Tool for Rapid Economic Analysis of PV Business Models

User Guide

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Content

Purpose of this User Guide

This manual is a complement to the EU Heroes Tool for Rapid Economic Analysis of PV Business Models ('The Tool'). It provides a brief introduction to the application of The Tool, an overview of its general construction and the main Business Models (effectively revenue streams) that can be analysed. Principally it explains the key terms used within The Tool and defines what is expected of the user at each of the input prompts.

Disclaimer

The EU Heroes Tool for Rapid Economic Analysis of PV Business Models ('The Tool') is intended to help community groups understand the potential viability of their community photovoltaic project. It is designed for very early-stage feasibility and scenario testing only. It should **NOT** be relied upon as the sole basis of community investments or other financial decisions.

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Glossary

In the context of The Tool, the terms tabulated below have the following meanings:

Term	Units	Definition
Annual Consumption	kWh	The annual electricity consumption of the site to which the PV system is attached. E.g. this may be the total annual electricity consumption of one or more buildings. *[See also section 2.1.2 below]*
Annual Degradation	%	The expected annual reduction in system performance due to natural ageing of the plant. *[Refer particularly to PV module manufacturers' product specification]*
CAPEX	Currency	The initial (up-front) costs to fully develop the project to the point of commissioning (including connection to the grid, where applicable).
Cost of Debt	%	The annual lending interest rate as a percentage of the initial loan. Typically this is the bank interest rate.
Cost of Equity	%	The annual return expected to be paid to equity investors for the financial risk undertaken, as a percentage of the initial investment.
Currency	EUR, GBP or PLN	The three currencies 'supported' in the EU Heroes model relate to the currencies of the seven countries participating in the project.
Debt	Currency	A financial loan, typically provided by a commercial or development bank. *[See also section 2.2.3 below]*
Direct Consumption Component	%	The proportion of electricity produced that is consumed directly on site. *[Applies to Net Metering business model]*
Equity	Currency	A financial investment made in exchange for a stake in the project. Typically provided by one or more shareholders. *[See also section 2.2.3 below]*
Excess Electricity Component	%	The proportion of electricity produced which is exported and metered as energy credits, but which is not claimed back within the balancing period. They are remunerated at the end of the balancing period *[Applies to Net Metering business model]*
Feed-in-Tariff Component	%	The proportion of PV electricity produced that is subject to a feed-in tariff agreement
Installation Lifetime	years	Duration for which the PV plant is expected to be operational

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Investment Subsidy	Currency	Monetary value of all up-front grants which effectively reduce the project cost burden. May also include the value of any in-kind contributions for services or equipment.
Net-Metering Credits Component	%	The proportion of PV electricity produced under a net-metering agreement that is fed into the grid and registered as a credit on the account
Net-Metering Component	%	The proportion of PV electricity produced that is subject to a net-metering agreement
OPEX	Currency	The annualised costs of operating the PV plant
PPA		Power Purchase Agreement
PPA Component	%	The proportion of PV electricity produced that is subject to a PPA
PPA Supply Rate	%	amount of energy compromised to be sold as a PPA
Principal	Currency	The project finance (loan) value, excluding any interest
Self-Consumption		The direct use of the electricity generated by the PV system to meet some or all on-site electrical consumption. *[See also section 2.1.2 below]*
Self-consumption Component	%	The proportion of the total electricity generated by the PV plant that is consumed directly on site (%)
Specific System Cost	Currency/kWp	The initial investment cost per kW of installed system capacity *[See also section 2.2 below]*
Specific System Yield	kWh/kWp	The annual electricity production of the PV system per kW of installed system capacity
Tenure	years	The period or term of the debt
WACC	%	Weighted Average Cost of Capital. A composite project finance rate determined from the relative contributions of the Cost of Debt and Cost of Equity.

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1 About the Tool

This financial modelling tool has been created to allow community groups to quickly undertake economic analyses of potential community PV projects and to explore some of the options that can influence the viability of such projects.

To determine the project financial performance, The Tool makes cash flow projections based on the annual project revenue against the annualised project costs.

- On the revenue side, the tool requires the user to provide information on the expected generation of the system and the monetary value of that electricity, for example what price will be paid for sale of electricity.
- On the costs side, the user must provide information on the initial capital cost (CAPEX) of the equipment and works, the expected annual operating costs (OPEX) and the composition of the initial project finance (debt & equity).

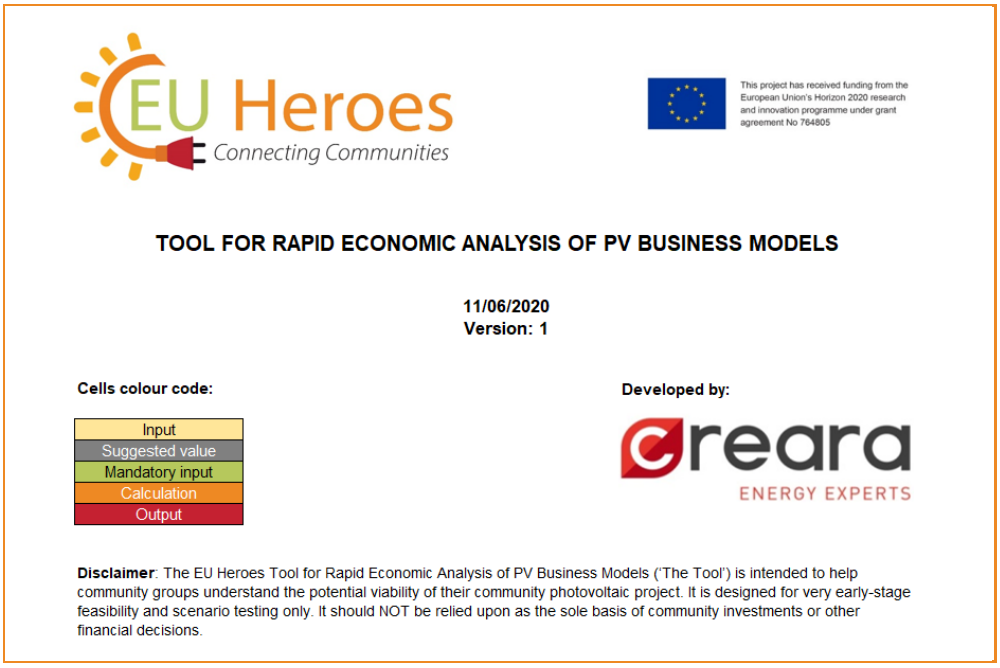
The Tool does NOT directly offer the facility to design a solar PV system. Likewise, it does NOT directly enable the direct estimation of PV system performance. (For more advice on this, please see *Appendix 1: Determining PV System Generation*, below).

However, given a few basic input parameters, it can be used to perform a 'first-pass' analysis of potential project viability, depending on the 'business model' adopted.

The outputs of the tool include a high-level financial analysis and an assessment of the project's potential impact on the electricity grid.

The Tool was developed to meet the needs of seven quite diverse European countries. As such, not all business models are directly relevant in every country.

Figure 1 – Cover of the HEROES Financial Model


EU Heroes Connecting Communities

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TOOL FOR RAPID ECONOMIC ANALYSIS OF PV BUSINESS MODELS

11/06/2020
Version: 1

Cells colour code:

Input
Suggested value
Mandatory input
Calculation
Output

Developed by:

Creara ENERGY EXPERTS

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2 Preparation

Do familiarise yourself with your own project and undertake some background research in preparation for using the model.

As with most models, the accuracy of the input data is generally reflected in the reliability of the outputs. (In other words: If you put garbage in you will probably get garbage out). If you can spend some time considering and gathering the relevant data inputs as outlined below, you should see more refined results and improve the value of the tool.

Appendix 2: Data Gathering Template is provided to assist in this.

2.1 Revenue Factors

As noted previously, the key determinants of the project revenue stream are the system generation performance and the monetary value of that generation.

2.1.1 PV System performance (generation)

PV system performance is driven by the amount of light that can be usefully harnessed by the PV modules and converted to electrical energy. This varies during the course of the day and throughout the course of the year, but it is still possible to make reasonably well-informed estimates of the likely system performance over time based on a few key inputs.

