ECOWAS Regional Workshop on WIND ENERGY

First Large Scale Wind Energy PPP in Sub-Saharan Africa

CABEÓLICA

05 November 2013

Investors

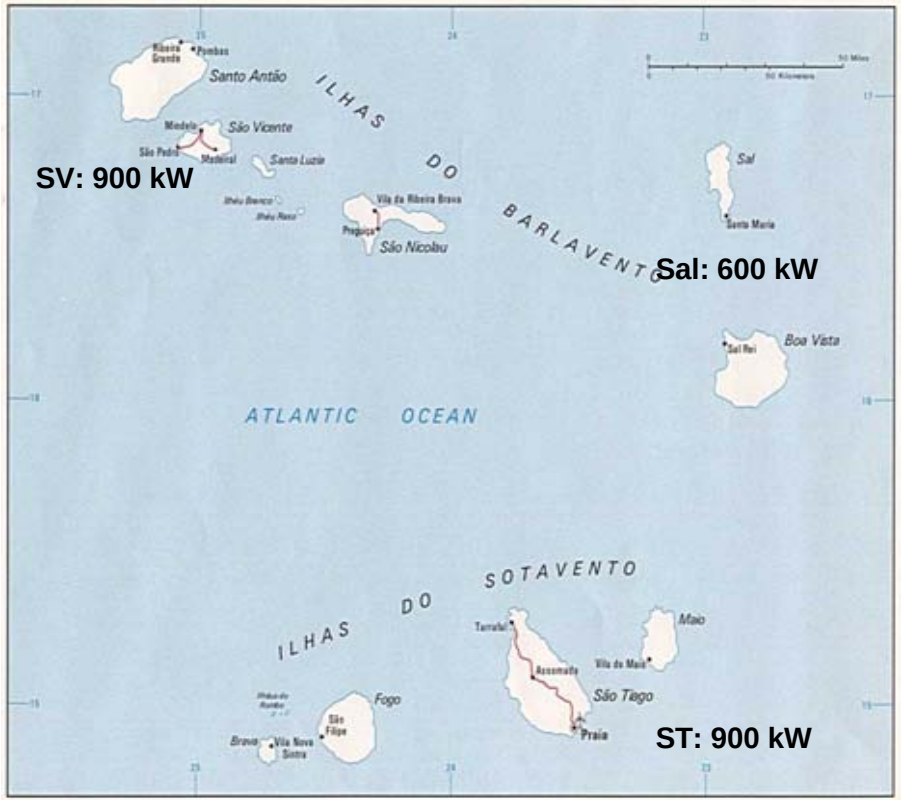
Lenders

History:

- Prior to Cabeólica only 2.4 MW wind capacity connected to national grid network.

- Government sought expansion of wind energy capacity for over10 years.

- The aspirations of the Government of Cape Verde and the need for foreign investment and technical and business know-how, resulted in the dynamic Cabeólica PPP.



Background of the company:

- In 2008 this strong PPP was established between a Developer - InfraCO Lda; GoCV and Electra, that had the purpose of implementing an economically feasible alternative for the rapidly growing energy sector.

- In 2010 a PPA was signed with the Off-taker.

- Africa Finance Corporation and Finnish Fund for Industrial Cooperation joined as investors in 2010.

- European Investment Bank and Africa Development Bank entered as long-term Lenders in 2010.

- Construction initiated at the end of 2010 and was completed by mid 2012 and the wind farms began commercial operation as follows:
  - Santiago – November 2011
  - São Vicente – November 2011
  - Sal – February 2012
  - Boa Vista – July 2012

The Cabeólica Company:

o Cape Verdean company that constructed and currently operates four wind farms, with a total installed capacity of 25.5 MW.

- Santiago – 9.35 MW;
- São Vicente – 5.95 MW;
- Sal - 7.65 MW;
- Boa Vista – 2.55 MW.

o Currently contributing with roughly 20% of total energy consumption in Cape Verde.

o Playing an important role in the Government's established renewable energy targets.

oHas the strategic objectives of

- Reducing oil based electricity generation;
- Attract private investment;
- Relieving State of alone financing the country's energy sector.

Public Private Partnership:

- The PPP administers the development, financing, construction, ownership and operation of the four wind farms for wind production under an independent producer regime.

