Innovation Fund

Call for Large-Scale projects 2021 - Relevant cost calculation

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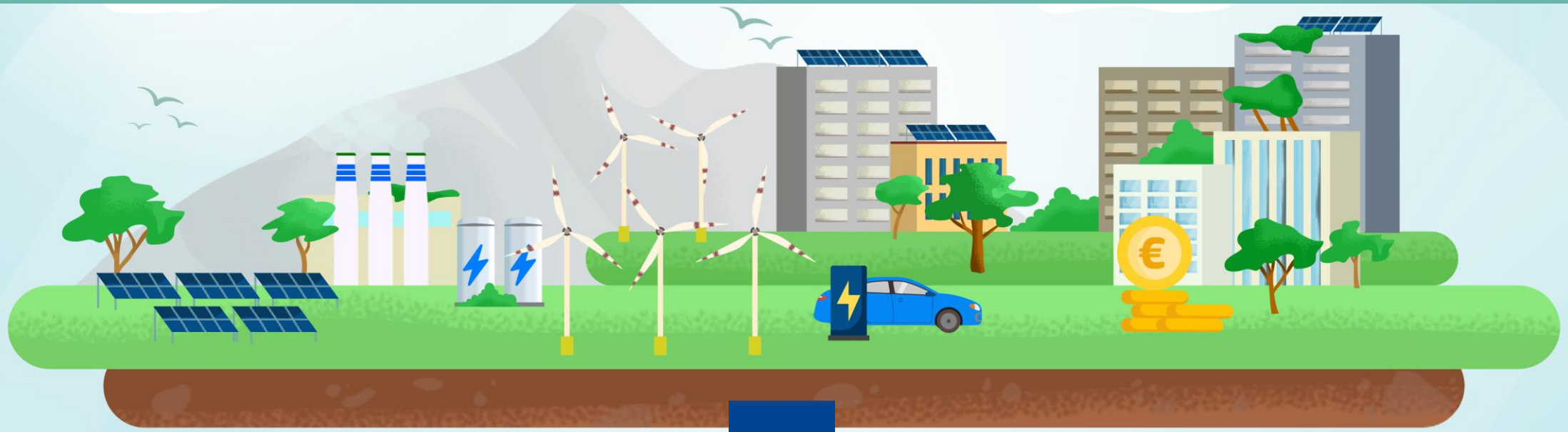

Key principles

Definitions

Relevant costs ("RC") = "difference between the best estimate of the CAPEX, the NPV of OPEX and operational benefits arising during 10 years after the entry into operation of the project compared to the result of the same calculation for a conventional production with the same capacity in terms of effective production of the respective final product."

CAPEX	Construction costs, site infrastructure costs, development costs and intangible assets of the project (please refer to glossary in Annex B)
OPEX	Operation and Maintenance cost, decommissioning costs (if in the first 10 years), they do not include depreciation cost of CAPEX !
Operational benefits	Any revenue received by the project from the sale of EU ETS allowances for reductions in CO_2 emissions, preferential tariffs or feed-in premia, or other market-wide regulatory support programs
Discount rate	Discount rate used for NPV calculations is the Weighted Average Cost of Capital (WACC) of the project

Key principles

Which methodology should applicants use?

Relevant costs are “additional costs” borne by applicants as a result of the application of the innovative technology related to GHG emissions avoidance

Methodologies

Levelised cost

1a 1b 1c

Levelised cost: for most projects RC should be based on the difference between the levelised cost of producing an output unit with the new technology compared to the cost of producing a reference product, using its current market price (“reference price”)

Reference plant

2

Reference plant: “fall-back” option in case the project includes processes generating intermediate or multiple products, or where market prices cannot be easily established and no substitute products exist and internal cost data deliver more reliable results

No reference

3

No reference scenario: “last-resort” option in exceptional cases if there is no reference product or conventional technology available as reference to compare the project with

Key principles

1 Levelised cost methodology

- **“Default” methodology**
- General principles: if identifiable final product and existence of a product reference price
- Approach: based on levelised unit cost, which is cost of one unit of production over the **full project lifetime**. Note that financing costs are captured by the WACC
- **Suitable for most projects using different variants of the methodology:**
  - Energy/electricity generation 1a
  - Product manufacture from energy intensive industries 1b
  - Manufacture of innovative renewable or storage technology components from a new production facility 1b
  - Electricity storage 1c

Key principles

2 Reference plant methodology

- **“Fall back” methodology**
- General principles: existence of a reference plant (ETS benchmark installation in the case of industrial products or fossil fuel equivalent for renewable electricity/heat) and reliable cost data for the reference plant
- Approach: based on project CAPEX, OPEX, Operational Benefits and Revenues compared to the best estimate of the same parameters of a Reference Plant using conventional technology and with similar product and similar location to the project, where applicable. Revenues defined as all sources of revenues generated by the project, excluding operational benefits and external benefits outside the project boundary.
- **Suitable for projects where market prices cannot be easily established and no substitute products exist and where internal cost data deliver more reliable results**

Key principles

3 No reference plant methodology

- **“Last resort” methodology**
- General principles: no comparable conventional reference plant exists – either in the EU (EU ETS benchmark installation for industrial products) or globally; and no reference product exists
- Approach: based on the best estimate of CAPEX and NPV of OPEX, Operational Benefits and Revenues arising over the first ten years of operation.
- **“Last resort” for projects where no reference product or conventional technology is available as reference**

Key principles

General assumptions applicable to all methodologies

Carbon price and OPEX inflation

Updated

- **Carbon price:** applicants are instructed to use average price of 2020 and 2021 (EUR 34/tCO_2). However, they could use higher carbon prices if deemed appropriate and with a justification provided. Evaluators to consider whether the assumptions are realistic.

