



LEBANON PV MONITOR 1.0



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ABSTRACT

The Lebanon PV Monitor 1.0, developed and published in its first edition in 2020, highlights major solar photovoltaic (PV) trends in Lebanon.

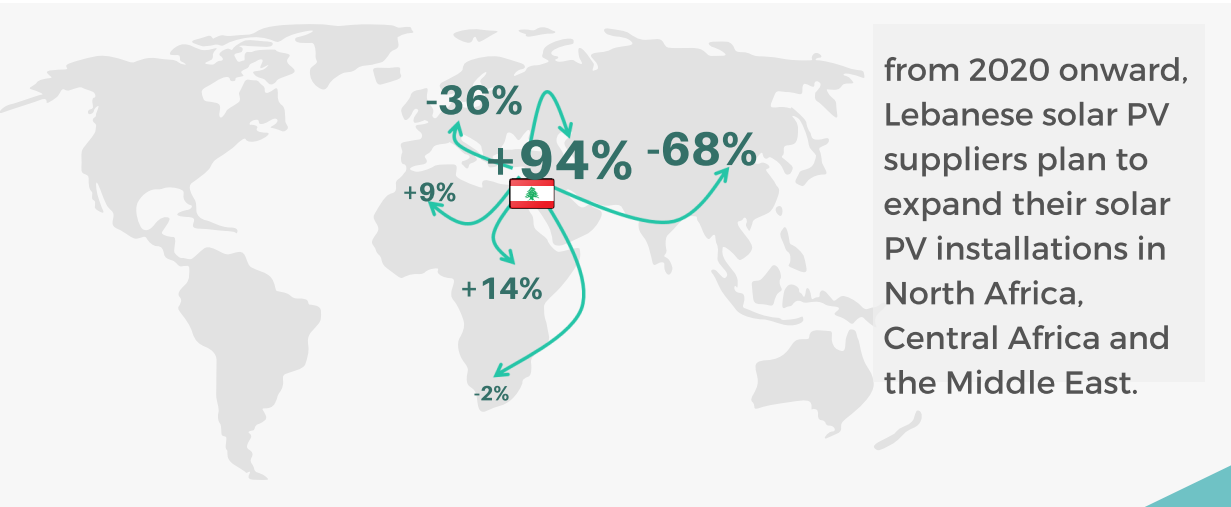
This report is based on data collected from 14 Lebanese solar PV companies with installed and operational systems all over Lebanon, until the second quarter of 2020.

The analyzed data enables a fair understanding of the PV market in Lebanon including the selling price of different PV systems' types, the breakdown of components, and the brands deployed by Lebanese PV companies.

Finally, the future of this renewable energy technology is assessed based on financial expectations and measures to be taken, following the global spread of COVID-19 and the country's current financial crisis.



EXECUTIVE SUMMARY



50%
of suppliers are willing to procure **locally manufactured components** in the future.



Off grid solar PV systems could be **2.3 times more expensive** than on grid systems.

+ 70%
up to 70% increase in off-grid PV systems prices

TOP Deployed Brands

Modules

Inverters



JinkoSolar

SMA



TrinaSolar

HUWAEI



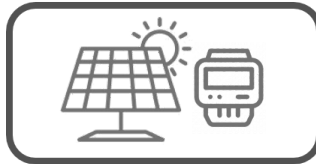
QCells

FRONIUS



LEGEND

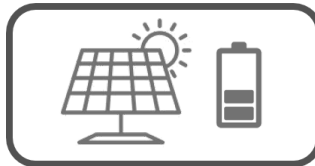
01 ON GRID



On Grid solar PV systems are connected to the electric utility grid.

When PV production is greater than local demand, energy surplus is injected into the grid via net-metering.

02 OFF GRID



Off Grid solar PV systems operate on their own, independent of the electric utility grid.

They include batteries to store electrical energy, therefore ensuring self sufficiency.

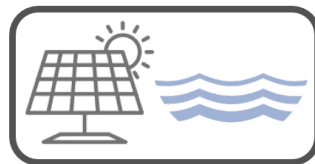
03 ON GRID WITH BATTERIES



Also known as dual mode systems, these combine the features of on grid and off grid systems: they are connected to the grid and

include batteries for storage.

04 SOLAR PV PUMPING



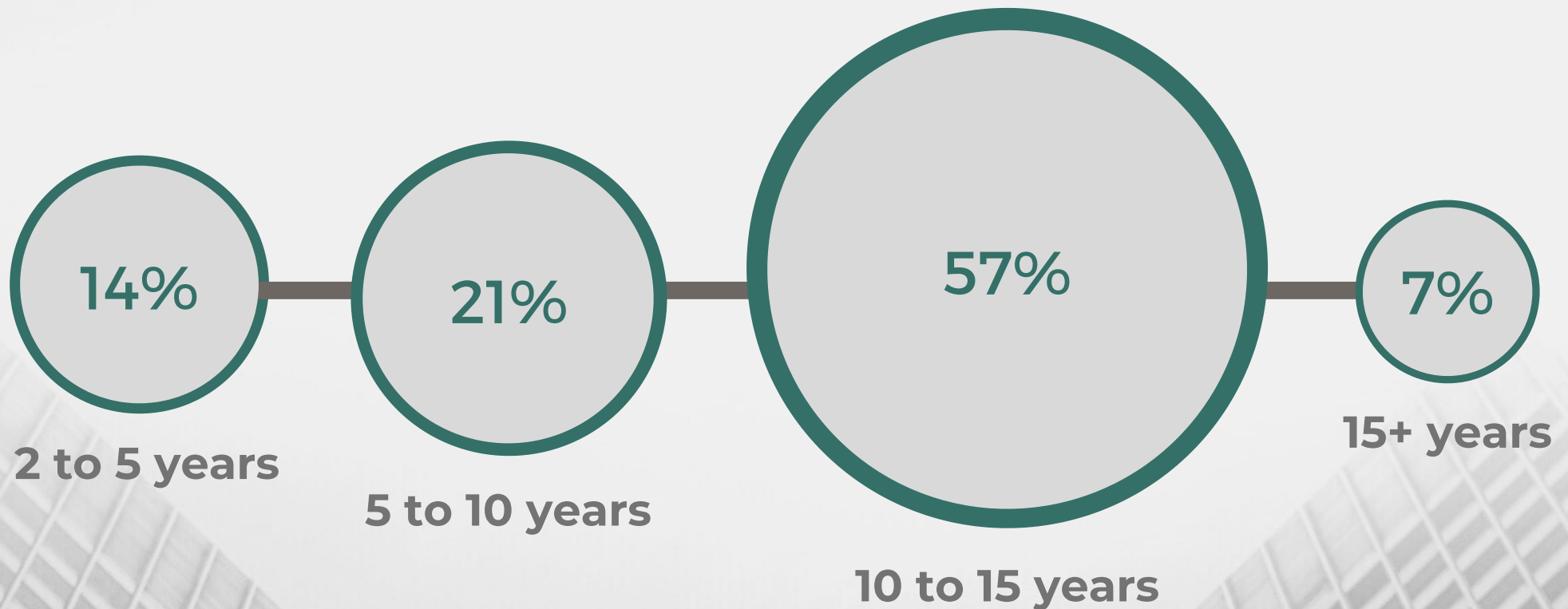
This technology converts solar energy into electrical energy needed to drive a water pump.

