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Regional Workshop: “Mapping EE and RES Market Potential Areas with Higher Impact on Local Economy and Job Creation”

November 12, 2019

UNDP - Lebanon
Prepared by: Jad Taha El-Baba



Value Chain Assessment of Lebanon's RE and EE Markets in Lebanon

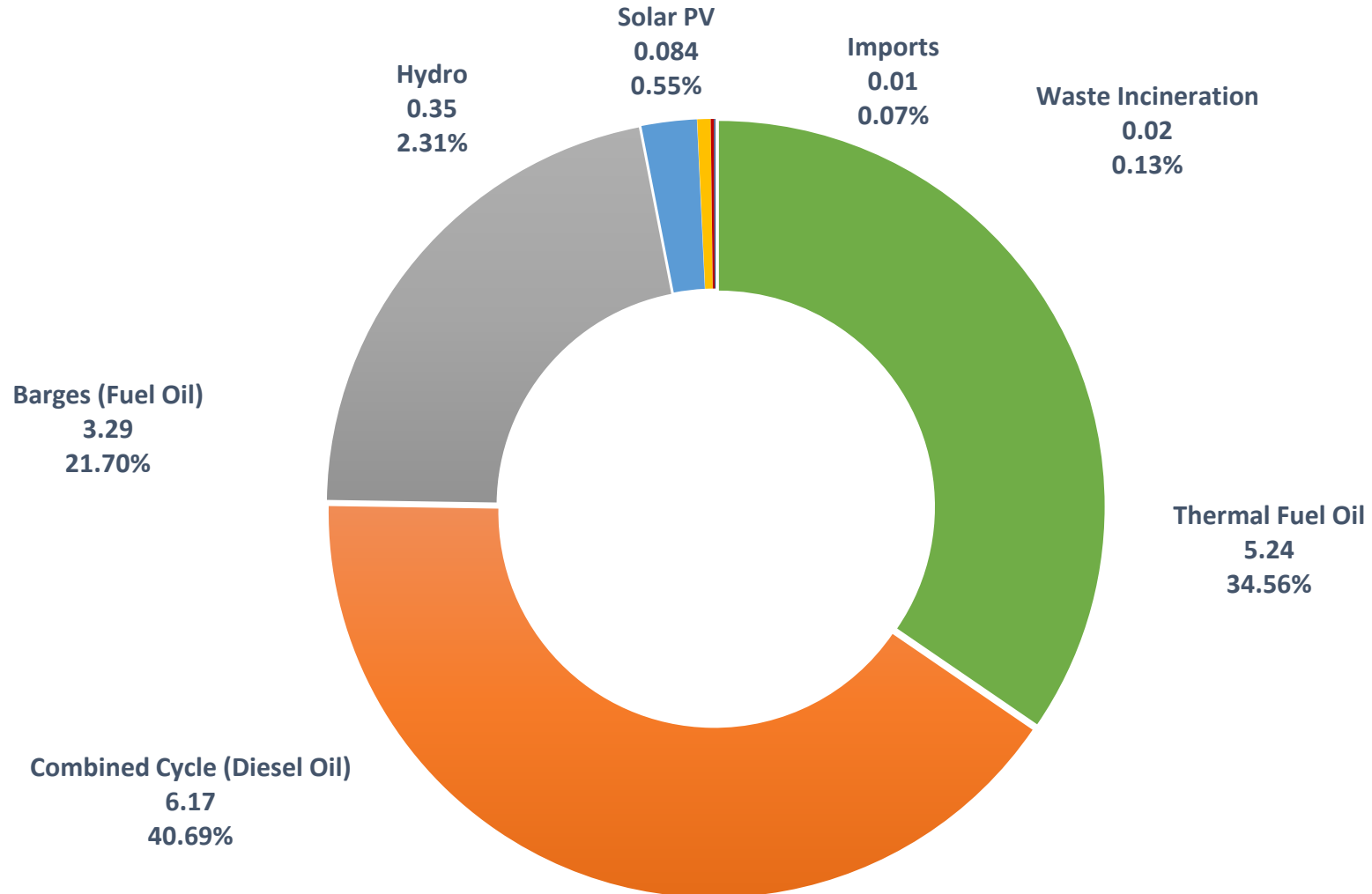
Outline:

- 1. Lebanon's Achievements in RE and EE Technologies**
- 2. Impact on Local Economy (Jobs and Supply Chain)**
- 3. How to increase the number of jobs created?**
- 4. Lessons Learned and Key Recommendations**

Value-Chains Selected:

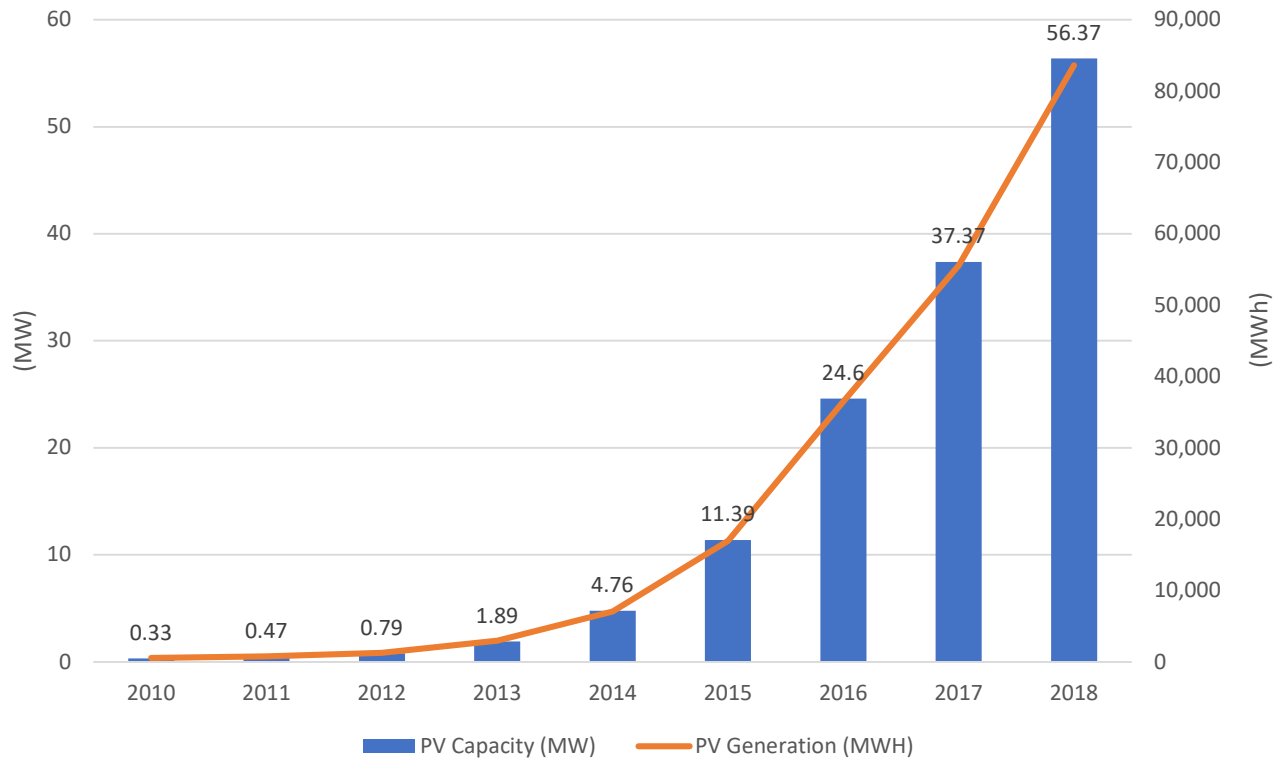
- 1. Solar PV: Large & Decentralized**
- 2. Wind Energy**
- 3. Bioenergy: Briquettes & Biogas**

Lebanon's 2018 Electricity Generation Mix (TWh | %)

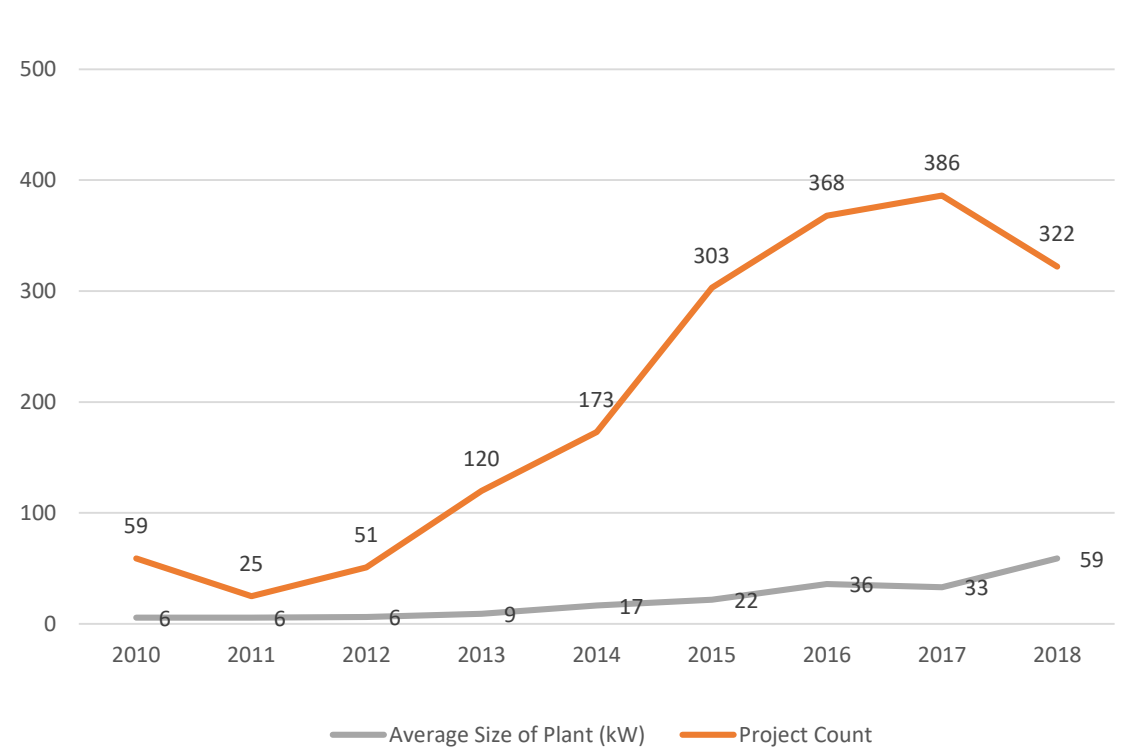


Solar PV Status in Lebanon (2010-2018)

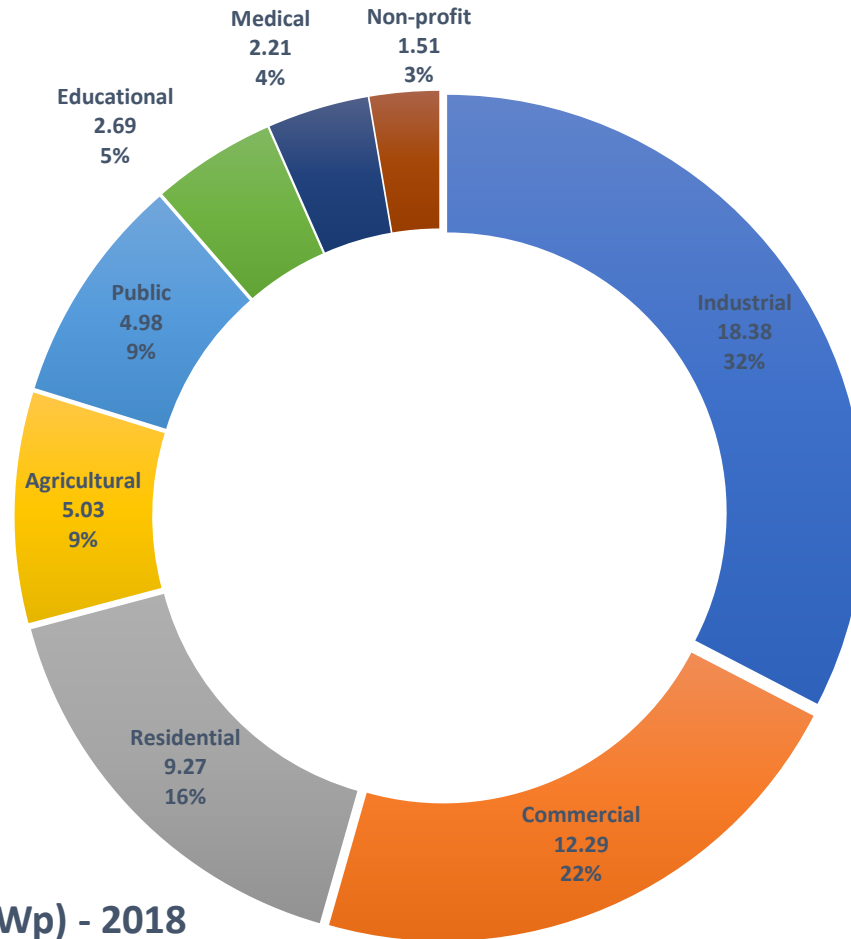
Solar PV Capacity and Generation (2010-2018) - Lebanon



