LEBANON'S 'GREEN OPPORTUNITY'

HOW TO GET OUT OF THE DARKNESS

December 2, 2021

L F
R E
The Lebanese Foundation *for* Renewable Energy

A FAILED SYSTEM

$40 BN
PUBLIC DEBT

$1.8 BN
ANNUAL EDL DEFICIT

HUGE DRAIN
OF FOREIGN CURRENCY

EXPENSIVE
ELECTRICITY COSTS

18-20 HOURS
POWER CUTS

LETHAL
POLLUTION

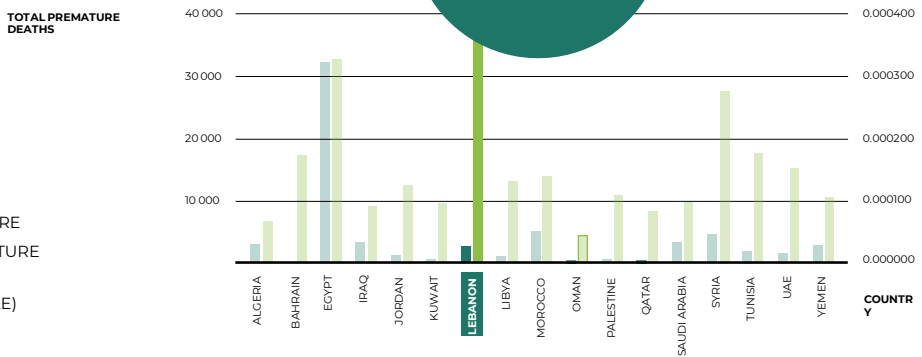
$6.2 BN FOSSIL FUEL IMPORTS

INCL. $3.4 BN FOR ELECTRICITY

PREMATURE DEATH RATE ATTRIBUTED TO FOSSIL FUELS

~ 2,700

AVERAGE YEARLY DEATHS FROM FOSSIL FUELS

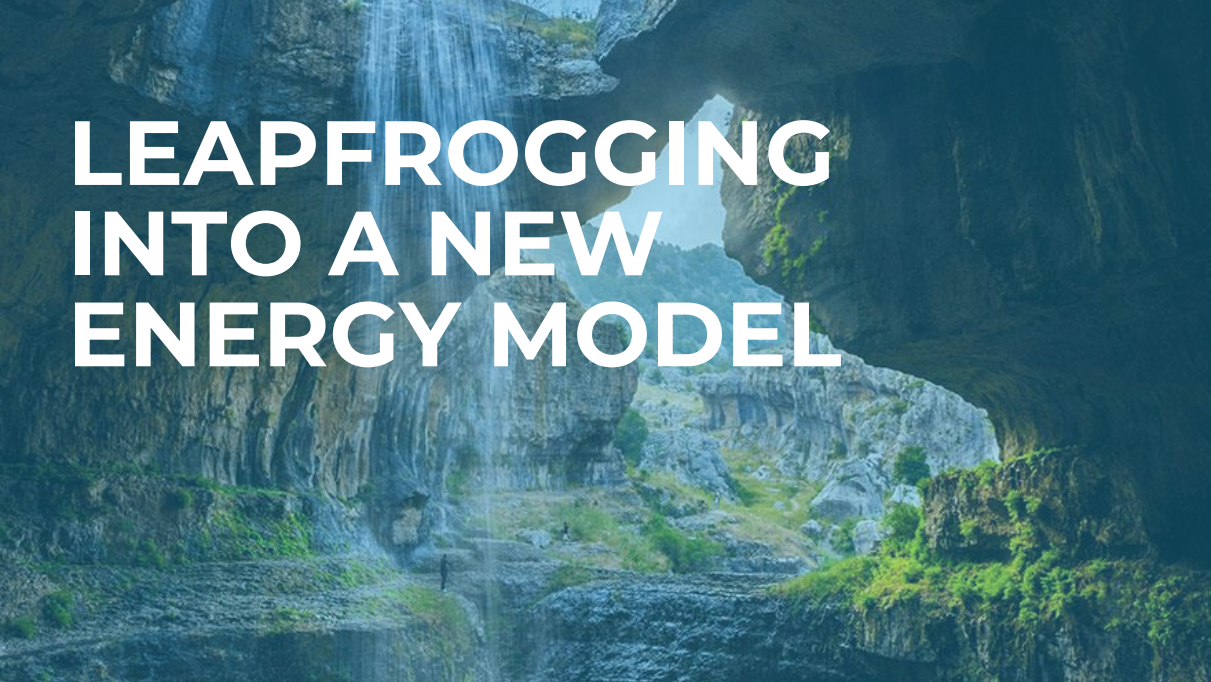


TOTAL PREMATURE

DEATHS PREMATURE

DEATH RATE (PER 1000 PEOPLE)

