Photovoltaic Market Development

EUPD Research

Parag Bhamre

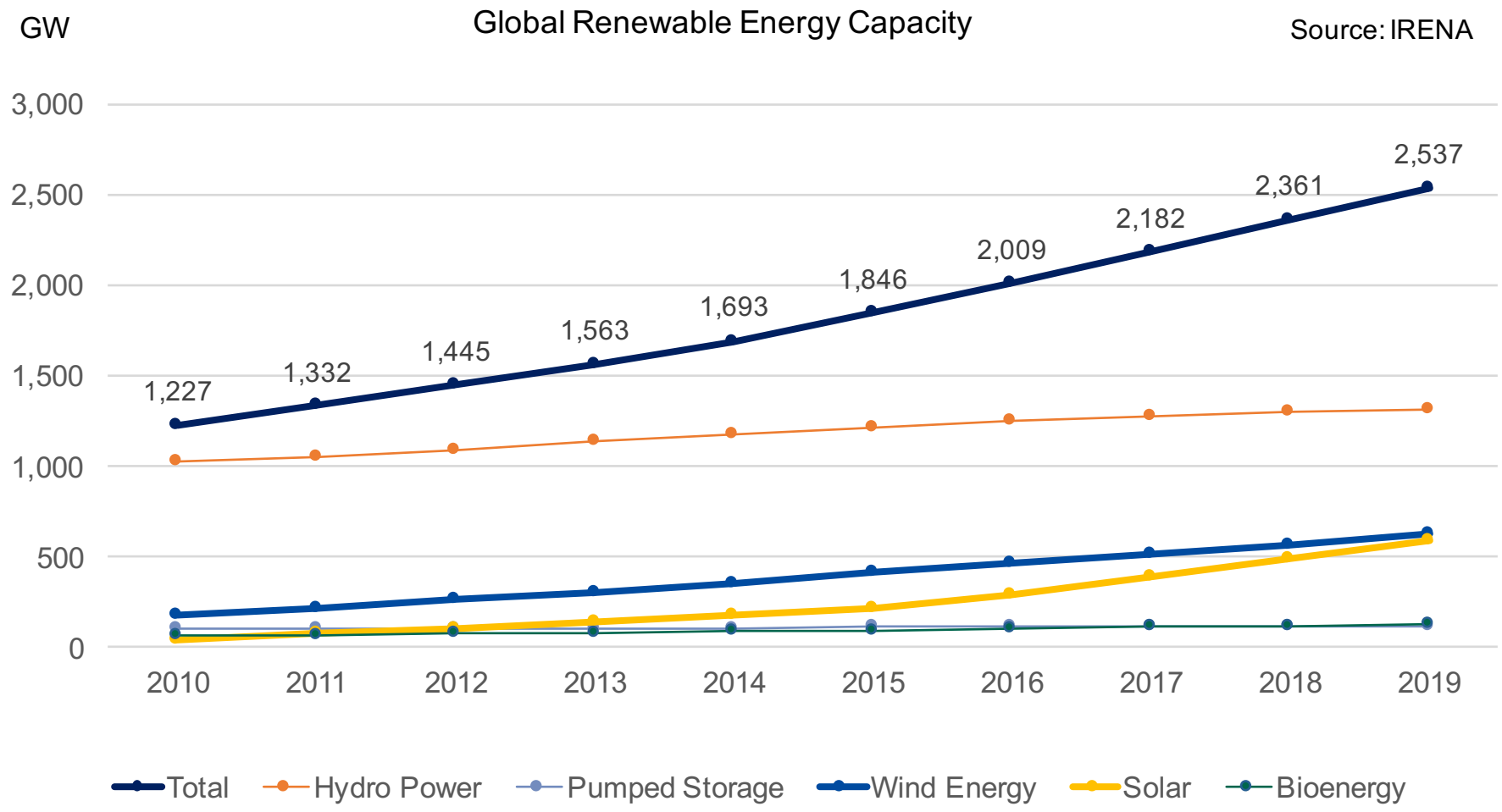
EUPD Research Sustainable Management GmbH

