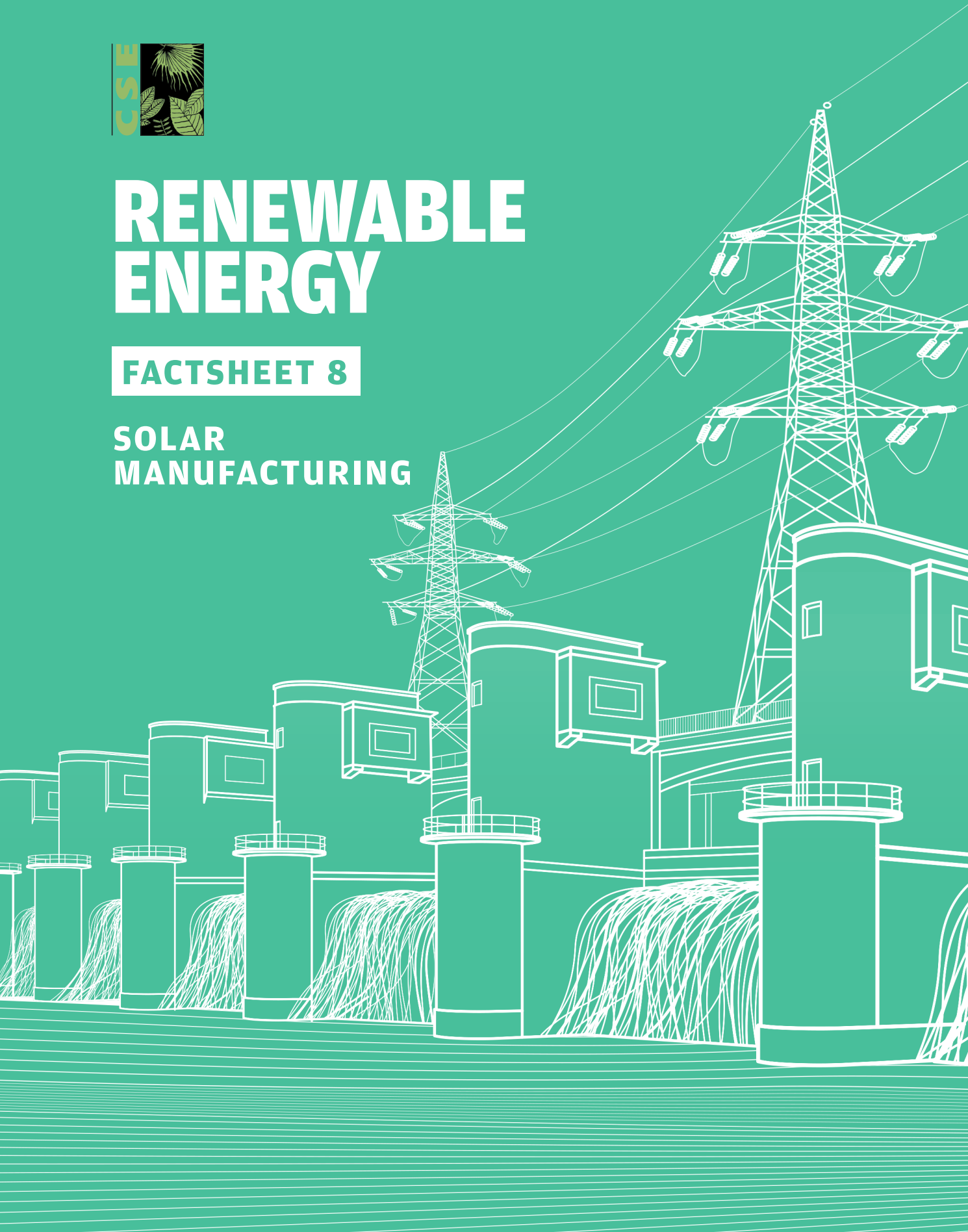




RENEWABLE ENERGY

FACTSHEET 8

SOLAR MANUFACTURING



SOLAR MANUFACTURING

The domestic industry remains way behind China's, whose products rule the roost in India. What is needed is a comprehensive policy and strategic vision, with vigorous investment in R&D

