Powering Nusantara: 'coal' hearts, clogged 'mines'

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ONE major challenge to the relocation of the Indonesian capital to Kalimantan is probably the city's energy demand considering the expected population boom.

Currently, the entire province of East Kalimantan only has a population of about 3.7 million. For comparison, more than 31 million people live in the Jakarta Metropolitan area.

While renewable energy is often cited as a major source of power, no one really knows how to materialise it if there will be a population explosion in the province.

The coal heart-land

It would not be surprising if coal became the major energy source to power the new capital which will be sitting in the coal-mining heartland of Indonesia. In the past two decades, coal mining has been booming in East Kalimantan, South Kalimantan, and to a lesser extent in Central Kalimantan alongside the massive oil palm expansion. This part of the country is recognised as the coal-mining heartland of Indonesia.

In East Kalimantan, many coal companies operate along the Mahakam River, relying on it for transportation just like their peers in the logging businesses. The city of Samarinda, which will be part of the Nusantara metropolitan area, is a major port for coal export. As shown on the map by Global Energy Monitor, there are quite a number of proposals to open up new coal mines in the province not only along the coast but also in the interior, aiming to extract more than 40 million tonnes per year.

Extensive development in coal mining is also seen in South Kalimantan, mainly concentrated on the southern coast of the province.

While Central Kalimantan is found to house some high-quality coal, the development has been slow due to logistic challenges.

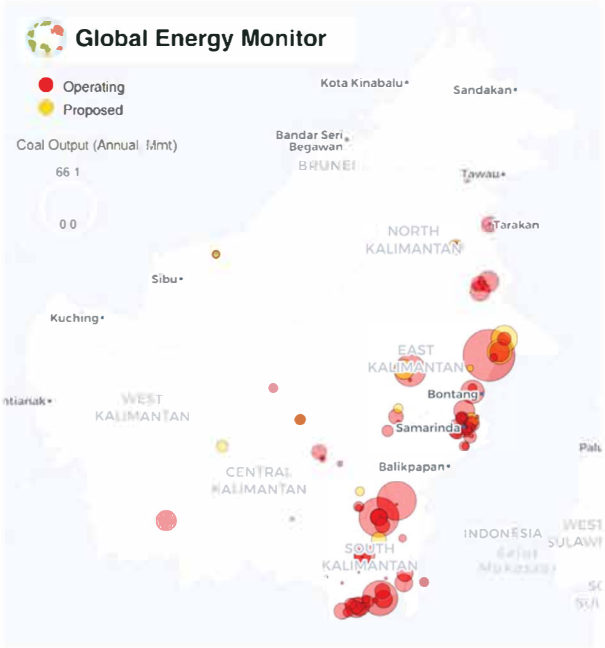
Coal for growth

In 2020, East and South Kalimantan contributed 249 million tonnes of 44% of the country's total coal production. Particularly, 187 million tonnes of coal was extracted from East Kalimantan. This allowed Indonesia to overtake Australia as the largest coal exporter in the world. China is the major destination for Indonesia's coal, buying up to one-third of the country's production. Indonesia also relies heavily on coal for energy, with about 40% of its total primary energy supply coming from coal.

It seems convenient to power the new capital city with the vast coal resources surrounding it. Furthermore, a number of prominent government and political figures have been widely reported to be linked to the coal mining industry in East Kalimantan. It is foreseeable that the energy demand will continue to grow for both the construction of the city and the daily use by the population and industry.

This, however, goes against the country's commitment to reduce its greenhouse gas emission. In 2015, Indonesia announced its Nationally Determined Contributions, setting a target to halt the construction of coal-fired plants after 2023. It is unclear if this target will be postponed to accommodate the construction of Nusantara.

Abandoned coal mines



Map shows location of coal mines in Borneo.

While the consequences of global climate changes are more insidious, the polluted river and the deep pit lakes left behind by coal mining bring direct and immediate impacts to the people and the environment.

As reported by Indonesia's Environment Ministry, there are 2,415 abandoned pits found across the province. The pits may cover nearly one-half of Singapore, reaching a total of 29,000 ha, and most of them are filled with acidic water. Due to the remaining harmful materials, these pit lakes can bring long-term impacts on groundwater and river systems, affecting community water supplies and damaging aquatic ecosystems.

Ideally, these pit lakes may be restored with nature-based solutions, such as turning them back into swamp forests, coupled with economic activities such as agritourism to finance the rehabilitation. Some have even proposed to turn the lakes into water reservoirs for the new capital. Unfortunately, there are currently no plans to rehabilitate these abandoned coal mines.

Biomass co-firing as an option?

While the impacts of coal are obvious, it is still unclear what alternatives are practical for Nusantara. The temptation of using coal to power up the city may override the country's climate change commitments. Across the country, there have been initiatives to speed up the retirement of coal-fired power plants, but the deployment of renewable energy to fill the gaps is still lagging.

One option that has been experimented with by Indonesia's State Electricity Company (PLN) is biomass co-firing. Co-firing stands for the simultaneous combustion of two different types of materials. In this case, biomass is added to partly substitute coal in the boilers to reduce emissions from power plants.

The option is attractive as the country generates a massive amount of oil palm and forestry residues that can be potentially used as feedstock. It is estimated that about 6 million dry tonnes of residues is generated in East Kalimantan every year. Sabah and Sarawak are among the territories that generate the most biomass, amounting to about 15 million dry tonnes each, after 16 million dry tonnes in Central Kalimantan. These numbers have not yet included oil palm trunks generated from replanting.

In the last few years, Japan and Korea have been sourcing palm kernel shells (PKS) from Indonesia and Malaysia for co-firing in their coal power plants. However, the mobilisation of other residues remains explorative due to logistics challenges.

Apart from that, there are also proposals to cultivate fast-growing timber species on degraded land in Kalimantan, hoping to kill two birds with one stone – rehabilitating the degraded land and generating biomass for energy purposes. At the time of writing, these plans remain on paper as the country has not made any incentives to drive the co-firing of biomass. Biomass co-firing is still considered too expensive for day-to-day operations.

In this context, re-examining the role of coal power and bioenergy by placing it in a broader framework of regional economic development may reveal new possibilities and opportunities.

At the moment, the province of East Kalimantan still relies heavily on the primary sectors, i.e., agriculture, forestry, and mining for development. The development of a high value-added bioenergy sector by tapping on local bio-resources and linking existing agriculture and forestry sector can contribute to diversifying the local economy with more sustainable downstream development.

Interestingly, Sabah and Sarawak may have a role to play here. As mentioned earlier, both states possess not only enormous biomass resources but also key infrastructure like advanced seaports. Bio-energy is not new in Sabah – it has 20 biomass energy plants, of which 17 are located on the east coast. It would be intriguing for the Bornean territories to follow closely the changes in regional energy supply and demand brought by the relocation of Indonesia's capital.

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