

Expert Roundtable on Scaling up Sustainable Energy for Public Buildings in Jordan - Summary

The Chatham House-WANA Institute partnership under the Moving Energy Initiative in Jordan held a special inter-ministry and expert roundtable on 27 June, 2018. The meeting followed up on the recommendations of the second Working Group meeting (September 2017), and took forward a practical conversation on sustainably financing and upscaling energy efficiency and renewable energy for public buildings.

The roundtable discussed the following topics:

- i) The experience of sustainable energy for schools in support of the Jordan Response Plan;
- ii) The potential for sustainable energy for hospitals serving national and refugee communities.

Sustainable Energy for Public Buildings Offers Huge Opportunities

Public buildings are becoming a strong focus for Jordan in its goals for energy efficiency and renewable energy. They present an opportunity for change and local market development because they are government-owned and the government will benefit from long-term fuel and electricity bill savings.

The country's national electricity and water utilities deficit currently stands at around JOD5 billion (a subsequent 2018 report referring to the Ministry of Finance's reporting put the utilities deficit at JOD7.3 billion – around 2.6 per cent of GDP¹). Energy supply in Jordan is around 95 per cent dependent on fossil fuel imports (and subject to market volatility – e.g. the cost of crude oil and products to Jordan [increased by 30 per cent](#) between 2016 and 2017). On top of this, the country has faced of a population increase of over 53 per cent in the last decade. Improving infrastructure to reduce future fuel needs is therefore critical.

Buildings such as schools, hospitals, and houses of worship also serve communities that could benefit from better energy resources as well as learn about sustainable energy practices. The Syrian refugee crisis has put immense pressure on facilities, particularly in terms of health care and education, increasing their energy and water demand.

The current aid flows to ease the pressures on Jordan and the flagging up of public buildings in the Jordan Response Plan presents an opportunity for aid to bolster local funds and upgrade state-owned infrastructure. Jordan stands to benefit economically in the long term if aid is harnessed to enable sustainable financing (independent from aid). This will help create greater energy security and fiscal space.

¹ "Public debt drops to 95.8 of GDP as budget deficit rises to JD435.1 million", Jordan Times, 5 July 2018. <http://www.jordantimes.com/news/local/public-debt-drops-958-gdp-budget-deficit-rises-jd4351-million>

However, as our [previous workshop](#) noted, there are **several barriers** to sustainably scaling up energy efficiency, including the issue of how the generated savings could be used or redistributed. Since government ministries are responsible for utilities bills, the bills either go unpaid or are paid from the budget allotted by the Ministry of Finance. This means that savings would not automatically accrue to the building managers and users may feel no benefit of redistributed savings. This situation may offer little incentive to schools and hospital managers for energy upgrading and would also prevent commercial models from evolving in which investments could be paid for through the savings generated over several years.

What is Happening with EE & RE for Schools?

The meeting heard about the efforts of the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF), Princess Alia Foundation, and Norwegian Refugee Council (NRC) in sustainable energy for schools.

JREEEF is currently working on 127 schools in Jordan. As part of its schools heating programme, it plans to complete work on 2600 schools across the country in partnership with EBRD, CoWater, JWPC, MercyCorps, NERC, NRC, and Princess Alia Foundation). The current JREEEF budget is JOD8 million (USD11.3 million) including co-funding.

JREEEF aims to complete work on 100 schools each year until 2020, with the remaining schools to be covered by a programme being developed with EBRD under a PPP scheme. This includes for example, a fruitful partnership with the Princess Alia Foundation on 10 schools in Jerash, and partnerships with several companies. It is also supporting the 20 schools that NRC equipped with solar panels with efficient HVAC systems, and working with 8 schools in communities hosting Syrian refugees in Northern of Jordan (co-funded by JREEEF & Mercy Corps). JREEEF is currently working with Al Wasatyeh and Irbid municipalities to enhance the building envelope, replace lighting and automation systems and provide the schools with solar energy. It is planning to implement 1.5MW of solar energy for 40 schools (rooftop on-grid systems using net-metering) after an impact assessment will have been conducted. This alone is expected to deliver offset 100 per cent of the electricity demand in schools serving more than 30,000 pupils and reap financial savings of JOD397,800 per year.