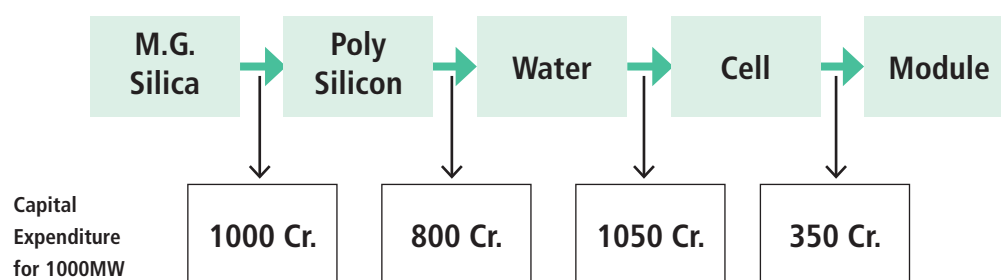
A. WHERE DO WE STAND TODAY

A 1 Between 2014 and 2019, the installed capacity of solar energy projects has grown at a compounded annual growth rate (CAGR) of over 60 per cent. The demand for solar modules has been strong and is expected to remain so over the next few years. India has installed more than 8 GW capacity of solar panels annually for the last three years.

A 2 Solar photovoltaic (PV) panels are an assembly of solar cells, which in turn are fabricated from silicon wafers through a chemical treatment. The wafers are processed from silicon ingots. As per latest government regulations, a 'domestically manufactured panel' requires to use solar cells made in India.

A 3 The capital cost for 1 GW of backward integrated solar panel manufacturing capacity, right from the manufacturing-grade silica, works out to Rs 3,200 crore (~42US\$/W) (see Figure 1). Backward integration is not only very expensive, but also technology- and energy-intensive (see Table 1).

Figure 1: Capital expenditure for 1 GW manufacturing capacity



Source: MNRE concept note

Table 1: Step-wise cost distribution estimations for PV module manufacturing in India (typical scenario)

Sl. No	Cost item	Ingot & wafer (US \$c/Wp)	Cell (US \$c/ Wp)	Module (US \$c/ Wp)	Total (US \$c/ Wp)	
1	Raw materials (BOM)	6.1	4.3	9.9	20.3	72%
2	Labour & staff	0.3	0.7	0.5	1.4	5%
3	Power & utilities	0.6	1.1	0.1	1.7	6%
4	Manufacturing overheads	0.8	0.6	0.3	1.7	6%
5	Depreciation costs	1.7	1.1	0.2	3.0	11%
	Total direct cost, US \$c/Wp	9.3	7.8	11.0	28.1	100%

Source: TERI¹

A 4 According to the MNRE, India currently manufactures only cells and modules (see Table 2).

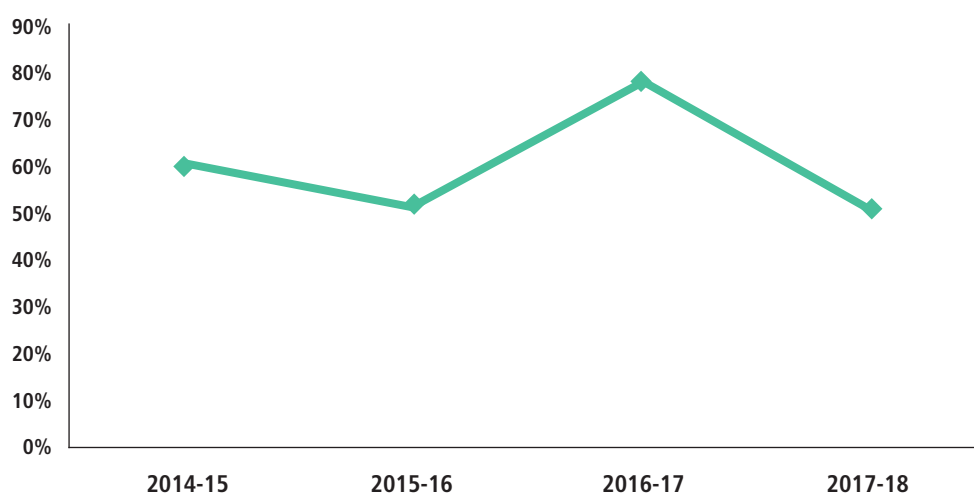
Table 2: Installed solar PV manufacturing capacity in India (current)

Solar PV cells capacity	Around 3 GW / year
Solar PV modules capacity	Around 10 GW / year
Polysilicon / Wafer / Ingots	No manufacturing in India

Source: MNRE

A 5 In 2017, the MNRE reported that about one-third of these manufacturing capacities were operational, but they were significantly under-utilised (see Graph 1) as the in-house manufacturing cost is not competitive compared to Chinese imports (see Graph 2).