EPIC Online Technology Meeting

1st March 2021

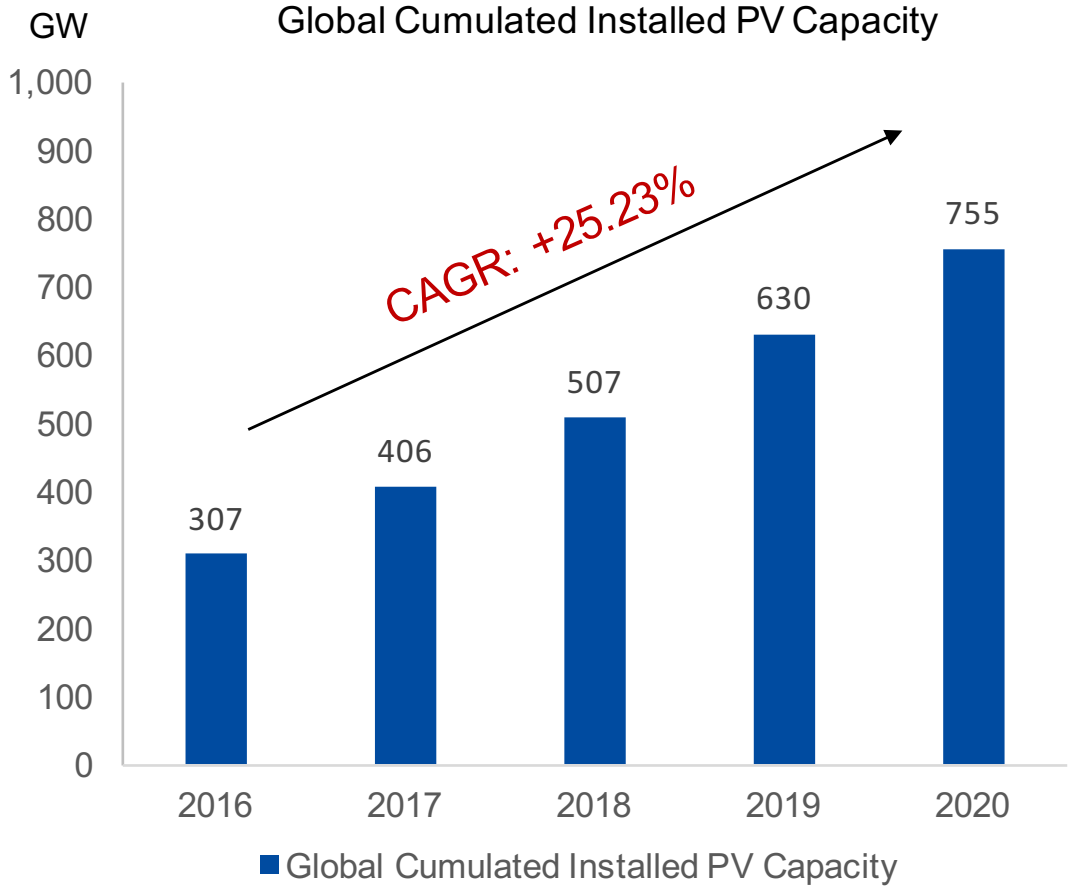
Global RES Capacity

Renewable Energy Sources particularly Solar and Wind has seen rapid growth since 2010.



Global Cumulated Installed PV Capacity 2016-2020

PV Deployments have grown at a CAGR of +25.23% over the last 4 years. Globally, the markets have added more than 100 GW+ per annum over this period.