Average Plant Size (kW) and Project Count (2010 - 2018)



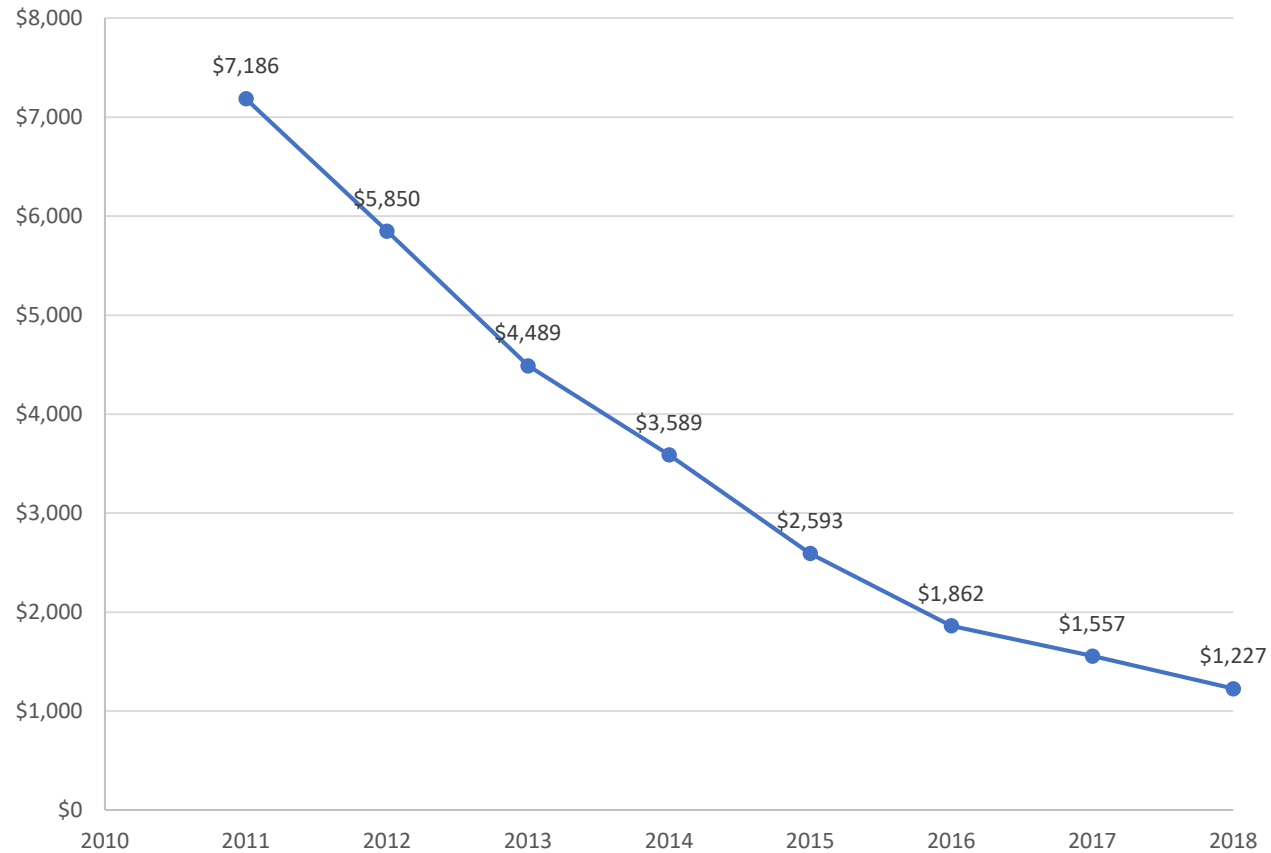
Solar PV Status in Lebanon (2010-2018)



