HOME

THE SOUL OF LEBANON



Marlo Thomas

THE LEBANESE-AMERICAN MEGASTAR BEHIND
ST. JUDE CHILDREN'S RESEARCH HOSPITAL

LEBANON THROUGH THE EYES OF
FRENCH AMBASSADOR
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RAGHIDA DERGHAM
THE COURAGE TO COME HOME

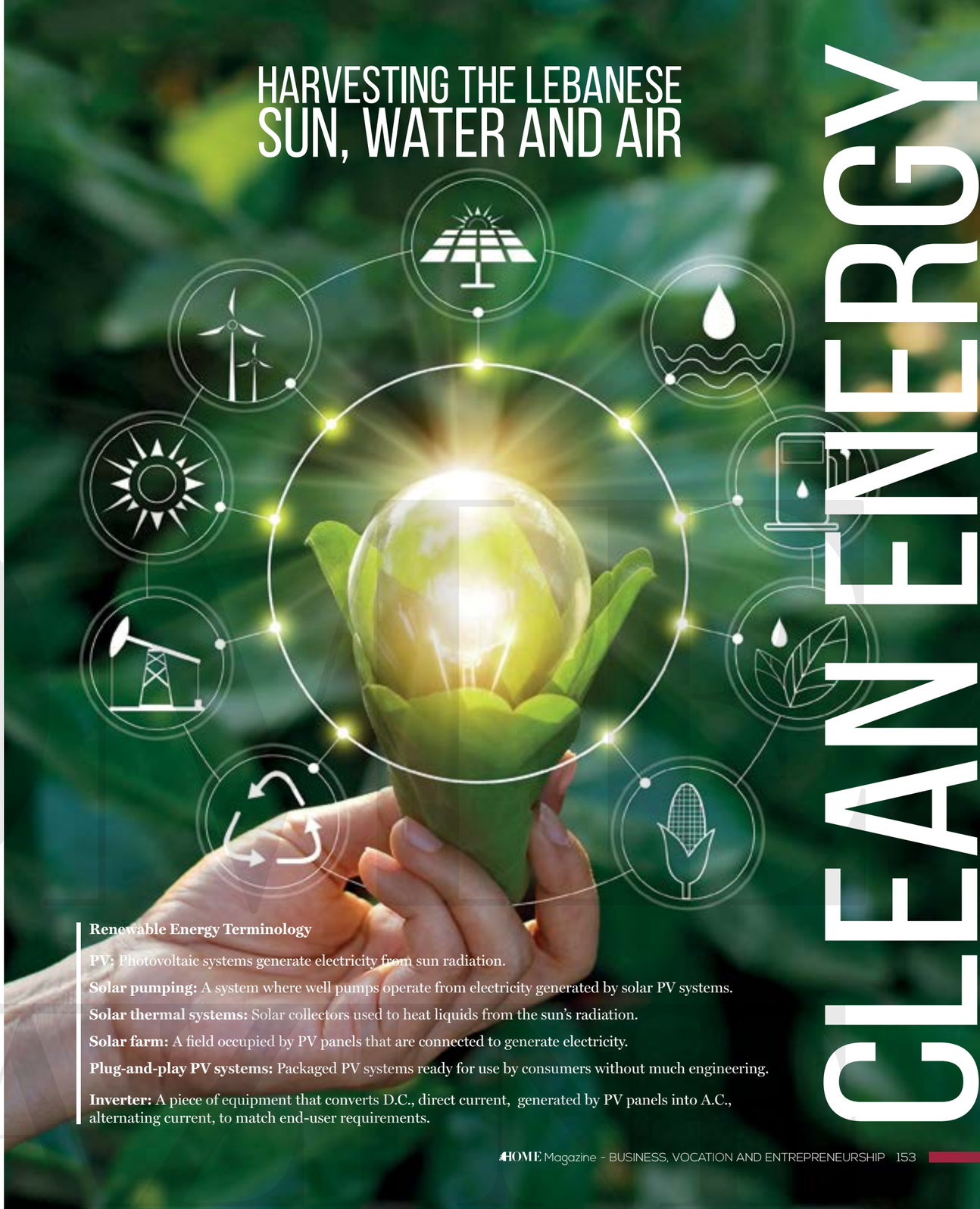
Dr. Mohamed H. Sayegh
AT THE HELM OF AUBMC

LEBANON'S CHAMPION
Chirine Njeim
OLYMPIC SKIER TO
OLYMPIC RUNNER

Pierre Rabbat
LIGHT-HEARTED HUMOR,
SHAKING THE STATUS QUO

CLEAN ENERGY

HARVESTING THE LEBANESE SUN, WATER AND AIR



Renewable Energy Terminology

PV: Photovoltaic systems generate electricity from sun radiation.

