FROnT tool: Frequently asked questions

Work Package 3 - Estimating RHC energy costs

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1. FREQUENTLY ASKED QUESTIONS

The overall objective of this document is to provide a basic guidance regarding some of the key aspects and assumptions of the tool and its methodology.

DISCLAIMER

The FROnT tool has been simplified to make it easy for end-users.

The calculations and results provided by the tool should be supplemented by real quotes from experts on the ground. An investment decision should not only be based on the results provided by the tool.

1. Who is the tool aimed at?

The tool is aimed, mainly, at residential consumers. The guidance and default values included in it are targeted to ease the completion of the forms by non-expert users.

However, the tool allows to carry out simulations for greater demands and systems, and therefore takes into account the commercial and industrial segments.

2. What is the main objective of the tool? What is the output of the model?

The overall objective of the tool is to assess the competitiveness of renewable energy technologies (biomass, solar thermal, air-source heat pump and ground-source heat pump) against traditional fossil fuels.

The output compares the constant cost of generating one kWh of heat/ cold over the lifetime of the renewable energy technology (this concept is known as the Levelised Cost of Heating and Cooling – LCoHC) with the LCoHC of the conventional (non-renewable) system.

Therefore, the tool aims to provide a fair and transparent methodology to compare renewable energy technologies and conventional systems, accounting not only for investment costs but for all the costs and generation associated to each system through its lifetime (LCoHC).

In addition, three financial parameters (Net Present Value, Internal Rate of Return and Simple payback) measuring the profitability of replacing the conventional system by the renewable one are provided, and the environmental impact (reduction in the consumption of energy commodities and in the emission of greenhouse gases) is analysed.

3. What are the default values based on?

The guidance and default values included in the tool are based on expert knowledge from national energy agencies and intend to serve as a basic guidance for non-expert users. However, one should note that some of the default values might vary significantly from case to

case. Therefore, one should try to replace default data by more accurate information for the specific case analysed.

4. How are taxes considered in the tool?

For private corporations, corporate taxes are considered to determine after-tax costs and depreciation tax shields.

Value Added Tax (VAT) is considered for residential consumers snd for all those who cannot compensate taxes.

5. What is included in the prices shown as default values?

Prices included as default values account for all the costs (including fixed components of price) except for VAT. VAT is added automatically by the internal calculations of the tool when the user type selected is 'person'. Therefore, any value replacing the default data should not incorporate VAT neither.

6. How are default efficiency values measured?

Default efficiency values correspond to seasonal figures.

7. What is the range of the LCoHC based on?

The range shown for both LCoHCs (renewable and reference system) is based on a sensitivity analysis that was conducted to determine the parameter with the greatest influence on the final results. A high and a low default values are considered for the most relevant parameter identified in each case, providing the range as a result.

8. What should the 'required return for investor' correspond to?

The methodology analyses costs from the perspective of the whole project (free cash flows), which should be discounted using the Weighted Average Cost of Capital (WACC). This discount rate is calculated internally based upon the inputs of the user. The required return should only correspond, therefore, to the cost of equity (i.e. the return that the investor would require to the investment).

9. How is depreciation considered in the tool?

The tool calculates tax shields (when the user type selected is 'Corporation') on the basis of straight line depreciation. The user only has to plug-in the depreciation period in years.

10. Should the initial investment and operation and maintenance costs include the price increase derived from VAT?

No, as with the default values, the tool internally considers VAT when relevant. The investment and O&M costs plugged-in should not therefore include VAT.

11. What is the difference between the technical and the economic lifetime?

The technical lifetime relates to the operation period of time of the considered renewable energy system.

The economic lifetime represents the investment horizon, that is, the horizon for which the financial parameters are calculated. As no re-investments are considered, the economic lifetime cannot exceed the technical life. Thus, by default, the economic lifetime is equal to the value inserted for the technical lifetime.

If the economic lifetime inserted is lower than the technical life, then residual value (see next question) is calculated.

12. How is the residual value defined?

If the economic lifetime is lower than the technical lifetime, the renewable system would have a determined value at the end of the investment horizon. This affects the LCoHC in different ways:

If the equipment is sold or recycled, the investor receives an inflow that increases taxable income, which reduces the LCoHC.

If the technical lifetime exceeds the economic life of the investment, the value of the generation beyond the life of the investment can be considered as an inflow equal to the expected savings, reducing the LCoHC as well.

The tool considers the second approach, estimating the residual value as the present value of the potential cash flows after the end of the investment lifetime and up to the theoretical end of its technical lifetime. The logic behind this estimation equates the residual value to the maximum price a consumer would be willing to pay for the RHC system at the end of the economic horizon.

13. Why three different results are provided for solar thermal? What do they mean?

Given that a solar thermal system's generation is subject to the availability of solar hours, a back-up system is often required to provide space heating (and in cases domestic hot water). Thus, apart from the LCoHC of the solar thermal energy, the tool displays the LCoHC of the so-called 'hybrid system', which accounts for the back-up system (i.e. solar thermal will be treated as a feedstock consumption reduction element in this case and not as a substitute).

14. How is energy demand calculated in the tool?

The tool estimates the demand from the insulation level, living area and daily DHW consumption inserted by the user.

However, more advance users can update the demand to be considered for the calculations by clicking on the link in blue below the insulation level and overwriting the demand shown.

15. What are the implications of choosing 'I do not have but I want' for an energy service?

When 'I do not have but I want' is selected for an energy service, the extra demand associated to it will only be considered for the renewable system, and not for the current (conventional) one. This would be the case, for example, of a user with an electric DHW heater installing a biomass boiler to provide DHW and heating, or the case of a user with a traditional boiler replacing the system by a ground-source heat pump providing all three energy services.

In such cases, LCoHC can be calculated using the same methodology, but financial and environmental parameters require some clarifications:

- Since financial and environmental parameters estimation are based on the difference between the reference and the renewable systems (difference in cash flows and energy commodities consumption, respectively), only comparable energy services between them should be considered.
- This isolation has been translated into a 'current demand' ratio. This ratio allows the tool to take into account only the comparable energy services between both systems. The current demand ratio is calculated as:
    - Current demand ratio = Current demand/ Total demand
- Thus, the costs and emissions associated to the renewable system are adjusted by this ratio, showing only the comparable results.
    - This explains why, for instance, the total investment shown in the calculation results is lower than the value inserted in the second step of the tool when 'I want' has been marked for any energy service

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