
SEERMAP

South-East Europe Electricity Roadmap

Technics of financial assessment of an infrastructure project

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Main focuses of the corporate (TSO) level financial assessment

- Identify the investment costs of the project including the material and financial costs of investment;
- Model the effects of the new infrastructure on the operational costs and revenues of the TSO;
- Check the TSO's general financial capabilities to finance the fixed asset investment;
- Measure the effects of the regulatory regime on the added value of the project.

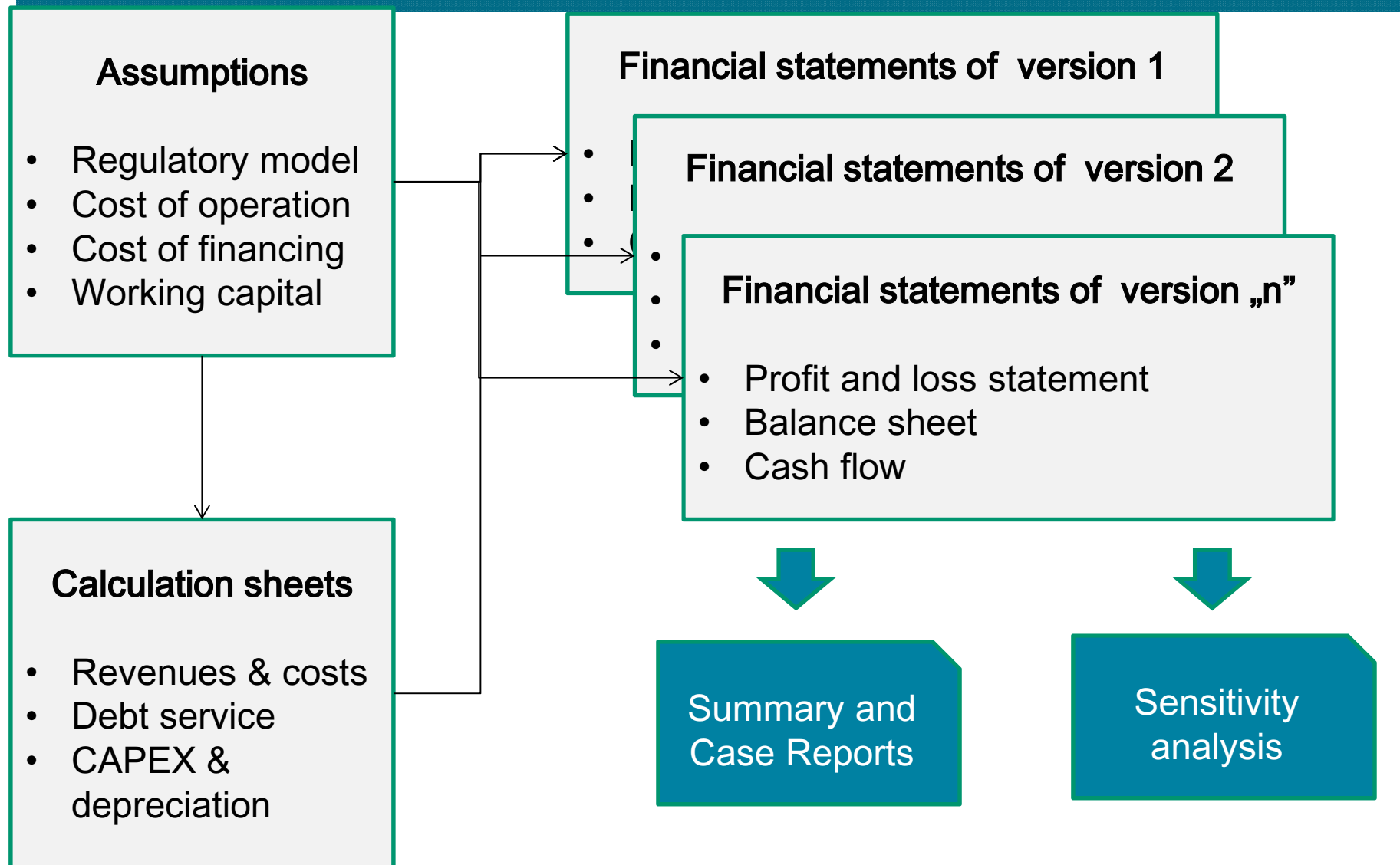
Infrastructure project benefit categories of the ENTSO-E Guideline