Solar pumping: A system where well pumps operate from electricity generated by solar PV systems.

Solar thermal systems: Solar collectors used to heat liquids from the sun's radiation.

Solar farm: A field occupied by PV panels that are connected to generate electricity.

Plug-and-play PV systems: Packaged PV systems ready for use by consumers without much engineering.

Inverter: A piece of equipment that converts D.C., direct current, generated by PV panels into A.C., alternating current, to match end-user requirements.



If you ask Lebanese citizens about their sweetest dreams and their most dreadful nightmares, the answer for many would be about electricity.

Many factors have led to this situation in which we have a drastic shortage of electric power production and distribution in Lebanon: long years of war and lack of investment in the energy sector, the increase in population and demand without a matching increase in production, the failure to implement fruitful policies due to political incoherency among the stakeholders, the weak billing system in terms of the subsidized electricity rates and the non-collectability of a big percentage of the bills, etc., etc.
All these factors have created a big toll on the country's economy. We are paying a high cost for energy for domestic, industrial and commercial applications alike due to the need to provide parallel private power generation (which is polluting, inefficient and costly), in addition to paying power bills for the national electric utility authority, the Electricité Du Liban.

Like every challenge in life, many bright opportunities come out only when things reach a gloomy state. In our situation, renewable energy, be it solar energy (thermal and PV), wind energy, hydropower, biomass energy and many other forms, present themselves as a necessity rather than a luxury.

The current national electrical power demand for a population of more than 5 million Lebanese plus an estimated 1.5 million refugees in the country peaks at about three gigawatts. The Electricité Du Liban is providing barely two gigawatts of this demand; the rest comes from private power generation. Each district has its own local generators and local electric grid run by a local establishment that has no real legal framework to generate and sell electricity, but during the war these de facto power sources became the norm. The authorities had to accept them since the government did not provide any alternatives.

> **“In the 2009 Copenhagen United Nations Framework Convention on Climate Change, the Lebanese Government committed itself to the major milestone of having a minimum of 12 percent renewable energy in its energy production by 2020.**

To rectify this situation, a two-way approach is needed: increase production and reduce demand. To increase production, a new energy mix with increased renewable energy should be sought. The government, through the Ministry of Water and Energy and the Lebanese Center of Energy Conservation, and the other stakeholders, have set renewable energy targets and published them through the National Renewable Energy Action Plan for the Republic of Lebanon 2016-2020. In fact, in the 2009 Copenhagen United Nations Framework Convention on Climate Change, the Lebanese Government committed itself to the major milestone of having a minimum of 12 percent renewable energy in its energy production by 2020. This means a production of 8,900 gigawatts per hour in 2020 from renewable energy. This commitment was translated again in the Policy Paper for the Electricity Sector issued by the Ministry of Energy and Water in 2010.

Lebanon, being a Mediterranean country, has an abundance of sun, water and wind. So, the possibility of reaching this targeted goal is certainly feasible.

Harvesting the Lebanese sun

The opportunities to use solar energy in Lebanon are numerous.

The first opportunity is to use thermal solar water heaters for domestic and commercial applications. This source has proven to be very popular and financially rewarding to consumers with pay back periods of three years, give or take, especially with the increase in oil prices in the years after 2000. Many small companies have specialized in this field in all areas of the country.

The second potential for using solar energy is with photovoltaic solar panels, which convert light (photons) into electricity. They can be used on a big utility scale and connected to the grid, which are called solar farms. An example of this is the Beirut River Solar Snake, a solar farm realized in 2015 that produces one megawatt (peak) electricity. This project was meant to be a showcase of what renewable energy can do in the city of Beirut.

