

# SCORE

Co-own. Prosume. Renew.

Supporting **C**onsumer **O**wnership in **R**enewable **E**nergies

## D 4.3 SCORE Prosumer-Investment Calculator

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## **Disclaimer**

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## Summary

The Renewable Energy Directive ([RED II, 2018/2001](#)) created on EU level a policy framework, in which normal citizens who organise themselves in so-called Renewable Energy Communities (REC) are given a much more prominent role in the energy transition. At the same time, the policy and economic frameworks on the national level are still very demanding for RECs. There is yet no level playing field with professional project developers and utilities.

The objective of the [SCORE Prosumer-Investment Calculator](#) is to provide RECs with an easy-to-use online tool for appraising the economic viability of a joint photovoltaic (PV) energy project. The SCORE partners developed the online calculator between 2018 and 2020 based on earlier developments (offline tools). By offering the tool free-of-cost with its intuitive graphic user interface, even non-experts can now quickly assess the key performance indicators (KPI) of a planned PV project.

The calculator holds 10-15 potential input parameters. Based on these, the summary dashboard displays the project's energy production, investment, and amortisation. Six dynamic graphs provide a quick assessment of important parameters such as yield, loan repayment, costs overview, tax payments, electricity production and consumption as well as a breakdown of the operational costs. Current market conditions (module and installation prices) and feed-in tariffs are taken into account.

The tool is available in three languages (EN, DE, CZ) for public use free-of-cost since 2021. The calculator is embedded as an iframe on the SCORE website, making it possible to embed the calculator on other host-websites with only minor programming or adaption effort.

To date, the online calculator has been (or will soon be) embedded on three additional websites, namely of the SCORE partner [Climate Alliance \(CA\)](#) and and the SCORE follower cities Cascais (PT) and Magliano Alpi (IT).

## Background

The Renewable Energy Directive ([RED II, 2018/2001](#)) created on EU level a policy framework, in which normal citizens who organise themselves in so-called Renewable Energy Communities (REC) are given a prominent role in the energy transition. Since June 2021 – once the Directive has been transposed into national law – consumers, as prosumers, will have the right to consume, store or sell RE generated on their premises.

Today, the policy and economic frameworks on the national level are still very demanding for RECs. It will depend on the quality of the national RED II transposition, to what extent this will become easier in the future. Presently, there often is no level playing field with professional project developers and utilities. The SCORE Prosumer Investment Calculator is therefore meant as an open-source tool for RECs to facilitate a first assessment of the viability of a joint solar PV project.

## Objectives

The objective of the [SCORE Prosumer-Investment Calculator](#) is to provide RECs with an easy-to-use online tool for evaluating the economic viability of a planned PV energy project. The SCORE partners developed the online calculator between 2018 and 2020 based on comparative research undertakings from the European University Viadrina and the University of Rostock, Germany. Even non-experts can quickly assess the key performance indicators (KPI) of a planned PV project with the calculator.

The user interface allows for real-time toggling with key project parameters to arrive at a realistic forecast of the planned PV project. It helps to understand and optimise the interrelation between different parameters that influence the economic viability, such as the number of households/ investors, the contribution per household, or the PV system size. Thus, the tool is explicitly designed for RECs with many participating households who are at the same time investors and prosumers of the energy produced.

## Tool development

The Tool was originally developed as an excel tool by the Kelso-Professorship of the European University Viadrina. Firstly, it only existed for wind energy projects. However, wind energy projects at the time and nowadays are very capital intensive. PV projects are much better suited for a joint investment of smaller consumer groups. Therefore, the excel tool was extended to PV projects in Germany. When allocating the tool to actual consumer groups it became clear that the excel file was not easy to use, especially with people that did not have experience with the excel application. Therefore, within the scope of the SCORE project the excel tool was taken as a basis to develop an easy-to-use online application with a professionally designed front-end. Further, the tool was extended to the SCORE pilot countries DE and CZ. In a last step

further research and development work to extend the tool for follower cities in Portugal and Italy is planned.

## **User Guide**

The calculator has been developed for citizens interested in setting up a joint PV project. It uses up to date data on economic and legal ramifications necessary to evaluate PV projects in the pilot regions. This is channelled into 15-20 parameters on the project size and investment conditions that can be edited by the user. Based on these input parameters, the calculator creates graphical forecasts of important key performance indicators (KPI) concerning the project's energy production, investment, and amortisation, namely on:

- Yield
- Loan repayment
- Costs overview
- Electricity production and consumption
- Breakdown of operational costs.