Benefit categories in ENTSO Guideline	Effects on TSO level	Consideration in the corporate level model	Comments
B1. Improved security of supply-	Partial	Through decreasing O&M costs	Newer infrastructure reduces the cost of maintenance
B2. Socio-economic welfare (SEW)	Partial	Effects of rent change calculated in corporate model. All other SEW impacts considered in economic model	Rent change impact depends on regulatory regime.
B3. RES integration	None	Considered in economic model	No direct impacts on TSO level.
B4. Variation in losses	Partial	Considered in economic model	Better system quality reduces the cost of network losses- depends on regulation.
B5. Variation in CO2 emissions	None	Considered in economic model	No direct impacts on corporate level
B6. Technical resilience/system safety	YES	Higher technical capabilities calculated in investment cost of fixed assets	Direct effects on TSO through cost of capital
B7. Flexibility	Partial	Higher technical capabilities calculated in investment cost of fixed assets	Direct effects on TSO through cost of capital

Infrastructure project cost categories of the ENTSO-E Guideline

Cost categories in the ENTSO-E Guideline	Consideration in the corporate (FA) model	Comments
Expected cost for materials and assembly costs	Yes- cost of investment	Input from system study
Expected costs for temporary solutions which are necessary to realize a project	Yes- cost of investment	Input from system study
Expected environmental and consenting costs	Partial	Expropriation, compensation for forest cutting
Expected costs for devices that have to be replaced within the given period	None	Calculated depreciation would finance the required replacements
Dismantling costs at the end of life of the equipment	Limited	Conservative calculation of residual value partially considered.
Maintenance costs and costs of the technical life cycle	Yes	

Detailed structure of a financial assessment model



General methodology of measuring the costs and revenues

ENTSO-E Guideline expressions on calculation method: *„All costs and benefits are discounted to the present, and expressed in the price base of that year.”*

Our model's main methodological characteristics:

- based on a **discounted cash flow (DCF)** method;
- uses the **net present values (NPV)** of the project as a main indicator to demonstrate the key economic impacts;
- all figures are in **nominal terms**
- **Discount rates are in nominal terms.** The ENTSO-E Guideline declares: *the discount rate can be calculated as a real or a nominal rate. However, this choice must be consistent with the valuation of costs and benefits: real prices imply real rates, nominal prices imply nominal rate.*

Estimation of the attractiveness of an investment opportunity - DCF method

Discounted cash flow method based on future free cash flows generated by the planned project.

NPV: difference of cash inflows and cash outflows.

$$NPV = \sum_{t=1}^n \frac{FCFE_t}{(1 + r_{E_t})^t}$$

where $FCFE$ is the free cash flow to equity; r_{E_t} is the return expected by the shareholders in the t^{th} year.

$$WACC = r_E \frac{E}{V} + r_D (1 - T_c) \frac{D}{V}$$

where E is equity, D is the stock of liabilities subject to interest (loans), V is the aggregate value of equity and loans, and T_c is the corporate tax rate.

In the financial assessment we simulate the most probable impacts of the regulatory regime on the costs and income of the TSO. The simulation applies the general equation of the RoR framework as the following:

$$RR_n = OE_n + D_n + T_n + (RAB * RoR)_n$$

where: RR_n means the required revenue of the project for period 'n'; OE means the operating expenses; D means the depreciation expense; T means the tax expense; RAB means the regulated assets base and RoR means the rate of return.

We can calculate the project level required revenue on the following way:

1. “Pass-through cost elements”, including:
 - O&M costs
 - Cost effects of the rent differences comparing the current situation.
 - Other project related costs
 - Depreciation.
2. Corporate tax
3. WACC*RAB

Information from publicly available sources

1 - Calculation of return on equity

Enter the current risk premium for a mature equity market	6,00%	Updated February 11, 2016
Do you want to adjust the country default spread for the additional volatility of the equity	Yes	
If yes, enter the multiplier to use on the default spread (See worksheet for volatility num	1,39	Updated February 11, 2016