- Experienced developers created the dynamics behind the financing of the project by identifying investors to take the risk of investment and assume a shareholding position, as well as, identifying international institutions to assume the financing.

- Provided essential Government Support.

- Had positive influence on private financing and private companies investing in developing the electricity supply systems, thus providing additional financial and business know-how resources to complement the public sector resources.

Main Challenges:

- Development phase: time necessary to finalize all preliminary studies; agreements; land concessions; permit and licenses; and contractual and legal documentation.

- Conceptual design: a dynamic power analysis of four completely different power grids, each with its own complex issues, had to be conducted to assess the limitations and evaluate wind energy integration.

- Implementation phase: transportation of 30 turbines to different islands with logistic limitations and equipment and personnel for in land specialized works.

- Operating phase: sudden transition from almost 100% diesel to a diesel-wind grid connected system posed challenges related to grid stability, dispatching of power generated by different sources and personnel capacitation.

Financial Aspects:

o Project Finance Structure

- Investment based on a project finance scheme: 30% equity and 70% debt provided, in a total project amount of +/- 60 M Euros

o Essential Instruments

- PPA - Take or Pay.
- Support Agreement - Escrow Account (essential to attract external investors and debt providers).
- Development and Investment Agreement between Investors
- Common Terms Agreement with the Lenders (requirements).
- EPC contract with Vestas for the implementation of 30 V-52 turbines.
- SAA contract to guarantee performance.

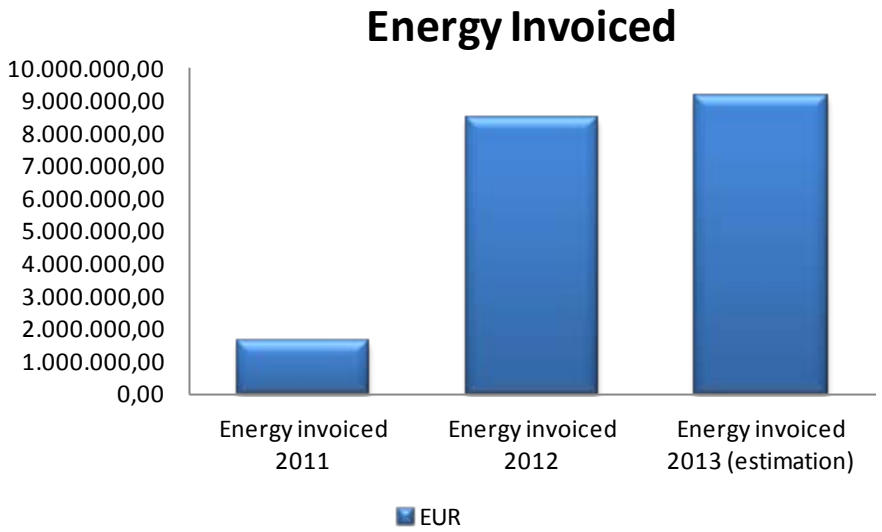
Economic Benefits:

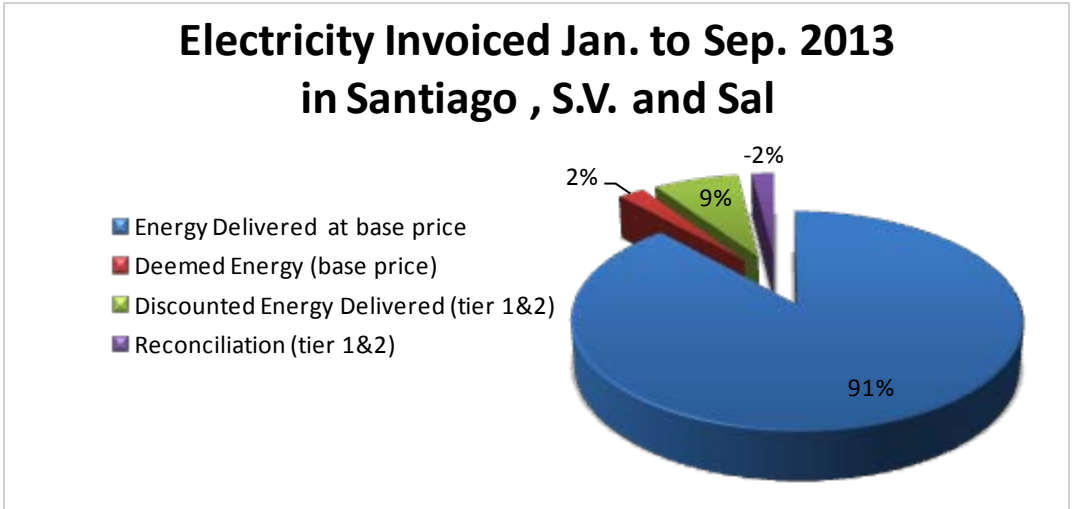
o Tariffs stable and lower than current conventional production costs.