For solar PV installations, the key parameters governing the production of the system are:

- Location
- Panel orientation ('azimuth') and inclination (slope)
- Shading
- System size

The EU Heroes Tool was not conceived to be a system design tool and it is not possible to calculate likely system performance directly within the tool. However a number of reliable tools do exist for precisely this purpose.

TIP A quick, simple and reliable estimate of system performance can be performed using the The European Commission Joint Research Centre's Interactive Photovoltaic Geographical Information System (PVGIS). Please see *Appendix 1: Determining PV System Generation* below for further information.

2.1.2 General electrical configuration and 'on-site' electrical consumption

It is not necessary to have a detailed electrical design of the proposed PV system in order to use the EU Heroes Tool. However it is helpful to have an appreciation in general terms of how the electricity generated by the system might be used, since the 'overlap' between when the PV system typically generates electricity and when the site typically consumes electricity can have a significant bearing on the value of the PV electricity.

For larger PV systems with a ground-mounted PV array, the power produced by the system is likely to feed directly into the local electricity distribution network. There will typically be very little 'self-consumption' of the electricity generated by the PV system in such a configuration. Depending on the model for selling/buying the PV generated power, the electricity produced may receive a fixed payment for every unit of electricity supplied to the grid. For large systems there may be a variable payment for the electricity supplied to the grid determined by the bulk power purchase price at the time of production. Please note that this financial model does not currently support the analysis of time-of-production variable revenue.

Some plants may be contracted to supply all of the electrical output of the system to a specific end-user, site or application. There may be a dedicated electrical connection between the PV system and the user. This is normally known as a 'private wire' arrangement. Typically a 'Power Purchase Agreement' will exist between the generator (PV system owner) and the customer (end-user). The PPA will typically define the amount of electricity that will be taken, the price that will be paid for that electricity and any variations in price or penalties that may apply for over supply or under supply.

PV systems ranging from a few kW to several MW may be installed on a building (or on the same site as a building or other captive demand). In some countries, the PV system can be connected on the customer's side of the electricity meter. This allows the electricity generated on site to be used in preference to electricity purchased from the grid. If the instantaneous generation exceeds the total on-site demand, excess production may be exported to the grid, or (increasingly) may be stored on-site in a battery or some other form[1] for later use.

Where the PV system is directly supplying a building(s), the financial viability of the project may be influenced by the amount of electricity that can be directly used on site. This in turn is broadly influenced by the building type of use and the electrical demand (consumption) profile. The EU Heroes financial analysis tool incorporates some capability to analyse the value of this 'self-consumption'. The Tool contains some pre-installed profiles for electrical energy consumption of different types of building by country and region. Additionally, there are generic generation profiles installed for each country and region. Overlaying these allows generation to consumption profile matching and offers an indication of the self-consumption potential.

TIP For improved results, it is also possible for users to manually load more site-specific generation and consumption profiles where these are known (for example from monitored consumption data). Please refer to sections 4.2 and 4.3 below for more information.

2.1.3 Business Model Scheme

The Business Models (revenue models) that can be explored with the EU Heroes Tool build on those defined under the EU PV Financing project[2], which aimed to remove the barriers and identify new avenues for photovoltaic market development. The project was fully supported under Horizon 2020 from the EU H2020 project.

The main business models covered by this Tool are:

- Self-consumption
- Feed-in Tariff (FiT)
- Net-metering
- Power Purchase Agreement (PPA).

The business models can each be analysed individually or several combined to form an aggregate model.

[1] For example, non-electrical energy storage applications include heating water, or charging heat batteries for hot water supply or space-heating purposes.
[2] Further information on the project and the PV Financing tools can be found at: http://www.pv-financing.eu/tools/

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The tool also offers the opportunity to analyse various complementary technologies and measures, notably battery storage or demand side management measures, which could potentially enhance the business case.

Self-Consumption

i.e. using the generated electricity directly, to meet some or all on-site electrical consumption.

The tool includes some generic data relating particularly to typical consumption profiles of different building types (e.g. residential, commercial, public, industrial). This can be used to quickly help determine an indicative self-consumption figure in the absence of actual detailed site-specific information.

Feed-in Tariffs

In many countries the Feed-in Tariff (FIT) has been adopted as a key support measure for PV sector market development. Typically PV system owners are paid for the electricity that they supply – i.e. feed in – to the electricity grid. This tends to be at the distribution network level, and the arrangement is particularly relevant for relatively small-scale PV systems, typically on buildings.

Certain national FIT models may allow the direct on-site consumption of part of the generated electricity, with the FIT payment only applicable to the balance of generation that is 'exported' to the grid.

This is generally no longer relevant in the UK.

Net-metering

Net-metering is particularly applicable for smaller scale PV systems, typically attached to a building or other on-site direct load. A meter that allows bi-directional registration of electricity flows is required. As the name implies, the quantity of electricity exported from the site of generation to the grid is deducted ('netted-off') the total imported electricity. It may therefore be considered a form of 'virtual' short- to medium-term energy storage; the monetary value of electricity exported is normally recognised as the same as the price of electricity purchased from the grid. There may however be certain balancing or use of service charges imposed.

Net-metering is not generally applicable to the UK at present.

Power Purchase Agreements

The PPA model generally relates to a long-term contract to generate electricity for a specific customer at an agreed purchase price.

There may be 'penalties' for failure to deliver as much electricity as predicted (for example if there is a minimum performance guarantee), and/or a different purchase price (normally lower) for electricity supplied exceeding the contracted amount.

The PPA model could be adapted to reflect the UK's Smart Export Guarantee.

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2.2 Cost Factors

As previously noted, the key determinants of project costs are the initial capital cost (CAPEX) of the equipment and works, the expected annual plant operating costs (OPEX) and the composition of the initial project finance (debt & equity).

2.2.1 CAPEX

The project development costs through to installation and system commissioning constitute the Initial Investment (CAPEX). This principally encompasses:

- site investigation and preparation (for example ground levelling, foundations, trenching for cables);
- grid connection costs
- hardware such as the photovoltaic modules, inverters, mounting structure (frame), cables and connectors, electrical switchgear and protection, meters, monitoring and communication equipment as well as the enclosures, containers or buildings that may be needed to house some components
- project management and installation services

The cost of the power generating equipment and the installation labour can normally be fairly well estimated by comparing costs of recent similar scale projects. Note that grid-connection and site preparation costs can vary significantly from site to site.

TIP If indicative site-specific data can be obtained in advance, that may enhance the reliability of the financial outputs. However, some 'what-if' testing can be performed with the tool through the sensitivity analysis selections.

2.2.2 OPEX

Ongoing operation and maintenance (OPEX) costs might include:

- landowner fees (site rental)
- scheduled servicing and maintenance allowance
- insurances
- data plans (for remote communications and control)
- site security

TIP Opex costs can normally be fairly well estimated by comparing costs of recent similar scale projects. Some 'what-if' testing can be performed with the tool through the sensitivity analysis selections.

Note that it is not directly possible to include additional mid-life capital expenditure (for example scheduled inverter replacement) within the tool. Instead please adjust your OPEX figure to reflect the annualised cost of intermittent scheduled replacement costs.

2.2.3 Funding Scheme

The composition of project capital has an important bearing on the project's financial performance.

Debt

Invariably commercial debt (loan) finance will require the project to demonstrate that it can service the regular debt repayments. Repayments will normally be monthly. The repayment amount will depend on the initial loan value, the duration of the debt (i.e. the 'term' or 'tenure') and the interest rate.

Commercial lenders (including development finance, which may be available at somewhat lower rates of interest than true commercial loans) will additionally check to ensure that the project generates enough surplus to comfortably meet the repayment schedule. This is generally known as the Debt Service Coverage Ratio (DSCR). Please note that DSCR is NOT directly determined within the EU Heroes tool.

Equity

Project equity relates to financial investments for which the investor takes a stake in the project. In start-up project finance this can be more risky for the investor, but with the potential for greater reward in future (for example an innovative product or service could be sold at some point in the future yielding additional returns for stakeholders).

For community energy projects, investors are frequently individuals or groups (often within the general geographic area of the project) that may have some degree of altruistic intent motivating their investment in a project. For example, they may have some expectation that the project will generate a long-term revenue stream for re-investment in other local community initiatives or services. Community equity investors are generally therefore willing to accept a somewhat lower return on their long-term investment than would commercial debt (or conventional equity) finance providers. This should translate to greater retained community value, though there may be certain additional ongoing costs in administering equity investments.

