



Financial Impact of the Electricity Law Amendments for NCRE Projects

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Background conditions

- Power system based on the principle of technological neutrality (i.e. no positive discrimination);
- Aims to foster efficiency: Operation at the lowest possible cost;
- NCRE traditionally high related costs;
- Little or no experience in NCREs;
- Immature market: lack of experience, unknown methodologies of risk assessment;
- **RESULT:**
 - Strong dependency upon fossil fuel price fluctuations;
 - Very little use of NCRE.
 - NG supply shortages + high international oil prices = Problems!!

Legal Framework

- Entitlement of selling energy and power to the spot market regardless of size;
- Equal treatment to small scale generators (< 9 MW): Right to sell at the Mg system's cost and node prices;
- Legally guaranteed access to the grid for small scale generators;
- Complete/partial release of transmission toll fee for power plants less than 20 MW.
- 5% energy supplied to regulated customers by distributors must come from NCRE sources.
- Power recognition -even for wind- based on either historical records or expected forecast.
- Self-dispatch principle: releasing companies from dispatching energy beyond their generation capacity.

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In concrete

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Technology	Power		Energy Px	
	Without	With	Without	With
Wind	0%	<45%	0,9*node px	Mg Cost (Current or Node px)
Run-of-river	55%	55%	0,9*node px	Mg Cost (Current or Node px)
Biomass	85%	85%	0,9*node px	Mg Cost (Current or Node px)
Biogas	85%	85%	0,9*node px	Mg Cost (Current or Node px)

In concrete

Transmission lines for project type

Installed Capacity	Transmission Line	Line Length
6 MW	23 kV	10 km.
18 MW	66 kV	30 km.
60 MW	110 kV	50 km.

Assessment Scenarios: Base case projects

- **SING:**
 - Wind and Biogas (6, 18, and 60 MW);
 - Mejillones input sub-station;
 - Antofagasta & Iquique exit sub-station.
- **SIC:**
 - Wind, run-of-river, biomass and biogas (6, 18 and 60 MW);
 - Concepción and Valdivia input sub-station;
 - Pan de Azúcar, Cerro Navia and Charrúa exit sub-station.

Assumptions for project evaluation

Background	Transmission Line
Discount Rate	10%
Tax Rate	17%
CERs Px	10 US\$/Ton *
Time Frame	20 años

* CO2 certificates USD10/ton CO2eq between 2008-2012.
The period after USD8/ton CO2eq

Business models

- Model 1. Energy and power to the spot market:
 - Px energy: System's Mg cost
 - Px power: Node px of power
 - CO₂ certificates USD10/ton CO₂eq between 2008-2012. The period after USD8/ton CO₂eq
- Model 2: Energy and power PPA (non-regulated customers)
 - Px energy: 67 mills por kWh
 - Px power: 7 US\$/kW/mes
 - Input/output toll fee according to regulation
 - CO₂ certificates USD10/ton CO₂eq between 2008-2012. The period after USD8/ton CO₂eq
- Model 3: Selling to the distributor
 - Feed in to the grid in one point and selling to the distributor in another one
 - Px energy & power according to bidding conditions
 - Input toll fee according to regulation
 - Output sub-stations used by distributors
 - CO₂ certificates USD10/ton CO₂eq between 2008-2012. The period after USD8/ton CO₂eq

Results: SING

System	Technology	Model	Detail	6MW		18MW		60MW	
				IRR		IRR		IRR	
				Without	With	Without	With	Without	With
SING	Wind	1	Sell Spot Mejillones	10,27%	13,78%	9,17%	12,48%	9,11%	12,42%
		2	Input Mejillones Exit Antofagasta	8,26%	11,18%	7,35%	10,13%	7,41%	10,20%
		2	Input Mejillones exit Iquique	9,68%	12,84%	8,70%	11,71%	8,77%	11,79%
		3	Input Mejillones retiro de ELECDA	7,11%	10,06%	6,25%	9,06%	6,31%	9,13%
		3	Input Mejillones exit de ELIQSA	8,47%	11,65%	7,54%	10,58%	7,61%	10,65%
	Biogas	1	Sell Spot Mejillones	19,11%	22,39%	25,13%	27,90%	25,13%	27,90%
		2	Input Mejillones Exit Antofagasta	17,82%	20,42%	17,82%	20,42%	23,52%	25,76%
		2	Input Mejillones exit Iquique	20,66%	23,47%	20,66%	23,47%	25,97%	28,41%
		3	Input Mejillones retiro de ELECDA	15,99%	18,43%	21,83%	23,89%	21,97%	24,04%
		3	Input Mejillones exit de ELIQSA	18,71%	21,33%	24,13%	26,38%	24,28%	26,54%

Impact on the IRR:

- **Wind: Between 2,92% and 3,5% increase (Best so far: 12,42%; discount rate: 10%)**
- **Biogas: Between 2,6% and 3,2% increase (Best so far: 23,47%, discount rate: 10%)**
- **Greater effect on 6 MW projects due to toll fee exemption.**