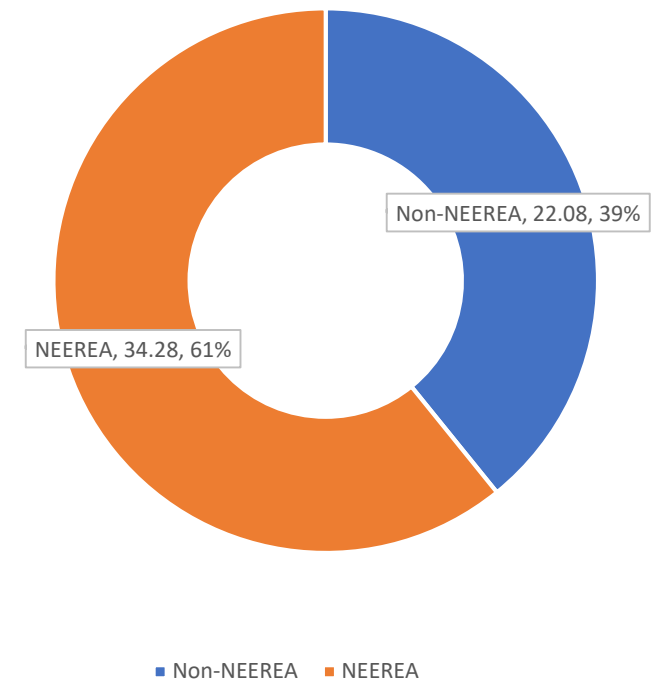
Solar Capacity by Sector (MWp) - 2018

Main Economic Drivers of Solar PV Installations in Lebanon

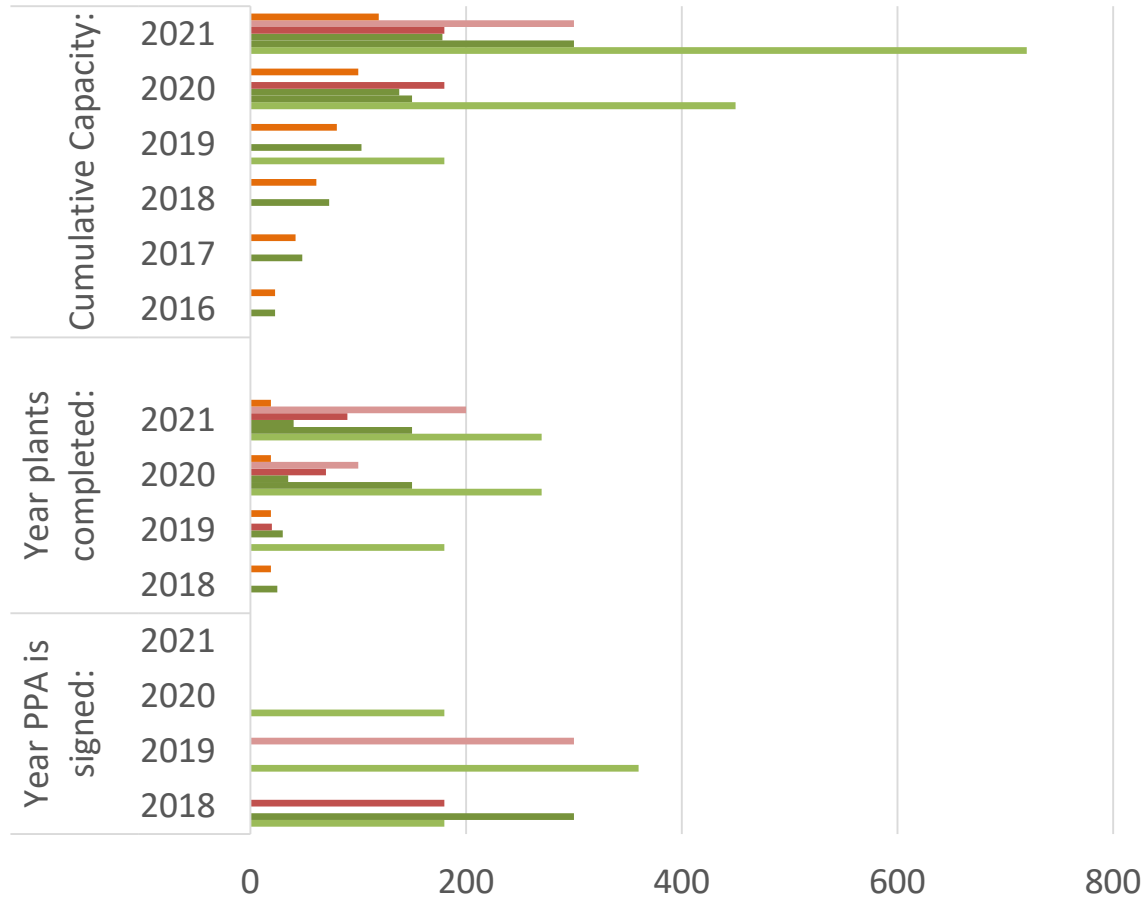
Yearly Average Solar PV Turnkey Prices (\$/kwp)



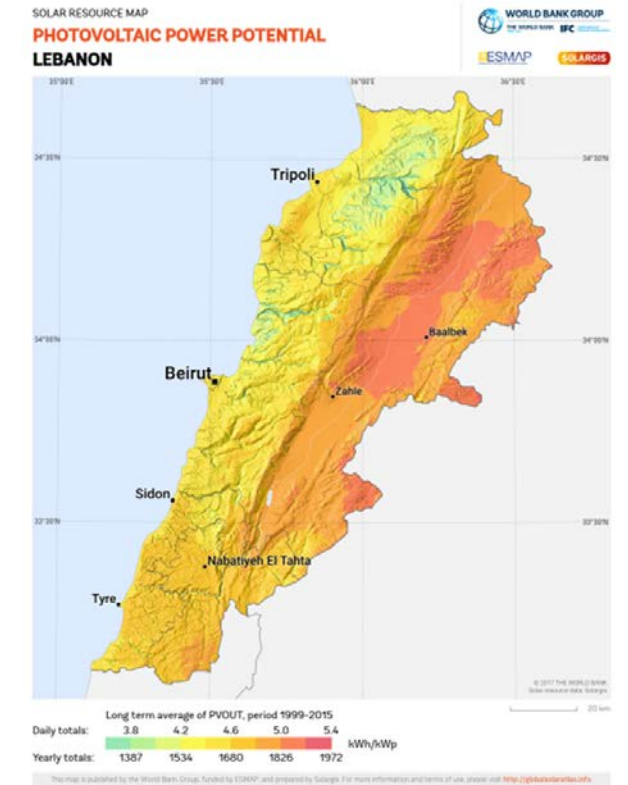
Capacity share per Source of Funding (MWp | %)



PV in Lebanon – Future Development (MW)



- Distributed Solar, conservative
- Large Solar w/ Storage*, conservative
- Large Solar, conservative
- Distributed Solar, optimistic
- Large Solar w/ Storage*, optimistic
- Large Solar, optimistic