The EU Heroes financial analysis tool allows users to explore the general effects of debt finance versus (or in combination with) equity investment.

The user can specify the debt amount (Currency), tenure (years) and annual cost of debt (i.e. annual Interest rate, %). The Equity component is automatically calculated from the initial investment cost less the debt amount. The cost of equity can be specified by the user.

TIP Sensitivity analyses of the adjusting the debt finance proportion can be easily performed within the tool. Assuming other factors remain unchanged, this will reattribute the balance of finance to equity, enabling a quick comparison of debt Vs equity composition on the overall project performance.

3 The Tool – General Overview

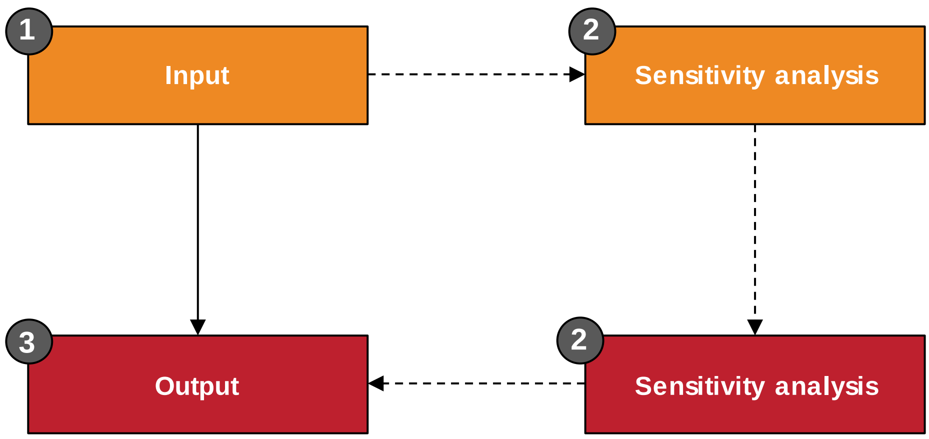
3.1 Tool workflow

The tool is composed of five steps that relate to five main tabs: 'Input', 'Consumption profile', 'Generation profile', 'Sensitivity analysis' and 'Output'.

First, the user inserts the information relating the PV project in the 'Input' tab (step 1), and the installation's consumption and generation profile on the 'Consumption profile' and 'Generation profile' tabs. Based on these inputs, the outcomes of the internal calculations are shown in the 'Output' tab (step 3).

The usefulness of the 'Sensitivity analysis' tab (step 2) is twofold: first, it allows the user to modify some of the key parameters for the calculations, such as the electricity and operating costs escalation (step 1), and second, it also enables the user to perform scenario analysis (step 3). For more detailed information on the 'Sensitivity analysis' tab please refer to section 4.4. The figure below shows the workflow of the model and how the main tabs are related:

Figure 2 – Workflow of the model



3.2 Colour codes

The tabs of the tool are set in accordance to the following colour code:

- Tabs in **orange** correspond to input tabs
- Tabs in **red** correspond to output tabs

The cells within each tab also follow a colour code:

- Cells in **yellow** correspond to user input cells
- Cells in **grey** correspond to suggested values for some of the user inputs
- Cells in **green** correspond to mandatory input
- Cells in **orange** correspond to automatic calculation cells
- Cells in **red** correspond to sensitivity analysis cells (see section 4.4)

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Important Note on VAT Treatment

Within the EU Heroes Tool, the decision as to whether Value Added Tax (VAT) should be included depends principally on the VAT status of the project owner:

- If the owner is registered to reclaim VAT, then relevant inputs should generally use values excluding VAT (this applies for all costs and all revenues)
- If the owner cannot reclaim VAT the input values entered should include VAT.

At certain points, various input parameters apparently require the VAT rate to be specified. These are:

- Self Consumption Electricity price
- Net Metering Electricity Tariff (direct consumption)
- Net Metering Electricity Tariff (net-meter credits)

The decision as to whether VAT should be included remains similar on the consumption (revenue) side:

- If the owner would normally reclaim VAT then they should enter a value of 0 (zero) against the VAT inputs.
- If the organisation is not VAT registered, then the relevant VAT rate should be included.

In this way, for the purposes of modelling the simple year-on-year project cash flows, the costs and revenue sides will receive the same VAT treatment.

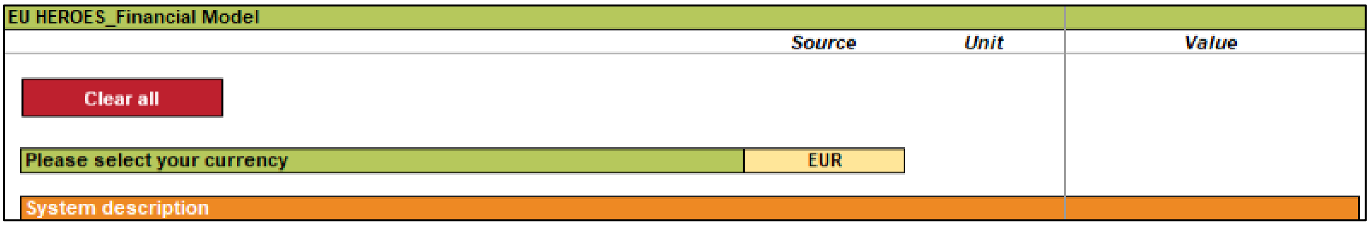
Please note, however, this does not imply that project development costs or revenues will not be subject to VAT! More detailed financial analysis should be undertaken in order to explore the implications of VAT on short-term project cash-flows.

4 Operating the tool – Worksheets (tabs)

4.1 Input

The input sheet of the Tool is divided into four subsections, as detailed below. Near the top left corner of the tab is a ‘Clear all’ button which quickly removes any user content previously entered on the sheet. A currency selection dropdown list allows results to be presented in EUR, GBP or PLN (the currencies of the seven HEROES countries). Note that this is purely for display and reporting purposes and does not perform any currency conversion function.

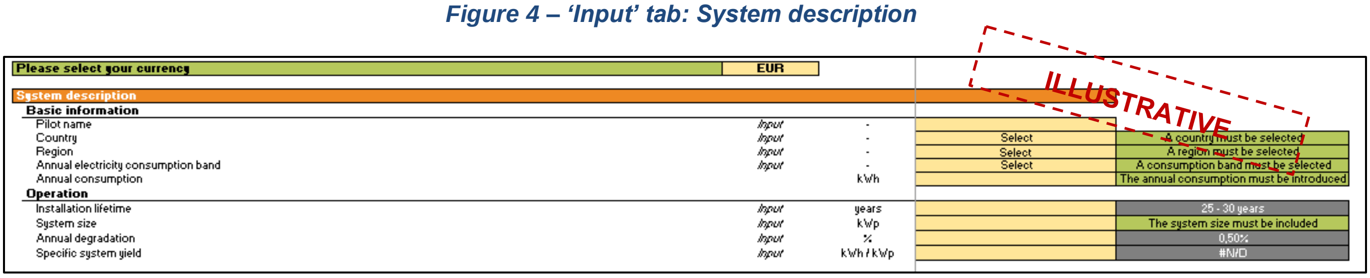
Figure 3 – Clear all and currency selection



4.1.1 System description

The first subsection of the *Input* Tab compiles basic information about the PV project to be analysed, such as location, electricity consumption or size of the PV system:

Figure 4 – ‘Input’ tab: System description



- Pilot name
  - *User defined identifier*
- Country
  - The seven HEROES countries. *User selection from a dropdown list* .
    This is used to help define ‘typical’ generation and consumption profiles
- Region
  - Geographical regions within the selected country. *User selection from a dropdown list*
    This is used to further refine ‘typical’ generation and consumption profiles in the absence of site-specific data.

