

## **Post-Conflict Energy Planning in the Middle East**

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### **1. Introduction**

The eventual end of armed conflicts in Iraq, Libya, Syria and Yemen would normally be followed by a reconstruction phase, in which, energy is expected to be a priority. Access to energy is imperative for peace and ensuring a speedy economic recovery. Additionally, access to modern and sustainable energy services are indispensable to increasing productivity, creating enterprises, employment and incomes, and providing effective public services such as health, education and safe water.

Providing basic services, post-conflict, is perhaps the most effective tool for promoting and regaining peace, enhancing legitimacy and speeding up economic recovery (Whaites, 2008). Ensuring an acceptable level of access to electricity after prolonged periods of blackouts would be associated with getting back to normality. The ability of the governing state to provide basic services would also strengthen the social and political contract between rebuilt, or newly formed, state institutions and the society.<sup>1</sup>

One of the widespread observations in conflict post-conflict contexts is the spread of violence (Schuld, 2013). For example, in May 2017, The United Nations warned that the energy crisis in Gaza was severely affecting water supplies and health services, and could trigger an outbreak of violence (Ariel, 2017). Several international organizations such as the World Bank and the United Nations Development Program are working on this timely issue.<sup>2</sup>

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<sup>1</sup> Claire McLoughlin found that the relationship between providing basic services in fragile states and legitimacy is likely to be conditioned by shifting expectations of what the state should provide, subjective assessments of impartiality and distributive justice, the relational aspects of provision, how easy it is to attribute (credit or blame) performance to the state, and the technical and normative characteristics of services (McLoughlin, 2015).

<sup>2</sup> The World Bank is currently launching Consultations for Country Partnership Framework in Iraq (2018-2023) and one of the focused areas of the consultation will be to support improved efficiency and transparency of the energy sector (World Bank, 2018).

In this paper, we examine the primary policy constraints that affect post-conflict energy planning in the Middle East region. The focus countries are Iraq, Syria, Yemen and Libya. We also highlight the role of renewable energy projects in promoting sustainable energy planning post-conflict.

## 2. Overview of Energy Sector's Realities in Conflict-affected States

By the virtue of being a strategic target that promptly and deeply affects all life aspects, energy facilities, be it power generation plants or oil and gas fields, are generally one of the early victims of wars and armed conflicts. In Syria, for example, the damage mainly concentrated in the low and medium voltage grids in the combat areas. Additionally, a loss of generation capacity due to loss of natural gas led electricity production to fall by more than 50 percent (Hinawi, M., 2017). As fighting intensified, 2 of the 14 the generation plants have been destroyed -- Aleppo (1000 MW steam turbine) and Ziazon (460 MW).

Similarly, Iraq, Libya and Yemen's energy infrastructure have been badly hit by conflict. In Iraq, the damage to the power sector is estimated at \$7 billion (Gordon & Coles, 2018).<sup>3</sup> In Libya, damage to the assets owned by the national utility GECOL since 2011 amounts to \$15 billion, according to Ali Sassi, GECOL's CEO (AfrElec, 2018). As for Yemen, energy access was an issue even before the start of the conflict; however, the ongoing conflict has worsened the energy crisis in Yemen mainly due to fuel shortages (World Bank, 2017a). The capital Sana'a, which has a demand of around 500 MW, is barely supplied by 40 MW for a few hours a day, according to a note published by the World Bank last year.

Of course, the exact level of damage to existing energy infrastructure is yet to be established, as some of the conflicts in the region are still ongoing despite some serious stabilization efforts, particularly in Iraq and Syria. Damaged infrastructure could represent a window of opportunity to "start from scratch" and leapfrog into more modern energy systems, on the generation and transmission sides. As stated in details below, renewable energy systems have a great potential to remedy energy crisis post-conflict.

## 3. Understanding Policy Constraints

Each country that is affected by conflict in the Middle East represents a unique case in terms of its conflict dynamics, availability of natural resources, existing infrastructure and its level of destruction, etc. These variables, among others, would impact how post-conflict energy plans and policies are shaped. Some of the major factors or constraints that are expected to influence the decision-making process on energy policies in conflict states in the region are:

### *Access to conventional energy resources*

Existence of proven oil and gas reserves is a double-edged sword. On one hand, they could be utilized either during or after the conflict to generate electricity using existing thermal

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<sup>3</sup> After retreating, ISIL has left many of the important stations with improvised explosive devices, including a 400 KV station which supplies 20% of Mosul's energy (UN HABITAT, 2017).

power capacity.<sup>4</sup> Additionally, for significant oil and gas exporters like Libya, oil and gas revenues could help with financing the country's economic recovery including reviving its energy sector. In 2017, Libya's oil and gas revenues halved the country's budget deficit (Lewis, 2018a).

