

# PV manufacturing capacity expansion announcements in Q2 2018

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## Abstract

PV manufacturing capacity expansion announcements in the second quarter of 2018 were slightly higher than the previous quarter, although activity slumped specifically in June, following China's decision to suddenly cap utility-scale and distributed generation projects. The quarter was also characterized by activity in India, partially driven by a major Chinese manufacturer. The report will also analyze first half year capacity expansion plans and targeted locations, globally.

## April review

Total capacity expansion announcements in the month of April 2018 were 12,800MW, slightly higher than the total of 12,570MW announced in the previous month. In the last few years April had not been a particularly strong month for announcements but the plans announced were the highest on record for the month of April.

The strong month was supported by activity across thin film, solar cell and module assembly. Following on from an announcement in the previous month from Hanergy Thin film Power

Group, primarily CIGS (Copper-Indium-Gallium-Selenide), which totalled 2,140MW, CdTe leader First Solar announced the building of a new 1.2GW manufacturing plant near its existing flagship facility in Perrysburg, Ohio.

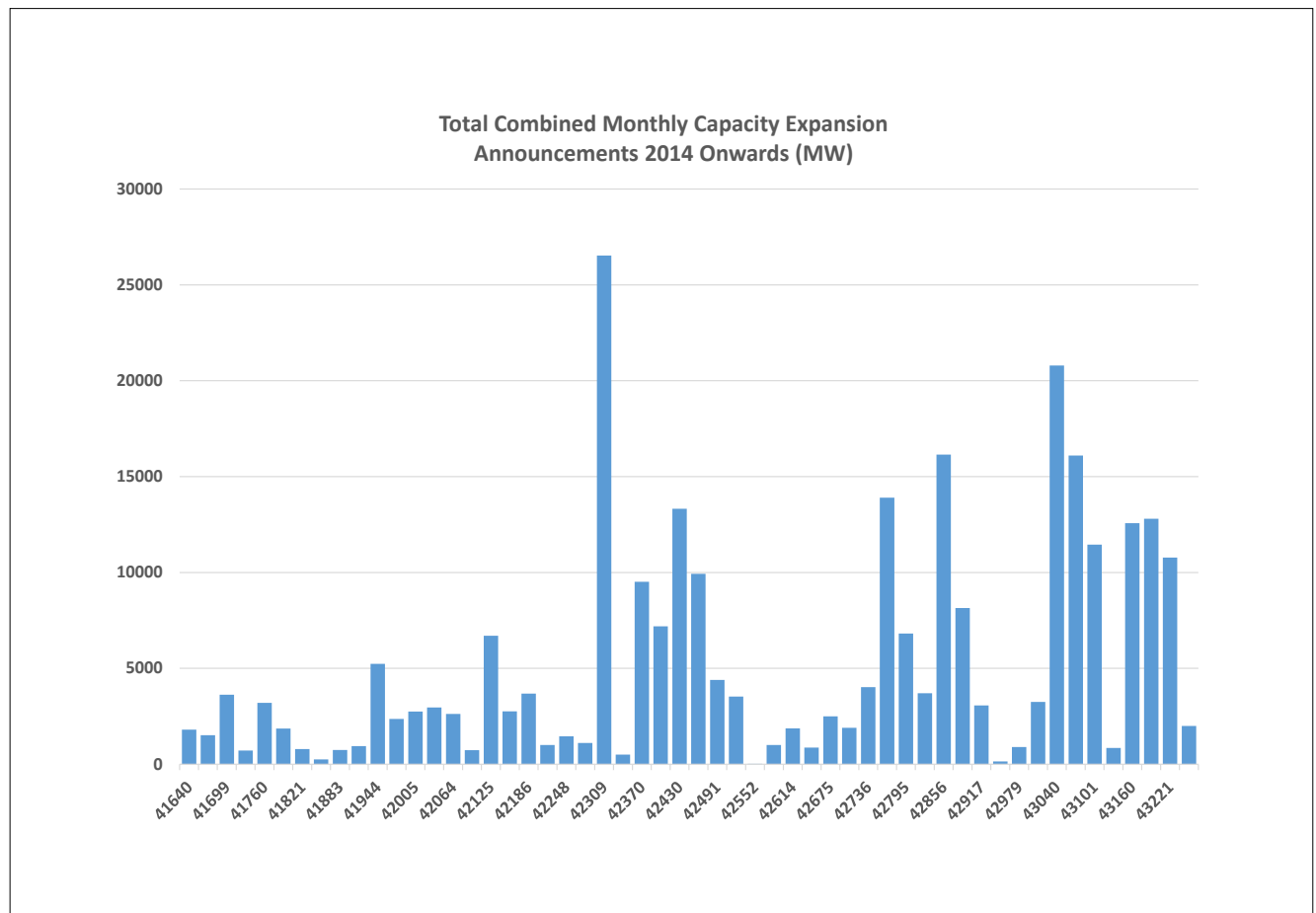
The company said that the new production plant for its large-area Series 6 modules would require around US\$400 million in capital expenditure and create around 500 new jobs.