- **OPEX inflation:** average of 2019 and 2020 to be used based on harmonised indices of consumer prices (HICP) of Member States in Annex B.

The projections should be consistent with those used in the financial model

Non-eligible costs

- **Terminal value:** no value beyond the asset useful lifetime
- **Stranded assets:** write down of assets related to existing technologies are excluded
- **Decommissioning costs:** acceptable if during first ten years (e.g. for demo projects)

Methodology

1a Levelised Cost of Energy (LCOE)

Approach

Generates unit cost over the project lifetime which is compared to the reference price

Reference

Reference price is the long-term market price for either power or heat. Default choice is two-year historic average price, but applicants may propose alternative if appropriately justified

Formula

LCOE = [present value of the costs over the full project lifetime]/discounted number energy units produced (MWh) over the full project lifetime

$$LCOE\left[\frac{€}{MWh}\right] = \frac{CAPEX + \sum_n^N \frac{O\&M\ cost}{(1+r)^n} + \sum_n^N \frac{Fuel\ cost}{(1+r)^n}}{\sum_n^N \frac{Elec_{Produced}}{(1+r)^n}}$$

Where: r = discount rate (WACC)
n = the year
N = lifetime

Note: no fuel cost in most renewables projects

European Commission

Methodology

1b Levelised Cost of Product (LCOP)

Approach

Same approach as LCOE

Reference

Same as for LCOE except that reference price is now the long-term market price for the product the project is seeking to compete with or displace. Default choice is 2-year historic average price

Formula

LCOP = [present value of the costs over the full project lifetime]/discounted number product units produced over the full project lifetime

$$LCOP\ \left[\frac{€}{Product}\right] = \frac{CAPEX + \sum_n^N \frac{O\&M\ cost}{(1+r)^n} + \sum_n^N \frac{Fuel\ cost, Materials\ cost\ etc.}{(1+r)^n}}{\sum_n^N \frac{Units_{Produced}}{(1+r)^n}}$$

Where:
r = discount rate (WACC)
n = the year
N = lifetime

Methodology

1c Levelised Cost of Storage (LCOS)

Approach

Similar approach to LCOE/LCOP

Reference

Electricity storage technologies can be used in numerous applications. In contrast to LCOE and LCOP, the methodology incorporates revenue streams from each specific storage 'use case' to determine the reference price (based on current prices and volumes for each service)

Formula

LCOS = [present value of the costs over the full project lifetime]/discounted discharged electricity (MWh) for a specific storage technology and application over the project lifetime

$$LCOS\left[\frac{€}{MWh}\right] = \frac{CAPEX + \sum_n^N \frac{O\&M\ cost}{(1+r)^n} + \sum_n^N \frac{Charging\ cost}{(1+r)^n}}{\sum_n^N \frac{Elec_{Discharged}}{(1+r)^n}}$$

Where:
r = discount rate (WACC)
n = the year
N = lifetime

Methodology

OPEX adjustment to the Levelised Costs

- Rationale: to be in line with the IF Delegated Regulation, the share of OPEX after 10 years has to be excluded from the relevant costs calculation.

- Approach: estimate the share of the project's discounted OPEX beyond 10 years out of the sum of CAPEX and discounted OPEX over the project lifetime ('discounted costs'). To derive the relevant costs, use this percentage to adjust the discounted costs of the project and of the reference scenario.

Methodology

2 Reference plant (*)

Approach

- Establish the reference plant based on the product produced, not sector
- Use benchmark plant under the EU ETS if such a plant exists
- In first instance from Member State where project is located, or else a EU installation or, if that does not exist, internationally

Formula

RC = difference in CAPEX and NPV of OPEX net of Revenues and Operational Benefits over a 10-year period between the project and reference plant

$$\begin{aligned} &Relevant\ costs \\ &= (project\ CAPEX\ - reference\ plant\ CAPEX) + (PV\ project\ OPEX\ - PV\ reference\ plant\ OPEX) \\ &-\ (PV\ project\ Operational\ Benefits\ - PV\ reference\ plant\ Operational\ Benefits\ ) \\ &-\ (PV\ project\ Revenues\ - PV\ reference\ plant\ Revenues) \end{aligned}$$

(*) Fall-back methodology when no reference unit cost or reference product price is available

Methodology

3 No reference plant (*)

Approach

- Mimics the reference plant model approach, however applicants do not include reference plant data

