

STEPPING - Supporting The EPC Public Procurement IN Going-beyond

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EPC SIMULATION TOOL MANUAL

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INTRODUCTION

The main objective of the EPC Simulation Tool is to find different investment scenarios to balance public and private interest in making the investment.

The profitability of the investment is assessed by a number of economic parameters such as Profitability Index, Net Present Value, Internal Rate of Return.

The variables that can make the investment attractive are:

- Duration of contract
- Thermal energy saving rate
- Electric energy saving rate
- Fee on baseline cost.

The tool was designed to assess an investment plan of a building bundle.

FUNCTIONING OF THE EPC SIMULATION TOOL

In the general functioning of the tool the user can only fill the white cells, which are unlocked, as all other cells are locked. Grey cells are prefilled or automatically calculated.

The specific functioning of the EPC Simulation Tool will be described below as we explain each worksheet of the Tool.

Building Baseline WorkSheet

In this first worksheet, the user should input the baseline data concerning all the public buildings to be bundled in a joint Investment Plan.

The user should read the worksheet by row because each row is related to a single public building.

First of all, the user should specify the name of the building and of the building administrator. In addition to that the user should indicate:

- Surface,
- Volume heated,
- Designated use of the building.

For the designated use of the building, the tool displays a drop-down menu listing different choices (i.e. school, swimming pool, offices, etc.). The user should also specify all the annual data concerning the baseline, such as energy heating consumption and energy heating annual costs, by each energy vector

used (methane, wood biomass/pellets, wood biomass/chips, district heating, diesel, LPG, electric) and, finally, the O&M annual cost.

This operation must be repeated for each public building to be included in the Investment Plan. Thus, the outputs provided by the tool will be based on the bundle and not on the single building.

[illegible]

Fig 1. Building baseline worksheet

BUILDINGS				
P.A.	buildings	surface	volume heated	use
		m ²	m ³	
envi	SCUOLA PRIMARIA PRINCIPI DI PIEMONTE	22764	126495	office
TOTAL		22.764	126.495	

Fig 2. Building baseline worksheet – buildings general description.

Fig 3. Building baseline worksheet – energy consumption and cost baseline.

In the second worksheet the user is required to indicate the achievable energy savings rate that is estimated after the implementation of the proposed energy efficiency measurement. It is worth noting that the user must have a good knowledge of the buildings and of their features in order to input such data, and that a preliminary energy audit is required for the estimation.



 Project co-financed by the European Regional Development Fund

Fig 4 Buildings energy savings worksheet

Input Data WorkSheet

This worksheet contains some general input data.

First of all, the tool displays the cost for the Public Administration of each energy vector, which is obtained from a calculation of the data for annual consumption and annual energy cost.

Besides, the user can insert supposed ESCO energy cost (for each energy vector). This could be the same as the current cost paid by the Public Administration, or different, if it can be established that ESCO would supply at different prices.

In this worksheet the user can also enter the cost that the ESCO has to be incurred: Performance Measurement and Verification Protocol (PMVP) and the cost for tender, both as a rate of the investment.

Moreover, the data to be entered concerning financial and economic parameters are (all expressed as a percentage, except the mortgage duration, in years):

- Bank interest rate
- Inflation rate
- Energy carrier inflation rate
- ESCO business profit
- Mortgage duration (in years)
- Equity
- Taxes on profits

As a consequence, the tool will calculate the Weighted Average Cost of Capital (WACC) and also the WACC before taxes.

INPUT DATA			
P.A. energy cart	energy carrier	unit price	U.M.
average unit cart	methan	0,700	l/m3
average unit cart	wood biomass (pellets)		l/t
average unit cart	wood biomass (chips)		l/t
average unit cart	district heating		l/kWh
average unit cart	diesel		l/t
average unit cart	LPG		l/t
average unit cart	electricity		l/kWh
ESCO energy cart	energy carrier	unit price	U.M.
average unit cart	methan		l/m3
average unit cart	wood biomass (pellets)		l/t
average unit cart	wood biomass (chips)		l/t
average unit cart	district heating		l/kWh
average unit cart	diesel		l/t
average unit cart	LPG		l/t
average unit cart	electricity		l/kWh
PMVP			%
tender cart			%
financial and economic parameters			
bank interest rate		2,00%	%
discount rate		2,00%	%
inflation rate		2,00%	%
energy carriers inflation rate		2,00%	%
ESCO business profit		25,00%	%
mortgage duration		10	years
		10	years
EQUITY		30,0%	%
tax on profits		24,0%	%
WACC (before taxes)		8,90%	%
WACC		8,56%	%
energy conversion	U.M.	kWh/UM	
methan	m ³	9,59	
pellets	t	4900	
wood chips (25% humidity)	t	3840	
diesel	l	9,17	
LPG	l	6,52	

Fig 5 Input data worksheet

Scenarios WorkSheet

This worksheet will show total thermal energy savings and electric energy savings, both calculated from the baseline data and energy savings percentage entered in the previous worksheet.