LIST OF FIGURES

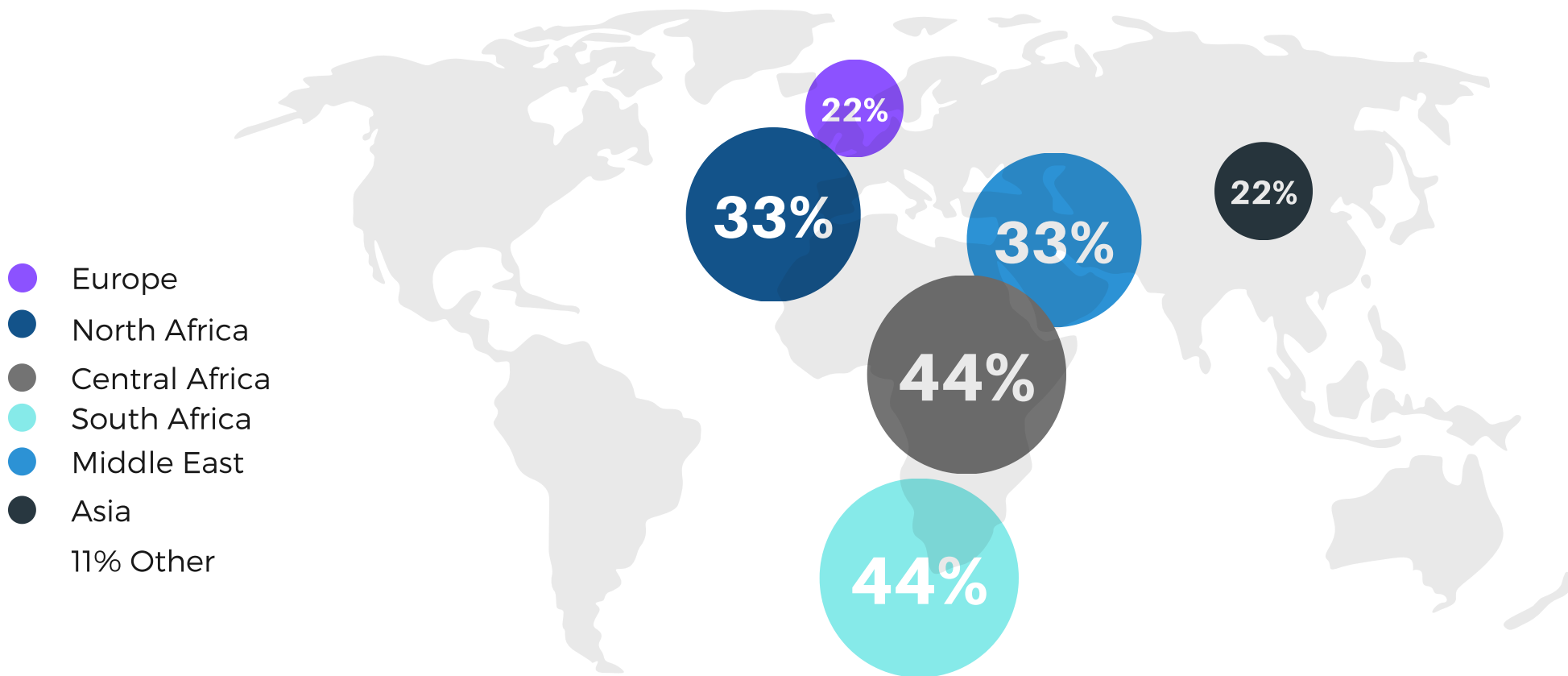
Figure 1 - Experience in Solar PV-----	1
Figure 2 - Map: Previous Global Activity-----	2
Figure 3 - Map: Future Global Activitiy-----	3
Figure 4 - Map: Expansion-Reduction in Global Activity-----	4
Figure 5 - Installed Capacity-----	5
Figure 6 - Solar PV Projects Duration-----	6
Figure 7 - Solar PV Projects Trends-----	7
Figure 8 - PV Pricing-----	8
Figure 9 - PV Average Price Breakdown-----	9
Figure 10 - PV Street Lighting Turnkey Prices-----	10
Figure 11 - PV Modules Brands-----	11
Figure 12 - Inverters Brands-----	12
Figure 13 - Batteries Types-----	13
Figure 14 - PV Mounting Structure-----	14
Figure 15 - Future Pricing Expectations-----	15
Figure 16 - Current Procurement-----	15
Figure 17 - Future Procurement-----	16

EXPERIENCE IN SOLAR PV

57% solar PV suppliers have been active in the Lebanese market for 10 to 15 years. This existence was sustained by the national financing mechanism, the National Energy Efficiency and Renewable Energy Action (NEEREA), launched and developed by the central bank BDL back in 2010.

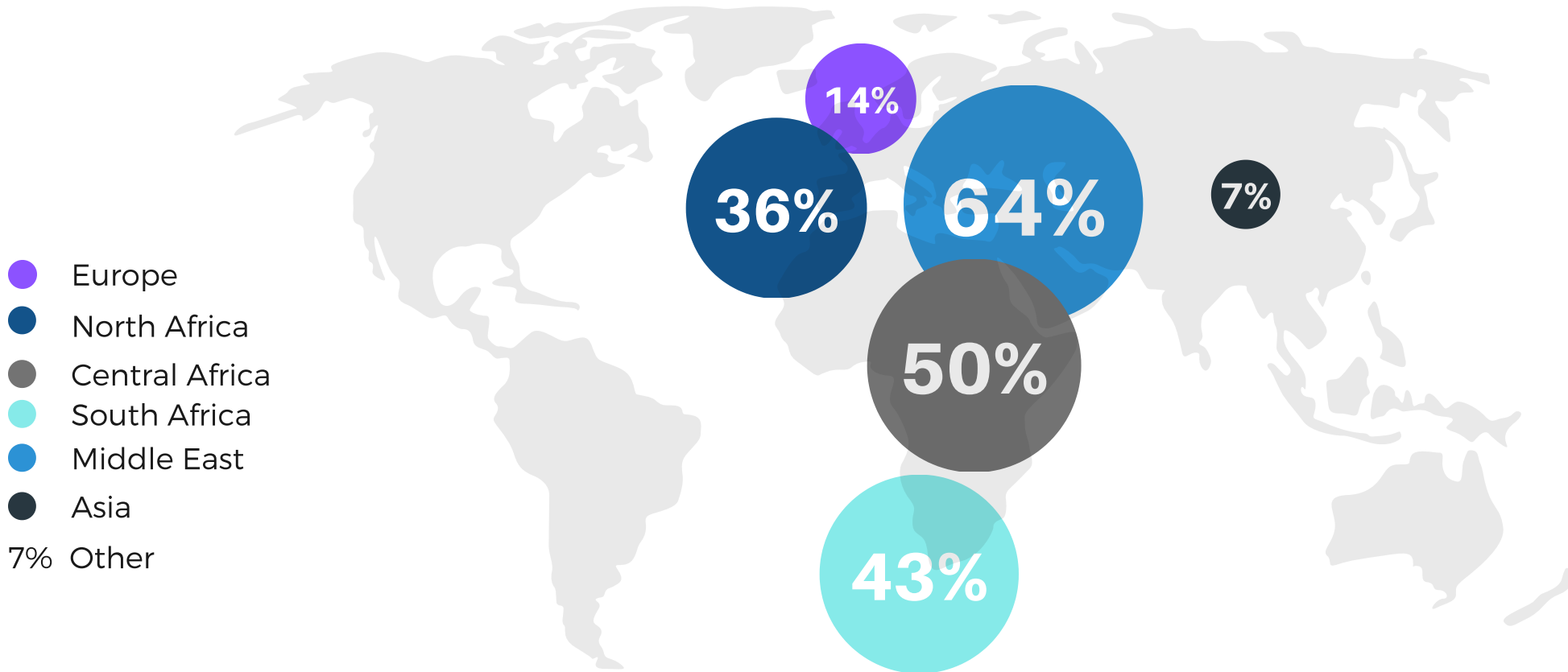


This map shows percentages of respondents with solar PV installations in the indicated regions outside Lebanon, prior to 2020.



