Electricity Sector Reform: What Have We Learned?

Tooraj Jamasb
Durham University Business School
and
Durham Energy Institute (DEI)

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Outline

- Reforms background and context
- Selected issues
  - Environmental impact
  - Pricing and subsidies
  - Access
  - Role of capital
  - Emerging issues
- Lessons learned
- Reform steps
- Reforms status around the world
“The Government’s view of the economy could be summed up in a few short phrases:

If it moves, **tax** it. If it keeps moving, **regulate** it. And if it stops moving, **subsidize** it.”

"**Economics are the method**; the object is to change the soul“
Current State

- The reforms of the 1990s marked withdrawal of the state from the sector.

- In recent years, some return to state intervention:
  - Many reforms have not delivered the expected benefits.
  - Climate change, energy security concerns, and social policies require intervention in the sector.

*Many reforms are stalled*
Electricity Liberalisation 101: Generic Model (Inputs)

- **Vertical separation**
  - Generation, Transmission, Distribution, Retail
- **Competition in Generation**
  - Entry by new producers
  - Full-blown markets
- **Competition in retail**
- **(Independent) Regulation of T & D networks**
  - Access for competition over networks
  - Incentive regulation for improving efficiency
- **Privatisation (Optional?)**
- **Pricing/subsidy reform** – Tariff re-balancing, or cost-reflective pricing
Reform Effects (Outputs)

- **Microeconomic:**
  - Efficiency
  - Prices / subsidies
  - Quality of service

- **Macroeconomic:**
  - Access
  - Economic welfare / equity
  - Economic growth

- **Innovation**

- **Environment**

Reform inputs and outputs linked through institutional factors
## Drivers of Power Sector Reforms

<table>
<thead>
<tr>
<th>Sector level drivers</th>
<th>External drivers</th>
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<tbody>
<tr>
<td><strong>Developed countries:</strong></td>
<td>a) Political and economic ideology: faith on the forces of market, competition and privatization</td>
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<tr>
<td>• Excess capacity,</td>
<td>b) Technological innovation: such as the development of CCGTs</td>
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<tr>
<td>• Economic inefficiency,</td>
<td>d) Capital raising options: privatization of state owned energy assets</td>
</tr>
<tr>
<td>• Demand for lower prices</td>
<td>e) OECD energy deregulation: creation of new energy multinationals looking for new investment opportunities</td>
</tr>
<tr>
<td><strong>Developing countries:</strong></td>
<td>f) Lending policies: such as those of the World Bank and IMF with strings attached</td>
</tr>
<tr>
<td>• Capacity shortage</td>
<td>g) National economic reform context: as a result of economic crisis and structural adjustment programs</td>
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<td>• Burden of subsidies,</td>
<td></td>
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<tr>
<td>• Low service quality,</td>
<td></td>
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<tr>
<td>• High energy losses,</td>
<td></td>
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<tr>
<td>• Poor access,</td>
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<td>• Capital constraints</td>
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Initial Condition of Reforms – Differ

- Structure
- Size
- Ownership
- Geography
- Resource base
- History
- Institutions
- ...

...
Assessing Reform Performance – Not Easy

- Efficiency and productivity analysis – markets, sectors, networks
- Micro-econometric methods
- Macroeconomic methods
- (Social) cost benefit analysis – what counterfactual?
- Case studies (intensive, extensive, comparative)
Restructuring

- Vertical integration
  - Economies of scale and coordination

- Vertical separation
  - Gains from competition, higher transaction cost

- Unbundling makes the extent of inefficiencies along the value chain visible
  - Which can be corrected with cost-reflective pricing
Selected Issues
The Environment (1)

- Reform / cost-based pricing improves energy efficiency
- TE reduces carbon intensity

- Are reforms damaging to the environment?
  - They can be, but not because of reforms per se
  - Rather, a question of having a sound environmental policy

- **Social acceptance** - The changing role of public in environmental policy and towards the sector – e.g. Norway
  - Old decision frameworks less effective than before
  - New governing framework and processes required
The Environment (2)

- Non-Technical Losses
  - Leads to waste
  - Negative environmental externalities
  - Damages the revenue base of the utilities
  - Prevents improvement in extension and improving quality of service
  - Places many users beyond the reach of energy and environmental policies
Global Energy Subsidies

Figure 1: Distribution of Global Energy Subsidies (480 billion USD)
- MENA: 50%
- Emerging and Developing Asia: 20%
- Cental Eastern Europe and Central Asian: 15%
- Latin American and Carribean: 8%
- Sub-Saharan Africa: 4%
- Advanced Economies: 3%

Figure 2: Distribution of Global Energy Subsidies by Energy Sources (480 billion USD)
- Petroleum: 44%
- Electricity: 31%
- Natural Gas: 24%
- Coal: 1%
Pricing and Subsidies

- Reasons for energy subsidies:
  - Security of supply
  - Industrial policy
  - Job creation
  - Income buffering
  - Energy poverty
  - Redistribution of wealth / income
Prices Matter for Energy Intensity!

