

Assessment on the Water-Energy- Food-Ecosystems Nexus in Lebanon

Energy Sector

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Outline

1. Brief Description of Current Situation of the Energy Sector
2. Legal Framework
3. Policies, Strategies and Action Plans
4. Interlinkages with Other Sectors
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Current Situation

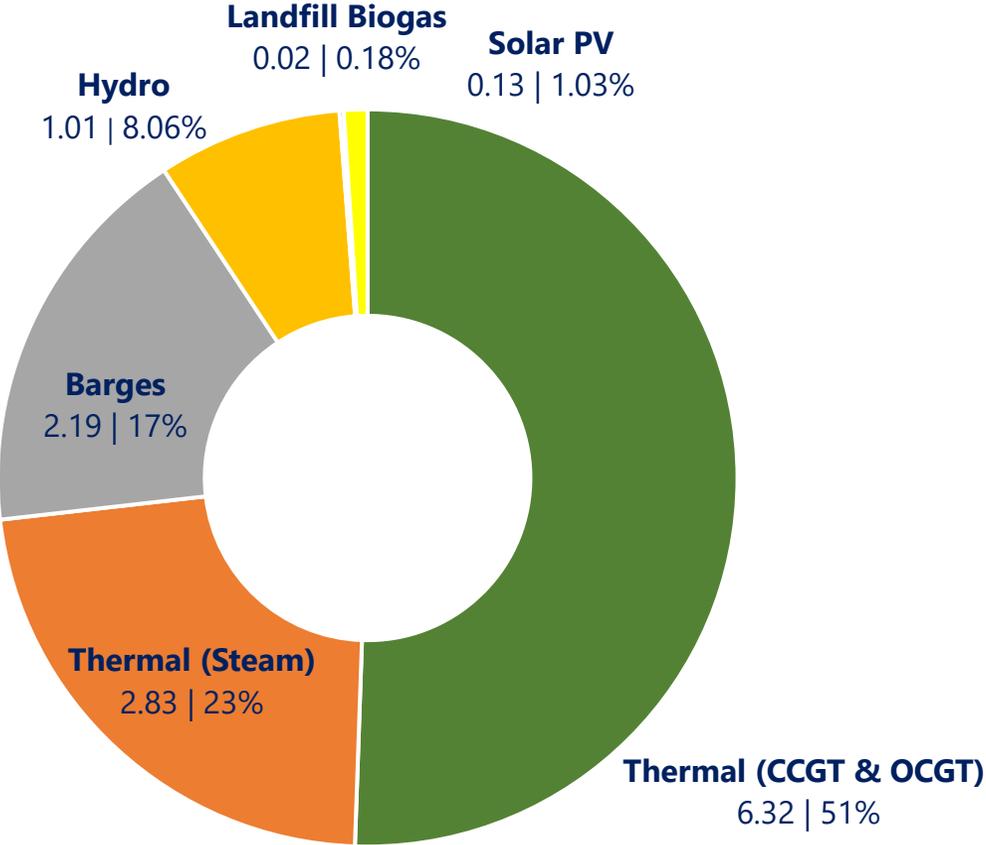
Electricity Generation

- More than 96% of primary energy is imported
- Significant tariff subsidies with a highly burden on the national budget
- Significant gap between electricity demand and supply.
- Gap is covered by self-generation:
 - Private individual diesel generators (legal if power less than 1.5 MW and if Ministry of Environment's minimum environmental standards are complied with.
 - Neighborhood-level diesel generators (informal).
- Distribution of neighborhood-level generated electricity is done through informal networks (not connected to the national grid).

Financial Status

- The freezing of electricity tariffs since 1994 at an average of 9.1 cUSD/kWh (138 LBP/kWh); it corresponds to the price of crude oil of 20 USD/barrel
- The operation of old thermal power plants having low efficiencies with continuous costly maintenance and low energy output and high operating costs based on Diesel Oil and Heavy Fuel Oil
- Up to 17% of technical losses in transmission (4%) and distribution (13%) networks, despite the investments made regularly by the MoEW, the EDL and the DSPs in rehabilitating and upgrading the networks,
- 21% of non-technical losses in distribution networks due to the illegal connections to distribution networks and the inability of the DSPs to remove these,
- 5% of non-collected bills, including the arrears (except for the period of strikes that delayed further the collection and increased the non-collected bills percentage to 30%), and
- the effect of the refugees whose electricity consumption has been estimated to be around 500 MW, causing USD 275 million of additional costs on the EDL.

