Quasi-fiscal Deficits in the Electricity Sector of the Middle East and North Africa: Sources and Size

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Abstract

The annual electricity investments needed in the Middle East and North Africa region to keep up with demand have been estimated at about 3 percent of the region's projected gross domestic product. However, in most economies of the region, the ability to make those investments is limited by fiscal and macroeconomic constraints. This paper demonstrates that the solution is readily available: by improving the management and performance of the region's utilities, more than enough resources could be freed up to make the investments needed. The paper presents the first evaluation of the size and composition of the quasi-fiscal deficit associated with the management of the electricity sector in 14 economies in the Middle East and North Africa region. The estimations are for 2013. They show that the average quasi-fiscal deficit is 4.4 percent of gross domestic product (but goes down to 2.9 percent if Lebanon, Djibouti, Bahrain, and Jordan are excluded). Only five economies have a quasi-fiscal deficit below 3 percent of gross domestic product (Algeria, Morocco, Tunisia, Qatar, and the West Bank), and hence would not be able to finance the average investment requirement through elimination of inefficiencies. For most economies, the main driver of the quasi-fiscal deficit is the underpricing of electricity, which costs on average 3.2 percent of gross domestic product (but 2.2 percent without Lebanon, Djibouti, Bahrain, and Jordan). Commercial inefficiency comes next, at an average cost of 0.6 percent of gross domestic product. Technical and labor inefficiencies represent, respectively, 0.4 and 0.2 percent of gross domestic product.

JEL codes: H54:, H69, L32, L94, L98

Keywords: Quasi-fiscal deficit, electricity, utilities, Middle East and North Africa

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[1] This paper is a background note prepared to support the recent region-wide diagnostic conducted by the World Bank and published as Camos et al. (2018). However, none of the assessments conducted here should be credited or blamed to the World Bank. We are grateful to R. Bacon and V. Foster for useful comments and suggestions but the authors are solely responsible for any mistake or misinterpretation.

1. **Introduction**

Despite its huge oil and gas reserves and its efforts to increase its reliance on renewables, the Middle East and North Africa region (MENA) may soon be unable to meet the electricity needs of its fast-growing population and business activities. In a region with a long tradition of generous subsidies in the sector, fiscal constraints are starting to become binding in many of the economies and the scope to continue funding these subsidies is quickly disappearing.[2] The region has indeed started to find ways to cut public expenditures to address unsustainable fiscal deficits close to 10% of Gross Domestic Product (GDP) in 2015 and 2016. One of the effects of these adjustments is that MENA may not be able to allocate the estimated 3% of GDP needed annually over the next 30 years to cover the cost of annual electricity investments required to keep up with demand.[3] If, and when, this happens, the current strong coverage rates and quality of service will drop, probably to the surprise of many in the region now used to overall good coverage rates. Turning on the light would no longer be a sure thing for many users.

Part of the adjustments required can be managed by the sector itself so as to reduce the risks of investment rationing. As recognized already by many policy makers and utility managers of the region, there is a solid margin to improve the financing space of the sector within the sector itself by cutting the hidden costs linked to various sources of inefficiencies.[4] These are seen as implicit subsidies to the sector's producers, users and workers even if they do not usually appear in the budget. Their total cost is known as the quasi-fiscal deficit (QFD) among macroeconomists. It has already been assessed for other regions, but no estimations have so far been produced for MENA.[5]

To get a sense of the importance of the QFD at the economy level, the first step is thus to actually quantify them, which is the first purpose of this paper covering 14 economies of the region: Algeria, the Arab Republic of Egypt, Bahrain, Djibouti, Iraq, Jordan, Lebanon, Morocco, Oman, Qatar, the Republic of Yemen, Saudi Arabia, Tunisia, and the West Bank.[6] The quantification requires a detailed diagnostic of the financial, technical, commercial, and labor-related inefficiencies.[7] And this disaggregation allows, in turn, the assessment of the relative importance of the various inefficiency sources and of the specific areas on which reforms need to focus if the sector is to increase its ability to finance its investment needs on its own. This prioritization is the second main purpose of this paper.

To report the results of the assessment, the paper is organized as follows. Section 2 explains the methodology adopted. Section 3 discusses the data and the assumptions which had to be made when data constraints were an issue. Section 4 discusses the results, including a diagnostic of the priority areas in each economy, and an estimation of the size of the effort required from economies to enable them to fulfill their desire of improving their ability to finance their investment needs. Section 5 offers some concluding comments on the main policy options hinted at by the results of the analysis to allow economies to improve their ability to finance their investment needs.

[2] See for instance, Fattouh and El-Katiri (2012) and Sdralevich et al. (2014).
[3] See Ianchovichina et al. (2012).
[4] Algeria, Oman, Qatar and Saudi Arabia have already started to address these issues in 2016 though energy price reforms and have, as a result, improved their fiscal situation quite significantly (IMF 2017).
[5] See Petri et a. (2002), Saavalainen and ten Berge (2006) and Ebinger (2006) for Europe and Central Asia or Eberhard et al. (2011) and Trimble et al. (2016) for Sub-Saharan Africa.
[6] A diagnostic at the utilities level is also available in Camos et al. (2018) mostly targeted at utility managers to allow them to get a monetary value associated with the inefficiencies they need to address at the level of their firm.
[7] The QFD (or hidden-cost) approach has been used in numerous analyses as a powerful tool to communicate with policy makers. It also has been applied to other infrastructure sectors, notably water. For example, the methodology used for the utility QFD in this paper was largely inspired by Trimble and others (2016).