Still small, but large potential and ambitious plans

Employment from PV – Scenario Overview

	2018	2019	2020	2021
SCENARIO A: Optimistic				
DIRECT EMPLOYMENT	556	2,606	4,765	4,917
Installation	550	2,574	4,675	4,768
Operation & Maintenance	6	32	90	149
INDIRECT EMPLOYMENT	641	5,114	11,974	12,171
Installation	609	4,987	11,707	11,763
Operation & Maintenance	32	127	268	408
TOTAL EMPLOYMENT	1,197	7,720	16,739	17,088
SCENARIO B: Conservative				
DIRECT EMPLOYMENT	423	606	2,216	2,469
Installation	418	596	2,175	2,395
Operation & Maintenance	5	10	40	73
INDIRECT EMPLOYMENT	493	971	6,637	7,141
Installation	463	926	6,554	7,009
Operation & Maintenance	30	45	84	132
TOTAL EMPLOYMENT	917	1,577	8,853	9,609
DIFFERENCE				
TOTAL EMPLOYMENT DIFFERENCE	280	6,143	7,886	7,479

Average
Employment per
Capacity Installed
= 40 FTE/MW

Specific Actions for PV

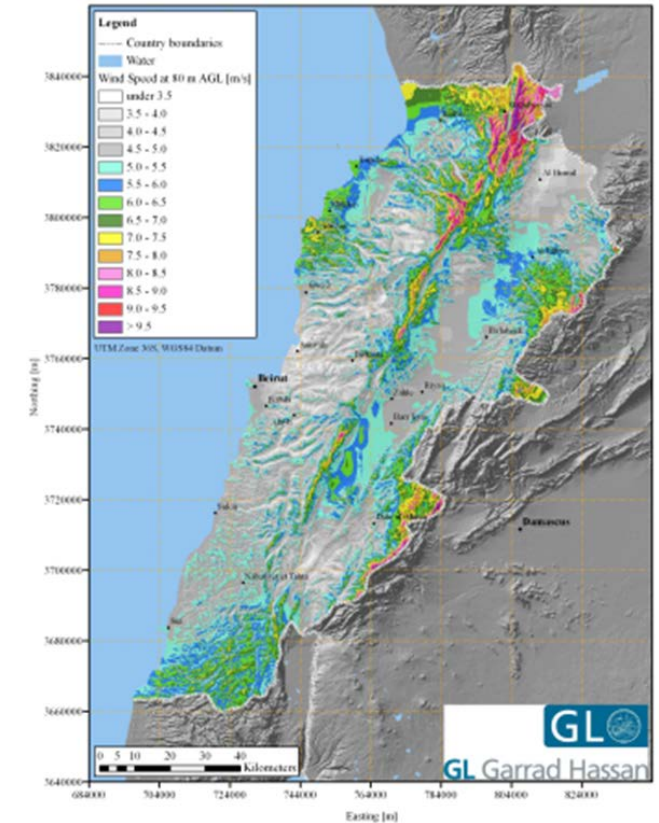
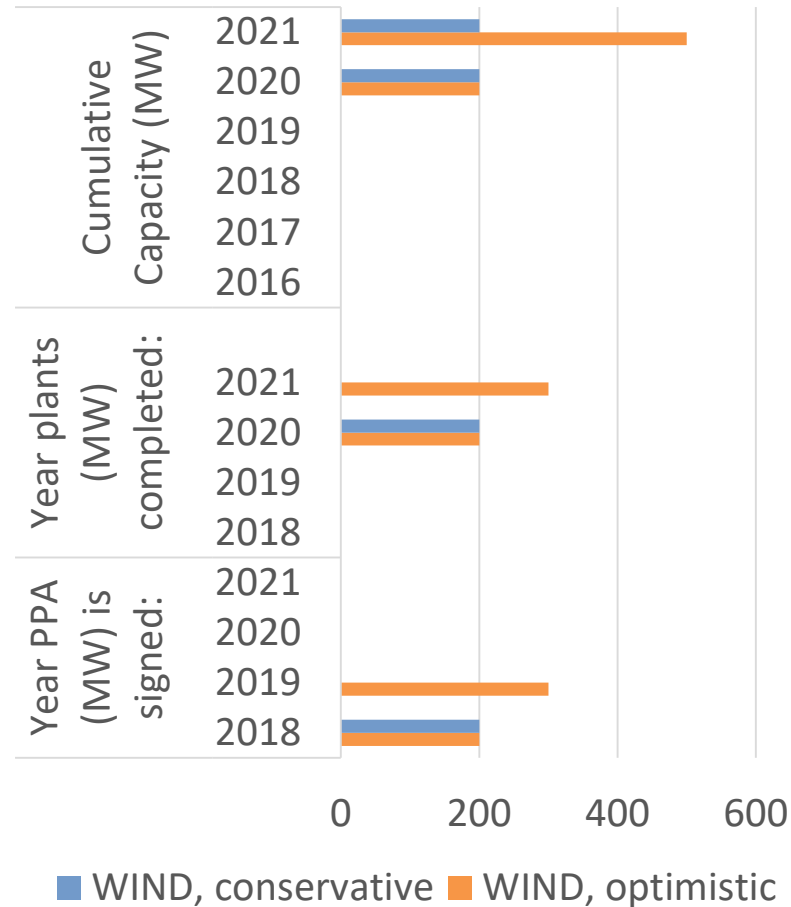
Actions	Timeline	Priority	costs/ efforts	Responsible	Support by UNDP
General strategy – decentralized approach with central support					
Establish local energy hub with focus on PV (and EE)	Starting 2018	medium-high	medium-high	Government, PV sector	yes
Establish a central PV knowledge hub	2018-19	high	medium	Government, PV sector	yes
Strategic investment promotion					
(Continue to) provide and promote an attractive and stable PV support scheme	on-going	high	low	government	
Streamline the NEEREA process	2018-19	high	low	government	
Accelerate the introduction of grid connection standards and guidelines	2018-20	medium-high	medium	government, EDL	yes
Provide solar maps indicating useful roof-tops and available land	2019-20	medium-high	medium	government, RE sector	yes

Specific Actions for PV

Actions	Timeline	Priority	costs/ efforts	Responsible	Support by UNDP
Improving cooperation between public research organizations and private sector					
Quality assurance framework for PV	2019-20	medium	Medium-high	government, EDL	yes
Promote R&D, pilots and companies working on hybrid systems	2019-20	medium	medium	government, RE sector, research institutes	yes
Improve Building Code	2018-20	high	medium	government, RE sector, other stakeholders	
Enhancing know-how through education and training					
Provide technical and vocational training to installers (and others)	2018-20	medium-high	medium	government, RE sector	yes
Launch a certification scheme for installers	2019-20	medium-high	low-medium	government, RE sector	yes
Organize awareness raising campaigns to promote RE prosumers	2018-20	medium-high	low-medium	government, RE sector	yes

Wind in Lebanon – Future Development

- 200 MW in the conservative scenario, 500 MW in the optimistic
- Construction, service, design, finance, cables, construction material
- No manufacturing at this stage



None yet, but plans and potential

Many different components – manufacturing possible, value in all phases of the value chain.