On the other hand, availability of oil and gas resources could have a detrimental effect on post-conflict energy planning. As it has been the case in the three conflict countries studied in this paper, existence of oil and gas fields have played a destabilizing role and a trigger for conflict renewal. In Iraq, following the deterioration of the so-called Islamic State, the Iraqi central government in Baghdad clashed with the Kurdish Peshmerga over gaining control of the oil-rich city of Kirkuk (Chmaytelli & Jalabi, 2017). The need to transport oil and gas via pipelines could also be a complication that triggers further violence and conflict.<sup>5</sup>

Another negative influence of the existence of oil and gas resources in a post-conflict context is that it could be favored over renewable energy sources by decision-makers due to perceived ease of mobilizing these resources for domestic power generation. This could lead to an extended period of overdependence on fossil fuels for power generation. Clearly, this could have a significant opportunity cost, particularly in a high oil price cycle.

### *Weakened Economy*

The economic impact of conflicts is well observed and documented (Humphreys, 2003; Mueller & Tobias, 2016; Rother et al., 2016). For countries in the Middle East that are either in conflict or neighboring a conflict, the most prominent macroeconomic impact has been a substantial drop in economic growth and of GDP and rise of inflation (Rother et al., 2016). In Syria, for example, the armed conflict interrupted economic activity for six years, resulting in a \$200-300 billion loss of GDP relative to the "no war" estimates (Devarajan, 2017). Moreover, the IMF estimates that it could take two decades or more for Syria to achieve its pre-conflict GDP levels (Gobat & Kostial, 2016).

For Libya, where hydrocarbons account for than 70 percent of the country's GDP, the armed conflict and the subsequent collapse of oil production led to a 60 percent drop of the GDP (Chami et al., 2012). Although oil production was quickly restored to about half of the pre-conflict levels, destruction of infrastructure and political instability continued to negatively impact economic growth.

War-weakened economies pose several challenges that would affect energy planning. Competition over drained financial resources to restore basic services would limit the scale

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<sup>4</sup> For example, in Syria, both the government and rebels relied on domestically produced natural gas for electricity production (Butter, 2014).

<sup>5</sup> Despite the Iraqi central government's acquisition of the oil fields in Kirkuk, the crude oil can only flow through the Iraq-Turkey pipelines which are controlled by the Kurds, making the Iraqi government unable to export its oil without reaching an agreement with the Kurds. The Iraqi government is unable to have access and make use of the oil fields. The oil barrels in this situation will end up being stranded if no agreement is reached (DiChristopher, 2017).

and rate of investments in the energy sector. This problem is magnified if the country is not externally supported through a reconstruction fund.

In addition to above, a compounding factor, and a common feature of a conflict-hit economies, is having low credit rating that extends beyond conflict periods that results in elevated risk premiums. Local and international investors may lack confidence in the post-conflict business environment due to continued instability and/or weak state institutions. High interest rates mean higher project costs, particularly for the capital-intensive energy projects.

Moreover, the issue of weak governance is a common challenge across the Middle East region. In the context of post-conflict planning, weak governance is likely to result in increased levels of corruptions, particularly in the petroleum sector and fossil-fuel-based power generation since it involves a significant O&M costs.

### *Tribalism and regionalization*

Tribalism is a factor that is specifically relevant to the cases of Libya and Yemen, where tribal actors are prominent and woven into the political economy of both countries.<sup>6</sup> There is a growing resentment among tribes in both countries over the unfair allocation of oil and gas revenues, particularly from the resources that have been extracted from tribal regions (Al-Dawsari, 2012; Gazzini, 2017).

The role of tribal dynamics in the political transition in Libya and Yemen has been open for debate, however, tribes' influence is a factor that should be taken into consideration in post-conflict energy planning. In Libya, since the beginning of the country's civil war in 2011, tribal chiefs have been vocal about their willingness to cut oil production (Lewis, 2018b; Reuters, 2011). In Yemen, local tribe leaders are either controlling or attempting to control ports and oil fields in the country (Al Batati, 2013; Mojalli & Murdock, 2015). Be it about controlling oil and gas fields and pipelines or securing power infrastructure, satisfying the demands of local tribes and improving their social dividend can be an unavoidable reality that governments and international companies have to deal with.

