RENEWABLE ENERGY

USAID Power the Future Regional Program
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Bishkek, Kyrgyzstan
Cost Structure Country vs Utility
COST ALLOCATION: ISSUES

When a government owned utility does not pay the open market price for a product or service provided by another government related entity and/or the product, service or market is directly or indirectly subsidized.

- A hydro plant was built with government funds, then assigned to the utility to operate.
  - The cost of the plant is not supported by the utility but with the national budget, therefore the utility does not include the payback in his costs, making an “artificially” low cost per kWh. The government still has to pay for the loans and becomes a loss for the country.

- The roads to access the plant are built and maintained with funds from the ministry of transportation, while also provide access to other locations unrelated with the plant.
  - The costs of construction nor maintenance, for the part that benefits the plant, is not reflected in the plants operational costs. This is a loss for the country.

- A coal mine, built, by the ministry of public works, owned and operated by the ministry of energy and licensed to a private company, which sells the coal to the power plant at a price defined in his license agreement or other government document which is lower than the international spot market.
  - Various losses here, first, the ministry of energy is not paying back the cost of the plant to the ministry of public works, which is also not paying back to the ministry of finance, making the cost of the plant a national loss; then the difference in the price of the coal because the client is a government owned power plant, another loss for the national budget because the plant is exempt from paying the normal fees for sales at market price, and the resulting “artificial” cost of fuel for the utility, resulting again in apparently lower cost per kWh, which is really a loss.

In short, the whole country’s economy will always pay the difference between the real cost of kWh and the governmentally fixed tariffs, creating a burden for the country’s development instead of supporting it.

Artificially low tariffs, if well managed and identified, can be used in the country’s advantage.
## COST ALLOCATION: ISSUES

<table>
<thead>
<tr>
<th>Item</th>
<th>Government Supported Cost</th>
<th>Utility Cost Reflected</th>
<th>Country Supported Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>I</td>
<td>0 – 0.3</td>
<td>0.7 – 1</td>
</tr>
<tr>
<td>Facilities</td>
<td>I</td>
<td>0 – 0.5</td>
<td>0.5 – 1</td>
</tr>
<tr>
<td>Licenses &amp; Permits</td>
<td>I</td>
<td>0 – 0.3</td>
<td>0.7 – 1</td>
</tr>
<tr>
<td>Fuel</td>
<td>I</td>
<td>0.3 – 0.5</td>
<td>0.5 – 0.7</td>
</tr>
<tr>
<td>Services</td>
<td>I</td>
<td>0.3 – 0.8</td>
<td>0.2 – 0.7</td>
</tr>
<tr>
<td>OM Direct</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>New Investments</td>
<td>I</td>
<td>0 – 0.5</td>
<td>0.5 – 1</td>
</tr>
<tr>
<td></td>
<td>0.85</td>
<td>0.22 – 0.55</td>
<td>0.44 – 0.72</td>
</tr>
</tbody>
</table>

Relative cost values supported by the country and the utility as by the usual practice in countries with government owned utility and directed tariffs.
COST ALLOCATION. USUAL PRACTICE
UTILITY COST

Is the usual metric in many developing countries with a government owned utility and intervened energy sector, where only the payments effectively made by the utility are accounted for.

Given the integrated nature of these government owned utilities, most have special financial treatments and costs along the whole process chain, from the procurement of the primary energy to the defective collections for consumers.

This cost allocation helps to create an artificially low tariff for the consumers, shifting a large part of the real costs to the national budget, intending to support the country’s economic development with cheap electricity.

This approach never delivers the intended results, making the whole energy sector completely dependent from governmental subsidies.

The system always fails because it induces a down drift which self feeds; with every % increase in GDP the government has to support higher costs, which aggregated are bigger than the increase in incomes from the government and the system eventually collapses, either financially or also technically by lack of funds for utility systems maintenance.
COST ALLOCATION. DESIRABLE COUNTRY AGGREGATED COST

Reflects the real and total cost of each kWh for the country’s national budget and economy, accounting for and aggregating all possible costs, direct, indirect, financial, political, hidden, overheads and any others, from the primary source of energy to the effective delivery after consumer’s meter.

Is the key metric to understand the implications of any legal, regulatory, political and financial decision which relates to energy sector.

Without it, no country can make any realistic policies nor support the growth of his economy and people’s welfare.