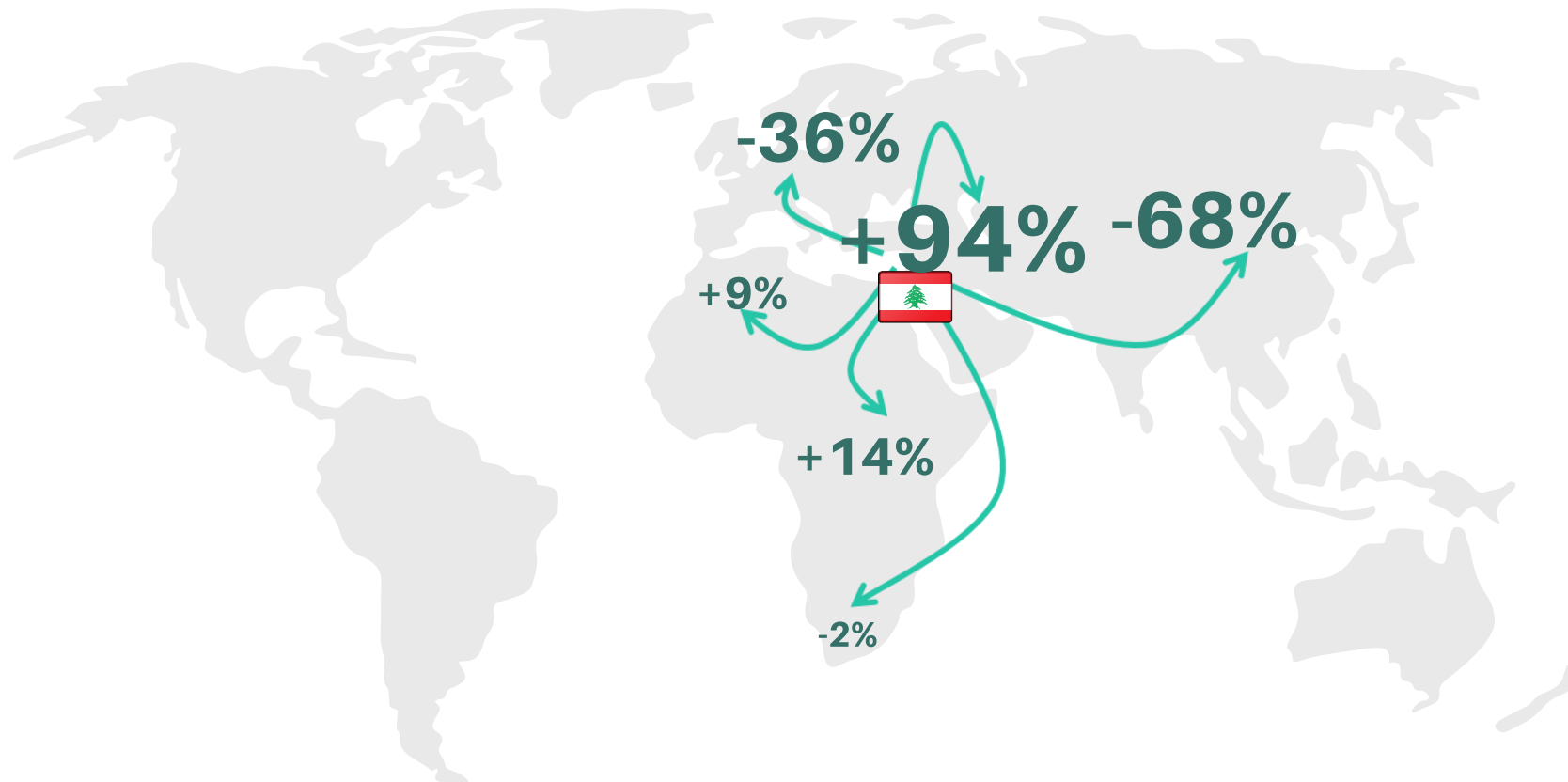
PREVIOUS GLOBAL ACTIVITY

FUTURE GLOBAL ACTIVITY



This map shows percentages of respondents planning to expand their solar PV installations in the indicated regions outside Lebanon, starting 2020.

EXPANSION-REDUCTION IN GLOBAL ACTIVITY



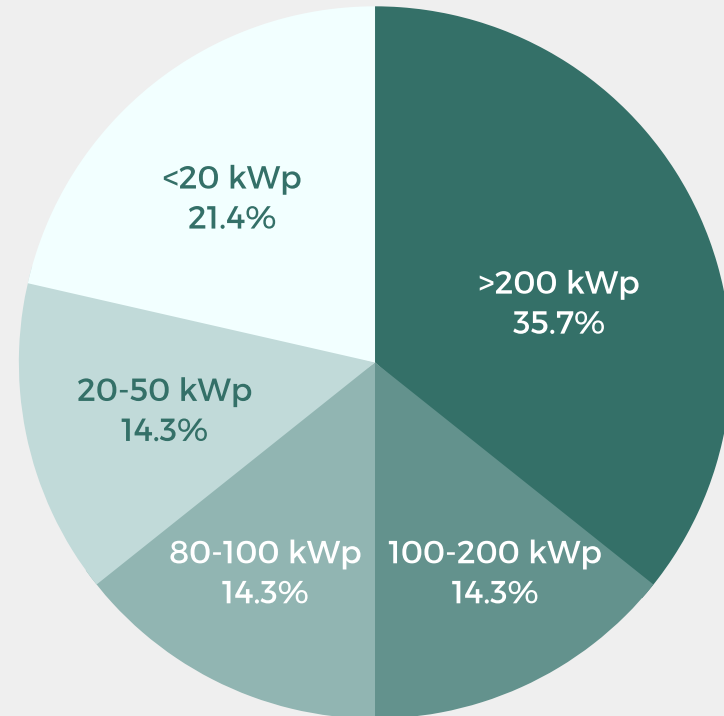
Respondents plan to expand their solar PV installations in North Africa, Central Africa and the Middle East by 9%, 14% and 94% respectively. On the other hand, they also plan to reduce their solar PV installations in South Africa, Europe and Asia by 2%, 36% and 68% respectively.

INSTALLED CAPACITY

Lebanon is home to a diverse range of solar PV system sizes.

This figure shows the common solar PV system sizes which are being implemented in Lebanon. Commonly implemented sizes are those greater than 200 kWp.

Up to this day, the on grid Beirut River Solar Snake installation remains the largest, with an implementation size of 1 MWp.



