Attracting Private Capital to The Electricity Sector

-regulatory challenges and lessons-

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“If you have ten thousand regulations you destroy all respect for the law.”
*Winston Churchill*
Capital Attraction

Two Decades of Reform (1990-2011)

Total Investment Commitments in Power USD 000
Privatizations, Concessions, Green Field Projects

Source: World Bank and PPIAF, PPI Project Database. (http://ppi.worldbank.org) Date: 01/23/2012
Capital Attraction

and the winners are…

Attraction of Private Capital to Power (1990-2011)

Total Investment Commitments USD 000

Source: World Bank and PPIAF, PPI Project Database. (http://ppi.worldbank.org) Date: 01/23/2012
$ Capital Attraction

Attraction of Private Capital to Power (1990-2011)

Concessions, Divestitures or Privatizations, Green Field Projects  USD 000

Distribution privatized in all countries with exception of:

- Vietnam
- Thailand
- China
- Mexico

Indian Ultradea (Gov Guarantee)

Brazil (Concessions + Greenfield)

Russian Privatization (Generation)

Source: World Bank and PPIAF, PPI Project Database. (http://ppi.worldbank.org) Date: 01/23/2012
Capital Attraction

Attraction of Private Capital to the Regulated Business

Eastern Europe - Prices Paid for Discos (US$/customer)

Brazil an outlier?

PRG = Partial Risk Guarantee

EV = [(amount paid for equity) + (debt assumed * % bought)]

Disco = Distribution Company
Vertical Integrated
UTILITY (Monopoly)

COMPETITION and Choice

Minimize $\sum_{i=1}^{n} Q_i P_i$, subject to $\sum_{i=1}^{n} Q_i = \text{demand}$ and $Q_i \leq Q_i(\text{offer}), Q_i \geq 0$

where $Q_i = \text{quantity procured from } i$
$Q_i(\text{offer}) = \text{quantity offered}$
$P_i = \text{offer price from } i$

Cost Plus = O&M + Dep + r (Assets)

CHANGE TRENDS
How the Sector Structure Has Evolved
Private participation and competition

High

Norway
New Zealand
Australia

Hungary
Russia
Poland, Argentina

Philippines
Turkey
Brazil

Bulgaria
Romania
Slovakia

Latin American Model

Argentina
El Salvador
Panama
Guatemala
Peru
Colombia

Low

France, Italy
South Africa
Portugal
Morocco
Uruguay

China, India
Vietnam
Egypt

Indonesia
Pakistan
Thailand
Philippines

UK +
Latin
American
Model

Ghana
Cote d’Ivoire

Cameroon
Uganda

Asian (IPP) Model

Low

Private Participation

High

UK

Source: T Bakovic
Ingredients of "good regulatory reform":

1. Clear “rules-of-the-game”
   *Electricity Law and Regulations*

2. Competition
   *Lowest cost producer wins and no market concentration nor dominant state-owned generator (no single-seller, no single-buyer)*

3. Free contracting scheme
   *Free to enter into bilateral contracts*

4. Credit worthy off-taker
   *Private distribution*

5. Trading arrangements
   *Clear and transparent rules of dispatch and operations*

6. Open access to transmission (and distribution)
   *Wires are equally and transparently open to all competitors*

7. Independent Regulator
   *Independent regulator with instances of appeal and appointed by congress/parliament and paid by fee on sector revenues (no Gov budget)*
First Question: Do tariffs cover costs...?
Second Question: Do we want to maximize sale revenues to the Treasury or do we want to minimize tariff impact to customers?
Third Question: How sustainable are the tariff increases required by the privatization policy?

Tariff Components

Lessons Learned and Best Practices

Checklist before embarking on reform/privatization
If you achieve competition at the wholesale level then you only need to regulate the “wires-business”.

-50% Power Purchase Costs (PPC)

Key Regulatory Issues:
- Promote competition
- Respect free-market price determination
- PPC passthrough mechanism

-50% Distribution Margin (VAD)

Key Regulatory Issues:
- Asset revaluation
- WACC determination
- Allowed losses passthrough
- Allowed bad-debt passthrough
- X-factor determination
- Quality of Service Regulations
- Forex indexation
- Supply margin determination

RAB = Regulated Asset Base
Show me the cash...

