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WEST KALIMANTAN POWER GRID STRENGTHENING PROJECT

Reducing Indonesia's Oil Dependency While Fostering Regional Cooperation

Construction of the Bengkayang Substation

- Oil fuels all power generation in West Kalimantan and a quarter of such generation in Indonesia.
- Oil dependency makes the country vulnerable to volatile market prices. In 2007 and 2008, high oil prices forced Indonesia to switch off many of its oil-based power plants, causing massive blackouts.
- The Asian Development Bank, through the West Kalimantan Power Grid Strengthening Project, is assisting Indonesia secure power supply through a cross-border power trade agreement with its neighbor, Malaysia.
- The project will provide cheaper and reliable electricity to West Kalimantan and its neighboring areas, increase access, and contribute to regional cooperation among Southeast Asian countries.

CONTEXT

In West Kalimantan, Indonesia, oil fuels all power generation, negatively affecting both the environment and the economy. Because oil is the most costly fuel for power generation, its dominant use in West Kalimantan has resulted in high electricity costs. The average cost of power generation is more than $0.25 per kilowatt-hour (kWh).[1]

This high cost presents a major obstacle to the ability of P.T. Perusahaan Listrik Negara (PLN), the state electric utility, to invest in new assets and maintain current assets, hampering electricity supply and economic growth, especially since West Kalimantan urgently needs additional electricity to meet increasing demand, which will reach 600 megawatts (MW) by 2020, from about 200 MW in 2012 (footnote 1). Even if the country decides to develop its abundant coal resources, it will take time because development of this resource will require about 7–10 years.

Overdependence on oil exposes the country to price shocks. When global oil prices soared in 2007 and 2008, oil-based power generation became too costly for Indonesia. The government had shut down some of its oil-fired power plants, leading to rotating blackouts nationwide. Oil dependency also has environmental repercussions because fossil fuels emit greenhouse gases, contributing to climate change and harming health.

PROJECT SNAPSHOT

LOAN APPROVAL DATE:
August 2013

LOAN AMOUNT:
$49.5 million

BORROWER:
Indonesia

EXECUTING AGENCY:
P.T. Perusahaan Listrik Negara

GEOGRAPHICAL LOCATION:
West Kalimantan

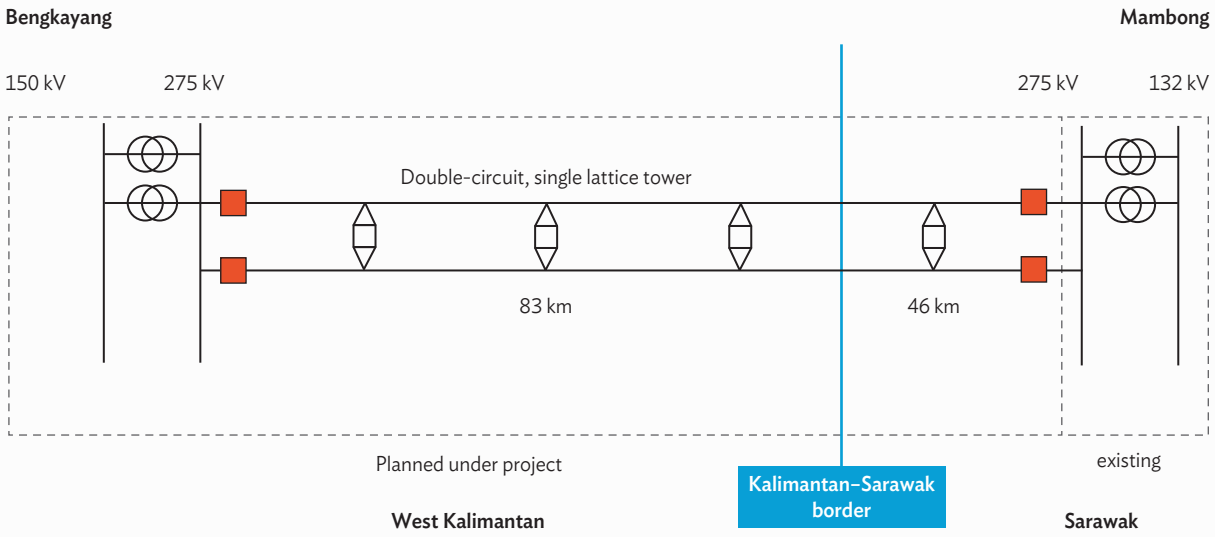
TYPE OF ENERGY PROJECT:
Cross-border power trade – regional interconnection

PROJECT COMPLETION DATE:
January 2016

West Kalimantan explored cross-border power supply as a way to meet rising demand for electricity at a lower cost. To extend energy supply to the West Kalimantan grid, PLN aims to import 230 MW of low-cost (about $0.10 per kWh) hydropower-generated electricity from Sarawak, Malaysia, to the West Kalimantan grid. Through financing from the Asian Development Bank (ADB), the West Kalimantan Power Grid Strengthening Project helped Indonesia build a transmission line from Bengkayang, West Kalimantan to the Malaysian border. Malaysia will finance transmission line extension from the border to Mambong, Sarawak.

