FISUEL GAM 2019
Beirut - Lebanon

Where has the Renewable Energy Sector reached in Lebanon?

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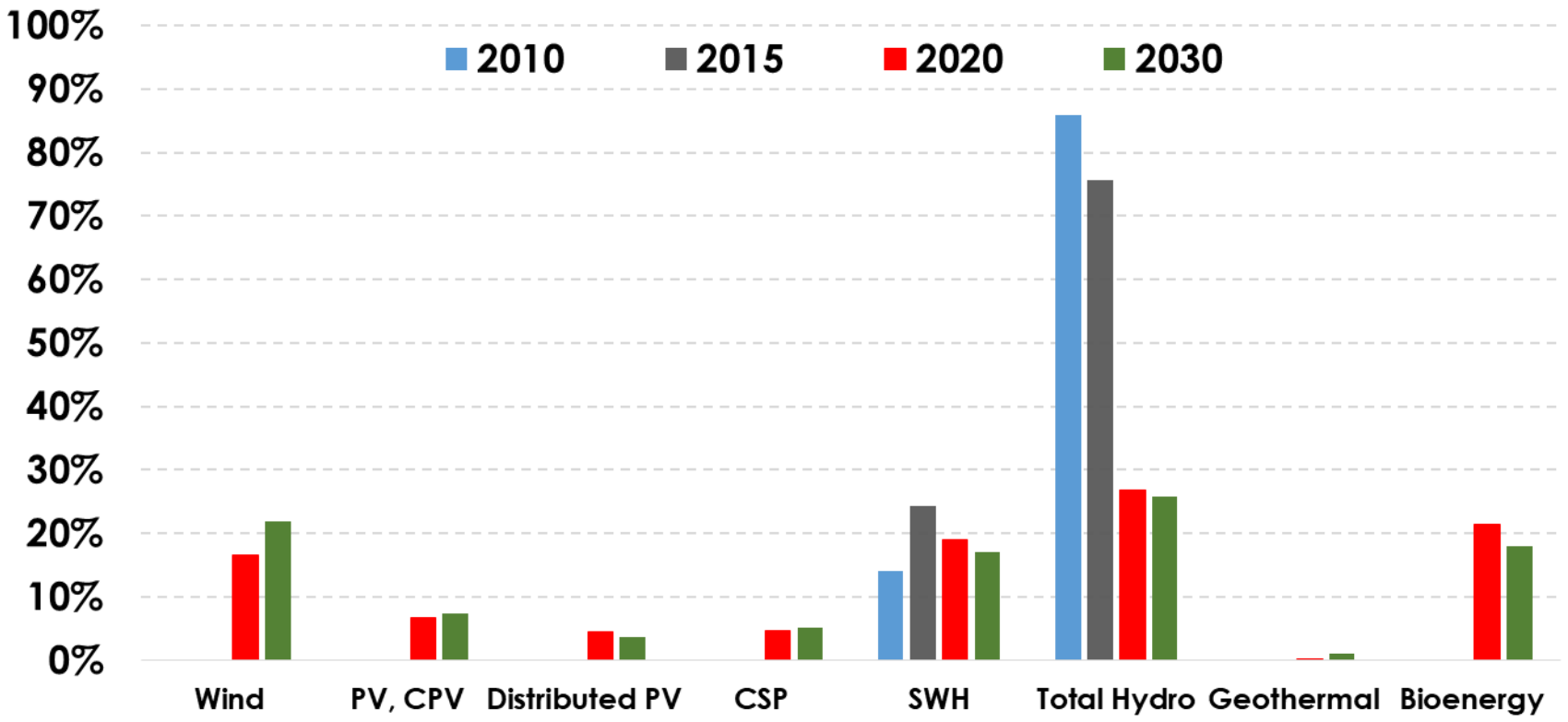
LCEC
LEBANESE CENTER FOR ENERGY CONSERVATION
المركز اللبناني لحفظ الطاقة
efficient resources, sustainable achievements