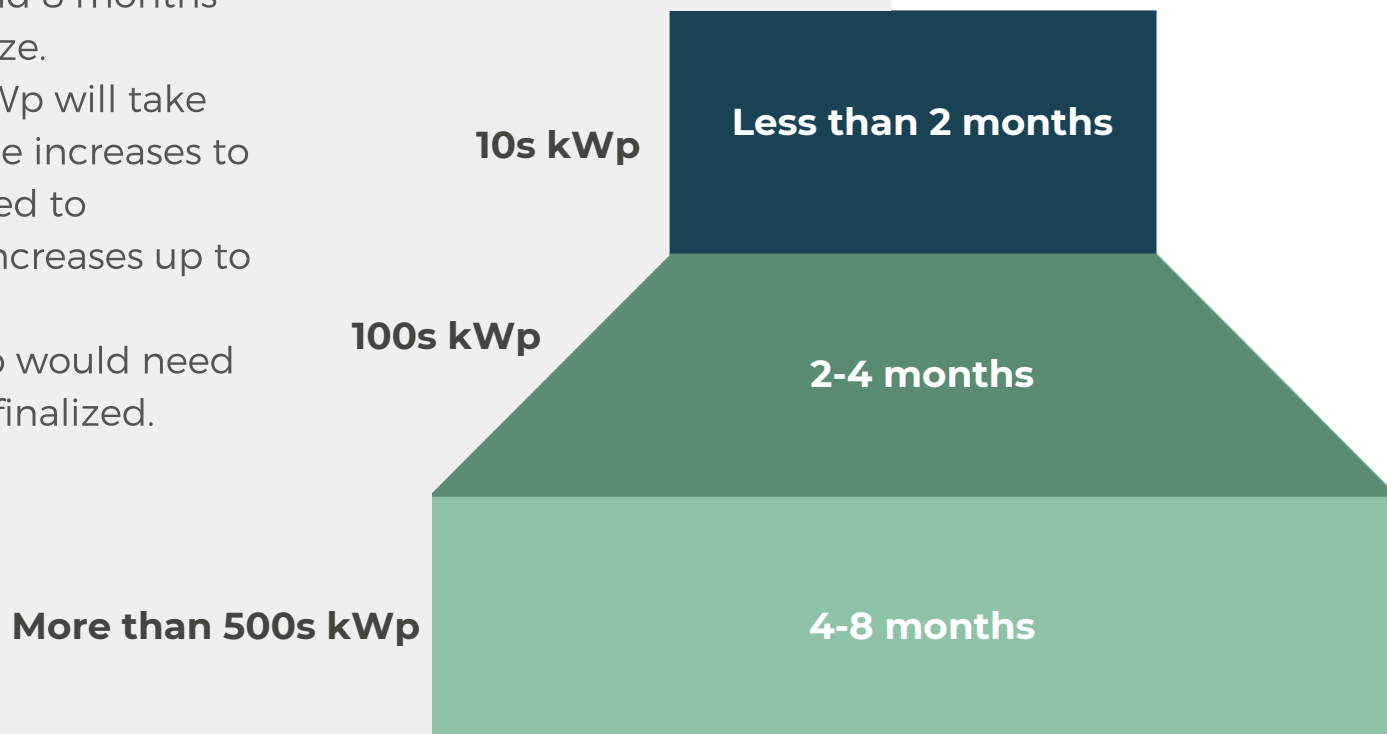
SOLAR PV PROJECTS

DURATION

Starting from the date of contract signature until commissioning, implementing a solar PV project lasts between 2 and 8 months depending on the project's size.

On average, projects of 10s kWp will take less than 2 months. As the size increases to the 100s kWp, the time needed to implement the project also increases up to 4 months.

Projects exceeding 500s kWp would need around 4 to 8 months to get finalized.



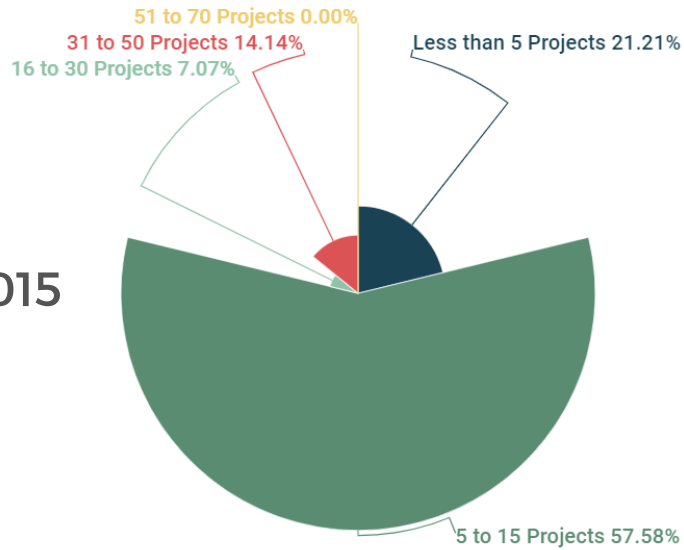


71%

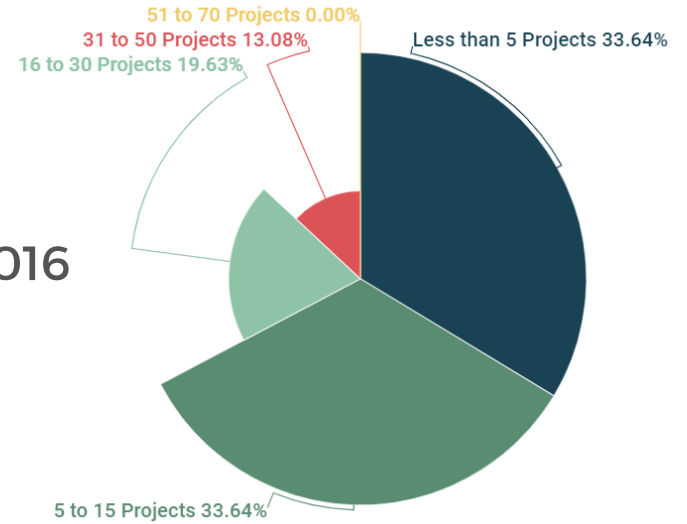
Suppliers ranked on grid solar PV systems as the most common implemented in Lebanon, followed by on grid with batteries, off grid and solar PV pumping systems.

SOLAR PV PROJECTS TRENDS

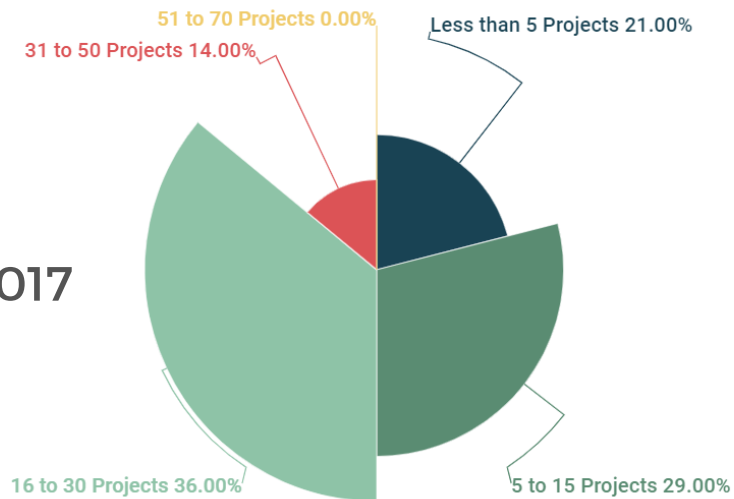
2015



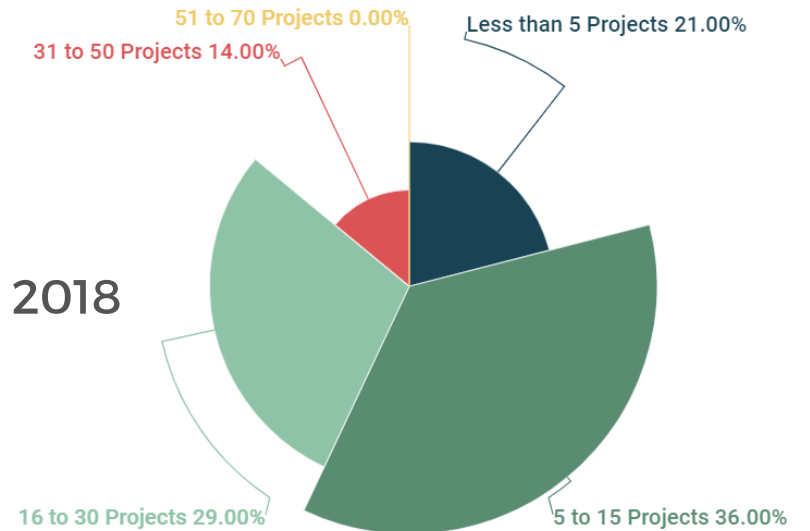
2016



2017



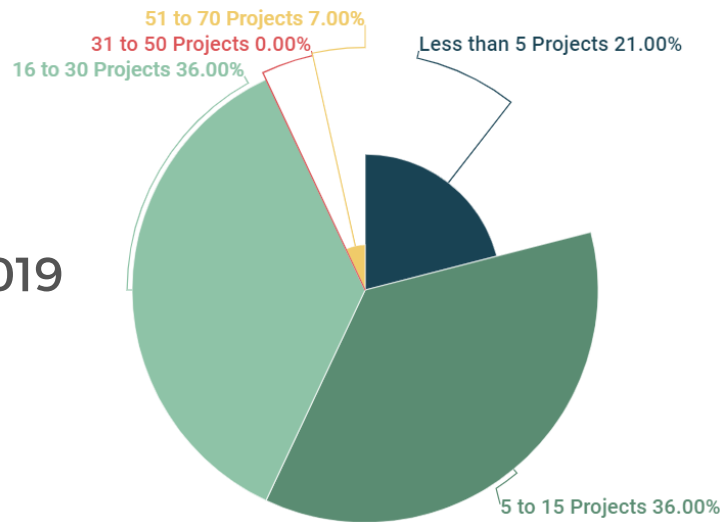
2018



2020

ACTIVITIES

2019



The graphs show the yearly installed number of projects from 2015 till 2020 according to the respondents.