[1] Asian Development Bank (ADB). 2013. *Report and Recommendations of the President to the Board of Directors: Proposed Loan and Administration of Loan and Grant to the Republic of Indonesia for the West Kalimantan Power Grid Strengthening Project.* August. Manila.

Figure 3.2.1: Schematic Diagram of Proposed Regional Interconnection



HVTL = high voltage transmission line, km = kilometer, kV = kilovolt.

Source: Asian Development Bank. 2011. *Initial Environmental Examination: Strengthening West Kalimantan Power Grid.* July. Manila.

SOLUTIONS

Power exchange agreement. In 2012, PLN and its counterpart in Malaysia, Syarikat SESCO Berhad (SESCO) signed a 20-year power exchange agreement that stipulates take-or-pay and take-and-pay prices[2] during Phase 1 (i.e., first 5 years). PLN will purchase from SESCO about 50 MW of capacity as base load on a take-or-pay basis and another 180 MW of capacity under a take-and-pay contract. Phase 2 provides for long-, medium-, or short-term purchases of a maximum capacity of 230 MW (footnote 1).

Cross-border interconnection. The project will connect Indonesia and Malaysia using a 275-kilovolt (kV) regional interconnection high voltage transmission line (HVTL) between Bengkayang, West Kalimantan and Mambong, Sarawak. To provide access to electricity in West Kalimantan, the project will also construct two 150 kV HVTLs, from Bengkayang to Ngabang and from Ngabang to Tayan.[3]

[2] Take-or-pay amounts are like capacity payments in that payments for full amounts have to be made even if only a portion of the contract amount is consumed. Take-and-pay allows the buyer to pay only for the amounts used.

[3] ADB. 2011. *Initial Environmental Examination: Strengthening West Kalimantan Power Grid.* July. http://www.adb.org/sites/default/files/project-document/74164/41074-013-ino-iee-01.pdf

275 kilovolt Transmission towers in West Kalimantan connecting to Sarawak, Malaysia

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The project will augment the existing 275/150 kV substation at Mambong in Sarawak while constructing a new 275/150/20 kV substation in Bengkayang, West Kalimantan. Further extension of the grid within West Kalimantan will require construction of a new 150/20 kV substation in Ngabang and a four-line feeder extension in the 150 kV Tayan and Bengkayang substations. Potentially, the grid interconnection could exchange an estimated 230 MW per hour between the two systems. A $2 million grant component will provide 8,000 new households with access to electricity by 2016.[4]

[4] ADB. 2013. ADB's First BIMP-EAGA Project to Bring Clean Energy to West Kalimantan. News release. http://www.adb.org/news/adbs-first-bimp-eaga-project-bring-clean-energy-west-kalimantan

Construction of the HVTL corridor. The power grid corridor consists of 83 kilometers (km) of 275 kV transmission line connecting West Kalimantan and Sarawak, and 145 km of 150 kV HVTLs within West Kalimantan. The HVTL corridor will traverse a rural landscape, with flat to moderately hilly terrain and few secondary urban centers.

Because the corridor is adjacent to existing roads, the transmission lines will have minimal impact on the area through which it passes. The route also avoids sensitive ecosystems (e.g., parks and protected forests, houses and schools, and high concentrations of high-value economic trees). No houses or other structures were relocated.

The project includes four contract packages. Package 1 covers construction of the 275 kV transmission line between Bengkayang substation and the border at Sarawak, East Malaysia. Package 2 covers construction of the 275/150 kV substation at Bengkayang. Package 3 deals with the 150 kV transmission line between Bengkayang substation, the new Ngabang substation, and the substation in Tayan. Package 4 includes construction of the 150/20 kV substation at Ngabang and the Tayan substation extension.