Results SIC

WIND	Model	6 MW (IRR)		18MW (IRR)		60 MW (IRR)	
		Without	With	Without	With	Without	With
	1	8,04%	12,36%	7,56%	10,97%	7,56%	10,97%
	2	8,22%	12,55%	9,08%	12,75%	9,48%	13,02%
	3	10,39%	14,39%	9,46%	13,03%	9,54%	13,06%

IRR:

- Between 3,03% and 4,39% impact on the IRR
- Model 3 greater IRRs
- Need to consider impact of a line < 50 km and CERs selling px higher than USD 10/ton

Results SIC

	Model	6 MW (IRR)		18MW (IRR)		60 MW (IRR)	
		Without	With	Without	With	Without	With
Run of river	1	17,86%	20,98%	16,88%	18,99%	17,79%	18,81%
	2	17,76%	20,51%	16,91%	18,83%	17,01%	18,86%
	3	19,96%	22,86%	18,97%	21,06%	19,07%	21,11%

IRR:

- Between 1,62% and 3,02% impact on the IRR
- Need to consider impact of CERCs selling px higher than USD 10/ton

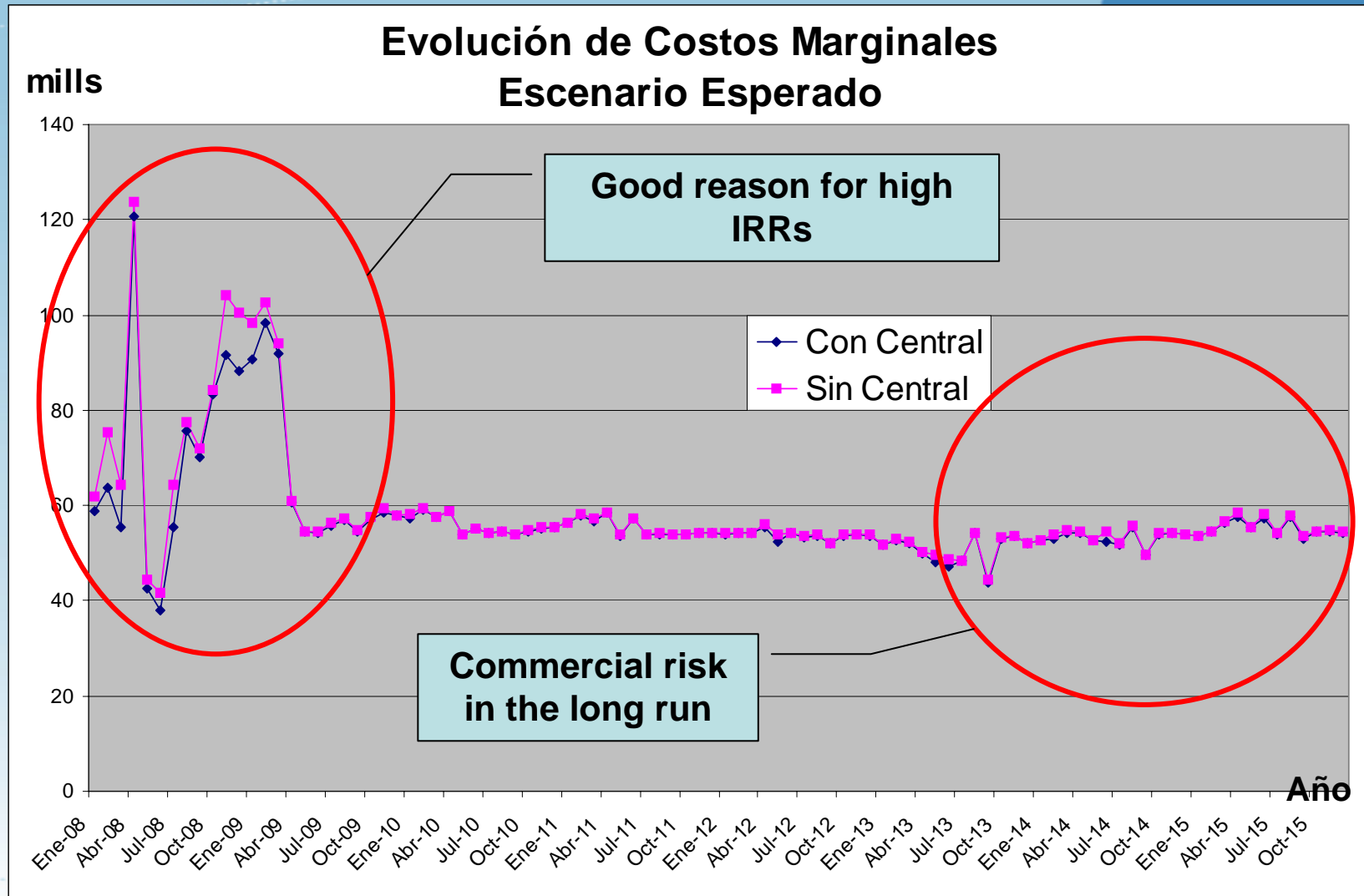
Results SIC

	Model	6 MW (IRR)		18MW (IRR)		60 MW (IRR)	
		Without	With	Without	With	Without	With
Biomass	1	26,12%	30,17%	23,42%	27,16%	22,66%	26,27%
	2	24,26%	27,68%	22,11%	25,35%	22,86%	26,10%
	3	28,66%	32,42%	26,28%	29,83%	26,44%	30,01%

