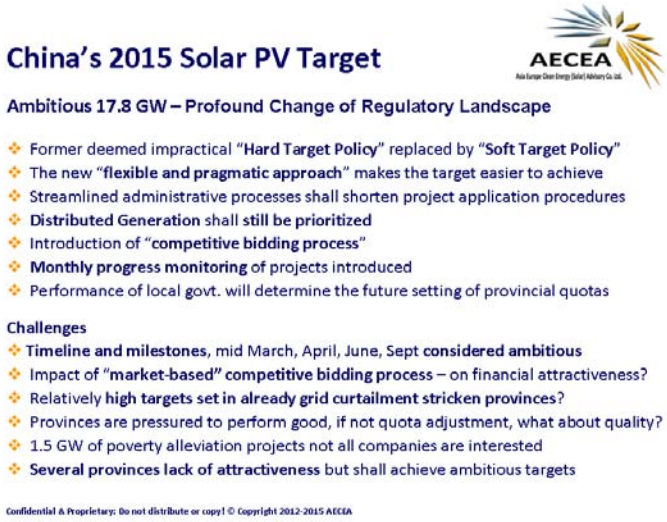
July 2015 – Briefing-Paper – China Solar PV Development

China's 2015 Target – 17.8 GW – A Brief Assessment of the Corresponding Regulatory Landscape

China's target of installing 17.8 GW makes 2015 an ambitious year. If successful, China's target of 35 GW set in the context of the 12th Five Year Plan (2011-2015) will be exceeded by approx. 30%. According to statistics published by the National Energy Administration (NEA), Q1/2015 already witnessed 5.04 GW of installations of which AECEA is of the opinion are largely roll-over-projects from Q4/2014. Along with the announcement of this years annual target the NEA came forward with a number of regulatory changes. Next to the abolishment of the former hard target policy, i.e. in 2014 caps were set for both utility/ground-mounted and distributed projects and the introduction of a soft target policy, i.e. no longer any target for any type of applications, however during the local govt. project approval process distributed projects shall be prioritized is the re-introduction of a competitive bidding process. Re-introduction because in 2008/2009 the NEA put in total 320 MW (14 projects) up for tender and invited the PV industry to bid. Back then in 2008 the lowest bid was US$ 14cts/kWh and in 2009 the lowest was US$ 9cts/kWh, too low to be accepted and one of the main reasons why the govt decided to discontinue the bidding process, because such artificially low FIT proposals raised questions about the long term financial viability and motivation behind the designated project developers.



AECEA is of the opinion that the re-introduction of such competitive bidding processes shall help the NEA to get a feel for to which extend developers are willing to offer a discount on the current FIT levels, in particular since the FIT levels remained unchanged with the exception of a 5-10% lowering in certain provinces in 2014, since 2012. Against this background, several provincial govt stipulated the discount on the FIT as one important evaluation criteria in their corresponding project approval schemes. Given that provincial govt had to approve 2015 projects by late April, AECEA assumes that in the meantime sufficient data should have been obtained allowing NEA to consider an adjustment of the present FIT scheme within a certain range effective from Jan 2016. A possible announcement of new FITs could take place in Q3/2015.

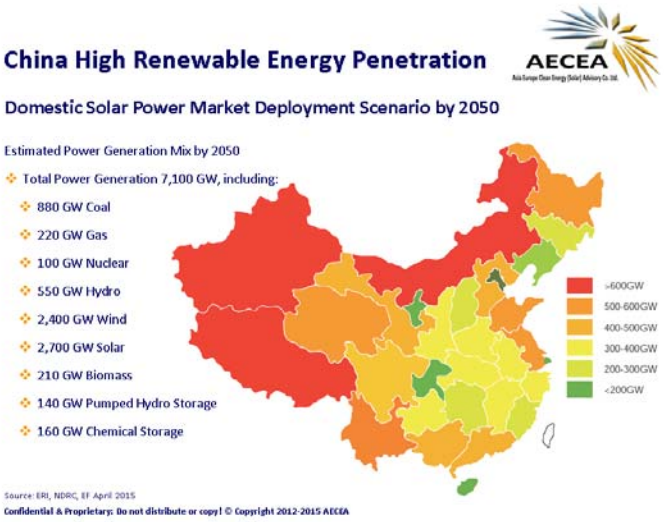
Another new feature being introduced along the announcement of the 17.8 GW in mid March is the monthly progress monitoring reporting of projects. Local governments are being requested to monitor and report back to Beijing on the actual situation on the ground, thus allowing NEA not only to have a better visibility about the real deployment, but as well which project developer is executing projects according to approved terms. The past 2-3 years witnessed project implementations deviating from what was approved by the authorities leading to an unclear situation, eventually resulting in a worsening of grid curtailments in various locations. AECEA believes that such a monitoring scheme will facilitate a better coordination and planning among involved govt stakeholders at all administrative levels.

