



ASIA REGIONAL SUMMARY

There are reportedly 117 million lakes on Earth, covering about 4 percent of the planet's non-glaciated land surfaces. The bulk of them are in the Arctic or boreal regions of North America and Eurasia, and most are largely untouched by human activity. (Check out the pockmarked, lake-rich surfaces of the Canadian Shield or the "Barren Lands" of Nunavut to get a look at what these northerly lakes are like.)

Nansi Lake in China's Shandong province has a very different story. With more than 96 million people living in Shandong, the fingerprints of human civilization are all over this shallow lake

OVERVIEW

Asia – the world’s largest single landmass, five of the world’s 10 most populous countries, and three of the 10 largest national economies – is a vibrant region for clean energy investment. One country, China, is simultaneously the world’s biggest electricity system, the world’s largest CO₂ emitter, and also the world’s most active clean energy investor in projects and industry value chains. India, not far behind on population, continues its clean energy expansion as it works to electrify the world’s largest population without reliable access to the grid. Smaller countries such as Tajikistan, and those emerging from decades of state-controlled power sectors, such as Myanmar, all show promise for deploying capital into clean energy investment.

China and India are national energy economies, but with their vast populations and diverse natural resource bases, merit an extended inquiry into their provincial energy systems and value chains. Indeed, sub-national regions such as India’s Uttar Pradesh (population approximately 200 million), or Guangdong (population more than 100 million) are as significant as large countries in their own rights. This study analyzes India’s states and China’s provinces in addition to each country in aggregate. Indonesia (the world’s fourth-largest country with 255m people) and Bangladesh (eighth-largest, with 159m) mean that the populations studied in *Climatescope*, and the human capital that they create, exceed 3bn.

As wide-ranging as Asia’s human capital resources for clean energy, are its physical resources. Mountain ranges and deserts, as well as large areas with sparse population, mean that much of Asia is well-suited to deploying clean energy at scale. Some countries, in particular China, have converted this potential into meaningful energy production – as of last year, China’s wind energy production exceeds its nuclear energy production and places it third behind coal and hydro in total power generation. Other countries, including smaller markets such as Nepal and

Tajikistan, remain largely potential markets, with actual clean power generation now only a small fraction of what could be. Tropical regions too, in Vietnam and Indonesia, have excellent potential for developing biomass in an environmentally sustainable fashion.

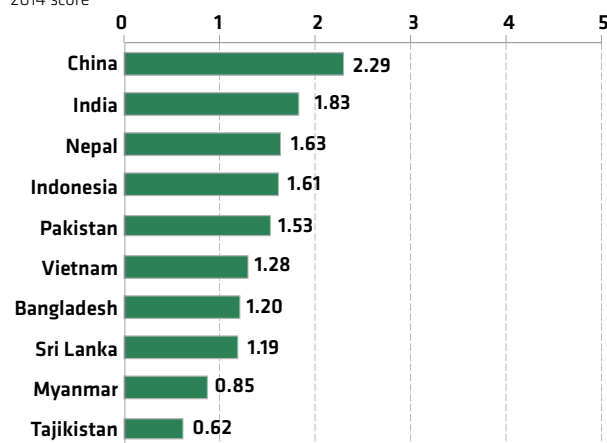
This is the second year in which the Global *Climatescope* methodology has been used to examine activity in Asian nations. In reiterating the methodology, several notable developments emerge.

The first is that some countries have substantially enhanced their policy supports for clean energy. Myanmar, in particular, is emerging from decades of state control in its power sector to allow private sector investment. Likewise, major reforms in India brought by the Modi administration bring hope of quicker deployment for the country’s eager renewable energy developers. The second observation is that Asia remains the tops among the regions examined for *Climatescope* as a hub for manufacturing. In 2013, Asia *Climatescope* countries performed particularly well in the clean energy value chain, which is not surprising given population bases and increasingly sophisticated industrial networks in China, India, and Pakistan. In 2014, *Climatescope* analysis deepens the understanding of these value chains and their strengths and comparative advantages. Large countries beget complete value chains, but industrial policies in support of export also bring countries into global trade in clean energy goods and services.