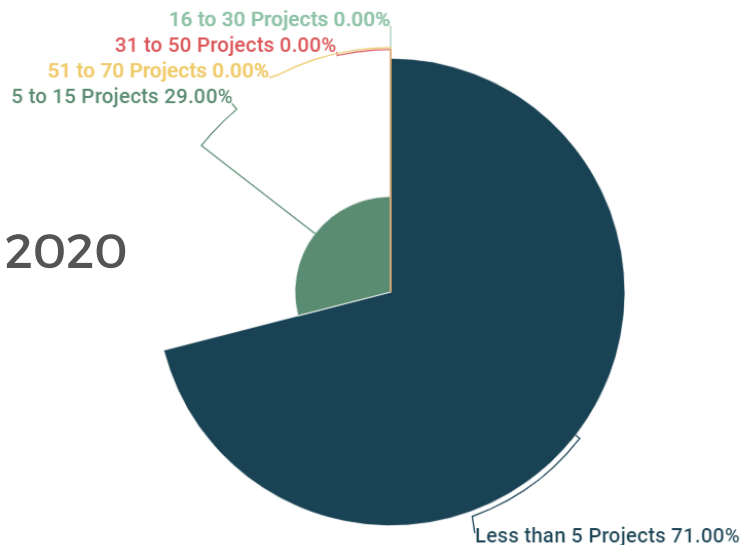
New solar PV companies have emerged in 2016 as the percentage of respondents reporting less than 5 projects increased by around 12% from 2015 to 2016.

In 2017, the percentage of companies implementing between 16 to 30 projects has increased by 16%, which indicates a healthy activity to the companies which entered the market in the previous years.

In 2018, the percentage of companies installing 16-30 projects has decreased by 7% while that of companies installing 5-15 projects has increased by 7%. According to the latest Solar PV Status Report (LCEC, 2018), solar PV investments funded by NEEREA have also decreased between 2017 and 2018.

2019 witnessed a rise in fresh business opportunities: 7% participants reached 51-70 installed projects. However, this impressive increase in the number of projects is disrupted in 2020: the majority (71%) reported installing less than 5 projects. The unprecedented COVID-19 crisis delayed many installations, thus freezing important solar PV investments.

2020





PV PRICING



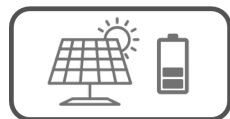
ON GRID

0.81-1.00 USD/Wp



ON GRID WITH BATTERIES

1.80-1.82 USD/Wp



OFF GRID

1.48-1.90 USD/Wp



SOLAR PV PUMPING

0.84-0.98 USD/Wp

On average, an on grid solar PV system costs the user between 0.81 and 1 USD/Wp. The primary data indicates that 43% of respondents report a selling price of 0.86-0.96 USD/Wp.

Solar PV pumping systems seem to be a bit more expensive with a selling price ranging between 0.84 and 0.98 USD on average. However, the majority of respondents, corresponding to 42%, reports a lower range of 0.76-0.96 USD/Wp.

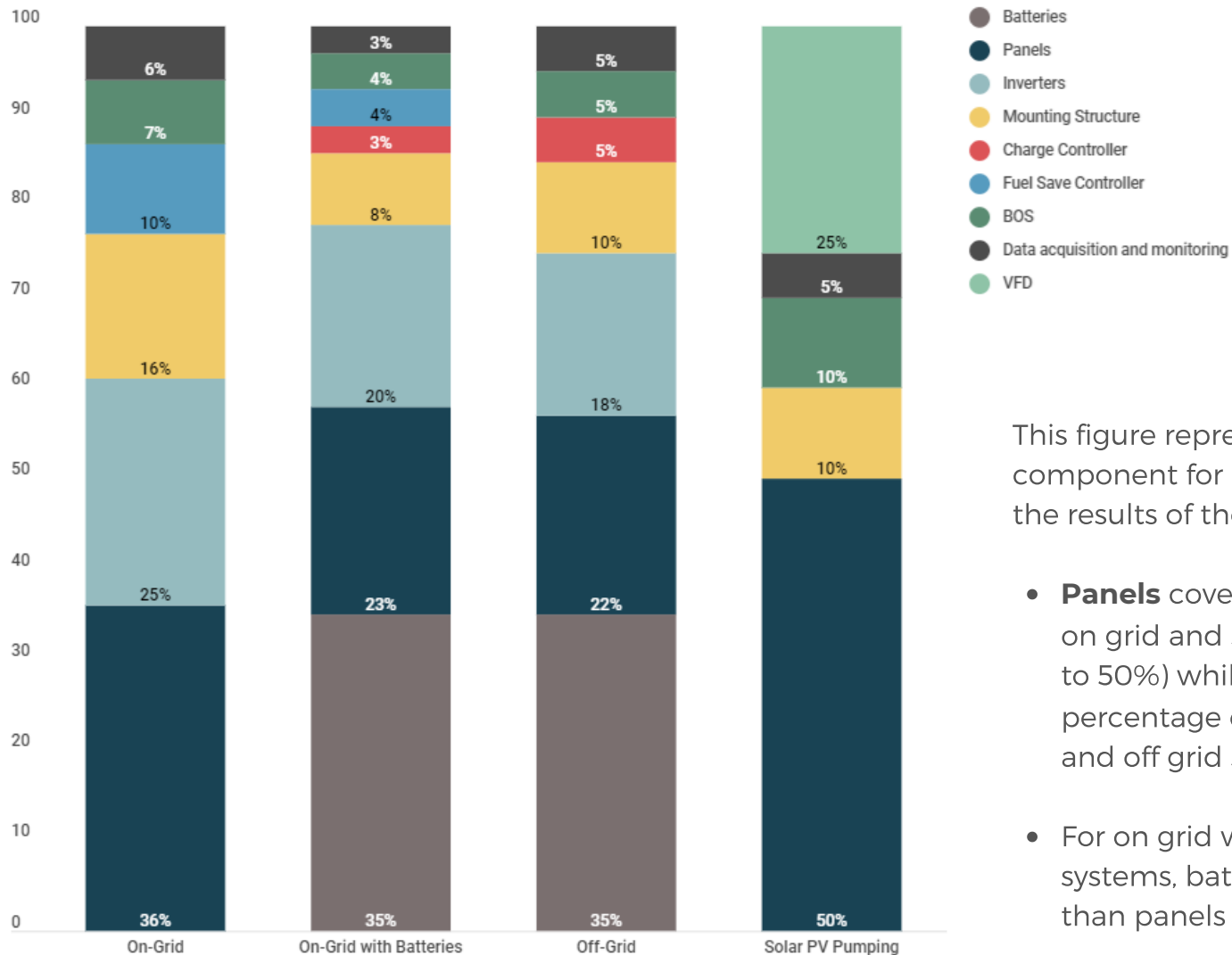
On grid with batteries solar PV systems are more expensive and average between 1.80-1.82 USD/Wp. 50% respondents report the following price range: 2-3 USD/Wp.

Off grid solar PV systems are the most expensive, with an average selling price between 1.48-1.90 USD/Wp. They could even cost the user higher than that as 36% respondents report a selling price of 2-3 USD/Wp and 29% report more than 3 USD/Wp.



Off grid solar PV systems could be **2.3 times more expensive** than on grid systems.