To date, NEA's fairly ambitious target of 17.8 GW has been met with an exceptional bullish demand. According to AECEA's monthly demand analysis, demand during H1/2015 is more than double YoY, with a fairly large share of projects intended to be realized before the end of the year. Provinces assumed falling short of their annual quota turned out to perform better than anticipated. Even the so-called "grid-connected poverty alleviation projects" are enjoying a certain demand, because the funding for such projects (capital subsidies are being offered) is secured by local and national govt. Given the overall picture, to date, AECEA is still cautiously optimistic and estimates 14-15 GW (baseline), 16-17 GW (optimistic), and 18 GW (bullish) to be installed in 2015.

NDRC publishes "China 2050 High Renewable Energy Penetration Scenario and Roadmap Study"

Late April the Energy Research Institute (ERI) affiliated with the National Development and Reform Commission (NDRC) published its "China 2050 High Energy Renewable Energy Penetration Scenario and Roadmap Study".

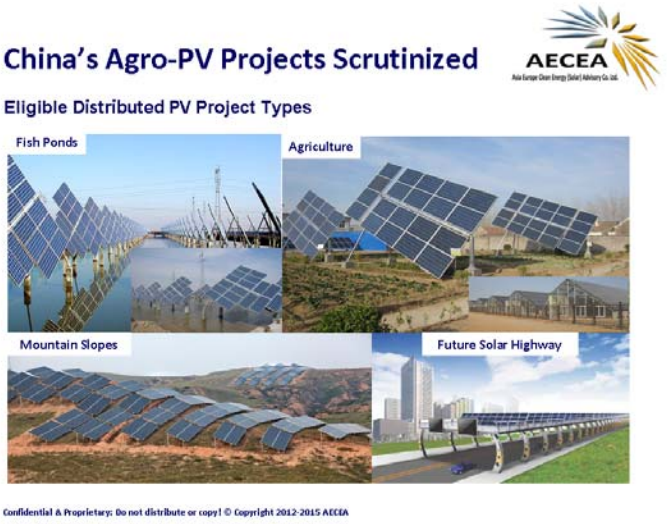
According to the high penetration scenario the fossil-fuel consumption shall be below 1 bln tonnes and renewables shall be accounting for over 60% of primary energy consumption and over 85% of electricity consumption by 2050. That latter according to the reference scenario shall reach 46%. By then, China's total power generation capacity shall amount to 7,100 GW and like in other previously published "China RE 2050" studies, both wind and solar power shall make the bulk of with 2,400 GW and 2,700 GW respectively.



Admittedly, 2050 is a long shot, that's why the mid-term deployment targets are of greater interest, in particular the 2020-2030 period, because the study suggests a total 157 GW of solar power by 2020 (the author believes is achievable) and by 2030 a whooping 500 GW of total solar power generation capacity. True, the study lacks to explain what defines "solar power", but e.g. given China's current non-existent CSP power generation capacities and other "China RE 2050" studies suggested a maximum of 60 GW by 2040, leads to the assumption that the bulk of it shall be made up of solar PV. Therefore, simple maths suggests a possible installation of 300-350 GW during the 2020-2030 period corresponding to 30-35 GW annually. In terms of market segmentation the study suggest that ground-mounted installations will make up a fairly large share compared to distributed generation. The study concludes that today's solar workforce will increase from 1,25 Mio jobs to more than 4,8 Mio by 2050.