2. **Defining the quasi-fiscal deficit**

Following the methodological insights provided by the earlier diagnostics conducted for Eastern Europe, Central Asia, and Sub-Saharan Africa, and in particular building on the approach presented in Trimble et al. (2016), the analysis focuses on the following sources of inefficiencies:

- *Financial inefficiency,* usually labeled underpricing, is measured by the size of gap between the average end-user tariff (T_e, expressed in \$/kWh) and the cost-recovery tariff (T_c, expressed in \$/kWh) weighted by the level of end-user consumption (Q_e, expressed in kWh).
- *Technical inefficiency,* usually labeled technical losses in the engineering literature, is measured by the relative difference between actual transmission and development (T&D) losses (l_m) and those of an "ideal" utility T&D losses (l_n) as documented by Prasad et al. (2009), valued at the cost recovery tariff (T_c) and weighted by the volume of end user consumption.
- *Commercial inefficiency* focuses on revenue collection losses and is measured from the collection rates (R_{ct}) estimated for each economy weighed by the theoretical revenue ($Q_e.T_e$) which is also the revenue billed.
- *Labor inefficiency,* focuses on overstaffing and is estimated by comparing the number of customers (NC) per utility employee (NL) against an "efficient" or best practice customer per employee benchmark (BENL), weighted by the cost of labor per employee expressed in \$ (CL).

All four inefficiencies can be expressed in absolute monetary terms or as a percentage of GDP and adding up these valuations defines the QFD as seen in equation (1):

$$Q_e(T_c - T_e) + \frac{Q_e T_c (l_m - l_n)}{1 - l_m} + Q_e T_e (1 - R_{ct}) + \left(\frac{BENL - \frac{NC}{NE}}{BENL} \right) CL \qquad (1)$$

Financial inefficiency (underpricing)	Technical inefficiency (technical losses)	Commercial inefficiency (bill collection losses)	Labor inefficiency (overstaffing)

3. **The data and the assumptions**

Technical efficiency is the only hidden cost relatively easily computed from available data simply because it builds on indicators commonly monitored in the sector by engineers. All of the other forms of inefficiencies demand some extra data work implying significantly more creativity than the simple formula just introduced implies. The task relies on multiple sources of information and a number of, sometimes strong, assumptions on certain of the variables. But none of these is very different from those made in earlier studies on other regions. This is one of the common consequences of the poor commitment to accountability in the sector, evidenced by the very narrow sets of data available from public sources on the sector. Most data come from the MENA Electricity Database recently produced by the World Bank Energy Global Practice, the World Development Indicators (WDIs), reports from the Arab Union of Electricity and the International Labor Organization (ILO).

Table 1 explains how the various variables were approximated and Appendix 1 provides further details on data sources. The quantification of the financial, commercial and labor inefficiencies was particularly complex. Often, data for all 14 economies were not available in a single source, requiring further collection, verification and occasionally assumptions. For some of the economies, data had to be collected at the utility level and information aggregated to produce economy-specific data. The main additional details on the way the data were generated is the main focus of the rest of this section.

Table 1: Descriptions and assumptions of economy-level quasi-fiscal deficit components

Variable	*Description and assumptions*
(Qe) End-user consumption	Calculated by multiplying the electric power consumption per capita by the total population of the economy for the year 2013.
(Te) Average end-user tariff	Taken to be the average residential tariff for a consumption of 250 kWh/month for the year 2013. Values for all economies were calculated based upon the 2014 Arab Union of Electricity's "Electricity Tariff in the Arab Countries." In the case of Djibouti, calculations were based upon the official tariff document published by the country.
(Tc) Cost-recovery tariff rate	Estimated using the LCOE unit cost of energy per technology type ($/kWh) weighted according to the energy mix of each economy. Data is from WDI for the energy mix information, and an LCOE modeling tool[(1)] developed by ESMAP for most of the LCOE values. Since the unit cost of fuel and renewables used in the modeling tool did not reflect the current state of energy sources in the MENA region, values from Lazard's LCOE Analysis 2014 were used instead and adjusted to include T&D contribution to the unit cost by adding ¢ 3.2/kWh to the figures.
(Lm) Technical loss rate	The technical loss rate is defined as the electric power transmission and distribution losses (% of output) and was obtained from WDI database. WDI did not include data for West Bank (calculated alternatively as the average of the technical losses of West Bank distribution utilities in the MED) and Djibouti (value obtained as the grid losses from AEEP, 2013).
(Ln) Normative loss rate	The choice of 5% was done so as to have values of Ln below the region's best-performing economies, namely Bahrain and Qatar with technical loss rates of 5.2% and 6%, respectively.
(Rct) Collection rate	The bill collection rate indicates the income effectively collected during the year by the utility in relation to the income billed. In the cases where a single utility existed (a VIU in the case of Algeria, for example), the collection rate of the economy was that of the utility. When more than one utility existed, the average value of the distribution utilities was used (in the case of Egypt, for example).
(NC) Number of customers (connections)	This figure was easily obtained for economies with a single VIU. For economies with several utilities, the presence of a regulator would allow for an aggregate official figure to be obtained from the regulator's annual report. However, in the case of no regulator present, the sum of individual utility customers was calculated.
(NE) Number of employees	The number of full time equivalent (FTE) employees was used for all utilities, except for Oman, where the number of total (direct and indirect) employees was used. This is because several utilities in Oman have a very low number of FTE while the number of outsourced (or indirect) employees is high.
(CL) Cost of labor	The cost of labor is defined as the annual cost of personnel directly employed by the utility, and was sourced mainly from the financial statements of utilities. However, when this was not available, estimates were made to calculate a unit labor cost per employee, which was then multiplied by the number of employees present in the utilities for which labor cost data were not available. A calculated sum then allowed the economy-level aggregated estimate of the cost of labor to be obtained. Approximation had to be made for a number of economies.
(BENL) Benchmark number of customers per employee in LICs	Customer per employee is an indicator of performance with values commonly above 500 in the OECD economies. The value of 413 used in this study was obtained using the same benchmark value for the number of customers per employees in low-income economies (Ebehard et al. 2008).