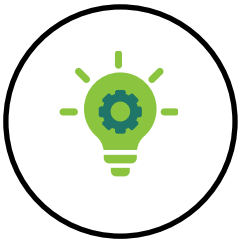
Source: Greenpeace June 2020



LEAPFROGGING INTO A NEW ENERGY MODEL

KEY PRINCIPLES

SUSTAINABILITY

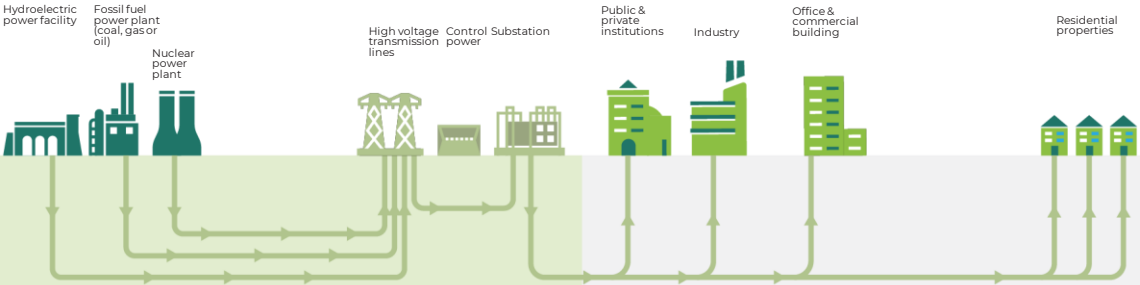


SPEED

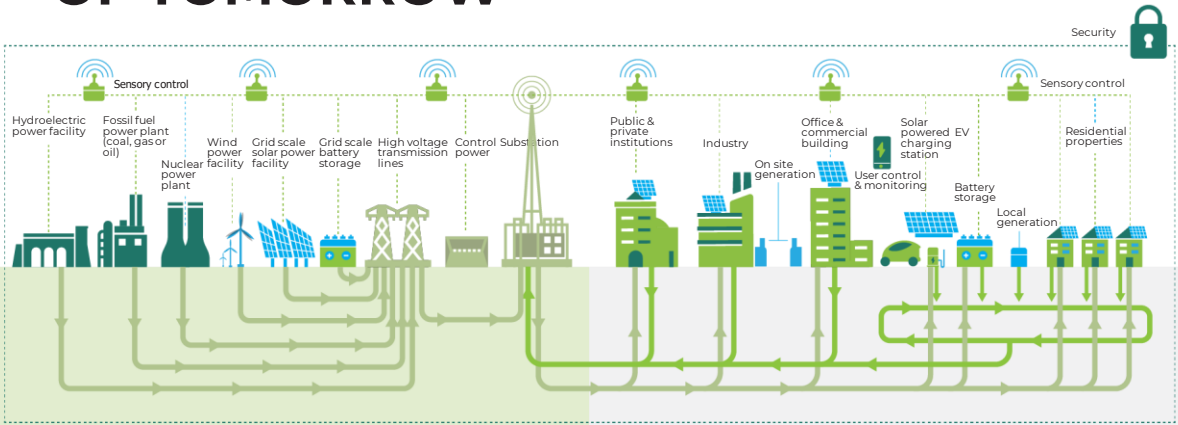
SAVINGS

ENERGY SECURITY

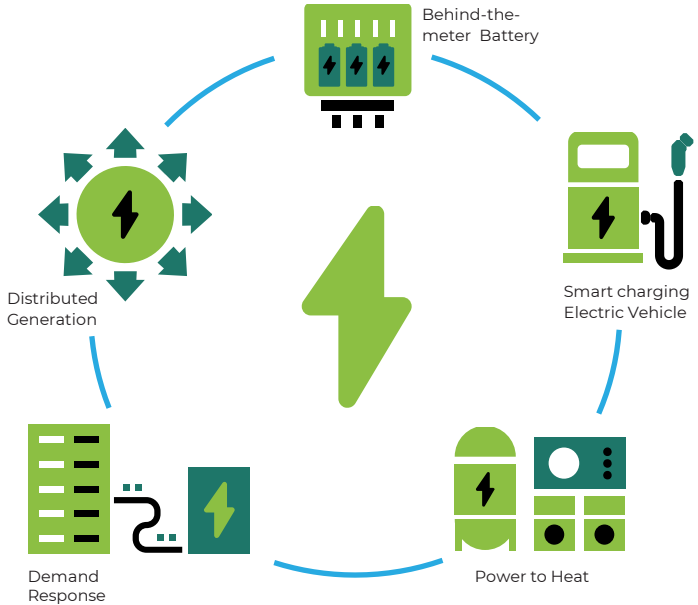
THE POWER INDUSTRY OF TODAY



THE POWER INDUSTRY OF TOMORROW