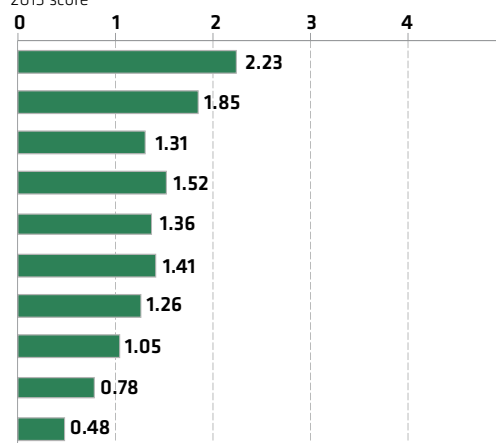
Finally, the newly concerted efforts to remedy local pollution issues – and not just global climate change impacts – in Asia’s urban areas provides a new impetus for investment in low-carbon power generation and environmental goods and services. China’s “war on pollution” and similar efforts in India are not only a health imperative – they are a bright opportunity for investment.

CLIMATESCOPE ASIA SCORES, 2014 AND 2013

2014 score



2013 score



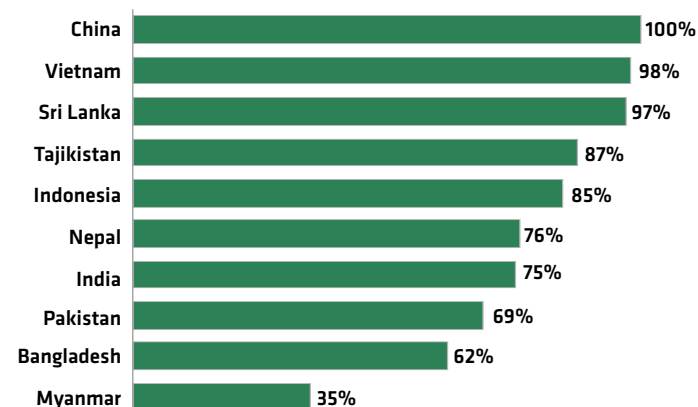
Source: Bloomberg New Energy Finance

ENABLING FRAMEWORK PARAMETER I

Asian countries had a range of performance on Global *Climatescope* Enabling Framework Parameter I. This includes 22 indicators that between them account for a country's policy and regulatory frameworks, levels of clean energy penetration, level of price attractiveness for clean energy development, and the expectations for how large the market for clean energy can become.

Last year, there were a number of notable developments in country and state/provincial enabling frameworks for *Climatescope* Asia. The first is the marked strengthening of scores from two countries, India and Nepal, thanks to government policy moves. The goal of providing round-the-clock power to India's 1.25bn people created major investor interest in the country, but just as importantly, a strengthened energy minister overseeing coal, power, and "new and renewable" energy sectors could streamline planning and permission. India also has an ambitious solar target of 100GW of solar by 2022, implying 12GW of new solar power built every year. Another was marked increases in electrification in Indonesia and Myanmar. Indonesia increased its grid-connected electrification rate by four percentage points (from 80.5% to 84.5%) as did Myanmar (31% to 35%).

ELECTRIFICATION RATES BY COUNTRY



Source: IEA

In *Climatescope* 2015, China (1.54) and India (1.51) were the strongest countries in Parameter I, as they were last year. As vast as they are, in both countries a number of regions outperformed their national scores. One third of Chinese provinces, and 60% of Indian states, had scores above their national averages. As in 2013, remote but resource-rich regions such as Xinjiang and Tibet in China, and Rajasthan in India, score highly.

