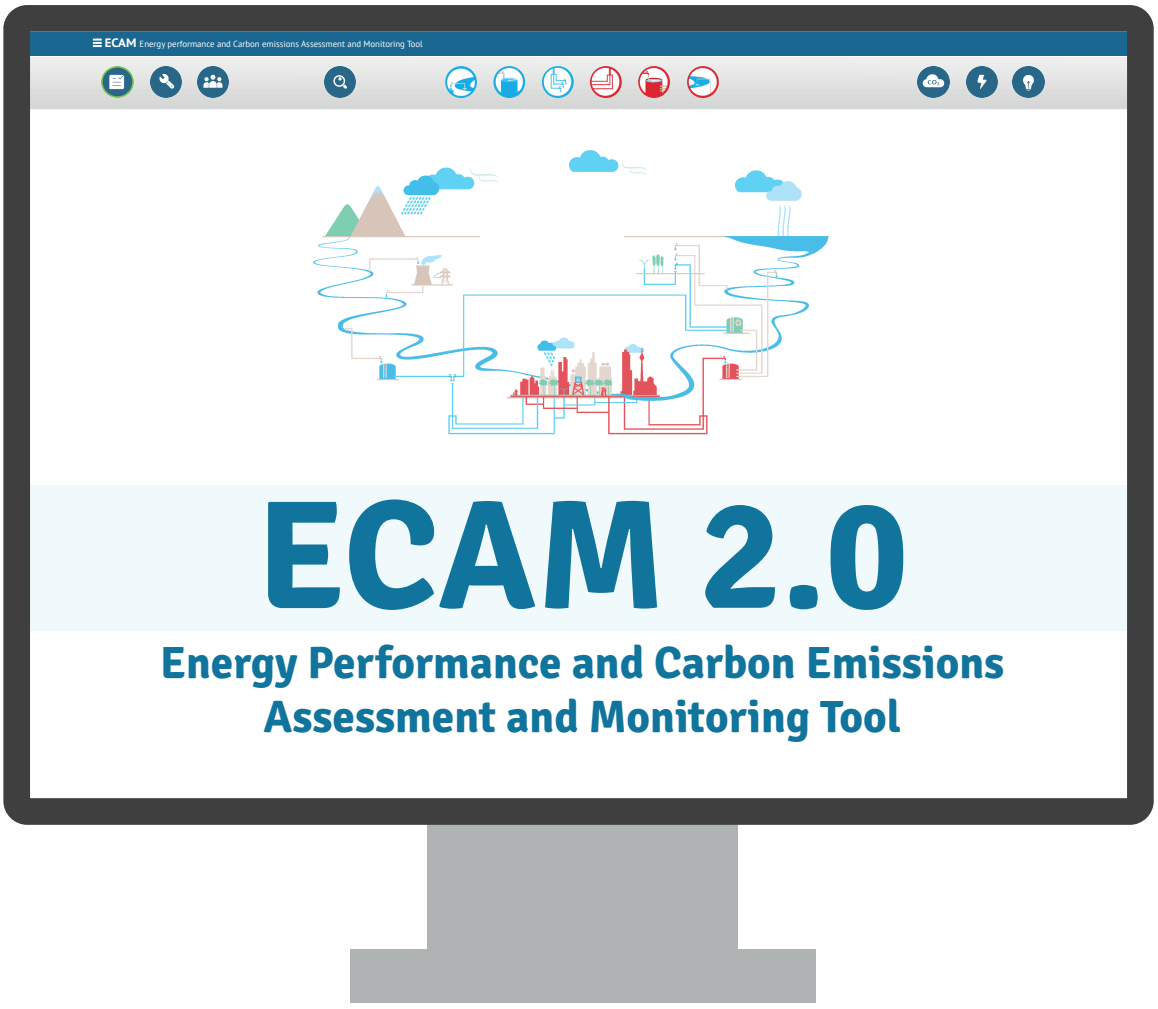
Introduction to ECAM

Carbon Footprint Assessment for Urban Water Utilities

Water and Wastewater Companies for Climate Mitigation

WaCCliM



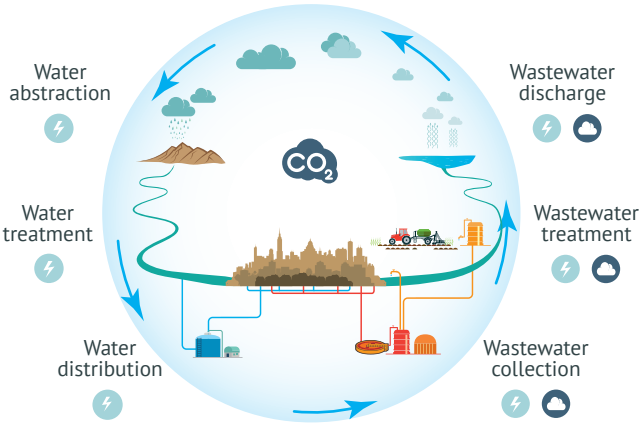
LINKING WATER AND CLIMATE
GREENHOUSE GAS REDUCTIONS IN THE WATER SECTOR

The Energy Performance and Carbon Emissions Assessment and Monitoring Tool (ECAM), enables utilities to quantify their Greenhouse Gas emissions and contributions to Nationally Determined Contributions and offers solutions for reducing emissions from energy use and wastewater management.