Is an extremely complicated, unpleasant and lengthy process, which requires absolute internal transparency, data honesty and recognition of national weaknesses.

Unfortunately is still a “work in progress” in many countries with state-owned utilities and government intervened energy sector.
COST ALLOCATION. BENEFITS OF CHANGE

Transition from Utility Cost to Country Cost means the application of “Analytical Accounting Principles” to the public finances.

It does not mean increasing consumer tariffs.

By knowing the real Country Cost the government can:

- Define strategic energy policies for regions, activity sectors, and replacement or renewal of power infrastructures.
- Identify “sunken costs” across all governmental stakeholders that can be used to “facilitate” the participation of IPP’s.
- Set the right targets for cost reduction and drive a coherent competitive procurement.
- Reduce the governmental dependence from loans and reduce investment costs.
- Improve access to stable, reliable and cheap energy.
- Reduce the financial weight of the government utility in the national budget.

This cost identification and allocation transformation, by itself alone, is not the key to unlock these benefits; it has to be supported by an horizontal trans-ministerial approach and requires changes in multiple areas and regulations, but is a key driver in the whole process.
Development models – IPP / PPP
DEVELOPMENT MODELS – IPP / PPP

Almost all development models fall into these categories:

**IPP**

**Independent Power Producer**
There are many variances to this form of development, but normally is a private entity which is responsible for the complete project cycle, from obtaining finance to engineer, procure, build and operate the plant.
Depending on the size of the project, the private entity may be one company or a consortium of various companies and financial institutions.
This formula diverts all material and operational costs from the utility and government, in exchange for a reasonable value for the power delivered.

**PPP**

**Public Private Partnership**
This option, which also has many variations, pivots on the concept of shifting some public or utility owned assets and/or licenses to a private entity which will operate and manage those assets and/or licenses on behalf of the utility or government.
This approach is normally used for large projects and concessions, like national infrastructures or services.
It allows for a partial diversion of costs with an improvement in financial efficiency of the operation.
## DEVELOPMENT MODELS – IPP / PPP

### Key Drivers

<table>
<thead>
<tr>
<th>IPP</th>
<th>PPP</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPA value and time</td>
<td>Value of the market</td>
</tr>
<tr>
<td>Commercial contract based</td>
<td>License/Concession based</td>
</tr>
<tr>
<td>Facilitation is key for cost reduction</td>
<td>Customized regulations</td>
</tr>
<tr>
<td>Cover generation and grid</td>
<td>Utility alike rights</td>
</tr>
<tr>
<td>Fully private management</td>
<td>Shared Public/Private Management</td>
</tr>
<tr>
<td>The project is the core</td>
<td>The area/market rights is the core</td>
</tr>
<tr>
<td>No subcontracting the delivery</td>
<td>Rights to subcontract the delivery</td>
</tr>
<tr>
<td>Financial obligations are fully private</td>
<td>Financial obligations are shared</td>
</tr>
<tr>
<td>Cost reduction oriented</td>
<td>Performance improvement oriented</td>
</tr>
<tr>
<td>Adequate for specific projects</td>
<td>Adequate for areas or markets</td>
</tr>
</tbody>
</table>
Grid Readiness vs Quota vs Tendering
SYSTEM READINESS VS QUOTA VS TENDERING

Key questions

The obtention of competitive tenders is the result of a highly elaborated and detailed plan, which comprehends country’s long term energy strategy, financial considerations, utilization of overheads, regulatory coordination, trans-ministerial proactive cooperation and technical considerations.

Usually, regulators are not aware of these requirements and implications and, tend to launch tenders without the adequate approach. This creates multiple technical and financial issues.

The right approach follows these steps:
1. System readiness and financial evaluation.
2. Assignment of Quota or capacity, by technology and area.
3. Tendering of quota sections.

Successful procurement of variable generation has implications across many regulations and government entities, which requires alignment and coordination, otherwise is unlikely to obtain the benefits in the medium and long term.
Whether you procure IPP’s or PPP’s, the offering and the process has to be attractive for investors. You need to provide certainty, consistence and coherence, which are the counterbalance for the price. High uncertainty and risk = higher price = lower quality bidders.
Procurement Case Studies
PROCUREMENT CASE STUDIES

UAE, Saudi Arabia, Oman and Jordan.