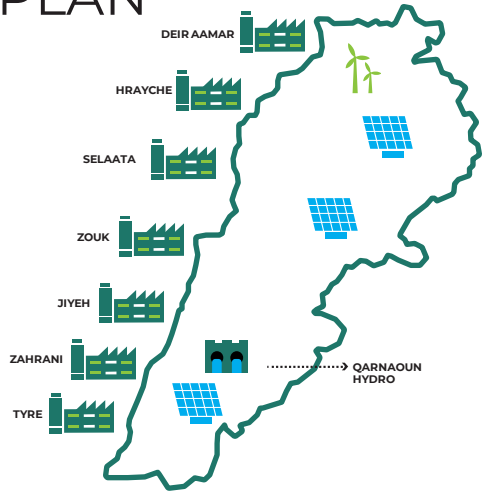


A HOLISTIC APPROACH

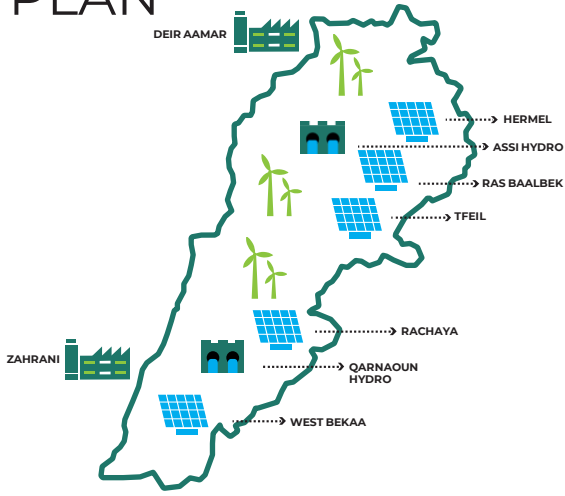


WHY IS IT A GAME CHANGER?

GOVERNMENT PLAN



LFRE PLAN



POTENTIAL OF LEBANON

POTENTIAL CAPACITY

32,000 MW incl. 26,800 MW solar capacity & 5,000 MW wind capacity

ON PUBLIC LAND

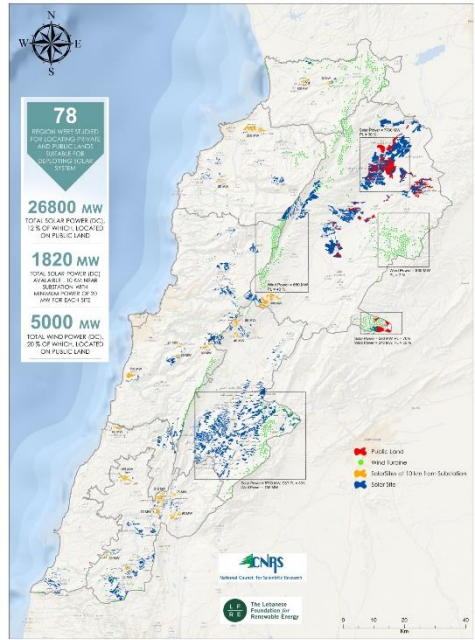
5,700 MW incl. 4,700 MW for solar & 1,000 MW for wind