o Estimated savings for the utility company/country at a total of EUR 3 million.

o Reduced oil imports for energy production reduces the Country sensitivity to commodity prices and improves the trade balance.

o EUR 60 million of investment made with no public funding.


Energy Invoiced
10.000.000,00
9.000.000,00
8.000.000,00
7.000.000,00
6.000.000,00
5.000.000,00
4.000.000,00
3.000.000,00
2.000.000,00
1.000.000,00
0,00
Energy invoiced 2011
Energy invoiced 2012
Energy invoiced 2013 (estimation)
EUR


Electricity Invoiced Jan. to Sep. 2013 in Santiago , S.V. and Sal
Energy Delivered at base price
Deemed Energy (base price)
Discounted Energy Delivered (tier 1&2)
Reconciliation (tier 1&2)
2%
9%
-2%
91%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Cabeólica Technical Performance

oThe wind farms significantly increased availability of power.

o As of October 2013 the wind farms had generated a total of 138,000 MWh.

o This translates to roughly 20% of the total supply in Cape Verde.

Total Energy Production			
Site	**2012**	**2013**	**%**
Santiago	22.201	25.716	14%
S. Vicente	16.198	17.649	8%
Sal	8.253	13.301	38%
Boavista *	3.083	3.829	19%
Total	**49.734**	**60.496**	18%

* Operation started in April 2012

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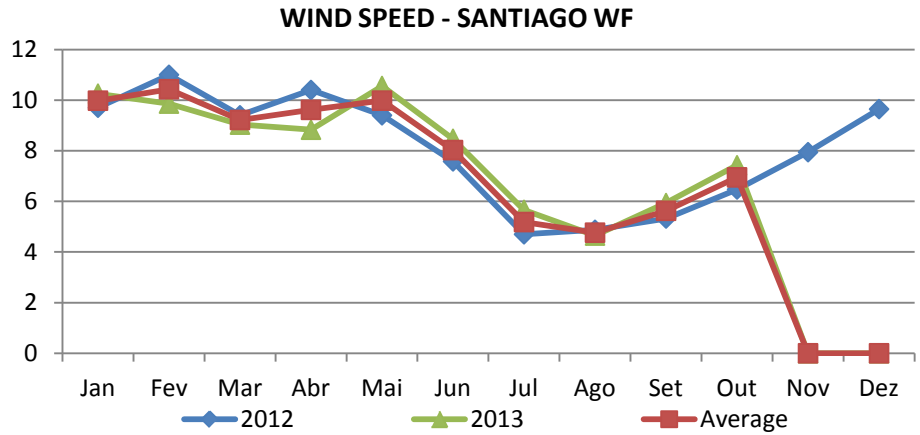
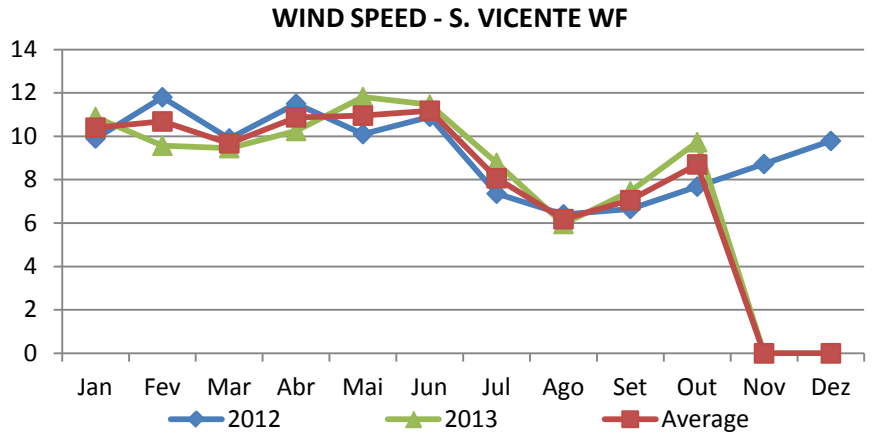
Wind Speed - monthly distribution