National Renewable Energy Action Plan NREAP 2016-2020

Year	2010	2015	2020	2025	2030
Source	MW	MW	MW	MW	MW
Wind			200.0	350.0	450.0
PV, CPV			150.0	200.0	300.0
Distributed PV			100.0	125.0	150.0
CSP			50.0	50.0	100.0
SWH	211,988 m2	413,988 m2	1,053,988 m2	1,345,185 m2	1,716,835 m2
Total Hydro	190.00	190.00	331.5	402.3	473.0
Geothermal			1.3	6.5	15.0

Renewable Energy Mix



RE Mix- Information

	CAPEX	OPEX	LCOE	PBP	Extra supply	Buget 2020
	US cents/kWh	US cents/kWh	US cents/kWh	Years	Hours	MUSD
Wind	10.3	1.5-3	11.8-13.3	7.2-12.7	176	340-490
Solar PV	5.5	1	6.5	7.3	71	240
Distributed PV	11	1	12	8.7	47	321-600
CSP			16	11	50.5	300
SWH			2.3	2.6	123	192
Hydro			2.39	2.68	136.14	219.5
Geothermal			20			5
					603.64	**1,767.50**

- For solar PV and Wind based on a cost of production of 20.2 US cents/kWh by EDL power plants
- For decentralized PV systems based on a cost of production of of 35 US cents/kWh diesel generators
- For CSP plant would be replacing high cost power plants such as the Tyre and Baalbeck power plants where the cost is close to 32 US cents/kWh.

Trending: Enforcement

- 100 MW of PV solar rooftop applications
- 150 MW of central PV farms
- Linking energy efficiency (EE) to renewable energy (RE)
- Mandatory energy audit for PV projects with an installed capacity greater or equal to 60 kWp – for existing facilities only
- Shift towards a more integrated approach ("green cities" Vs. "green neighborhoods")

Overview: Implementation of Solar Projects

- Shift to large scale projects
- Potential for all types (rooftops and central stations)
- Public and private funding
- Rooftops- UNDP DREG

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Zahrani Oil Installations- 1 MW

