

Pakistan Solar Quality Potential: Target Segments & Products

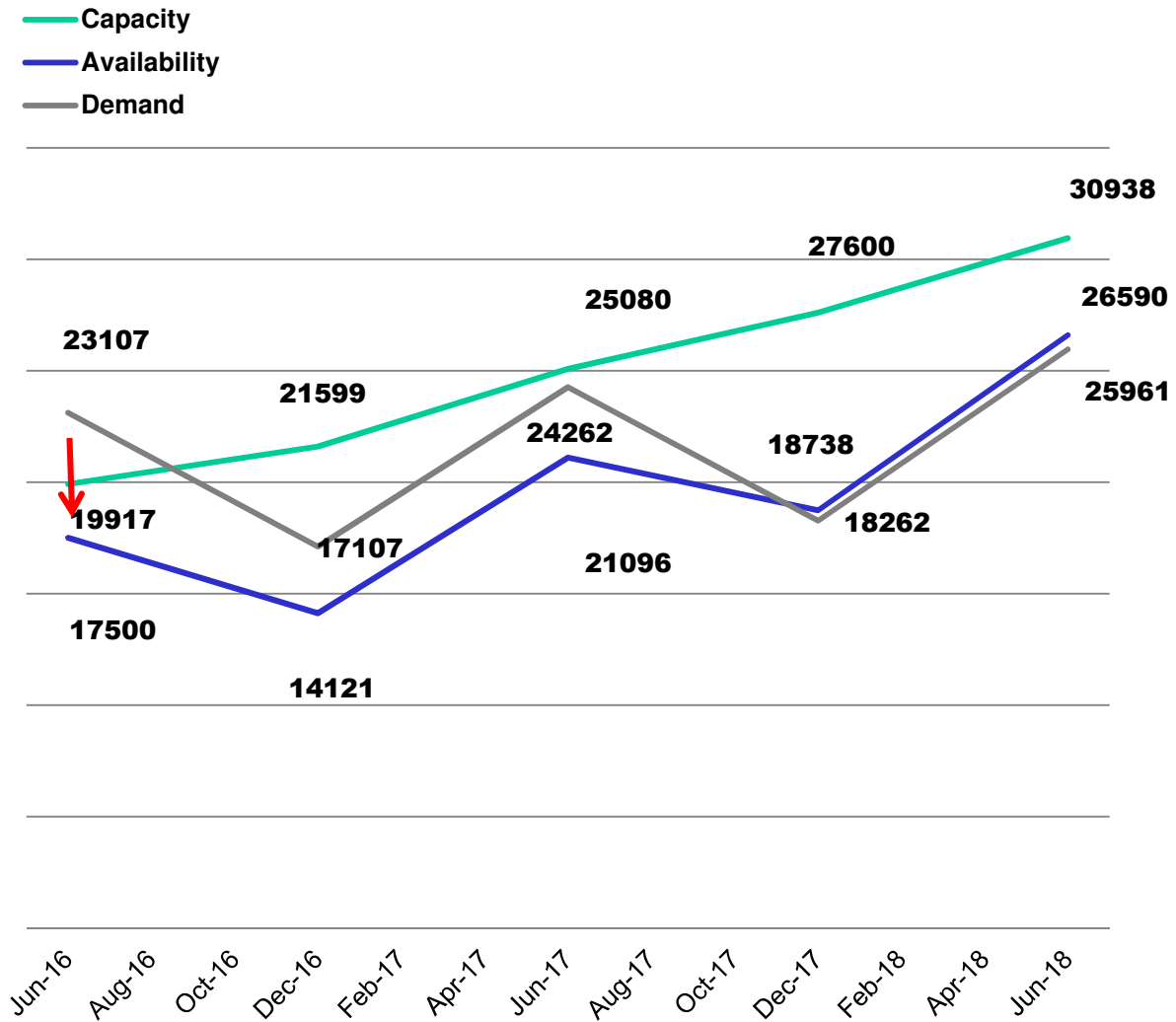
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International Project Manager