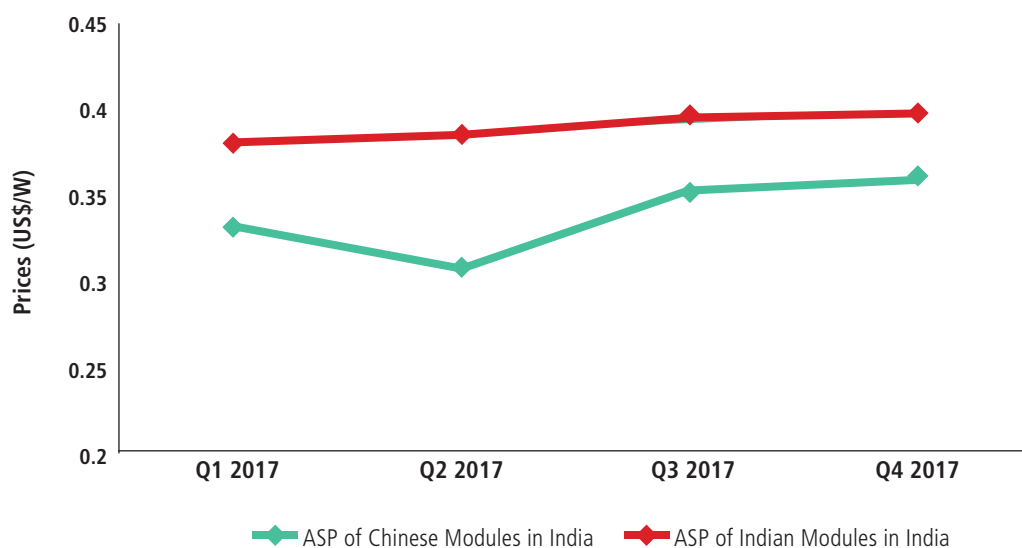
Graph 1: Capacity utilisation of solar cell manufacturing facilities*



*For 5 major manufacturers who have 72 per cent share in total installed capacity

Source: Directorate General of Trade Remedies²

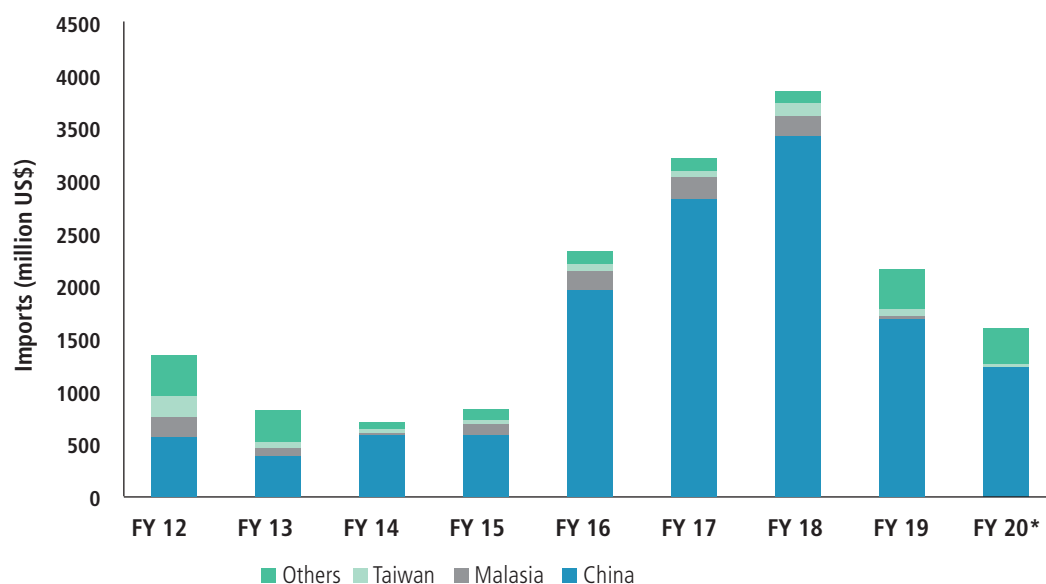
Graph 2: Average selling price (ASP) of PV modules in India



Source: Mercom India and CSE estimates

A 6 Cheap imports have been the backbone of solar installations in India and account for 80-90 per cent of the total installations. This has been counter-productive in the growth of the indigenous solar manufacturing sector. In the last decade, we imported solar cells and panels worth US \$17 billion, of which over 75 per cent was spent in the last five years (see *Graph 3*).