[(1)] A compilation of economic costs of more than 50 electricity generation and delivery technologies, the Model for Electricity Technology Assessment (META) was rolled out to the World Bank Group and selected partners and clients in June 2012. The modeling tool can be downloaded here: http://esmap.org/META.

Notes: ESMAP = Energy Sector Management Assistance Program; FTE = full-time equivalent; ILO = International Labour Organization; kWh = kilowatt-hours; LCOE = levelized cost of electricity; LICs = low-income countries; MED = MENA Electricity Database; MENA = Middle East and North Africa; META =; T&D = transmission and distribution; VIU = vertically integrated utility WDI = World Development Indicators.

a. Methodology for estimating the cost-recovery tariff

Cost-recovery tariffs were calculated using the basis of the economy's fuel mix, and the levelized cost of electricity (LCOE) from different energy sources, as described by equation (2):

$$\begin{aligned} \boldsymbol{T_c} &= \boldsymbol{Weighted\ LCOE} = \\ &= (\boldsymbol{LCOE_{Coal}} \times \%_{\boldsymbol{Coal}}) + (\boldsymbol{LCOE_{Hydro}} \times \%_{\boldsymbol{Hydro}}) + (\boldsymbol{LCOE_{N.gas}} \times \%_{\boldsymbol{N.gas}}) \\ &+ (\boldsymbol{LCOE_{Fuel}} \times \%_{\boldsymbol{Fuel}}) + (\boldsymbol{LCOE_{Renewables}} \times \%_{\boldsymbol{Renewables}}) \end{aligned} \quad \textbf{(2)}$$

where

- "%Coal, Hydro, Natural Gas, Fuel and Renewables" represents the percentage share of each technology in generation; the share for each economy is reported in Table 2.
- $LCOE_i$ represents the levelized cost of electricity (LCOE) for each generation technology expressed in US$ cents per kilowatt-hour; the costs are reported in Table 3.

Table 2: Share of energy mixes used in the calculation of Tc (%)

Economy	**Coal**	**Hydro**	**Natural gas**	**Fuel**	**Renewables**
Algeria	0	1	93	7	0
Bahrain	0	0	100	0	0
Djibouti	0	0	0	100	0
Egypt, Arab Rep.	0	8	77	15	1
Iraq	0	8	55	19	0
Jordan	0	0.3	25	74	0.1
Lebanon	0	7	0	93	0
Morocco	43	10	21	21	5
Oman	0	0	97	3	0
Qatar	0	0	100	0	0
Saudi Arabia	0	0	53	24	0
Tunisia	0	0.3	96	0.4	2
Yemen, Rep.	0	0	32	68	0
Israel*	54	0	42	36	1

Source: WDI.Note: * for the West Bank, all electricity is imported from Israel, therefore Israel's LCOE is used for Tc.

Table 3: LCOE values used to calculate the cost-recovery tariffs and their sources

Generation type	LCOE (US$ cents) /kWh	Source
Coal	7.44	ESMAP META Model
Hydro	2.86	ESMAP META Model
Natural gas	8.12	ESMAP META Model
Fuel	31.45	Average Lazard
Renewables	6.9	Average Lazard

Source: Author calculations based on ESMAP META Model and Lazard (2014).

Note: (1) ESMAP = Energy Sector Management Assistance Program; (2010 as base year); META = Model for Electricity Technology Assessment; (2) The META does not cover T&D LCOE. In order to address this limitation, a value of US$ cents 3.2 per kilowatt-hour (kWh) was added to their LCOE estimations;[8] (3), for renewables utility-sized photovoltaics (PV) and wind only are considered.

b. Methodology for collection rates in Oman, Saudi Arabia, and Qatar

The bill collection rate is defined by revenues collected divided by the billed amount. More specifically, the billed amount is defined as the income effectively collected from customers for energy consumption and related services/revenues related to energy consumption and services. The data were readily available for all economies except for Oman, Saudi Arabia and Qatar.