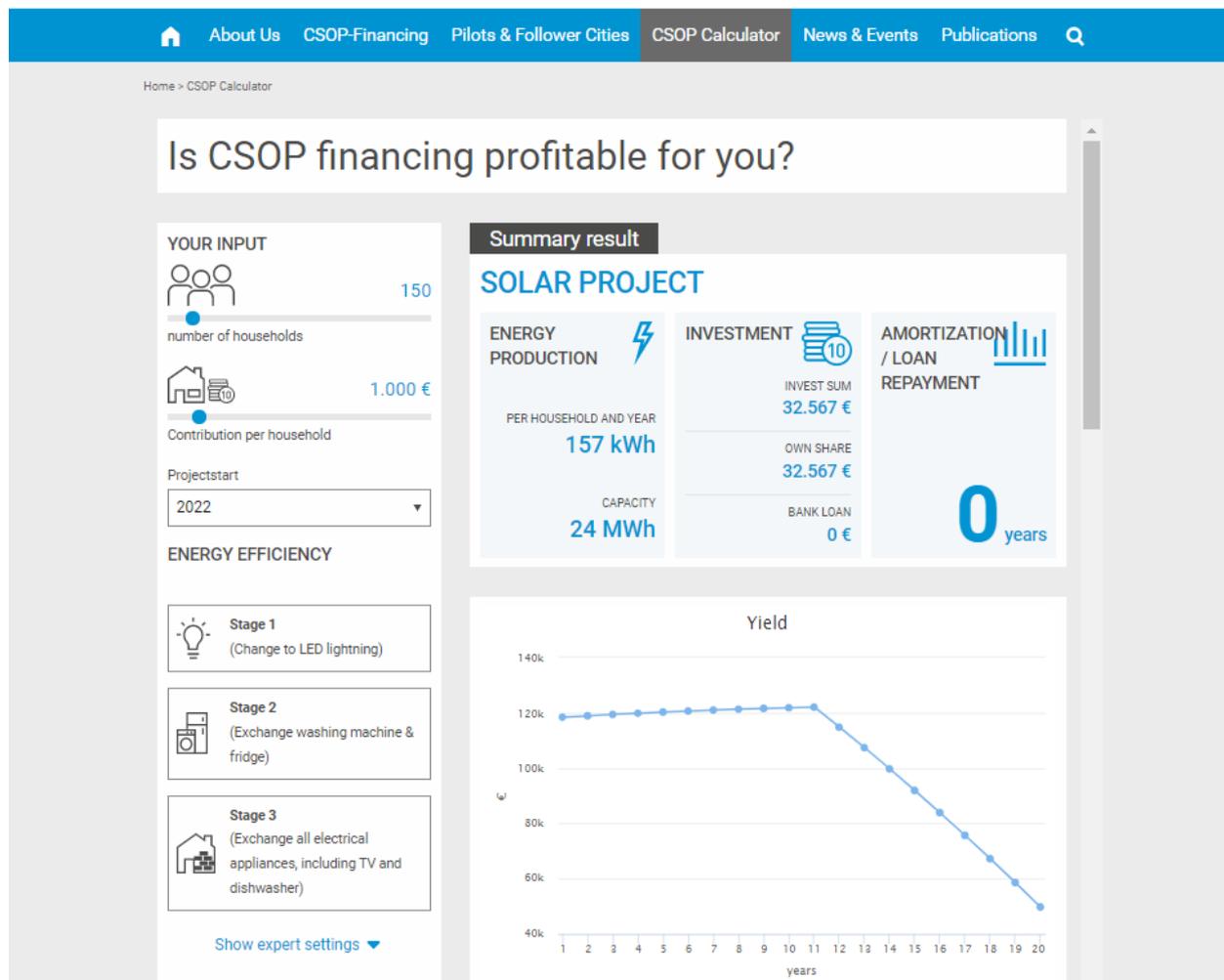


Figure 1: SCORE CSOP Calculator, screenshot

The easiest input parameters are the number of households and available capital. For a deeper understanding of the project the user can progress with opening the expert settings. In a three-step approach, the users can enter the relevant detailed data for getting a thorough assessment of the project's profitability. **If the user does not open the expert settings the calculator operates with assumptions based on regular installations in the chosen dimensions.**

### Step 1: How many can invest how much?

Everything is prepared now to address very important issues for the project initiators and their supporters: How many citizens will become investors in the project and what is their average investment sum? In the upper left area of the calculator, the number of households and the contribution per household can be entered:

#### Number of households

Default value 50  
Possible values between 0 and 2,000

**Contribution per household**

Default value 1,000 €  
Possible values between 0 and 10,000 €

Furthermore, the starting year can be entered. Possible values are the next 3 years.

**Step 2: Energy Efficiency**

As a rule, the avoiding of unnecessary energy consumption is just as important in a REC as the generation of power. Therefore, the tool allows to define 3 levels of energy efficiency measures which the REC members intend to implement, combined with the project year these measures will be implemented.

Considering the energy savings will allow for a proper dimensioning of the PV system, avoiding expensive oversizing of the system.