As last year, Sri Lanka (0.89), Tajikistan (0.86), and Myanmar (0.84) had relatively low scores – though all countries improved their global ranking significantly. Tajikistan jumped 11 places, from 52nd to 41st, and Sri Lanka rose nine places from 49th to 40th. Myanmar's government amended regulations which had not altered in decades, which helped attract foreign investor interest in its power sector. Myanmar is also pursuing a number of rural electrification programs which are overseen by private investors and non-profits. Pakistan, too, initiated new policies to incentivize solar power generation and has proposed a net metering policy to benefit domestic, commercial, and industrial producers of wind and solar power from projects under 1MW of capacity.

Climatescope Asia countries remain a very mixed story on electrification. China completed its electrification effort more than a decade ago; India still has hundreds of millions without reliable access to the grid. Low electrification rates, as in Bangladesh, Myanmar, or Pakistan, are a hindrance to development. At the same time, remedying those low electrification rates is an opportunity for capacity and value-chain building in countries considered "off-grid". Likewise in Indonesia, with relatively high electrification but with thousands of small islands still largely dependent on diesel power, newly increased feed-in tariffs for small hydropower and fiscal incentives for geothermal could attract and enable new clean energy investment.

CLEAN ENERGY INVESTMENT & CLIMATE FINANCING PARAMETER II

Asia excels in Clean Energy Investment & Climate Financing Parameter II, which accounts for the amount of clean energy capital a country attracts, the availability of local funds, the local cost of debt, and green microfinance activity through a total of 14 indicators.

In 2014, China placed first amongst the 10 Asia *Climatescope* countries, but in 2015 Nepal had the highest score, of 1.68 thanks to a very strong growth in clean energy investment. China placed second, with a score of 1.46, and Indonesia third with a score of 0.88. Bangladesh, which scored second in 2013, placed fifth with a score of 0.66. Tajikistan had the lowest score in Asia, with 0.14.

China's second-place score obscures its provincial-level performance. Qinghai, a sparsely populated, windy, sunny, high-altitude province in western China, had the highest score in Asia with 1.90. Gansu, with similar resources, ranks behind Nepal but ahead of the rest of China as well. In India, Madhya Pradesh's score of 1.54 places that state ahead of China.

In terms of total investment, China likewise excels – it is only its vast electricity system which makes its capacity expansions small in comparison. While China's total dollars invested, and capacity installed, are world-leading, investment must be understood in context and within the methodology of Global *Climatescope*. As the world's second-largest economy and its largest electricity system, China's clean energy invested dollars are a relatively small as a proportion of GDP.

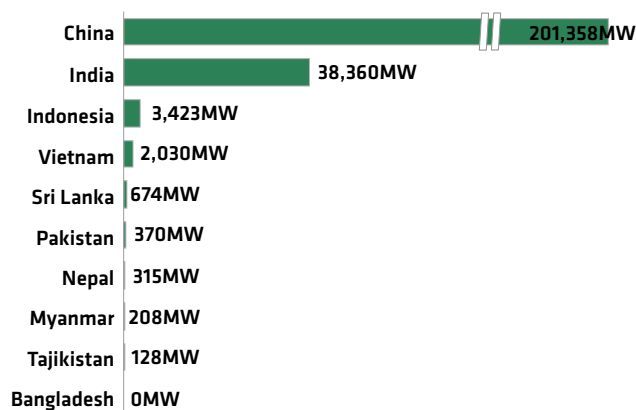
China added nearly 35GW of new clean energy generation capacity in 2014, which is nearly six times more than the rest of all *Climatescope* Asia countries put together. India added 5GW of clean energy generation capacity.

On a proportional basis, some countries with smaller non-large hydro clean energy capacity added nearly as much renewable energy generation capacity as did China. India, Vietnam, and Sri Lanka all added more than 10% to their installed non-large hydro clean energy capacity base. Pakistan, installing 141MW of capacity, increased its clean capacity by 62%, while Tajikistan nearly doubled its clean capacity by adding 57MW of new projects.