For those economies, the collection rate was calculated from the annual reports and financial statements of the utilities. Since the annual reports do not provide a value for billed amounts, these were approximated as follows:

1. The income effectively collected is approximated by the annual sales of, or annual revenues from, electricity in the financial statement.
2. The income not collected is approximated by the receivables from customers, as stated in the financial report.
3. The billed amount is therefore the sum of what was not collected (the receivables) and what was actually collected (the sales revenue reflected in the financial report).
4. The collection rate = Sales revenue / (sales revenue + receivables from customers).
5. If the economy has several utilities, steps 1 to 4 above were applied to each utility and the average of all utilities was taken to be the economy collection rate.

Appendix 2 reports the detailed computations from the raw data.

c. Estimating labor costs with data limitations

The cost of labor defined as the annual cost of personnel directly employed by a utility was collected from the financial statements of utilities. However, when this was not available, estimates were made to calculate a unit labor cost per employee from the partially available data found in the MED (if several utilities were present in the economy) or the average cost data available from the ILO as in the case of the Republic of Yemen. To get to the total cost, this average unit cost was then multiplied by the total number of FTE. The utilities' specific data were then aggregated at the economy level. For the Arab Republic of Egypt, Jordan, Morocco, Oman, and the Republic of Yemen, labor costs were unavailable

[8] This is based on a recent tariff study for Morocco (see Macroconsulting, 2013) which found a transmission LCOE of about US$ cents 0.08 per kWh and a distribution LCOE of US$ cents 0.24 per kWh. This is also aligned with figures reported in IEA, 2014.

for several utilities and were obtained based on calculations making use of an estimated unit labor cost, as described next. Appendix 3 reports the detailed computations.

Arab Republic of Egypt

Egypt counts 12 utilities (including generation, distribution, and transmission). The cost of labor for all utilities was available except for the important Hydro Power Plants Electricity Production Company. To calculate the total cost of labor, including that of the Hydro Power Plants Electricity Production Company and EEHC, a unit average cost per employee was produced from the data for the utilities with labor costs and number of employees available. This unit cost was then multiplied by the number of employees to obtain the value for the total labor cost for Egypt.

Jordan

For Jordan, of 10 utilities, the number of employees was available for nine, and labor costs for eight. Data from the report of the Jordanian regulator, the Energy and Minerals Regulatory Commission (EMRC), were used for the utility with the missing number of employees, Qatrana Electric Power Company, (QEPCO). Since the Amman Asia utility was not operational in the year of study (2013), it was omitted from the computations. From then on, the methodology used in the case of Egypt was applied to calculate the total cost of labor for the nine utilities in Jordan.

Morocco

In the case of Morocco, the number of employees of all the utilities was available from public sources, but not the labor costs per utility. This demanded some extrapolations. Essentially, they consisted in applying the average unit labor cost observed to the utilities for which these costs were not observed and multiplying them by the observed FTE. The details are provided in Appendix 3

Oman

For Oman, the challenge was that utilities often have a larger number of outsourced employees than full-time employees. For consistency, the total number of employees is included in the labor cost estimates. Twelve utilities had data for both the total number of employees and the labor costs. A unit cost of labor was calculated from these 12 utilities. The total number of employees for the 12 utilities was then used to compute the total cost of labor obtained for these 12 utilities. From an aggregate value for the total direct and indirect employees in 2013 obtained from the Authority for Electricity Regulation (AER) annual report for 2014, the unaccounted-for number of workers was identified. Combined with an assessment of the average labor cost, it allowed an estimation of the total labor cost for the economy.

Republic of Yemen

The cost of labor for the Public Electricity Corporation (PEC), the Yemeni public VIU, was unavailable. Data on the number of employees were obtained. An estimate of the cost of labor was done using Republic of Yemen–specific average values from the ILO for the main professional categories. These were then used to produce an average unit cost used in turn to produce the total labor cost.

4. **The economy-specific estimations of QFD levels and composition**

Table 4 brings together the results of the estimations made for every source of inefficiency for each of the 14 economies covered by the sample as per the approaches and assumptions discussed in section 3. To make comparisons across economies easier, the estimations are normalized to GDP. The cost of the sum of the various sources is then reported as a share of GDP and in absolute value. The following are the main insights unveiled by the quantification of the burden imposed by hidden costs on the sector in MENA.

Table 4: Drivers of QFD in MENA, 2013 (except as noted)