The Princess Alia Foundation is concentrating on areas of poverty and unemployment, having completed work on 85 government schools. Together with the Dutch government, the Foundation is now planning to retrofit another 100 schools. The focus is on improving the educational environment by providing adequate temperatures in winter and summer and training the community.

NRC will scale up their energy response in public (state) schools with the Renewable Energy for Refugees (RE4R) project beginning late 2018. The project will be implemented in partnership with Practical Action, with funding from the IKEA Foundation. The project aims to support public schools in Irbid that have been affected by the refugee influx, with solar systems to offset electricity demand, in addition to energy efficiency upgrades to improve the learning environment. NRC will

also support capacity building for government staff members in supervising, monitoring, and maintaining RE&EE projects.

These projects are benefitting from close coordination with the Ministry of Education. A **new Renewable Energy Unit** has now been established under the buildings department within the MoE and will have several local branches to help enable solar applications for all schools.

Sustainable Financing and Scale-up Impeded by Lack of Clarity on how Savings Are Accounted for

While the logic for a transition to a more financially sustainable scale-up is known, obstacles remain. As one participant put it: “We know we can reach 100 per cent savings on electricity in schools, but who can make use of the savings? – the hidden part is not yet solved - and donors asking for advocacy on this issue.” Increasingly, donors are asking how their money is being used to reduce aid dependence and stimulate the national economy in Jordan. In this respect, in order to fund efficiency and RE for example, they want to know how the bill savings will lead to one or more of the following objectives: financially sustainable scale up of EE and RE, benefits for vulnerable people (e.g. in improved health and education outcomes), the possibility for the institution to enhance its infrastructure, or a reduced national utilities debt.

Current Plans for Hospitals and Medical Centres

Between 2011 and 2015, energy demand in hospitals and health centres in the northern and central governorates increased by 20 to 200 per cent. As a result, the Ministry of Health was forced to look at how to increase efficiency and RE. However, energy and water efficiency, and solar applications in the health sector stand at an earlier stage compared to the education sector.

At the time of writing, the EU was funding a demonstration case for showing large-scale solar thermal applications in Jordan at one of Jordan’s biggest hospitals, the Al-Bashir Hospital in Amman. 80 per cent of the total project cost was funded by the EU and the 20 remaining per cent was funded by Millennium Energy Industries, a Jordanian company. The agreement for the pilot phase was signed in January 2016 and set for completion in autumn 2018. This is both a test case and a learning experience for all parties. According to media sources, Al-Bashir hospital is now also planning to have an off-site [4.7 MWp PV solar plant](#) to supplement its power needs in partnership with Dubai-based company Yellow Door Energy and Jordanian Meroun Green Solutions Co.

JREEEF is working on PV and cooling systems for several medical centres where most patients are women, for example in Al-Ghor where temperatures reach over 40 degrees Celsius in summer.

The Moving Energy Initiative awarded Millennium Energy Industries a Low Carbon Energy grant of UK£185,000 in 2017 to solarise the water heating system at Al-Mafraq public hospital. This includes a boiler upgrade, solar thermal technology, 4 PV panels and 4 years of maintenance. The expected solar thermal system savings are approximately 260,000 KWH/year or the equivalent of 30,000 litres of diesel, and a CO² reduction of 76 tonnes/year. The expected solar PV system savings are 27,500 KWH/year and a CO² reduction of 18.2 tonnes/year.

One of the biggest projects addressing the health sector was being prepared at the time of the meeting, building on German KfW's initial study on energy efficiency in public buildings. In this partnership, KfW will provide EUR15 million and the Government of Jordan will provide EUR1.5 million to apply solar PV and LED in 25 health centres and 19 hospitals. The project initially started with five buildings: the Ministry of Public Works' building, two hospitals, one health centre, and one school before rolling out. The completed work is projected to save 13,000 tonnes of CO² per year and reduce the pressure on the Government of Jordan with approximately JOD5 million of annual savings. It will then be up to the ministries to decide on how they reallocate that budget.

Lessons from the Experience with EE&RE for Public Buildings

- **Efficiency should come first...** To gain the full benefit of solar energy and correctly size the panels (and thus save on capital costs), buildings should first undergo an audit and upgrades for efficiency.

...then passive solar applications... One participant noted that space needed for solar thermal water heating applications is 25 per cent of that needed for solar PV for the same amount of energy savings. "Solar thermal is a low hanging fruit," the participant said, noting that there is also a large potential for a storage component whereby hot water could be delivered throughout the year or at least part of the winter through storing hot water in insulated underground pits. This technique is currently under evaluation in Jordan.