The Asian countries studied in *Climatescope* have a wide range of capital availability. China's capital markets for clean energy extend from private venture capital to asset finance from state-sponsored banks. India has active financial markets but high costs of capital, as well as high costs to swap currency risks. Indonesia has introduced a geothermal drilling fund which helps develop its superb natural resources, and Vietnam Development Bank provides for loans for renewable energy as well. Bangladesh continues to excel in green microfinance mechanisms suited specifically to off-grid clean energy projects, in particular solar PV.

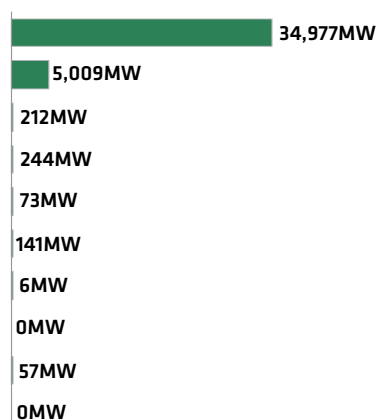
CLIMATESCOPE ASIA CLEAN ENERGY CAPACITY

2014 total installed clean energy capacity



Source: Bloomberg New Energy Finance

Additions in 2014

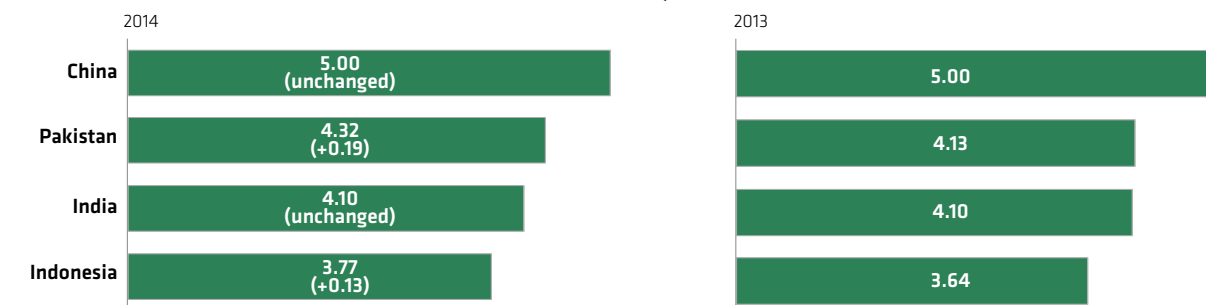


LOW-CARBON BUSINESS AND CLEAN ENERGY VALUE CHAIN PARAMETER III

Asian countries performed exceptionally well in Low-Carbon Business and Clean Energy Value Chains Parameter III, which assesses the ability of local manufacturing and other capacity to spur clean energy deployment through five indicators. These parameters account for the presence of local manufacturers, service providers and, in the case of lesser-developed nations, players participating in facilitating the growth of distributed generation.

Asia truly excels in Low-Carbon Value Chain Parameter III, with three countries scoring above four and 16 total countries and regions scoring above 2. China leads with a perfect score of 5.000, meaning that its manufacturing and service firms cover every aspect of the clean energy value chain. Pakistan scores next at 4.32, then India at 4.10. Indonesia is next, at 3.77. China's score could not improve from last year, and India's is stable, but both Pakistan and Indonesia increased their already high scores from 2013.

CLIMATESCOPE ASIA VALUE CHAIN COMPLETENESS, 2014 AND 2013



Source: Bloomberg New Energy Finance

Asia's dominance in Parameter III is a function of population. The four countries with the highest scores all have populations exceeding 200m; two have populations greater than 1bn. Large populations (and with the exception of China, large and growing populations) create a number of factors to create these high scores. The first is an internal need for new power generation capacity, which pulls firms into the energy value chain – particularly evident in Pakistan, India, and Indonesia. Low electrification rates and irregular electricity supply impose high costs on growing economies...at the same time that they create a clear business case for technologies and businesses to relieve those costs.

