



SOLAR WATER HEATING (SWH) TECHSCOPE GHG CALCULATOR TOOL



WHAT IS THE GHG CALCULATOR?

The **Greenhouse Gas (GHG) Calculator** is an optional module integrated into the *Solar Water Heating (SWH) TechScope Market Readiness Assessment Analysis Tool*. This Excel-based evaluation tool estimates the GHG emissions avoided by installing Solar Water Heating systems in the residential sector. It is designed for use in any country and is available to download from the following link: <http://www.solarthermalworld.org/content/solar-water-heating-techscope-greenhouse-gas-ghg-reductions-calculator>

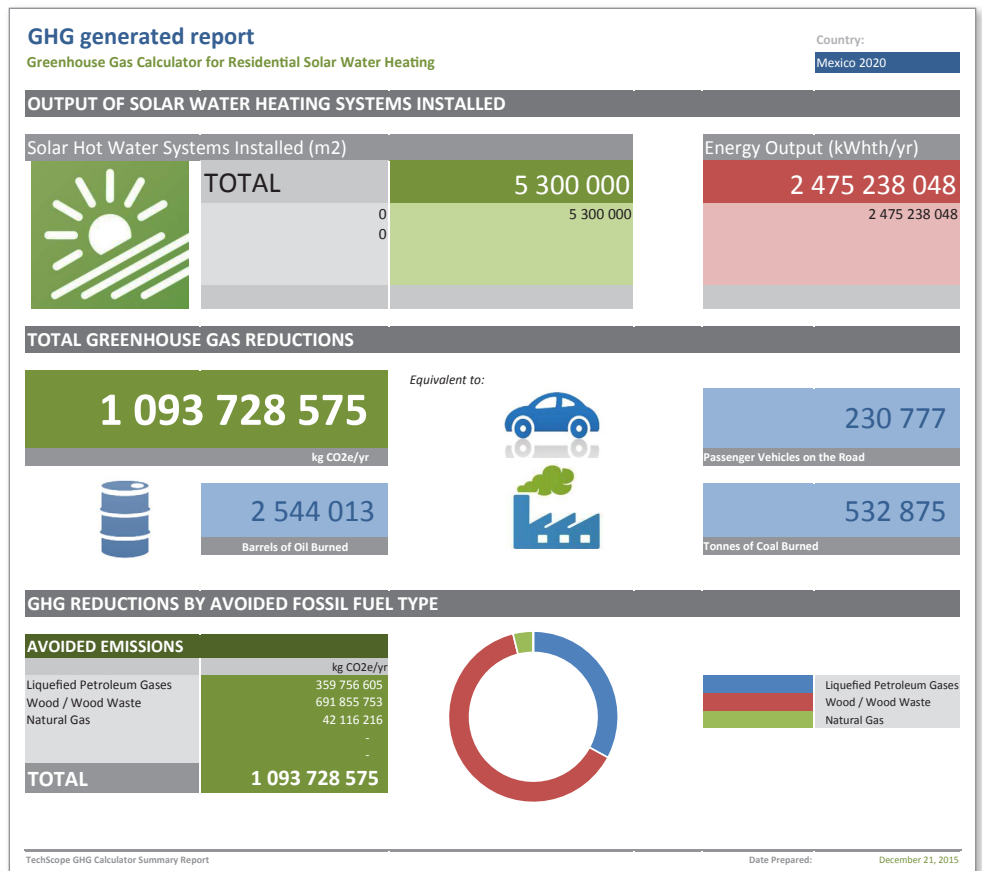
FINAL GHG GENERATED REPORT

GHG reductions for Mexico based on the expected swh market growth projections for 2020



WHAT CAN BE CALCULATED?

- GHG **emissions avoided by currently installed SWH systems** in a country or region;
- Potential GHG **emissions reductions from a single project**;
- Potential GHG **emissions reductions from a policy or programme** based on assumptions about the amount of SWH installed as a result;
- **Setting a target** quantity of SWH systems needed to reach a desired GHG emissions reduction target;



WHO CAN BENEFIT FROM THE TOOL?

The *GHG Calculator Tool* has been developed to help quantify GHG emissions reductions for single SWH projects and national programmes. It can be used as a companion tool to the *SWH TechScope Market Readiness Assessment Analysis Tool* in order to plan solar water heating market development initiatives. It can also aid policymakers in target setting, as it can be used to determine the quantity of SWH systems needed to meet a specific GHG emissions reduction target.

Although the Tool has been designed having policymakers in mind, it can be adapted to a wide variety of users interested in estimating GHG emissions.