IRR:

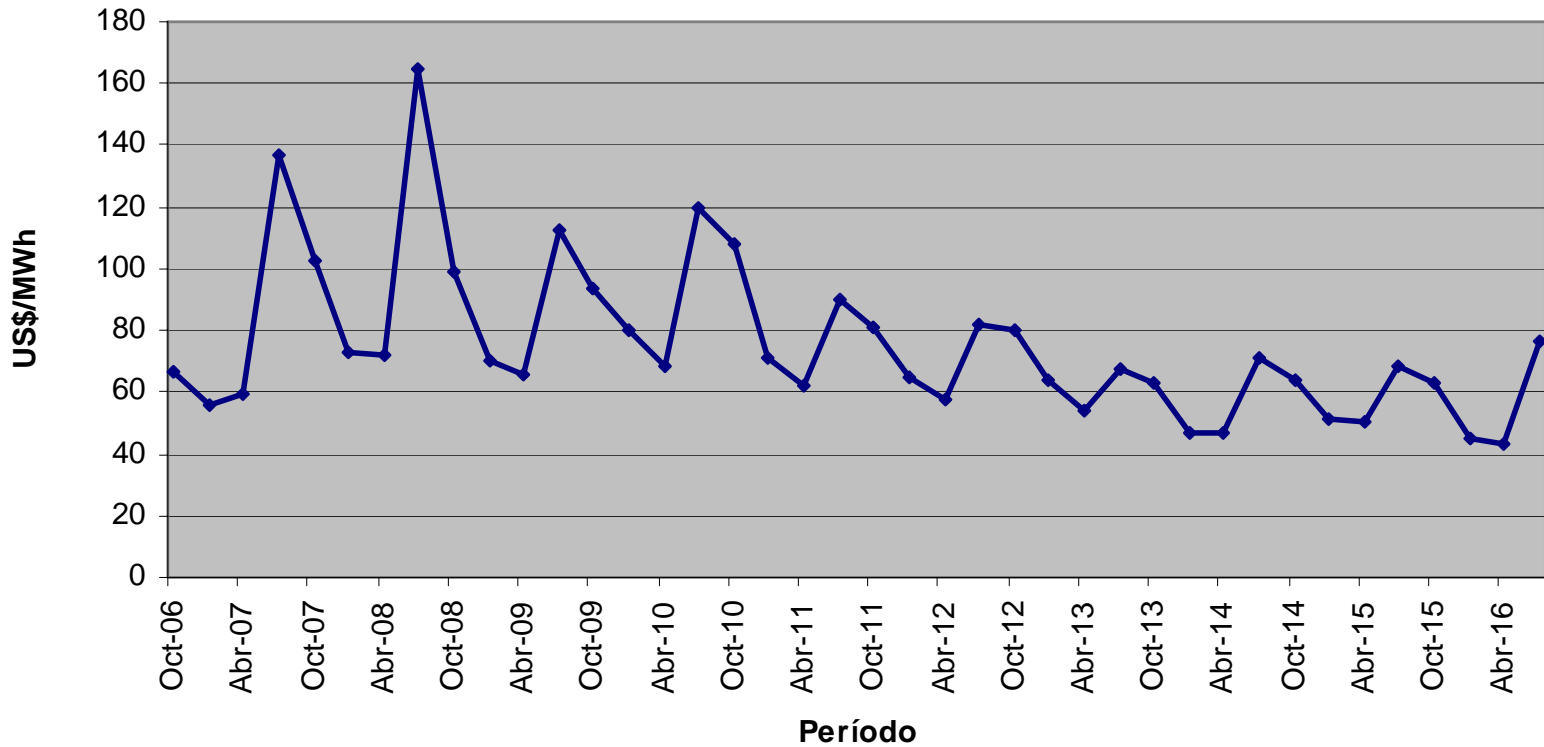
- Between 2,82% and 3,92% impact on the IRR
- Need to consider impact of a CERCs selling px higher than USD 10/ton

Expected scenario of Mg Cost for the SING system



Expected scenario of Mg Cost for the SIC system

**Escenario Esperado Costos Marginales SIC
Periodo 2006 - 2016**



Conclusions

- Law amendments show a consistent positive impact on the IRRs. Mostly between 2%-4%.
- Assessed examples represent typified cases. No actual projects.
- Non-profitability myth in question.
- NCRE projects are economically interesting but they present commercial barriers.
- Bigger challenges:
 - Commercial risk due to long term price forecast on the spot market, and
 - Lack of expertise & knowledge.
- What does it mean?
 - Good quality projects will do very well