- Average wind speed: 8m/s
- 73%: above 6m/s
- Above 60%: N – NNE

- Average wind speed: 9,5m/s
- 80%: above 6m/s
- Above 80%: NNE - NE

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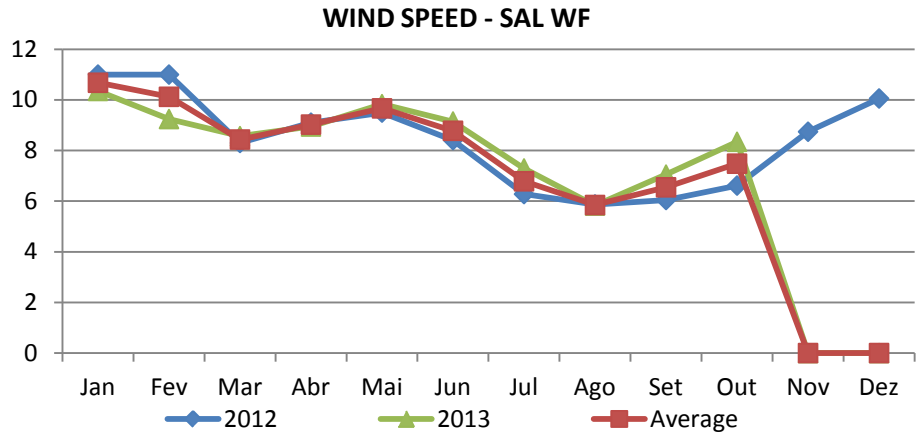

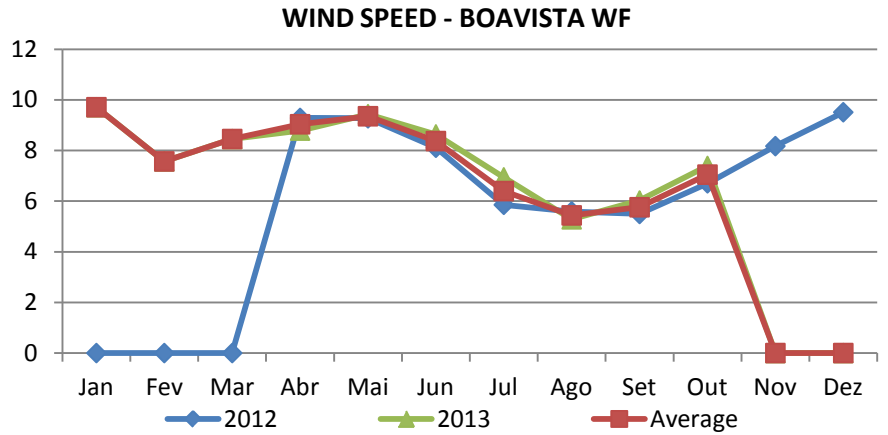

- Average wind speed: 8,5m/s
- 78%: above 6m/s
- Above 50%: NE – ENE

- Average wind speed: 7,8m/s
- 70%: above 6m/s
- Above 55%: NE – ENE

o Energy Available

- **Curtailment of the wind farms through set point**
  - Santiago: set point released since February 2013;
  - S. Vicente: set point min- 2,5 MW (from 1AM to 6 AM);
  - Sal: set point max - 3,4 MW
  - Boa Vista: set point max - 1,3 MW.

- **Production challenges**
  - Increase of Energy Production (5% - 2014);
  - Keeping grid stability;
  - Tests and fine tunings;
  - Work with off-Taker to reduce events.

