Cost Benefit Analysis of Power Sector Reform in Haiti

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Session E3: Issues in the BCA of Electrical Power Reforms

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The intervention proposed in this study was selected as the best project for Haiti among 85 submissions by an eminent panel of economist at Haiti Priorise (http://www.copenhagenconsensus.com/Haiti-Priorise)

The International Confederation of Energy Regulators (ICER) voted to award the authors the 2018 ICER Distinguished Scholar Award in the category of Impact on Developing Countries.
Background of Study

- CCC asked for CBA of introducing smart meters in the Haitian utility
- CBA would have been easy but project would have failed
- Actual work involved first designing a program to improve the sector
- Identifying potential projects/interventions and phasing
- Carrying out simple CBA

Main Lesson:

CBA is just one, perhaps minor, aspect of improving resource allocation
Background - Sector

Electricité d’Haïti (EDH): the main provider of electricity services

Highly dependent on fossil fuel based generation

320 MW: installed capacity
176 MW: functionally available

Evidence on high WTP: own generation and storage markets
Background - Current status

ATC&C losses: 70% (21% technical)

Legal connections: 12% of population

5-15 hours of electricity per day

Stealing power not a crime in Haiti

Some connections receive help/support from EDH employees

EDH requires an annual subsidy of around 200 Million USD
Background - Experience with reform

Past attempts by USAID, World Bank, and IDB have failed

Loss reduction: The World Bank, 2006

Management → TA: USAID, 2011

Probable main issue: Corruption
Challenges

1. How to design a program to succeed?

2. How to conduct a defensible CBA to justify the investment?
The project

Using USAID’s DABS project in Kabul as a benchmark

➔ Took less than 5 years to show results (reduction in losses: 60% to 24%)
➔ Included commercialization, changes to the governance, smart metering, changes to the procurement, performance management and removing illegal connections

Add conditionality into the design to manage incentives

➔ Phase I: TA for corporatization for 3 years
➔ Support continued to phase II only if targets are met
CBA - Methodology

Consider CBA from both EDH (financial) and the country as a whole (economic)

Typical sources of benefits

➔ Reduction in technical losses;
➔ Reduction in commercial losses;
➔ Reduced market risk for IPPs resulting from financial stability of the off taker;
➔ Reduction in EDH operating costs (improved institutional efficiency);
➔ Moving consumption to consumers with higher WTP does not apply in Haiti;
CBA - Methodology

Reduction in financial losses

The transfer resulting from reduction

Demand for electricity

Coping cost

EDH price

Current level of financial recovery

Target level of financial recovery

Reduction in technical losses

The value of increased supply

Demand for electricity

Current supply

Increased supply
CBA

Build the conditionality into the model

➔ Benefits and costs of phase II will only happen if conditions are met
➔ Chance of success ($\alpha$) does not only affect benefits ($B$)

\[ \text{Expected NPV} = \alpha B - C_I - \alpha C_{II} \]

Take conservative assumptions

➔ Focus on most defensible source of benefits (reduction in technical losses)
➔ Consider taking twice as long to reach the levels in Kabul (10 yrs to 15%)
➔ Report the minimum chance of success that justifies the project
CBA - Costs and effectiveness

Costs

Aggregate Technical, Commercial, & Collection (ATC&C) Losses

Regulatory and Legal Costs  Cost to EDH

Target Commercial and Collection Losses  Target Technical Losses
CBA - Benefits and net cash flow @ $.30/kWh

- **Benefits**

  - Value of reduction in Commercial and Collection Losses (Transfer)
  - Value of reduction in Technical Losses (Economic Benefit)

- **Net Cash (Resource) Flows**

  - Net Economic Resource Flow
  - Net Cash Flow for EDH
## CBA - Sensitivity Analysis

### Chance of success

<table>
<thead>
<tr>
<th>Chance of success</th>
<th>ENPV @12%</th>
<th>EIRR</th>
<th>FNPV @12%</th>
<th>IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>$(7)</td>
<td>5%</td>
<td>$4</td>
<td>28%</td>
</tr>
<tr>
<td>8%</td>
<td>$0</td>
<td>12%</td>
<td>$31</td>
<td>28%</td>
</tr>
<tr>
<td>50%</td>
<td>$40</td>
<td>17%</td>
<td>$195</td>
<td>28%</td>
</tr>
<tr>
<td>70%</td>
<td>$59</td>
<td>18%</td>
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</tr>
<tr>
<td>100%</td>
<td>$87</td>
<td>18%</td>
<td>$391</td>
<td>28%</td>
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</tbody>
</table>

All $ figures in Million 2017 USD
CBA - Scenario Analysis

A bad scenario

30% for commercial losses;
15% for technical losses;
10% probability of success.

<table>
<thead>
<tr>
<th>ENPV @12%</th>
<th>EIRR</th>
<th>FNPV @12%</th>
<th>IRR</th>
</tr>
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<tbody>
<tr>
<td>$ 3</td>
<td>13%</td>
<td>$ 40</td>
<td>28%</td>
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All $ figures in Million 2017 USD
Conclusions

➔ CBA is a tool with its own limitations

➔ However, it can still inform decision-making if
  ◆ Its limitations are acknowledged
  ◆ Expectations are managed
  ◆ Its formulation is adapted to constraints and context
  ◆ It is used alongside project design

➔ PIR can be very feasible despite limited evidence about their success

➔ Financial and institutional incentives are key in the success of PIR projects,

➔ Integration of such incentives into CBA does not need to be complicated

➔ Institutions can be limiting the use of CBA to inform decisions if they prescribe strict rules around how CBA needs to be conducted and what should be reported out of it (e.g. NPV or IRR)