Distribution underpins the fundamental soundness of the sector -regardless of sector structure-

$1 Electricity Generated

At 25% Energy loss

$0.75 Billed to Customer

At 70% Cash Collection

Less Transmission and Distribution Cost

$0.53 Collected in Cash

Source: A. Marghub
Lessons Learned and Best Practices

Typical Components of the Distribution Tariff

An asset based business…

- Operating costs
- RAB Depreciation
- Regulated Return on RAB
- Cost of distribution losses

Regulated Revenues

Projected Demand
For Regulatory Period

Distribution Tariff
(indexed to inflation during regulatory period)

Source: Tonci Bakovic

RR_t = OC_t + Depn_t + [RAB_t x RRR] + DL_t

PCAP_t = \frac{RR_t}{\#customers}

PCAP_t = PCAP_{t-1} \times (1 + CPI - X)
Lessons Learned and Best Practices

Case Study: Bolivia - Dilution of the Distribution Margin

Approved Distribution Margin vs. Actual Distribution Margin

1. Devaluation

2. Losses

3. Slower Growth

4. Passthrough

5. All

Example:
Consumption = 1,000 GWh
Initially Approved DM = $30/MWh
PPC = $30/MWh w/ exception of case 4
All sales to contract, no sales to 'spot'

PPC = Power Purchase Cost
DM = Distribution Margin
Performance Improvement → Higher Capex → Larger RAB → Higher Tariff

- Difficult for regulator to add capex to the asset base
- Company trying to improve efficiencies (reduce O&M, improve collections, reduce losses)
- Privatization restrictions on employee reductions
- Trying to shift share of VAD that is going to O&M and losses to the asset base (capex)
- Chicken-and-egg issue since you need capex to improve efficiency (reduce losses, increase collections)

RAB = Regulated Asset Base
**Lessons Learned and Best Practices**

**Macedonia: Single Buyer and Pass-through of Losses**

- **Single Buyer stops delivering electricity to cover losses**
- **Import wholesale mkt prices at 7 euro-cent/kWh**
- **Only 11% losses allowed for pass-through**
- **Actual losses in 2008 are 21%**
- **Current scenario already shows losses at regulated wholesale prices**
- **Revised scenario shows losses at import wholesale mkt prices**

**Not enough cash to meet capex needs or debt service**
A dangerous path toward competitive markets…?

- Weakens the incentives for discos to collect payments from customers. Non-payment from Gov entities is deducted from power purchase costs. State-owned SB is often reluctant to take politically unpopular action against a delinquent disco. Aggregation of cash proceeds from discos allows it to spread the shortfall caused by a poorly performing disco among all generators.

- Case studies: Macedonia (SB does not apply to non-allowed losses), Turkey (Gov has to guarantee off-take of IPPs), Philippines and Dominican Republic (large stranded PPAs), Hungary (difficult to phase-out SB), Mexico, Uganda, etc…

The Single Buyer Model
(State-Owned Vertically Integrated Utility or State-Owned Transco)

SB

IPP1 IPP2 IPPn

G1 G2 Gn

PPA1 PPA2 PPA n

Customers

- $ + $ - $
Lessons Learned and Best Practices

Argentina: Devaluation and No Indexation

Effect of Devaluation – Residential Tariffs US$/kWh

- Argentina Post 2001

Effect of Devaluation – Industrial Tariffs US$/kWh

Source: Electricity Association Argentina + Edelap
Capacity Node Price in Chilean Pesos (79% xrate & import duties, 10% salary index, 11% wholesale price index)

\[
\text{Price} \times \text{Capacity} = \text{Base Price} \times \left( \frac{\text{Dollar Price}}{\text{DOL}_0} \times \left( \frac{1 + D_1}{1 + D_{10}} \times 0.79 \right) + \left( \frac{\text{ISS}}{\text{ISS}_0} \times 0.1 \right) + \left( \frac{\text{IPM}}{\text{IPM}_0} \times 0.11 \right) \right)
\]

Where:
- Dollar Price: Average price of the exchange rate for the US Dollar, for the last thirty days, published by the Central Bank.
- DOL0: Average Exchange rate for the US Dollar, published by the Central Bank (Chilean$/US$).
- D1: Custom Duty applicable to electro-mechanical equipment at the Iquique Extension Free Zone.
- D10: Current Custom Duty applicable to electro-mechanical equipment at the Iquique Extension Free Zone.
- ISS & IPM: Salary & Wholesale Prices indexes published by INE for the third month before the Indexation is calculated.
- ISS0 & IPM0: Base values for the ISS and the IPM.

