Sustainability & Profitability in the Spanish electricity sector

A study for Iberdrola

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Reconciling profitability & sustainability

Traditional business model

New model: Goal of this work
Why the electricity sector?

20 -20-20 target

- 20% Renewable Energies
- 20% Decrease GHG emissions
- 20% Improvement energy efficiency

Part I: Electricity production
- Generation mix

Part II: Electricity consumption
- Bono Social

Why Iberdrola?

Main player in the Spanish electricity sector

Positioning as a sustainability leader
Part 1 - Production
Energy planning in the Spanish context

- Security of supply
- Environmental sustainability
- Cost efficiency

Demand evolution 1995-2030

- Increase of demand by 70% between 2010 and 2030

PWC study

- **Scenario 1**
  - 50% renewables
  - No nuclear

- **Scenario 2**
  - 50% renewables
  - Extension of nuclear lifetime

- **Scenario 3**
  - 30% renewables
  - Extension of nuclear lifetime

- **Scenario 4**
  - 30% renewables
  - Extension of nuclear lifetime
  - 3 new reactors
### Sustainability example: CCGT financial analysis

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overnight Investment Costs</td>
<td>280,840,000 €</td>
</tr>
<tr>
<td>Installed Capacity</td>
<td>400 MW</td>
</tr>
<tr>
<td>Investment Costs/kW</td>
<td>702,1 €/kW</td>
</tr>
<tr>
<td>Lifetime</td>
<td>35 years</td>
</tr>
<tr>
<td>Construction Period</td>
<td>2 years</td>
</tr>
<tr>
<td>Debt Finance</td>
<td>66.2%</td>
</tr>
<tr>
<td>Equity Finance</td>
<td>33.8%</td>
</tr>
<tr>
<td>Cost of Equity</td>
<td>9.7%</td>
</tr>
<tr>
<td>Cost of Debt</td>
<td>9.2%</td>
</tr>
<tr>
<td>Tax Rate</td>
<td>25.0%</td>
</tr>
<tr>
<td>WACC</td>
<td>7.8%</td>
</tr>
<tr>
<td>Yearly Production</td>
<td>2,564 h</td>
</tr>
<tr>
<td>Yearly Power Price Increase</td>
<td>2%</td>
</tr>
<tr>
<td>Power Price</td>
<td>50 €/MWh</td>
</tr>
<tr>
<td>Yearly coal Production Cost Increase</td>
<td>2%</td>
</tr>
<tr>
<td>Production Costs</td>
<td>27.68 €/MWh</td>
</tr>
</tbody>
</table>

#### Share of production costs

- Fixed O&M: 15%
- Var. O&M: 12%
- Gas: 66%
- CO2 certificate: 7%

#### NPV (Lifetime, power price)

- BAU - 10%
- BAU
- BAU + 10%
- 12.9 Mio. tons of CO2 over lifetime
- IRR higher than WACC for both cases of price increases (2% vs. 5%)
- Problems might arise from new methods of gas extraction (methane)
- Problem of security of supply
**Financial results**

- New nuclear power plants are not a solution (financial risk, resistance of society) => Exclusion of scenario 4
- Nuclear enlargement provides a suitable solution both in environmental and financial terms
- Gas-fired power plants are profitable while coal power plants are not, also preferable in environmental terms
- Solar thermal power most profitable for renewables
- Diversify renewables to reduce risks

**Sustainability results**

**IRR power plants under Ordinary Regime**

- Nuclear
- Gas
- Cofiring
- Nuclear extension

**IRR power plants under Special Regime**

- Onshore Wind
- Offshore Wind
- Solar PV
- Solar thermal

(Coal: no calculation possible)
Approach to achieve a green generation mix in 2030 for scenario 2

