

Macroeconomics & Fiscal Management

MFM PRACTICE NOTES

Assessing policy Trade-Offs with Easy-to-Use Models in PERs – Examples from the Energy Sector

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Introduction

In this note, we summarize three energy sector models used in Lebanon, Kosovo and the Comoros, three countries that had significant energy-sector challenges and limited fiscal space available to finance solutions. Public Expenditure Reviews (PERs) can help governments to learn from past experiences to identify future risks and improve future resource allocation. Sometimes this can involve taking difficult decisions. Developing easy-to-use “tools” that highlight the impacts (pros and cons) of different policy options can bring more clarity to difficult decision-making. This note presents the experiences of three PERs that developed models to show the impact of energy policy options. Each model was designed to address the specific challenges faced by each country to ensure relevance and facilitate policy dialogue.

The models showed policy-makers the links between sectoral performance, financial performance of state owned enterprises (SOEs), the budget, and economic performance. In each case, the models were constructed with a similar ‘bottom up’ framework based on financial data from SOEs, energy sector data, combined with budget data. Users are able to model policies changes or performance parameters to estimate the likely impacts of choices. For example, the impact of subsidies on the budget and consumer tariffs; the impact of public

expenditure invested in reducing transmission losses; or the impact of different public and private financing mixes on fiscal balances.

Developing these tools allows for flexibility in answering different policy questions. Each tool can be adapted or augmented to focus on a broad set of questions as they become relevant. The tools presented in this note focused on fiscal impacts; consumer tariff impacts; and economic impacts. In the Comoros case - what are the subsidy needs and will ongoing reforms narrow the utility’s financing gap? In the Kosovo case - how do investment and subsidy choices impact required power imports/exports and consumer tariffs? In the Lebanon case - what is the expected economic loss (in terms of growth) resulting from the deficiency of the electricity sector? Other potential questions may include how different income groups are impacted by tariffs or which productive sectors suffer from energy deficiencies, among others.

The tools are based on easy-to-use Excel-based models that can be extended to a wide number of sectors. Recent examples include tax policy and health insurance. While they are not likely to show one specific policy recommendation, they can help policy-makers assess trade-offs.

Comoros²: Estimating the size and path for reducing subsidies

Comoros Context: Comoros suffers from a high cost (diesel based) and low efficiency electricity sector. The financial position of the main utility (MA-MWE) has deteriorated sharply in recent years and its subsidy needs

¹ This Knowledge Note was cleared by Mark Roland Thomas, Practice Manager (GMFDR).

² Comoros Public Expenditure and Fiscal Management Review, 2015.

have been growing, amounting to approximately 1.5 percent of GDP in 2013. These difficulties contributed to the onset of the ongoing electricity crisis.

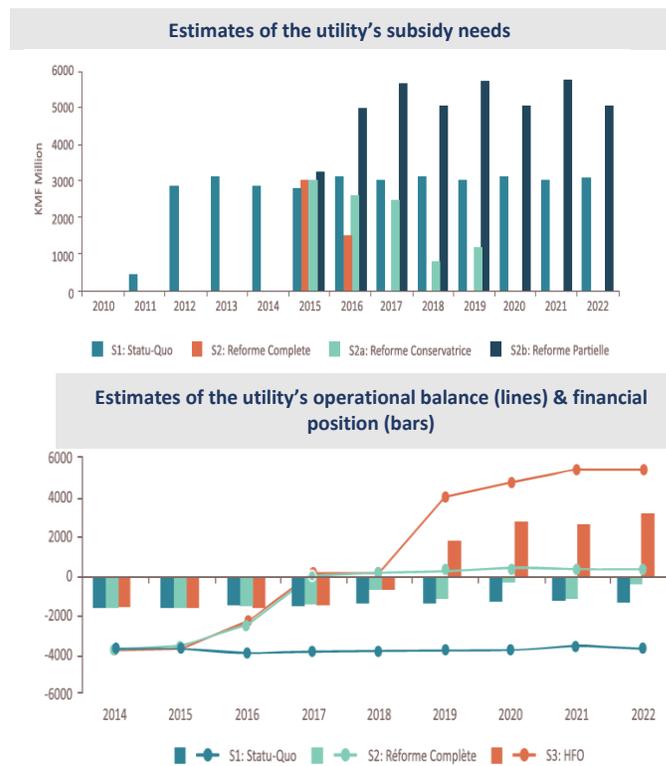
Policy questions: A model was developed to estimate the fiscal and financial recovery implications of reform scenarios for the electricity sector. The model sought to answer the following questions:

- (i) What are the drivers of the utility's financing gap, will it need a subsidy going forward, and for how long?
- (ii) What is the expected fiscal impact of the planned reforms and investments in the sector?
- (iii) What will it take for utility's long-term financial recovery?

An excel based model was constructed to answer these questions based on a three step procedure:

<p>ONE: CONSTRUCT THE UTILITY'S FINANCIAL FLOWS Build MAMWE's income and expense statement, and the budgetary flows between government and the utility.</p>
<p>TWO: BUILD THE SCENARIOS Develop scenarios based on the relevant policy questions, potential sector reforms and investments.</p>
<p>THREE: CREATE THE SIMULATIONS Forecast performance under various reform assumptions and apply them to the financial framework to estimate the utility's financing gap, operational balance and net financial position.</p>

The results: The analysis delivered the required estimates of the utility's financing gap and its financial position. It helped to deliver three important messages to the authorities. First, subsidies are essential to the success of the recovery plan and should be budgeted for the next five years. Second, that investing in production capacity without improving commercial performance will widen the financing gap. Third, that diversifying the fuel mix away from diesel is the most feasible path to easing out subsidies and achieving sustained commercial recovery.



The policy impact was high. The analysis contributed to a shift from ad-hoc funding practices to a costed and budgeted subsidy to MA-MWE in 2016 for the first time. The government also used the model to support a decision to reduce the administered price of diesel to MA-MWE by 25 percent. This decision represents the only pass-through of the recent global fuel price reductions to the economy, and has significantly reduced the operating costs of MA-MWE.

Kosovo³: Modeling the impact of capital investment on performance and tariffs

Kosovo context: Kosovo was reliant on two aging coal-fired power plants that would soon need to close for 97 percent of its energy generation. At the same time, the energy sector benefited from explicit and implicit subsidies that, combined with the amortized generation facilities, kept energy tariffs the lowest in Europe. Between 2009 and 2012, explicit subsidies including those for imports cost around 1 percent of GDP. Over the same period, the government was providing capital investment and loans, which went un-repaid.

³ Kosovo Public Finance Review available from: <https://openknowledge.worldbank.org/handle/10986/20756>

The latter were worth 4 percent of GDP by 2012. With subsidies keeping tariffs low (a bonanza from which the wealthy benefited more than the poor), Europe's lowest energy prices (bar Serbia) would be unable to cover the costs of much-needed investments. Fiscal space was limited (partially due to an impending government decision to construct a new highway rather than address energy issues), public debt reasonably low (though with market access issues), and social protection for the poor shrinking. There were difficult choices to be made to finance the costs of investment in the sector, which amounted to around 20 percent of GDP

Policy questions: Doing nothing wasn't an option in an energy-starved region with volatile relations between the countries. But who and how should the investments into the sector be paid for? The tool, based on data from the Energy Regulator and augmented with fiscal and public debt data, shows the impact of various choices on: electricity tariffs; required public resources; public debt and interest costs.

The results: The Kosovo tool allows the user to modify several parameters and see the impacts. Parameters that can be modified include: (i) decommissioning, new construction or renovation of plants; (ii) how the work is financed (private, public shares and if public whether from budget or debt); (iii) new subsidy policies; (iv) distribution losses; (v) reactivity of import prices to increased demand; (vi) speed with which renewables come online; (vii) retail margins permitted; (viii) coal royalty policies; (ix) export prices; and (x) growth in demand. By modifying these parameters, the user controls (a) the supply and the demand, with the former controlled through investment choices and parameters, and (b) who pays for these choices. By allowing all costs to be passed to the consumer, the user can see the impact on average energy tariffs. By bringing all costs to the government, the user can see the impact on public expenditures and public debt. Intermediate options are also available (e.g. by modifying subsidy policy).

