

Evaluate energy security costs based on volatilities in the system

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Topics for discussion

Volatilities examples

Cost of security

Conclusions

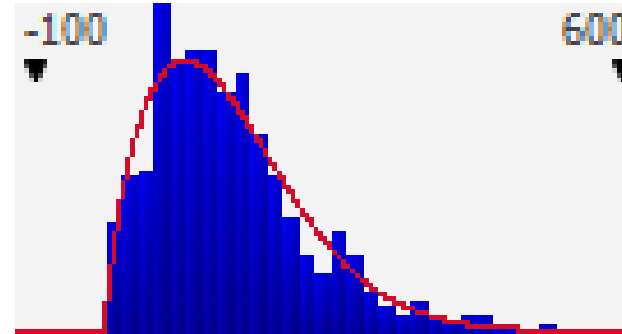
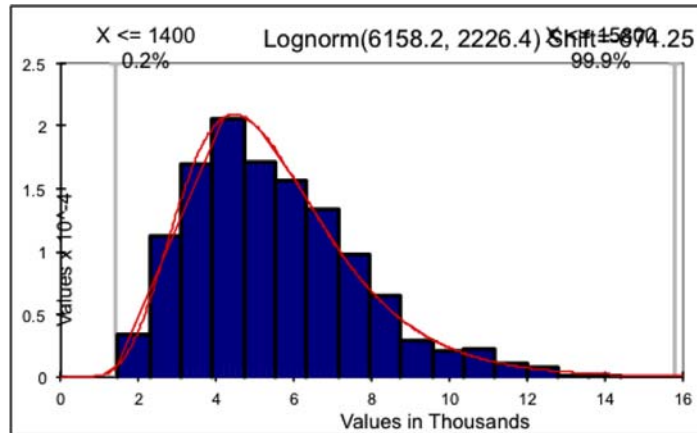
Internalizing the cost of security

The elements of energy security are part of the EU energy security strategy

Implementing an efficient energy security system induces costs that are different from the state aid as defined in the EU agreements.

Evaluation of the security costs may be done by considering the resilience of the system to volatilities of operational and economic parameters that have a significant impact on the budget.

Evaluation of necessary power based on volatilities



Needed security hydro run river

TWh 16

TWh run river 11.2

h/year 8760

exposure TWh 4.049183203

power MW 462.2355254

hidro lake

TWh 16

TWh lake 4.8

h/year 8760

exposure TWh 3.145310928

power MW 359.0537589

Financing scheme model for 600MW

	A	B	C	D	E	F	G	H	I	J		
1	financing	FI equity	loc. equity	Comm.loan	Exp.loan	LT loan	Bonds	TO: \$/KW	\$mm i10	\$mm i15	\$/K	
2								FI equity	0.00	0.00		
3	i	0.00	0.00	0.13	0.00	0.07	0.06	loc. equity	0.00	0.00		
4	N	8	8	5	15	15	10	Comm.loan	450.00	450.00	€	
5	PMT	0.00	0.00	269.47	0.00	162.76	72.03	Exp.loan	0.00	0.00		
6	capital \$/kWh	0.0720	0.8	utilization	\$/kW	PMT SUM	504.26	LT loan	850.00	850.00	12	
7	fixed op \$/kWh	0.0131	40.97	\$/KW	\$/kW	project life	259.13	Bonds	300.00	300.00	4	
8	var oper \$/kWh	0.0011				difference:	94.60%	Total	1600.00	1600.00	23	
9	fuel \$/kWh	0.0017	0.47	\$/MWh t	\$/kWh inv.	project life:	0.0370	cost adjustment ratio>		1.00		
10	TOTAL \$/kWh	0.0879	3.64	MWh t/MWh				\$mm cap	1600.00			
11	LIFE \$/kWh>>	0.0529	0.0350	B10-B11				-idc	0.00			
12	WDR	life	PV cap	PV fix op	PV var op	PV fuel	PV kWh	-pr.conting	0.00			
13	0.08452	50	3012.72	1068.30	89.63	139.85	81477.64	-wk.cap	0.00			
14	AFUDC = allowance for funds used during construction											
15	YTC = years to commissioning					i = interest or return rate			net capital			1600.00
16	WDR = weighted discount rate					N = years to maturity			MW			669.6
17	ERROR verifies i8 and i29					PMT = annual capital charge			\$/kW			2389.49
18	Capital charge unit components:											
19		FI equity	loc. equity	Comm.loan	Exp.loan	LT loan	Bonds	TOTAL				
20	\$/kWh>>>	0.0000	0.0000	0.0385	0.0000	0.0232	0.0103	0.0720				
21												
22	AFUDC calc.	FI equity	loc. equity	Comm.loan	Exp.loan	LT loan	Bonds	YTC	cashflow %			
23		0.00	0.00	92.81	0.00	79.51	25.39	5	0.15	All cost data \$/k		
24		0.00	0.00	71.15	0.00	62.92	20.15	4	0.15			
25		0.00	0.00	51.91	0.00	47.34	15.20	3	0.15			
26		0.00	0.00	34.82	0.00	32.73	10.54	2	0.15			
27		0.00	0.00	26.19	0.00	25.35	8.18	1	0.20			
28		0.00	0.00	8.22	0.00	8.18	2.65	0	0.20			
29	afudc/kW	0.00	0.00	285.09	0.00	256.03	82.11	623.23	1.00	1.00		
30	\$/kW <afudc	0.00	0.00	672.04	0.00	1269.41	448.03	2389.49				
31	\$/kW w. afudc	0.00	0.00	957.13	0.00	1525.44	530.14	3012.72				
32												
33	For WDR:	"i" weighted by PMT shares; N = 1										
34		FI equity	sp. equity	Comm.loan	Exp.loan	LT loan	Bonds	TOTAL				
35	PMT	0.00	0.00	1077.73	0.00	1625.36	561.95	3265.04				

Conclusions

Security costs of the system do not represent state aid

They must be evaluated and internalized in the energy system operation.

As an example supporting coal generation has a determinant role in providing the resilience of the energy system in crisis situations.

It is necessary to establish security costs extended at a regional level within the EU.

Thank you !

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