In the case of these countries, there is a consistency in the approaches taken, all of which rely heavily on facilitation mechanisms by changing laws and regulations, and utilizing overheads, existing unproductive assets and pro-active coordination between all government entities, all within a long term national energy strategy.

The results are well known and programs are ongoing,

2014, Jordan, 1,1 GW at < 0.04 USD/kWh
2016, UAE, 1,5 GW at 0.0249 USD/kWh
2017, Oman, 1.5 GW at 0.0223 USD/kWh
2018, Saudi Arabia, 1.5 GW at 0.0149 USD/kWh

On the PPP side, the most relevant development comes from Mexico, where new electrification and refurbishment programs were launched in 2017. They successfully closed projects in excess of 5 GW under a concession/license scheme, which included new networks, metering system, collections rights and generation mix.
PROCUREMENT CASE STUDIES

ASEA Cases

They have in common a lack of long term national energy strategy, facilitation mechanisms are inconsistent and regulation is not coordinated nor reliable, while governments and utilities take a reactive approach. As result, they are not benefiting for the cost and management advances that renewables and power PPP’s can provide to the nations.

2019, Indonesia, 0.05 GW at 0.18 USD/kWh
2019, Malaysia, 0.48 GW at 0.07 USD/kWh – ~ 0.33 GW by new regulations in 2018
2019, Philippines, 0.23 GW at 0.078 USD/kWh
2019, Thailand, 0.74 GW at 0.073 USD/kWh

Is no coincidence that these countries have many points in common, like artificially low energy tariffs, financially weak utilities and have not started or completed the “Country Cost” evaluation. They also have in common the signature and acceptance of all international treaties for expanding clean energy and bold public announcements of unrealistic targets.
PROCUREMENT CASE STUDIES

Ukraine Case

Closer to our region and with alike background, they have been proactively incorporating variable generation (>5GW since 2014) and upgrading their backbone generation to manage that variability.

Is to be noted that only in the last year, together with the creation of an energy market, they unbundled the national utility, separating generation facilities and transmission network into various state owned companies, while the distribution has been fully privatized under a form of PPP.

Presently they are restructuring of the FiT, as widely obsolete mechanism and, have a solid program to further upgrade their power infrastructures to cut the last connections with Russian grids and become connected to the European Entso-E transnational grid, which will open for exports the whole European power market.

Their regulations don’t have strong facilitation mechanisms but are extremely simple proven and reliable, creating no uncertainty risks for investors or developers.

For the disconnection from Russia and the connection to Europe, the country has requested technical support USAID, WB and EBRD.
Integrated Regulatory and Policies Framework
Development of energy sector and integration of renewable generation into the system requires much more than bold announcements. An adequate policy and regulatory framework is required.

Certainty  
Transparency  
Timing  

Cost kWh

In many countries the required changes are done as exemptions on the existing regulations, which is usually much simpler and quicker, but a detailed roadmap of changes and interrelations is needed.
### Integrated Regulatory and Policies Framework

Depending on the regulatory and legal structure of each country, the following key permits and areas need special treatment.

<table>
<thead>
<tr>
<th>Regulation</th>
<th>Change</th>
<th>Usual Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project construction</td>
<td>Set of generic requirements</td>
<td>Set of clear and specific rules and requirements for the project construction and operation, including grid code, which must be complied with. They are the base of the simplification and even removal of certain permits. Under this approach, most administrative processes, permits and inspections are replaced by the “right to inspect”, which can be excised by any relevant governmental entity at any moment during the lifetime of the project, instead of the traditional “compliance on paper” which is lengthy and not clearly defined in most cases and has fuzzy legal implications. – After audit by international certification agency, non compliance with regulation is punishable with loss of all rights, cancellation of PPA reimbursement of all payments received and expropriation of the plant and, could extend to jail terms for owners, contractors and engineers.</td>
</tr>
<tr>
<td>Construction permits and usage of public roads</td>
<td>Simplification and acceleration</td>
<td>Reduce to simple notice to municipality, who provides a N/O note in 48 hours or even eliminate completely for projects under public award. Tenders and/or related regulation includes the requirement to reinstate all public area used to original conditions. May include rights of way if under local jurisdiction.</td>
</tr>
<tr>
<td>Environmental permits</td>
<td>Pre-award for defined areas</td>
<td>When public projects are awarded within preassigned lands, permit is removed. Conditions to protect, preserve and reinstate environment are included in the tender process. May include rights of way if under jurisdiction.</td>
</tr>
<tr>
<td>Rights to connect</td>
<td>Right to connect</td>
<td>The projects are pre-granted connection rights, including overhead lines and rights of way from site to point of connection on public or communal roads and/or paths.</td>
</tr>
<tr>
<td>Customs</td>
<td>Import duties and process</td>
<td>The key factor is removal of the transit time and associated process, while cost is secondary.</td>
</tr>
<tr>
<td>Finance and Ownership</td>
<td>Non restrictive</td>
<td>Allowance for free unrestricted foreign finance and plant shareholders, even under a local registered SPV. This process shall be supported by quick and simple SPV creation and bank account opening simplification.</td>
</tr>
</tbody>
</table>
Attracting Private Investment
ATTRACTION PRIVATE INVESTMENT