Examples of results in Kosovo include:

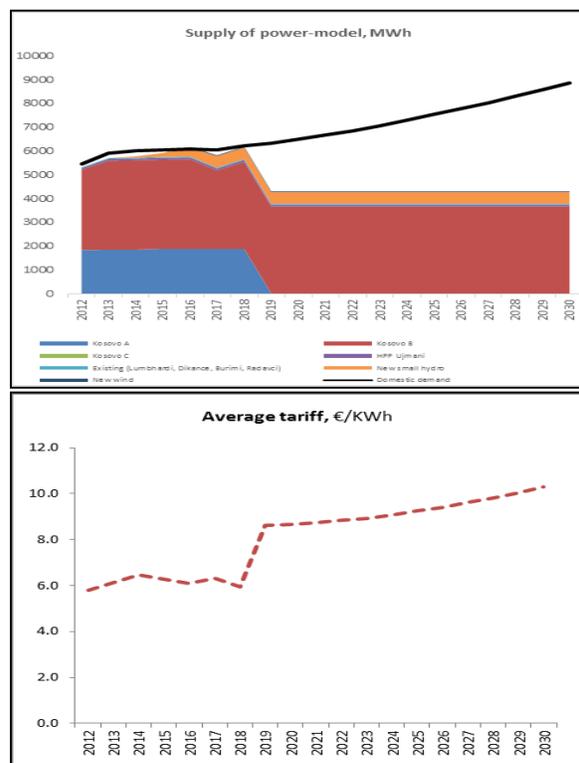
- Doing nothing resulted in an energy supply gap and increasing tariffs (or growing subsidies) due to imports costing

more than domestically-produced energy. This would also have large Balance of Payments impacts.

- Building a new power plant would maintain energy supply long into the future but would also cost around 20 percent of GDP. Either tariffs would need to increase or resources would need to be found from the public sector.

The policy impact: In Kosovo, these results were used to present various scenarios in the PER. Unfortunately, progress in expanding Kosovo's energy provision and issues with one of the two aging power plants has even led to energy supply cuts. Sensitive discussions regarding options for power supply are still ongoing and the Bank team continues to use this model for various simulations, particularly regarding tariff impact of the options.

Sample model results: The cost of doing nothing in Kosovo



Lebanon: Modeling economic loss from an underperforming electricity sector

Lebanon Context: Electricity cuts are widespread across Lebanon reaching a daily average of 9 hours. These cuts are due to the: (i) the insufficient capacity of generation, (ii) tariffs set more than 50% below cost recovery levels, (iii) the rapid depreciation of the sector's

physical assets, and iv) the weak governance of the sector with high operational, financial and technical losses. Government subsidies to the monopoly electricity utility (EdL), covering almost exclusively fuel purchase, have reached 4.2% of GDP in 2011; while the burden on household and businesses was estimated at 11.4% of GDP.

Policy Question: Investing in electricity can also be considered as an investment in fiscal consolidation, in household welfare and in the performance of businesses. As such, the report examines the fiscal and social returns from implementing the electricity sector investment program approved by the government of Lebanon (GoL) in 2010. To do so, the report developed an Excel based simulation tool with three pillars.

Pillar 1 uses cash flow analysis to determine the net cash position of the utility and sector, and computes the Net Present Value (NPV) of the accumulated net cash results. While losses and consequently subsidies are estimated at a sectoral level; the NPV can be viewed as the opportunity cost arising from accumulated losses that could have been re-invested into the economy. Data used under this pillar are primarily EdL's financial statements, planned capital investments and debt service contracted as a result.