The user should enter the data concerning the:

- Total value of investment (in €)
- Value of subsidy (in €)
- Duration of subsidy
- Fee on baseline cost (to be paid to the ESCO) (in %)
- EPC contract duration (in years)

As regards the value of subsidy, the user shall input the overall amount expected to be received and the number of years (Duration of subsidy) in which such amount will be split. For example, for a capital grant to be received in a single stage, the duration of the subsidy will be 1. In the case of subsidy lent pro-quota over years, for example 100,000 € to be received in 5 years, i.e. 20,000 €/y, the Value of subsidy will be 100,000, whereas the Duration will be 5.

As far as the fee on baseline cost is concerned, the percentage to be input is the share of the total baseline energy and O&M costs paid to ESCO as a fee. This could be 100% or less, in order to reduce the costs for the public sector.

On the basis of the above data, we can develop various scenarios with different conditions in terms of investments, contract duration, economic savings for the public administration, etc.

The EPC Simulation Tool will show some economic indicators (Net Present Value – Internal Rate of Return – Debt Service Coverage Ratio – Profitability Index) that will highlight the profitability of the investment. In fact, the field will turn green if the parameters are attractive to the ESCOs or red if not.

To allow a comparison between different investment scenarios, the EPC Simulation Tool will enable the user to save up to five different scenarios at the same time, including all the data concerning energy savings targets, the value of the investment, the fee on baseline cost, the EPC duration contract and all the economic indicators described above.

In this way it is possible to display different investment options to facilitate the selection of the best choice.

EPC SIMULATION TOOL			
INPUT DATA			
energy parameters			
total thermal energy saving	%		0,00%
total electric energy saving	%		0,00%
investment and subsidy			
value of investment	I		200.267,43
value of subsidy	I		20.000,00
duration of subsidy	T		5
duration of subsidy	T		5
financial and economic parameters			
fee on baseline cost	%		100,00%
EPC DURATION			
EPC contract duration	year		14
ECONOMIC INDICATORS			
Net Present Value (NPV)	I		-100.426,22
Internal Rate of Return (IRR)	%		#NUM!
Debt Service Coverage Ratio (DSCR)			0,1
NPV/INVESTMENT	%		-50,00%

	Save scenario 1	Save scenario 2	Save scenario 3	Save scenario 4	Save scenario 5
energy parameters					
thermal energy saving	%				
electric energy saving	%				
investment and subsidy					
value of investment	I				
financial and economic parameters					
fee on baseline cost	%				
EPC DURATION					
EPC contract duration	y				
economic indicators					
Net Present Value (NPV)	I				
Internal Rate of Return (IRR)	%				
Debt Service Coverage Ratio (DSCR)					
NPV/INVESTMENT	%				

Fig 6 scenario worksheet

EPC SIMULATION TOOL			
INPUT DATA			
energy parameters			
total thermal energy savings	%	30,00%	
total electric energy savings	%	0,00%	
investment and subsidy			
value of investments	€	10.000,00	
value of subsidy	€	5.000,00	
duration of subsidy	Y	5	
	Y	5	
financial and economic parameters			
fee on basline cost	%	100,00%	
EPC DURATION			
EPC contract duration	years	10	
ECONOMIC INDICATORS			
Net Present Value (NPV)	€	2.165,35	
Internal Rate of Return (IRR)	%	13,69%	
Debt Service Coverage Ratio (DSCR)		2,0	
NPV/INVESTMENT	%	20,62%	