Dubai. 26th September 2017



Power sector in Pakistan: supply & demand scenario

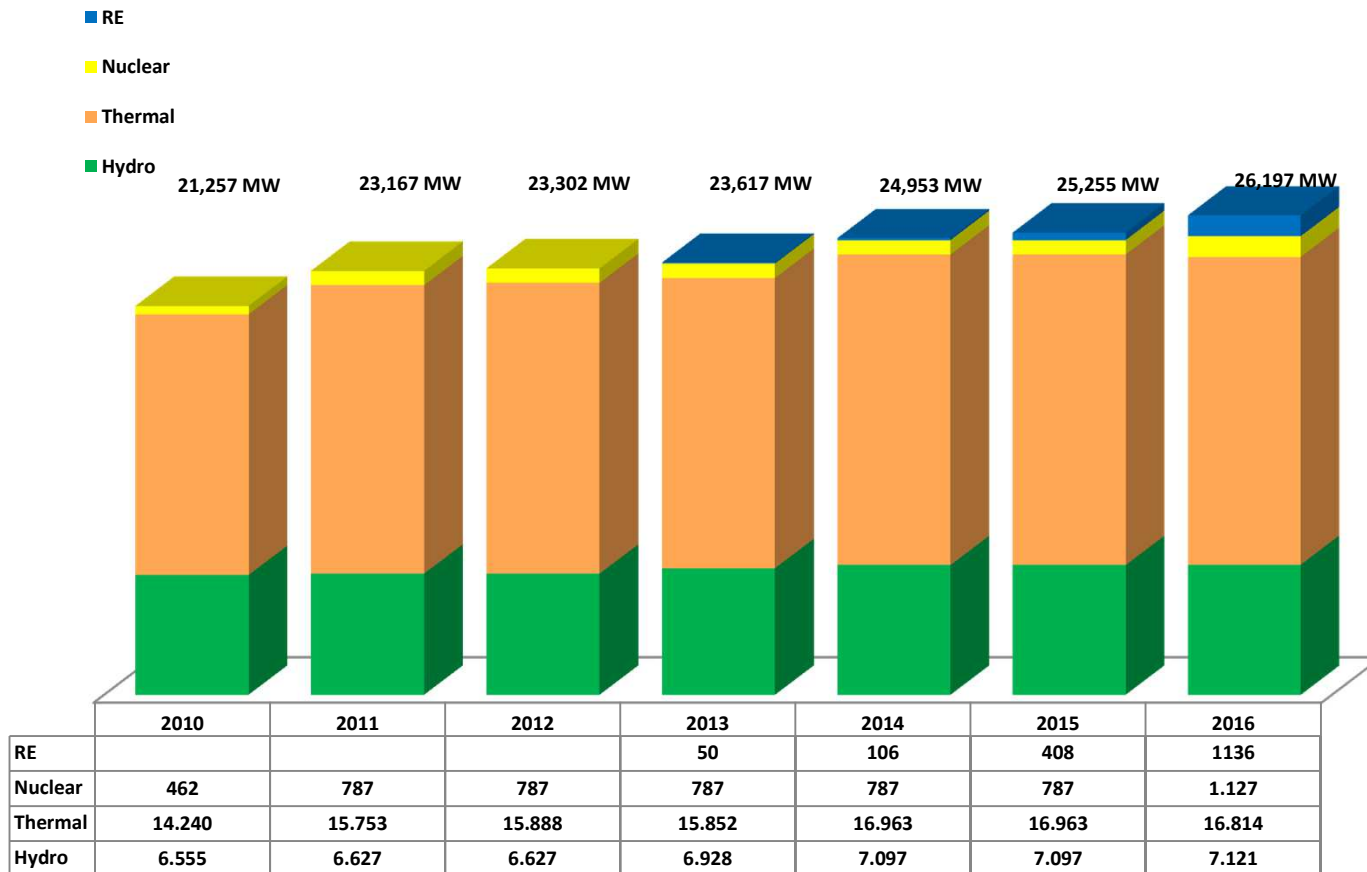


The power deficit was near 5 GW in summer 2016

- Multiple power generation projects from various sources are currently in the pipeline and are envisaged to eliminate the power deficit by 2019 - if expected projects are completed on time
- PV based projects can play a key role in the elimination of the power deficit, particularly in the industrial and residential sectors.



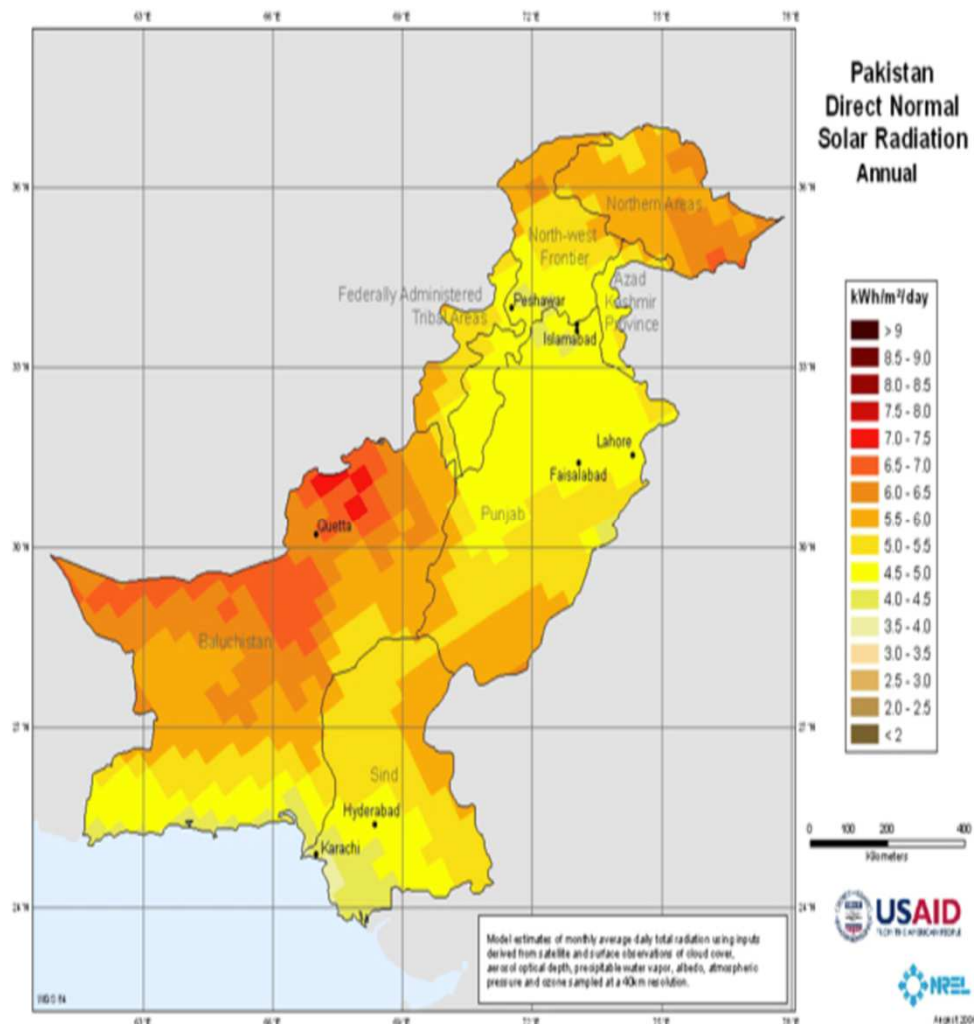
Power sector in Pakistan: installed capacity



- Share of RES steadily increasing each year
- 1136 MW of RES installed by 2016, mainly PV, wind and micro/mini hydropower
- **Goal to install 9700 MW of RES by 2030**