Graph 3: Solar cells and PV module imports



*From April 2019-January 2020

Source: Department of Commerce, Export Import Data Bank, Commodity - 85414011

A 7 To support manufacturers in India and make them competitive, the Central government had imposed a safeguard duty on imports of PV cells and modules from China and Malaysia in July 2018 for two years, pegged at 25 per cent for the first year and 20 per cent and 15 per cent for the subsequent six months and the last six months, respectively. The duty is coming to end in July 2020. During this period, the fall in solar panel prices in China has almost balanced the rise in cost due to the safeguard duty. Imports from China have reduced only by less than 10 per cent from FY-18 to FY-19. Additionally, Chinese modules are being re-routed into India through other Asian countries such as Vietnam and Thailand.

B BOOSTING THE DOMESTIC SECTOR

B 1 The government has taken some steps to facilitate domestic manufacturing capacity of solar energy equipment (see *Table 3*).

B 2 Despite these efforts, domestic production of cells has not increased since 2017; module manufacturing has gone up by a mere 1.2 GW from 8.8 GW in 2017. The reason has been a lack of a streamlined strategy, a dearth of vision, a want of a comprehensive policy. For example, the safeguard duty for two years did not provide manufacturers enough time and incentive to set up new factories or expand their facilities; neither did it offer any commitment from the government to procure from these manufacturers. The impact, therefore, was limited.

B 3 This attitude reflects in several postponements and a series of maneuvering in the terms and capacities for tenders issued by the Solar Energy Corporation of India (SECI) in FY 2018-19 for setting up solar power projects and solar manufacturing capacity. In 2019, this was finally tendered out for selection of developers for setting up of 7 GW of solar projects combined with 2 GW solar manufacturing facilities. Under the tender, capacity of 4 GW of solar projects with 1 GW of manufacturing plant has been awarded to two developers (Azure Power and Adani Green Energy)⁶.

Table 3: Government's efforts to boost domestic manufacturing³

Year	Initiatives
2016	Modified Special Incentive Package Scheme (M-SIPS) of the Ministry of Electronics and Information Technology. The scheme, inter alia, provides for: <ul style="list-style-type: none"> 20-25 per cent subsidy for investment in capital expenditure for setting up the manufacturing facility Reimbursement of Countervailing Duty (CVD) / excise duty for capital equipment for the units outside a Special Economic Zone (SEZ)
2017	MNRE proposed a scheme to support new manufacturing capacity of solar PV modules, cells, wafers / ingots, and polysilicon in India by either Central Financial Assistance (CFA) in the form of capital subsidy of 30 per cent or through interest subvention of 3 per cent. This will be offered for setting up / up-gradation of domestic manufacturing capacity in the country. ⁴
2018	The 'Implementation of Public Procurement (Preference to Make in India) Order for Renewable Energy Sector' has stipulated that apart from civil construction, preference shall be provided by Central ministries / departments and Central PSUs to domestically manufactured / produced products such as solar PV modules and other components like inverters, etc for grid-connected solar power projects. The minimum percentage of local content required is 100 per cent in the case of solar modules and 40 per cent for other components such as inverters etc.
2019	A mandate has been issued for use of solar PV cells and modules from domestic sources for the new schemes of MNRE, such as the Grid-connected Rooftop Solar Programme Phase-II (40 GW), PM-KUSUM (~25 GW), and CPSU Scheme Phase-II (12 GW), in a WTO-compliant manner – a government subsidy will be provided under these schemes.
2020	The finance minister, in her 2020 Budget speech, has announced a basic customs duty of 20 per cent on imported solar cells and modules. But her statement lacks clarity. While safeguard duty was applicable only on cells and modules imported from China and Malaysia, a customs duty will apply to all imports and may even be applicable on units domestic manufacturers have set up inside SEZs.
2020	RE Equipment Manufacturing Parks: The MNRE has initiated action towards setting up new hubs for manufacturing renewable energy equipment in the country to meet both domestic and global demand. ⁵

B 4 The COVID-19 pandemic has affected the supply chain, which disrupted the installations. Industry experts say that now it is imperative to develop full-fledged local solar manufacturing capacity along with that of ancillary products through a national policy that addresses the challenge of meeting the solar power generation target of 100 GW by 2022 under the National Solar Mission.

B 5 All said and done, Indian-made modules will keep facing competition from Chinese modules. The economies of scale and expertise are in favour of China, which is estimated to have over 50 GW of PV module production facilities. Chinese solar manufacturers have announced expansion plans in recent months amid a push to grab greater market share and reduce costs, which analysts say could signal more pain ahead for the domestic industry. GCL System Integration Technology Co, the China-based company, plans to build the world's biggest solar panel manufacturing plant, with a capacity to meet half of the global demand – the investment will be to the tune of US \$2.54 billion⁷. Hence, India needs to increase spending on research and development to constantly innovate not only to overcome the Chinese hegemony, but to also stay ahead in the competition.

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