Lebanon's 2020 Electricity Generation (TWh)



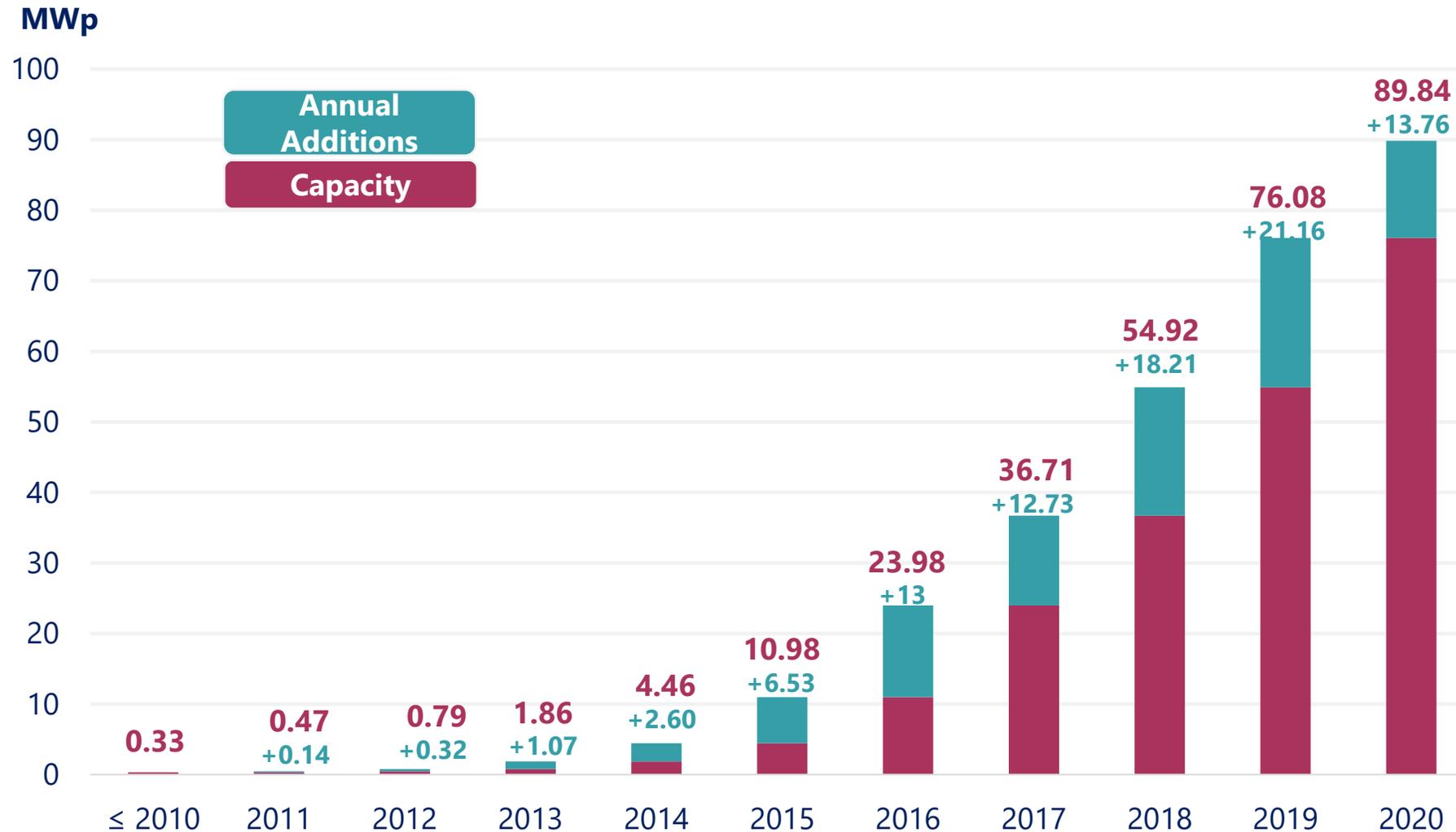
- EDL's share of total electricity generation equaled 12.50 TWh while the solar PV share equaled 0.13 TWh or 1.03% of total electricity generation (up from 0.73% in 2019).
- With solar PV added to Hydro and Biogas, the share of renewables of the total annual electricity generation in 2020 reached 9.27%.