AVERAGE PRICE BREAKDOWN



This figure represents the price breakdown by component for each solar PV system, based on the results of the survey.

- **Panels** cover the highest percentage cost in on grid and solar PV pumping systems (36 to 50%) while **batteries** cover the highest percentage cost in on grid with batteries and off grid systems (35%).
- For on grid with batteries and off grid systems, batteries cost 12% and 13% more than panels respectively.

64%

**OF SUPPLIERS RANK THE
RESIDENTIAL SECTOR AS THE
MOST EXPENSIVE APPLICATION**

The residential sector ranks first as the most expensive application to install in Lebanon followed by the commercial, industrial and solar PV pumping sectors.



PV STREET LIGHTING



YES

64%

NO

36%

3736+

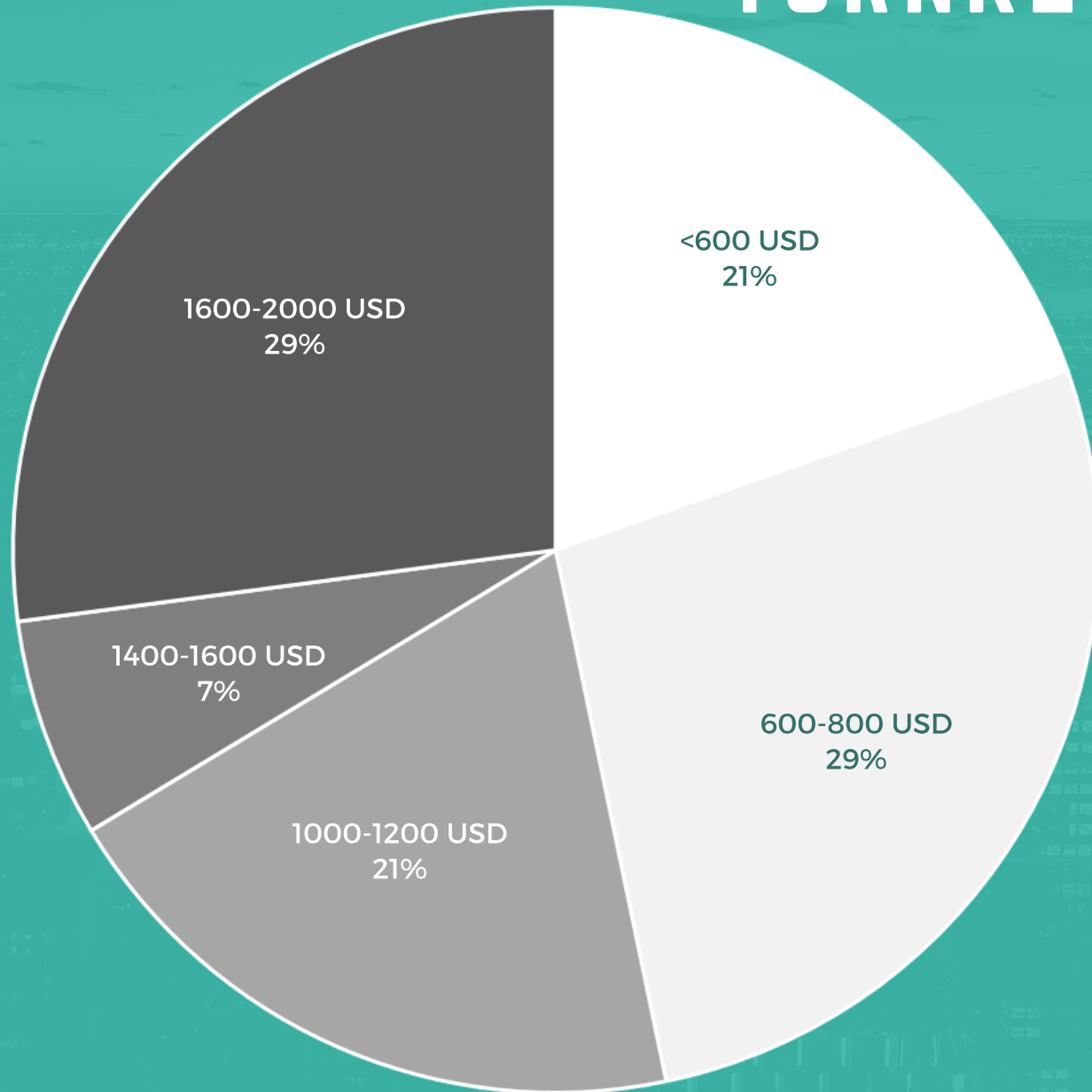
solar PV street lighting installations

Solar PV Street Lighting systems are mounted on lighting structures - poles - and form a fully autonomous light source.

64% of respondents are engaged in PV street lighting installations and have installed more than 3736 systems.

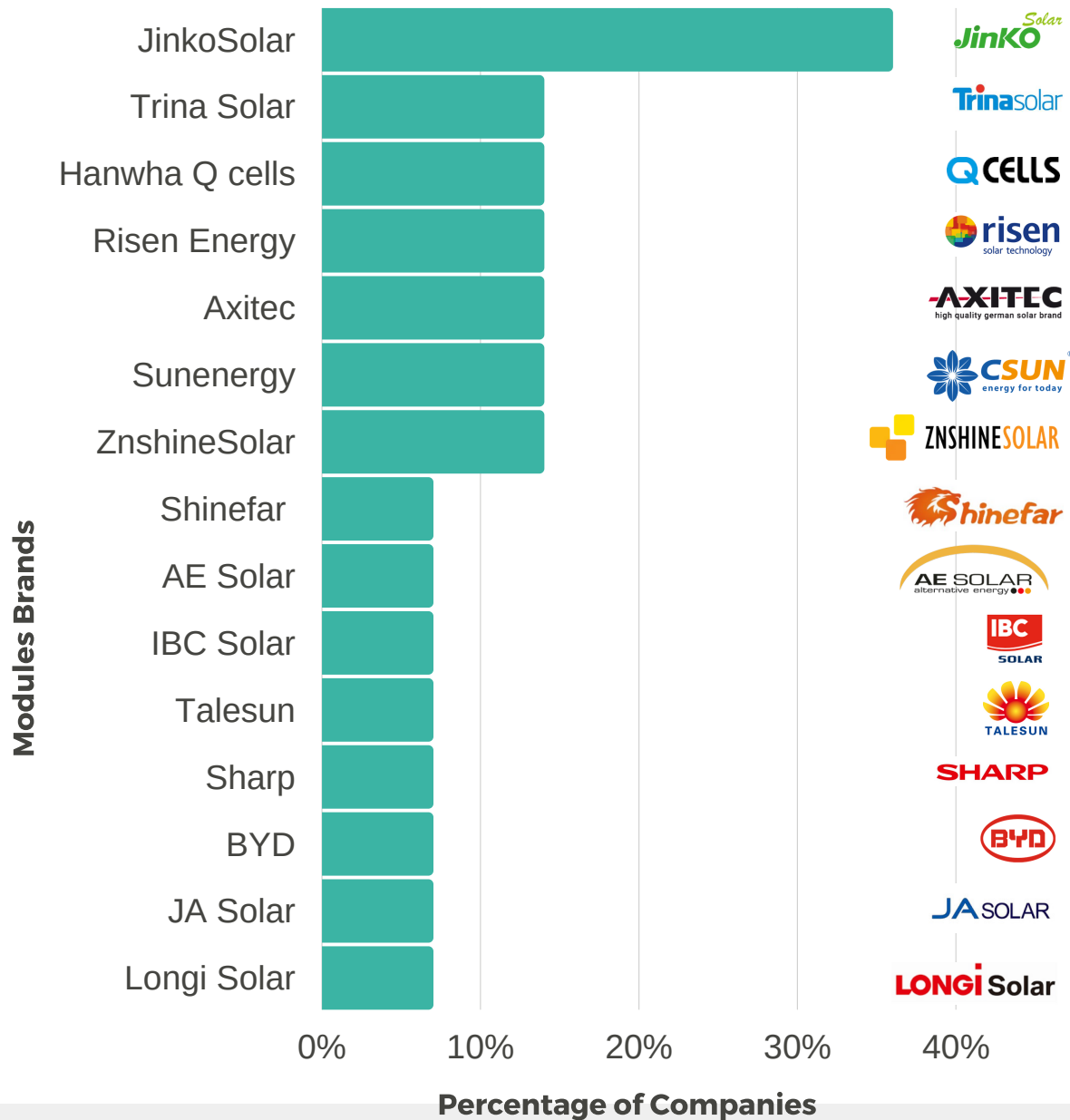
The selling price of this popular technology highly depends on the installer. The following pie chart shows different prices assigned by participating suppliers. 29% respondents assign a price between 1600 and 2000 USD. Another 29% indicates a significantly lower price between 600 and 800 USD.