AREA FOR SOLAR

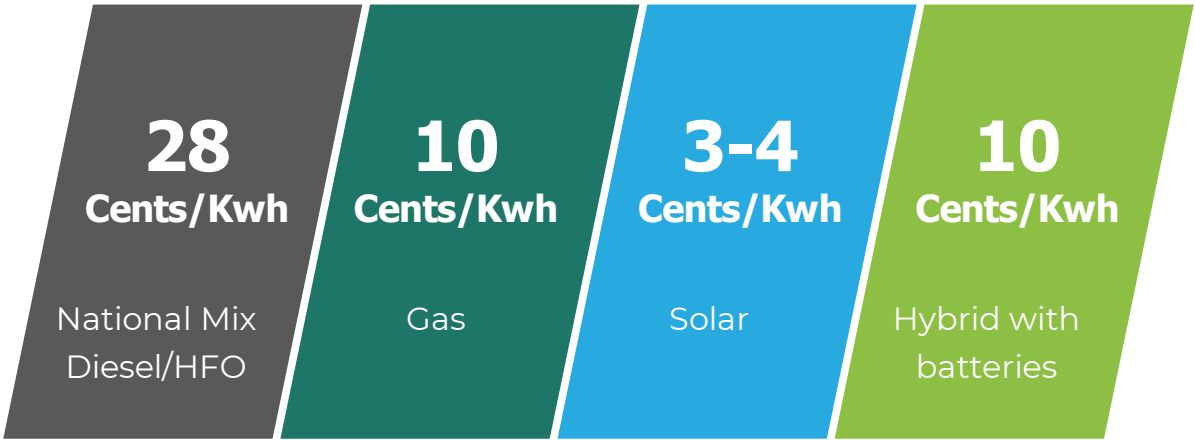
811 sites cover 448 km2 – 10% which are within 10km of a substation