China's Agro-PV Projects are Subject to Thorough Scrutiny

Last September, China's National Energy Administration (NEA) published a revised version of its distributed solar PV policy, in an attempt to overcome prevailing barriers preventing the distributed market segment from taking off and paving the way to stimulate a greater demand. Among the numerous policy adjustments were a re-definition of what makes a project a distributed solar PV projects. Accordingly, ground-mounted projects up to 20 MW feeding into the 35 kV grid (in Northern China 66 kV) being built e.g. in wasteland areas, on barren land, within fish ponds, in tidal zones and on agricultural land were all labelled as distributed. In particular the latter type of projects enjoyed an exceptional strong demand, apparently too strong requiring no less than three ministries (Ministry of Agriculture, Ministry of Land and Resources, State Administration of Industry and Commerce) and the Central Govt. Leading Office for Agriculture to issue an official notification "Opinions on Strengthening the Supervision of Leasing Agricultural Land for Industrial and Commercial Purposes and Risk Prevention" in mid April.



According to the "Notification" in future the conversion of "arable land into land for commercial purposes" will be subject to greater scrutiny, due to the absence of a clear classification of types of rural/agricultural land in the past. The ministries were concerned that the construction of PV power plants on arable land not only put local farmers out of business, thus contributing to local employment, but as well to run contrary to the central government policy to ensure a high degree of domestic food supply. Obviously, food security is of greater national

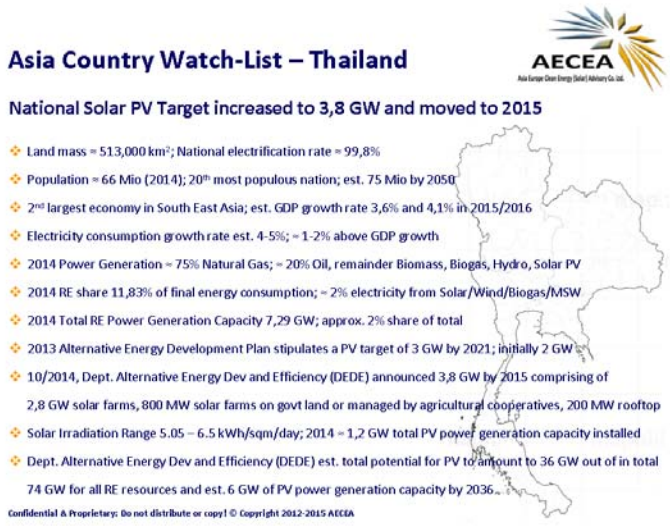
importance. Suggestions from the ministries go that far to limit the amount of land which could be converted in a given location, as well, the amount of arable land a single company could convert in order to use it for PV plants.

At this stage, it is challenging to quantify the likely impact of this notification, i.e. how much less of Agro-PV projects will be realized in future, assuming a strict future enforcement of the notification, because according to AECEA's market analysis, a considerable number of projects approved across the country by various local governments are exactly falling into this category. At this stage, the impact of PV plants build on arable land is possibly not that large yet, however in longer terms gives reasons to be concerned, hence the notification, in order to prevent that the problems may spiral out of control in future. Interestingly, the notification at the same time encourages the PV industry to develop e.g. innovative "greenhouse integrated PV solutions" thus not only minimizing the conflict of converting valuable arable land, but as well offer local farmers an opportunity to generate additional income from leasing their greenhouses to project developers. In this context, not only are Agro-PV projects subject to a greater scrutiny, because late May the construction of the first phase of a 200 MW ground-mounted system in Henan Province along the Yellow River were ordered to stop, because corresponding flood regulations were not properly taken into account.

AECEA's Asia Country Watch-List "Thailand"

In 2013, Thailand's Department of Alternative Energy Development and Efficiency (DEDE) announced a revision of its long-term strategy for renewable energy deployment. Accordingly, the "Alternative Energy Development Plan (AEDP)" increased the former target of 2 GW solar PV to 3 GW by 2021. However, given the overall market dynamics, in 2014 approx. 1,5 GW were either constructed or under construction, the National Energy Policy Council (NEPC) decided to move the 3 GW target to the end of 2015. Closer to the end of 2014 the NEPC decided to further increase the target to now in total 3.8 GW. The latter comprise 2,8 GW of solar farms, 800 MW of solar farms on govt. land managed by agricultural cooperatives, and 200 MW of PV rooftop.