Source: CPPA, NEPRA and AEDB

Solar irradiation levels - Pakistan



High irradiation levels

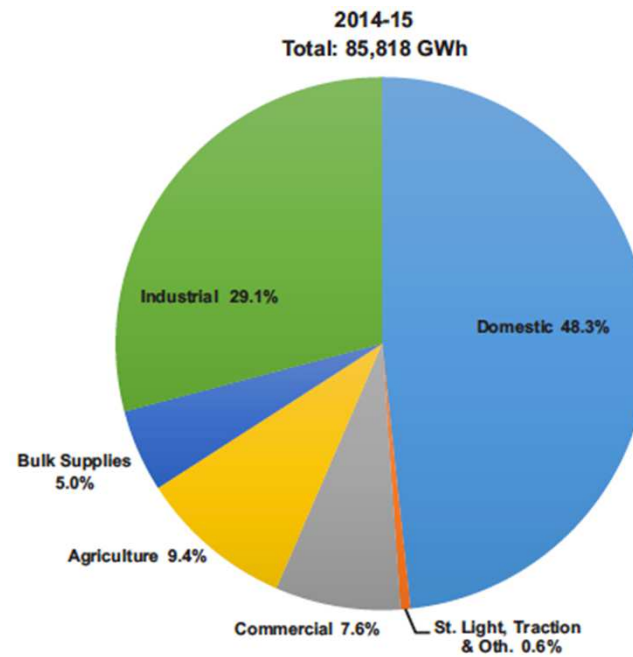
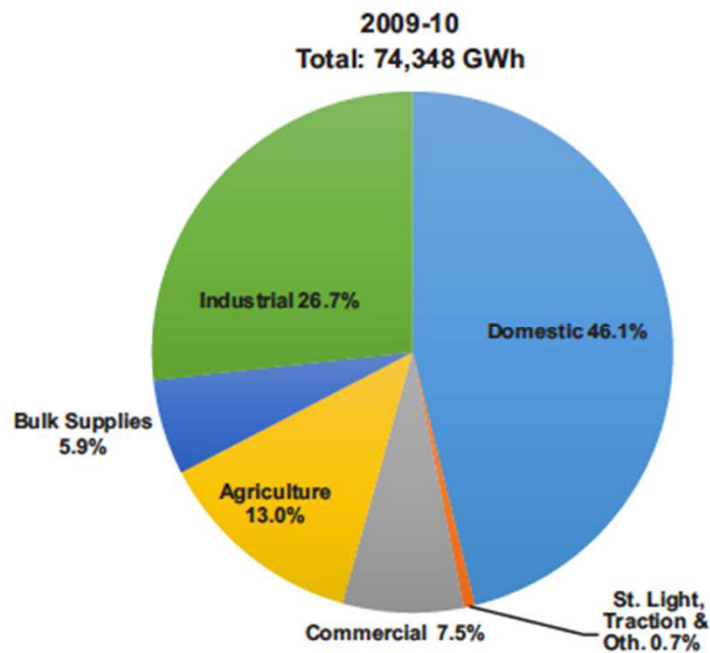
Across the country 4.5-7 kWh/m²/day

In particular: Punjab & Sindh provinces:

4.5 – 6.0 kWh/m²/day

High PV potential in both rural and urban areas. Industry concentrated in Punjab & Sindh provinces.

Power sector in Pakistan: higher demand in the domestic & industrial sector



Increase of **11,000 GWh** in the last 5 years, specially in the domestic and industrial sector

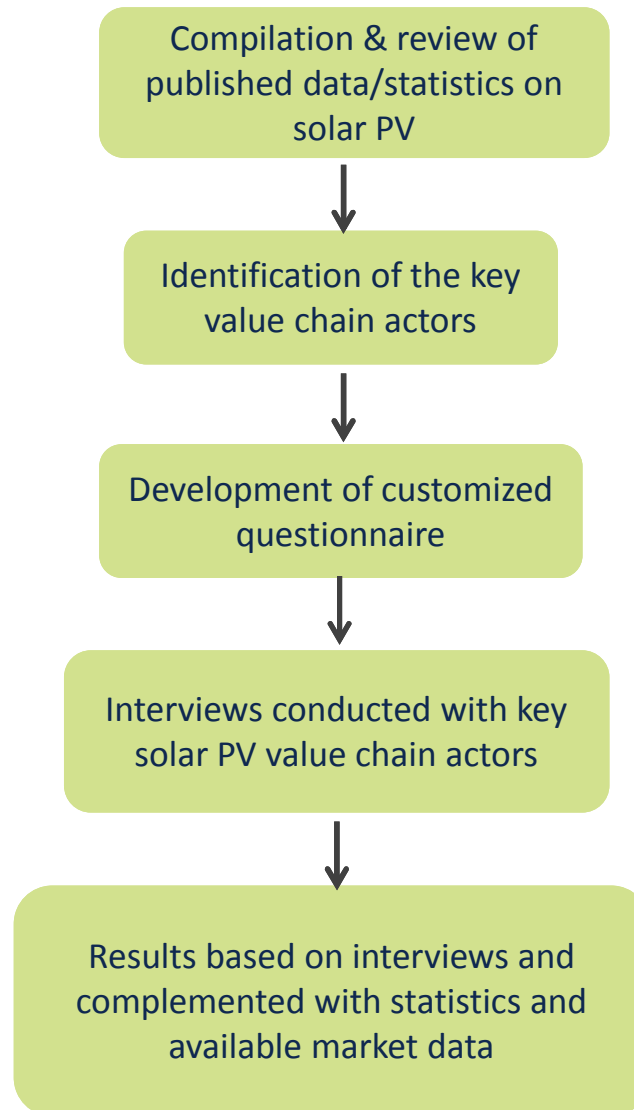


Rationale for PV development

- Significant and increasing energy demand in the country
- Policy on FITs (Feed in tariffs) catalyzing project development
- Introduction of net metering
- Introduction of import quality standards
- Financing available for PV