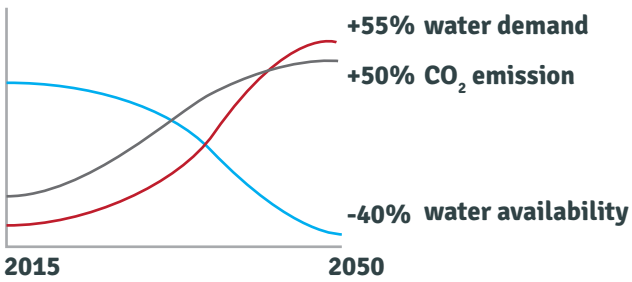
Limiting climate change to 1.5°C requires substantial reductions in Greenhouse Gas (GHG) emissions in all sectors. The urban water sector has under-recognized opportunities to reduce carbon emissions, mitigate climate change and contribute to the successful implementation of the Paris Agreement by contributing to the Nationally Determined Contributions (NDCs) of supporting countries.

Global demand for water will increase by 55% by 2050, while water availability will decrease by 40%. While the water sector has to cope with the impacts of climate change, it also contributes 3-5% of global CO_2 (emissions) from energy consumption as well as methane and nitrous oxide emissions from wastewater. If appropriate measures are not implemented in the sector, emissions could increase by at least 50%.

The Urban Water Cycle



The Water Demand is increasing



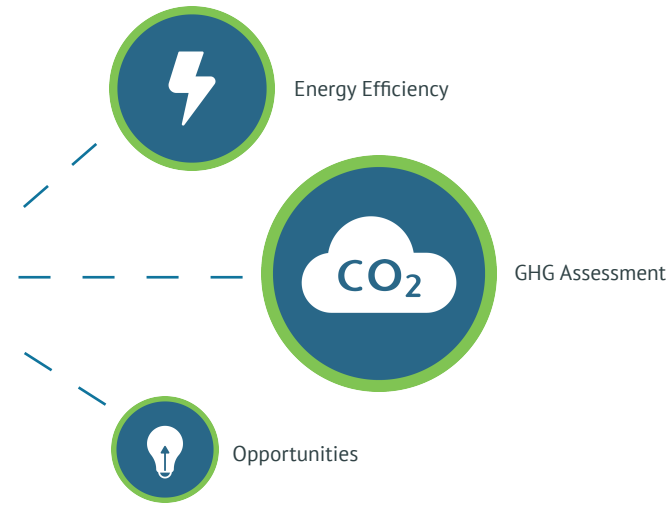
Carbon reduction measures can be achieved by working with utilities in emerging economies, where emissions are the highest due to a large portion of treated or poorly treated sewage, as well as poorly managed sewage sludge.

ECAM was developed to be consistent with the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories and peer-reviewed literature. It offers a transparent and sound approach for emission calculation within the water sector. ECAM helps link Monitoring, Reporting and Verification of mitigation actions in the water sector to the national level.

ENERGY PERFORMANCE & CARBON EMISSIONS ASSESSMENT & MONITORING TOOL

ECAM 2.0

The ECAM tool is the first of its kind. It follows an holistic approach to the urban water cycle to drive GHG emission reduction in utilities, even those with limited data availability.



What ECAM offers for water and wastewater utilities:

- **ECAM** is a tool for GHG reduction.
- **ECAM** is a tool to assess carbon footprint, energy consumption and service levels.
- **ECAM** is a tool to reduce operational costs.
- **ECAM** is a tool to strengthen performance monitoring and decision making.
- **ECAM** is a tool to develop scenarios on the future impact of GHG reduction measures.