Source: EUPD Research 2021

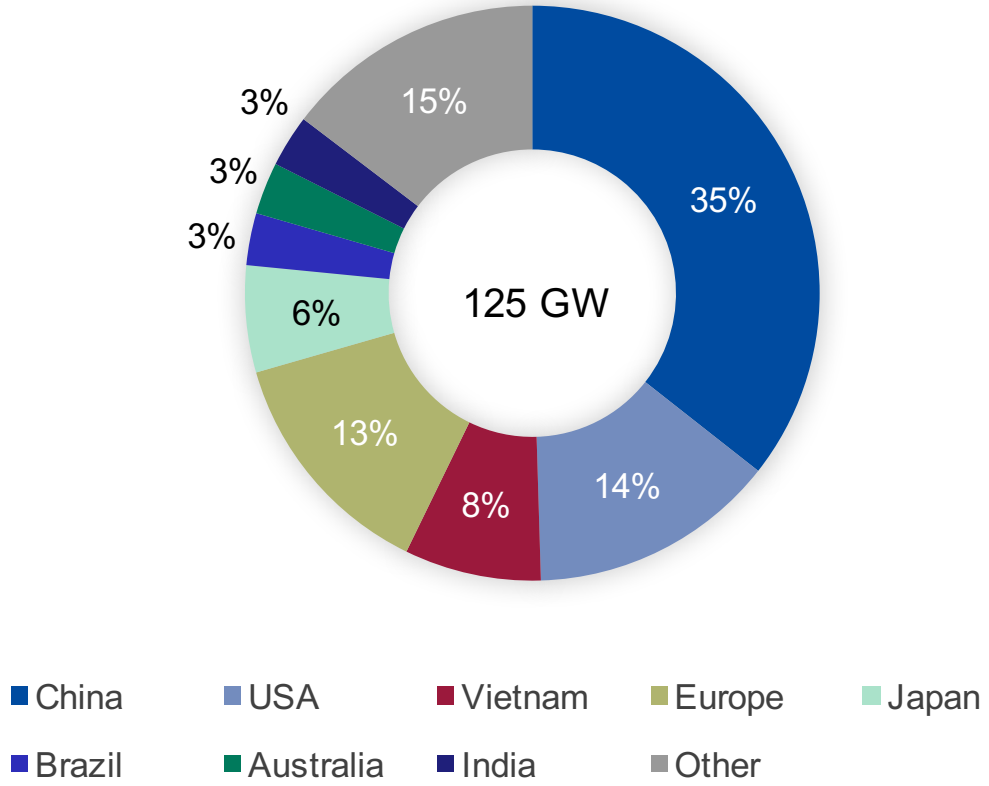
Major Reasons:

1. Strong support mechanisms
2. Economies of scale leading to reduced costs
3. Technological improvements

Top PV Markets – 2020

Despite the COVID-19 pandemic, 2020 was a relatively strong year for PV, although some large projects were delayed and deadlines extended. The momentum is further expected to increase in 2021.