- Annual electricity consumption band[3]
  - This input (*User selection from a dropdown list)* is purely used to offer suggested 'typical' electricity prices for the level of consumption and the selected country. This is reflected elsewhere on the worksheet.
- Annual electricity consumption (kWh)
  - The annual electricity consumption of the site to which the PV system is attached.
    This is a parameter in determining the overall consumption. The consumption profile in combination with the generation profile will help match consumption to generation and determine the self-consumption element.
- Installation lifetime (years)
  - The expected operational life of the system. Also taken as the duration of the project. *User defined* (a default value is suggested).
- System size (kWp)
  - The rated generation capacity of the PV system.
    This is used in combination with specific system yield and specific system cost data to calculate the total project annual production / total project cost.
- Annual degradation (%)
  - The annual rate of reduction of system performance. *User defined* (a default value is suggested).
    This is used to modify (reduce) the amount of expected electricity generation year-on-year, which in combination with the monetary value per unit of the electricity produced determines year on year revenues.
- Specific system yield (kWh/ kWp)
  - In the absence of more site-specific information, a default value is suggested based on the country & region selected[4].
    Refer to *Appendix 1: Determining PV System Generation* for further information.

[3] The reference electricity consumption bands included in the model correspond to Eurostat's classification
[4] Regional system yield values have been obtained from the PV GIS estimation tool of the European Commission. See: http://re.jrc.ec.europa.eu/pvg_tools/en/tools.html

4.1.2 System cost

The second subsection of the *Input* Tab compiles information relating to the investment and operating costs of the PV project:

Figure 5 – 'Input tab': System cost

ILLUSTRATIVE

System cost				
Initial investment costs (CAPEX)				
Specific system cost	*Input*	EUR / kWp	1,250	
Total system cost	*Calc*	EUR	25,000	
Investment subsidy (if any)	*Input*	EUR	0	
Applied system cost (scenario-based)	*Calc*	EUR	25,000	
Operation and maintenance costs (OPEX)				
Fixed annual OPEX	*Input*	EUR / year	150	250
Variable annual OPEX (relative to generated energy)	*Input*	EUR / kWh	0.00	
Cost escalation (annual) (scenario-based)	*Input*	%	0.5%	
Other costs (e.g. annual land lease, insurance, software)	*Input*	EUR / year	600	

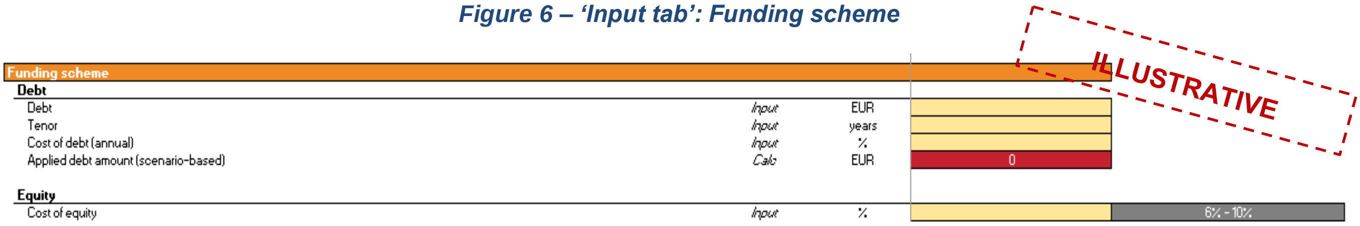
- Specific system cost (Currency/kWp)
  - Please refer to section 2.2.1 for further help with this item.
    This is used in combination with the system size input to calculate the Total System Cost.
- Total System Cost (Currency)
  - *Internal calculation of the tool* (from System Size and Specific System Cost).
    This is used to determine the total project finance required (and in combination with the Debt amount to determine the project Equity amount).
- Investment subsidy (Currency)
  - Monetary value of all up-front grants which effectively reduce the project finance requirement.
    This is deducted from the Total System Cost to modify the amount of Debt and Equity required to finance the project.
- Applied system cost (Currency)
  - System Cost is one of the sensitivity analysis parameters. This enables the user to rapidly test the project financial performance by adjusting the system cost amount.
    This cell shows the actual System Cost that is being applied by the model for the cash flow calculations.
    User defined from the Sensitivity Analysis tab. See section 4.4 for more information.
- Fixed annual OPEX (Currency/year)
  - *User defined* for which guidance is provided.
    See section 2.2.2 above for further assistance.
- Variable annual OPEX (Currency/kWh)
  - This relates to Operating costs which are proportional to the amount of electricity produced by the system, for example metering or network use of service charges in some jurisdictions.
- Cost escalation (%)
  - This is driven from the *Sensitivity Analysis* tab. See section 4.4.
    The expected annual increase in operating costs (above inflation)

- Other costs (e.g. land lease, insurance, software) (Currency/year)
  - For transparency, it may be preferable to define certain operating costs here. They are combined with and treated in the same way as the Fixed Annual OPEX above.
    See section 2.2.2 above for further assistance.

4.1.3 Funding scheme

In this subsection of the model the user inserts the most relevant information with regards to the funding of the project, i.e the debt and equity parameters:

Figure 6 – 'Input tab': Funding scheme



Funding scheme			
Debt			
Debt	Input	EUR	
Tenor	Input	years	
Cost of debt (annual)	Input	%	
Applied debt amount (scenario-based)	Calc	EUR	0
Equity			
Cost of equity	Input	%	6% - 10%

- Debt (Currency)
  - The principal (loan) value, excluding any interest.
    Alongside the 'Equity' value (described below), this relates to the total system cost. Note that the Equity value is derived from {System Cost minus Debt}
- Tenure (years)
  - The period or term of the debt repayments.
    Alongside the 'Debt' and 'Cost of Debt', this determines the interest repayable.
- Annual cost of debt (%)
  - The interest rate.
    Alongside the 'Debt' and 'Tenure', this determines the interest repayable.
- Applied debt amount (Currency)
  - The debt amount is one of the sensitivity analysis parameters. This enables the user to rapidly test the project financial performance by adjusting the Debt amount (and by implication Equity amount)
    This cell shows the actual debt amount that is being applied by the model for the debt service calculations (see box below).
    User defined from the Sensitivity Analysis tab. See section 4.4 for more information.
- Equity (Currency)
  - *Internal calculation of the tool* {Total System Cost minus Debt}
    This is the value of shareholder financial investments to the project capital costs.
- Cost of Equity (%)
  - *User defined* (the typical range is suggested)
    The shareholders' expected annual rate of return.
    Note that the Cost of Equity and Cost of Debt

Debt Service

Within the EU Heroes Tool, the internal calculation assumes identical annual repayments, comprising a repayment of part of the principal plus an interest payment.

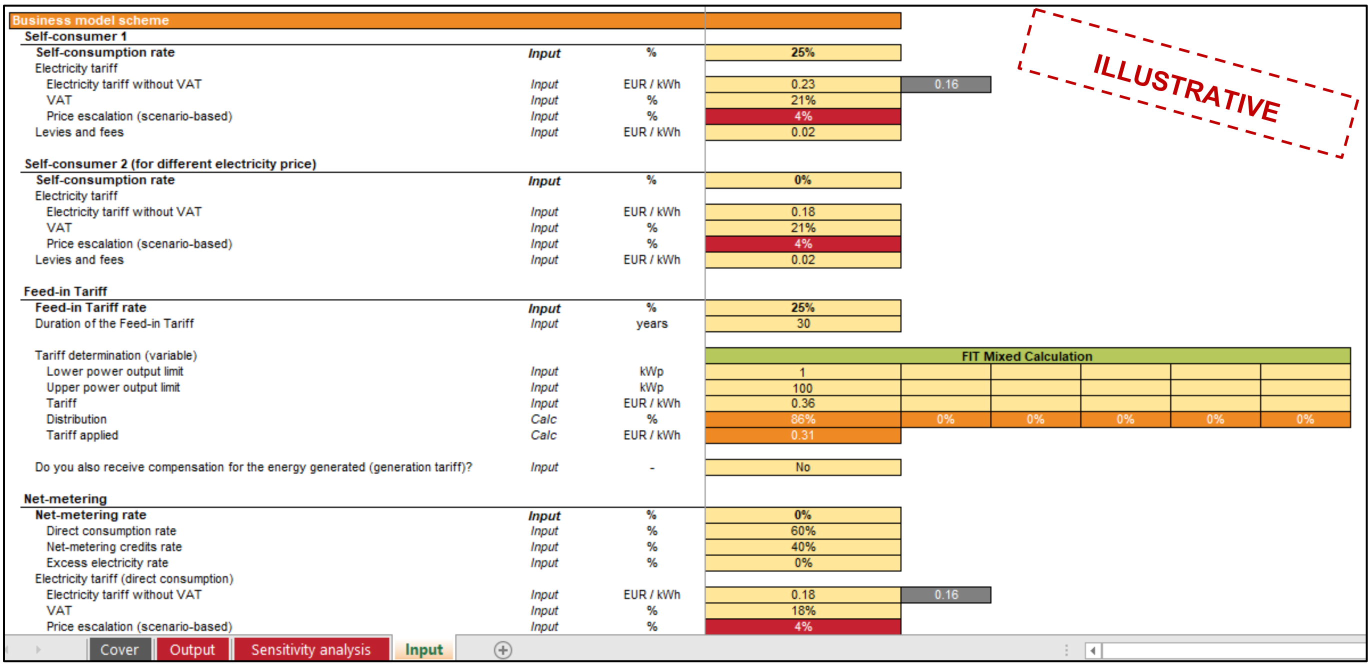
Principal payments are determined according to the Excel [PPMT] function based on the Cost of Debt, Tenure and (Initial) Debt.