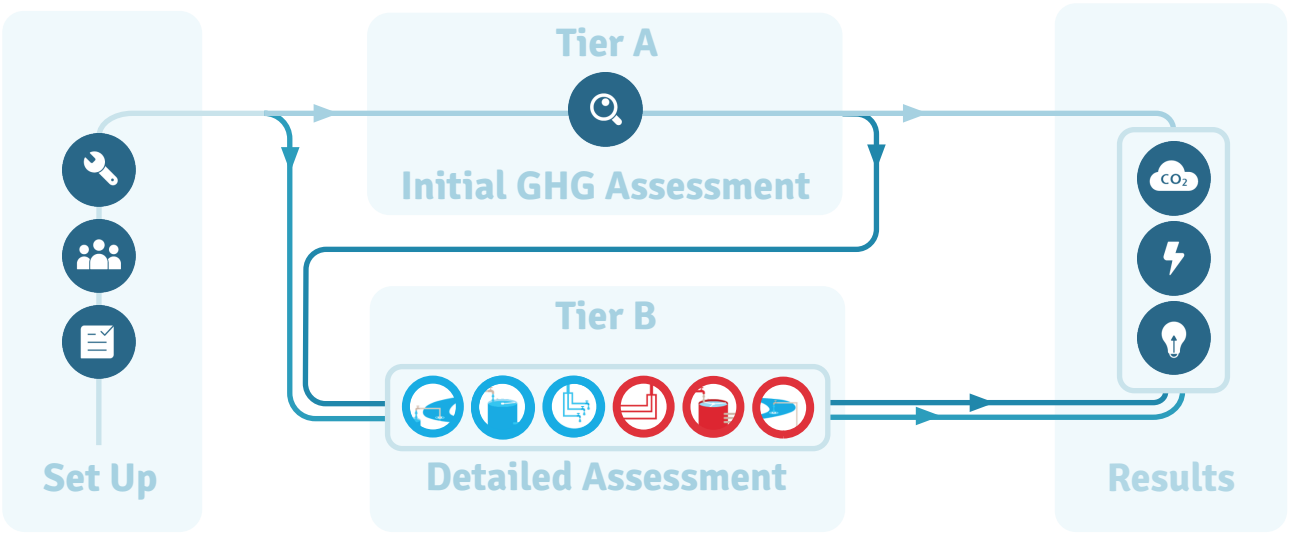
What ECAM offers for the water sector:

- **ECAM** is a tool for monitoring, reporting and verifying the water sector's GHG reduction contribution to the NDCs.
- **ECAM** only requires data typically available in utilities in developing and emerging economies.
- **ECAM** facilitates national benchmarking and knowledge exchange between utilities.

OVERVIEW OF ECAM ELEMENTS

ECAM follows a tiered approach with an increasing level of detail from Tier A to Tier B. Tier A can be used with limited data inputs for an initial assessment, Tier B with detailed data for each stage of the urban water cycle for a more accurate assessment.

Assessment Options



Description of ECAM Elements

Set Up

General Information
Enter the **assessment period**, **file name**, **currency** and if desired, make comments. The specified assessment period will affect the results that are stated per annum.

Configuration
Activate the elements of the urban water cycle that are going to be assessed. Selecting a **country** will set standard literature values for the **grid emission factor**, **annual protein consumption** and **BOD_5 loads** per person. Different global warming potentials for **CH_4** and **N_2O** can be selected by chosing the respective IPCC assessment report. Activating the option for **fuel engines** will add corresponding input fields in Tier A and Tier B.

Population
Set the numbers for **resident population** and **serviced population**; for the wastewater system, the **connected population to the sewerage** and the **population with on-site treatment**. Estimations of wastewater loadings and corresponding emissions are based on specified populations.

Initial Assessment
Use the Initial GHG Assessment (Tier A) when available data or time is limited. Tier A provides an overview of GHG emissions and energy consumption, using data readily known and accesible to utility managers and operators, and provides complementary basic assumptions.

Tier A

Tier B

Abstraction

Insert the **energy consumed** and, if available, the **volume of abstracted water**. Assessments of pump efficiency, energy production and GHG reduction potential with new pumps are optional.

Treatment

Specify the **energy consumed** and, if available, the **volume of treated water**. Pump efficiency evaluation is optional.

Distribution

Insert the **energy consumed** and, if available, the **volumes of water injected to the distribution system**, **the authorized consumption** and **billed metered consumption**. By providing a value for the different volumes of water, the fraction of water losses and non-revenue-water are calculated. Assessments of service performance, topographic energy, pump efficiency and new pumps are optional.

Collection

Enter the **energy consumed** and **volume of wastewater conveyed**. If desired, the predefined country-specific values for **BOD_5 loads** and annual **protein consumption** per person can be modified. Water efficiency, pumping efficiency and new pumps assessment is optional.

Treatment

Enter the **volume of treated wastewater**, **energy consumed**, the **treatment technology** and **BOD_5 influent** and **effluent loads**. If desired the estimated value for BOD_5 removed as sludge can be adapted. Assessment of treatment performance, pump efficiency, biogas production and valorization and sludge management is optional.

Discharge / Reuse

Specify the v**olume of discharged wastewater**, **energy consumed**, **total nitrogen in the effluent** and if applicable **volume of reused water** and the corresponding transport. Pumping efficiency assessment is optional.

Results

Greenhouse Gas Summary

See the **total emissions** and how they are distributed across the water and wastewater system and the different stages. Understand what the sources of emissions are and what their relative contribution is with the graphs. Identify to what UNFCCC (United Nations Framework Convention on Climate Change) category the emissions are attributed.