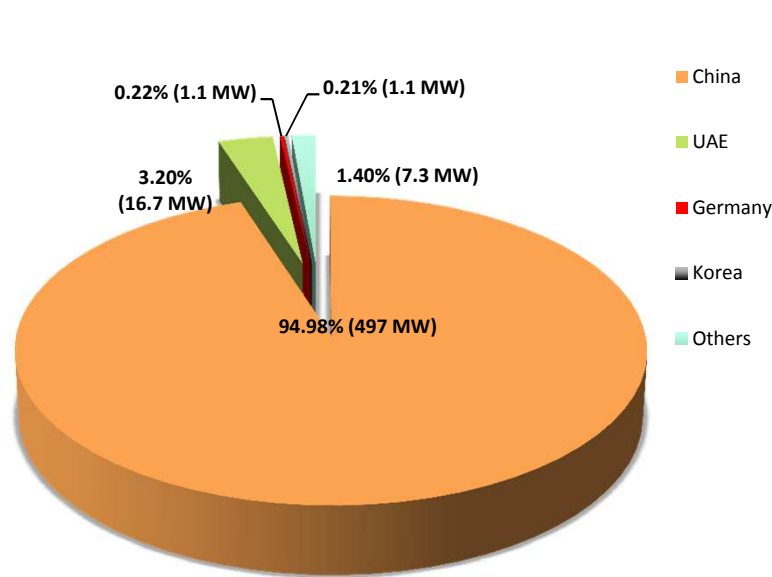
Methodology of the study



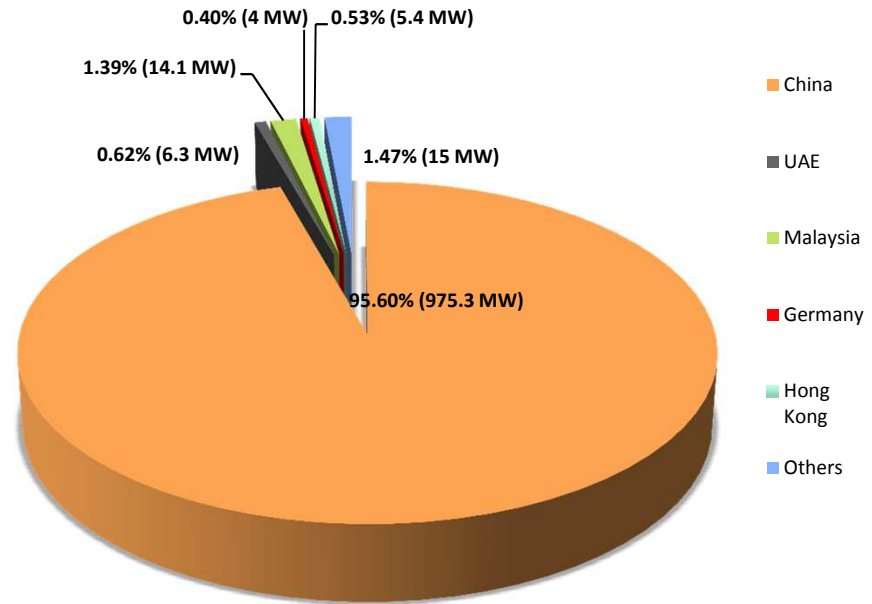
Trend of import of PV panels: Oct'14 - Sept'15 vs. Oct'15 - Sept'16



Chinese PV panels have the highest share of imports into Pakistan which has increased between 2014 and 2016. This is attributed to price competitiveness with similar products from other countries, extensive customer outreach through dealership networks and a large variation in product quality/pricing which caters to different economic classes of customers.



Oct'14 - Sept'15



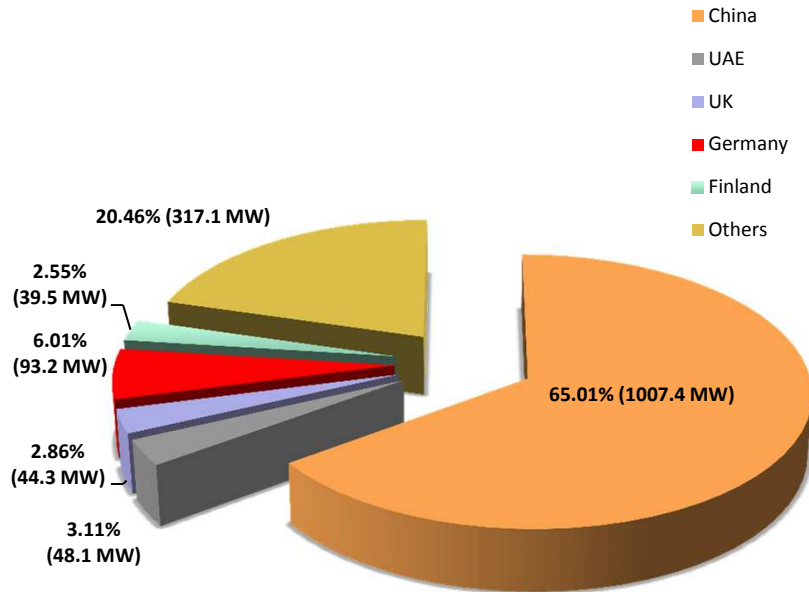
Oct'15 - Sept'16

- Federal Board of Revenue (FBR), GoP, 2016
- Panel volume imported (MW) calculated based on 0.7 USD/Watt (FBR Valuation Ruling No. 620/2013)