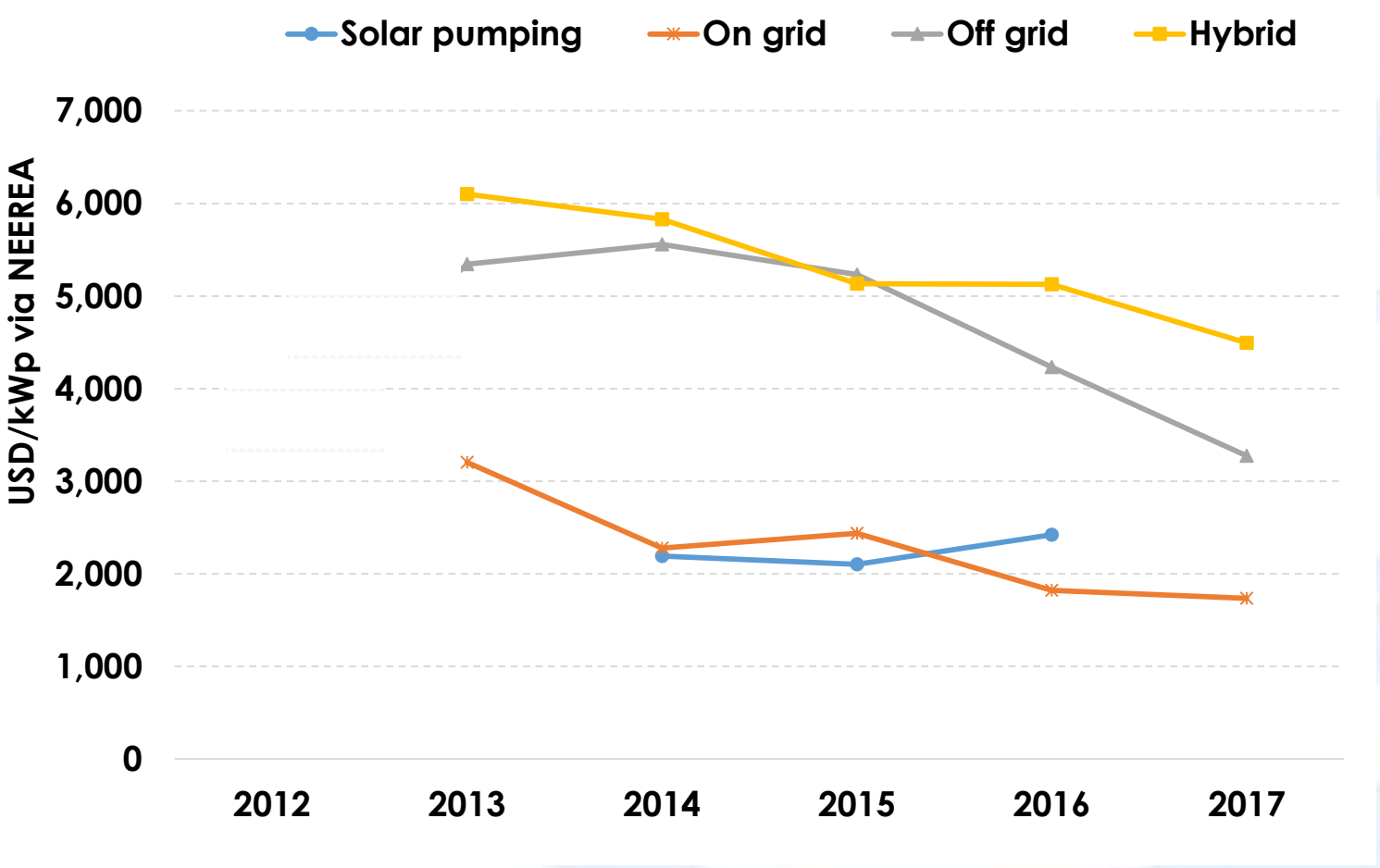
BRSS- 1 MW

Overview: Implementation of Solar Projects

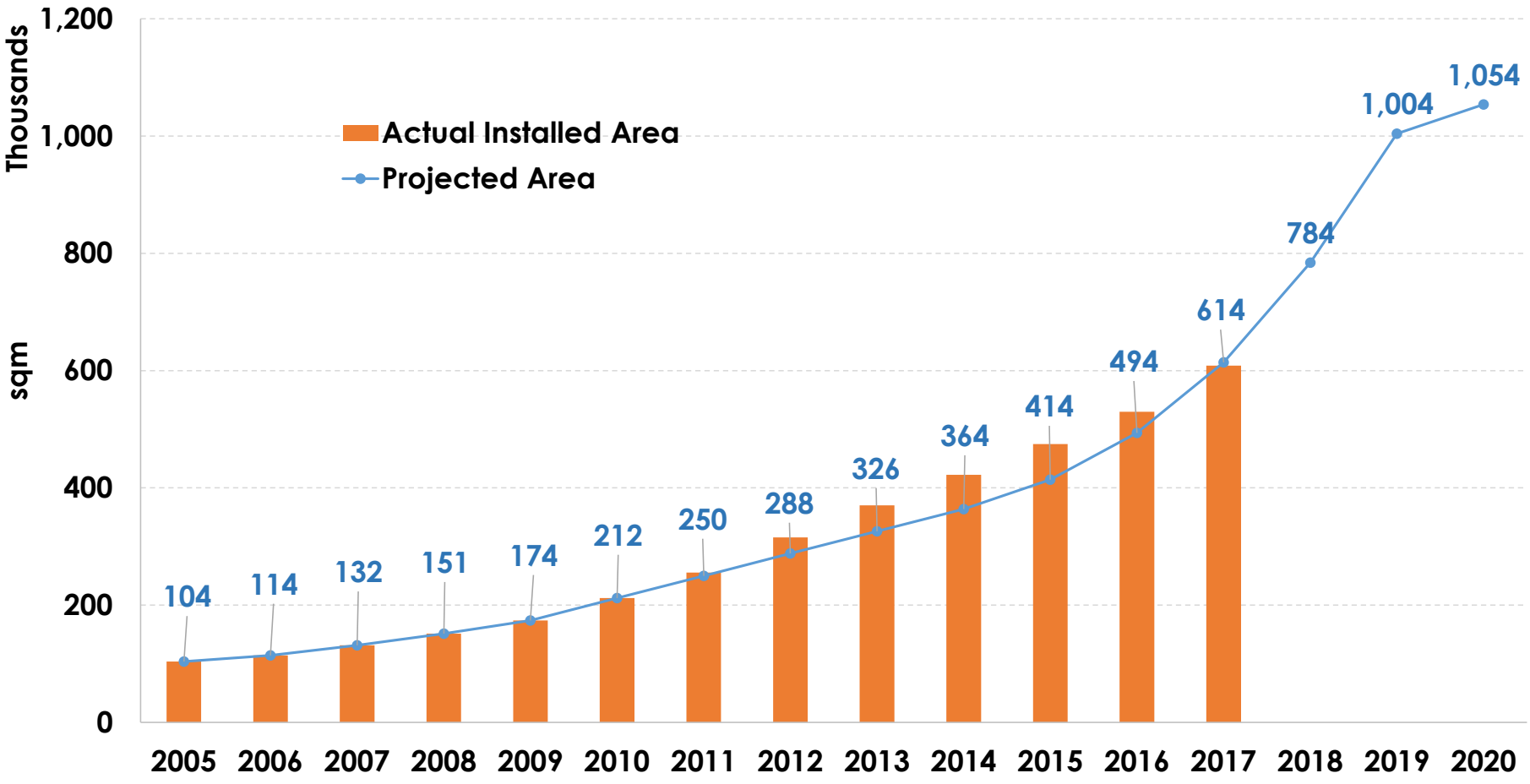
- Beirut River Solar Snake
- Zahrani Oil Installation
- Ten Public bids for Ten Public Buildings (Total expected 3 MWp)
- NEEREA Decentralized Solar PV
- Solar Pumping (CDR)
- Solar street lighting
- Solar PV 180 MW