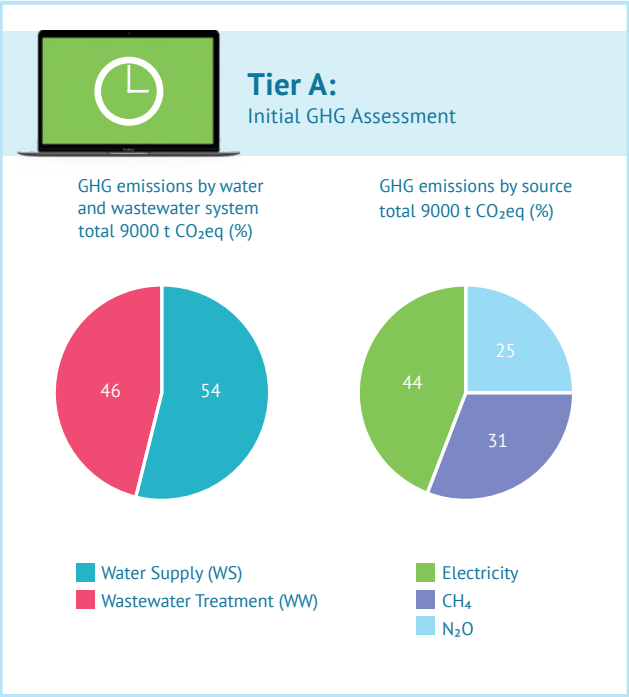
Energy Summary

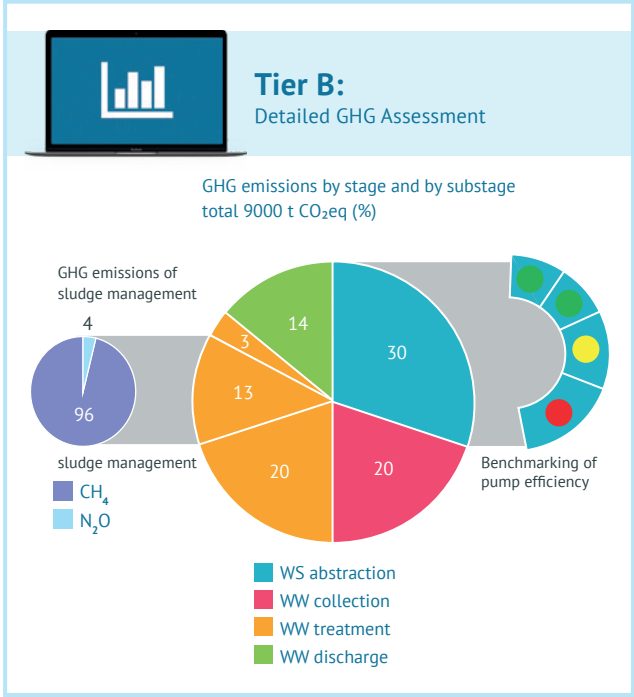
View where and how much **energy** is **consumed across the stages**, water and wastewater system and in total. If substages are assessed, their relative energy consumption can be seen.

Opportunities

Get an overview of the **potentials** and **opportunities** to reduce GHGs. The potentials are based on the proceeding assessment.

TIERED APPROACH FOR INCREASING ACCURACY





Tier A is an **Initial GHG Assessment** that helps utilities to understand their overall energy usage and total GHG emissions at system-wide level (portable water and wastewater). Tier A uses a number of assumptions that allows the user to reduce the amount of data inputs.

Tier B is a **Detailed GHG Assessment** looking at energy use and GHG emissions at the individual stage level of the urban water cycle (i.e. abstraction, drinking water treatment, distribution, collection, wastewater treatment, wastewater discharge), providing a more thorough assessment.