Interest payments are determined according to the Excel [IPMT] function based on the Cost of Debt, Tenure and (Initial) Debt.

4.1.4 Business model scheme

The project revenue is defined via the 'Business model subsection on the *Input* tab.

Figure 7 – 'Input tab': Business model scheme



Business model scheme								
Self-consumer 1								
Self-consumption rate	***Input***	%	**25%**					
Electricity tariff								
Electricity tariff without VAT	*Input*	EUR / kWh	0.23	0.16				
VAT	*Input*	%	21%					
Price escalation (scenario-based)	*Input*	%	4%					
Levies and fees	*Input*	EUR / kWh	0.02					
Self-consumer 2 (for different electricity price)								
Self-consumption rate	***Input***	%	**0%**					
Electricity tariff								
Electricity tariff without VAT	*Input*	EUR / kWh	0.18					
VAT	*Input*	%	21%					
Price escalation (scenario-based)	*Input*	%	4%					
Levies and fees	*Input*	EUR / kWh	0.02					
Feed-in Tariff								
Feed-in Tariff rate	***Input***	%	**25%**					
Duration of the Feed-in Tariff	*Input*	years	30					
Tariff determination (variable)			**FIT Mixed Calculation**					
Lower power output limit	*Input*	kWp	1					
Upper power output limit	*Input*	kWp	100					
Tariff	*Input*	EUR / kWh	0.36					
Distribution	*Calc*	%	86%	0%	0%	0%	0%	0%
Tariff applied	*Calc*	EUR / kWh	0.31					
Do you also receive compensation for the energy generated (generation tariff)?	*Input*	-	No					
Net-metering								
Net-metering rate	***Input***	%	**0%**					
Direct consumption rate	*Input*	%	60%					
Net-metering credits rate	*Input*	%	40%					
Excess electricity rate	*Input*	%	0%					
Electricity tariff (direct consumption)								
Electricity tariff without VAT	*Input*	EUR / kWh	0.18	0.16				
VAT	*Input*	%	18%					
Price escalation (scenario-based)	*Input*	%	4%					

As previously noted (Section 2.1.3), the tool covers four main revenue business models: Self-consumption, Feed-in Tariff (FiT), Net-metering and Power Purchase Agreement (PPA).

It is possible to combine a number of the revenue streams for a single project by apportioning a percentage of the system generation to the relevant business model alternatives (for example 50% of the energy is self-consumed and the remaining 50% is sold via PPA).

The tool also allows some simple exploration of the potential impact of incorporating battery storage and other Demand Side Management measures (Electric Vehicle Chargers or Heat Pumps) on the project financial performance.

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4.1.4.1 Self-consumption (either self-consumer 1 or 2)

Refer to Section 2.1.3 above for a general overview of Self-Consumption and the other revenue models.

It is possible to enter two alternative components and price indicators for self-consumption for those cases where community PV projects involve different consumer types (e.g. residential and commercial) with different electricity prices.

TIP **Note that if your project uses the Net-metering revenue model (see 4.1.4.3 below), you should generally leave this subsection blank**.

The inputs within this subsection are:

- Self-consumption component (%)
  - The tool gives the option of directly introducing a value for self-consumption if it is known.
  - Alternatively site-specific usage details can be input via the *Consumption profile* tab. This will then produce a suggested value for the self-consumption component on the input sheet.
    Note that the user must manually enter any suggested value!
- Electricity tariff without VAT (Currency/kWh)
  - *User defined with* suggested value based on the consumption band indicated in section 4.1.1[5]
- VAT (%)
  - The prevailing rate for VAT on electricity purchases.
    Note that the VAT rate on electricity may differ from the general rate for other goods.
- Price escalation (%)
  - This relates to the expected/projected future increase in the price of electricity above inflation.
    User defined from the Sensitivity Analysis tab. See section 4.4 for more information.
- Levies and fees (Currency/kWh)
  - Additional tariffs to which owners are subjected
    User defined

4.1.4.2 Feed-in Tariff

Refer to Section 2.1.3 above for a general overview of Feed-in Tariffs and the other revenue models.

The inputs for the Feed-in Tariff scheme are as follows:

- Feed-in Tariff component (%)
  - This is referring to the proportion of the generated electricity that is actually supplied onto the grid.
    Note, under the UK Feed-in Tariff arrangements this term would equate to the Export (or Deemed Export) component!

[5] Suggested electricity prices correspond to average 2017 prices including taxes (except for VAT and other recoverable taxes) and have been obtained from Eurostat

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- Duration of the Feed-in Tariff (years)
  - The period of time that the project will benefit from FIT contract
- Tariff determination: lower and upper power output limit and applicable tariff for each range (Currency/kWh)
  - In certain jurisdictions, graduated tariffs apply according to the size of the PV system. The tool accommodates such graduation of the tariff when exceeding a determined power limit.
  - For example in the table below, the tariff up to 20 kW is 0.25 EUR/ kWh, while from 20 kW to 150 kW the tariff decreases to 0.20 EUR/ kWh.
  - If there is no tariff graduation, the user needs to indicate 0 kW as the lower power output limit and at least the capacity of the PV system under analysis as the upper power limit, unless there is a requirement for system curtailment above a certain level.
  - Note that in the UK the 'Tariff' value entered here would equate to the Export Tariff rate!

Figure 8 – 'Input tab': Feed-in Tariff graduation

FIT Mixed Calculation					
0	20				
20	150				
0.25	0.20				
40%	60%	0%	0%	0%	0%
0.22					

- Do you also receive compensation for the energy generated (generation tariff)? (Yes/ No)
  - *User drop-down selection which unlocks a further input cell*
  - This principally relates to the UK, where the Feed-in Tariff principally relates to the payment for generation.
  - Note in the UK, the Generation Tariff value equates to the FIT rate!

4.1.4.3 Net-metering

Refer to Section 2.1.3 above for a general overview of Net-metering and the other revenue models.

The user is required to indicate the component (%) of the total system generation which is eligible for net-metering. Additionally the contribution corresponding to direct consumption, net-metering credits (i.e. for energy not immediately self-consumed but injected into the grid) and excess electricity (balancing credits that are not directly compensated via the general credits but instead remunerated at the end of the period).

TIP **Note that if your project uses the Net-metering revenue model you should generally leave the preceding Self-Consumption subsection BLANK (see 4.1.4.1 above)**. However, you may find it helpful to switch the Self-consumption 1 drop-down to 'Yes' in order to view the suggested value for self-consumption component. This can then be entered as the 'Direct consumption' component here.

- Net-metering component (%)
  - the component of the PV system generation which is eligible for net-metering
- Direct consumption component (%)
  - See TIP above.