Energy Node Price in Chilean Pesos (100% indexed to import components: xrate + import duties)

\[
\text{Price} \times \text{Energy} = \text{Base Energy Price} \times \left( \frac{\text{Dollar Price}}{\text{DOL}_0} \times \left( \frac{1 + D_2}{1 + D_{20}} \times 1.00 + 0.00 \times \frac{\text{PPDA}}{\text{PPDA}_0} + 0.00 \times \frac{\text{PFOA}}{\text{PFOA}_0} \right) \right)
\]

Where:
- Dollar Price: Average price of the exchange rate for the US Dollar, for the last thirty days, published by the Central Bank.
- DOL0: Average Exchange rate for the US Dollar, published by the Central Bank (Chilean$/US$).
- D2: Custom Duty applicable to electro-mechanical equipment in Antofagasta.
- D20: Current Custom Duty applicable to electro-mechanical equipment in Antofagasta.
- PPDA: Price for Light Diesel in Antofagasta, (in $/m3).
- PPDA0: Current Price for Light Diesel in Antofagasta (in $/m3).
- PFOA0: Current price for Fuel Oil Nº6 in Antofagasta (en $/ton).

The fuel prices to be used in the indexation formulas will be the purchase prices, net of IVA (sale tax).

Note: Wholesale Energy Prices get Adjusted Every 6 Months Based on Expected Spot Forecast for Next 48 Months.
Cost of Distribution (17% indexed to import components: xrate + import duties)

\[
CDBT = CDBTo \times \left( (IB1 + OB1) \times \frac{IPC}{IPCo} + (IB2 + OB2) \times \frac{IPMN}{IPMNo} + IB3 \times \frac{IPCu}{IPCuO} + IB4 \times \frac{D}{Do} \right)
\]

\[
CDBT = 3.811 \times \left( 0.40 \times \frac{IPC}{IPCo} + 0.43 \times \frac{IPMN}{IPMNo} + 0.10 \times \frac{IPCu}{IPCuO} + 0.07 \times B \times \frac{D}{Do} \right)
\]

Fixed Charges

\[
CFE = CFEo \times \left( CFE1 \times \frac{IPC}{IPCo} + CFE2 \times \frac{IPMN}{IPMNo} \right)
\]

\[
CFE = 371.25 \times \left( 0.82 \times \frac{IPC}{IPCo} + 0.18 \times \frac{IPMN}{IPMNo} \right)
\]

In which:

- **CDBT**: Cost of Distribution in Low Voltage $Chilean/kW-month
- **D**: Index of imported products where \( D = Tc \times (1 + Ta) \) where \( Tc \) corresponds to the average price of the exchange rate for the US Dollar, for the month before the last, published by the Central Bank, and \( Ta \) corresponds to the custom duty applicable to electro mechanical equipment
- **IPC**: Consumer Price Index published by INE for the third month before the month when the tariffs will be applied
- **IPMN**: Wholesale Price Index published by INE for the third month before the month when the tariffs will be applied
- **IPCu**: Copper Price Index calculated as the average monthly price for the last 12 months of the price of Copper in the London Mercantile Exchange
- **IAi and OAi**: Weights applied to each service area
- **CFE**: Fixed Charges; billing and metering $Chilean/client-month

In the past also indexed to salary index (IRH) published by INE (IRH and IPMN ~20% each in the CDBT, and 70% and 30% -respectively- in the CFE)

\[
CDBT = CDBTo \times \left( \ldots + (IB5 + OB5) \times \frac{IRH}{IRHo} \right)
\]

\[
CFE = CFEo \times \left( CFE1 \times \frac{IPMN}{IPMNo} + CFE2 \times \frac{IRH}{IRHo} \right)
\]

**INE = National Statistics Institute**
Is your passthrough mechanism sustainable...?

Pass Through of Power Purchase Costs

http://www.regulationbodyofknowledge.org/documents/001.pdf
Brazil: Asset Revaluation (RAB)

- What should be the new asset-base at the end of the regulatory period?

Book Value
Replacement Value
Market Value

3,000 $/cust
1,000 $/cust
400 $/cust

Brazil: Percentage premium of market value over minimum sale price (distribution privatizations)

Source: The Regulatory Challenge of Asset Valuation. Vivien Foster and Pedro Antmann
Lessons Learned and Best Practices

Romania: The Supplier of Last Resort

Why me…?

Exerting the Right to Choose

SOLR = Supplier of Last Resort

- will PPC be allowed a full passthrough?
- what is the regulated supply-margin?
- can customers leave and come back at any time?
- who is in charge for stopping supply in case of no payment?

PPC = Power Purchase Costs
Prior to privatization, the GOA entered into a Partial Risk Guarantee (PRG) Agreement with IBRD in May 2009 for an amount of up to EUR 60 million ensuring that the regulatory framework committed to in the pre-privatization phase will be preserved and not changed unilaterally following the privatization.

- The PRG backstops the Government’s debt obligation to a commercial bank (Citibank) who issued the Letter of Credit (LC) that may be drawn by OSSH to compensate for a resulting loss of revenue upon a non-compliance by ERE or the Government relating to the distribution tariff formula, the full pass-through of the electricity costs and the timely approval of the tariffs.