Main Assumptions in Tier A

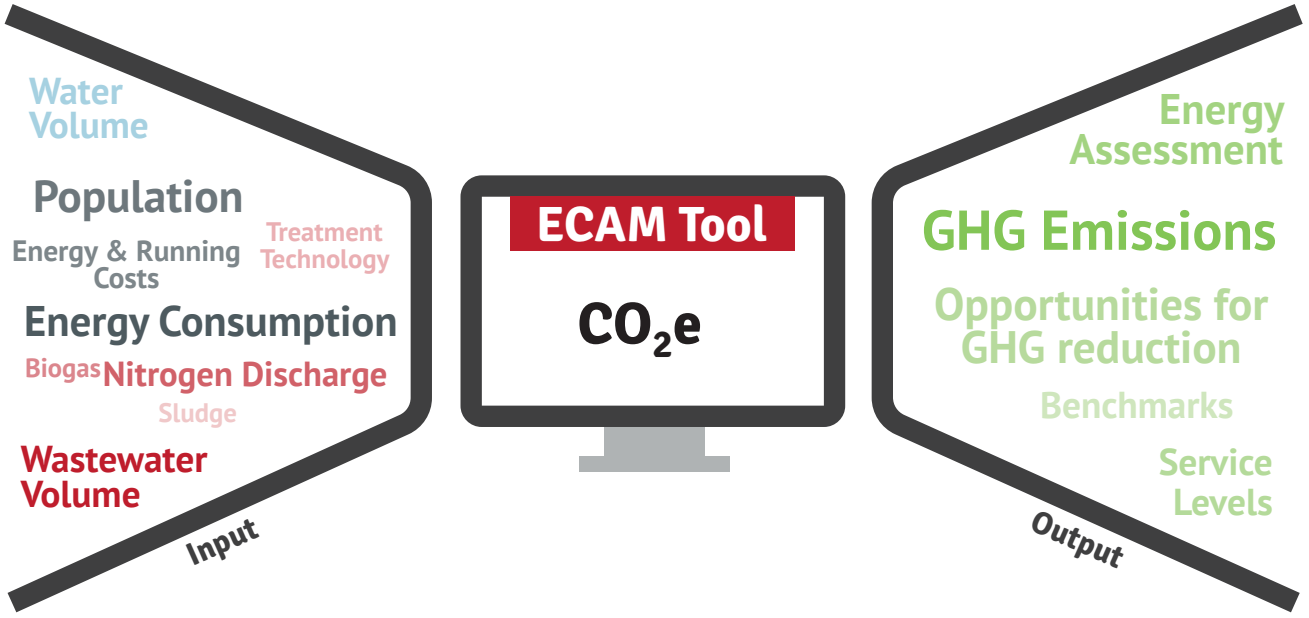
- Influent and effluent BOD_5 loads
- Mass of BOD_5 removed as sludge
- CH_4 emission factor of technology
- Mass of sludge produced
- Volume of produced biogas
- Volume of valorized biogas
- Dry weight of sludge disposed
- Temperature in fluidized bed reactor (only for sludge incineration)

Advanced Assessment in Tier B

Tier B allows the user to display additional input fields that can be optionally used for an advanced assessment. Depending on the stage, this advanced assessment includes pumping performance, the use of topographic energy, water efficiency, sludge management, treatment performance, biogas production and more.

In Tier B you will find pre-filled input fields with values based on the assumptions from Tier A. Values can be edited if more accurate data is available.

WHAT DATA IS REQUIRED?
WHAT CAN BE EXPECTED?

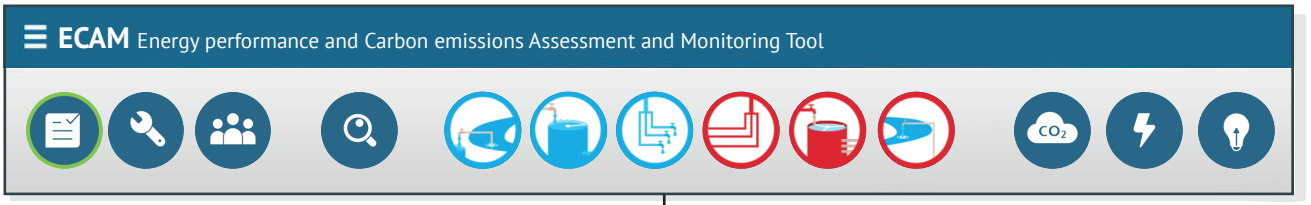


BENEFITS OF ECAM AT A GLANCE

- GHG & Energy Assessment
- Holistic Approach
- Free & Open-Source
- Monitoring
- Opportunities to improve Service

HOW TO FILL IN DATA?