In 2017, the Ministry of Water and Energy released a tender for the private sector to install 12 solar farms in four regions of Lebanon: North, Bekaa, Mount Lebanon and the South. Each farm will produce between 10 to 15 megawatts (peak) electricity. These contracts were based on a long-term power purchase agreement contracts.

Besides the above government action, a major boost for the development of solar systems was the introduction of subsidized loans from the Lebanese Central Bank through the National Energy Efficiency and Renewable Energy Act of 2010.

> **“Subscribers can install a smart electric meter that enables them to inject the extra electricity that would be generated from a PV system, to the government electric grid, where it would reduce the subscriber's electric bill for the amount that is injected back.**

Another important tool to increase the use of PV for power generation is the net metering system, adopted by the Ministry of Water and Energy and the Electricité Du Liban. Subscribers can install a smart electric meter that enables them to inject the extra electricity that would be generated from a PV system, to the government electric grid, where it would reduce the subscriber's electric bill for the amount that is injected back.

Street lighting presents another opportunity to use PV systems. Many municipalities and private properties are installing PV street lighting with storage batteries.

On a private level, many citizens are using packaged plug-and-play PV systems, with inverters and storage batteries for their HOMEs, instead of private generator subscriptions.

For rural and agricultural applications, solar pumping is another beneficial option. Municipalities and private users are increasingly installing such systems. Also, the government has tendered several solar pumping wells in the Baalbek region.

Harvesting Lebanon's wind

The National Wind Atlas for Lebanon was issued in 2011 with the help of the United Nations Development Program's CEDRO project.
CEDRO stands for "Country Energy Efficiency and Renewable Energy;" it provides the basis of any scientific feasibility analysis for wind turbine projects in Lebanon. It has identified potentially feasible areas to install wind farms.

Lately, the ministry has reached an agreement to erect three wind farms in Akkar in North Lebanon with a total peak capacity of 200 megawatts. These farms will be built by private sector companies that will sign a power-purchase agreement with the government, where by the Electricité Du Liban will buy the power produced on a long-term basis. More farms are planned in the near future.

> **“Lebanon started using hydro plants to generate electricity in the 1920s and 30s.**

Harvesting Lebanon's water

Interestingly enough, in the 1970s, more than 70 percent of Lebanon's electricity came from hydro plants. Lebanon started using hydro plants to generate electricity in the 1920s and 30s.

Currently, the government, under the 2010 electricity plan, has planned and started the construction of several dams with hydropower plant potential. In addition, micro-hydro turbines are envisaged for some areas with small rivers and streams.

Biomass energy

An important potential source of renewable energy for Lebanon is the energy extracted from biomaterials such as forestry residue and solid waste. Recovered biogas from the Naameh Landfill is currently used to generate seven megawatts. With our garbage and solid waste crisis, waste to energy conversion is one solution that should be considered.

On a smaller scale, rural applications, like using olive cake byproducts and wood waste, can be used for domestic heating applications.

The outlook for renewable energy in Lebanon

The Ministry of Energy and Water has started taking important steps toward achieving the targets set for using renewable energy. Yet, there is more to be done.

To accelerate growth of the renewable energy sector, the following actions should be considered:
- The development of a clear legal framework in which the private sector is encouraged to partner with the public sector to produce energy and sell it to the national grid.

- Further financial support from the banking sector and international donors for renewable energy projects.

- The removal of subsidies on traditional fossil fuel electricity production to reduce the burden of domestic debt and to make renewable energy more feasible.

- The elimination of all custom duties on imported clean energy technologies.

- Encouragement of the use of renewable energy in buildings and projects by creating incentives for the citizens and the investors.

We should not forget that using clean energy sources not only reduces the energy gap but also reduces pollution caused by fossil-fuel energy. It opens many new work opportunities for our youth and reduces the running cost of power generation.

Nature is radiating its energy on us for free; let us receive it with wide open arms to secure a clean and prosperous future for Lebanon.

LSES



Youssef Ghantous, M.S., M.B.A. and B.E., is the president of the Lebanese Solar Energy Society, a founding member of the Lebanon Green Building Council, and is the vice president of the fourth branch of the Order of Engineers and Architects, Beirut, and a member of its Committee on Energy and Sustainability. He is a managing partner and head of the mechanical department at Design Engineering Partners.

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