PV STREET LIGHTING TURNKEY PRICE



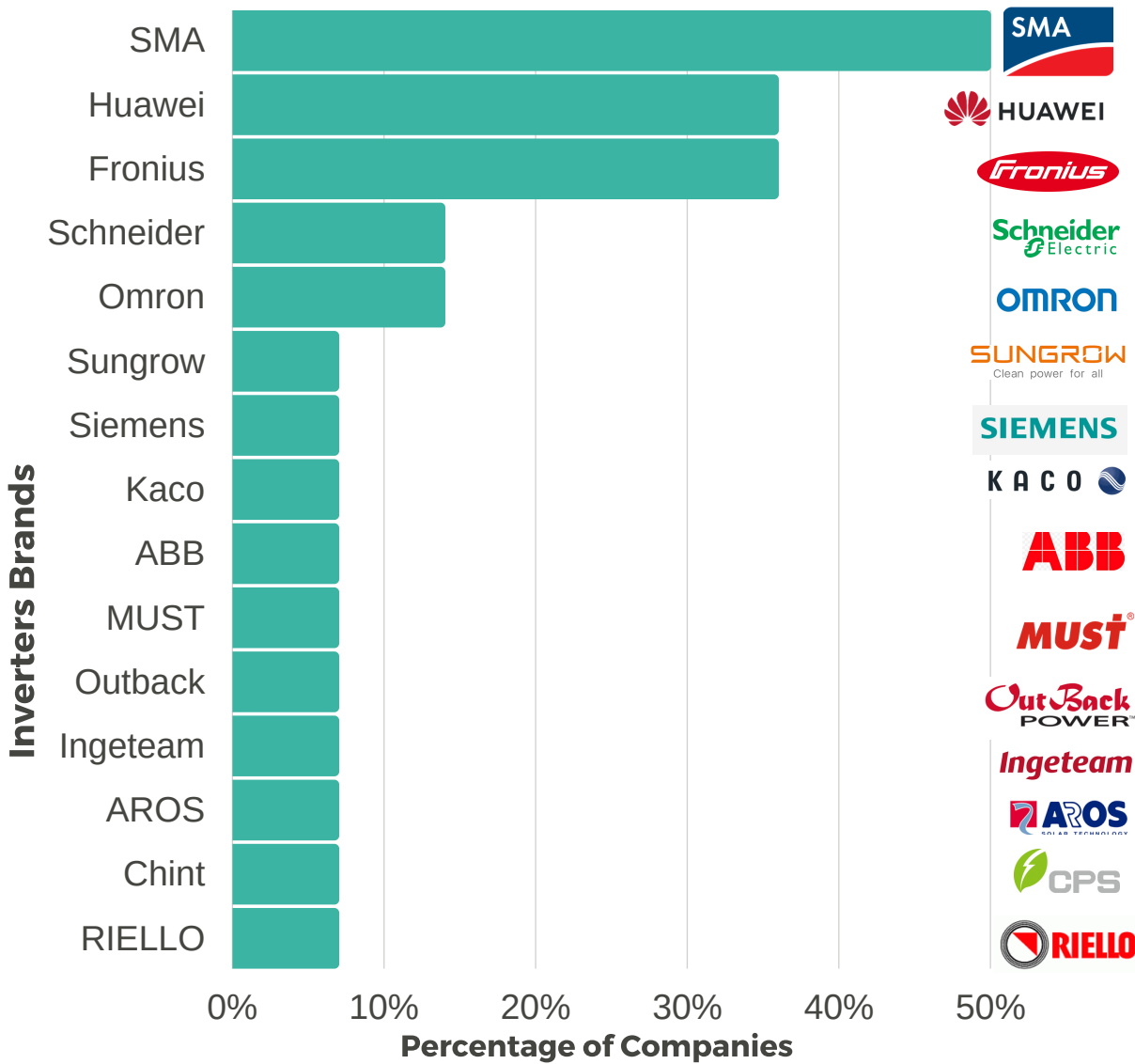


MODULES BRANDS



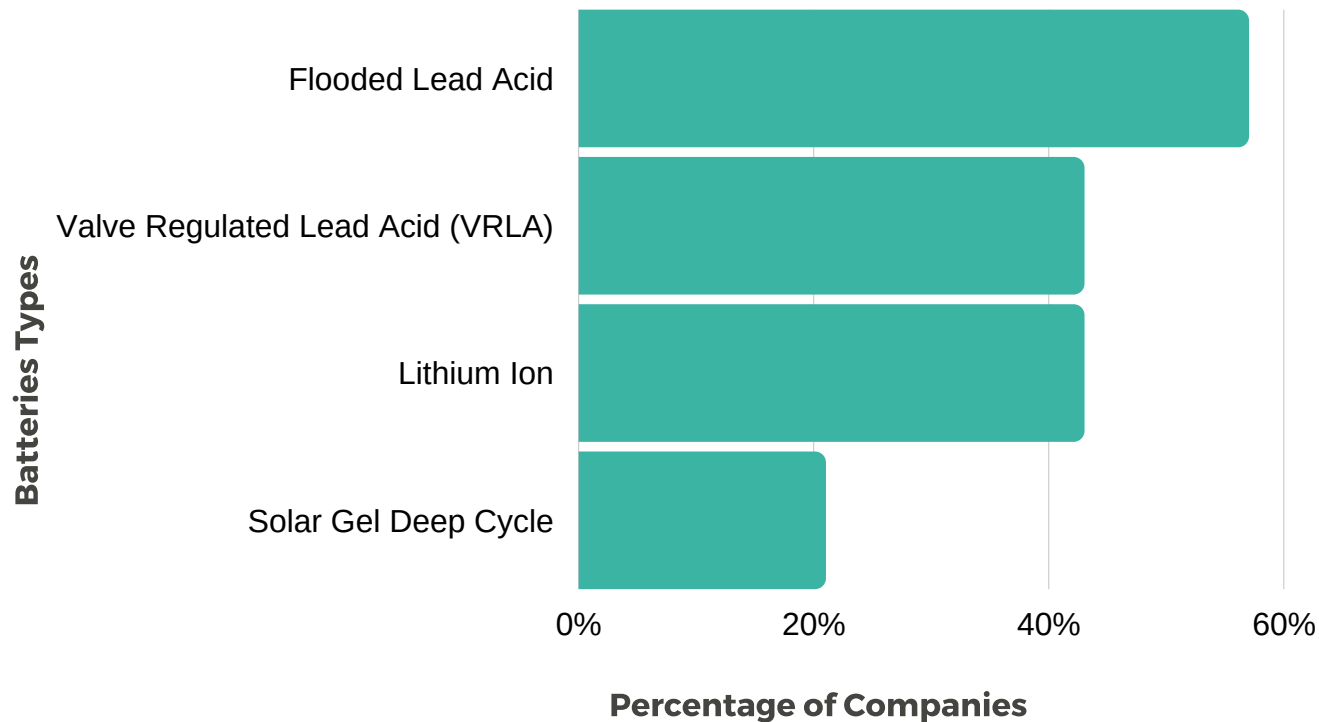
Participating solar PV suppliers do not restrict their companies to the use of one brand of PV modules. The graph above shows a variety of PV modules procured by the solar PV suppliers in Lebanon. **36% reported the use of JinkoSolar,**

INVERTERS BRANDS



The graph above shows diverse inverters brands procured by the solar PV suppliers in Lebanon. The most common brand, reported by 50% of respondents, is German **SMA**. **Huawei** and **Fronius** are also common as 36% of respondents reported employing these brands in their installations.