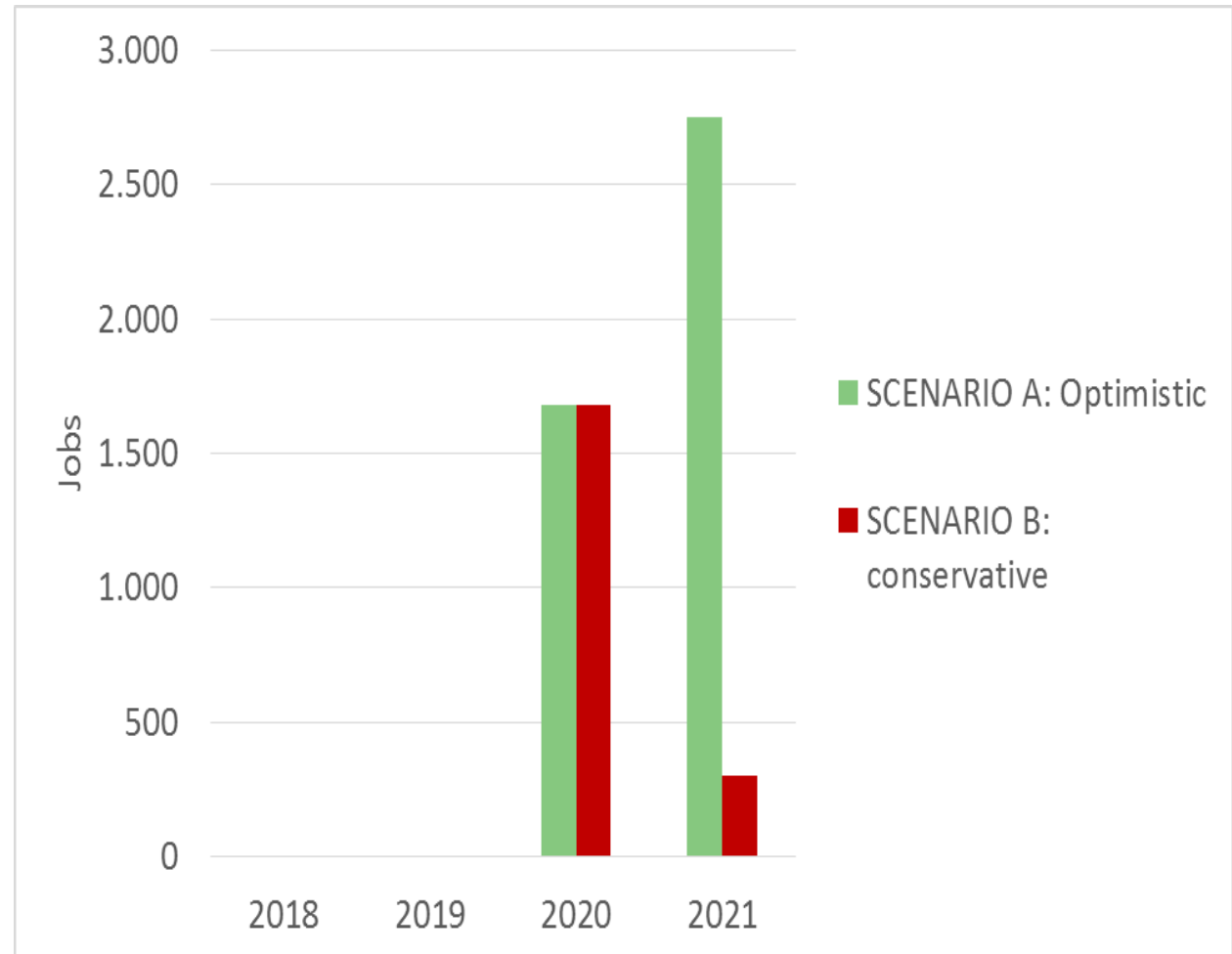
Employment from wind – scenario overview

	2018	2019	2020	2021
SCENARIO A: Optimistic				
DIRECT EMPLOYMENT	0	0	777	1,222
Installation	0	0	720	1,080
Operation & Maintenance	0	0	57	142
INDIRECT EMPLOYMENT	0	0	902	1,531
Installation	0	0	657	936
Operation & Maintenance	0	0	245	595
TOTAL EMPLOYMENT	0	0	1,679	2,753
SCENARIO B: Conservative				
DIRECT EMPLOYMENT	0	0	777	57
Installation	0	0	720	0
Operation & Maintenance	0	0	57	57
INDIRECT EMPLOYMENT	0	0	902	245
Installation	0	0	657	0
Operation & Maintenance	0	0	245	245
TOTAL EMPLOYMENT	0	0	1,679	302
DIFFERENCE				
TOTAL EMPLOYMENT DIFFERENCE	0	0	0	2,451