Pillar 2 uses micro simulations to compute the household electricity bill from both public and private sources. To do so it recurs to data on household electricity consumption collected as part of the 2009 nationally representative PSIA household survey, and to data on electricity tariffs and on fees for private generators services.

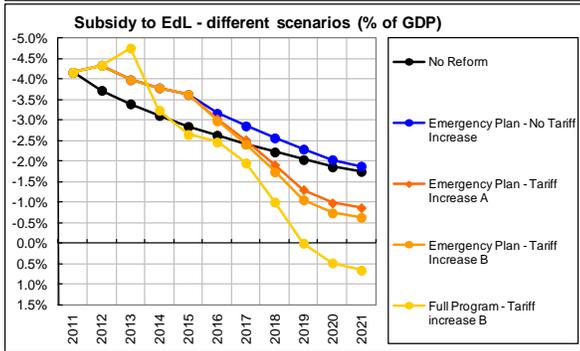
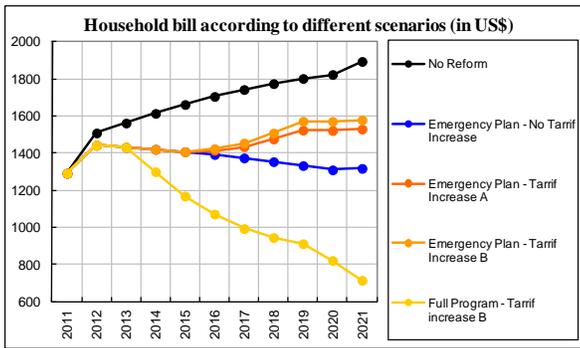
Pillar 3 builds on the Input-Output tables of the Lebanese National Accounts data to determine the overall growth returns from private sector savings, and the inflationary impact due to tariff adjustment. In addition to national accounts data, the model uses data on private sector losses from the ICA survey, along with inflation indices.

The tool allows for scenario building as most of the parameters remain flexible to input across the projection timeline. Such approach enables a policy discussion around the sequencing aspect of reforms. The main simulation parameters are the investment program (size

and time), operational performance indicators (like non-technical losses and bill collection rate), and tariffs. Using those parameters, the report discusses 5 scenarios: a no reforms option used as a baseline, 3 scenarios building on the emergency investment plan coupled with 2 sets of tariff adjustment, and a 5th full reform program that includes additional investment in generation capacity.

Results: Scenario analysis revealed that the GoL cannot reduce subsidies in a substantial way without increasing electricity tariffs, and that these subsidies will have to be maintained for at least 6 years under the most optimistic scenario. The tool estimates that the accumulated subsidies will range between US\$9.7 and 11.8 bn. On the welfare impact, the report reveals that households are penalized by 2 electricity bills averaging US\$1292 yearly per household. This is equivalent to 22% of the minimum wage and 13% of GDP per capita. Scenarios also indicate that any reforms that increase supply would generate savings reaching up to \$629 per household per year even if tariffs are increased. The overall welfare gains could therefore go up to US\$2.9 bn. per year. Finally the analysis shows that business losses due to outages could reach up to US\$7.5 bn. (9.8% of GDP) by 2021 under the status quo. Reforms could save firms up to a yearly US\$2.9 bn. Moreover, suggested tariff reforms would add 0.2 to 0.3 percentage point (ppt) to inflation in year 1 of implementation, followed by 0.1 ppt hereafter till 2019.

The Policy Impact: This report came as part of a larger ESW entitled "Lebanon-Boosting Growth and Social Welfare" with 3 policy notes focusing on electricity reforms, telecom reforms, and the economic implications of public sector wage increase. The report was formulated as an on-time support for the economic unit of the prime minister's office and with strong collaboration with the ministries of economy and of energy. Closed policy discussions were conducted with senior officials, including ministerial level, and cabinet was informed of the outcome of the simulations. Unfortunately no decision has been taken and reforms were delayed due to the political deadlock that continue to paralyse Lebanon.



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