Evaluate energy security costs based on volatilities in the system

Prof.univ.Dr.ing.Dr.ec.
Ionut PURICA,
m.c.AOSR

Topics for discussion

Volatilities examples

Cost of security

Conclusions

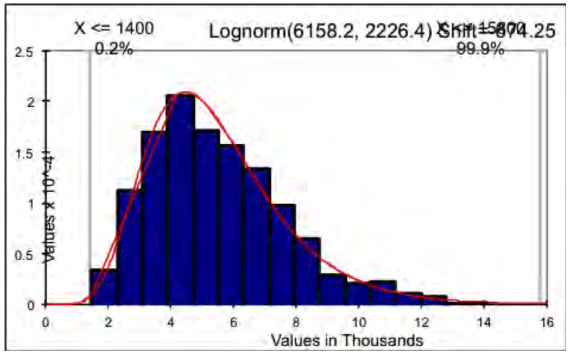
Internalizing the cost of security

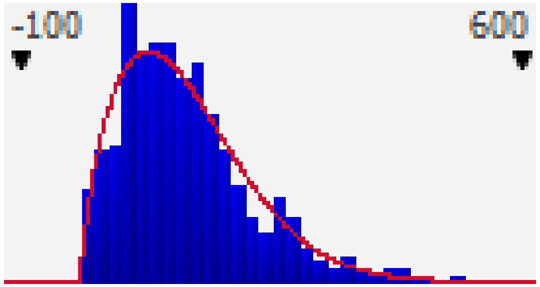
The elements of energy security are part of the EU energy security strategy

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

Eveluation 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							other adj	0.00		
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 suporting 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 !

Prof.I.Purica

ipurica@gmail.com