Regulatory issues - 0

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Today’s objectives

1. Introduce the module on regulation
2. Get an overall perspective of the role of regulation in accelerating electrification access
3. Focus on the activity of distribution
Power sector regulatory frameworks

From traditional to market-based
Traditional regulation
Typical structure of the companies

Generation → Transmission → Distribution/Retail → Consumers

Generation → Transmission → Distribution/Retail → Consumers
Traditional regulation

Typical features

• Public service obligation in franchise territory

• Regulated monopoly
  – The electric utility makes all economic & technical decisions: centralized planning & operation
  – Under regulatory review (frequent overlap of public ownership & regulation)

• Cost-of-service remuneration

• Regulated tariffs

• Voluntary coordination transactions of limited importance among utilities
Market-based regulation

The structure of markets

- Generator
- Generator
- Generator
- Power Exchange
- Supplier
- Supplier
- Distributor/Retailer
- Distributor/Retailer
- Qualified consumer
- Qualified consumer
- Captive consumer
- Captive consumer

Wholesale market
Retail market
Market-based regulation

Typical features

• **Unbundling** of activities
  – generation & retailing are open to competition
  – transmission & distribution remain regulated
  – diverse alternatives with system & market operation

• End consumers can **choose supplier** (retail market)

• **Wholesale market**: organized &/or bilateral

• Diverse **contracts** *(physical, financial)* to hedge the risk

• Operation & investment **planning** is **no longer** a **centralized** activity

• Independent **regulator**
What has happened in the developing countries?

This section of the presentation owes much to documents & presentations by Prof. Anton Eberhard & colleagues at Cape Town University, in particular Catrina Godinho.
# The Traditional Industry Model in Developing Countries

<table>
<thead>
<tr>
<th>Traditional Model in Developing Countries</th>
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</thead>
<tbody>
<tr>
<td><strong>Sector Structure</strong></td>
</tr>
<tr>
<td>- State owned</td>
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<tr>
<td>- Vertically integrated</td>
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<tr>
<td>- Highly bundled</td>
</tr>
<tr>
<td><strong>Policy &amp; Regulation</strong></td>
</tr>
<tr>
<td>- National energy ministry</td>
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<tr>
<td><strong>Revenue &amp; Tariffs</strong></td>
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<tr>
<td>- Tariffs set by ministry</td>
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<tr>
<td>- Direct subsidies from state budget</td>
</tr>
<tr>
<td>- Cross-subsidies from industry</td>
</tr>
<tr>
<td>- Metering and collections constraints</td>
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<tr>
<td><strong>Financial &amp; Investment Conditions</strong></td>
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<tr>
<td>- Utility finances tied to national budget</td>
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<tr>
<td>- Self-financing limited by revenue generation and tariff arrangements</td>
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<tr>
<td><strong>Operational Performance</strong></td>
</tr>
<tr>
<td>- Operational performance tied to utility financial conditions, national technical capacity, physical and geographical endowment, national economic conditions, and management practices</td>
</tr>
<tr>
<td><strong>Consumption &amp; Access</strong></td>
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<tr>
<td>- Low per capita consumption and access rates</td>
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<tr>
<td>- Extractive industries and government typically account for majority of demand</td>
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Departure from the “standard model”

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Reality in developing countries is different from the “standard model”

Power sector reform in many developing countries has not followed the standard model

- Few countries have fully unbundled their utilities
- Private sector participation often limited to IPPs
- Wholesale and retail competition often absent

Instead, hybrid power markets have developed

- Incumbent state-owned utilities have retained dominant market positions
- Independent Power Producers (IPPs) are being introduced on the margin, i.e. both State Owned Enterprise (SOEs) and IPPs are involved in new generation investments
POWER STRUCTURES IN SUB-SAHARAN AFRICA

Eberhard & Godinho (2016), University of Cape Town.

GROUP 1: Vertically integrated with no PSP
- BENIN
- BURKINA FASO
- BURUNDI
- CAR
- CHAD
- COMOROS
- DRC
- EQUATORIAL GUINEA
- ERITREA
- GUINEA-BISSAU
- LIBERIA
- MALAWI
- MAURITANIA
- SEYCHELLES
- SOMALIA
- SOUTH SUDAN
- THE GAMBIA
- REPUBLIC OF CONGO
- NIGER

GROUP 2: Vertically integrated with PSP
- BOTSWANA
- CAPE VERDE
- GUINEA
- MADAGASCAR
- MAURITIUS
- RWANDA
- SENEGAL
- SAO TOME AND PRINCIPE
- SWAZILAND
- TANZANIA
- TOGO
- CAMEROON
- COTE D'IVOIRE
- GABON
- MALI
- MOZAMBIQUE
- SOUTH AFRICA
- ZAMBIA

GROUP 3: Vertically unbundled

<table>
<thead>
<tr>
<th>Without PSP</th>
<th>With PSP</th>
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<tbody>
<tr>
<td>ETHIOPIA</td>
<td>ANGOLA</td>
</tr>
<tr>
<td>LESOTHO</td>
<td>GHANA</td>
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<tr>
<td>SIERRA LEONE</td>
<td>NIGERIA</td>
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<tr>
<td>SUDAN</td>
<td>UGANDA</td>
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<tr>
<td>ZIMBABWE</td>
<td></td>
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KEY
- Generation activities
- State owned entity
- Transmission activities
- Private owned entity (PSP)
- Distribution activities
- Regulatory agency exists
- Grid connected for power import/export
Key regulatory challenges

• Insufficient power infrastructure capacity
  – lack of public resources & difficulty in attracting private investment, both in generation & transmission

• Unreliable electricity supply
  – in need of investment also in distribution, inadequate incentive regulation, conflictive consumer interaction resulting in theft & non-paid bills

• Lack of & unequal electricity access
  – In need of a viable electrification business model

• Tariffs systematically below the high *(as a result of inefficiency)* supply costs
How can we make regulatory sense of this messy diversity?
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How can regulation help?
How can we make regulatory sense of this messy diversity?
How can regulation help?

What is regulation?
How can we make regulatory sense of this messy diversity?
How can regulation help?
What is regulation?
Where to start from?
How can we make regulatory sense of this messy diversity?
How can regulation help?
What is regulation?
Where to start from?
Uganda – Southern territories - Results obtained with the REM planning model [link]
IEA forecast on how to reach universal electricity access

- **Grid extension** for 150 million additional people, with hydro accounting for the lion’s share
- **Decentralized solutions**, mainly solar PV, for the remaining 450 million people in rural areas
Will these forecasts materialize?
(this will depend on many factors beyond the cost, where regulation will play a major role)
Uganda – Southern territories - Results obtained with the REM planning model http://universalaccess.mit.edu/#/main

What can / must be regulated?
Let’s build a solid foundation...
... by learning how to regulate distribution
Questions or comments?