Fig 7 scenario worksheet – input data and economic indicators result

	Save scenario 1	Save scenario 2	Save scenario 3	Save scenario 4	Save scenario 5
energy parameters					
thermal energy savings	36,08%	36,08%	36,08%		
electric energy savings	20,11%	20,11%	20,11%		
investment and subsidy					
value of investments	728.800,00	728.800,00	728.800,00		
financial and economic parameters					
fee on baseline cost	100,00%	90,00%	95,00%		
EPC DURATION					
EPC contract duration	12	12	12		
economic indicators					
Net Present Value (NPV)	427.933,93	-410.314,49	8.809,72		
Internal Rate of Return (IRR)	8,17%	-6,01%	2,14%		
Debt Service Coverage Ratio (DSCR)	3,1	1,5	2,3		
NPV/INVESTMENT	54,37%	-52,13%	1,12%		

Fig 7 scenario worksheet – scenarios

Cash Flow WorkSheet

In the cash flow worksheet, the user can view a summary of all the information concerning the investment of the project for the latest data entered in the previous sheet. Cash flow data are provided on a 30-year basis.

YEAR		0	1	2	3	4	5	6	7	8	9	10
COST												
tender cost	3%	21.864,00										
administrative cost			20.962,99	21.366,44	21.777,96	22.197,71	22.625,86	23.062,56	23.508,00	23.962,35	24.425,79	24.898,50
management cost			11.270,43	11.487,34	11.708,58	11.934,25	12.164,44	12.399,23	12.638,71	12.882,99	13.132,15	13.386,29
works		728.800,00										
thermal energy cost			207.142,02	211.284,86	215.510,56	219.820,77	224.217,18	228.701,53	233.275,58	237.941,07	242.699,89	247.553,89
electric energy cost			443.411,42	452.279,65	461.325,24	470.551,75	479.962,78	489.562,04	499.353,28	509.340,35	519.527,15	529.917,70
PMV			2.231,77	2.276,41	2.321,94	2.368,37	2.415,74	2.464,06	2.513,34	2.563,60	2.614,88	2.667,17
O&M			268.451,25	273.820,28	279.296,68	284.882,61	290.580,27	296.391,87	302.319,71	308.366,10	314.533,43	320.824,09
design cost	executive project	18.220,00										
	construction management	18.220,00										
TOTAL COST		787.104,00	953.469,88	972.514,97	991.940,96	1.011.755,47	1.031.966,27	1.052.581,29	1.073.608,60	1.095.056,46	1.116.933,28	1.139.247,64
REVENUE												
incentives			8.500,00	8.500,00	8.500,00	8.500,00	8.500,00	8.500,00	8.500,00	8.500,00	8.500,00	8.500,00
FEE			1.138.145,00	1.160.907,90	1.184.128,06	1.207.808,58	1.231.964,75	1.256.604,05	1.281.736,13	1.307.370,85	1.333.518,27	1.360.188,63
TOTAL REVENUE		0,00	1.146.645,00	1.169.407,90	1.192.626,06	1.216.308,58	1.240.464,75	1.265.104,05	1.290.236,13	1.315.870,85	1.342.018,27	1.368.688,63
EBIT (Earnings Before Interests and Taxes)		-787.104,00	193.175,12	196.892,93	200.685,10	204.553,11	208.498,48	212.522,76	216.627,53	220.814,39	225.084,98	229.440,99
mortgage payment	BANK		67.929,96	67.929,96	67.929,96	67.929,96	67.929,96	67.929,96	67.929,96	67.929,96	67.929,96	67.929,96
Total financial cost			67.929,96	67.929,96	67.929,96	67.929,96	67.929,96	67.929,96	67.929,96	67.929,96	67.929,96	67.929,96
bank financing		550.972,80										
equity		236.131,20										
Total financial revenue		787.104,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Financial cash flow		787.104,00	-67.929,96	-67.929,96	-67.929,96	-67.929,96	-67.929,96	-67.929,96	-67.929,96	-67.929,96	-67.929,96	-67.929,96
EBT (Earnings Before Taxes)		0,00	125.245,16	128.962,97	132.755,14	136.623,15	140.568,52	144.592,80	148.697,57	152.884,43	157.155,03	161.511,04
taxes on EBT		0,00	30.058,84	30.951,11	31.861,23	32.789,56	33.736,45	34.702,27	35.687,42	36.692,26	37.717,21	38.762,65
ANNUAL NET INCOME		0,00	95.186,32	98.011,86	100.893,91	103.833,59	106.832,08	109.890,53	113.010,15	116.192,17	119.437,82	122.748,39
PROGRESSIVE NET INCOME		0,00	95.186,32	193.198,18	294.092,08	397.925,68	504.757,76	614.648,29	727.658,44	843.850,60	963.288,43	1.086.036,81