THE FINAL GHG GENERATED REPORT

Results can be viewed in a summary sheet that provides the GHG emissions reductions as a result of the SWH installations in visual and graphic format. The information provided includes the energy output of solar water heating systems installed, the total greenhouse gas reductions in kg CO2e/year and useful equivalencies of GHG reductions in the form of passenger vehicles on the road, barrels of oil burned and tonnes of coal burned, and the GHG reductions avoided by each fossil fuel type.



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HOW DOES THE GHG CALCULATOR WORK?

The *GHG Calculator* is designed for simplicity, flexibility and scalability, as it estimates the emissions avoided by using few simple inputs and assumptions. The first set of inputs is related to the type and quantity of installed SWH system in a country. The second set of inputs is related to the type and ratio of fossil fuel-driven hot water heating systems displaced by SWH systems.

DESCRIPTION OF INPUT SHEETS

INPUT SHEET-I

In this section the user enters data to define the scale of SWH uptake for which associated GHG reductions are desired. Input sheet I requires six distinct inputs:

1. Preferred units of measurement;
2. Solar resource of the country or region;
3. Type of SWH system;
4. Average collector yield;
5. Average piping & storage losses;
6. Amount of SWH systems installed.

4A. Choose Option to Use
Option 1: Use model defaults

OPTION 1: USE MODEL DEFAULTS

4B. Select your country or region:
Mexico

| 4C. Type of SWH System(s) | 4D. Average Collector Yield (%) |
|---------------------------|---------------------------------|
| Unglazed | 25% |
| Glazed | 25% |
| | |
| | |

OR

OPTION 2: USER ENTERED DATA

| 4E. Type of SWH System(s) | 4F. Average Collector Yield (%) |
|---------------------------|---------------------------------|
| Unglazed | 26% |
| Glazed | 38% |
| | |
| | |

5 ? Average Piping & Storage Losses

| 5A. Type of SWH System | 5B. Assumed Average Pipe Losses | 5C. Assumed Average Storage Tank Losses | 5D. Total System Losses |
|------------------------|---------------------------------|---|-------------------------|
| Unglazed | 10% | 5% | 15% |
| Glazed | 10% | 5% | 15% |

INPUT SHEET-II

In this section the user enters information on the fossil fuel energy that will be replaced by the SWH systems. Using this data, the model calculates GHG emissions of avoided fossil fuel systems. The input sheet requires four inputs:

1. Type of fossil fuel used that is avoided by SWH systems;
2. Efficiency of avoided or replaced fossil fuel systems;
3. Total primary energy of avoided fossil fuel consumption;
4. Effective CO₂ emissions factors for fossil.

10 ? Total Primary Energy of Avoided Fossil Fuel Consumption

| 10A. Displaced Fossil Fuel Type | 10B. Primary Energy Use Avoided kWh/yr |
|---------------------------------|--|
| Gas/Diesel Oil | 5 067 518 |
| Natural Gas | 739 013 |
| Wood / Wood Waste | 4 750 798 |
| | - |
| | - |
| TOTAL | 10 557 328 |

11 ? Effective CO₂e Emissions Factors for Fossil Fuels

11A. Select your country or region:
Mexico

| 11B. Displaced Fossil Fuel Type | 11C. Default Effective CO ₂ e Emissions Factor (lbs CO ₂ e/kWh) | 11D. OPTIONAL: User-Entered Effective CO ₂ e Emissions Factor (lbs CO ₂ e/kWh) |
|---------------------------------|---|--|
| Gas/Diesel Oil | 0.592 | |
| Natural Gas | 0.447 | |

GHG REDUCTIONS TARGET SETTING

By completing Input Sheets-I and II user can view resulting GHG emissions reductions obtained by defining the scale of SWH installations. The SWH Goal Module does the opposite: it allows user to define the desired GHG reductions and lets the model determine the required level of SWH installations needed to meet these GHG reductions.

D i Calculate SWH Goal

Calculate SWH Goal

[Note: This function requires that Macros be enabled under Excel settings. Click this link for more information on how to enable Macros.](#)

E i Total Quantity and Output of SWH Needed to Reach SWH Goal

| E1. Type of SWH System | E2. Quantity of SWH m ² | E3. Output of SWH Systems kWh/yr |
|------------------------|------------------------------------|----------------------------------|
| Unglazed | 0 | 0.0 |
| Glazed | 0 | 0.0 |
| | 0 | 0.0 |
| | 0 | 0.0 |
| Total | | 0.0 |