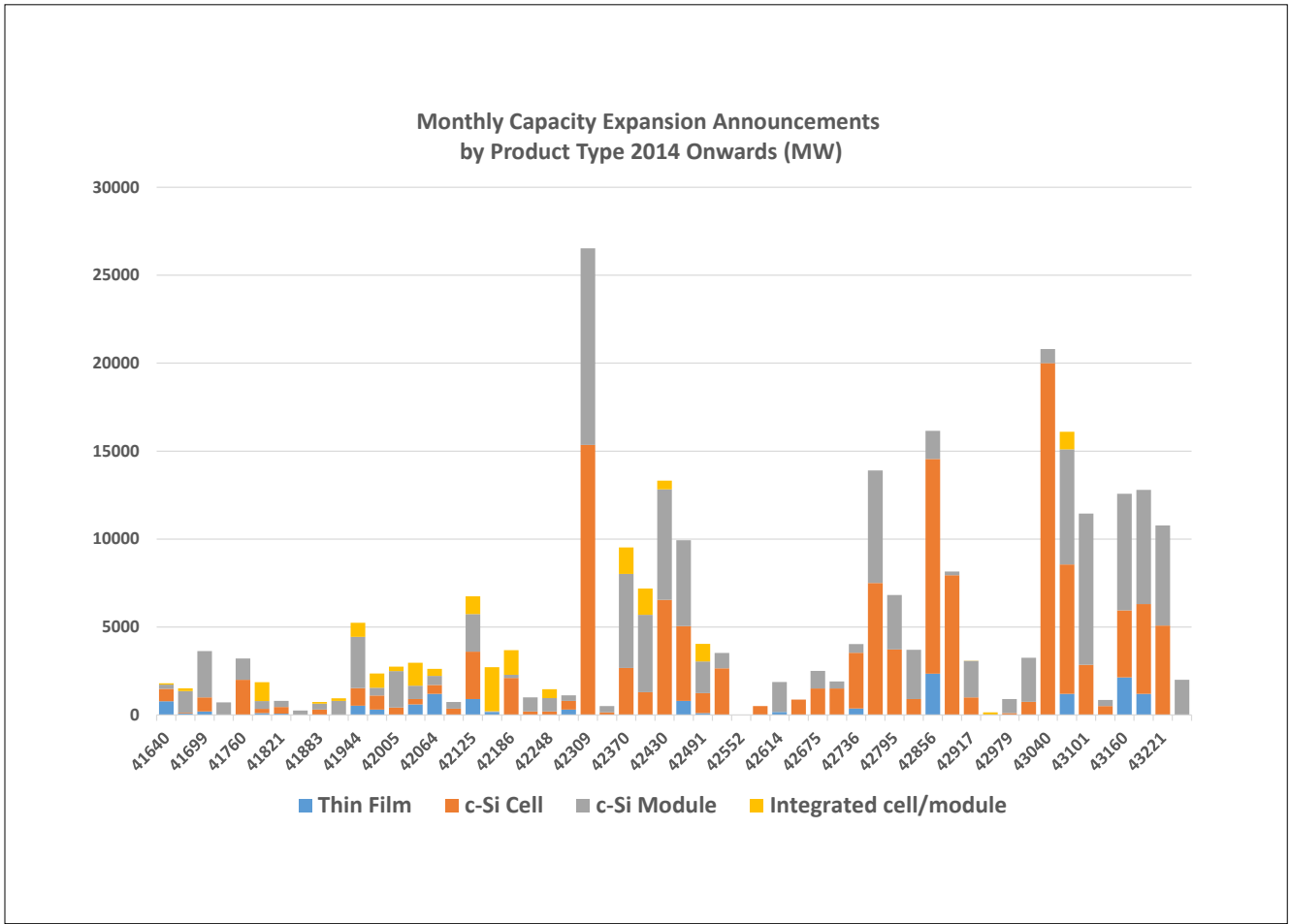
The capacity expansion plan includes a one million square foot facility located in Lake Township, Ohio, a short distance from the Perrysburg facility, which started construction in mid-2018 and is expected to start full production ramp in late 2019.