Cross-section relation between average energy intensity and average energy price

1993-99

Best fit constant price elasticity of -1.0 (S.E. 0.14), R² = 0.69 (Excl CEE)

Source: David Newbery
### Pricing and Subsidies (1)

<table>
<thead>
<tr>
<th>Supply-side tools and interventions</th>
<th>Demand-side tools and interventions</th>
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<tbody>
<tr>
<td>❖ Direct public funding for research and development</td>
<td>❖ Financial incentives for user take-up e.g. feed-in-tariffs, investment tax credits, rebates, concessionary financing, tax-exempt financing, matching grants, green certificates</td>
</tr>
<tr>
<td>❖ Indirect subsidies to innovators</td>
<td>❖ Pricing policies – e.g. externality pricing via taxes and cap-and-trade, price stabilization such as price floors</td>
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<tr>
<td>❖ Production tax credits, accelerated depreciation, matching grants, loan guarantees, procurement programs, purchase guarantees, price guarantees</td>
<td>❖ Regulatory mandates such as portfolio standards, efficiency codes and standards</td>
</tr>
<tr>
<td>❖ Government financed seed and venture funds</td>
<td>❖ Government procurement</td>
</tr>
<tr>
<td>❖ Monetary prizes</td>
<td>❖ Industry and market restructuring such as unbundling, regulation, nationalization</td>
</tr>
</tbody>
</table>

*Source: Adapted from World Economic Forum (2013)*

**Table 1: Demand/Supply side policy tools/interventions**
Pricing and Subsidies (2)

- Pricing and subsidy reform a critical component of the wider reform
- An important source of inefficiency and build up of debt in pre-reform sectors
- $US 400 billion or 0.7% of global GDP. IMF (2013)

- Help reduce debt
- Help introduce competition and price-mechanism
- Improve the environment

*But, pricing reform is not enough, other policies must provide substitutes, technologies, etc.*
Pricing and Subsidies (3)

- Richer households benefit disproportionally from subsidies
- Fossil fuel subsidies as barrier to deployment of renewable energy sources

- Subsidies most effective when aimed at providing access
- Short term gains small. Main gains from subsidy reform in the long term
- Thus a gradual approach should be preferred
Access

- Reforms do not automatically improve access
- But, to benefit from reforms one has to be connected

- **Negative externalities** - Energy use

- **Positive externalities** - Access
  - Smart market-based capital subsidy programmes improve access
The Role of Capital

- Energy sector is capital intensive

- Governments have lower borrowing costs than private sector

- Private sector is more efficient

- Governments should reduce risk premiums
  - So performance of reform depends on how efficient the government is initially, efficiency of private sector, private vs. public cost of borrowing, risk premium
  - There may be scenarios where public sector is the option – e.g. political/regulatory uncertainty leads to very high cost of borrowing
Emerging Issues

- The urban poor
- Link to urban environmental quality
- Combine reform with environmental, climate change, renewable objectives
- The changing nature of public engagement with the sector
Lessons (1)

- Reforms tend to improve technical and economic efficiency of the sector

- Reforms may not automatically increase consumer welfare
  - Through “incentive regulation” of natural monopolies and “competition” where markets can exist.
  - Effective regulation / policy required to ensure efficiency gains are passed to consumers
Lessons (2)

- Reforms not inherently damaging to the environment, but they can be
  - Need to get the environmental policy right

- Reforms do not directly reduce poverty, but they can
  - Need to design smart policies targeted at the (fuel) poor

- Reforms will not automatically improve access
  - Need smart market-based capital subsidy schemes
Lessons (3)

- Reform only on the paper will not deliver social benefits
- Prices and pricing are at the heart of most inefficiencies and shortcomings in the sector
- So, do not leave the price reform to private actors.
  - Political economy sensitivities are high. Pricing reform before privatisation
- The relatively more successful reforms have adopted home-grown models
Lessons (4)

- Do not compromise economic principals for political approval – California
- Do balance economic efficiency and equity
- Do introduce cost-reflective pricing – But do it yourself, and slowly!
Lessons (5)

- The potential for efficiency improvement in networks was only realised later.

- Legitimacy important – and linked to transfer of efficiency gains and ensuring equity and access.

- Where markets are difficult to organize consider “competition for the market” instead of “competition in the market”.
Lessons (6)

- Reforms remain work in progress,
  - Need to be continually modified and adapted

- Developed countries better in creating markets, but have market power problem

- Climate change and security of supply issues call for intervention in the market
  - Complicating the liberalisation
Lessons (7)

- Evidence of reforms remain mixed

- Many LDCs are still ‘reforming’
  - Or rather, their reforms have stalled

- Some seem to have progressed on the paper

- Reflecting the difficulties of implementing reforms
Lessons (8)

- The reforms have not been a run away success
- But, the underlying motivations remain
- Infeasible to return to the pre-reform era, much has changed
- Need to keep re-inventing reform models and processes
Reform Measures –
A Summary
Restructuring

- Vertical integration
  - Economies of scale and coordination.