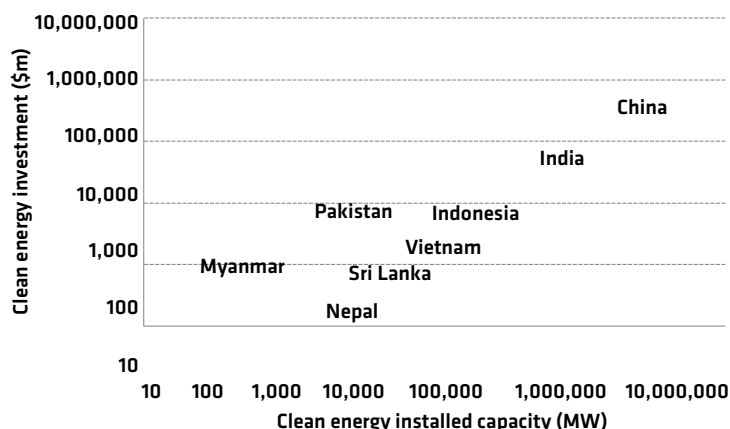
The second factor is the ability to leverage a large and increasingly skilled workforce for export-driven industries, as is notably the case in China. India is also beefing up its value chain, not just in manufacturing but also in services.

China's and India's states and provinces, however, score very differently than each large country does on its own. Each country's wealthier and more industrialized areas have high scores for value chains – while their less-developed areas have low scores. Inner Mongolia, the heart of China's wind industry, has a nearly-complete clean energy value chain (4.75) while remote Tibet has a very low score (only 0.25). India has a more tightly grouped clean energy value

chain than China. Its highest state score is in relatively developed Tamil Nadu (2.40), which would rank second from bottom in China; however, its lowest score in Madhya Pradesh (0.72) is much higher than Tibet's very low score. Remote sites which are often ideal for clean energy asset deployment, are not often home to thriving value chains beyond engineering and operations and maintenance.

Value chain completeness also correlates highly total deployed capital for clean energy, and total installed capacity.

CLIMATESCOPE ASIA VALUE CHAIN COMPLETENESS, COMPARED TO INSTALLED CAPACITY AND INVESTMENT



Source: Bloomberg New Energy Finance

Note: Larger bubbles indicate more complete value chains. China has a perfect score of 5.00 for value chains. Tajikistan (no large-scale renewable energy investment) and Bangladesh (no large-scale capacity) are excluded

GREENHOUSE GAS MANAGEMENT ACTIVITIES PARAMETER IV

Asian countries had a wide range of scores in Greenhouse Gas Management Activities Parameter IV, which takes into account carbon offset project activity, the level of policy support for carbon emissions reduction, and local corporate awareness of carbon issues.

Despite no countries in the region signing the Kyoto global emissions protocol, Asia performed quite well on Parameter IV. China performs best with a score of 3.24, higher than its score last year and good for first place in the global rankings. India was second, with a score of 2.60, slightly lower than last year and good for eighth in the global rankings. Bangladesh, Sri Lanka, and Myanmar had the lowest scores.