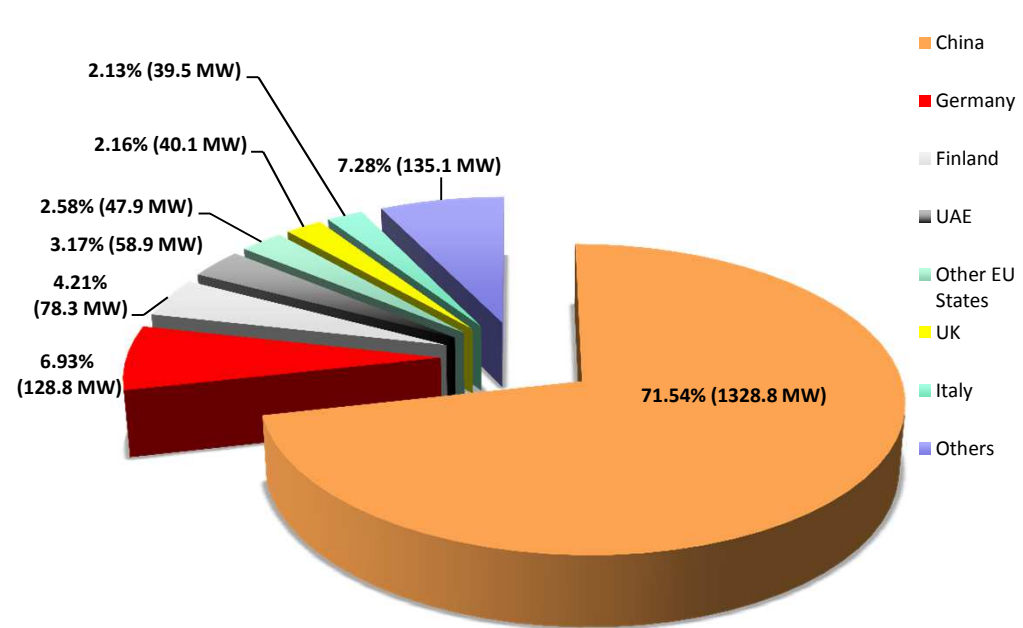
Trend of import of inverters: Oct'14 - Sept'15 vs. Oct'15 - Sept'16



Chinese inverters have highest share of imports into Pakistan which has increased between 2014 and 2016. The reasons behind this dynamic are the same as in the case of import of PV panels i.e. price competitiveness with similar products from other countries, extensive dealership networks and a large variation in product quality/pricing which caters to different economic classes of customers.



Oct'14-Sept'15



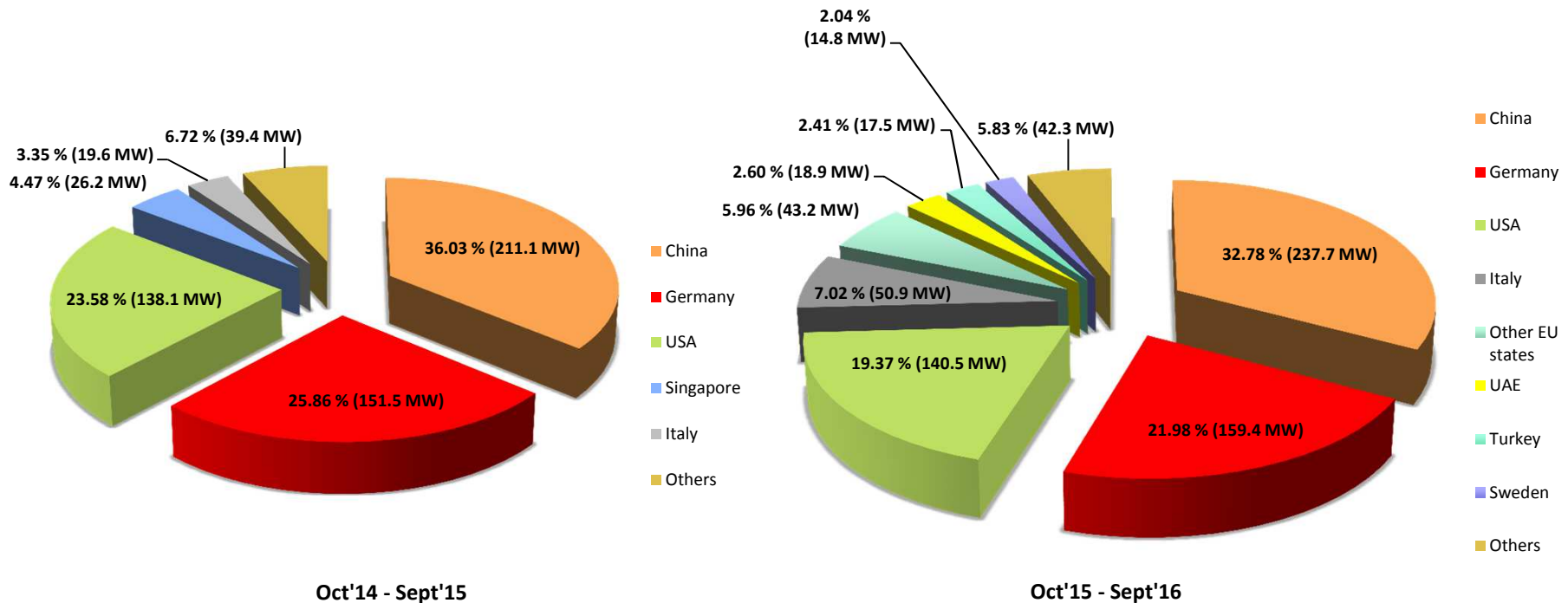
Oct'15-Sept'16

- Federal Board of Revenue (FBR), GoP, 2016
- Inverter volume imported (MW) calculated based on 37.5 USD/kW (FBR Valuation Ruling No. 751/2015)
- Inverter statistics presented are for all inverters imported into country (i.e. for use with PV systems and also for use as UPS for charging only from the grid)

Trend of import of charge controllers: Oct'14 - Sept'15 vs. Oct'15 - Sept'16



High proportion of 'Chinese' Charge controllers being imported into the country with the same reasons behind this dynamic as those already cited above for the case of PV panels and inverters. Overall volume of Charge controllers imported from Germany has increased over the last year, although there has been a minor decrease in the market share