Total Installed Capacity End of 2018 is 52.11 MWp

Overview: Decentralized Solar PV Projects



Overview: Implementation of Solar Water Heaters



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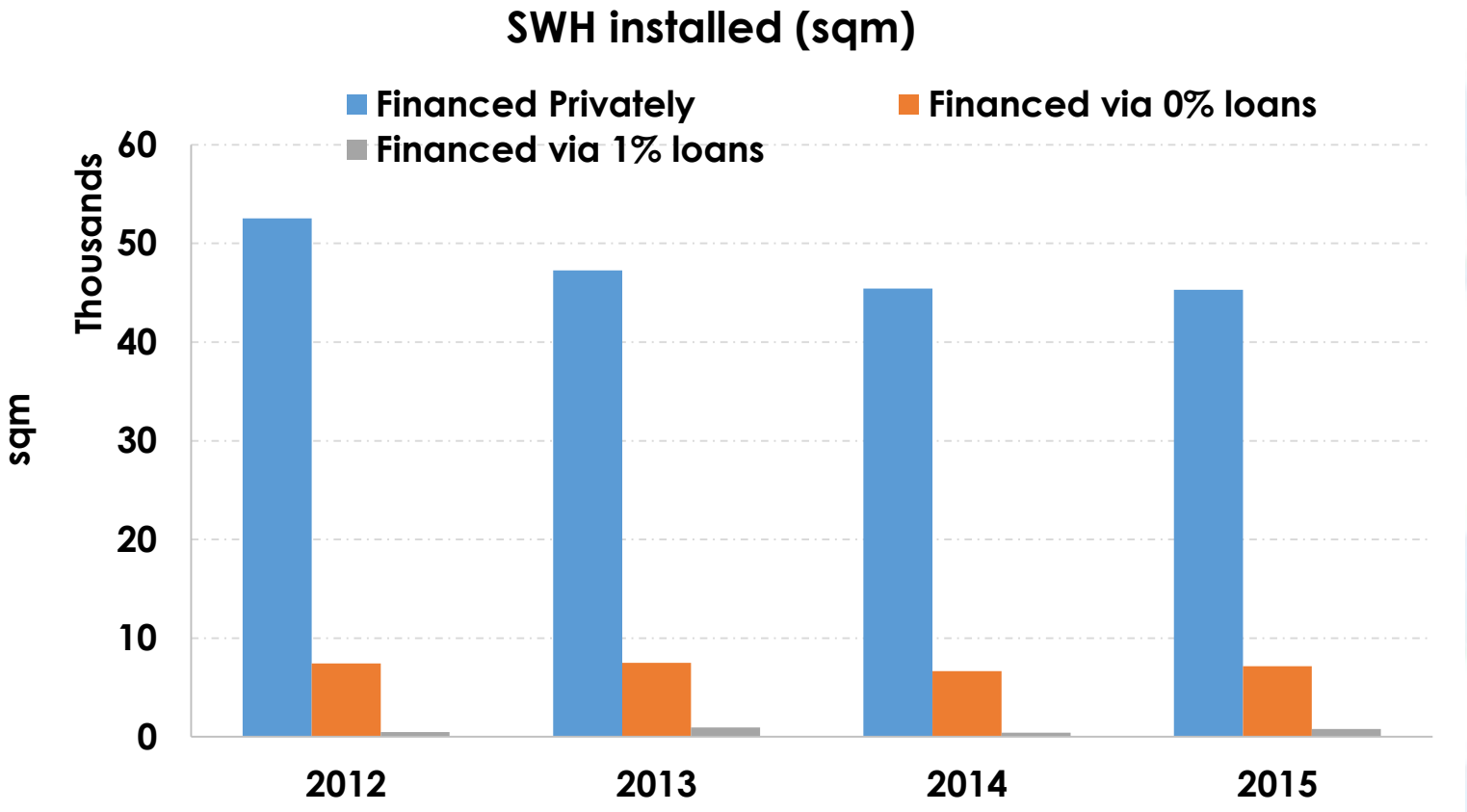
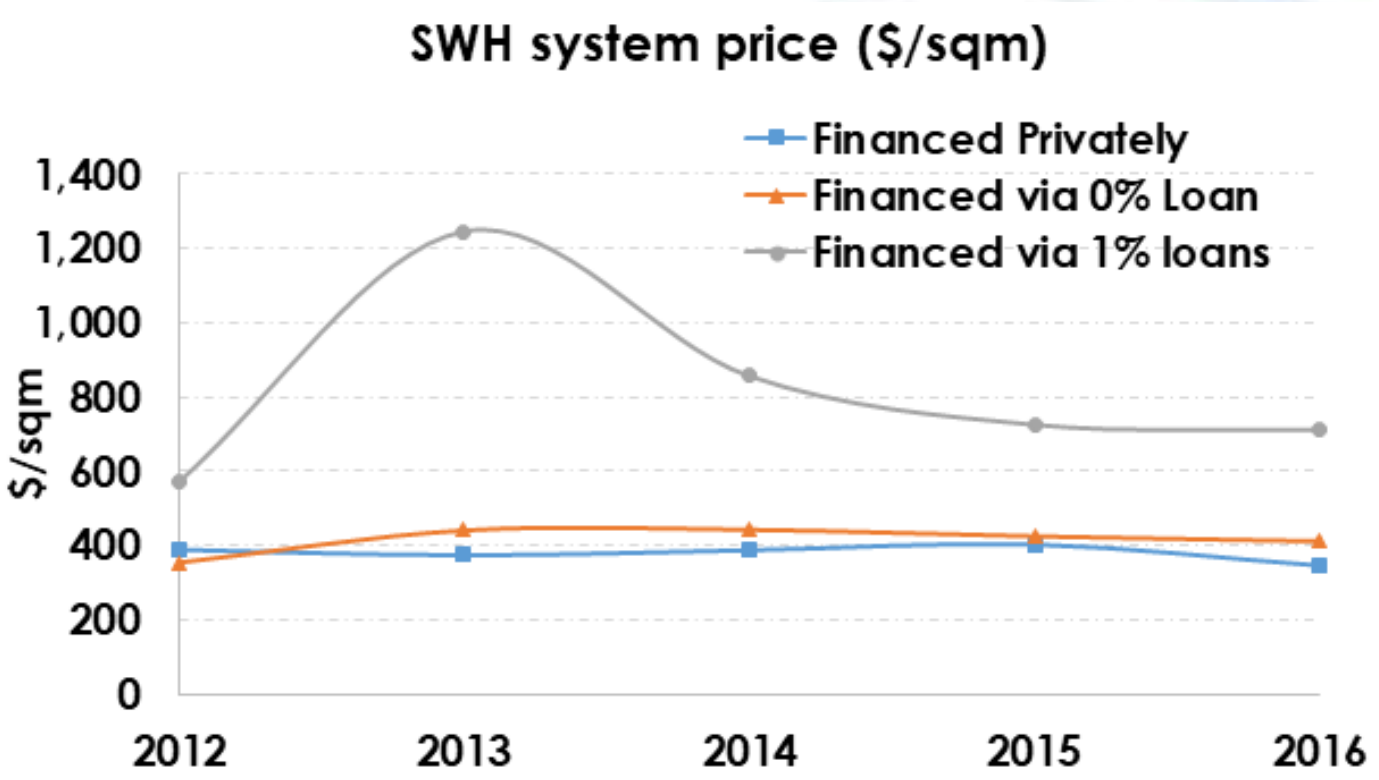