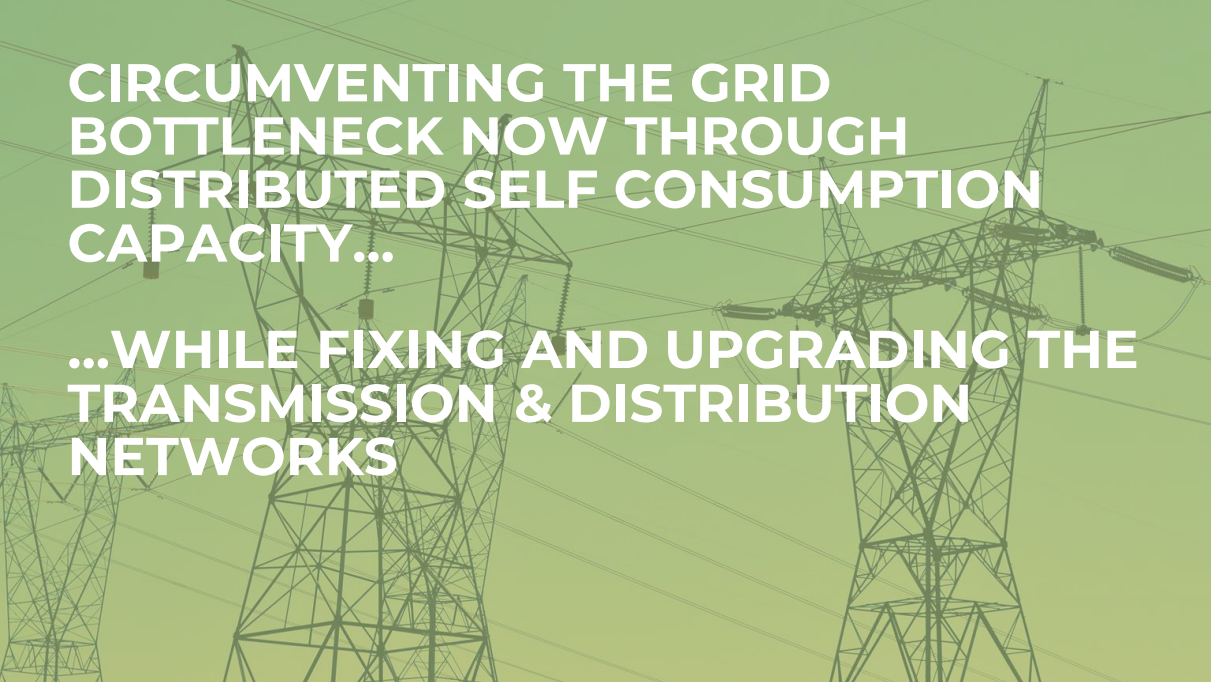
LAND FOR WIND

Land mostly on state and municipal parcels



COST OF ENERGY TODAY





CIRCUMVENTING THE GRID BOTTLENECK NOW THROUGH DISTRIBUTED SELF CONSUMPTION CAPACITY...

...WHILE FIXING AND UPGRADING THE TRANSMISSION & DISTRIBUTION NETWORKS

RENEWABLES 2022
GREEN ACCELERATION

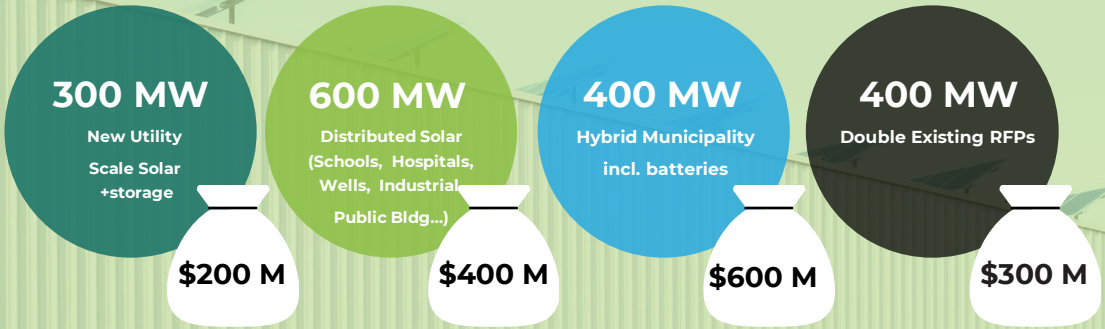
1300 MW
NEW SOLAR

400 MW
CURRENT SOLAR & WIND TENDERS

300 MW
HYDRO REHABILITATION

+

QUICKLY RAMP UP
1700 MW- 24 months
Cost: $1.5 billion, Grid: $0.3 billion



FAST & CHEAP
4 TWH GREEN ENERGY
(20% OF DEMAND)