Energy Available			
Site	**2012**	**2013**	**%**
Santiago	25.988	26.300	1%
S. Vicente	23.131	24.191	4%
Sal	22.270	24.451	9%
Boavista *	5.499	7.169	23%
Total	**76.887**	**82.110**	6%

* Operation began in April 2012

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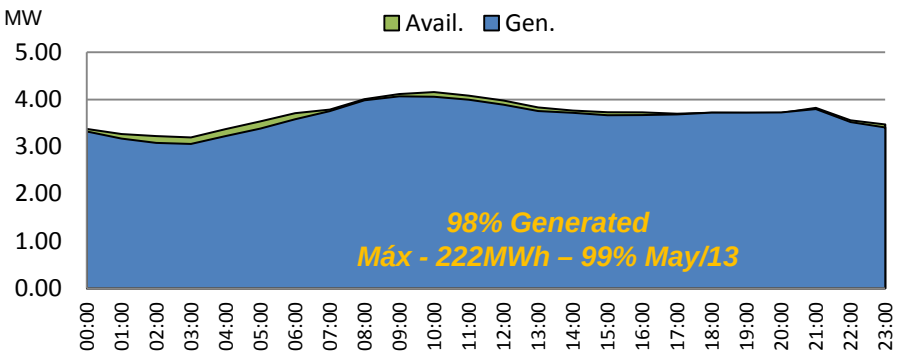
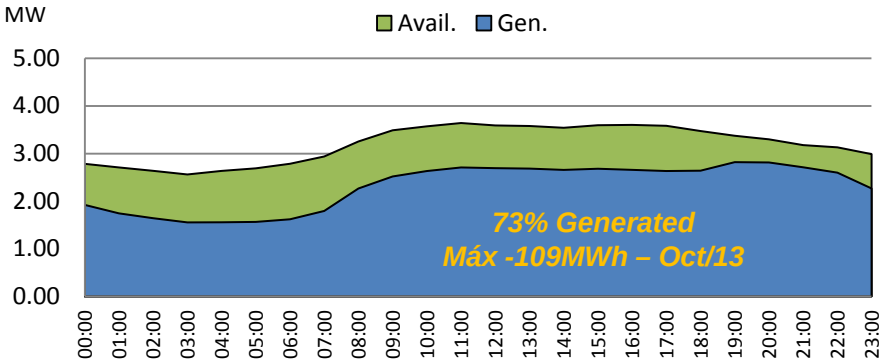
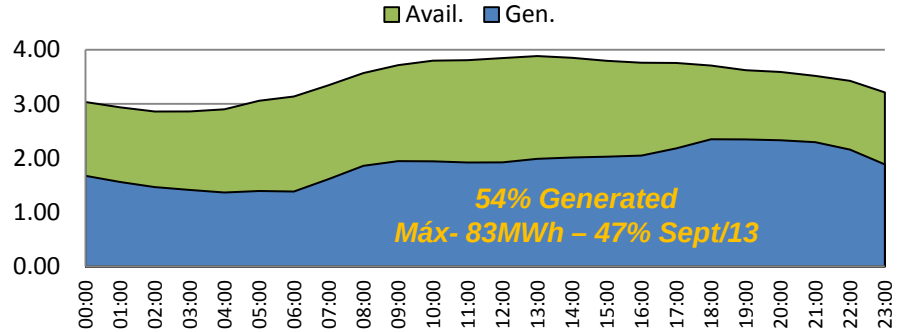
Santiago Annual Hourly Average Power



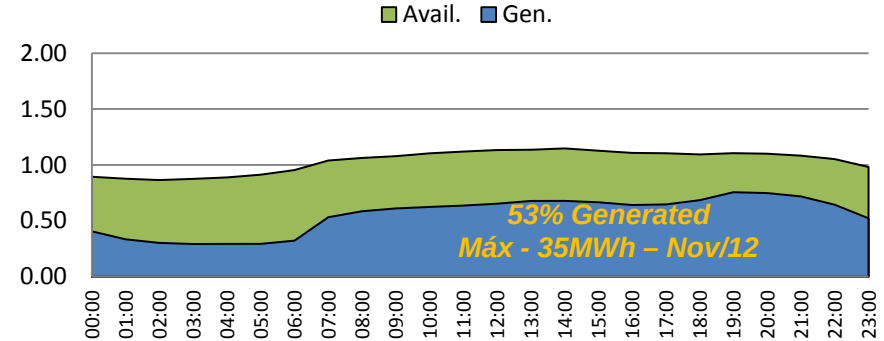
S. Vicente Annual Hourly Average Power



Sal Annual Hourly Average Power



Boavista Annual Hourly Average Power



- **Availability (first interim period)**
  - Santiago – 99%
  - S. Vicente – 97%
  - Sal – 97%
  - Boavista – 99%