May 2015, according to the Energy Regulatory Commission (ERC), 1,36 GW were installed, approx. 300 MW under contracted, and further 990 MW were awarded PPA's which are subject to a scheduled commercial operation date by Dec 31, 2015. PPA awarded projects will receive a FIT of 5.66 Baht/kWh (€ts 15.1) for 25 years.



Thailand's long-term energy planning is formulated in the Power Development Plan (PDP) 2012-2030. The PDP is under revision since the fall 2014. The new PDP covering the period from 2015 through 2036 aims to install an additional power generation capacity of approx. 57 GW (including approx. 19 GW of alternative energy), thus amounting to a total of 70,4 GW by 2036. By then the RE share in Thailand's final energy consumption shall rise to 15-20%. According to the new PDP by 2036 Thailand shall be home to approx. 6 GW of solar PV. Against this background and given Thailand's anticipated mid single-digit power consumption growth rates requiring substantial investments in the power sector in the coming years leads to the anticipation that solar PV is expected to play a greater role than in the past, hence AECEA is of the opinion that "Thailand" qualifies to be on it's "Asia Country Watch-List".

AECEA – Internal Affairs

Upcoming Activities **********

AECEA will attend the upcoming Intersolar North America scheduled to take place in San Francisco / United States, from July 13-16. http://www.intersolar.us/en/home.html

AECEA will attend the Intersolar South America in Sao Paulo / Brazil from Sept 1-3. http://www.intersolar.net.br/en/home.html

AECEA – Internal Affairs

Recent Activities **********

Global PV Market Report 2015-2020 – Launched on July 1, 2015 !

AECEA joined the "**PV Market Alliance**" an alliance formed in 2014 by well-known regional PV experts from the US, Europe, Japan, China and Latin America. The PV Market Alliance was formed at the end of 2014 by AECEA, the Becquerel Institute, Creara, RTS and SPV Market Research to provide research on the global markets for photovoltaic, CSP and CPV technologies from the perspective of experts in these markets. The "PV Market Alliance" will publish an annual **"Global PV Outlook"** report on global PV markets.

The Presentation to the Press is available here:
http://pvmarketalliance.biz/wp-content/uploads/2015/06/Press-Presentation-PVMA-Market-Report-2020.pdf
To buy the 2015 edition: http://pvmarketalliance.biz/?p=383

The PV Market Report Alliance

June 18, 2015 witnessed the launch of the 10th annual edition of the "Global Status Report" the world's most frequently referenced report on the global renewable energy market, industry and policy landscape. AECEA has been commissioned as a lead country (China) contributor since 2012. The report can be downloaded here:
http://www.ren21.net/status-of-renewables/global-status-report/

On June 9, 2015 SolarPower Europe (former EPIA) launched the publication of its annual "Global Market Outlook for Solar Power / 2015 – 2019". As an external contributor AECEA provided information outside Europe (China) in the context of the PV Market Alliance.
The report can be downloaded here: http://www.solarpowereurope.org/media/downloads/

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Company Profile

Frank Haugwitz is an independent solar energy consultant based in Beijing since 2002. In his early years in China he was seconded by the German govt. and involved in a bilateral solar / PV energy technical cooperation program. Following this assignment he was responsible for the renewable energy component of the EU-China Energy & Environment Program until the fall of 2009. Since then he has been consulting foreign enterprises and international organizations on the development of renewable energies in general and solar / photovoltaic in particular in China. Since early 2010 he works for the organizer of Intersolar as their Head of Intersolar Conference Development.

From late 2009 until August 2012 he worked as a director in the Deutsche China Consult Co. Ltd. (HK) and in October 2012 he founded his company "Asia Europe Clean Energy (Solar) Advisory Co. Ltd. (AECEA) in HK. His services include working with individual clients to apply his extensive China photovoltaic energy-focused insights to their specific needs. Industry experience and in-depth analysis shall assist strategy development and corporate decision making. Focus is on the regulatory framework conditions, policy, as well market and business development. His advisory services provide objective and independent research.

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→ Previous versions of the "Briefing Paper – China Solar PV Development" are available at http://www.aecea.com.de/downloads.html

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