Source: LCEC,2022

Renewable Energies Incentives

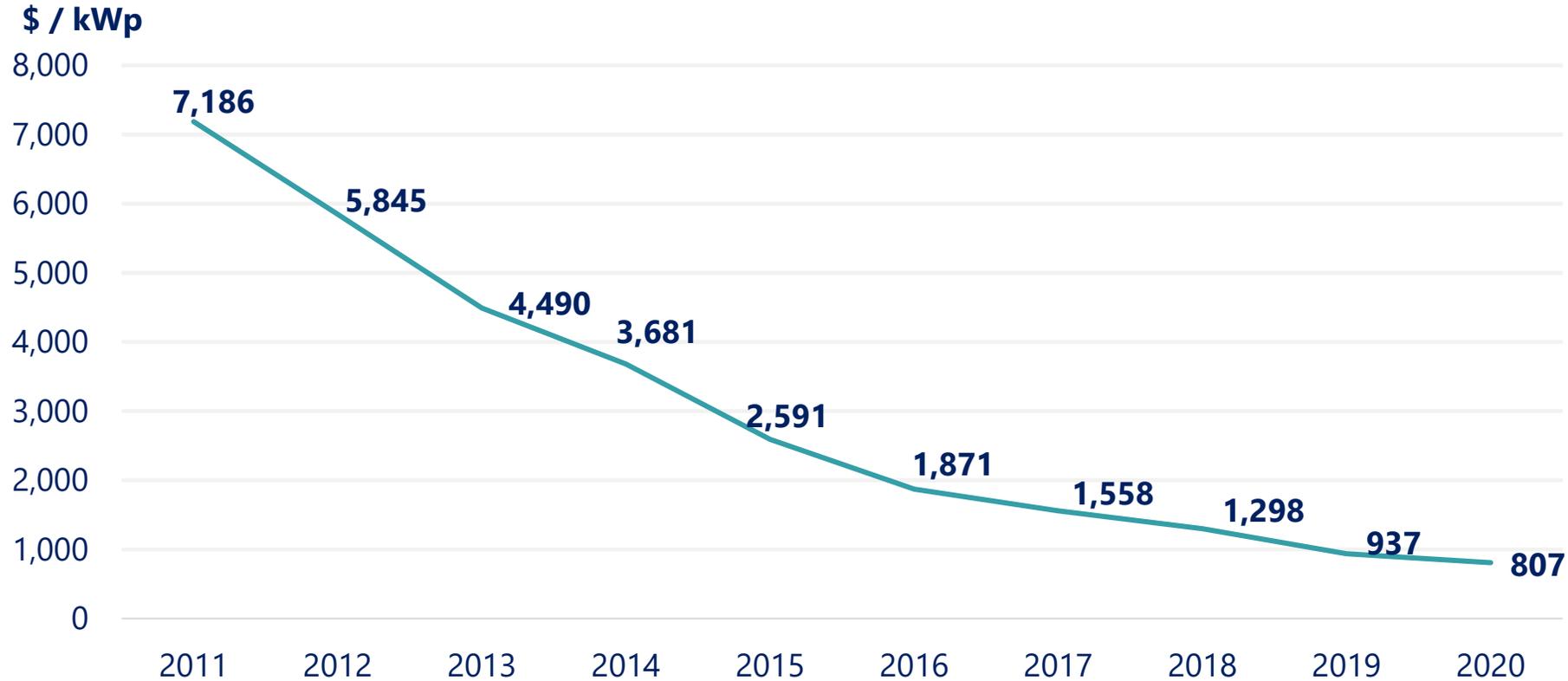
- To incentivize the adoption of RE, initiatives have been established to support their financing:
 - The National Energy Efficiency and Renewable Energy Action (NEEREA) program
 - The “solar power loans” (2022) through a MoU between the LCEC and BDH to support installation of high-quality energy systems to people with low-medium incomes