- **Capacity Factor**

	Capacity Factor	
	2012	2013
Santiago	33%	39%
S. Vicente	36%	41%
Sal	14%	24%
Boa Vista *	19%	21%

* Operation started in April 2012

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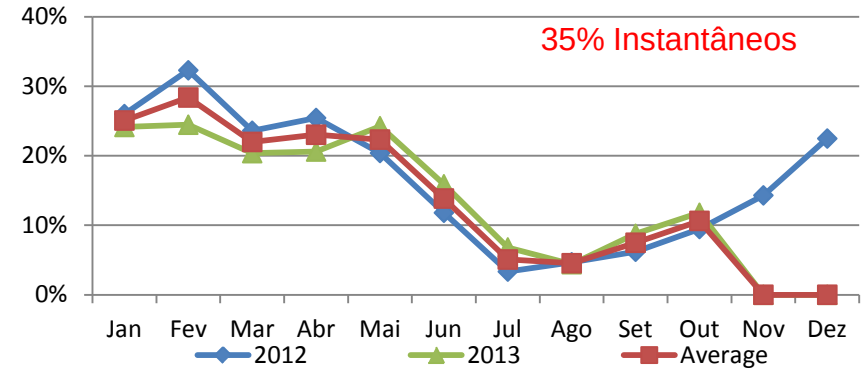
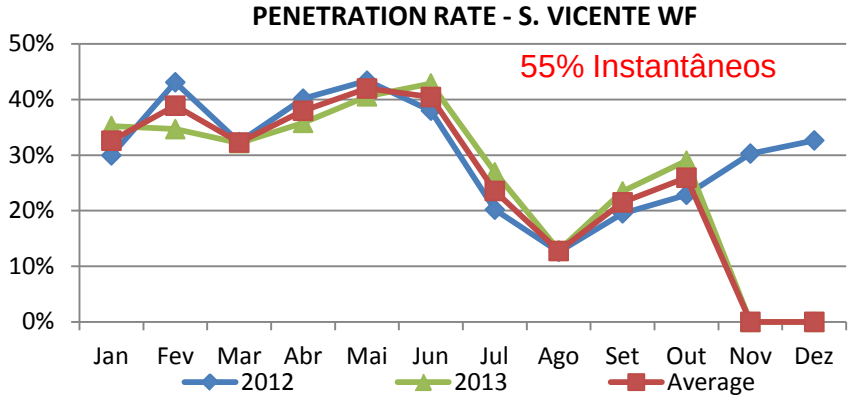
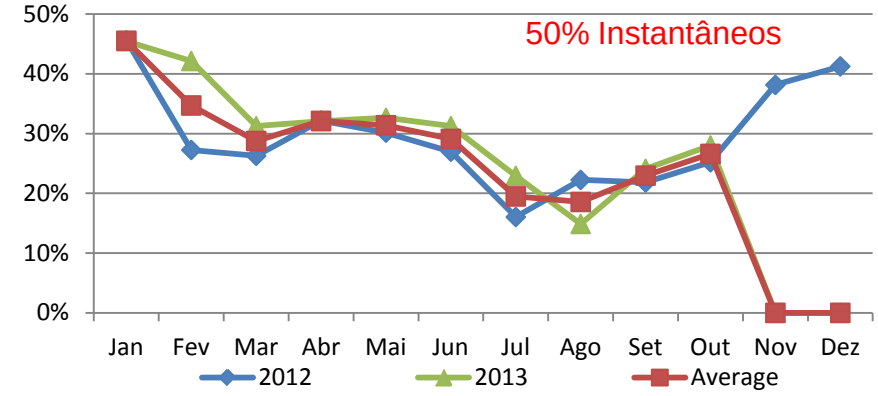
PENETRATION RATE - SANTIAGO WF