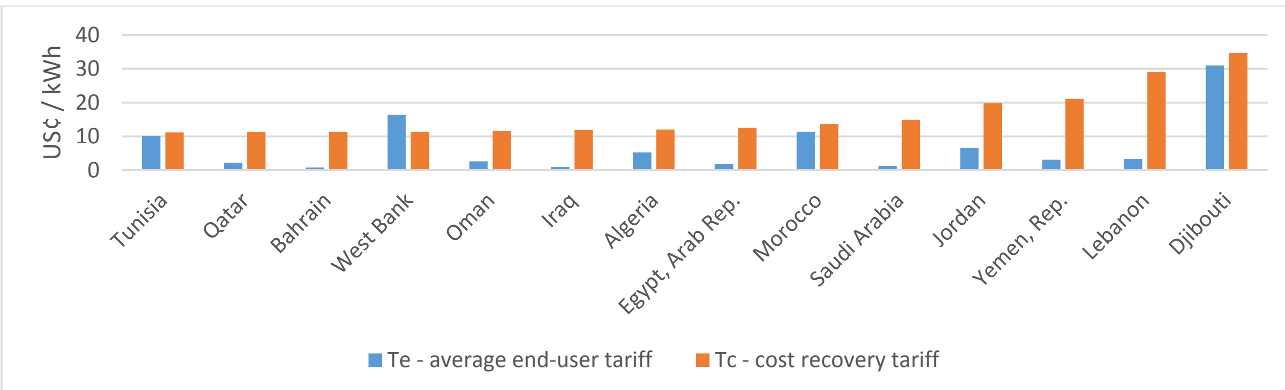
Economy	Cost of the sources of inefficiencies expressed as a share of GDP (%)				QFD as share of GDP (%)	Absolute QFD value ($ million)
	Financial inefficiency (underpricing)	Technical inefficiency (T&D losses)	Commercial inefficiency (Collection losses)	Labor inefficiency (Overstaffing)		
Lebanon	8.20	0.41	0.21	0.03	**8.9**	3,826
Djibouti	0.98	1.08	5.24	0.88	**8.2**	101
Bahrain	7.86	0.02	0.02	0.13	**8.0**	2,640
Jordan	5.96	0.84	0.75	0.21	**7.8**	2,608
Egypt, Arab Rep.	5.61	0.42	0.06	0.28	**6.4**	18,219
Saudi Arabia	4.81	0.11	0.17	0.07	**5.2**	38,467
Yemen, Rep.	3.16	0.81	0.08	0.11	**4.2**	1,494
Iraq	2.44	0.83	0.13	0.21	**3.6**	7,888
Oman	2.70	0.22	0.18	0.10	**3.2**	2,496
Algeria	1.46	0.37	0.10	0.32	**2.3**	4,720
Qatar	1.47	0.02	0.10	0.01	**1.6**	3,224
Tunisia	0.34	0.39	0.54	0.15	**1.4**	655
Morocco	0.65	0.33	0.20	-0.21	**1.0**	948
West Bank	-0.84	0.30	0.30	0.13	**-0.1**	-13
Average	**3.2**	**0.4**	**0.6**	**0.2**	**4.4**	
Average without Bahrain, Djibouti, Jordan and Lebanon	**2.2**	**0.4**	**0.2**	**0.1**	**2.9**	

Source: Authors' calculations.
Note: The year is 2013 for all except the following: 2012 for Lebanon, Iraq, Morocco, and the West Bank; and 2011 for Djibouti. This variation reflects data availability. GDP = gross domestic product; MENA = Middle East and North Africa; QFD = quasi-fiscal deficits; T&D = transmission and distribution.

The first insight emerging from the table is that the hidden costs of financial inefficiency drive the high QFD values in MENA whether outliers (Lebanon, Djibouti, Bahrain and Jordan) are included or not. As seen in Figure 1, in most economies the difference between cost recovery and actual tariffs is often quite significant. It leads to a financial inefficiency averaging 3.2% of GDP in the region. Overall this is more than the sector's investment requirements for the region on an annual basis. Ignoring the outliers in terms of underpricing (Lebanon, Bahrain, Jordan and Egypt) however, leads to an average of 1.7% which implies that improving cost recovery alone will not be enough for many of the economies.

But underpricing is an issue in most economies. In 8 of the 14 economies, it represents more than three-quarters of the QFD and in 11, it represents at least two-thirds. Lebanon and Bahrain suffered from a particularly strong underpricing issue in 2012. It is unfortunately hard to distinguish between underpricing linked to electricity subsidies to users and subsidies to producers for fuels used to generate electricity. This is because the cost-recovery tariff used to estimate the economy-level QFD is based on levelized energy costs, computed as weighted averages of each economy's energy mix, to which a factor was added to account for transmission and distribution (T&D) costs. Djibouti and the West Bank are notable exceptions to the trend of underpricing as a driving force of the QFD. This is because they have high average end-user tariffs: $0.31 per kilowatt-hour (kWh) and $0.16 per kWh, respectively. Note also, that the negative values for underpricing in the West Bank simply mean that the West Bank's cost-recovery tariff is smaller than the average end-user tariff (based on the energy mix of Israel, given that the West Bank imports all of its electricity from there).

Figure 1: Comparing average end-user and cost-recovery tariffs in MENA, 2013 (or most recent year with data, 2009–12)



Source: Authors' calculations.

The second most important QFD driver is commercial inefficiency. It averages 0.6% of GDP (although, without Djibouti the average drops to 0.2% of GDP). In relative terms, it is the main driver of QFD in Djibouti, Tunisia and the West Bank. In absolute terms, it is a significant problem in Djibouti (5.24% of GDP), Jordan (0.75), Tunisia (0.54) and the West Bank (0.3). In most of the other economies, collection rates are reasonably high and poor collections do not represent a major issue in absolute or relative terms. It is worth mentioning however, that, somewhat counterintuitively, high financial efficiency (i.e. when cost recovery is high, it does not mean that collection is bad) is not strongly correlated with high commercial efficiency. The correlation coefficient is -0.23.