20% OF LEBANON'S ELECTRICITY NEEDS BY 2022

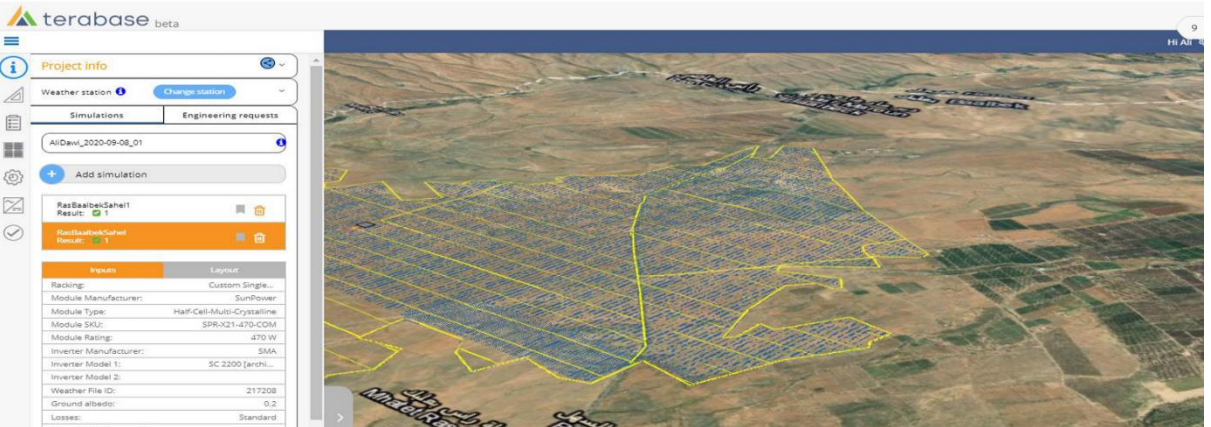
60%* COST REDUCTION

$ 1.5 BN
GREEN
BUDGET

*Hybrid @ 10 cents/Kwh vs.
Diesel/HFO Mix @ 25.7 cents/Kwh

UTILITY SCALE :
RAS BAALBACK SOLAR & STORAGE

300 MW-1000 MW ($ 200-600 M)



LEBANON'S SCHOOLS & UNIVERSITY ROOFTOPS

2852 – 450 MW

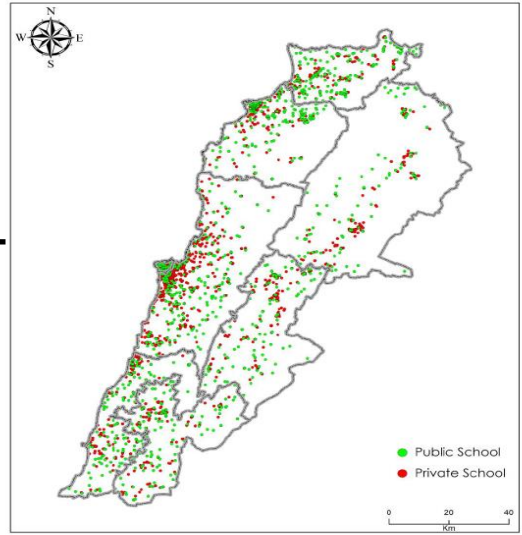
SCHOOLS

1236

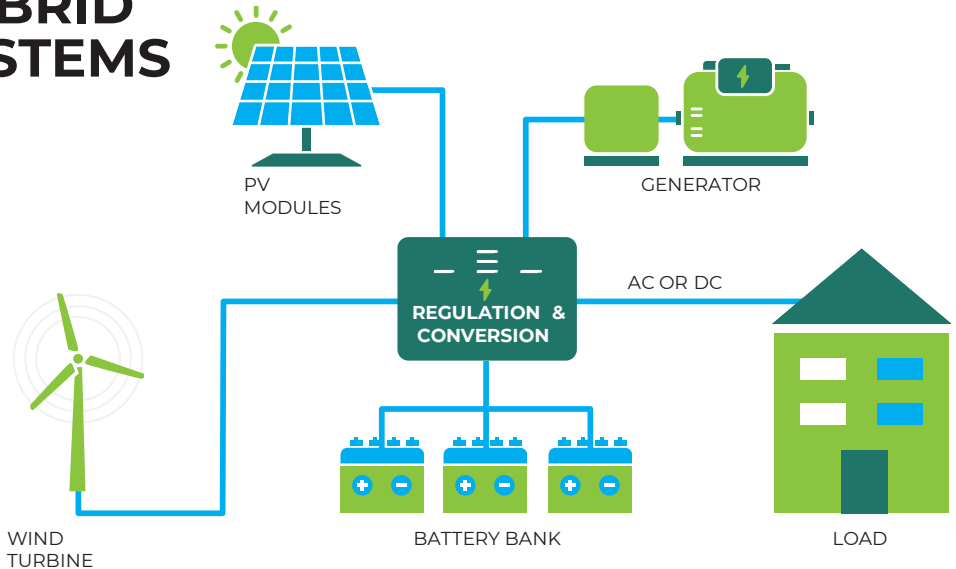
PUBLIC SCHOOLS

1617

PRIVATE SCHOOLS



HYBRID SYSTEMS



JABBOULE VILLAGE HYRBID PROJECT

Village 18h Solar + Battery – 3h EDL- 3h Generators

800 KWp Solar

500 KW Batteries – 500 KVA Generators

THE LONG TERM OPPORTUNITY

RENEWABLES

30%

2025

50%

2030

LEAST-COST GENERATION MIX

BY 2030 WITH
50%
RENEWABLES

$36.1 BN WILL BE SAVED

Source: Strategy&/AUB/LPPE-May 2019,
Leapfrogging to Higher Penetration of Renewables"