- The PRG covers the first three regulatory periods until the end of 2014.

- Following any LC drawings, the Ministry of Finance is obligated to pay the withdrawn amount to IBRD within 12-18 months.

- The PRG recognizes the compensation mechanism and the option of the Government to limit the tariff increase at 15% (in real terms) and therefore as long as the tariff increase is at 15% + inflation (if required), the LC cannot be withdrawn.

- If the event is not remedied within review/cure periods in the Government Support Agreement (GSA), OSSH is entitled to draw under the LC and the LC amount is reduced by the amount of drawing.

- If this is disputed by the Government, the claim will be referred to international arbitration and in the mean time OSSH can continue to draw provisional payments by posting security in favor of the Government.

Source: World Bank
Lessons Learned and Best Practices

Turkey’s Transfer of Operating Rights (TOR scheme)

Source: TEDAS
Lessons Learned and Best Practices

Turkey’s TOR – not an asset based business

- ‘Bypassing’ privatization
- No sale of assets
- A lease of Gov assets to operate the distribution business
- No termination payment

Regulated Tariff = (Procurement Price + Wholesale Supply Margin + Allowed Losses) + (O&M Costs + Return on Assets + Depreciation + TOR Value) + Retail Supply Margin + Transmission

Privatization of Distribution Companies in Turkey

<table>
<thead>
<tr>
<th>DisCo</th>
<th>Buyer</th>
<th>Acquisition Amount (USDmm)</th>
<th>USD/ Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEDAS</td>
<td>Akenerji-CEZ</td>
<td>USD 600mm</td>
<td>476.0</td>
</tr>
<tr>
<td>BASKENT</td>
<td>Sabanci-Verbund</td>
<td>USD 1200mm</td>
<td>436.3</td>
</tr>
<tr>
<td>MERAM</td>
<td>Alarko Holding</td>
<td>USD 440mm</td>
<td>312.3</td>
</tr>
<tr>
<td>Coruh</td>
<td>Aksa Elektrik</td>
<td>USD 227mm</td>
<td>245.0</td>
</tr>
<tr>
<td>Osmangazi</td>
<td>Yildizlar Holding</td>
<td>USD 485mm</td>
<td>417.7</td>
</tr>
<tr>
<td>Yesilirmak</td>
<td>Calik Holding</td>
<td>USD 441.5mm</td>
<td>323.6</td>
</tr>
</tbody>
</table>
gov supports the creation of private power exchanges mainly to encourage captive generation (cogen) to inject into the grid

companies must prepay 2-days before transacting on exchange

distribution “franchising” model gets implemented by some states given difficulties implementing privatization
Establish a fair mechanism to set-up the limits and a ‘smoothing mechanism’ of the power purchase costs (pass-through)

Length of concession should be at least 30 years

In case of intervention or concession lapse, a clear ‘asset-transfer-mechanism’ must be established indicating how the ‘terminal value’ of the concession will be determined

Establish clear and measurable quality standards in the concession and/or regulations and the corresponding penalty levels

Obtain a technical audit of the starting distribution losses and agree on a realistic loss reduction program for – at least – the first two regulatory periods. Audited losses should be disclosed at the data-room before privatization

Clearly indicate and obtain regulatory approval for the investment program for the first regulatory period

Clearly indicate the upper limit of the efficiency factor X in at least the initial two regulatory periods

Obtain an audit of the starting ‘accounts receivable’ of the disco and clearly indicate how much of those receivables are ‘bad debt’. Audited bad-debt should be disclosed at the data-room before privatization.

Clearly indicate who will have the responsibility to be SOLR and how ‘grey customers’ will be treated

Avoid an intermediate ‘single-buyer’-between Generation and Distribution

Do not leave anything for approval post-privatization – discount from purchase value information not provided at time of sale
Recommended Reading

World Bank Group – Two Decades of Regulatory Lessons

- The Regulatory Challenge of Asset Valuation: A Case Study from the Brazilian Electricity Distribution Sector (Vivien Foster and Pedro Antmann)
- Pass Through of Power Purchase Costs. Regulatory Challenges and International Practices (Beatriz Arizu, Luiz Maurer, and Bernard Tenenbaum)
- The Single-Buyer Model: A Dangerous Path toward Competitive Electricity Markets (Laszlo Lovei)
- The Regulation of Investment in Utilities Concepts and Applications (Ian Alexander, Clive Harris)
- Regulation by Contract: A New Way to Privatize Electricity Distribution? (Tonci Bakovic, Bernard Tenenbaum and Fiona Woolf)