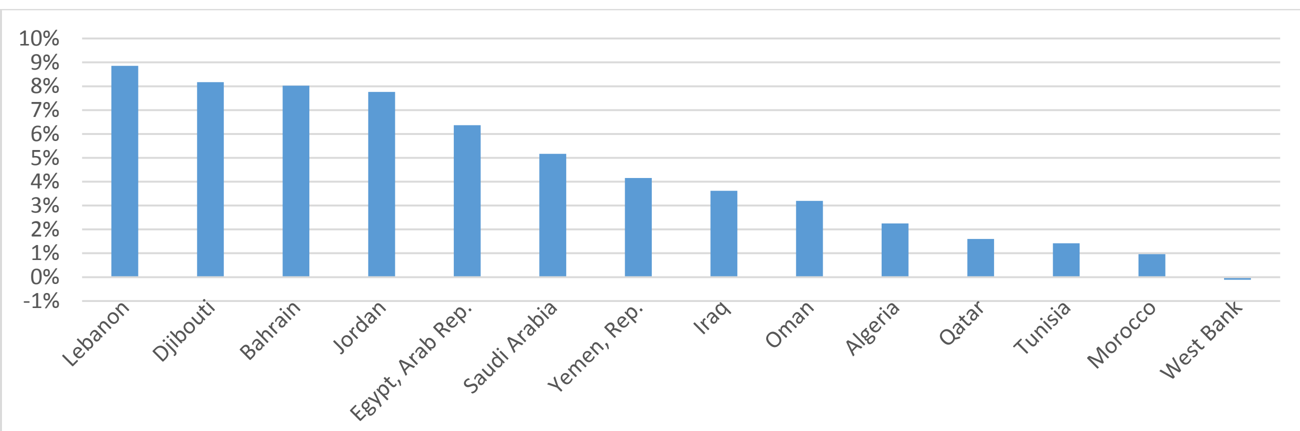
Technical inefficiencies come third in relative importance as a driver of QFD with an average size of 0.4% of GDP. In absolute terms, it is an above average problem for Djibouti, Jordan, the Republic of Yemen, and Iraq, and to a lesser extent Algeria and Lebanon. In relative terms, it is a notable issue in an important part of some economies' QFDs: they represent more than one-fifth of the total QFDs in Morocco, the West Bank, Tunisia, Iraq, and the Republic of Yemen. It is useful to note that there seems to be a strong correlation (0.61) between technical inefficiency and labor inefficiency. Both of these dimensions are, to some extent management issues but may also reflect the age of the technology in the economies characterized by the joint presence of these two forms of inefficiencies.

Labor inefficiencies are the weakest driver of QFD in absolute and often in relative terms. On average, it represents about 0.2% of GDP but it is higher than average in absolute terms in Djibouti, Egypt, and Algeria. The low average impact in the region partially reflects the low average labor cost in MENA which tends to reduce the impact of overstaffing when this takes place. It represents between 10 and 15 percent of the QFDs in Algeria, Tunisia, and Djibouti. In short, the QFD's share of GDP is relatively small in Maghreb economies, and large in some Mashreq and Gulf Cooperation Council (GCC) economies.[9]

Addressing this type of inefficiency may be a delicate act for governments, since it often implies reducing the size of state-owned enterprises (SOEs). Providing public jobs—and subsidized basic services—has been part of the social contract in the region for the past several decades, in exchange for social stability.

The aggregation of these different components provides a clear picture of the high total costs of management and policy weaknesses in the region. The average QFD is 4.4% of GDP. Excluding the four main outliers (Bahrain, Djibouti, Jordan and Lebanon) brings down the average to 2.9% of GDP, which is right below the average value of the estimated annual investment requirement in the sector to allow the economies to meet the future consumption needs. Figure 2 illustrates the wide range of experiences visually. A more detailed look at table 4 and figure 2 shows that 9 of the 14 MENA economies studied have a QFD above 3% of their GDP. In other words, these economies of the region have enough margin to increase their financing space by simply reducing their inefficiencies. The margin is particularly strong for Lebanon, Djibouti, Bahrain, and Jordan with a QFD between 8 and 9 percent of GDP in 2012-13. Only five economies have a QFD below 3 percent of GDP (West Bank, Morocco, Tunisia, Qatar, and Algeria). For those economies, cutting inefficiencies will help but not be enough to cover the investment needs.

Figure 2: QFD (% of GDP) in MENA, 2013



Source: Authors' calculations.

[9] Note that the negative values for overstaffing in Morocco simply mean that Morocco's ratio of customers to employees is better than the efficiency benchmark (413:1) used here.

Note that by international standards, the margin for action is quite strong as MENA's QFD tends to be high. For Sub-Saharan Africa (SSA), Trimble et al. (2016) find values ranging from -0.3% to 6% of GDP for an average of 0.8% of GDP vs 4% for MENA. In other words, MENA's utilities have more hidden costs than SSA's. Another difference is that the MENA QFD appears to be driven mostly by financial inefficiency while for SSA, technical and commercial inefficiencies play the largest role.