Solar PV Capacity in Lebanon



Source: LCEC, 2022

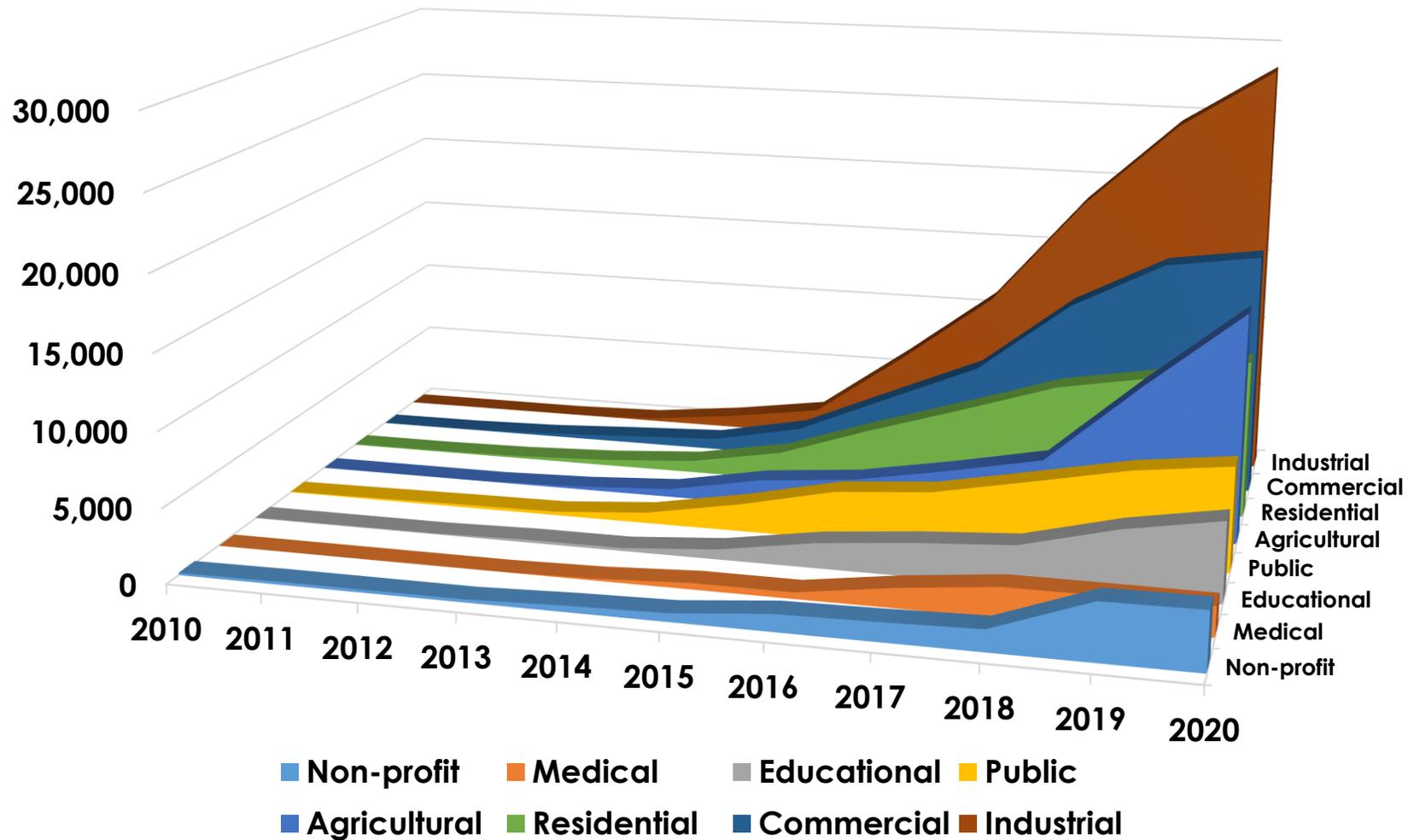
Cost of Solar PV



- Constant increase in solar PV installations.
- Constant increase in total investments in the sector.
- Constant reduction in turnkey price.