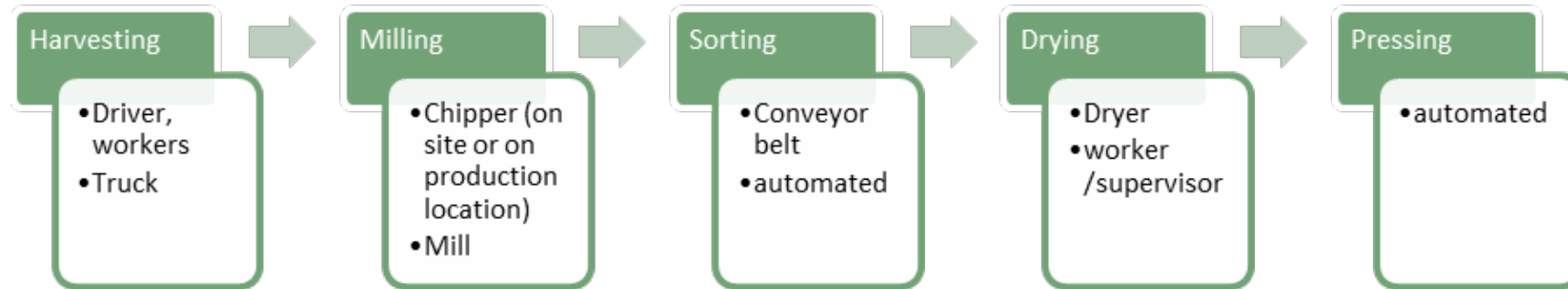
Average
Employment
per Capacity
Installed = 9
FTE/MW

Employment from Wind scenario overview

- Jobs from planning and installation, O&M small in comparison.



Value chain of briquetting



- From interviews with stakeholders: briquetting should be described briefly => simple analysis: how many jobs in O&M of the briquetting:
- Show the impacts of the briquetting process as such.
- Upstream activities such as the manufacturing of the briquetting machine do not occur domestically.
- The collection of wood, the sales of the briquettes and other upstream and downstream activities depend largely on the respective regulatory framework.
- The collection of residuals should be encouraged, while informal wood collection should be discouraged or prohibited.

Employment from Biomass Briquettes

According to a pilot project, one-time investment costs are estimated at \$210.000 for 1 MW plant.

During operation and maintenance, 7-8 jobs/MW are reported from a pilot project

Up to 40 processing plants could be installed in Lebanon. With these 40 plants, 280 additional jobs would be created from O&M.

Looking at the equipment needed, 40 projects would require an investment of \$8.4 million.

The machinery can either be imported or developed in Lebanon. An input of \$1 million to the machinery industry in Lebanon yields 60 additional jobs.

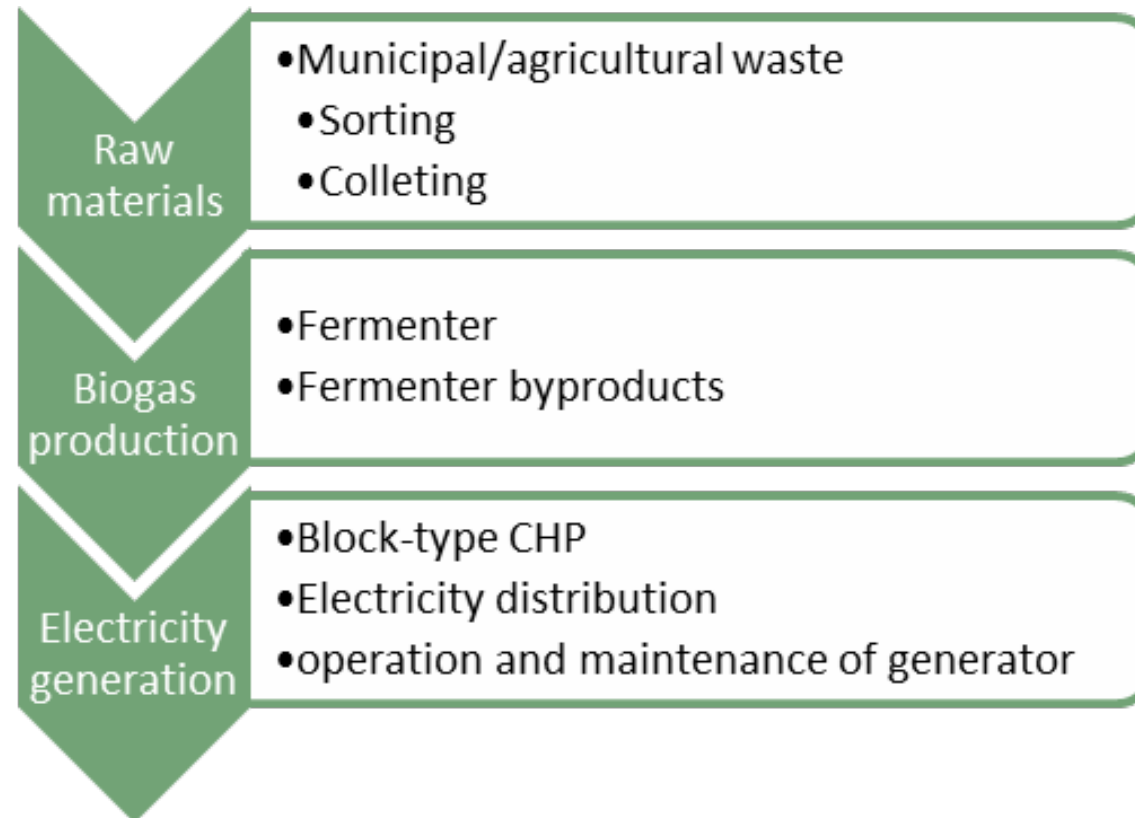
Selling the briquettes can yield more work, but depending on the delivery method to customers this could be one or two people.

- **Note:**
- Biomass from forests comes with some challenges, which should not discourage the promotion of this technology.
- The wood collected has to be monitored to ensure *sustainable collection methods and quantities* and the availability of wood for briquetting frequently has to be checked and approved.
- The briquettes could potentially replace part of the demand of subsidized diesel fuel for thermal purposes, while at the same time decrease the fumes and burn CO₂-neutral.

Average
Employment
per Capacity
Installed = 9
FTE/MW

Value chain of biogas from wastes

- Currently, Lebanon does not have a target for biogas or an installation path.
- The Council of Ministers approved the Policy Summary on Integrated Solid Waste Management (January 11, 2018), which leaves room for Biogas, but does not make explicit reference to it.
- To show value creation from biogas in Lebanon, data from earlier studies is used.



