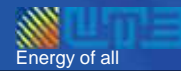


## ARPEL 2009 Conference Sustainable Development

- Current Status and Outlook of Electric Generation based on non traditional renewable energy sources in Uruguay

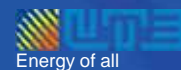
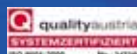
Daniel Tasende

[dtasende@ute.com.uy](mailto:dtasende@ute.com.uy)



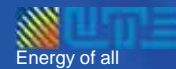
## Energy policy objectives linked to the promotion of renewable sources

- To reduce the dependence on oil
- To increase the participation of native sources
- To favor undertakings that generate local development
- To guarantee environmental protection



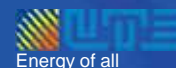
## Other energy policy objectives

- To guarantee supply
- To study the use of other sources (natural gas, coal, international interconnections, nuclear) to obtain minimum costs
- To promote energy efficiency



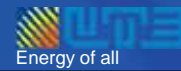
## Working Group

- Composed of experts:
  - In investments in generation
  - In network planning
  - Legal
  - In connection works
  - Commercial
  - In power and energy measurement
  - In electric sector regulations
  - In procurement



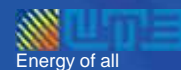
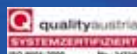
## Situation of the electric system

- Growing demand
- Limited future development of large-scale hydraulic generation
- Non-firm international trade
- More expensive fossil fuels
- Renewable sources as basic alternative in the medium term



## Historical

Year	Generation (MWh)
2005	2610
2006	7688
2007	2914
2008	19973



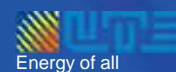
## Installed power capacity net of own consumption (MW)

Year	Biomass	Wind
2009	57.2	20.3
2010	57.2	32.3
2011	61.7	32.3



## Impact on the interconnected system

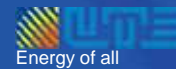
- Botnia generation and demand of its free zone were not included. Random surpluses, at times exceeding 30 MW
- In 2010
  - More than 3% of the installed power capacity
  - More than 4% of the annual energy generated
- In the longer term (growth acceleration)
  - Objective: to exceed 15% of the annual energy generated
  - Larger-scale wind energy
  - Biomass
    - Security of energy supply.
    - Callable contracts



## Definition of energy policy (1)

### Decree 77/006

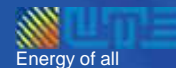
- Promotion of wind energy, biomass and small hydroelectric plants (20 MW of each source)
- Power station with installed capacity up to 10 MW
- Competition in each separate source
- Long term energy purchase contracts
- Exclusive sale to UTE during contract
- Prices independent from spot price
- Free use of the grid and distribution
- Connection costs payable by Generator
- Neutral corporate result for UTE



## Definition of energy policy (2)

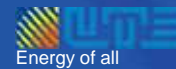
### • Decree 397/007

- Installed power capacity up to 20 MW, contracted under promotion up to 10 MW. Sale of surplus at spot price
- Generators increase installed power in Uruguay
- Minimum contracted power of 50% of installed power capacity in large power stations
- Regulation of contracts and surplus



## Implementation (1)

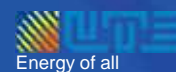
- Free localization
  - Generation offers (power station localization and dimension)
  - Preliminary draft of grid connection
  - Additional offers (due to connection cost)
- Connection made by Generator
- Sales methods (independent or surpluses)



## Offer price

- $P_0$ : Offer price
- $p_g$ : generation price
- $fa$ : Adjustment factor
- $cu$ : unit cost

$$P_0 = p_g + fa * cu$$



## Comparative price

- pc: comparative price
- CN%: national component
- CE%: foreign component
- T: Suply period

$$pc = p_0 * \left( \frac{CN\%}{110} + \frac{CE\%}{100} \right) + 0.25 * (20 - T)$$



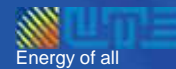
## Signed contracts

- Connection agreements
  - Technical requirements for physical connection
  - Conditions of use of distribution facilities
  - Electric energy quality
  - Regulated contract
- Contracts of energy sale
  - Commercial contract



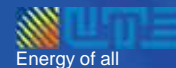
## Results (P35404)

Generator	Primary source	Contracted power (MW)	Supply period (years)
GALOFER	Biomass	10.0	12
Amplin 1	Wind	2.0	20
BIOENER	Biomass	9.0	20
NVO. MANANT. 2	Wind	4.0	15
FENIROL	Biomass	8.8	14



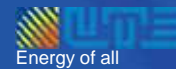
## Results (other biomass)

Generator	Installed Power (MW)	Net Power (MW)
Las Rosas	1	1
Alur	13	9
Los Piques	12	11
Liderdat	5	4.85



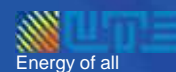
## Results (other wind energy)

Generator	Installed Power (MW)
Agroland	0.3
Nvo. Man. 1	4
Caracoles 1	10



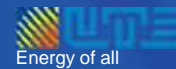
## Results (P37637)

Generator	Installed power (MW)
Caracoles 2	10
Amplin 2	7.5
Amplin 3	7.5
Ponlar	5



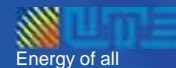
## Achievements

- Number of offers
  - Call P35404: 10
  - Call P37637: 22
- Free localization of generators
- National component of investment
  - Development of national boilers
  - Approximately 50% of investment



## Lessons Learned

- Completion of stages of the call: guarantee of maintenance of offers
- Acceptance of used power stations
- Free localization
- Separation of long-term contract price and market price
- The cost of wind energy connection is frequently higher than that of biomass



## Recommendations

- Prices should not be adjusted according to variables co-related to the oil price
- Energy purchase contracts adapted to the wind source and biomass from waste.
- Contracts with guaranteed supply are proposed for forestry with energy purposes.