Source: LCEC, 2022

Cumulative Installed Capacity by Sector (kWp)

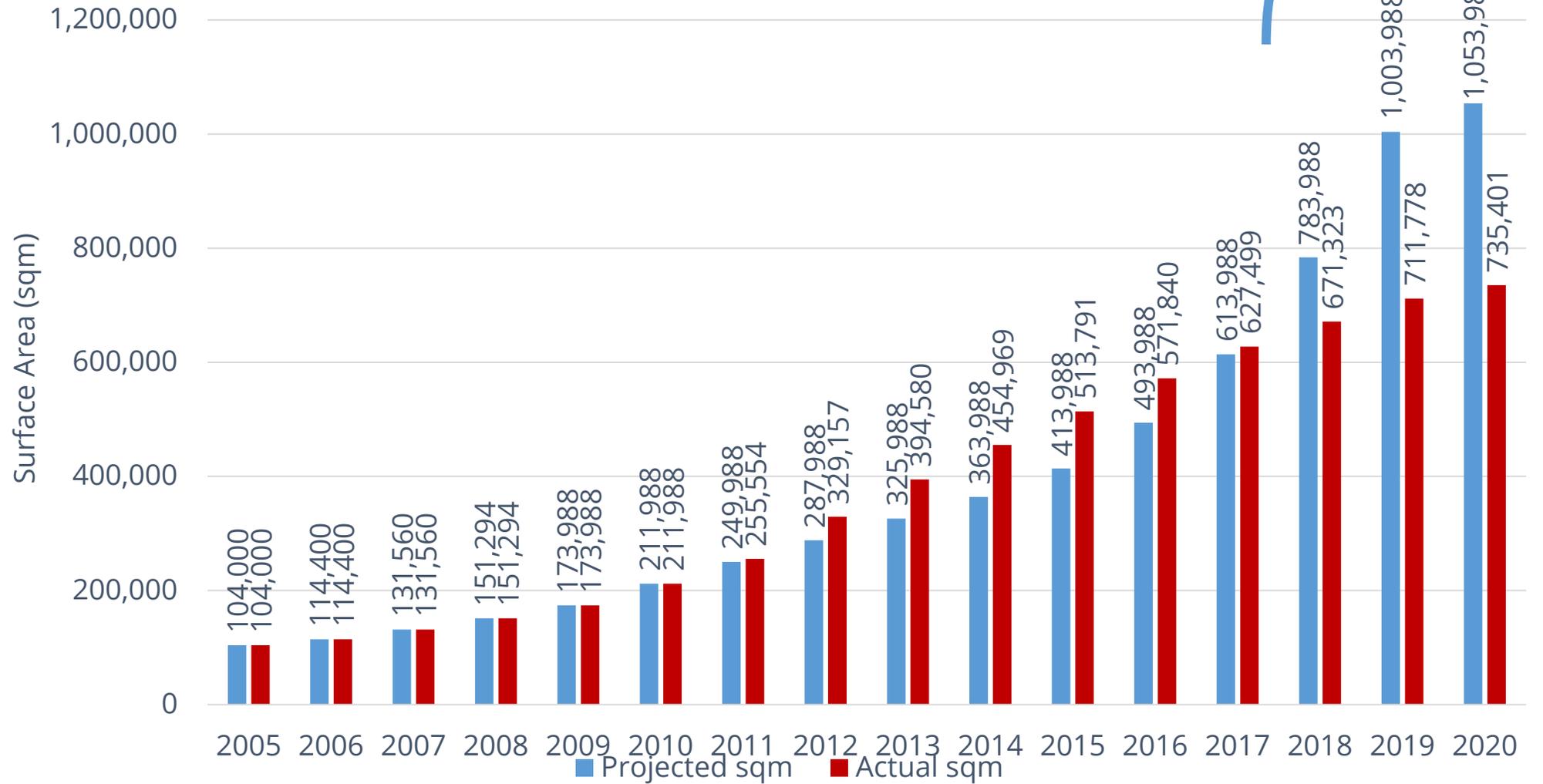


- During 2020, the agricultural and residential sectors recorded a growth of 138% and 93% respectively compared to the year before in terms of installed capacity.
- The economic downfall which resulted in an electric power crisis drove the market towards finding sustainable solutions for these essential sectors.