BUILD A FLEXIBLE SYSTEM…
… & AVOID THE BASE LOAD SYNDROME

AVAILABLE ON DEMAND RENEWABLES

- Hydro
- Utility scale batteries
- Concentrated Solar Power (CSP)
- 24 h Hybrids on 20 KV+ Substations
- Electrical Vehicles
- Pumped hydro storage

SMARTLY MANAGING IMPORTS

- Imports to regulate low supply periods
- Prepare for regional network connection
- Excess electricity exports in medium term

SPREADING WIND & SOLAR FARMS

- Geographical distribution of renewable energy production

SMART DEMAND MANAGEMENT

- Shave peaks
- Manage low supply periods
- Smart meters and switches
- Consumers appliance programming

ALIGNING EMERGENCY ACTIONS WITH GOVERNANCE

LEBANON

< 4-5 YEARS

Establishing ERA

Building infrastructure

FINANCING

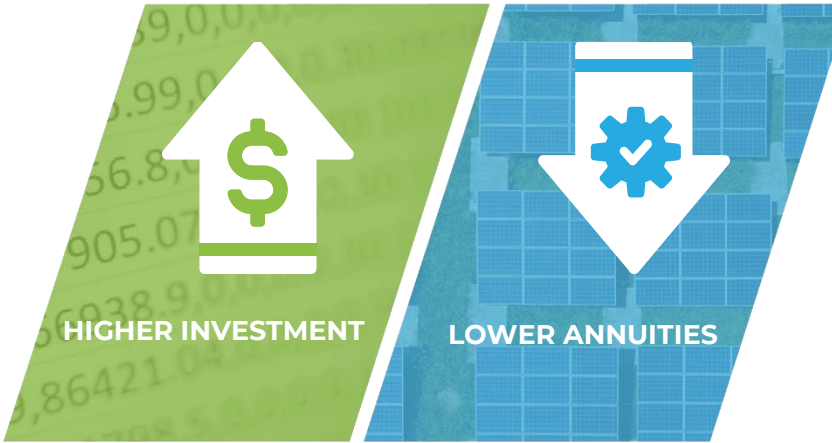
GREEN vs. GAS FINANCING

EASIER FINANCING

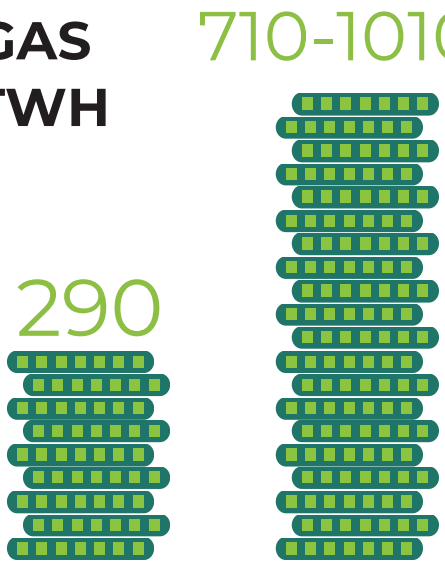
LOWER YEARLY PAYMENTS

CASH OUTFLOW PREDICTABILITY

REDUCED HEALTH BILL



RENEWABLES vs. GAS YEARLY CASH- 10 TWH



*10 Twh Green vs. Gas simulation-1200 MW gas vs. 5000 MW renewables
Initial Investment: $3.2 billion green vs. $ billion gas
Annual debt payment for plant : $260 million for solar vs. $80 million for gas
Annual operating cost : $30 million for O& M solar plant
Annual operating costs. gas plant $600-900 million for gas & $120 O&M
*** World Bank Commodity: Price for Gas: Market Outlook report, April 2020
2020 Gas: $3.1/mmbtu, 2030 Gas: $7/mmbtu, today $4.3/mmbtu