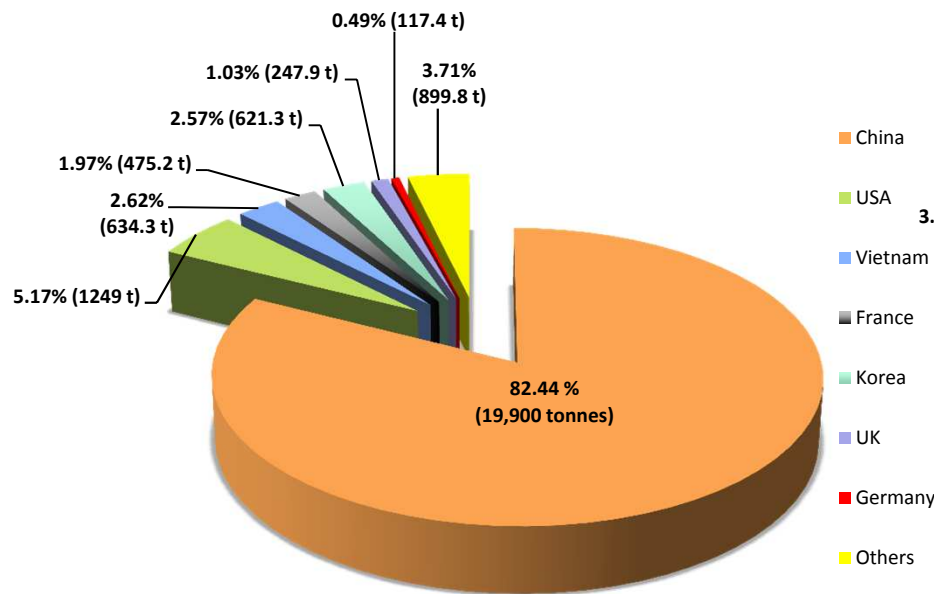


- Federal Board of Revenue (FBR), GoP, 2016
- Charge controller volume imported (MW) calculated based on 37.5 USD/kW (FBR Valuation Ruling No. 751/2015)

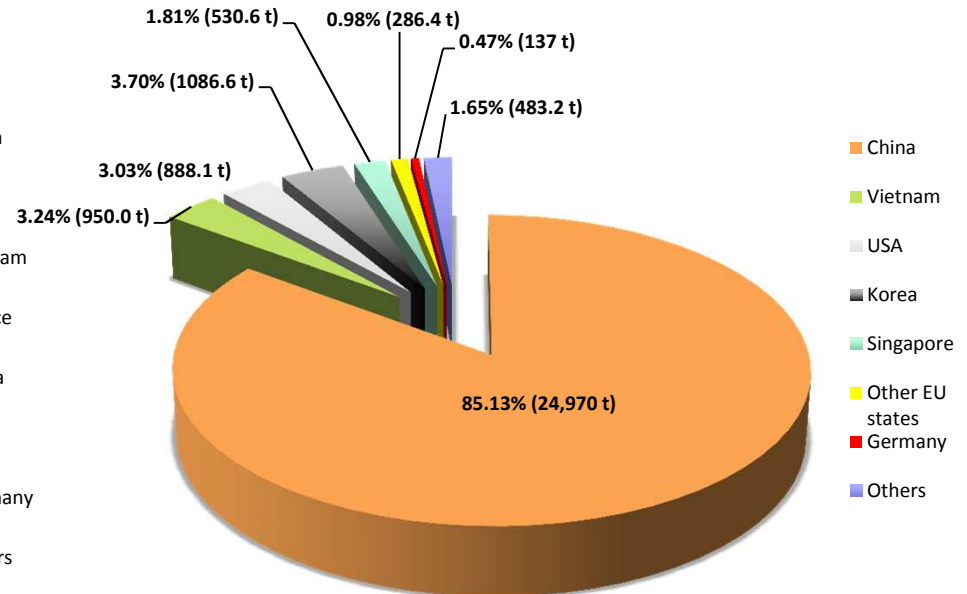
Trend of import of deep cycle' batteries: Oct'14 - Sept'15 vs. Oct'15 - Sept'16



High proportion of Chinese 'deep cycle' batteries being imported into the country with the same reasons behind this dynamic as those already cited above for the case of PV panels and inverters. Overall volume of batteries imported from Germany has increased over the last year, although there has been a minor decrease in the market share



Oct'14 - Sept'15



Oct'15 - Sept'16

- Federal Board of Revenue (FBR), GoP, 2016
- Deep cycle battery volume imported (tonnes) calculated based on 1.72 USD/ kg (FBR Valuation Ruling No. 723/2015)



Results based on interviews and market research



PV products & service range in Pakistan imported brands available



PV panels

Yingli	(China)
Kyocera	(Japan)
Rene Sola	(China)
LG	(Korean)
JA Solar	(China)
Canadian Solar	(China)
Alfa Solar	(Germany)
Hitek	(UK)
Jinko Solar	(China)
GH	(Belgium)
Trina Solar	(China)
Solar World	(Germany)
Phono	(China)
Beyond PV	(Taiwan)
Eurener	(Spain)
Hanergy	(China)
Shanghai Solar	(China)

Inverters

Voltronic	(Taiwan)
Schneider Electric	(French)
Sacred Sun	(China)
SMA	(Germany)
ABB	(Swedish-Swiss)
Outback	(USA)
Nedap	(Holland)
Sungrow	(China)
Baykee	(China)
Studer	(Swiss)
TBB Power	(China)
Fronius	(Austria)
Victron	(Holland)
I-Energy	(Taiwan)
Kaco New Energy	(Germany)