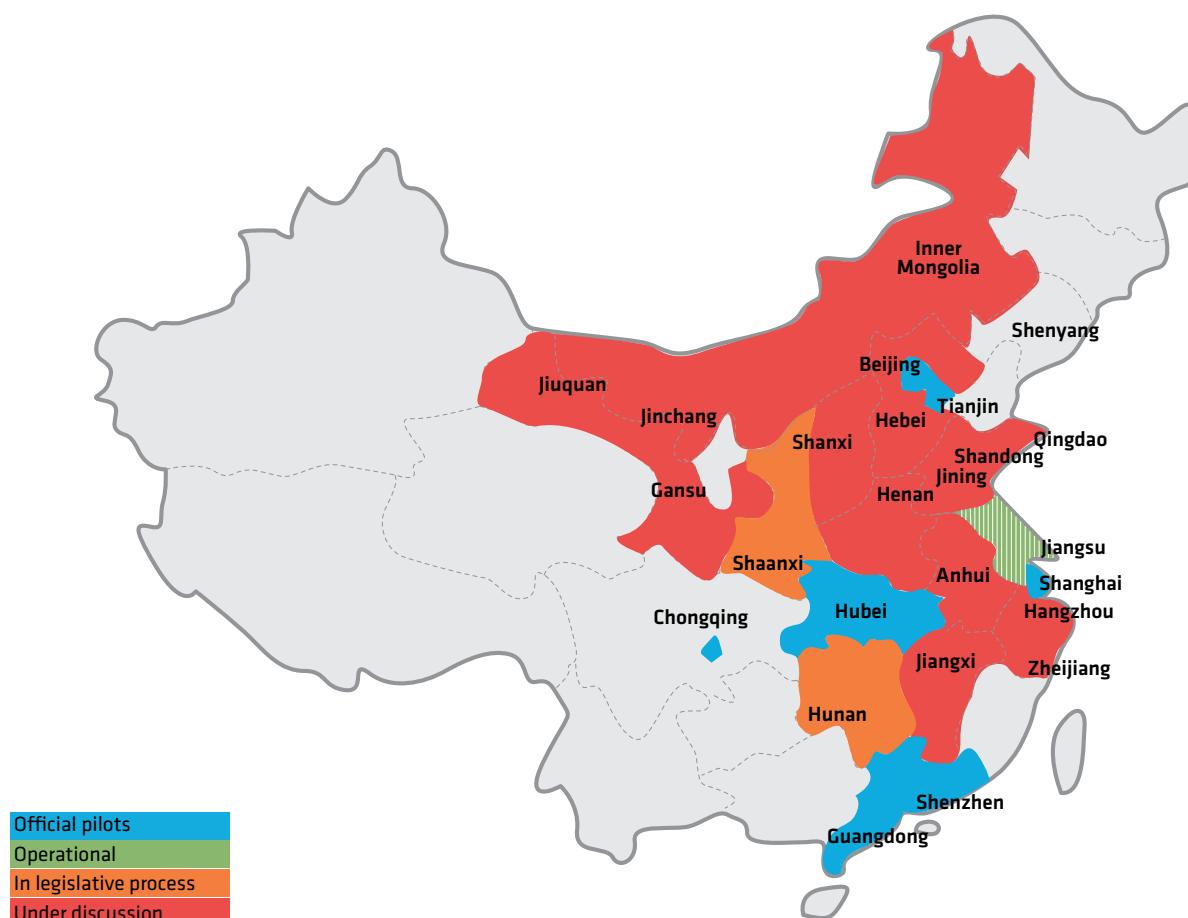
Given that these countries are exempt from formal GHG emissions targets, their low scores are not surprising. At the same time, there is an increasingly robust – and high-level – interest in voluntary emissions reductions at the state and regional

levels in Asia. China continues to roll out its provincial emissions trading schemes in pilot, and last year developed interim measures for a national Emissions Trading Scheme (ETS). Many countries, China and Vietnam among them, also host Clean Development Mechanism (CDM) projects.

Perhaps most importantly for *Climatescope* Asia countries, 2014 was a watershed year in acknowledging the costs of particulate air pollution, and not just the global warming impacts of carbon dioxide. China's premier, Li Keqiang, famously stated that China would “declare war on pollution as we declared war on poverty”. India's Prime Minister, Narendra Modi, also announced plans to make city air quality data available through an index simple enough for the general population to understand.

For Asia, and indeed for any developing region or country, clean energy, greenhouse gas emissions, and local air quality are converging as development drivers.

CHINA'S ENVIRONMENTAL MARKETS AND THEIR STATUS



Source: Bloomberg New Energy Finance, government announcements
 Note: Jiangsu is striped to indicate that it is an energy savings programme