Newly Installed PV Capacity in 2020



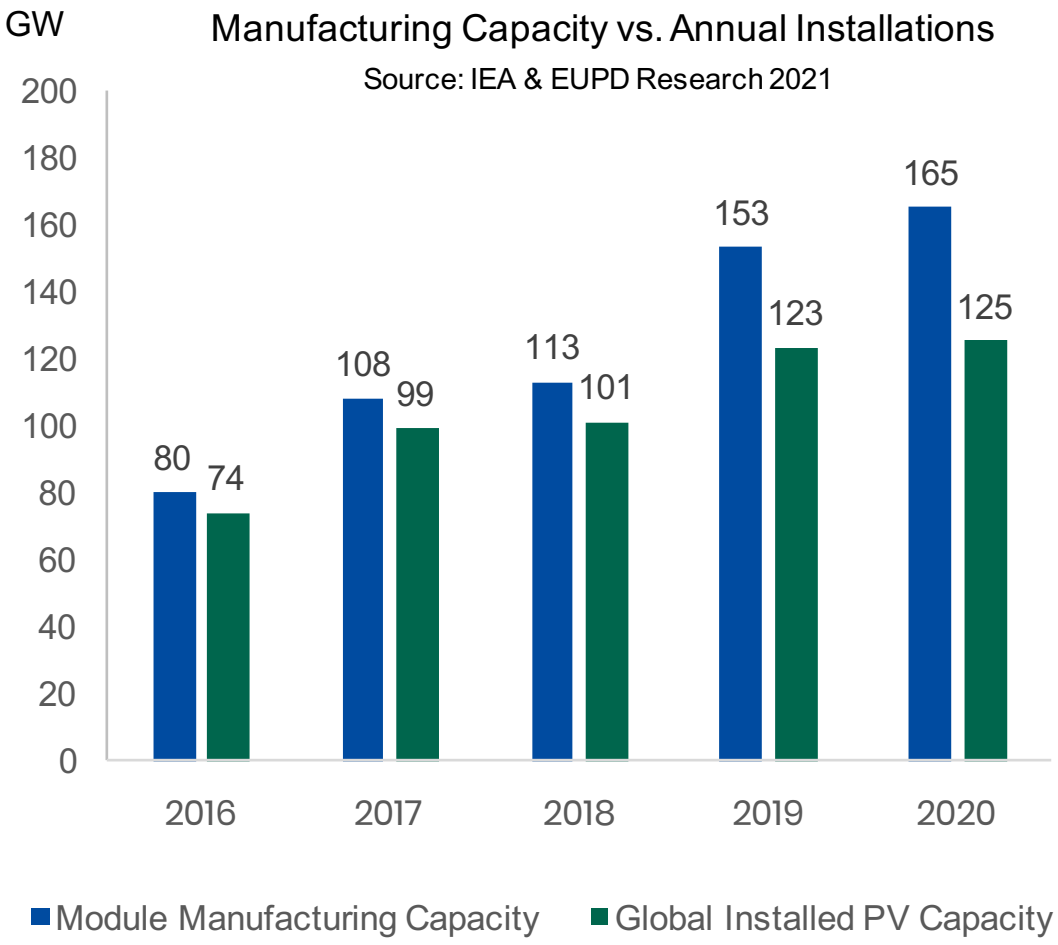
Source: EUPD Research 2021

Top Global PV Markets (2020):

- China – 48.2 GW
- USA – 19 GW
- Vietnam – 10.5 GW
- Japan – 8.2 GW
- Brazil – 4 GW
- Australia – 4 GW
- India – 4 GW
- Germany – 4.9 GW
- Spain – 3.2 GW
- Netherlands – 2.93 GW
- Poland – 2.2 GW

Global PV Manufacturing Capacities

Several Tier-1 module manufacturers have announced ambitious plans to scale production in China. Production initiatives in Europe have also started to take shape.



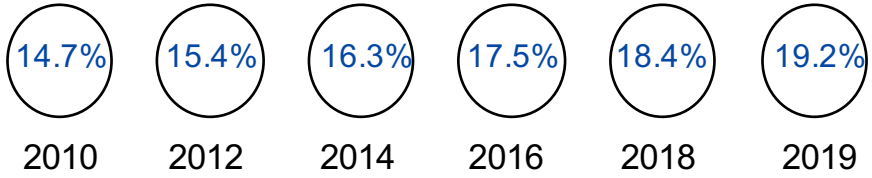
Top 10 Module Manufacturers (Tier 1) accounted for 80%+ of the market

PV Module Technologies

Key Metric(s)

- Efficiency – Ability of the solar module to convert incident solar light into electrical energy per unit area

Module Average Efficiency Progress ITRPV



Key Trends

- Increasing module power and sizes based on larger wafers is spreading rapidly

Wafer Size
M2 (156.75mm)
M6 (166 mm)
M10 (182 mm)
M12 (210 mm)

