Econometrics, Python and VBA

VBA project

Summary :

The principle of this project is to build a business plan for the installation of a photovoltaic plant. The inputs will be :

- the dimension of the installation in kW,
- the total duration of the project,
- the amount for the loan, the duration, the annal rate
- the choice of photovoltaic technologies in a predefined list
- the electrical purchase price and the inflation over the project period.

The expected outputs :

- the cash flow,
- the amortized table,
- the Internal Rate of Return (IRR),
- the Net Present Value (NPV)

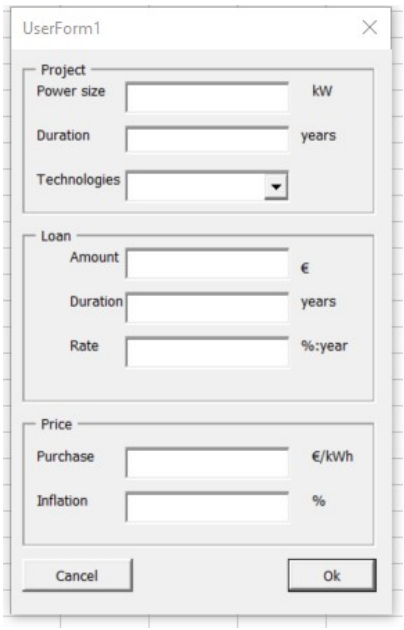
The sources consist in a directory with several files describing the different photovoltaic technologies in csv format. Each files will contain the same information :

- the name of the technology
- the price and power of a panel
- the annual yield
- the life duration
- the annual maintenance costs

Project breakdown:

Build a UserForm to set the different inputs (3 points)

The workbook of the project should contain a UserForm which will allow to set the different values for the inputs. This form will use textbox to enter the numerical values, a list corresponding to the different available technologies which are described in csv files in the source directory given for the project, a Cancel button and a Ok button to build the business plan. The different fields should be validated with reasonable values.



Read the content of the directory “technologies” and fill the field list of the UserForm (3 points)

The list in the UserForm must be filled with the content of the source directory. At the opening of the project workbook, the VBA program will parse the directory and fill the list of the UserForm with the name of the photovoltaic technology read inside each file. Each file are in csv format with the same structure:

- the name of the technology
- the price and power of a panel
- the annual yield
- the lifetime duration
- the annual maintenance costs

Creation a new workbook with two sheets (3 points)

Once all the inputs are set and validated, a new workbook is created with two spreadsheets : one for the summary and one for the detailed calculations. The data from the chosen photovoltaic technology should appear at the beginning of the detailed page.

Calculation of the different contributions in the detailed sheet (8 points)

Some calculations must be done to achieve the calculation of the IRR and NPV.

- Calculate the number of panels to buy to obtain the total required power.
- Calculate the total investment to realize. A part can be payed with the loan defined in the UserForm, the remaining comes from equity.
- Calculate how often the system must be replaced during the project lifetime. For instance for a project of 30 years with panels lasting 15 years, the investment must be done at the first year and done again at the 15^{th} year.
- Calculate the payment to reimburse the loan each year.
- Calculate the incomes by making the product of energy produced in one year (nominal power * 24 * 365 * annual yield) by the electric purchase price (€/kWh). Each year this price increases due to the inflation, so it should be multiply by the inflation coefficient.
- Calculate the costs of maintenance each year for chosen system.
- Calculate the cash flow for each year which is sum of the positive incomes minus all the expenses.
- Use Excel functions IRR and NPV to calculate the corresponding value.

Build summary sheet (3 points)

At the end of the calculation, present the results in a summary page:

- the capital invested (CAPEX)
- the costs of maintenance (OPEX)
- the amount borrowed and the cost of the loan
- the project duration
- the technology chosen
- the IRR and NPV values