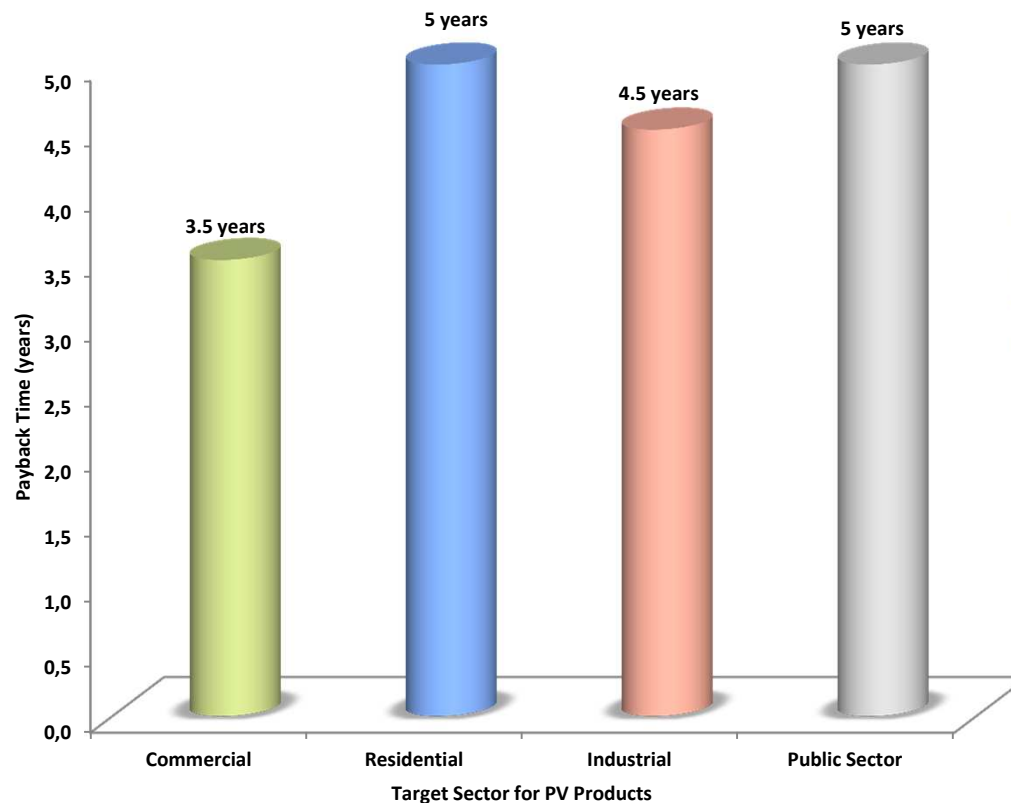
Batteries

Long	(Vietnam)
Hoppeke	(German)
Powersonic	(China)
Trojan	(USA)
Narada	(China)
Baykee	(China)
JTE	(China)
CSB	(Taiwan)
Huawei	(China)
Sunny Power	(China)
Inti Power	(China)

Results based on interviews with PV key value chain actors (wholesalers, importers, installers, retailers etc.) and on market research. The list is not exhaustive and may not include all available brands. The component brands are listed in no particular order. Considering the scope of this study, it was not possible to assess the specific market share of each respective brand mentioned here. Classification of equipment into 'Tiers' is currently not possible, due to the lack of quality standards in Pakistan.

Results: payback expectations

Question: What are the 'Payback expectations' from PV products of the different customer segments in the Pakistani market?



The shortest payback expectations are for the commercial sector (3.5 years), followed by the industrial sector (4.5 years)

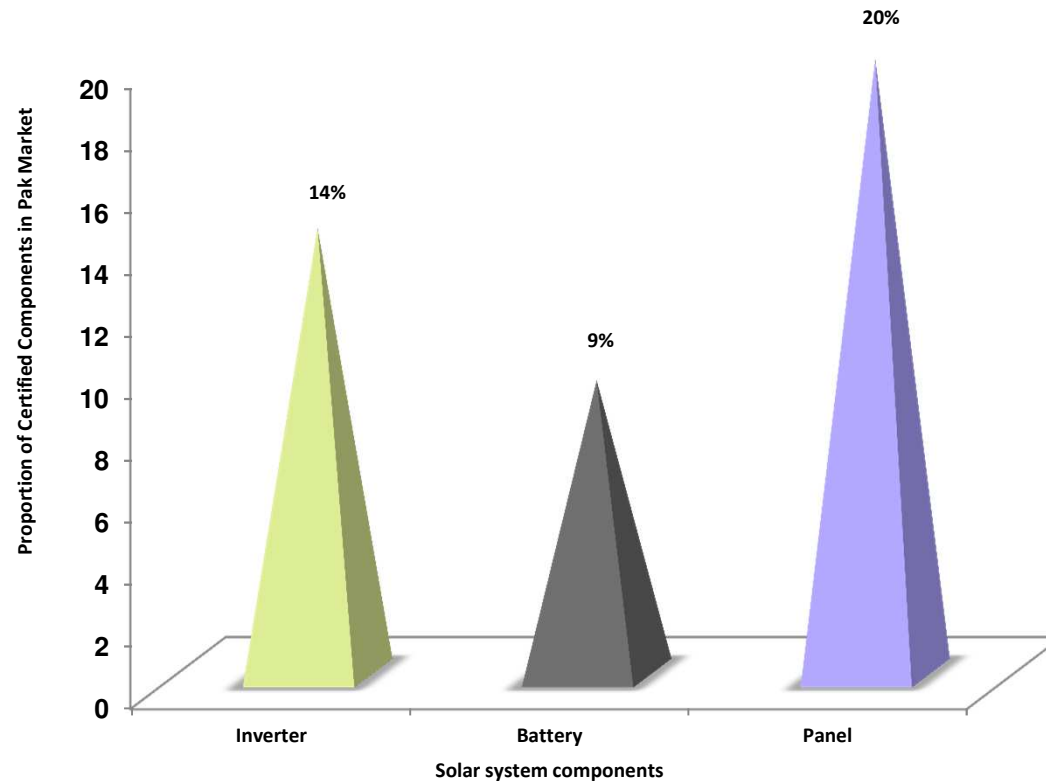
Note: 'Customers' collectively refers to clients from the residential, commercial, industrial and public sectors

Results based on interviews with PV key value chain actors (wholesalers, importers, installers, retailers etc.)

Results: certified PV components

Question: What is the proportion of 'Certified' PV components in the local market?