As a result, First Solar will have a nameplate capacity in the US of 1.8GW of Series 6 modules and the largest PV manufacturing base of any PV company in the US.

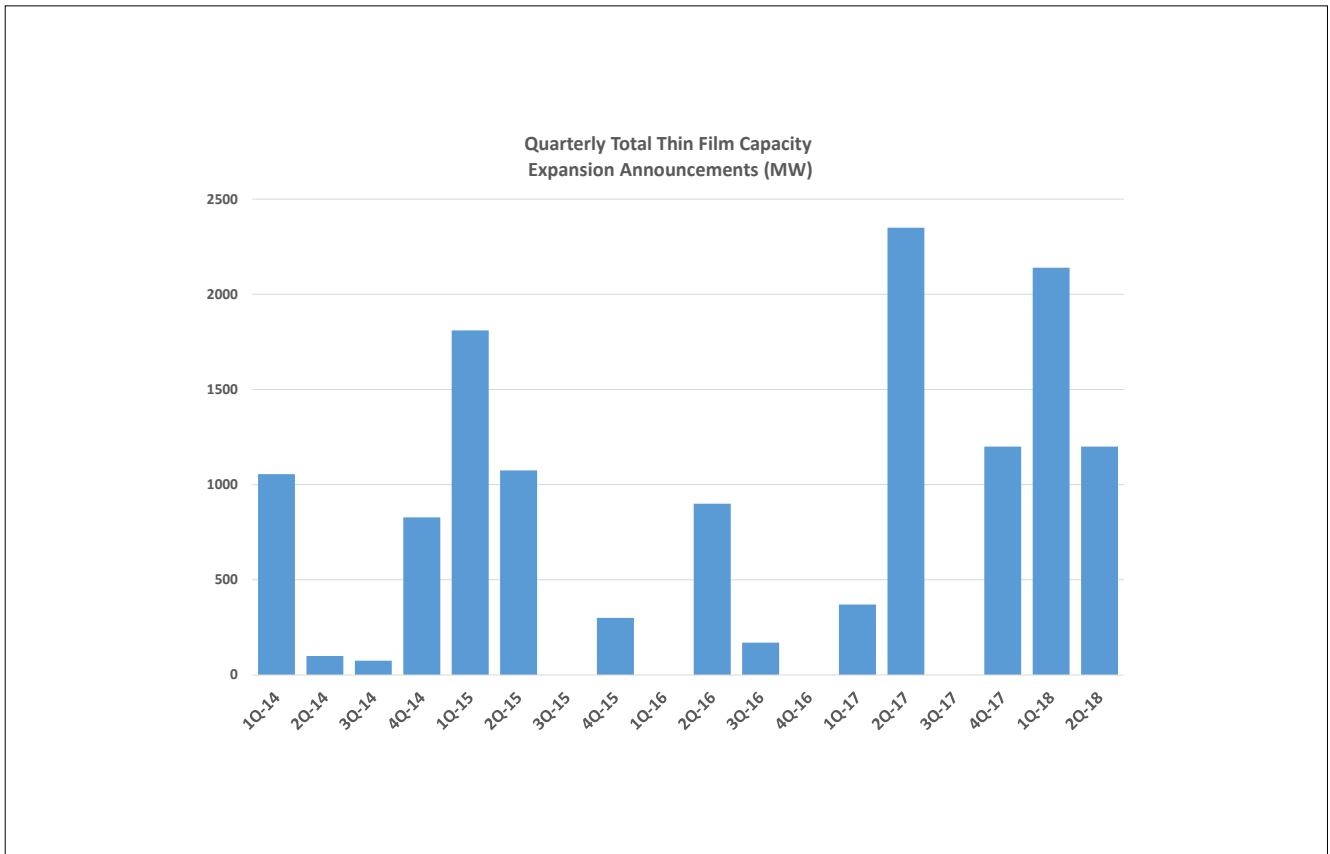
Solar cell expansions announced in April were also strong, totalling 5,100MW, up from 3,810MW