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- Net-metered credits component (%)
  - This is the proportion of PV generated electricity which is exported and which can subsequently be drawn back from the grid. Typically this would be the total PV Generation minus the Direct consumption.
  - Note however if the total site consumption is less than total PV generation during the balancing period, some Excess Credits' may be created which may not be drawn back.
- Excess electricity component (%)
  - This is generally the balance of the total Annual Electricity Consumption minus the Direct consumption and Net-metered credits
- Electricity tariff without VAT – direct consumption (Currency/ kWh)
  - *User defined with* suggested value based on the consumption band indicated in section 4.1.1
- VAT (%)
  - The prevailing rate for VAT on electricity generated and consumed directly.
    Note that National conditions may treat the VAT rate on electricity generated and consumed directly differently from the rate on electricity 'exported' and subsequently drawn back from the grid.
- Price escalation (%)
  - This relates to the expected/projected future increase in the price of electricity above inflation.
    User defined from the Sensitivity Analysis tab. See section 4.4 for more information.
- Electricity tariff without VAT – net-metering credits (Currency/ kWh)
  - *User defined with* suggested value based on the consumption band indicated in section 4.1.1
- VAT (%)
  - The prevailing rate for VAT on electricity 'exported' and subsequently drawn back from the grid.
    Note that National conditions may treat the VAT rate on electricity generated and consumed directly differently from the rate on electricity 'exported' and subsequently drawn back from the grid.
- Price escalation (%)
  - See section 4.4
- Net-metering fees (Currency/ kWh)
  - Typically these are charges imposed by the supplier to administer the agreement and cover use of service.
- Remuneration for excess electricity (Currency/kWh)
  - The rate payable for metered units of electricity that are generated and exported but not reclaimed (drawn back from the grid) within the balancing period.

4.1.4.4 Power Purchase Agreement

Refer to Section 2.1.3 above for a general overview of PPAs and the other revenue models.

The user can define the general proportion of the PV electricity generated that is subject to a PPA.

The user also needs to indicate what percentage corresponds to PPA supply (supply in accordance to the PPA contract), excess electricity () and PPA undersupply (penalties for not meeting the energy supply agreed in the contract).

- PPA component (%)
  - This might be all the generation, for example if the community PV system is installed on the end user's site and entirely feeds that end user. However, it is possible to combine this with some self-consumption – for example if the system is installed on a community building but also exports a proportion of the generated electricity to a separate end-user under PPA.
- Excess electricity component (%)
  - For example, if the system will produce more than is required by the PPA contract (which may then be exported to the wider grid)
- PPA supply component (%)
  - The amount of electricity generated by the PV system that the PPA end-user will usefully accept
- PPA undersupply component (%)
  - If there is any penalty for failure to supply as much electricity from the PV system as the PPA end-user requires, it is sensible to apply a contingency to determine the loss-of (project) revenue impact.
- PPA price (Currency/ kWh)
  - As agreed under the PPA contract
- Oversupply price (Currency/ kWh)
  - Typically the price for general export to the wider grid
- Undersupply penalty (Currency/ kWh)
  - As agreed under the PPA contract
- Price escalation (%)
  - See section 4.4
- Specific fees (Currency/ kWh)
  - For example private metering charges

4.1.4.5 Battery

Simple analysis of the impact that the installation of a battery could have on the system is also possible through the Tool. This is based on generation and consumption profile matching, to determine whether any generation in excess of the 'instantaneous[6]' consumption can be supplied to the battery.

Site specific hourly generation and consumption data for each month can be inserted by the user to give improved analysis. In the absence of site-specific profiles, the user can adopt the default data (by country / location and by general application type) contained within the Tool.

---

[6] For simplicity both generation and consumption profiles use hourly data for each month.

The list of inputs to perform the analysis is the following:

Figure 9 – 'Input tab': Battery

Battery (for self-consumption)			Yes	
Total battery cost	*Input*	EUR	5.000	
Battery capacity	*Input*	kWh	5	
Battery lifetime	*Input*	years	15	10 - 15 years
Do you currently inject excess electricity into the grid?	*Input*	-	Yes	
If you receive any remuneration for the electricity fed into the grid, indicate it here	*Input*	EUR / kWh	0,02	
Are you financing the battery through equity or through debt?	*Input*	-	Equity	

ILLUSTRATIVE

- Do you want to incorporate batteries into the analysis? (Yes/ No)
- Total battery cost (Currency)
- Battery capacity (kWh)
- Battery lifetime (years)
- Do you currently inject excess electricity into the grid? (Yes/ No)
- If you receive any remuneration for the electricity fed into the grid, indicate it here (Currency/ kWh)
- Are you financing the battery through equity or through debt? (Equity/ Debt)

4.1.4.6 Demand Side Management

Figure 10 – 'Input tab': Demand Side Management

Demand Side Management			
Do you want to incorporate Demand Side Management to the project?	*Input*	-	No

ILLUSTRATIVE

- Do you want to incorporate Demand Side Management to the project? (Yes/ No)
  - User selection
- Consumption and generation curves (kWh)

4.2 Consumption profile

Figure 11 – 'Consumption profile tab'

Residential - Single family house - kWh												
Hour	January	February	March	April	May	June	July	August	September	October	November	December
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												

Number of houses
1

The user has the option of introducing project specific consumption profile(s) if they are available, to allow more accurate reflection of the consumption timing versus generation. Profiles are differentiated by the following general applications:

- Residential - Single family house
- Residential - Multifamily house
- Commercial
- Public building
- Industrial

It is necessary to include the number of buildings included in each of the profiles. If only aggregate profiles are available, the user can still introduce the profile data but should maintain the corresponding "Number of houses/buildings" at one.

TIP The consumption profiles require the hourly data to be entered in kWh for each month of year.

If the user does not have access to the hourly consumption and generation curves, the tool bases the analysis on default curves by country and segment. It is necessary to introduce the relative amount of consumption per profile on the table included below[7].

Figure 12 – 'Consumption profile tab': Default profiles

If you do not know your consumption profile, please fill in the data below	
Segment	Relative consumption (%)
Residential - Single family house	
Residential - Multi family house	
Commercial	
TOTAL	INCORRECT

ILLUSTRATIVE

[7] For those users whose installations fall under the 'Public building' and 'Industrial' sectors, the consumption input must be introduced as the tool does not have default profiles for said segments.

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4.3 Generation profile

Similar to the 'Consumption profile' tab, the tool gives the user the option of introducing their own consumption profile. If the user cannot provide said information, a default profile will be used.

TIP The generation profile requires the hourly data to be entered as a percentage of the total generation for the month in question. i.e. the Monthly totals should each amount to 100%.

Figure 13 - 'Generation profile tab'

GENERATION PROFILE (%)												
Hour	January	February	March	April	May	June	July	August	September	October	November	December
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
TOTAL	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR

4.4 Sensitivity analysis

This section allows the user to visualize the impact of some key parameters on the final profitability results of the project. All the cells in **red** within the 'Input' tab correspond to the parameters that can be modified within the 'Sensitivity analysis' tab, which correspond to the following five categories:

- Electricity price escalation (%)
- PPA price escalation (%)
- OPEX costs escalation (%)
- System price (Currency)
- Debt amount (Currency)

Therefore, within this tab the user can:

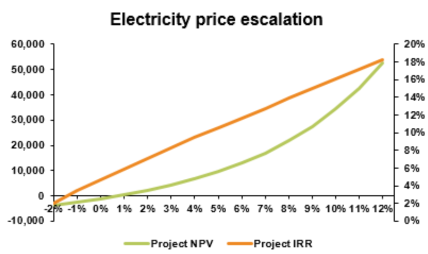
- Modify the default value to be used in the base scenario for each of the five categories above
  - The user can select the value to be applied to the calculations in the dropdown lists available on top of each of the five category tables. In addition, the user is allowed to modify the default values that compose each dropdown list by overriding the values in the cells in yellow
- Analyse how variations of these parameters affect the profitability of the project (scenario analysis), based on the tables and the charts included in the tab, as shown in the figure below:

Figure 14 – Sensitivity analysis

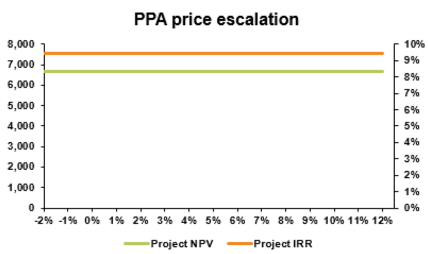
EU HEROES_Financial Model

SENSITIVITY ANALYSIS

Electricity price escalation (%)						
Scenarios	**Project NPV**	**Equity NPV**	**Project IRR**	**Equity IRR**	**Project payback**	**Equity payback**
4%	**6,689**	**11,080**	**9%**	**20%**	**11**	**7**
	-3,590	1,367	2.1%	9.4%	17	12
	-2,448	2,453	3.4%	11.4%	15	11
	-1,131	3,703	4.7%	13.3%	14	10
	396	5,148	5.9%	15.1%	13	8
	2,173	6,827	7.1%	16.9%	12	8
	4,250	8,785	8.3%	18.6%	11	7
4%	6,689	11,080	9.4%	20.3%	11	7
5%	9,562	13,779	10.6%	22.0%	10	6
6%	12,962	16,966	11.7%	23.6%	10	6
7%	16,999	20,743	12.8%	25.2%	10	6
8%	21,808	25,234	13.9%	26.8%	9	6
9%	27,555	30,591	15.0%	28.3%	9	5
10%	34,441	37,001	16.0%	29.9%	9	5
11%	42,714	44,689	17.1%	31.4%	8	5
12%	52,676	53,934	18.2%	32.9%	8	5



PPA price escalation (%)						
Scenarios	**Project NPV**	**Equity NPV**	**Project IRR**	**Equity IRR**	**Project payback**	**Equity payback**
3%	**6,689**	**11,080**	**9.4%**	**20.3%**	**11**	**7**
-2%	6,689	11,080	9.4%	20.3%	11	7
-1%	6,689	11,080	9.4%	20.3%	11	7
0%	6,689	11,080	9.4%	20.3%	11	7
1%	6,689	11,080	9.4%	20.3%	11	7
2%	6,689	11,080	9.4%	20.3%	11	7
3%	6,689	11,080	9.4%	20.3%	11	7
4%	6,689	11,080	9.4%	20.3%	11	7
5%	6,689	11,080	9.4%	20.3%	11	7
6%	6,689	11,080	9.4%	20.3%	11	7
7%	6,689	11,080	9.4%	20.3%	11	7
8%	6,689	11,080	9.4%	20.3%	11	7
9%	6,689	11,080	9.4%	20.3%	11	7
10%	6,689	11,080	9.4%	20.3%	11	7
11%	6,689	11,080	9.4%	20.3%	11	7
12%	6,689	11,080	9.4%	20.3%	11	7



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4.5 Output

The first four output categories (General information, PV System information, Investment and PV Business Model) are meant to provide a summary of the inputs inserted in the model. The last two categories (Financial results and Grid impact and Battery) provide, respectively, information on the profitability of the project (both from the project and the equity perspective) and the potential energy that could be saved through the installation of batteries, with the corresponding impact on the electricity grid.

In addition, cash flows charts (showing initial investment, annual cash flows and cumulative cash flow) are available from the project and equity perspective. The results of the analysis can be exported to a PDF document through the 'Export to PDF' button on the top left corner of the tab.

Figure 15 – Output section of the Financial Model

22/10/2018 **EU HEROES PROJECT OVERVIEW** Page 1 of 3

Export to PDF

EU Heroes
Connecting Communities

General Information	
Pilot name	XXX
Country	Spain
Region	Comunidad de Madrid
Segment	Residential - Single family house

PV System Information		
Category	**Unit**	**Value**
PV System Size	kWp	7
Specific System Cost	EUR / kWp	1,250
Investment Subsidy	EUR	0
Total System Cost	EUR	8,750
Fixed Operation Costs	EUR / year	800
Variable Operation Costs	EUR / kWh	0
Specific System Performance	kWh / kWp	1,596
Annual Degradation	%	0.5%

Investment		
Category	**Unit**	**Value**
Project Duration	years	30
Equity	EUR	3,750
Cost of equity	%	6%
Debt	EUR	5,000
Loan Tenor	years	10
Interest Rate	%	5%

PV Business Model			
Category	**Share**	**Unit**	**Price**
Self-consumption	25%	EUR / kWh	0.23
Fees		EUR / kWh	0.02
Feed-in Tariff	25%	EUR / kWh	0.31
Net-metering	0%	EUR / kWh	0.18
Fees		EUR / kWh	0.03
Excess Electricty		EUR / kWh	0.17
PPA	0%	EUR / kWh	0.20
Fees		EUR / kWh	0.02
Oversupply Price		EUR / kWh	0.20
Undersupply Penalty		EUR / kWh	0.05

Financial Results		
Category	**Unit**	**Value**
Select the perspective of the analysis	-	Project
Net Present Value	EUR	6,689
Internal Rate of Return	%	9.4%
Simple payback period	years	11

Grid Impact and Battery		
Category	**Unit**	**Value**
Current Self-Sufficiency Rate	%	23%
Current Self-Consumption Rate	%	25%
Potential Self-Sufficiency Rate	%	36%
Potential Self-Consumption Rate	%	39%
Increase in self-consumption	kWh	1,548
Total grid impact of the project	kWh	4,327

All the outputs of the analysis are listed below:

4.5.1 General information

- Pilot name
- Country
- Region
- Segment (residential, commercial, public building or industrial)

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4.5.2 PV System information

- PV System size (kWp)
- Specific system cost (Currency/kWp)
- Investment subsidy (Currency)
- Total system cost (Currency)
- Fixed operation costs (Currency/ year)
- Variable operation costs (Currency/ kWh)
- Specific system performance (kWh/ kWp)
- Annual degradation (%)

4.5.3 Investment

- Project duration (years)
- Equity (Currency)
- Cost of equity (%)
- Debt (Currency)
- Loan tenor (years)
- Interest rate (%)

4.5.4 PV Business model

- Share (%), electricity price (Currency/ kWh) and applicable fees (Currency/ kWh) for each of the four main business models analysed in the tool: Self-consumption, Feed-in Tariff, Net-metering and PPA

4.5.5 Financial results

- Net Present Value (Currency)
- Internal Rate of Return (%)
- Simple payback period (years)

