



CASE STUDY LED STREET LIGHTING AND MUNICIPAL BUILDING LIGHTING

CHALLENGE • The electricity costs of street lighting make up the bulk of GAM's electricity bill, and the city is spending close to JD12 million annually on street lighting.

SOLUTION • The city has two projects under implementation to replace existing street lights and municipal building lights with more efficient LED lights. There are close to 120,000 street lights which are operated by GAM. By 2017, almost half of these had been replaced by LED bulbs, which are more efficient and longer lasting. By the end of 2019 the remaining existing street light bulbs will be switched to LEDs and additional LED street lights will be added to improve safety and security in the city. It is projected the project will reduce consumption of electricity in public lighting up to 50 percent. In 2017 the GAM building maintenance department installed 1500 LED bulbs in key municipal buildings, by 2019 all of GAM municipality buildings will have LED lights.

BENEFITS • Reduced costs for municipality, less maintenance, improved quality of lighting for residents.

ACTIONS TO INCREASE ENERGY EFFICIENCY IN THE BUILDING SECTOR

ACTIVITY	TIMEFRAME*	VOLUME OF EMISSIONS REDUCED	SUSTAINABILITY BENEFITS
Improve energy efficiency in GAM-owned municipal buildings	● Medium	Low	Reduced costs for the municipality, and improved comfort of buildings
Implement green building strategies in public schools, universities, and religious institutions	● Medium	Medium	Reduced operational costs for schools and universities, and improved environment for learning
Implement green building strategies in public hospitals	● Medium	Medium	Reduced operational costs, and improved indoor environment
Improve enforcement of building codes	● Medium	Medium	Reduce costs for residents and improved living environment
Incentivize adoption of the Thermal Building Code and Retrofit Guidelines	● Medium	Medium	Reduced costs for residents and improved living environment
Increase participation in green building incentive program (Density bonus)	● Medium	Medium	Reduced costs for residents and improved living environment
Create a building energy rating and label program	● Short	Unknown	Improved perception of green building, incentivize efficient behavior, building awareness of benefits
Energy-efficient street lighting and lighting in parks	● Short	Low	Safer streets, and reduced costs for the city
Rebate program for energy efficient appliances	● Short	Medium	Reduced costs for residents
Solar water heater program incentive program	● Short	Low	Reduced costs for residents
Energy efficiency engagement plan for large energy users	● Medium	Medium	Reduced costs for residents
Existing buildings (residential): city-wide retrofit program	● Medium	High	Reduced costs for residents, and improved comfort and living environment

● Short - 10 years ● Medium - 10-15 years ● Long 15-30 years



RENEWABLE ENERGY POWERING CITIZENS' LIVES

CHALLENGES

The national government is steadily increasing the percent of renewable energy sources for the national grid. Indeed, it was on track to reach 10 percent of all energy needs in 2017. Amman currently sources the majority of its electricity from the national grid. As a result, stationary energy emissions, and specifically building electricity use, are the largest source of emissions for the city. In order to achieve the 2030 and 2050 targets, the city will need to

diversify the source of its electricity and convert to largely renewable sources by 2050. Amman has little control over the percent of renewables in the national grid. However, it can explore sourcing its own electricity from different, cleaner sources. This Plan will focus on decentralized, renewable options and the development of municipal renewable energy.

Highest Emitter:
GRID ELECTRICITY

KEY GOALS AND OPPORTUNITIES

KEY SHORT-TERM GOALS

- Incentivize and promote residential and commercial rooftop solar energy units
- Explore sites for municipal solar opportunities
- Research other clean, renewable source options

In order to achieve the envisioned transformational shift, the city will need to rapidly shift to non-carbon energy sources. Amman is already working to identify renewable energy opportunities and the country has abundant quality solar and wind resources. Reducing GHG emissions from the energy sector in Amman goes hand-in-hand with the national priority of reducing reliance on external fossil fuels.

Multiple national level regulations are in place that allow Amman to pursue municipal renewable energy resources.

- In 2018, the national government signed a policy that allows all public institutions to build and own a solar PV plant up to 10 megawatts (MW). Amman would need to produce many times this amount, and it should focus on raising this ceiling.
- The Renewable Energy and Energy Efficiency Law (REEEL) No. 13 (2012) promotes renewable energy production. It is the umbrella regulation for all other supporting schemes and incentives.
- Under the REEEL, net metering regulations allow individuals and municipalities to connect renewable energy back to the grid.

CASE STUDY SOLAR PV ROOFTOP GUIDELINES

CHALLENGE • Jordan is dependent on fossil fuel imports for almost all their energy needs, yet they have robust renewable energy resources. City level governance have little influence over national grid policies.

SOLUTION • Distributed renewable energy systems present a great opportunity for cities, companies and individuals to take control of their energy sources. GAM has created and shared design guidelines for rooftop solar PV systems. Combined with the 2012 Renewable Energy Law that allows individuals to sell excess output back to the grid, a substantial uptake in rooftop solar PV has occurred. Around 25MW of rooftop solar capacity was installed by 2017.

BENEFITS • Improved air quality, savings on utility bills, support of green jobs

This enabling environment is encouraging and supportive of renewable energy installations for individuals and the municipal government. As such, it should be leveraged to allow Amman to reduce their own emissions from the electricity sector, reducing dependence on the national grid.

BENEFITS

Using local renewable energy sources, such as solar energy, has a potentially large impact on the city and its inhabitants beyond the benefits of reduced emissions. Creating energy using clean sources at the city level will reduce city government spending on energy, freeing up resources for other initiatives. It can also lead to an increase in jobs and a

reduction in air pollution, while reducing reliance on imported fuel and oil. For individuals installing building-integrated solar systems, household spending on utilities will be reduced. In addition, jobs in renewable energy engineering, construction, operations and maintenance sectors will increase.

PARTNERS & STAKEHOLDERS

Amman cannot alone change the mix of the national grid, but it can look at alternatives to grid-provided electricity. To do this, Amman will need to partner with utilities, the national ministries and regulatory bodies, and the private sector.

There is a long history of developing renewable

energy in Amman. In addition, the national government is working hard to develop additional renewable sources. Amman can leverage existing partners – from international donors to local manufacturers and universities – to explore options for shifting its sources of energy.

ACTIONS TO INCREASE RENEWABLE ENERGY PRODUCTION

ACTIVITY	TIMEFRAME	EMISSION REDUCTION POTENTIAL (H,M,L)	SUSTAINABILITY BENEFITS
Develop solar power generation farm to power the GAM's municipal sites	● Medium	High	Improved air quality, and lower reliance on imported energy
Develop solar PV street lighting	● Short	Low	Reduce operating costs for the city
Outreach and awareness-building program to encourage installation of rooftop solar PV using existing national government financial incentives	● Short	Unknown	Reduce long-term energy costs for residents
Install rooftop solar units on GAM-owned municipal buildings, parking lots and pergolas	● Medium	Low,	Reduce operating costs for the city, provide leadership and an example for city residents
Explore renewable power purchase agreements for providing renewable energy for municipal use	● Medium	High	Support development of renewable energy