**Total combined monthly capacity expansion announcements, 2014 onwards (MW).**





Monthly capacity expansion announcements by product type 2014 onwards (MW)



Quarterly capacity expansion announcements by product type, 2014 onwards (MW)

in the previous month and the highest level since December 2017 (7,350MW).

The solar cell announcements were dominated by Softbank Vision Fund (SBVF) and GCL Group, with the two parties signing a memorandum of understanding (MoU) to launch a US\$930 million joint venture in the Indian state of Andhra Pradesh, primarily to manufacture PV ingots, wafers, solar cells and modules.

As with large capacity announcements, the companies said implementation would be carried out in two phases of 2GW each, should the plans be formalized. India has since placed a 'Safeguard Duty' on solar imports, making it more attractive to overseas PV manufacturers establishing local production.

At the opposite end of the scale, REC Group announced it had built a solar cell building at its integrated production plant in Tuas, Singapore, for its brand-new flagship module product, 'N-Peak'. The cell plant has adopted 'Industry 4.0' technologies and is expected to be highly automated. We have given this new plant an initial 100MW nameplate capacity as the company has yet to state the actual initial capacity or future nameplate capacity plans for the n-type mono half-cut cell facility.

Module assembly plans announced in April also trended strongly, reaching 6,500MW, slightly down from 6,620MW in the previous month, driven by the SBVF and GCL Group plans in India.

Other big news included plans by Turkish downstream EPC firm, Eko Yenilenebilir Enerjiler A.S. (EkoRE), which announced government support to build 1GW of wafer, cell and module assembly capacity in the Bor Organized Industrial Zone (OIZ) in Niğde.

'Silicon Module Super League' (SMSL) member JA Solar also released information on expanding mono wafer capacity in China by 4GW and expansions at module assembly plants in Fengxian, Shanghai (400MW), Hefei, Anhui (800MW) and 300MW at its facility in Xingtai, Hebei, China.

## May review

Total capacity expansion announcements in May were 10,780MW, down from 12,800MW in April and 12,570MW in March.

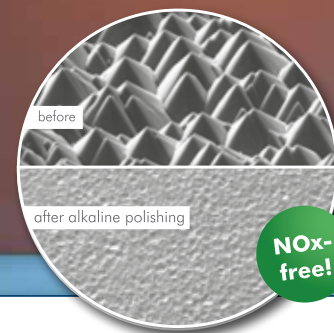
Both cell and module assembly expansions plans were fairly balanced at over 5GW each. There were no new thin-film announcements in May.