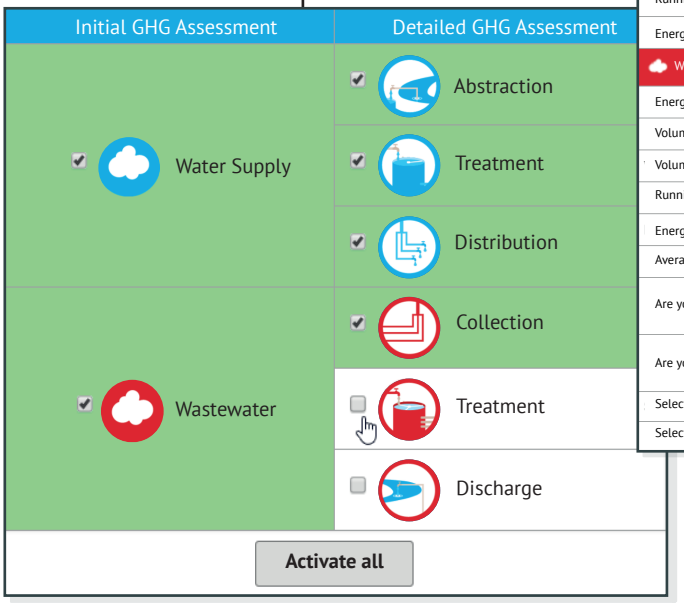
ECAM Navigation Bar

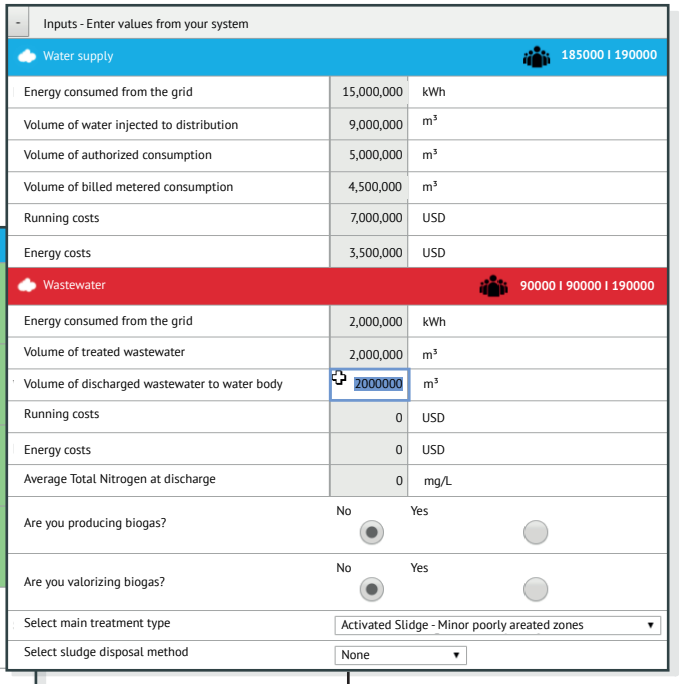


Navigate through ECAM by clicking on the icons.

Setup and Configuration of Data

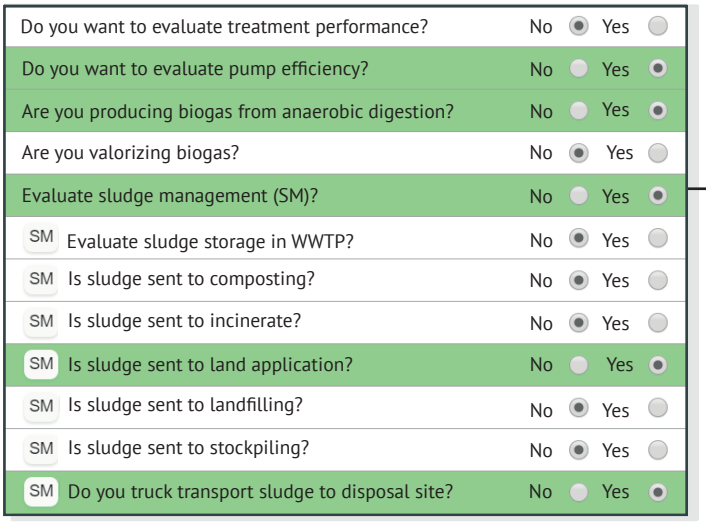
Easily set up the system boundary and conditions using graphical elements and dropdown selections.



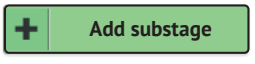


Find self explanatory input fields, tick boxes and drop down selections in Tier A and Tier B to fill in data.

Advanced Assessment

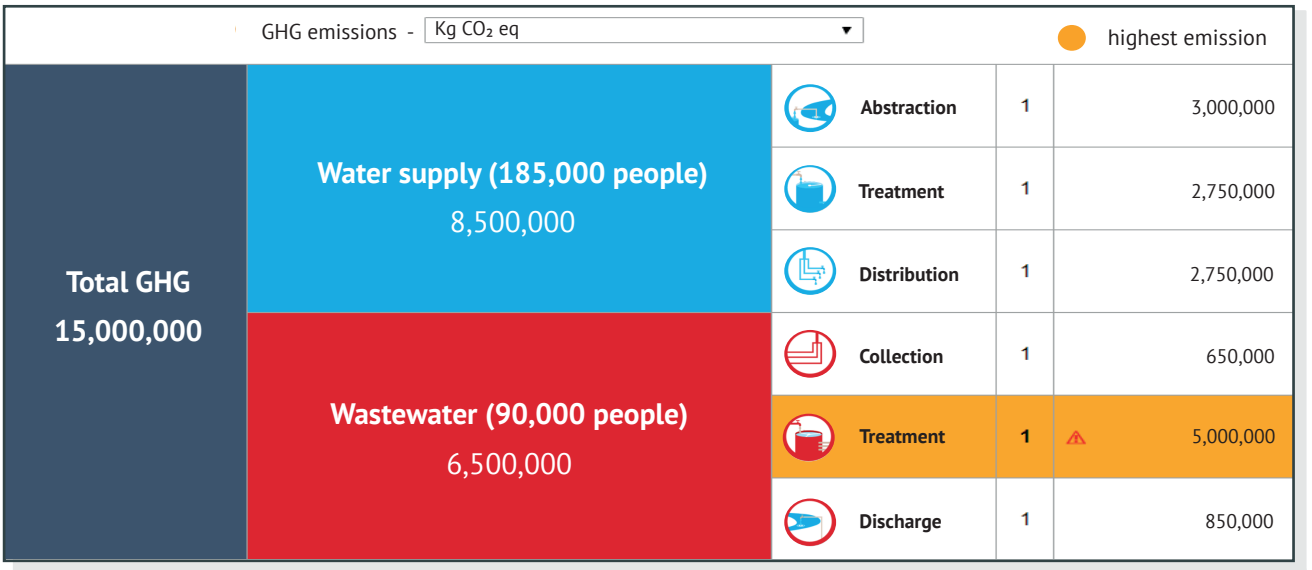


Use the advanced assessment questions to display additional input fields.