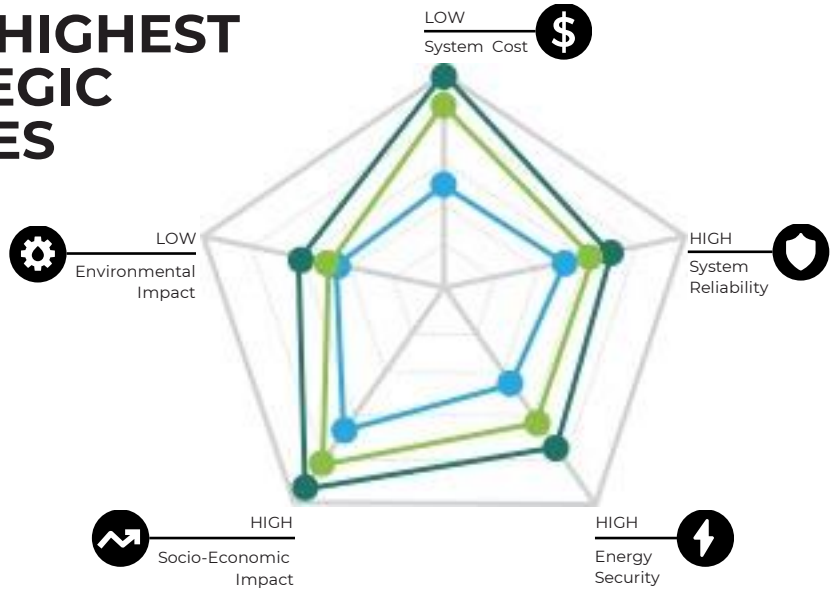
THE OBSTACLES

THE ELEPHANT IN THE ROOM

- Depolitisize the Energy Plan
- Overcome the ‘Crisis Management’ mode
- Establish Stringent Anti Corruption Laws & Practices
- Dispute the Old & Centralized Energy Model
- Avoid the ‘Oil Nation’ Illusion
- Confront our Addiction to Oil
- Analyze the ‘Grid is too Weak & Unstable’ argument

GREEN WINS...

… IN ALL HIGHEST 5 STRATEGIC PRIORITIES



Source: Strategy&/AUB/LFRE-May 2019-, Leappfrogging to Higher Penetration of Renewables'

A NEW ENERGY THAT WILL TRANSFORM LEBANON

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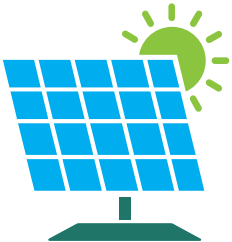
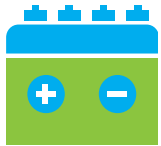
BI-DIRECTIONAL CARS



SOLAR PANELS

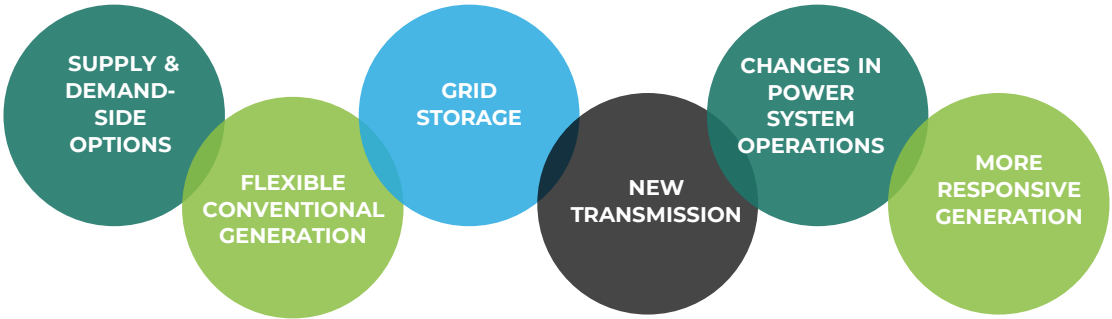


BATTERY OF A TESLA CAR

20 HOUSES

4 HOURS ELECTRICITY
(5 AMP)

REBUILD A FLEXIBLE SYSTEM...



LET US HARNESS OUR ENERGIES TOGETHER

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