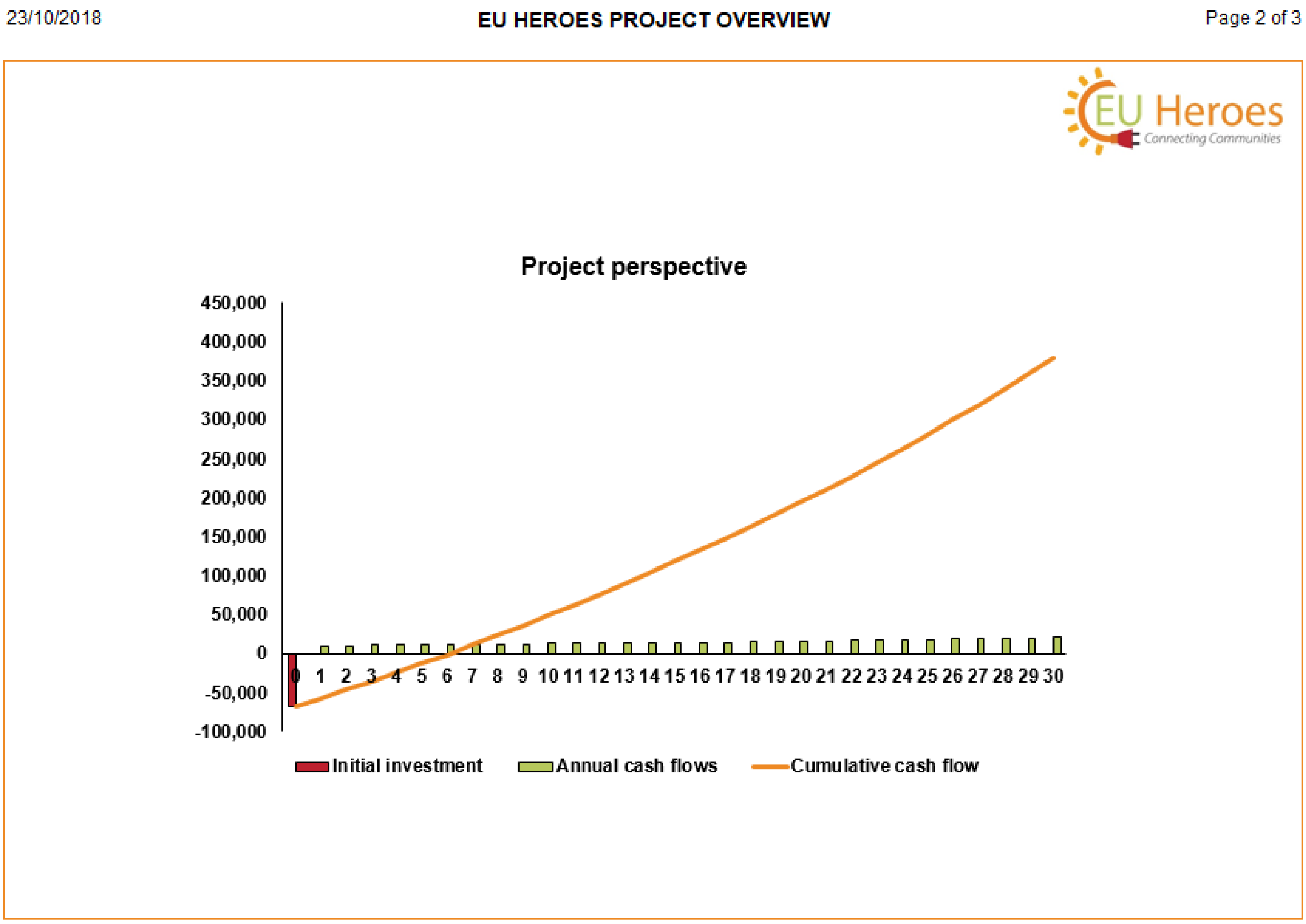
4.5.6 Grid impact and Battery

- Current Self-Sufficiency rate (%)
- Current Self-Consumption rate (%)
- Potential Self-Sufficiency rate (%)
- Potential Self-Consumption rate (%)
- Increase in self-consumption (kWh)
- Total grid impact of the project (kWh)

4.5.7 Charts

- Cash flow chart (initial investment, annual cash flows and cumulative cash flow) from project perspective
- Cash flow chart (initial investment, annual cash flows and cumulative cash flow) from equity perspective

Figure 16 – Cash flow chart – project perspective



Appendix 1: Determining PV System Generation

For solar PV installations, the key parameters governing the production of the system are:

- Location
- Panel orientation ('azimuth') and inclination (slope)
- Shading
- System size

Location

this largely determines the amount of solar irradiation available to your installation over the course of an 'average' year.

Panel orientation ('azimuth') and inclination (slope)

This refines the estimate of how much of the solar irradiation would be seen by your specific panel configuration over the course of a year.

Note that solar azimuth (in the Northern Hemisphere) generally takes due south as 0 (Zero), with due east regarded as -90 degrees from south and due west regarded as +90 degrees from south[8]. Slope is the angle of tilt from the horizontal plane.

If your panels are installed on the roof of a building – particularly if it is a pitched roof – azimuth and slope may well be dictated by the building orientation and the roof pitch angle.

If you intend that a significant proportion of the electricity generated will be used directly on site (self-consumption) and your system is substantially different from the optimal slope and azimuth, you might consider looking at a more detailed time-based[9] prediction of energy generation to refine the self-consumption analysis. However, the model does contain various generic data to offer an indication of self-consumption contribution as a first pass.

Shading

Shading of panels – even shading of only an apparently small part of the array - can have a major detrimental bearing on the actual performance of a PV system. Detailed shading analysis can be performed with various dedicated PV site hardware and/or certain PV design tools. However, many of these tools are specialist – hence rather expensive for casual users. There are various inexpensive apps available for smart phones that can quickly help to give indicative shading impact. However, the best advice would be to avoid shading the PV system if at all possible, as this will help minimise the generation losses.

System size

Rooftop PV systems using 300Wp to 350Wp panels mounted in the plane of the roof, typically require 5 to 6 m^2 roof area per kW of rated ('peak') generation capacity.

---

[8] The European Commission Joint Research Centre Interactive Photovoltaic Geographical Information System (PVGIS), which we suggest is used for assessing PV system performance in the first instance, adopts this convention.
[9] The level of generation detail required for more insightful Self-Consumption analysis would be the average hour-by-hour generation contribution

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For flat-roof systems, the power density is somewhat lower, typically around 7 to 8m^2 per kWp.

Be aware that rooftop systems will need to avoid roof furniture and other features that might cause partial shading of the array.

For larger ground-based solar farms, the current generally reported figure assumes some 2 hectares of land per megawatt of PV generation capacity, i.e. 20m^2 per kWp.

Determining indicative PV system performance: PV-GIS

For early stage estimation of site-specific PV system performance we suggest using the European Commission Joint Research Centre's interactive Photovoltaic Geographical Information System (PVGIS). This is a highly regarded free-of-charge online resource, which can quickly generate performance estimates based on a few limited details.

The location specific annual irradiation will be identified based on an address (or postcode), or from latitude / longitude data if known, or by identifying your site on the map provided.

You should have previously determined the system size (Installed peak PV power in kWp), the slope and azimuth.

You will also need to select the PV technology (the solar cell material), and the System losses. The vast majority of PV modules currently produced are still based on Crystalline Silicon, so this will generally be the selection for 'PV technology'.

In the absence of better information, the PVGIS default system loss (14%) may be selected. Note though that PVGIS is **not** accounting for losses due to partial shading within this figure.

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Appendix 2: Data Gathering Template

General characteristics

CHARACTERISTIC	Value
Annual electricity production (kWh)	
Annual electricity consumption (kWh)	
Installation lifetime (Years)	
System size (kWp)	
Annual degradation (%)	
Specific system yield (kWh/kWp)	

System cost

CHARACTERISTIC	Value
Specific system cost - CAPEX (Currency/kWp)	
Investment subsidy (Currency)	
Fixed annual OPEX (Currency /Year)	
Variable annual OPEX (Currency /kWh)	
Other Costs[10] (Currency /Year)	

Funding scheme

CHARACTERISTIC	Value
Debt amount (Currency)	
Debt proportion (%)	
Tenure (Years)	
Cost of Debt (%, annual)	
Equity amount (Currency)	
Equity proportion (%)	
Cost of equity (%, annual)	

[10] E.g. Land Lease, insurance, software…

Business model scheme[11]

Self-consumption NB LEAVE BLANK IF USING NET METERING

CHARACTERISTIC	Value
Self-consumption Component 1 (%)	
Electricity price 1 (Currency/kWh)	
VAT Rate (%)	
Levies and fees (Currency/kWh)	
Self-consumption Component 2 (%)	
Electricity price 2 (Currency/kWh)	
VAT Rate (%)	
Levies and fees (Currency/kWh)	

Feed-in Tariff

CHARACTERISTIC	Value
Export Component [12] (%)	
Duration of FIT (years)	
Lower power output limit[13] (kWp)	
Upper power output limit[14] (kWp)	
Export Tariff (Currency/kWh)	
Generation Tariff (Currency/kWh)	

Net-metering

CHARACTERISTIC	Value
Net metering Component (%)	
Direct Consumption Component (%)	
Net Metering Credits Component [15] (%)	
Electricity Tariff – import (Currency/kWh)	
VAT Rate (%)	

[11] Typically enter just one of the options, though certain streams can be combined
[12] In the EU Heroes Model this translates to the Feed-in Tariff Rate. In the UK, for small systems without Export/Smart Meter this would be deemed 50%
[13] This normally not relevant to UK FIT scheme
[14] Only relevant to UK if feed-in is curtailed. E.g. DNO imposed limit on Feed-in to distribution network <16A/phase
[15] Typically for UK this would be (1-Direct Consumption) since 'Excess electricity rate' does not normally apply

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Electricity Tariff – export (Currency/kWh)	
VAT Rate (%)	
Levies and fees (Currency/kWh)	
Remuneration for Excess Electricity (Currency/kWh)[16]	

Power Purchase Agreement

CHARACTERISTIC	Value
PPA Component (%)	
PPA supply Component (%)	
Excess electricity Component (%)	
PPA undersupply Component [17] (%)	
Electricity Prices (Currency/kWh)	
PPA supply	
Excess electricity	
PPA undersupply	
Levies and fees (Currency/kWh)	

Demand Side Management

Battery

CHARACTERISTIC	Value
Total battery cost (Currency)	
Battery capacity (kWh)	
Battery lifetime (years)	
Current excess injected to Grid? (Y/N)	
Debt or Equity financed? (Debt/Equity)	

[16] This normally not relevant to UK SEG scheme
[17] Typically 1-3% for undersupply due to system outages and/or worse irradiation than expected