To complete the snapshot, Table 4 also shows that, in absolute terms, the highest QFDs are to be found in Saudi Arabia ($38 billion), Egypt ($18 billion), and Iraq ($8 billion), and the lowest in the West Bank (with a negative QFD of $13 million), Djibouti ($101 million, despite having the second-highest QFD when expressed as a percentage of GDP), and Tunisia ($655 million). These values strongly correlate to the size of the economy and to the consumption levels of its population.

5. **Concluding comments**

This paper suffers from several data constraints, which demanded some creativity to be able to come up with decent approximations of the values for key variables. Despite these data issues, it seems quite reasonable to argue that the analysis conducted here provides enough evidence of the existence of an important QFD problem in MENA and on its sources in 2013.

The key to its reduction and to increasing space to finance investment from the available resources within the sector itself, resides, in fixing the significant underpricing problem characterizing the region. The user and producer subsidies, still widespread in the region, not only distort price signals and hence production and consumption patterns, but also decrease the region's odds of achieving its investment needs. Therefore, tariffs need fixing indeed.

But fixing tariffs does not simply mean increasing tariffs. Tariff structures often also need to change particularly in a context of social tensions linked to the limited capacity to pay of many families. Tariff reforms in most economies of the region could help improve the political viability of efforts to increase cost-recovery rates. However, to achieve improved cost recovery, subsidy cuts, and better targeting, there has to be a political will to assess the current design of electricity tariffs and its incidence in the various economies of the region.

Focusing on prices alone would be a mistake, as prices are not the only problem for the region and for many economies, this will not suffice. MENA also has some margin to increase its financing space by addressing the other components of the QFD, i.e. T&D losses, collection losses, and overstaffing, which add up to as much as 1 percent of GDP in some economies. The economy-specific diagnostics reported here show that the actual priorities are different across economies. Moreover, it is quite likely that, within economies also, there is some scope for differentiation, as many of the economies contain several utilities with very different constraints. Yet assessing these constraints is very specific to each utility and this would get into much deeper details than what this paper allows.[10]

At the economy level, the policies to address the broad economy-specific issues and the priorities are all relatively straightforward now that the relative importance of each source of inefficiency has been identified. The real issue for the region is that most of the solutions are politically sensitive. Tariff increases, improvements in revenue collection efforts and reductions in overstaffing are not easy to sell in the current social and political context. But there is enough margin to be fair and more efficient in the region such as to move in the right direction at the financial level, while also addressing social concerns.

[10] Camos et al. (2018) actually report the outcome of this assessment of the drivers of the QFD at the utilities level.

This should ease the political tensions even if, as always, such reforms would imply some losers likely trying to slow down the efforts made. The next analytical step for the region to prepare the implementation of the reforms may require a more detailed look at the winners and losers of the various policy options needed to cut the QFD. Without this additional information, progress may continue to be slow, at least in some of the economies of the region where private interests continue to dominate the public interest.

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Appendix 1: Sources of data used for the economy-level quasi-fiscal deficit calculations

Economy	Qe: End-user consumption (kWh)	Tc: Cost-recovery tariff	Te: Avg. End-user tariff	Lm: Technical loss rates[a]	Number of customers (connections)	Number of employees (FTE)	Cost of labor[b]	Rct: Collection Rates	GDP
Algeria	MED	Calculations (WDI; ESMAP META Model; Lazard's LCOE Analysis, 2014)	Arab Union of Electricity (2014), Electricity Tariff in the Arab Countries	WDI	MED	MED	MED	Online	WDI
Bahrain	WDI				MED	Online	MED	MED	
Djibouti	MED			Online[c]	MED	MED	MED	MED	
Egypt, Arab Rep. of	WDI			WDI	EEHC Annual Report 2014	EEHC Annual Report 2014	Estimation	MED (average)	
Iraq	MED			WDI	MED	Online[d]	MED	Online (World Bank)[e]	
Jordan	WDI			WDI	NEPCO Annual Report 2013	NEPCO Annual Report 2013	Estimation MED	MED (average)	
Lebanon	WDI			WDI	MED	MED	MED	Online[f]	
Morocco	WDI			WDI			Estimation MED	ONEE contact	
Oman	WDI			WDI	AER Annual Report 2013	AER Annual Report 2013	Estimation MED	Estimated	
Qatar	WDI			WDI	KAHRAMAA Sustainability Report 2013	KAHRAMAA Sustainability Report 2013	KAHRAMAA Annual Report 2014	MED	
Saudi Arabia	WDI			WDI	MED	MED	MED	SEC statistics 2000 to 2014	
Tunisia	WDI			WDI		MED		Data from utility	
West Bank	MED[g]			MED (average)		MED		MED (average)	
Yemen, Rep.	WDI			WDI		MED[h]	Estimated	MED	

Source: Author's calculations.

Note: AER = Authority for Electricity Regulation; EEHC = Egyptian Electricity Holding Company; ESMAP = Energy Sector Management Assistance Program; FTE = full-time equivalent employee; GDP = gross domestic product; kWh = kilowatt-hours; LCOE = levelized cost of electricity; MED = MENA Electricity Database; META = Model for Electricity Technology Assessment; NEPCO = National Electric Power Company; ONEE = Office National de l'Eau et l'Electricité; SEC = Saudi Electricity Company; WDI = World Development Indicators.