The Residential Solar Water Heater Market in Lebanon 2012-2015
Mediterranean Development of Solar Initiatives and Renewable Energies (MED-DESIRE)

Overview: Implementation of Solar Water Heaters



Wind 1st round: 200 MW PPA

- Proposed capacities: 62.1 MW, 62.1 MW and 82.5 MW
- 20-year Power Purchase Agreement
- Land acquisition
- Environmental Impact Assessment
- Interconnection on high voltage network according with EDL requirements

- **The first PPA signed on the 1st of February 2018**
- **USD 10.45 cents/kWh for the first three years and USD 9.6 cents/kWh for the next 17 years**

Solar Milestones

- First Round- Solar PV- 180 MW (12 farms)
  - Construction expected by 2020
- Second Round- Solar PV- 360 MW (24 farms)
  - Construction expected by 2020
- Third Round- Solar PV- 180 MW (12 farms)
  - Construction expected during 2021-2025
- Solar PV with storage- 210-300 MW
  - EOI launched => Deadline 12 July 2018
  - With Battery Energy Storage of minimum of 70 MW power with a minimum of 70 MWh of storage capacity per site
- CSP with storage- 50 MW
  - Construction expected during 2021-2025
- BRSS second phase (8 MW)

180 MW Solar PV bid

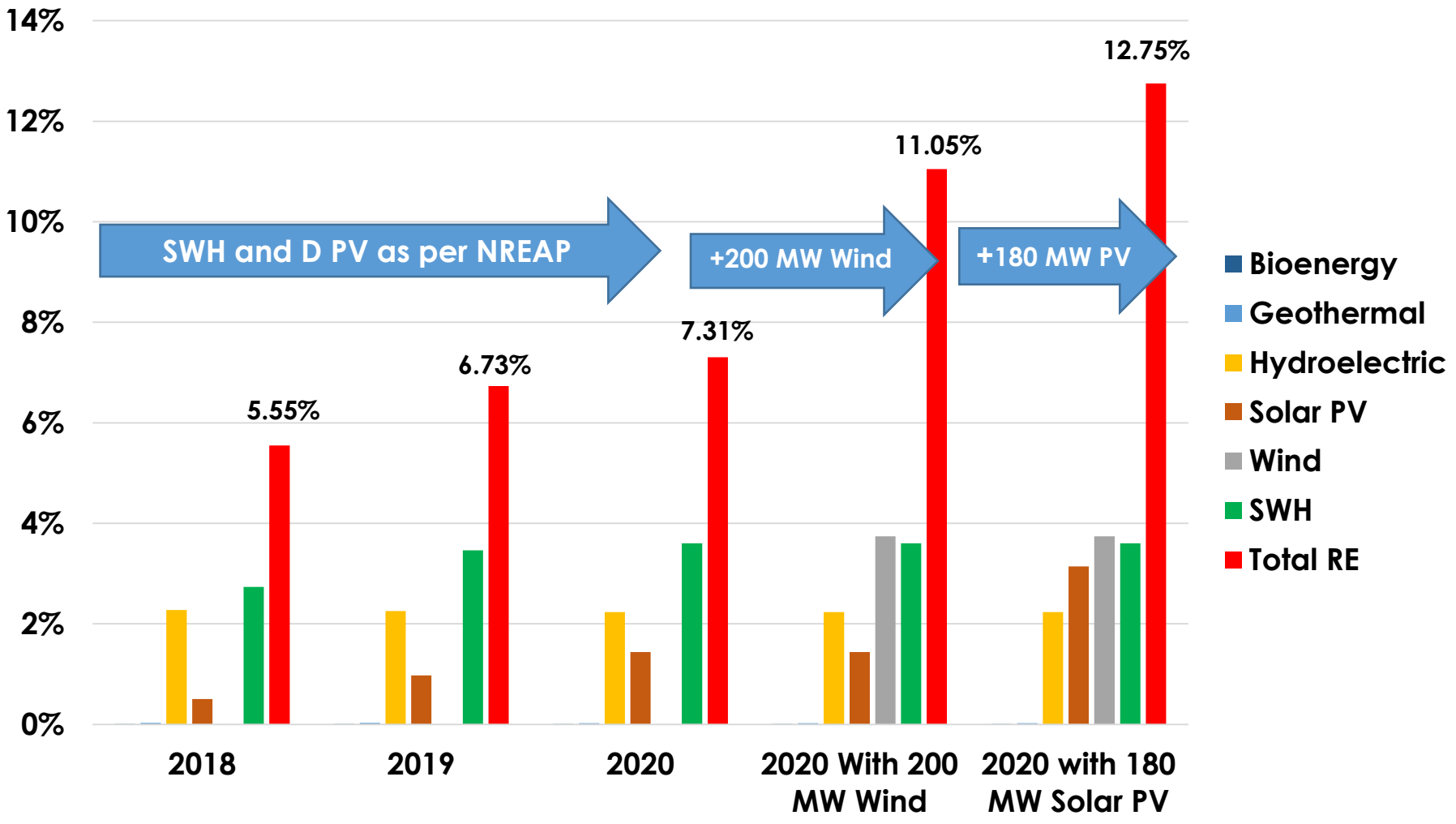
- The purpose of this initiative is to select three solar farms per district => 12 solar farms all over the country with an expected total installed capacity of around 180 MW.
- 42 proposals :
  - 22 in the Bekaa-Hermel district
  - 10 in North Lebanon-Akkar district,
  - 6 in Mount Lebanon district
  - 4 in South Lebanon-Nabatiyeh district
- Following the stage 1 evaluation (Pass/Fail), 28 bidders are qualified.

Wind and Hydro Milestones

- Second Round- Wind- 200 to 400 MW:
  - submittal of EOI's completed
    - 42 EOI's
    - 21 different countries, Lebanon,UAE, China, Denmark, France, Spain, Italy and UK
    - RFP was launched at iBEF 2018
  - Construction expected during 2021-2025

- Hydro first round 300 MW
  - EOI launched=> Deadline 20 June 2018

RE actual and projected Mix



Thank You

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