SWH Market

Economic Crisis+ COVID 19

Pandemic



Planned large scale RE Installations

- For **wind energy**, the GoL has signed 3 Power Purchase Agreements with private developers for the installation of 3 wind farms in Akkar
- In May 2022 the CoM has granted 11 licenses to produce electricity from **solar energy** with a 165 MW capacity, expected to start within three years

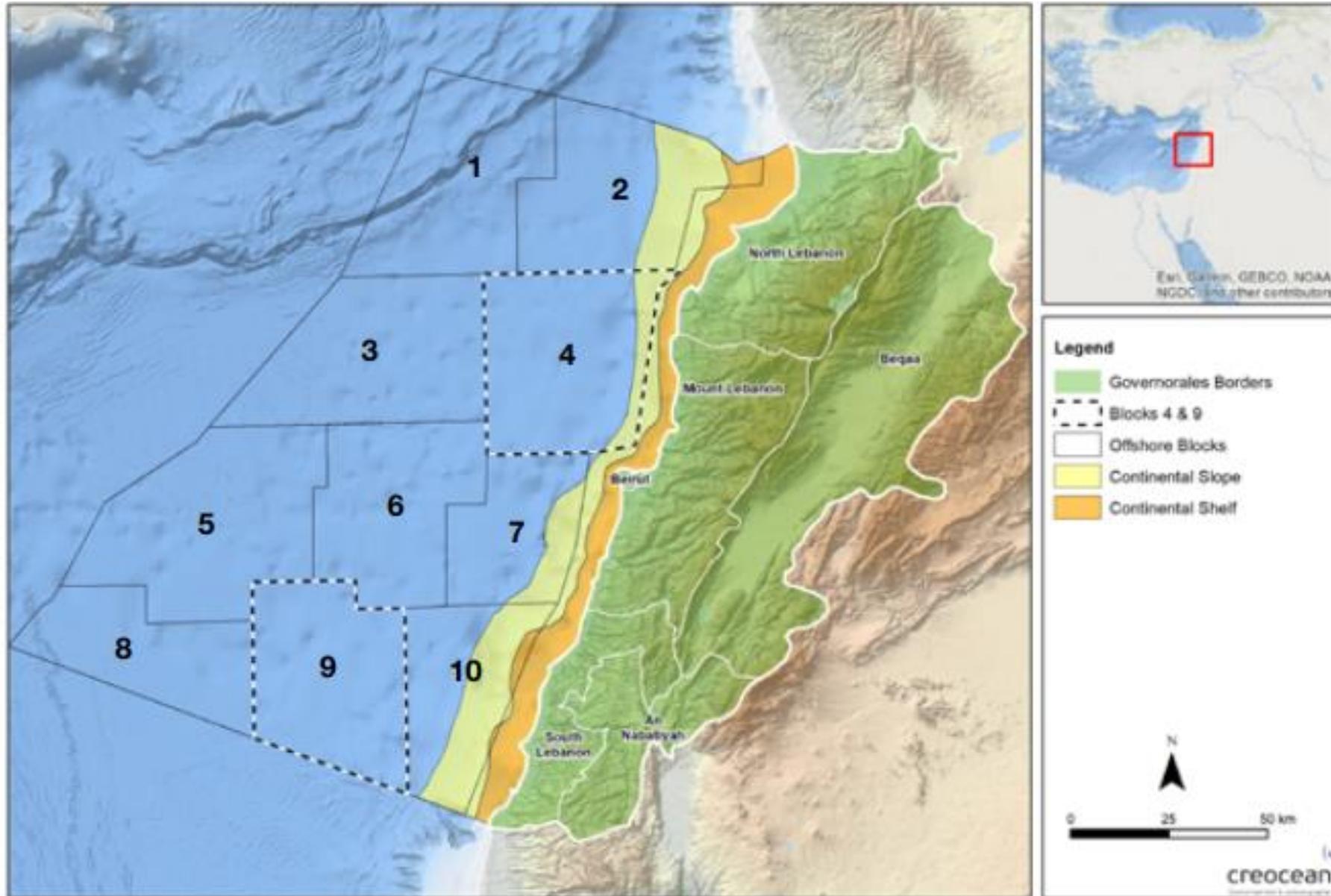
Bioenergy

- Bioenergy in Lebanon is under-exploited although considered in existing national action plans
- Constraints are cost of production, market formation and lack of adequate synergies between the agriculture and energy sector
- Several small-scale projects some publicly owned and others by the private sector have adopted bioenergy (briquettes)

Oil and Gas

- A potential contributor to Lebanon's energy security is the Oil and Gas Resources in case commercially extractable quantities are discovered and exploration activities are successful
- Lebanon may have around 1.7 billion barrels of recoverable oil and 122 trillion cubic feet of recoverable gas
- Ten offshore drilling and exploration blocks have been defined and in December 2017 the GoL approved a bid to start oil and gas exploration