Formula

RC = best estimate of CAPEX and NPV of OPEX net of Revenues and Operational Benefits of the project over a 10-year period

$$Relevant\ costs = project\ CAPEX + NPV\ (project\ OPEX\ - project\ Operational\ Benefits\ - project\ Revenues)$$

(*) Last resort methodology when conventional production does not exist. Applicants must justify in detail why it was not possible to apply another methodology

LCOP hypothetical project - Key inputs (1)

Key inputs

Capacity	100,000	**tpa**
Reference price	100	**EUR/ton**
Premium to reference price	10	**EUR/ton**

Date of financial close	31-Dec-22	
Construction costs	25,000	**EURk**
Construction period	1	**year**
Project lifetime	20	**years**

	Construction	**Operation year 1**
Production ramp up	0%	100%
Cost indexation	2%	

LCOP hypothetical project - Key inputs (2)

Key inputs

Operational benefits		
Carbon emission allowances sold	2,660	**Tons/year**
Carbon price	34	**EUR/ton**
Operating costs - variable		
O&M and other variable costs	10	**EUR/ton**
Feedstock	50	**EUR/ton**
Total	60	**EUR/ton**
Operating costs - fixed		
Fixed opex	1,500	**EURk/year**
Total opex	7,500	**EURk/year**
Maintenance capex	No maintenance capex assumed	

LCOP hypothetical project – use of WACC

- **Step 3:** Determine the number of units forecast to be produced by the project over the lifetime of the project
- **Step 4:** Discount the OPEX and units produced over the project lifetime using the WACC (see table)
- **Step 5:** Divide the CAPEX plus Present Value of the OPEX (the "total Discounted costs") by the total discounted Units produced over the full project lifetime (the "Levelised cost")

WACC calculation	
Cost of equity	14.0%
Cost of debt	4.0%
Equity percentage	40.0%
Debt percentage	60.0%
Corporation tax rate	28.0%
WACC	**7.33%**

LCOP hypothetical project – cost difference

- **Step 6:** Establish the difference between the:

  a) Levelised cost calculated for new product (115.59 EUR/ton)

  b) Reference product price (100 EUR/ton); and

  c) Adjustment for green price premium (10 EUR/ton)

  = 5.59 EUR/ton

Discount rate (WACC)	7.33%	
Discounted costs	111,246	EURk
Lifetime production discounted	962,398	tons
Levelised costs	115.59	EUR/ton
Reference product price	100	EUR/ton
'Green' price premium	10	EUR/ton
Difference	5.59	EUR/ton

LCOP hypothetical project – relevant cost

- **Step 7:** Multiply the cost difference (EUR 5.59/ton) by the discounted units produced over the full project lifetime
- **Step 8:** Calculate percentage of discounted costs that the discounted OPEX after 10 years of operation represents
- **Step 9:** Multiply difference by 1-OPEX % after 10 years to derive the **relevant cost = EUR 3.8m**
- **Step 10:** Apply IF's 60% maximum intervention rate to relevant cost to derive project's **maximum grant award level = EUR 2.3m**

Opex adjustment (substract OPEX percentage after 10 years)		
Date after 10 years of operations	31 Dec 33	
NPV of Opex beyond 10 years	32,384	EURk
Percentage of discounted costs	29.1%	
Cost gap	5.59	EUR/ton
Lifetime production discounted	962,398	
Relevant Cost	3,816	k EUR
Maximum IF grant	2,289	k EUR

Weighted Average Cost of Capital (WACC)

Key principles

- WACC is applied to discount future revenue income and cost streams over the project lifetime to make them comparable
- Applicants should calculate a project WACC based on cost of equity and cost of debt

Formula

$$WACC = E/V * Re + D/V * Rd * (1-Td)$$

Re = cost of equity
Rd = cost of debt
E/V = equity portion of total capital (Equity over total Value)
D/V = debt portion of total capital (Debt over total Value)
Td = Tax rate

Weighted Average Cost of Capital (WACC)

Approach

- Cost of equity:

$$Re = Rf + (\beta * MRP) + IP$$

  - Rf = risk free rate
  - β = beta of the project
  - MRP = market risk premium
  - IP = innovation premium

- Cost of debt:

$$Rd = base\ rate + credit\ spread$$

Estimation

Equity return expectations typically are in the **8-16% range**

- Rf: data from Eiopa[1] or LT Government yield of country of operations
- β: take the sector average beta. Please refer to IF call Annex B (in annex 2) or Damodaran's website[2]. For simplicity we assumed the standard leverage of the sector to be similar to the project
- MRP: Damodaran's website[2].
- Innovation premium: if innovation leads to risks that go beyond the conventional sector. As default, a value of 3% should be applied

Updated

- Base rate: bank lending rate consistent with the average maturity of the project debt. Please note that even if swap rates can be negative, banks will not lend money at negative rates
- Credit spread: default range of 150 to 650 basis points over base rate, or else use the credit spread of BBB- to C

1) https://www.eiopa.europa.eu/tools-and-data/risk-free-interest-rate-term-structures_en)
2) http://pages.stern.nyu.edu/~adamodar/