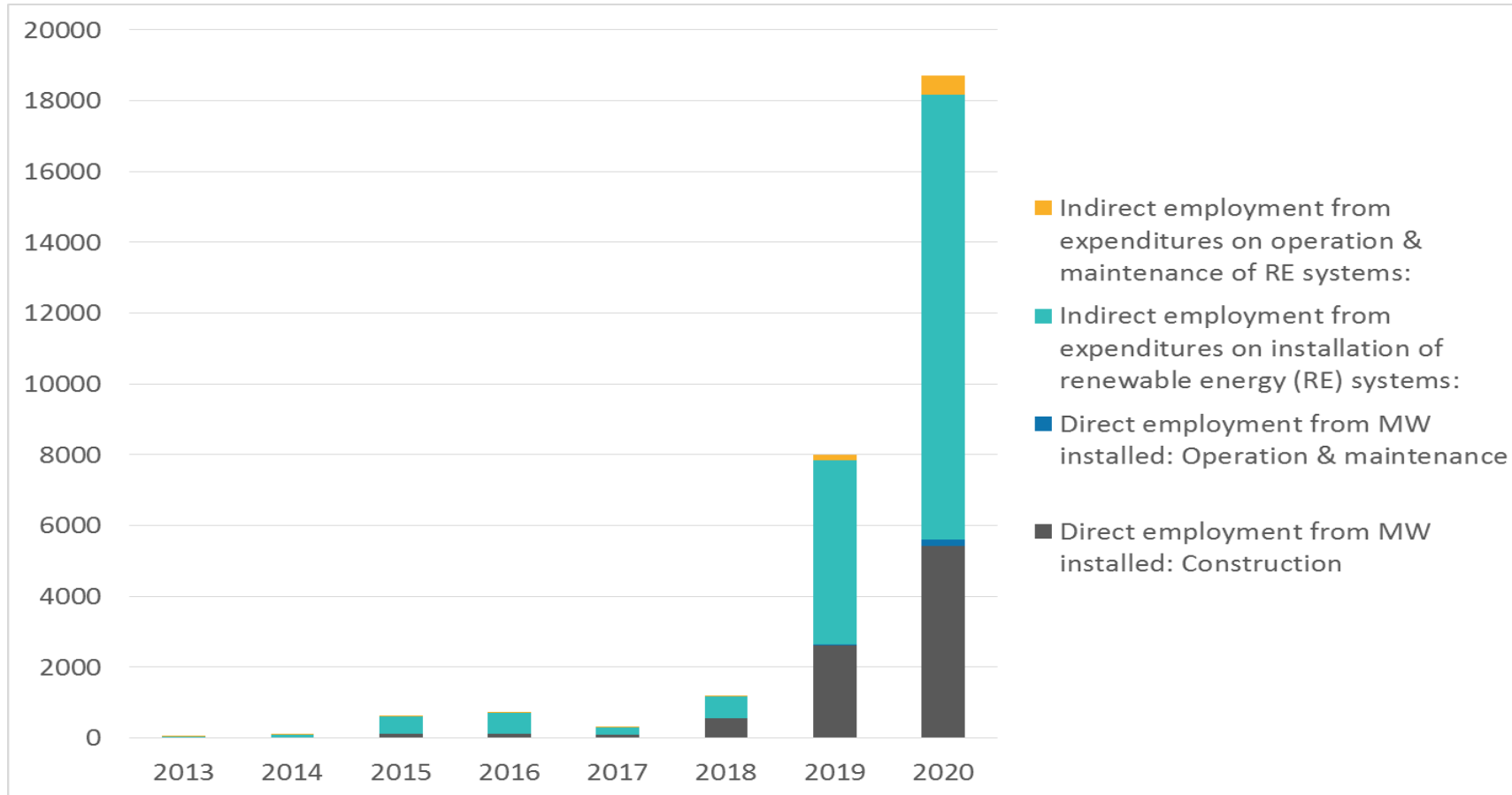
Employment from Biogas from Waste installation and O&M

- Small job effect, but decentralized and steady from O&M
- Deeper analysis of potential necessary
- Waste topic is discussed from the waste management rather than the energy aspect. Synthesis approach could lead to synergies

	2018	2019	2020	2021
DIRECT EMPLOYMENT	0	42	42	42
INDIRECT EMPLOYMENT	0	5	9	14
TOTAL EMPLOYMENT	0	47	51	56

Average
Employment per
Capacity Installed
= 14 FTE/MW

Total results – large opportunities



Optimistic scenario

- 20,000 jobs.... This is worth some effort
- Large potential across all sectors: science/education, construction, services
- The focus on PV creates fewer permanent jobs
- Permanent jobs are created from technologies which require O&M
- Industry should be more included in a RE strategy – not only as consumer, but as supplier.

Conclusions

- Continued RE support policies are required to create a strong local RE industry
- Key actions include:
 - Central and distributed RE incubation hubs (practitioner programme)
 - Support of RE policies and targets
 - PV:
 - Establish quality assurance framework for installations
 - Support training and education along the value chain
 - Promote R&D, pilots and companies working on hybrid systems
 - Organize awareness raising campaigns to promote RE prosumers
 - Wind:
 - Support training for service sector
 - Awareness raising for suppliers and subcontractors
 - Improve information on resources, site availability, grid impact study
 - Bioenergy:
 - Combine strategy with waste strategy

References

- Prioritization and Assessment of Value Chains within The Renewable Energy Sector in Lebanon, (UNDP, 2019)



PRIORITIZATION AND ASSESSMENT OF VALUE CHAINS
WITHIN THE RENEWABLE ENERGY SECTOR IN LEBANON
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Authors

Xavier Vallvé, TRAMA TECNOAMBIENTAL (TTA),
Ulrike Lehr, Institute for Economic Structures Research (GWS),
Kristian Petrick (on behalf of TTA)
Roger Sallent (TTA)
Rabih Chaar (Moneera)
Fatimah Hoballah (Moneera)

Reviewers

Leon Chammah (UNDP)
Jad Taha El-Baba (UNDP)
Hassan Harajli (UNDP)



- Solar PV Status Report 2019 (LCEC, 2019)

Thank you!