### *Degradation of human resources and institutional capacity*

Unlike natural disasters, which also could potentially cause serious damage to a country's infrastructure, wars and armed conflicts usually result in significant loss of human capacity and highly-skilled workforce. Such a loss affects all sectors including the energy sector, which is one of the most diverse sectors in terms of employment opportunities, and in a degradation of institutional capacity of the concerned country (Bazilian & Chattopadhyay, 2016).

The Syrian conflict, for example, has taken a severe toll on the country's human capacity, with more than 400,000 estimated deaths and over half the population driven from their homes causing a large refugee crisis (World Bank, 2017b). This degradation of human

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<sup>6</sup> Iraq and Syria have also strong tribal presence, however, this presence is concentrated only in parts of the country and been diminishing (Khaddour & Mazur, 2017).

resources and institutional capacity are major damages that are impeding the recovery and reconstruction process. Highly-skilled workforce, having had settled in better and more stable environments and reestablished their careers, may not be easily lured to return to their countries. Such drainage of competent and experienced workforce, particularly in specialized areas such as electrical engineers and grid operators, is one of the biggest challenges that conflict-torn countries in the region would face when they embark on rebuilding their energy infrastructure.

To tackle this problem, large funds are required to rebuild human capacity on the technical and policy levels, though this will take time. As many energy reconstruction programs start taking place, governments and investors will likely need to take an aggressive approach to allocate funds for workforce training and development.

The degradation of the human capital will inadvertently weaken institutional capacities, which in turn would lead to weakness in central planning capacity and implementation of international standards and best practices.

#### *Geopolitics and border issues*

Even before the latest wave of conflicts and civil wars in the Middle East, geopolitics has been a central theme when thinking about energy planning in the region. Some even go further by claiming that wars in the region have been fueled by oil and gas interests (Ahmed, 2013; Orenstein & Romer, 2015). Geopolitics and border issues could affect post-conflict energy planning in three distinct ways: security of supply of fossil fuels, feasibility of cross-country oil and gas pipelines and the prospects of regional grid interconnections.

As it has been demonstrated, armed conflicts also affect neighboring countries as they force migration, disrupt trade and damage joint infrastructure such as grid interconnections. Post-conflict political alignments would likely to determine stakeholders and their levels of engagement. For example, the alliance between the Syrian and Iranian governments led to Iranian companies given contracts to repair Syria's electricity grid (Reuters, 2017). Similarly, Russian oil and gas companies have been given preference to invest in the country's petroleum sector. Such political alignments would certainly limit the choice of technology and limits the sources of finance, rendering the country dependent on one or two allies. From an oil and gas perspective, Libya would be less affected by border hostilities as it has its own exporting facilities and much of the threat to its oil and gas infrastructure comes from within (Reuters, 2018).

#### *Donors' policies*

Related to the previous issue of geopolitics, political alignments could also influence donors' policies. Unilateral or multilateral sanctions, such as the case with Syria, can prevent international financial institutions such as the World Bank, IMF, etc. from intervening and offering their expertise and resources in the post-conflict era.

Moreover, international donors also have their own agenda that may or may not align with the government of the affected country. For instance, one could note that when economies experience economic shocks and emerge from post conflicts situation such as those

experienced by Egypt after the 2011 revolution, international financing mechanisms should have been mobilized much more quickly to help provide a cushion to make the economic reforms a bit more gradual to ease the political process. It is noteworthy that this did not happen on anything like the necessary scale for Egypt (or any other Arab Spring country). Almost as if the international community and IFIs were not fully committed to the success in the post conflict era in the Arab world.

The geopolitical dimension seems to be the main driver of the donors and had a priority versus raising financing for post-conflict reconstruction and economic recovery using for example donor guarantees on loans or guarantee operations, as well as to back the issuance of special bonds that would provide additional financing at a rate more advantageous than what the countries would be offered by commercial lenders and capital markets.

Development assistance should also be used to manage risk and help to build the resilience of communities in post conflict situations to better withstand shocks that can trigger humanitarian crises. Predictable levels of funding from donors and development partners are essential to help facilitate a transition from emergency to development, and building synergies and complementary approaches would help to facilitate this. Greater recognition of the range of stresses that countries face, and early action and interventions from donors to alleviate their impact, could help reduce the extent of humanitarian crises.

#### **4. Lessons from Past Conflicts**

##### *4.1 Patterns and classification of post-conflict states*

According to the World Bank experiences from several countries (e.g. Afghanistan, Bosnia-Herzegovina, Liberia) and other countries show that the approach to power rehabilitation have followed a similar pattern (Schwartz, Hahn, & Bannon, 2014):

- Phase 1: The letting of construction and rehabilitation contracts to restart services as quickly as possible.
- Phase 2: A return of the operational responsibility to the government agencies and state-owned utilities that controlled the assets prior to the conflict.
- Phase 3: A push for reform of those agencies and the introduction of public-private partnerships only after the effects of fiscal constraints, weak incentives and low management capacity are felt on the public services.