Power Rating
400 Wp+
450 Wp+
500 Wp+

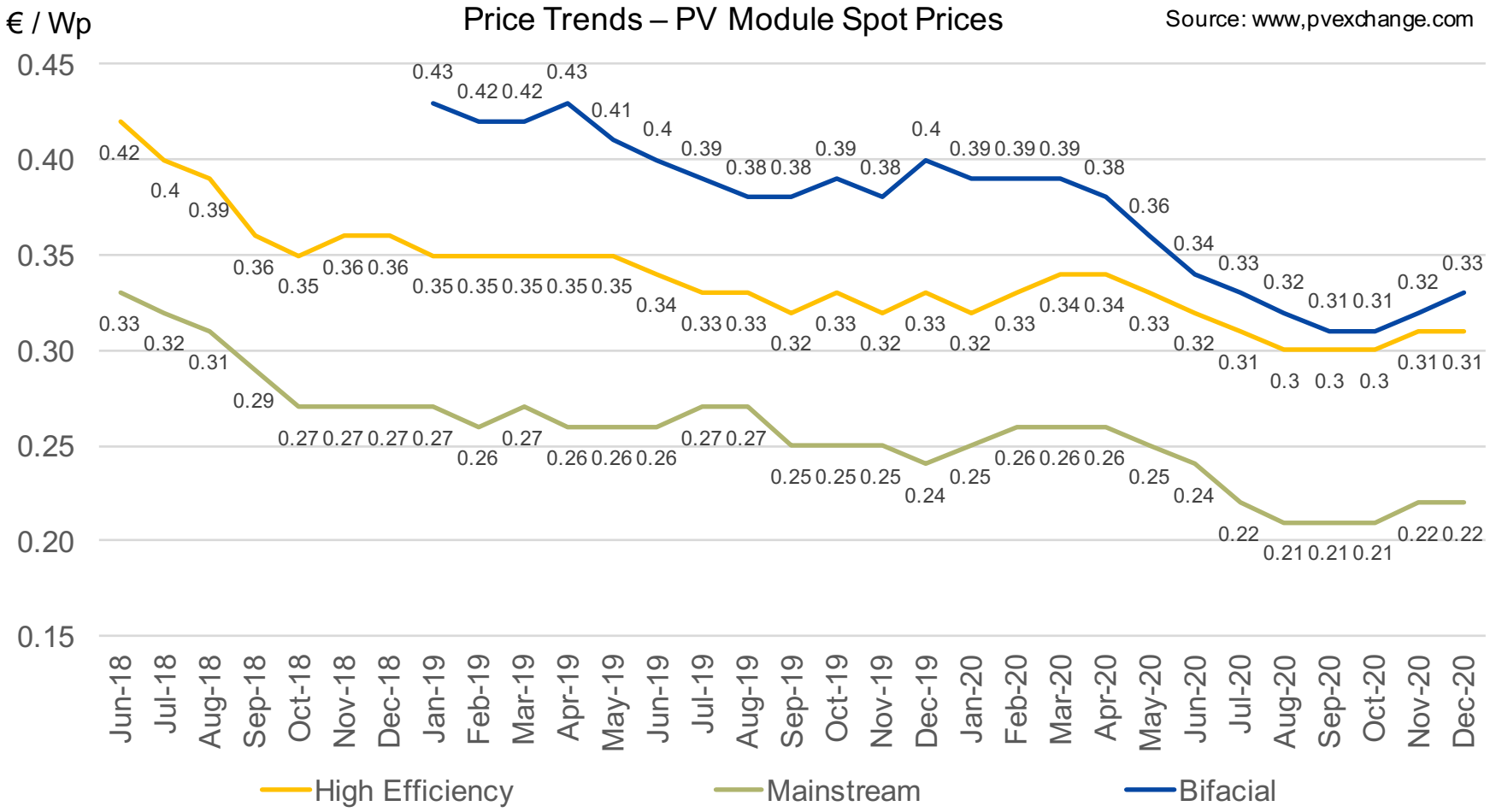
BOM Costs

- Move towards PERC (Passive Emitter Rear Cell) Technology
- HJT (Heterojunction Technology) and IBC (Interdigitated back contact) technology based on the application are gaining traction
- Migration from multi-crystalline to mono-crystalline is almost complete
- Increasing number of manufacturers are developing application oriented PV modules

Segment(s)	Drivers	Technology
Residential	Aesthetics, light weight	High Efficiency
C&I and Utility	High Power, Lower BOS Costs	Bifacial, MBB, Half Cells, Glass-Glass
Utility	High Power, Lower BOS Costs	Bifacial, MBB, Half Cells, Glass-Glass

PV Module Price Development 2018-2020

PV Module prices have dropped approx. 33% over the last couple of years in European markets. However, spot prices have slightly increased in recent months due to shortage of polysilicon and glass



Thank you for your attention!

Parag Bhamre
Partner | International Projects
EUPD Research Sustainable Management GmbH
M: +971-54-4427195
E: p.bhamre@eupd-research.com
W: www.eupd-research.com