...and water conservation and efficiency should be included. It was noted that the Ministry of Water spends JOD162 million per year on electricity in the water sector. In addition, the accumulated water utilities deficit currently varies between JOD2.5 - 3 billion.

- **Current problems with solar approvals, connections, and bill savings can be avoided by initially prioritising diesel replacement and off-grid PV.**

At present, there are often delays in getting solar PV connected to the grid (impact studies, delays in connection, reluctance of the distribution companies to take more solar due to lower than expected rise in electricity demand, and need for revenue to cover existing thermal generation). Where diesel is being used (widely used for water heating in hospitals), flow meters should first be installed to accurately monitor how much is being used.

Replacing old diesel boiler facilities with a solar-hybrid alternative can be done without approval of distribution authorities as it will not affect the grid, and will immediately save money for the hospital – as the Al-Mafraq Hospital water solarisation example proves. This is because diesel costs are paid by the hospital management directly (not by the ministry, like electricity bills) and the savings can be redistributed to improve medical services.

The new Zero Feed In mechanism may be another opportunity to speed up solar PV application. This can be used with both net-metering and wheeling. The distribution

authority will give permission for a license on the condition that no electricity returns to the grid.

- **Thoroughly checking the infrastructure and consulting with building management prior to drawing up plans.** Poor infrastructure will add liabilities and compromise the safety of projects. A thorough examination is needed before a project plan is drawn up. The structure of the project needs to be checked to know the load a rooftop can manage, for example. In the Princess Alia Foundation work on schools, rooftops are first checked by the Royal Scientific Society of Jordan (RSS) in coordination with the MoE to ensure there are no surprises or hazards. Old water tanks might not provide water suitable for drinking and may need cleaning, repairing, or replacing. Some of the sanitary systems were found to be in a terrible state.

In the case of Al-Mafraq, the boiler needed to be replaced, which was allowed for within the project. Later on during the project, it turned out that piping was in a poor state too, which could have easily been fixed simultaneously. While this project had limited resources to go beyond energy applications, initial direct consultation with the hospital management to trouble-shoot and define the project parameters was noted as a priority for future projects in this area.

- **Safety before efficiency.** It was noted that Jordan has replaced 70,000 streetlights with LED. This was a target since street lighting accounts for 3 per cent of all of Jordan's electricity consumption. It was pointed out that LED is not suitable for all street lighting: "For the countryside streets yes, but for highways there are the issues of glaring, uniformity of lighting and safety that must be taken into account," said one participant.
- **Budget must be allocated to provide long-term maintenance**
The Al-Bashir project was implemented when the MoH asked for 5 years of maintenance (rather than the 1 year agreed in the original plan between the hospital and the EU funder, this was subsequently negotiated to 2 years). Now maintenance is being included in contracts with the private sector as a matter of course. The Princess Alia Foundation has been using contracts with private sector companies that included a 3-year service agreement, and training and employing people from the area to be responsible for the maintenance.

The MoE's Renewable Energy Unit – with centres in 3 regions of the country also plans to inform the maintenance of the PV systems and coordinate the different donors towards the goal of solarising all schools.

There was interest in centralising monitoring of systems at the MoE level. But the possibility was also raised of responsibility to maintain equipment for schools being devolved to the municipalities, especially given Jordan's long-term process of decentralisation.

- **Engaging local communities in environmental awareness and care of systems.** The Princess Alia Foundation conducted orientation programmes to reach pupils using the classrooms to show the benefits of EE and RE for the country and the school.

The MEI Al-Mafraq hospital project has incorporated 5 local Syrian students of the al-Mafraq renewable energy training centre (set up by GIZ and the Jordanian government) as on-site trainees as part of its solar installation programme.

The importance of local engagement and emphasis on personal responsibility and shared pride in the projects was emphasised. It was mentioned that in some areas of the PAF projects on schools, small children had been throwing stones onto the roof resulting in 2 broken solar panels. “We need to educate people more directly,” said one participant, “they don’t care about energy savings but do care about things that affect the well-being of the community and its reputation.”