Low proportion of 'certified' PV components available in the local market



Results based on interviews with PV key value chain actors (wholesalers, importers, installers, retailers etc.)

Exact statistics on the specific brands and their respective volumes being imported into Pakistan are only available with the customs authorities. However, this information is restricted and classified.

Perception of the PV market segments

Industrial

Typical installation size 1 MW – 10 MW

High potential industries & locations

- **Textile** (spread across Punjab province)
- **Sports** (focused in Sialkot city)
- **Food** industry (across the country)
- **Pharmaceutical** industry (Karachi)

Possible project financing models

- **Financing** through recently announced scheme for RE project financing by State bank of Pakistan. Loans being offered at **6%** for solar PV projects up to 50 MW
- Conventional financing through lending from bank along with equity from project developer

Product preferences

Based on past trends, industry prefers to install reliable and high quality components to ensure project bankability.

SMA, Schneider and ABB quite popular in terms of reliability compared to Chinese products

Commercial

Typical installation size 100 kW – 1 MW

High potential segments & locations

- **Hospitals** (across the country)
- **Private educational institutions**
- **Hotels & restaurants** (across the country)
- **General provision stores** (across the country)

Possible project financing models

- **Financing** through recently announced Scheme for RE project financing by State bank of Pakistan. Loans being offered at **6%** for solar PV projects up to 50 MW
- Conventional financing through lending from bank along with equity from project developer
- Equity

Product preferences

In the past, tendency to install cheaper and less reliable quality Chinese brands. However, slowly trend moving towards increasing awareness leading to installation of SMA, Schneider and ABB due to high level of reliability

Perception of the PV market segments

Residential

Typical installation size 1 kW – 20 kW

High potential locations

- **Urban centers** (Karachi, Lahore, Islamabad, Rawalpindi, Faisalabad, Multan, Hyderabad)
- **40,000** un-electrified off-grid villages across the country
- **Agricultural areas** across Punjab, Sindh and KPK provinces owned by farmers with land holdings of different sizes

Possible Project Financing Models

- Financing through recently announced scheme for RE project financing by State bank of Pakistan. Loans being offered at **6 percent**¹ for solar PV projects up to 50 MW
- Equity
- Funding through donor projects in off-grid areas

Product Preferences

High price sensitivity exists with niche market for 'high quality' and certified products. Large proportions of clients in this sector opting for Chinese products although increasing interest in 'certified' high quality products as result of 'lessons learnt'

Public sector (Government funded)

Typical installation size 50 kW – 200 kW

High potential segments & locations

- **Public hospitals & health facilities**
- **Government educational institutions** (across the country)
- **Public parks and recreation facilities** (across the country)
- **Public offices** (across the country)

Possible project financing models

- Public financing from national approved budget as per PC-1 document
- Grant aid from international donor agencies

Product preferences

Tendency remains to maximize project size within allocated budget. Also, 'open' tenders bidding mechanism based on awarding project to 'lowest' bidder results in high quality and durable products losing out to competitors offering lower quality products

1. <http://www.sbp.org.pk/sme/d/circulars/2016/C3.htm>

* Results based on interviews with PV key value chain actors (wholesalers, importers, installers, retailers etc.)

Business environment for German PV companies: opportunities & challenges



Challenges

'Customer awareness' for PV and the benefits of investing in high quality and certified equipment need to be increased

'High Price sensitivity' for European products compared to non-European products.

- Residential sector: customers willing to pay 20%
- Industrial sector: 30 to 40% higher cost
- Commercial sector: 10-15% higher cost

Limited after sales' support of European products in comparison to e.g. China.

Limited technical expertise & product knowledge on PV components leads to issues during commissioning for system configuration and also during operation

Opportunities

Net Metering introduced by NEPRA in **Sept 2015**.

To increase the share of PV and generate revenue by feeding back into the grid. It is **expected to install 4000 MW of PV through net metering in the next 3-4 years**

Financing through recently announced scheme for **RES project financing by State Bank of Pakistan**. Loans with 6% interest rate for solar PV projects up to 50 MW

Implementation of **'Import Quality Standards'** to be implemented soon. It will ensure reduction in 'uncertified' solar PV components in the market and promote quality 'certified' products

German products enjoy high level of trust and reliability in all customer segments of the Pakistani solar PV market. Specially **grid tied systems**

The focus should be on **Large industry** (textile, sports, pharmaceutical etc.) . These industries are the mainstays of the Pakistani economy generating a high annual profit. **Solar pumping applications** also possess considerable potential for projects in the pipeline from the public sector in Sindh and Baluchistan provinces

Target segments for German PV products & services

Products

'Grid tied' inverters

for use in **medium scale** (100kW-1 MW) and **large scale** (>1 MW) grid connected projects being set up by industrial and commercial sectors.

(Price competitiveness with comparable products from other countries will be critical)

Batteries (Flooded or AGM)

The **residential, off-grid & the commercial** sector installations requiring battery back up. Installed system are expected to scale up to use the economic benefits of net metering and will require larger battery banks.

(Potential for high quality batteries exists but price competitiveness will other comparable products will be critical)

PV testing & monitoring equipment

(battery testers, PV panel testers, PV analyzers, PV panel flash test equipment)

Services

Technical consulting services

(techno-economic feasibility studies, grid connection studies, support in project tendering process, monitoring of commissioned projects, maintenance and operation of large scale grid connected & medium scale PV projects)

EPC Companies

for developing both commercial sector (kW scale) and large scale (>1 MW) grid connected projects

EPC contracting companies with a strong profile of developing large scale projects are in high demand

Study online available



<https://www.solarwirtschaft.de/enabling-pv.html>

Next activities: establishing the Solar PV sector through quality



- To **disseminate** targeted **information about quality companies, certified installers and products** to the different segments and consumers
- To **qualify the banking sector** about the evaluation of PV projects and the benefits of quality PV
- To **standardize procedures of PV installation** through certification
- To **stimulate the trade** exchange

On behalf of the GIZ from September 2017 - August 2019





Thank you for your attention

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