Oil and Gas



Source:
TotalEnergies and
CRÉOCÉAN, 2021

Transportation Sector

- The transportation sector in Lebanon is the main consumer of imported gasoline
- Ownership of private cars has been encouraged by the inefficient management of the mass transportation sector
- The economic and fiscal crises have impacted the transport sector due to the increased prices of fuel decrease of purchasing power and the capacity to buy cars, and the removal of car purchase credit facilities
- The renewable energy outlook for Lebanon adopted by the MoEW highlights the need of promoting the use of electric vehicles (EV)

Legal Framework

Legal Framework (Electricity)

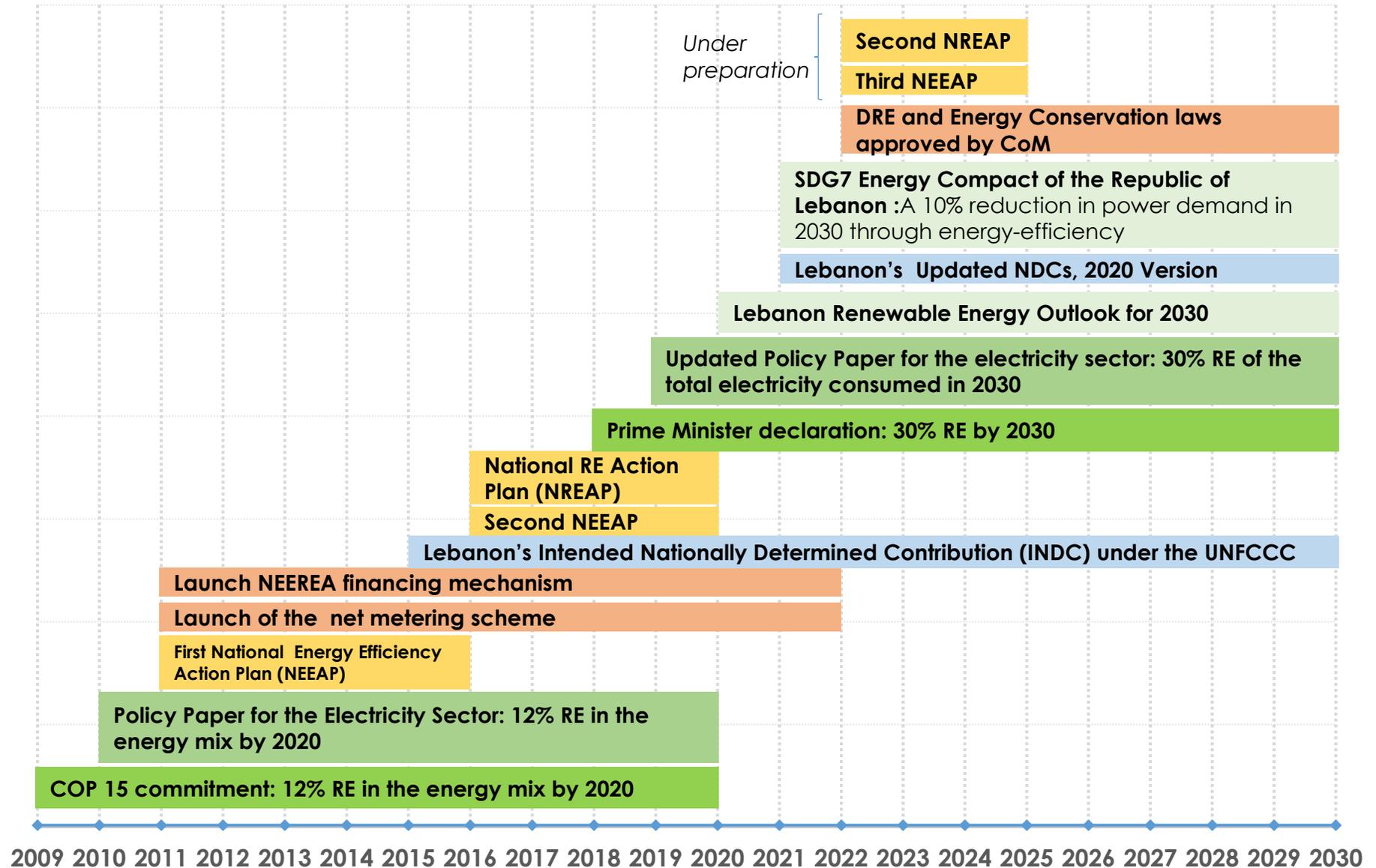
- Law № 462 issued in 2002 set the principles governing the power sector
- Decrees № 16878/1964 and № 4517/1972 give EDL exclusive authority in the generation transmission and distribution areas
- Decision № 13/2004 sets an Energy Supply Strategy that emphasized fuel diversification and harnessing renewable energy source
- Decree 9000/2022 Distributed Renewable Energy Law
- Decree 9196/2022 Energy Conservation Law
- Decree 9626/2022 Allows private sector to enter electricity market generation