It was noted that this could be the beginning of more holistic education on environmental care, and could be linked to instigating other green practices such as good waste management and recycling in schools. One suggestion was that putting sustainable systems in place could be done as a partnership between private and public schools. Awareness and education on these issues could also be incorporated through the Queen Rania Teachers Academy to feature in both public and private education curriculums.

- **Guidelines for new builds are urgently needed.** It was noted that Jordan’s Black Iris Rating for buildings could be rolled out to incentivise more efficient buildings.

With respect to new schools and hospitals, it was strongly recommended that the ministries, including the Ministry of Public Works and Housing, are supported by design specifications that take future energy use into account. These specifications include orientation, insulation, and the building envelope (sizing of rooms, windows, etc.). Certain elements should be specified as essential for all new buildings.

It was suggested that there should be a certification system for different types of buildings. After monitoring pilots and assessing achieved savings, the results can be used to develop the concepts for certification.

It was also suggested that the concerned ministries should link up with the Jordan Green Buildings Council which works on rating tools and trainings that can assist in drawing up such guidelines.

- **Shifting to performance contracting.** It was noted that donors are currently essential for these projects to go ahead, although there are also options for partnering with local finance organisations (such as JREEEF), investment and private sector in-kind support. However, donors are increasingly asking how savings will be reinvested and/or how their money will lead to sustainable upscaling. It was suggested that the role for donors should

be to enable the transition to a system whereby companies are contracted by the government on a ‘performance contract’ basis, paid back through energy savings.

A potential model to achieve this is elaborated on below and in the [summary of the 28 June Working Group Workshop](#).

A New Committee for Sustainable Energy for Public Buildings

It was suggested that the participants of the roundtable form a committee to follow up on this issue, to share knowledge and limit duplication. The WANA Institute offered to lead the follow-up on this.

It was suggested that in the future, the committee might become a unified body on this issue that would simplify advocacy and fundraising. Some participants through this could enable a transition from international donor funding to raising funds from local sources (including the private sector), and suggested the establishment of a special fund or revolving fund that could be distributed to the implementers.

About the Partnership

Since 2016, the West Asia-North Africa (WANA) Institute has partnered with Chatham House, The Royal Institute for International Affairs, EDAMA, and Norwegian Refugee Council (NRC) in implementing the [Moving Energy Initiative](#) in Jordan.

The Moving Energy Initiative (MEI) is an international, multi-partner project (Energy4Impact, Chatham House, Practical Action, UNHCR, NRC, DfID) funded by the UKAID to change the way energy is delivered in situations of mass displacement – to improve sustainable energy access for both refugees and internally displaced people, and the host communities.

The West Asia-North Africa (WANA) Institute is a non-profit policy think tank, operating under the chairmanship of His Royal Highness Prince El Hassan bin Talal, the Institute works to promote a transition to evidence-based policy and programming to combat the development and humanitarian challenges facing West Asia and North Africa.

The aims of the work in Jordan

The work of MEI and multi-sector dialogue with WANA in Jordan will generate learnings and tools that can be applied to help improve sustainable energy access and relieve local energy pressures – particularly in urban settings, given the large number of refugees living in urban areas of Jordan. This Initiative also studies Jordan as an evolving ‘best practice’ case for other countries to draw on, particularly in view of the [Jordan Response Plan for the Syria Crisis](#) (JRP).

The JRP is an exceptional and comprehensive plan under regular revision by task forces that include government, UN, and international and local NGO expertise. Energy is one of its priorities, and other priorities such as Shelter and Water are closely intertwined with energy needs. It is the first of its kind for a country facing a large refugee population increase and has been successful in channeling aid for both immediate humanitarian needs and longer term national development. The next step is to make sure that the projects translate into processes that can be scaled up in a financially sustainable way, enhancing the country’s long-term resilience.

The Energy & Water Working Group

In 2016, the MEI partnership held its first workshop (supported by the Ministry of Foreign Affairs of the Netherlands) which laid the groundwork and consultation with government, UN, NGO, private sector, and expert stakeholders to inform MEI’s practical projects in Jordan. Participants recommended a working group to support and assist with the effective and sustainable implementation of energy priorities of the Jordan Response Plan. The MEI Energy & Water Working Group was established in February 2017 under the auspices of the WANA Institute.

The Working Group shares expertise and increases connectivity and understanding between ministries, the private sector, and the humanitarian sector on how this can be done and encourages frank discussion of challenges, and sharing of experience and knowledge in order to make practical progress.