We should note that post-conflict countries differ tremendously in terms of the impact of the conflict and the extent of national capabilities. According

to the World Bank and the authors own experience, they can be thought of as laying somewhere along a continuum between two extremes or types—as functioning states and weak or non-functioning states. The ability of a country to leverage rehabilitating and reconstructing its energy sector depends to a large degree on where it falls in this spectrum.

The lengthy and complicated type of conflicts in the Middle East countries make having a clear distinction between the two classifications difficult. One example, in the Iraqi situation the country has a functioning government with a contested legitimacy in many areas, weakened institutions because of lengthy wars and religious and ethnic divisions in the country, are not capable of implementing long term policies and long term plans needed for the energy sector reform

In Syria, the government is regaining control on areas taken by the opposition, the Syrian crisis has transformed to proxy war between regional and international actors, the reconstruction of the country is related to finding a compromise between these powers. Currently the government has little resources for reconstruction as with a weakened administration due to the brain drain caused by the country’s massive migration.

#### *4.2 Lessons learned from the Lebanese experience*

Lebanon, which has suffered a lengthy civil war that ended almost thirty years ago, is still using informal power generation system to cover the supply-demand gap. Not surprisingly, owners of private generators in Lebanon provide about 40 percent of electricity to Lebanese consumers at prices higher than the power sold by *électricité du Liban* (EDL), the national electricity provider.<sup>7</sup>

Since 1992, Lebanon’s electricity sector has contributed around 40 percent of the country’s public debt, estimated at \$36 billion (EPS, CNRS & CRE, unpublished results). The Lebanese civil war could have played an opportunity to diversify the energy mix of Lebanon. In 1974, EDL produced around 1700 GWh of electricity, out of which 41 percent came from hydropower. Since then, Lebanon’s energy mix has shifted to a near-complete reliance on fossil fuel, currently at 95 percent (Berjawi et al, 2017).

The reconstruction of the country after the civil war and the return to normality increased demand heavily, but with no new investment in new power plants (the only investment in power generation was in the rental of two rented electricity producing ships with a capacity of 385 MW). There is a serious deficit in the generation capacity to meet demand that is mainly caused by the aging of the generation units, this deficit is covered by private sector generation using diesel generators, obliging the Lebanese consumer to pay a double bill, one for EDL electricity and the other for the private producer (Verdeil, 2016).

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<sup>7</sup> Lebanese citizens pay a dual electricity bill. EDL receives \$600 million from Lebanese consumers yearly, while private generators receive twice as much at \$1.2 billion per year (Chami, 2015).

Post-conflict, Lebanon was never able to correct its electricity tariffs as it is not equitable and subsidizes all customers, large and small, and penalizes small consumers with very large fixed charges (Fardoun, Ibrahim, Younes, & Louahlia-Gualous, 2012). The electricity tariff has not changed since 1996 when the oil price averaged \$21 per barrel, missing several opportunities for reform and widening EDL's fiscal deficit, especially when oil prices are high.

## 5. How Post-Conflict Energy Planning Can Be Sustainable?

Deployment of renewable energy sources, particularly wind and solar, in post-conflict regions in the Middle East has been proposed by many experts and development agencies (Anand, 2012; Guay, 2017).

Despite considerable resources, investments in wind and solar energy sources in the Middle East have so far been modest. The mismatch between potential and reality can be attributed to three main reasons: (1) policy path dependence has been an obstacle in the face of reforms and innovation; (2) desire to provide cheap electricity coupled with highly subsidized prices and the perception that renewables are expensive compared conventional energy sources; and (3) intermittency of renewable systems and the (perception of) technical difficulties of integrating those systems into the electricity grid.

The deployment of renewables in conflict-affected states poses a series of opportunities and challenges. The reconstruction phase usually involves a large number of stakeholders (local population, governments, international organizations and aid agencies, NGOs, etc). This offers an opportunity to deploy new technologies and ideas and experiment with new policy models, like temporary housing schemes and distributed energy system which are generally not used during peace time.<sup>8</sup>

As a matter of fact, renewable energy sources have been used in several conflict-affected countries or countries that have faced natural disasters to fulfill a very specific electricity demand such hospitals and homes in remote areas or areas where the grid has been damaged.<sup>9</sup> These systems are generally provided by international organizations or actors, which are working in the affected regions.