Solar cell expansion plans (5,080MW) included 5GW from GCL Group, this time in Egypt and approved by the National Authority for Military Production. As with plans for India, GCL could be planning to build an integrated manufacturing hub that would include ingot/wafer, cell and module production. Details of the plans remain limited and very much at an early stage of evaluation, despite Egyptian government rubber stamp.

Turkey-based Suoz Energy Group (marSUN), a module manufacturer also announced plans for a 500MW module assembly plant expansion after also buying an 80MW cell line from Greece from a bankrupt company.

Total module assembly expansion announcements in May were 5,700MW, down from 6,500MW in April and 6,620MW announced in March 2018.

## Key Processes for High-Efficiency Cell Production



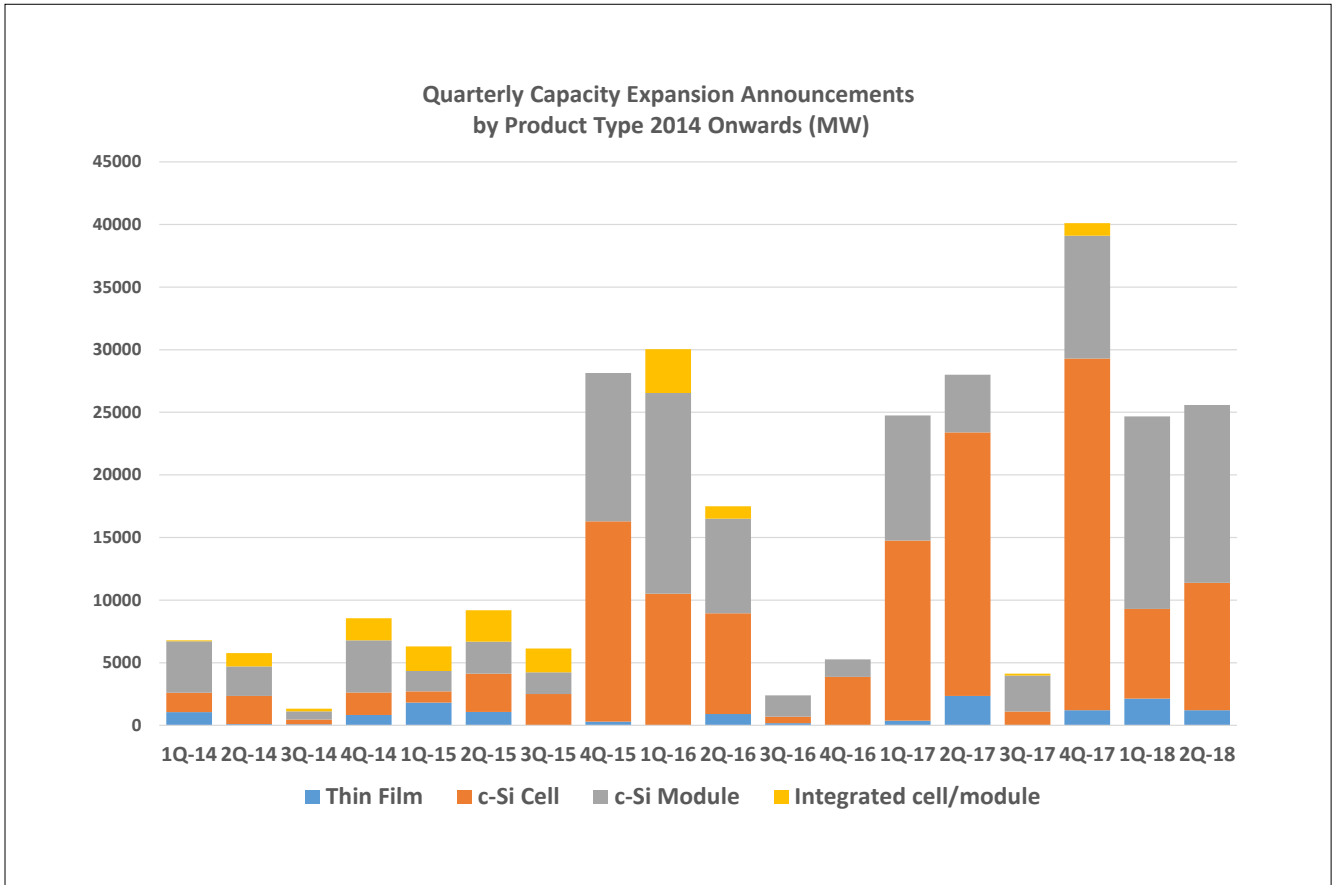
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**June review**

