Ultra-supercritical plants' efficiencies are at 40-45%

Asia is getting sick of using subcritical power plants

MALAYSIA

After Malaysia completed the construction of its first ultra-supercritical (USC) plant in 2015, it was yet another sign that Southeast Asia was starting to tire of subcritical power plants and were keen to shift towards more efficient coal-fired generation. There is also expectation that USC plants will dominate China's coal power project pipeline in the coming decade, notwithstanding concerns that the country will be ramping up its renewable energy quotas.

Subcritical coal-fired power plants in Southeast Asia operate at low average efficiencies of 33% in 2014, projected to increase to 35% by 2040, compared with supercritical and USC units that are projected to reach efficiencies as high as 40% and 45%, respectively, according to Marc Clemson, senior project manager at Mott MacDonald in Singapore. Subcritical coal-fired power plants also have higher operating costs since their lower efficiency levels imply larger volumes of fuel input.

"For countries such as Malaysia and Thailand, which rely on the international market to procure the bulk of their coal needs and therefore face greater risk of price fluctuations, there is additional incentive to build more efficient power plants," says Clemson.

The IEA notes that a growing share of new capacity additions are supercritical or USC. Over the period to 2040, supercritical and USC technologies represent most new coal-fired gross capacity additions at 35% and 21%, respectively.

Marc Clemson

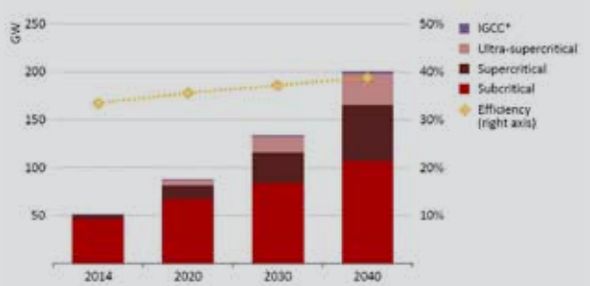
Subcritical coal-fired power plants in Southeast Asia operate at low average efficiencies of 33%.

Let's get "critical"

The move towards supercritical and USC plants come after decades of determined industry effort and investment to reduce emissions and simultaneously improve the performance of existing coal-fired power plants, says Wolfgang Moll, portfolio manager, thermal generation projects at RWE Technology International in Germany. "These parameters could only be realised by introducing new materials. As a direct consequence investments and operation rise in costs."

In China, the commercial operation of the first 2x1000MW double-reheat USC power plant and rising operational experience could mean that large-scale double-reheat units with high efficiency and low emission will become the mainstream for new coal power projects in the next decade, says Youwang Shen, engineering manager at Parsons Brinckerhoff in Singapore.

Gradual shift towards more efficient coal-fired generation



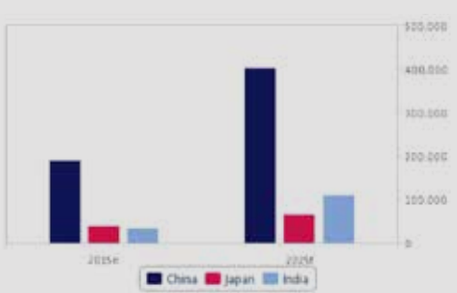
Source: IEA

THE CHARTIST: THREE CULPRITS BEHIND JAPAN'S STUNTED RENEWABLES EXPANSION

In the aftermath of the 2011 Fukushima disaster, the government offered attractive financial incentives to renewables developers in an attempt to bridge the generation gap left from the lack of nuclear output despite a permanent decline in power demand. According to Wood Mackenzie, Japan encouraged households and businesses to conserve electricity in response to expected power shortages. "These energy efficiency measures combined with continued awareness of energy usage in the residential and industrial sectors, meant that power demand will never recover," it says.

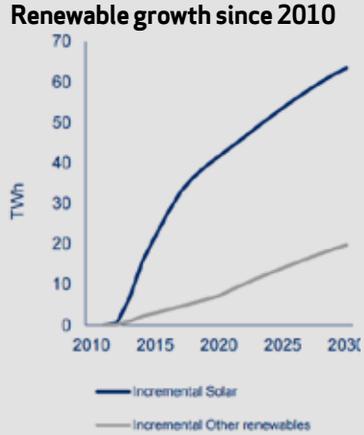
However, BMI notes that several dynamics have shifted in the sector since then, such as weakening government support, cheaper fuel alternatives, and electricity sector reform - which all contributed to the slowdown in growth in the renewables sector.

Japan slipping in the regional renewables rankings



Source: EIA, IRENA, BMI

Renewable growth since 2010



Source: Wood Mackenzie