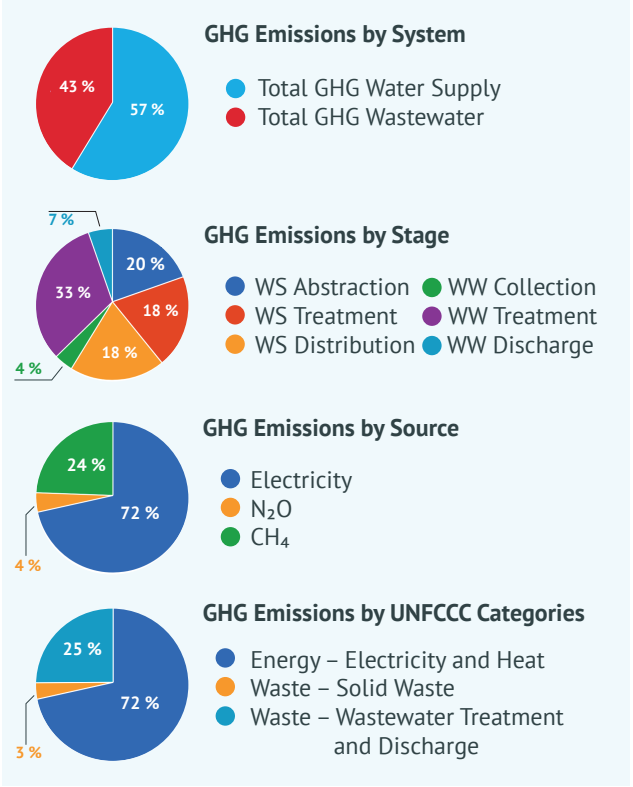
Add substages in order to seperately assess different pumping stations, treatment facilities, etc.

HOW ARE RESULTS PRESENTED?



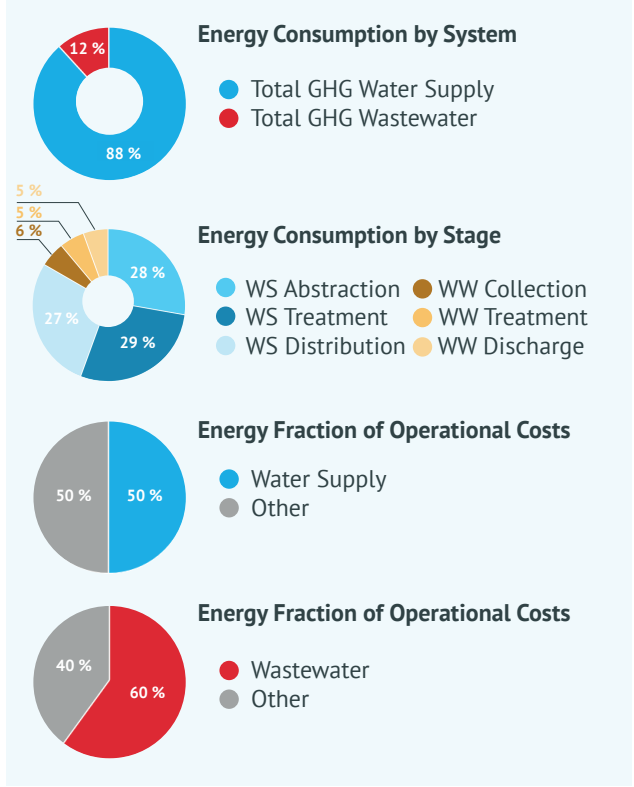
Greenhouse Gas Emissions

Sources of emissions and their distribution within the urban water cycle is shown graphically. The UNFCCC category to which the emissions are attributed is also displayed.



Energy Consumption

Where and how much energy is consumed within the urban water cycle is displayed. The contribution of energy costs to total operational costs is indicated.



Note that benchmarking results and performance indicators are shown within Tier B in the advanced assessment.

FURTHER FUNCTIONS

Work Offline...

The ECAM source code can be downloaded. To run the tool offline, you need a web server programme. Find full instructions on the ECAM help page.

Opportunities...

ECAM allows you to see where the greatest opportunities for reducing GHG emissions from various measures within the whole urban water cycle.

Understand Equations...

Click on a variable's code in Tier B to see its description, the formula to calculate it and the current value. Highlight relevant term input variables.

Export Your Data...