Regulators must understand the cost drivers to obtain competitive generation.

Cost of plants is almost universal. Today the project cost is driven by “soft costs”, like permits, finance, taxes, legal security, and others.

Key drivers are:

- Development cost & time
- Permitting time
- Origin and cost of finance
- Local ownership
- Legal security
- Corporate Tax
- Import limitations
- Authorities transparency

The country must compete with others to attract investment.

Regulators must be able to clearly answer “why in this country and not somewhere else?”

<table>
<thead>
<tr>
<th>Hard Costs</th>
<th>$/kWp</th>
<th>Weight</th>
<th>Effect in kWh price &amp; LCoE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel</td>
<td>250</td>
<td>6</td>
<td>Considered driver</td>
</tr>
<tr>
<td>Inverter</td>
<td>60</td>
<td>1</td>
<td>Irrelevant</td>
</tr>
<tr>
<td>Structure (fixed)</td>
<td>30</td>
<td>2</td>
<td>Irrelevant</td>
</tr>
<tr>
<td>BoS &amp; labor</td>
<td>126</td>
<td>5</td>
<td>Considered driver</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hard Costs</th>
<th>$/kWp</th>
<th>Weight</th>
<th>Effect in kWh price &amp; LCoE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development time &amp; effort</td>
<td>50</td>
<td>10</td>
<td>Time &amp; cost risk = project risk</td>
</tr>
<tr>
<td>PPA &gt; 20 years</td>
<td>0</td>
<td>8</td>
<td>Profits, + 25 =&gt; - PPA</td>
</tr>
<tr>
<td>BOOT</td>
<td>0</td>
<td>5</td>
<td>+ PPA</td>
</tr>
<tr>
<td>Land rights: lease</td>
<td>0.5% net</td>
<td>8</td>
<td>Lease =&gt; - LCoE =&gt; - PPA</td>
</tr>
<tr>
<td>Permitting</td>
<td>30</td>
<td>10</td>
<td>Time &amp; cost risk =&gt; + PPA</td>
</tr>
<tr>
<td>Local ownership required</td>
<td>0</td>
<td>10</td>
<td>Control risk =&gt; + PPA</td>
</tr>
<tr>
<td>Free origin of capital</td>
<td>&lt; 3%</td>
<td>10</td>
<td>Cost &amp; time risk =&gt; + PPA</td>
</tr>
<tr>
<td>Tax exemption</td>
<td>TBD</td>
<td>7</td>
<td>Cost =&gt; + PPA</td>
</tr>
<tr>
<td>Customs free transit</td>
<td>TBD</td>
<td>7</td>
<td>Cost &amp; time risk =&gt; + PPA</td>
</tr>
<tr>
<td>Local content required</td>
<td>700</td>
<td>10</td>
<td>Cost &amp; quality risk =&gt; - bankable</td>
</tr>
<tr>
<td>Ease of project finance</td>
<td>TBD</td>
<td>8</td>
<td>Cost risk =&gt; + PPA</td>
</tr>
<tr>
<td>IRR</td>
<td>&gt; 15%</td>
<td>10</td>
<td>Lender &amp; equity risk =&gt; + PPA / Key</td>
</tr>
<tr>
<td>DSCR</td>
<td>&gt; 1.30</td>
<td>10</td>
<td>Lender risk =&gt; + PPA</td>
</tr>
</tbody>
</table>
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