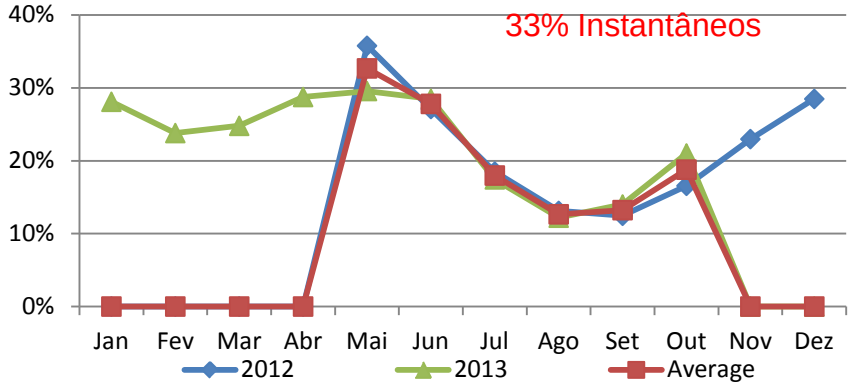
PENETRATION RATE - S. VICENTE WF



PENETRATION RATE - SAL WF



PENETRATION RATE - BOA VISTA WF



Environmental Aspects:

oThorough Environmental and Social Impact Assessment (ESIA) in line with local laws and World Bank environmental standards.

o Public consultation in all four islands.

o Set the highest possible standard in environmental assessment which will set an important precedent for future projects.

o Elaboration of a detailed Environmental Management Program ("ESMP") which will be implemented throughout the 20 year expected lifetime.

o Comprehensive long-term conservation work for local endemism such as Birds and reptiles.

Company progressing in line with obligations set in the ESIA and ESMP.

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Environmental and Social Benefits:

o Wind farm production has offset diesel imports by over 22,000 Tonnes.

o Curbed over 85,000 tonnes of GHG emissions to date, thus aiding in achieving international environmental obligations.

o Project is staffed entirely by Cape Verdeans thus ensuring retention of know-how.

o Environmental education work in schools.

oVarious studies financed by Cabeólica on relevant endemic species

Strict Health and Safety standards in place resulting in 0 accidents to date.

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Clean Development Mechanism:

o Advantages:

- o Additional funds for projects
- o First CDM project in Cape Verde –structure is set which is an attraction for other CER and VER Projects.

o Disadvantages

- o Long registration periods **– took Cabeólica 3 years to register**
- o Great resources associated with validation such as costs
- o Highly volatile market

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Clean Development Mechanism:

- Process of Registration
  - Development of a Project Design Document (PDD)
    - Key technical document describing the project
    - Contains calculation of estimated carbon credits according to CDM methodology.
  - Submission of approval letter by the Designated National Entity (DNA)
    - DNA of Cape Verde is Ministry of Environment
    - DNA must approve the project as in accordance with the country's sustainable development.
  - Validation from the Designated Operational Entity (DoE)
    - DoE = An independent auditor accredited by the UNFCCC
    - Validation assures the project meets requirements of the UNFCCC.
  - Final analysis of the CDM Executive Board.

Cabeólica was registered as a CDM project in October 2013 and to date has produced over 85,000 Emission Reduction Credits.

Replicability of the PPP:

o Cabeolica as the first large scale wind energy PPP in sub-Saharan Africa it has an important leadership role in encouraging other countries to launching of successful renewable energy PPPs.

o The PPP formula can work in countries with sufficient political will and serious and transparent environment between the public and private partners.

oThe key ingredients for the success of the Cabeólica PPP are:

- Participation of solid, transparent and high profile public and private partners
- Government support
- The incentive of a long term off take agreement to ensure predictable and transparent cost planning and predictable and transparent cash flow projections
- Stable and reliable energy supply and continuous optimization of the commercial relationship with the Off-Taker.

Steps Forward:

o Spurred on by the success of Cabeólica, the GCV has set an ambitious target for 2020 (100% RE).

o Currently the local grid stability and spinning reserve requirements limit RE penetration to around 40-50%.

o The increase in uptake of renewable energy in general in Cape Verde will require maximization of stable production and minimization of losses through:

- technical, commercial and organisational improvements
- continuous development of the grid control systems
- development of RE storage
- training and continuing capacity building of personnel.

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Acknowledgements:

- Cape Verde now boasts **one of the highest wind energy penetration rates in the world**. In 2011, the country was ranked third worldwide for total installed wind power per GDP.

- In 2011 Cabeólica won the **Best Renewable Project in Africa Award**, at the Africa Energy Award.

- In 2013 Cabeólica was recognized by IFC and Infrastructure Journal **as one of the top Public-Private Partnerships in Sub-Saharan Africa**.

- In 2013 Cabeólica **won the Ashden Awards** under the SIDS category for it's achievements.

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Thank you

Investors

Lenders