

TE-Ch5.1_REN-Hydro-Ex-5-1 to 5-2.xls
WACC

Item	Unit	Eigenkapital	
		Equity	Debt
Asset shares	%	20	80.0
Rates after tax			
Risk-free return rates	% /a	5.0%	5.0%
Venture premium	% /a	5.0%	0.0%
Sub total after tax	% /a	10.0%	5.0%
Corporate tax	25%	3.3%	0.0%
Pretax cost of capital	% /a	13.3%	5.0%
Weighted average cost of capital (WACC)	% /a	6.67%	
./ Inflation	% /a	2.0%	
WACCr in real terms	% /a	4.58%	

Values in cells in yellow can be changed

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Example 5-1_LEC_Hydro

Item	Unit	Run of River	Dam Hydro	Pump Storage
Technical Parameters				
Nominal power	MW	150	150	150
Load segment	-	base	Intermediate	peak
Typical full load utilization time	h / a	4,500	3,500	1,000
Annual electricity generation	GWh / a	675	525	150
Financial constraints				
Water head	m	20	200	250
Pumping electricity <small>eta=85.0%</small>	GWh / a	-	-	176
Pump utilization time	h / a	-	-	1,000
Cost of electricity for pumping	€ / MWh	-	-	30
Life time	a	50	50	50
Discount rate, in real terms	% / a	4.58%	4.58%	4.58%
Fixed OPEX	% Inv. / a	1.0	1.1	1.2
CAPEX, estimate, US\$ 2014, ±25%	Mio. €	525	600	675
specific	€ / kW	3,500	4,000	4,500
Annual electricity gen. Costs, in real terms				
Capital costs <small>4.58%/a 50 a</small>	Mio. € / a	26.9	30.7	34.6
Fixed OPEX	Mio. € / a	0.5	0.7	0.8
Variable Cost	Mio. € / a	-	-	5.3
Total annual costs	Mio. € / a	27.4	31.4	40.7
Levelized Electricity cost, real terms	€ / MWh	40.62	59.80	271.19
Capacity cost	€ / (KW a)	179.28	204.89	230.50
Variable cost	€ / MWh	-	-	35.29

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Example 5-2_LEC_Hydro

Item	Unit	Run of River	Dam Hydro	Pump Storage
Technical Parameters				
Nominal power	MW	150	150	150
Load segment	-	base	Intermediate	peak
Typical full load utilization time	h / a	4,500	3,500	1,000
Annual electricity generation	GWh / a	675	525	150
Financial constraints				
Water head	m	20	200	250
Pumping electricity <small>eta=85.0%</small>	GWh / a	-	-	176
Pump utilization time	h / a	-	-	1,000
Cost of electricity for pumping	€ / MWh	-	-	30
Life time	a	50	50	50
Discount rate, in real terms	% / a	4.58%	4.58%	4.58%
Fixed OPEX	% Inv. / a	1.0	1.1	1.2
CAPEX, estimate, US\$ 2014, ±25%	Mio. €	525	600	675
specific	€ / kW	3,500	4,000	4,500
Annual electricity gen. Costs, in real terms				
Capital costs <small>4.58%/a 50 a</small>	Mio. € / a	26.9	30.7	34.6
Fixed OPEX	Mio. € / a	0.5	0.7	0.8
Variable Cost	Mio. € / a	-	-	5.3
Total annual costs	Mio. € / a	27.4	31.4	40.7
Levelized Electricity cost, real terms	€ / MWh	40.62	59.80	271.19
Capacity cost	€ / (KW a)	179.28	204.89	230.50
Variable cost	€ / MWh	-	-	35.29

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Table 5-1 Cost Hydropwer

Item			Unit	Hydroelectric Dam Power Plant	Hydroelectric Pump Storage Power Plant
Technical parameters					
Nominal capacity			MW	500	250
Type of turbine			-	2 xFrancis	2 xFrancis
Minimum head			m	200	not specified
Financial parameters					
CAPEX			Mio. USD	1,468	1,322
Specific			USD / kW	2,936	5,288
Fixed OPEX			USD / kW a	14.13	18.00
Variable OPEX			USD / MWh	0	0
Annual costs					
Capital costs		5.50%/a 50 a	USD / kW a	173.40	312.32
Fixed OPEX			USD / kW a	14.13	18.00
Total fixed costs			USD / kW a	187.53	330.32

*) Source: eia – U.S. Energy Information Administration 2013