Capacity announcements in June only related to module assembly plans, which totalled 2,000MW from only three companies.

Notably, following China’s decision to suddenly cap utility-scale and distributed generation (DG) projects at the end of May, no China-based company announced new capacity expansion plans. Indeed, June stood out for being the only month so far in 2018 when a Chinese manufacturer did not announce new expansions.

India’s Waaree Energies had started production at its new 500MW assembly plant in the month and said it would add a further 1GW in the future.

Goldi Green, also based in Gujarat, India announced plans for a 500MW module assembly expansion with the plant expected to be highly automated.

However, arguably the significant announcement in the month came from LG Electronics, which said it would establish a 500MW module assembly plant in Alabama, US at a cost of around US\$28 million.

LG Electronics follows leading ‘Silicon Module Super League’ (SMSL) member, JinkoSolar, as well as Hanwha Q CELLS in establishing solar module assembly facilities in the US, post the Section 201 trade case.

LG Electronics USA said that the facility would be co-located at an existing complex in Huntsville-Madison County, Alabama. LG has had operations in Huntsville since 1981 and became the home of

LG’s service division in 1987. The company said that PV module production was expected to start at the beginning of 2019, producing its high-efficiency ‘NeON’ 2 series 60-cell n-type mono modules with 340Wp-plus output, primarily for the US residential rooftop market.

**Second quarter review**

Total combined second quarter 2018 capacity expansion announcements were 25,580MW, up from 24,870MW in the first quarter of 2018, despite the rapid decline in announcements in June.

Plans by GCL in India and Egypt significantly boosted totals in the quarter and both announcements remain highly speculative at the time of writing. Excluding the 9GW of MOUs from GCL, total announcements would have been around 16,500MW, considerably down quarter-on-quarter.

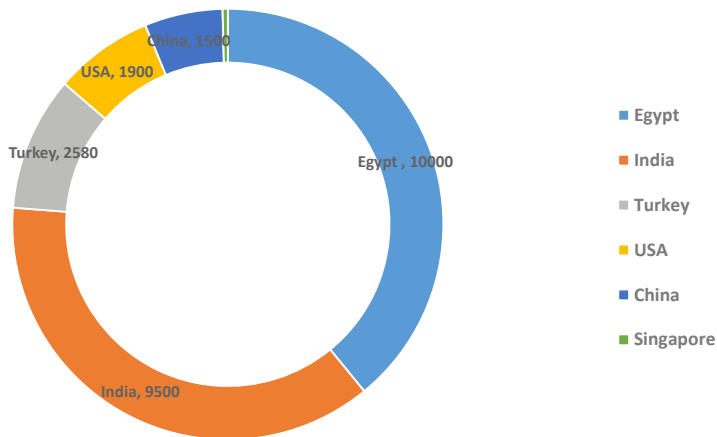
The biggest impact from excluding GCL would have related to solar cell expansions, which would have totalled just over 1GW, instead of over 10GW as reported.

Module assembly announcements in the quarter totalled 14,200MW and 5,200MW if GCL was excluded from the analysis. Thin-film was 1,200MW in the quarter, all contributed by First Solar.