[a] WDI technical losses (distribution and transmission losses).
[b] Refer to appendix C for calculation details.
[c] AEEP
[d] Iraq Energy Institute 2015.
[e] World Bank 2016a.
[f] Lebanon Ministry of Environment and UNDP
[g] Calculated as the sum of energy volume billed (from MED) for the three distribution utilities in the West Bank (TUBAS, JDECO, and NEDCO).
[h] Used 2012 value in the case of the Republic of Yemen due to lack of data for 2013.

Appendix 2: Data and sources used for calculating collection rates

Economy	Oman	Oman	Oman
Utility name	Muscat Electricity Distribution Company	Majan Electricity Company	Mazoon Electricity Distribution Company
Source of data	Annual report 2013	Annual report 2013	Annual report 2013
Amounts due from private customers in Omani Rials (RO)	33,562,000	17,357,000	20,344,000
Amounts due from government customers (RO)	13,610,000	6,029,000	5,776,000
Electricity sales to private customers (RO)	98,814,000	79,265,000	67,567,000
Electricity sales to government customers (RO)	37,479,000	10,221,000	18,815,000
Collection rate (%)	74	79	77

Economy	Saudi Arabia
Utility name	Saudi Electricity Company (SEC)
Source of data	SEC publication: electric data 2000–14
Receivables form customers and revenues accrued net	Saudi riyal (SRl) 18,452,000,000
Total electricity sales	SRl 32,878,000,000
Collection rate (%)	64

Economy	Qatar
Utility name	Kahramaa
Source of data	Kahramaa Annual Report 2013
Accounts receivable	Qatari riyal (QR) 585,434,000
Revenues from sale of electricity	QR 1,553,741,000
Collection rate	73

Appendix 3: Approximation of labor costs in economies with data gaps

Egypt

Formula	Description	Value
A	Number of employees without the Hydro Power Plants Electricity Production Company and without EEHC	172,733
B	Cost of labor in all utilities except the EEHC and Hydro Power Plants Electricity Production Company	$1,359,678,577
C = B ÷ A	Unit cost of labor	$7,872
D	Number of employees in the EEHC	3,586
E	Number of employees in the Hydro Power Plants Electricity Production Company	3,038
F = (D+E) × C	Cost of employees in the EEHC and Hydro Power Plants Electricity Production Company	$52,141,228
G = F + B	Total estimated cost of labor including EEHC and Hydro Power Plants Electricity Production Company	$1,411,819,806

Source: MENA Electricity Database and Authors' calculations.

Note: EEHC = Egyptian Electricity Holding Company.

Jordan

	Utility	No. employees (A)	Labor costs in $ (B)
1	AES Levant Holding B.V.	47	Not available
2	Amman East Power Plant (AES)	51	3,248,314
3	Central Electricity Generating Company	1,037	18,788,759
4	Electricity Distribution Company	1,320	19,813,536
5	Irbid District Electricity Company	1,088	16,270,190
6	Jordan Electric Power Company	2,602	86,150,700
7	National Electric Power Company	1,373	22,166,850
8	Qatrana Electric Power Company	78	Not available
9	Samra Electric Power Generation Company	345	6,096,730
	Total number of employees used in computation **C** =A2+A3+A4+A5+A6+A7+A9	7941	
	Total labor cost used in computation **D** = B2+B3+B4+B5+B6+B7+B9		$175,535,079
	Unit labor cost: E=D/C		$22,075
	Estimated labor costs for Qatrana: F=A8xE		$1,721,819
	Estimated labor costs for AES Levant: G = A1xE		$1,037,506
	Final total labor cost estimation for Jordan H=D+F+G		$ 175,294,404

Source: Authors' calculations based on MENA Electricity Database.

Morocco

	Utility	No. employees (A)	Labor costs in $ (B)
1	AMENDIS Tanger	401	25,306,122
2	AMENDIS Tetouan	468	25,772,595
3	LYDEC	1,432	92,912,657
4	ONEE	8,796	252,453,751
5	RADEEL	134	
6	REDAL	511	44,702,600
7	Regie de Kenitra	196	
8	Regie de Marrakech	370	8,355,024
9	Regie de Meknes	208	
10	RADEEJ	188	4,131,731
11	Regie de Fes	439	
12	Regie de Safi	118	
	Total number of employees available: C = SUM (A1 to A12)	13,261	
	Total labor costs available **D =** SUM (B1 to B12)		$453,634,480
	Unit labor cost: E = D/C		$34,208
	Estimated labor cost in non-available utilities: **F** = E x (A5+A9+A11+A12)		$37,457,940
	Total cost of labor for all utilities: G=D+F		$491,092,421

Source: Authors' calculations based on MENA Electricity Database.

Yemen

Position	Monthly salary in YRls (Yemeni Riyals)
Managers	30,290
Clerical support workers	42,591
Technicians and associate professionals	69,439
Average monthly earning calculated	47,440
Average annual cost in U.S. dollars per employee (assuming salary paid for 12 months; and using an exchange rate of $1 = 203.4 Yemeni riyals (corresponding to January 1, 2013)	$2,797
Number of employees in PEC	18126
Total estimated salary bill in U.S. dollars (cost of labor)	**$50,706,483**

Source: Authors' calculations based on MENA Electricity Database and ILO data