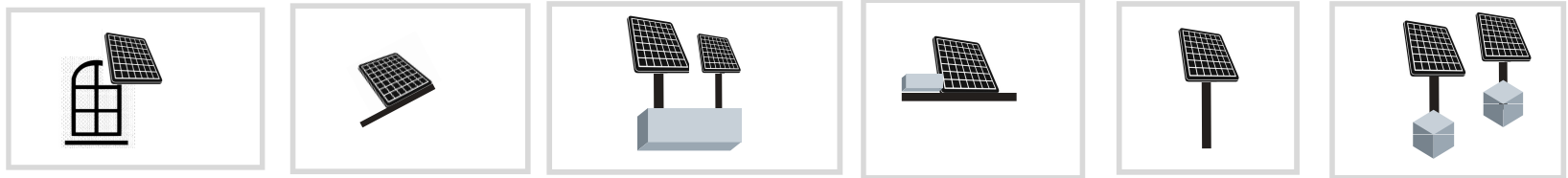
BATTERIES TYPES



The graph above shows the distribution of batteries types employed by the participating solar PV suppliers in Lebanon. The most common battery type is the **Flooded Lead Acid** accommodated by 58% of respondents. **Valve Regulated Lead Acid (VRLA)** and **Lithium Ion** batteries are used by 43% of respondents each, while **Solar Gel Deep Cycle** batteries are employed by 21% of respondents in their installations.



PV MOUNTING STRUCTURE



Mounting Type Material	Building Integrating PV (BIPV)	Railed Mount	Foundation Mount	Ballasted Mount	Pole Mount	Footing Mount
Aluminum	19%	22%	15%	15%	11%	19%
Hot dip galvanized steel	10%	20%	17%	13%	27%	13%
Painted Steel	13%	7%	27%	27%	13%	13%

This table includes percentages assigned by respondents to mounting structures types and material they use in their solar PV installations.



ALUMINUM

Aluminum is the most common material used in railed mounting structures.

HOT DIP GALVANIZED STEEL

Hot Dip Galvanized Steel is the most common material used in pole mounting structures.

PAINTED STEEL

Painted Steel is the most common material used in foundation and ballasted mounting structures.

FOUNDATION MOUNT

59% of suppliers have installed foundation mounts, making it the most commonly installed type of solar PV mounting structures.

BALLASTED MOUNT

55% of suppliers have installed ballasted mounts, making it the second most commonly installed type of solar PV mounting structures.



**FUTURE
PRICING
EXPECTATIONS**



ON GRID



14%

suppliers expect no change in the selling price of on grid solar PV systems in 2020.



36%

suppliers expect an **increase between 10 and 40%** in the selling price of on grid solar PV systems in 2020.



50%

suppliers expect a **decrease between 10 and 50%** in the selling price of on grid solar PV systems in 2020.



ON GRID WITH BATTERIES

36%

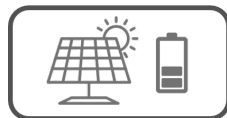
suppliers expect no change in the selling price of on grid with batteries solar PV systems in 2020.

43%

suppliers expect an **increase between 10 and 50%** in the selling price of on grid solar PV systems in 2020.

21%

suppliers expect a **decrease between 20 and 50%** in the selling price of on grid solar PV systems in 2020.



OFF GRID

43%

suppliers expect no change in the selling price of off grid solar PV systems in 2020.

50%

suppliers expect an **increase between 20 and 70%** in the selling price of off grid solar PV systems in 2020.

7%

suppliers expect a **decrease of 40%** in the selling price of off grid solar PV systems in 2020.



SOLAR PV PUMPING

28%

suppliers expect no change in the selling price of solar PV pumping systems in 2020.

43%

suppliers expect an **increase between 10 and 20%** in the selling price of solar PV pumping systems in 2020.

29%

suppliers expect a **decrease of between 10 and 50%** in the selling price of solar PV pumping systems in 2020.

Up to

70%

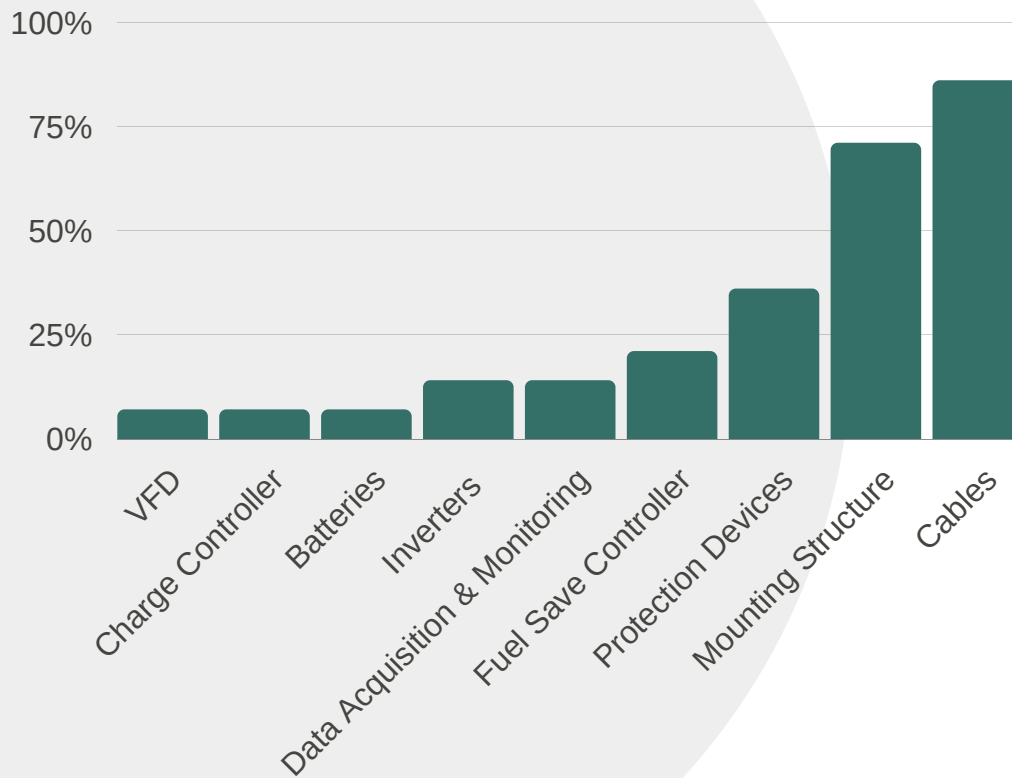
The selling price of **off grid** solar PV systems is expected to inflate the most - up to 70%

Up to

50%

The selling price of **on grid** solar PV systems is expected to deflate the most - up to 50%

CURRENT PROCUREMENT



86% of participating suppliers procure locally manufactured cables.

71% of participating suppliers procure locally manufactured mounting structures.

FUTURE PROCUREMENT

50%



suppliers are willing to procure locally manufactured components.

36%



suppliers believe locally manufactured components cannot meet international standards.

14%



suppliers believe locally manufactured components could be more expensive.

7%



suppliers believe locally manufactured components would be available in limited quantities only, leading to shortage in supply when implementing a project.

\$↑
7%

7% suppliers are increasing their selling prices.

\$↓

14%

14% suppliers are seeking local content that could limit the price.



36%

36% suppliers are seeking cheaper components from new suppliers abroad.

\$×

43%

43% suppliers are not taking any pricing measures.

FUTURE PRICING MEASURES



For any questions:

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