Legal Framework (Oil and Gas)

- Law 132 issued in 2010 sets the first steps towards offshore fuel and Natural Gas (NG) exploration in Lebanese territories of the Mediterranean
- Oil and Gas Law 1/2012: Allows for oil and Natural Gas (NG) exploration and initiation of the drilling process in undisputed offshore territories
- Law 57/2017 Petroleum Tax Law
- Law 84/2018 Enhancing Transparency in the Petroleum Sector

Policies, Strategies and Action Plans

Policy Framework : Overview



Interlinkages with Other Sectors

Interlinkages

- Energy is highly needed for **water supply** and **wastewater treatment**:
 - high energy cost highly affects the operating costs of related facilities
 - shortages in supply affects performance efficiency
- Various steps of **agriculture production** are dependent on energy supply:
 - supply of water for various irrigation and processing
 - cold storage for produce
 - operation of facilities and farms
 - transport of inputs and products

Interlinkages

- **Energy and Ecosystems:**

- the elevated price and unavailability of fuels increases the risks on forests
- However, under proper and sustainable management, biofuels can be produced to complement fuel supply.
- The emissions and leakages from energy related activities cause adverse impacts on ecosystems and biodiversity as well

Interlinkages

▪ **Energy and Health:**

- stable electricity supply is needed at healthcare facilities to ensure proper functioning of medical equipment, and for the storage of vaccines and drugs in refrigerated areas.
- Similarly, insufficient heating in the winter and cooling in the summer lead to various health problems (heat stress).
- Additionally, emissions and impacts of use of fossil fuels to produce energy create impacts on public health.
- Exposure to air that is in contact with gas generated from diesel generators for as little as three hours per diem impacts health the equivalent of several cigarettes per day

Challenges & Threats to the Energy Sector

Challenges & Threats to the Energy Sector

- Most of the power is produced from imported fuels
- Existing infrastructure is old and has very high operating cost with a low efficiency
- Production capacity is below the local needs
- The energy sector in Lebanon contributes to most of the country's emissions in Greenhouse Gases (GHG) and air pollutant emissions
- Areas in which diesel generators operate for longer than 3 hours/day can be expected to have proportionally higher ambient concentrations

Challenges & Threats to the Energy Sector

- More than 70% of the population is considered “Energy Poor”
- The Syrian crisis has increased the energy demands in Lebanon
- The main challenges and constraints facing RE project deployment in Lebanon include:
 - Unpredictability of supply due to dependence on weather conditions
 - High maintenance costs, that are not always feasible for operators

Needs and Opportunities

Needs of the Energy Sector

- Administrative
- Legal
- Technical
- Financial
- Human resources
- Need of capacity building to integrate additional RE capacity of into the national grid

Opportunities in the Energy Sector

- Energy Conservation Law
 - The energy conservation law tackles all aspects of energy conservation and energy efficiency for buildings, equipment, industries...
 - It sets requirements for public and private institutions related to energy conservation and efficiency
 - The law is considered a main milestone in reducing the country's energy consumption thus energy bill which would lead to ensuring energy security.

Opportunities in the Energy Sector

- DRE Law: presents an opportunity to achieve individual energy security (Rooftop Solar Panels Installation)
 - This legislation is an essential step in the development of RE projects distributed (capacity <10 MW) throughout Lebanon through issuance of mechanisms for integrating private sector projects on the EDL network and for peer to peer electricity exchange
 - The law also constitutes a practical and executive pillar in the work of the Ministry of Energy and Water and its pivotal role in combating climate change

Thank You!

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