Step 1: Take Iberdrola’s current installed capacity

Step 2: Calculation of future capacity of power plants

Step 3: Usage of overcapacity factor to predict need for backup power

Step 4: 2011-2030 Plan of construction of new capacity

⇒ Result: Generation Mix 2030
### Results

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPV (Bio €) Case 1</td>
<td>50,02</td>
<td>52,33</td>
<td>22,47</td>
</tr>
<tr>
<td>NPV (Bio €) Case 2</td>
<td>55,08</td>
<td>58,47</td>
<td>29,31</td>
</tr>
<tr>
<td>Investment costs (Bio €)</td>
<td>75,49</td>
<td>77,40</td>
<td>40,55</td>
</tr>
<tr>
<td>Mio. tCO2 emissions</td>
<td>190,9</td>
<td>143,5</td>
<td>208,6</td>
</tr>
</tbody>
</table>

#### Evolution of investment costs for all the scenarios Mio.€

- Highest total investment costs for scenario 2
- Scenario 3 is clearly the cheapest

#### Evolution of the CO2 emissions (tCO2)

- Lowest total CO2 emissions for scenario 2
- High increase of emissions for scenarios 1+3
Recommendations for Iberdrola (1)

• Lobby the government for **scenario 2**,
  - most sustainable for the company
  - most environmentally friendly for Spain

• High security of supply,
  lower risk of volatile commodity prices

• New nuclear power plants not a suitable solution:
  - Economic risks
  - Resistance of population
  **But**: Enlargement might be a solution

• Use CCGTs as thermal back-up power plants
Recommendations for Iberdrola (2)

• Diversify risks in the renewable energy sector

• Use competitive advantage in onshore wind power

• Use know-how for leader role in offshore wind

• Extension of interconnectors to export overcapacity

• BUT: High initial investment costs needed ⇔ Fund-raising?
Part 2 - Consumption
Spanish context

2003
EU Directive Liberalisation electricity market

2007
Transposition into Spanish law

2009
Implementation & creation of a regulated tariff: TUR (< 10 kW)

3 MILLION CLIENTS

Bono Social
Tariff < electricity cost
July 2009 - December 2013

Focus on:
- low-voltage
- minimum amount pensioners
=> 95% of Bono Social

TUR: Tarifa de Último Recurso, last resort tariff

3 MILLION CLIENTS

< 3 kW

Families, Unemployed

Pensionistas

Large
Bono Social problematic

State’s debt after 2014

Bono Social clients do not pay real price for electricity

Losses for IBERDROLA

Risk when switch in January 2014

No incentive to reduce consumption

Sustainable situation on the long-term?
How can Bono Social clients reduce their consumption?

Fridge and illumination: greatest share of electricity consumption

Energy efficiency as the means to reduce electricity consumption
For optimal results for IBERDROLA & the Bono Social beneficiaries:

- Launch contact phase: Autumn 2011
- Appliance renewal: January 2012
- End of repayment period: December 2013

Pack offer with:

-80% + -70% + -15% = 370 €

Electricity Reduction Potential
The Win-Win situation

- Appliances
- Bono Social customers
- Energy efficiency
- Reduction of electricity consumption

Client: 9 € saved / month

Example pensioners: - 550 kWh

Resell electricity => Reduction of losses

Financing in 2 years

2 years normal bill payment + 4 € / month extra payment for pensioners → 2 year payback
Three step model toward energy efficiency

1. Establishing contact

2. Building trust & Raising awareness

3. Renewal of appliances

Example: Pensioners

1. Collaboration with the UDP
2. Intervention of the Iberdrola-UDP Team
3. New appliances of high efficiency
   - Recycling of old appliances
Sustainability & Profitability

Potential CO2 reductions with appliance change per year

Annual electricity price increase

Potential electricity production sold at market price: 40 Mio. €

Current situation

Pack Iberdrola

Price with Bono Social

Expected price increase 2014

Expected price savings 2014 with Iberdrola offer

Savings of 204 € per pensioner household and year

- 45.61 %

Total saving potential if all clients reached:

45.197 tons of CO2/year
At the equilibrium of sustainability

- CO2 Emission savings on consumption-side
- Reduction of emission increase for production-side
- Job creation
- Decrease risk of future default
- Reduced losses on Bono Social segment
- Higher return for investment in renewables
- Positive impact on reputation => Gain and retain of clients

The government is a key actor to enable companies to combine profitability and sustainability
Thank you for your attention