- Unbundling
  - Gains from competition, but higher transaction cost

- Unbundling – makes visible the inefficiencies along the value chain
  - These can then be corrected with cost-reflective pricing
Electricity Market Reform Models

Figure 2: Electricity market models transitioning
Source: Adapted from USAID (2004)
Regulation

- Independent regulation still a difficult job in many countries
- Regulators need to ensure efficiency gains are passed to consumers
- Incentive regulation of networks – Promising but need to improve
- Reforms initially about competition in the markets
  - The efficiency improvement potential of the networks was discovered later. (Jamasb and Pollitt, 200x)
  - Technology and innovation policy were also overlooked
Wholesale Competition

- Choice of market model.
- Consider “competition for the market” vs. “competition in the market”.

- Competition more difficult in small system.
- Market power
- Capacity markets?
- V. integration with retail supply
- Interconnections
Retail Competition

- Tendency to market concentration in most countries
- Inelastic demand
- Price competition not profitable
- Vertical integration of generation and retail supply unhelpful

- Non-price competition strategies become attractive

- Are the current business models sustainable?
Privatisation

- Not a prerequisite, but ...
- Norway – An interesting example
- Must be done for right reasons – e.g. not for the sale proceeds

- Privatisation vs. IPPs, or management contracts
- Private sector efficiency gains must outweigh higher cost of capital
  - How to reduce cost of capital for private investors?
Pricing / Subsidies

- Tariff re-balancing prior to privatisation.
- Resource rich countries have highest subsidy levels

- Subsidy for access vs. consumption.
  - Market mechanisms for capital subsidies
- Interesting experiments in some countries
  - E.g. Iran - Substituting subsidies with cash payments
Access

Regional Trade

- A useful way to increase competition
- But, should not only benefit exporters
- Despite economic benefits there are political issues
Reforms Around the World
Developing Countries (1)

- Benefits of market-based reform for small systems potentially smaller.
- Full-blown market restructuring and reforms may not be necessary.
- Important given any market structure is the quality of institutions that sets ‘the rules of the game’ and its ‘governance arrangements’.
- Importance of ‘quality institutions’ increases with adoption of more market-based elements.
- Vertical separation in the form of accounting unbundling desirable to the minimum.
- Tariff rebalancing essential before private participation. Also acts an incentive to private investors than a deterrent.
Developing Countries (2)

- **Africa** - Inability of some countries (e.g. Sub Saharan Africa) became evident. Lack of private sector interest.

- **Asia** – Overall dispiriting (Japan: reform under consideration, Korea: reforms frustrated, India: reforms difficult, China: reforms postponed, Russia: reforms repealed)

- **Middle East** – Reforms (and destined to be) advancing (e.g. Oman as a pioneer of electricity markets reform and privatization in the Middle East); single buyer model (several variations) in MENA countries; Algeria, Saudi Arabia and Iran longing for a wholesale market

- **Latin America** – markets continue to develop (Chile, Colombia and Peru); reforms reversal such as renationalisation (Brazil, Argentina, Venezuela, Dominican Republic)
Developing Countries (3)

- **India** – Institutions have shown better progress in renewable energy promotion than promotion of power sector reforms

- **Iran** – Reduced energy subsidies and replaced with cash payments to all households
  - A text book exercise, but
  - Underestimated the ability to sustain the payments over time
  - Under-developed tax/admin. prevents a program targeting the poor only
FIGURE 12
RELATION BETWEEN PER CAPITA GDP AND INSTITUTIONAL DEVELOPMENT INDICES IN 161 COUNTRIES, 2002

Source: Author’s estimations based data from World Development Indicators (2005) and Kaufmann et al. (2005).
Note: Author’s regression line is in black and lines for confidence intervals at 90% are in grey.
Transition Economies

- Quick to privatise
  - But, not as a part of a well planned reform program

- Many reforms have been superficial
  - As a result they have not shown the expected benefits. (Nepal & Jamasb, 2012)

- However, energy efficiency has improved in these countries. (Nepal & Jamasb, 2014)
BRICS

- **Brazil** – Large hydro resources, privatization before regulator, relative success

- **Russia** – Two reforms. From central planning to corporatisation. Second, market based reforms

- **India** – Difficult and slow reform, pricing a major issue, Some progress on renewables

- **China** – Slow reform, fear of disruption to economy, some market experiments

- **South Africa** – Focus on distribution, progress with electrification, low prices
The European Union

- Some countries have been reluctant reformers

- Therefore, compliance with the Directives does not always equate to reform performance

- Climate change, supply security, and renewable objectives complicate implementation of reforms
References


Thank you!