By going to the export page within ECAM, highlighting the desired tables and then copying them into a data spreadsheet.

MRV OF CLIMATE CHANGE MITIGATION IN THE WATER SECTOR

ECAM provides a transparent, holistic and consistent approach for monitoring, reporting and verifying mitigation in the water sector, a prerequisite for accessing climate financing.

ECAM as a Tool for MRV

Methods to measure, report and verify information differ on the level of assessment and the objective. Sometimes a variety of methods is available; for building national inventories only IPCC Guidelines are accepted internationally.

ECAM can provide the methodology for MRV of GHG emissions in the water sector, since it is mainly based on IPCC Guidelines. ECAM supports developing a national GHG inventory and can also support a facility level GHG inventory.

ECAM TRAININGS MATERIAL

Materials for Trainers

- Trainer manual
- PowerPoint slides
- Solutions for exercises
- ECAM files for exercises
- Background information
- Agendas

Materials for Participants

- Participants manual
- ECAM files for exercises
- Agendas
- Feedback forms

Training Modules

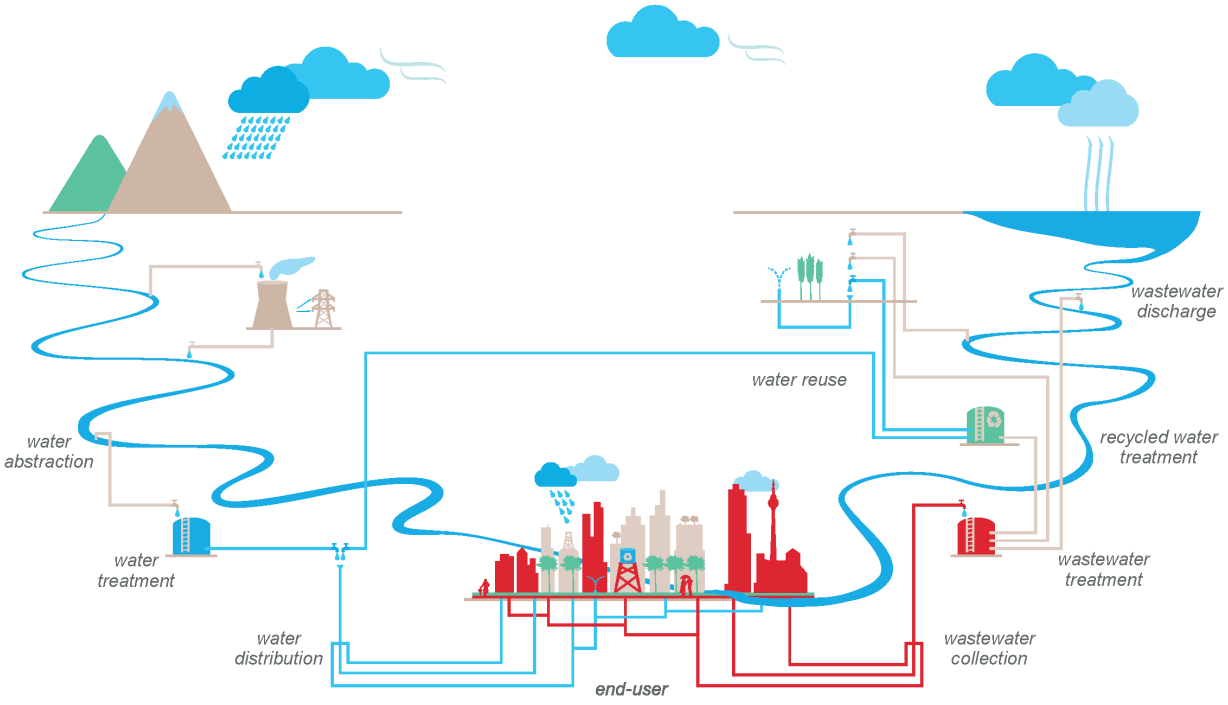
1. Introduction
2. Setting the Scene
3. Roadmap
4. ECAM Tool
5. GHG Assessment
6. Energy Assessment
7. Sludge Management
8. Opportunities
9. Bringing it all together
10. Wrap-Up and Closure

FAQ - FREQUENTLY ASKED QUESTIONS

- **Where can I find ECAM?**
  ECAM is available via www.wacclim.org/ecam
- **What is required to use ECAM?**
  Only a web browser with an internet connection is needed. ECAM is optimised for Google Chrome, but most browsers based on Chromium work well. Offline use can also be set up.
- **Do I need to register or pay in order to use ECAM?**
  ECAM is a free tool and can be accessed by anybody without the need for registration.
- **What happens with my data?**
  The input and output data are only stored temporarily in your local browser cache. You can also save the data in a .json file on your hard disk.
- **Where can I get more information?**
  Detailed documentation can be found, including a methodology guide, on the ECAM help page.

Access ECAM via:

www.wacclim.org/ecam



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On behalf of:

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