**ENERGY EFFICIENCY**

Remove selection ✕

**Stage 1**  
(Change to LED lightning)

**Stage 2**  
(Exchange washing machine & fridge)

**Stage 3**  
(Exchange all electrical appliances, including TV and dishwasher)

1

Starting Year of measures

7

### **Step 3: Forecast of Key Performance Indicators**

A total of six diagrams is generated by the calculator. They dynamically adjust in real-time whenever input parameters are being adapted by the user. A blue curve in the graphical forecasts indicates economic viability of the project. If curves are red, the project cannot be recommended, in this case the input parameters should be adjusted.

#### **Yield**

This diagram shows the annual financial yields of the project over 20 years. The annual yield is the balance of the project's earnings (especially sale of the generated electricity) and the project's costs (see also diagram Costs Overview).

The yield may change in year 11. This is due to the likely need to renew the transformer and possible changes in the running costs of the second decade. These may be adapted in the expert settings under the economic parameters.

#### **Loan repayment**

If a loan is needed to finance the project, this graph shows the necessary annual repayment costs. If the citizens' / shareholders equity is sufficient to pay for all expenses, this graph is a flat line.

#### **Costs overview**

This graph shows both annual income and costs of the project. The balance of these two curves results in the curve "Yield"

Due to the likely need to renew the transformer and possible changes in the running costs, the costs may change in year 11. The settings for the second decade may be adapted in the expert settings under the economic parameters.

#### **Electricity production and consumption**

Based on the size of the system, the number of households and the energy efficiency measures foreseen, the consumption and production of electricity are displayed in this graph. It is advisable to aim for a PV system size allowing at least to cover the energy consumption of the households participating in the REC.

#### **Breakdown of operational costs.**

These two pie charts show the breakdown of the operational costs in the first and second decade of the project. The actual building costs happen in year 0 and are not included here.

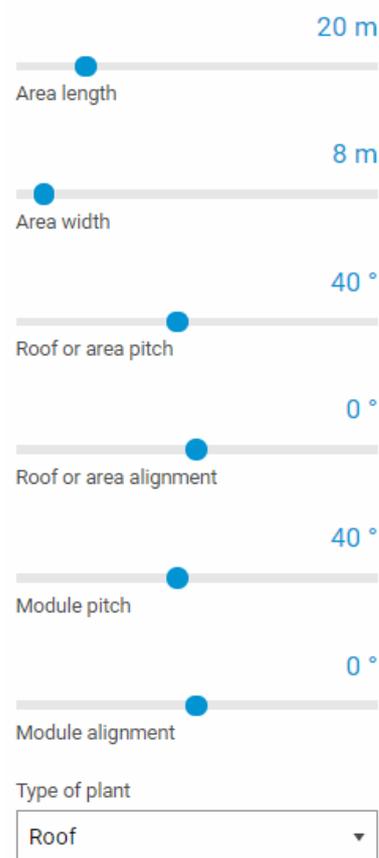
### Step 4: Configuration of the System (Expert Settings)

Here the user must enter the technical dimensions of the planned solar energy installation. Available fields are

- Area length
- Area width
- Roof or area pitch
- Alignment
- Module pitch
- Module alignment
- Type of plant: Roof or Other

Based on the system data entered, the calculator will show the system's capacity and energy yield per household in the dashboard section "Energy Production"

#### CONFIGURATION OF THE SYSTEM



The interface displays six configuration options, each with a slider and a current value:

- Area length:** Slider set to 20 m.
- Area width:** Slider set to 8 m.
- Roof or area pitch:** Slider set to 40°.
- Roof or area alignment:** Slider set to 0°.
- Module pitch:** Slider set to 40°.
- Module alignment:** Slider set to 0°.
- Type of plant:** Dropdown menu set to "Roof".

### Step 5: Economic Factors (Expert Settings)

Preferably a person with some economic background or experience should enter the economic factors which will be used by the calculator:

Concerning the "Main invest costs", the "Operation costs of the first decade" and the "Operation costs of the second decade", the user can choose between the general settings

- Low
- Normal
- High

This choice will consider external circumstances which impact the economic factors. For instance, investment costs change according to geographic characteristics, such as the location of a plant (e.g., mountains or lowlands). Operating costs are strongly influenced by weather conditions.

If respective information on the project is available, the appropriate conditions may be entered here. If no information is available "normal" uses average investment conditions.

Further, there are six specific economic factors to be entered:

### Inflation rate

Expected average inflation rate over the 20 years duration of the project.

Default value +2% p.a.

Possible values between -2% and +10% p.a.

### Interest rate (project)

Expected interest rate for bank (or other) loans for financing the project.

Default value +3,8% p.a.

Possible values between -2% and +20% p.a.

### Interest rate (efficiency)

Expected interest rate for bank (or other) loans for financing additional energy efficiency measures.