Plans by GCL in India and Egypt also skewed capacity announcements on a geographical basis in the second quarter. The 10GW possible plans (5GW cell and 5GW module assembly) in Egypt meant it

**Total capacity expansion announcements by country in Q2 2018 (MW).**

Total Capacity Expansion Announcements  
by Country in Q2 2018 (MW)



**Quarterly total thin-film capacity expansion announcements (MW).**

was the top location in the quarter.

However, GCL's potential plans in India were supported by planned expansions by two India-based companies, resulting in a total of 9,5GW announced in the quarter.

Turkey continues to attract potential capacity

expansions. Having accounted for 3,950MW of announcements in 2017, the second quarter of 2018 accounted for 2,580MW, highlighting both the local content rules and growth in PV deployments in the country that continues to attract potential capital investments in manufacturing from both Turkey and overseas.

Also of note in the quarter was the impact of new import duties imposed on most of the rest of the world in the US. Led by First Solar and LG Electronics and adjustments by CSUN, the US attracted a total of 1,900MW of new capacity expansion announcements in the second quarter, up from 1,600MW in the previous quarter.

**First half year review**

In the first half of 2018 a total of just over 50.4GW of combined (cell, module and thin-film) capacity expansions were announced, down from over 52.7GW in the prior-year period, indicating very little change.

Thin-film planned expansions remained strong with announcements totalling over 3.3GW in the first half of 2018, compared to a total of over 3.9GW in all of 2017.

Solar cell announcements in the first half of 2018 topped 17.3GW, compared to over 30GW in the prior-year period. This figure drops to



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around 8.3GW if GCL plans in India and Egypt are excluded.

A total close to 30GW of new module assembly capacity expansion announcements were made in the first half of 2018. This compares to nearly 14.6GW in the prior year period. However, the key difference was the significant level of new investments in high-efficiency PERC and next-generation cell technologies, compared to module assembly expansions. Much of the existing module assembly capacity could be upgraded to meet the cell technology migration.

Again, decoupling GCL from the second quarter, lowers module assembly plans to just over 21GW.

When analysing expansion plans on a geographical basis in the first half of 2018, it would seem that its business as usual when total combined announcements for China topped 15.74GW. However, only 1.5GW was announced in the second quarter, all from JA Solar.

Almost identical was the 15.71GW of new capacity plans announced for India, which included over 6GW in the first quarter and 9.5GW in the second quarter. Again, GCL plans in India would have to be taken into account.

Interestingly, in 2016, India had over 16GW of combined capacity expansion announcements, the highest annual record for the country. This record could be exceeded in 2018.

The key catalyst behind the revival of the USA as a manufacturing location has been driven by the Section 201 case and subsequent import duties for the next four years. But due to the progressive reduction in tariffs that start at only 30%, non-domestic PV manufacturers have selected to build only module assembly plants, limiting capital expenditure and remaining flexible to any long-term manufacturing commitments as a result.

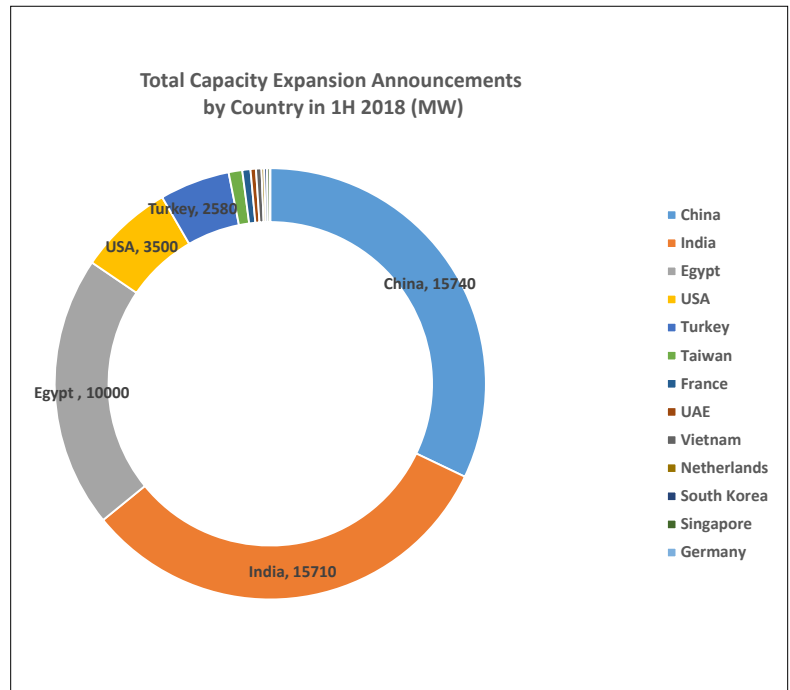
Finally, Turkey is proving to be an attractive location, not just for module assembly but in particular solar cells, with domestic PV manufacturers as well as overseas firms continuing to plan for manufacturing bases in the country, due to local content rules and government inward investment incentives.