Country	Moody's rating	Rating-based Default Spread	Total Equity Risk Premium	Country Risk Premium	Sovereign CDS, net of US	Total Equity Risk Premium	Country Risk Premium
Albania	B1	4,99%	12,95%	6,95%	NA	NA	NA
Bosnia and Herzegovina	B3	7,21%	16,05%	10,05%	NA	NA	NA
Bulgaria	Baa2	2,11%	8,94%	2,94%	1,81%	8,52%	2,52%
Croatia	Ba1	2,77%	9,86%	3,86%	3,00%	10,18%	4,18%
Germany	Aaa	0,00%	6,00%	0,00%	0,00%	6,00%	0,00%
Greece	Caa3	11,08%	21,44%	15,44%	NA	NA	NA
Hungary	Ba1	2,77%	9,86%	3,86%	1,76%	8,45%	2,45%
Macedonia	Ba3	3,99%	11,56%	5,56%	NA	NA	NA
Montenegro	Ba3	3,99%	11,56%	5,56%	NA	NA	NA
Romania	Baa3	2,44%	9,40%	3,40%	1,35%	7,88%	1,88%
Serbia	B1	4,99%	12,95%	6,95%	NA	NA	NA

$$r_E = r_f + \beta(r_m - r_f)$$

r_E return on equity, r_f risk free rate, r_m return on market

Information from publicly available sources 2 – betas and D/E ratios

Europe

<i>Industry Name</i>	<i>Number of firms</i>	<i>Beta</i>	<i>D/E Ratio</i>	<i>Tax rate</i>	<i>Unlevered beta</i>
Coal & Related Energy	21	0,83	50,64%	7,07%	0,57
Green & Renewable Energy	48	1,24	124,34%	12,79%	0,60
Oil/Gas (Integrated)	15	1,89	64,86%	20,56%	1,24
Oil/Gas (Production and Exploration)	133	2,02	179,05%	3,90%	0,74
Oil/Gas Distribution	34	1,72	106,31%	7,04%	0,87
Utility (General)	20	1,13	106,35%	23,58%	0,62

~ 52% debt and 48% equity

Emerging markets

<i>Industry Name</i>	<i>Number of firms</i>	<i>Beta</i>	<i>D/E Ratio</i>	<i>Tax rate</i>	<i>Unlevered beta</i>
Utility (General)	12	0,83	226,13%	12,47%	0,28

~ 69% debt and 31% equity

How to define the proper beta?

<i>Industry Name</i>	<i>Number of firms</i>	<i>Beta</i>	<i>D/E Ratio</i>	<i>Tax rate</i>	<i>Unlevered beta</i>
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What is this data?	Beta, Unlevered beta and other risk measures	Western Europe
Home Page:	http://www.damodaran.com	
Data website:	http://www.stern.nyu.edu/~adamodar/New_Home_Page/data.html	

$$B_U = \frac{B_L}{[1 + (1 - T_C) \times (D/E)]}$$

Description of Electricity Dummy Project (BG-RO new OHL line)

The dummy project: a new 400kV OHL between Romania and Bulgaria

Capacity: the new OHL increases the NTC by 1000 MW in both directions

Commissioning year: 2020

Investment costs:

BG: 10 m€ in 2018; 20 m€ in 2019, 20 m € in 2020

RO: 10 m€ in 2018; 20 m€ in 2019, 20 m € in 2020

Operation cost: from 0.7% up to 2.2% based on investment value of the infrastructure

NPV on TSO level has a limited focus compared to economic assessment

Components of Net Present Value (NPV) calculation:

$$\text{NPV} = \text{CS} + \text{PS} + \text{Rent} + \text{Value of losses} + \text{EENS} - \text{OPEX} - \text{Investment cost}$$

- ❖ CS: Consumer surplus change in the countries of the area of analysis
- ❖ PS: Producer surplus change in the countries of the area of analysis
- ❖ **Rent: Rent change in the countries of the area of analysis**
- ❖ Value of losses: Value of loss change in the countries of the area of analysis
- ❖ EENS: Value of Expected Energy Not Supplied change
- ❖ **OPEX: Operation and Maintenance cost change due to the project**
- ❖ **Investment cost: verified investment cost**

Reports and sensitivity analysis

Typical indicators required by the financial partners (banks)

- IRR
- DSCR (Net operating income / Total debt service)
- EBITDA/net interest
- Net debt/EBITDA

Sensitivity analysis

Potential impacts of several key parameters on the financial results of the TSO:

- 1) Overall financial cost environment
- 2) Cost overrun of investment
- 3) „Quality of regulation”

Teamwork with the demo model...