Default value +3,8% p.a.

Possible values between -2% and +20% p.a.

This field is only visible if energy efficiency measures have been selected (see Step 2)

### Redemption-free startup period (years)

If the bank loan for financing the solar energy plant foresees for the initial project phase a period without redemption payments, this can be entered here:

Default value 0 years

Possible values between 0 and 10 years

### Credit provisions

The financing bank will usually ask for a credit provision as a percentage of the bank loan:

Default value 3%

Possible values between 0% and 5%

## ECONOMIC FACTORS i

Main invest costs

Operation costs first decade

Operation costs second decade

2 %



Inflation rate

3,8 %



Interest rate (project)

3,8 %



Interest rate (energy efficiency)

0



Redemption-free start-up period (year)

3 %



Credit provision

6



Time of construction (month)



### **Time of construction (months)**

The time of construction has yet no electricity sales but already running costs (system, construction, and financing costs). Therefore, a shorter construction time improves the project's economics.

Default value 6 months

Possible values between 0 and 12 months

After the system configuration and the economic factors have been entered, the expert settings are finished.

### **Dissemination**

The tool is available in three languages (EN, DE, CZ) for public use free-of-cost since 2021. The calculator is embedded as an iframe in the project website, making it possible to embed the calculator into other host-websites with only minor programming or adaption effort.

The SCORE Follower Cities have been invited by the SCORE partner Climate Alliance to embed the calculator in their own websites. The embedding is technically easy, only a few lines must be included in the website's HTML code.

The following guidance has been prepared for multipliers (like municipalities) on how to implement the calculator:

### **CSOP Calculator: Guide to Website Integration**

In the following please find how to integrate the CSOP calculator, which was developed in the EU funded SCORE project, into your own website. The online tool is open to be used by any interested party or by the potential stakeholders of a CSOP itself. The original CSOP calculator can be accessed here: <https://www.score-h2020.eu/csop-calculator/>

#### **Target Groups:**

Local authorities (especially SCORE Follower Cities), external investors (SME, commercial investor, plant operator, etc.), financial institutions as well as consumers who are interested in providing an option to find out if a CSOP is feasible.

#### **About the CSOP Calculator:**

The CSOP Calculator was developed by co2online gGmbH and the European University Viadrina (EUV) as part of the EU funded SCORE project (HORIZON 2020).

The Calculator allows for a quick assessment of the economic viability of a Renewable Energy Project under the CSOP model.

### Steps to include the CSOP Calculator on your website

1. If the decision about the implementation of the CSOP Calculator is not in your hand but you think it could benefit your institution and the visitors of your website, clarify with your superior if and how it can be implemented on your webpage.
2. If the decision about the implementation of the CSOP calculator is in your hands and you want to integrate the calculator on the website of your institution, discuss the next steps with your website administrators.
3. The calculator does not record, store, or process any personal data. Furthermore, the calculator does not use any cookies. But please mention in your website's privacy policy that figures entered in the calculator are being stored and processed anonymously by co2online.
4. Decide at which place on your website the CSOP calculator should be integrated.
5. Decide in which language you want your CSOP Calculator. The CSOP calculator is at this point available in English, German or Czech language.
6. Copy the code segment of your preferred language and paste it to the position in your code where you want to implement it.

#### English (standard)

```
<iframe style="border: 0; width: 100%; height: 800px;"  
src="https://calculator.score-h2020.eu/" id="cscop-calculator"></iframe>  
<script src="https://calculator.score-h2020.eu/assets/js/embed.js"></script>
```

#### German

```
<iframe style="border: 0; width: 100%; height: 800px;"  
src="https://calculator.score-h2020.eu/solar?country=DE" id="cscop-  
calculator"></iframe>  
<script src="https://calculator.score-h2020.eu/assets/js/embed.js"></script>
```

#### Czech

```
<iframe style="border: 0; width: 100%; height: 800px;"  
src="https://calculator.score-h2020.eu/solar?country=CZ" id="cscop-  
calculator"></iframe>  
<script src="https://calculator.score-h2020.eu/assets/js/embed.js"></script>
```

## Early Adopters

To date, the online calculator has been (or will soon be) embedded on three additional websites, namely of the SCORE partner [Climate Alliance \(CA\)](#) and the SCORE follower cities Cascais (PT) and Magliano Alpi (IT).

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WP-leader	CSD
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Submission date	December 2021
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Dissemination level	Public
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## **Imprint**

SCORE facilitates consumers to become (co-)owners of RE in three pilot regions and in cities across Europe following these pilot projects. SCORE applies Consumer Stock Ownership Plans (CSOPs) utilising established best practice updated by inclusive financing techniques. Vulnerable groups affected by fuel poverty – as a rule excluded from RE investments – are in the focus of the project.

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