Costs of renewables, especially solar PV, have decreased greatly in recent years. As post conflict countries are deprived from financial resources, renewable energies represent an opportunity in the short term to provide electricity, particularly in regions where the grid has been damaged or access to the grid is not possible. Unlike, conventional power generation

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<sup>8</sup> Such solutions are typical for countries where the role of the central government is diminished because of the conflict or that the demand of the people cannot be met. It should be noted that distributed power systems are generally not allowed by law in many countries by the energy authorities as it offer a threat to the monopoly of energy institutions, and tend to negatively impact political legitimacy.

<sup>9</sup> Tesla's Puerto Rico hospital solar farm can generate 200 kilowatts of solar power and has 500 kilowatts of storage. That'll be sufficient to support the day-to-day operations of the facility, which has 35 permanent residents with chronic conditions and provides care to more than 3,000 children from across the island.

which requires uninterrupted fuel supply, renewables are attractive to investors as they are less vulnerable to attacks on fuel supply and fuel routes.

The use of renewables in post-conflict reconstruction plans should also be seen as an opportunity to move towards a new electricity sector paradigm that is happening around the world—electrification of large sectors of economy, decentralization and the digitalization of the grid, which is a development seen in many areas in world to less centralized electricity system. Deployment of renewables also offers a number of opportunities, other than generating power, such as possibilities of technology transfer. Part of the value chain can be localized, with large part of the system manufactured locally thus decreasing costs and inducing economic growth.

### *5.1 Challenges and remedies of scaling-up renewables*

The obstacles facing the deployment of renewables in post-conflict states in the Middle East range from high fossil fuel subsidies and the inadequate communication of the advantages of renewables to unclear government policies, a lack of good financial options, and not enough community involvement.

The problem with fossil fuels subsidies is that they distort the true costs of energy and encourage wasteful spending and increased emissions. They also present a barrier to scaling up clean energy by: (i) decreasing the costs of both formal and informal fossil fuel-powered electricity generation, thereby blunting the cost competitiveness of renewables; (ii) creating an incumbent advantage that strengthens the position of fossil fuels in the electricity system; and (iii) creating conditions that favor investments in fossil fuel-based technologies over renewables.

On the communication side, renewables are still less known and often suffer from a lack of understanding about the full cost of a renewable systems, benefits, opportunities, and capabilities—thereby acting as a barrier to effective deployment of large shares of renewables into the grid or off grid.

Mini-grids and off-grid solutions to energy supply are experiencing rapid falls in cost because of technology improvements and scale economies in supplying growing markets (IRENA, 2018). While the expansion of national electricity grids is the “conventional” method of expanding access to energy services involving adding power plants and electric utilities and expanding high-voltage transmission lines and distribution, a “mini-grid” solution a localized or isolated grouping of electricity generation, distribution, storage, and consumption within a confined geographic space, could be also considered to accelerate electricity service delivery to population in post-conflict areas.

Though definitions vary, these grids are often locally managed, have less than 10 MW of installed capacity, serve small household loads, and cover a radius of 50 kilometers or less. They can be connected to a national grid, but typically, they operate autonomously (World Bank, 2017c). Another approach is a “micro-grid.” It typically operates with less than 100 kW of capacity, has even lower voltage levels, and covers a three to eight kilometer radius.

Both off-grid and mini-grid options can be powered by renewable energy sources (like micro-hydro dams, solar PV plants, biomass combustion, and wind turbines) or fossil fuels, using diesel generators. When configured properly, off- and micro-grids can operate more cost effectively than centralized generation and distribution. For example, In Indonesia, many of the 6,000 inhabited islands are powered by small hydro- mini-grids; and a few are retro-fitted with solar PV systems.

## **6. Conclusion and Policy Implications**

Access to energy is imperative for peace and ensuring a speedy economic recovery of conflict states. In the context of the Middle East, each conflict-affected country is a unique case that will require a different reconstruction approach and strategy that reflects its human and physical capacity losses, length of the conflict as well as the emerging political and social contracts. Studying lessons learned from past conflicts provides a powerful tool to avoid experienced challenges and replicate success stories. The main lesson is perhaps that there is a window of opportunity to push for reforms immediately after the conflict has ended. The Lebanese case show how substantial the cost of missing such an opportunity could become.

In Middle Eastern markets, planning of electricity programs is a government role. Common features of successful electrification planning in post conflict countries include: (a) clearly established system to prioritize the areas to electrify and the projects to be selected; (b) a long-term multiyear vision that coordinates grid extension and off-grid efforts; and (c) the design and effective implementation of an institutional framework clearly establishing the roles and responsibilities of the public and private agents involved.

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