In 2017, Turkey attracted almost 4GW of manufacturing expansion plans, ranked fourth for the first time. In the first half of 2018, Turkey attracted over 2.5GW of new expansion plans and has become an important downstream emerging market in the last two years.

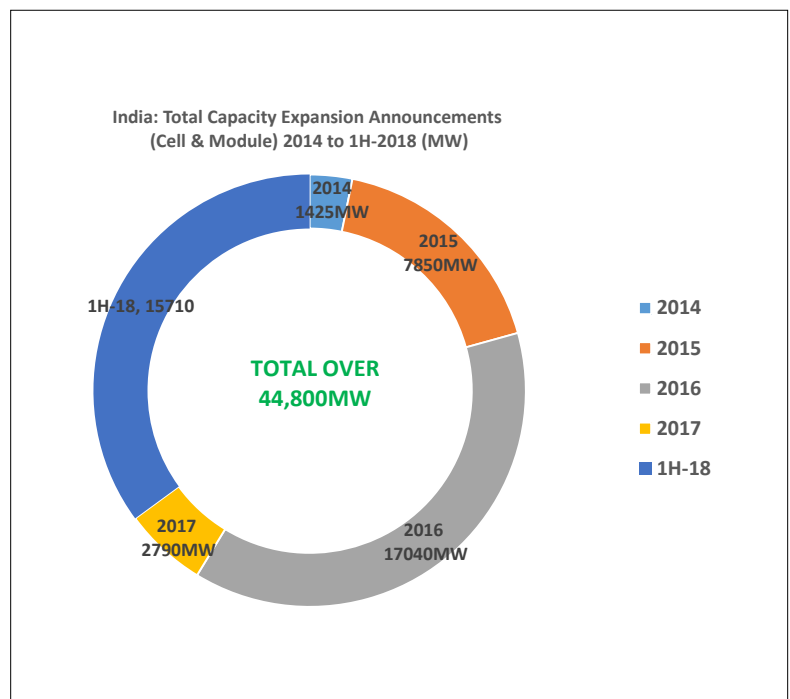
In the first quarter of 2018, expansion plans were announced in 10 countries, while this declined to six in the second quarter with Egypt being a speculative bet at this time.

### Conclusion

After record announcements in the fourth quarter of 2017, both first and second quarters of 2018 were stronger than expected, although a marked shift back to module assembly compared to cells



Total capacity expansion announcements by country in 1H 2018 (MW).



India: total capacity expansion announcements (cell & module), 2014 to 1H-2018 (MW)

in the fourth quarter of 2017. The revival in thin-film over the last nine months was supported in the second quarter of 2018 by the new First Solar facility for its Series 6 modules in the US, partially driven by the newly imposed import duties.

Government actions, whether positive (Turkey and Egypt, for example) or negative (USA, India and China), are influencing manufacturing decisions but in the first half of 2018, any major impact on announcements would not seem to be evident at this time.