Project implementation. As the executing agency, PLN is responsible for overall project implementation. One project management unit handles all procurement, planning, project supervision, monitoring, accounting, and consolidated reporting, and also coordinates with the project's Sarawak counterpart. A second project implementation unit supervises day-to-day operations and fulfills monitoring and reporting requirements. Figure 3.2.2 shows the project organization structure, and Figure 3.2.3 illustrates the fund flow.[5]

Regional power trade and cooperation. The 275 kV interconnection between West Kalimantan and Sarawak mainly supports power trade between Indonesia and Malaysia. However, this project is part of a larger endeavor by the Association of Southeast Asian Nations (ASEAN) Power Grid Interconnection Development Project. The ASEAN project encourages economic use of energy resources for mutual benefit, while enhancing power system security and creating opportunities for energy trading in the ASEAN electricity market.

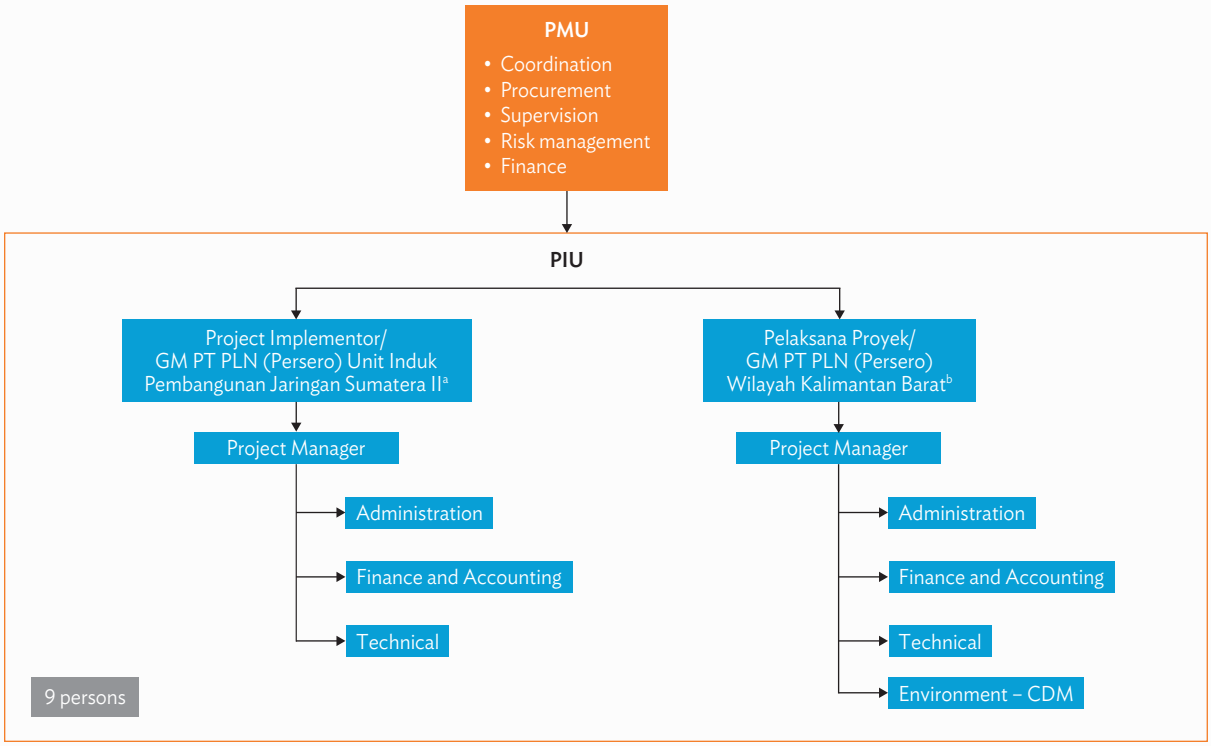
The interconnection between West Kalimantan and Sarawak is one of many power projects that will comprise an envisioned ASEAN power grid. Although ASEAN's member states have vast energy resources, many areas still experience energy poverty. A joint approach in developing a borderless electricity industry will help member countries secure their energy supply in the midst of surging power demand.[6]

RESULTS

Improved energy supply for Indonesia. West Kalimantan Power Grid Strengthening Project will augment electricity supply to West Kalimantan and its adjacent provinces and increase reliability. The 150 kV HVTLs to Ngabang and Tayan will bring access to electricity to many households, and the grant component will connect about 8,000 new households to the power grid, potentially reducing connection charges and connection time. Reliable power will create construction and maintenance jobs, boost the local and national economy, contributing to industrial growth and increasing trade, especially in rubber factories. Such activities will generate jobs, especially

[5] ADB. 2013. *Project Administration Manual: West Kalimantan Power Grid Strengthening Project in Indonesia.* July. Manila.
[6] Association of Southeast Asian Nations. n.d. *Program No. 1: ASEAN Power Grid.* http://www.asean.org/news/item/programme-area-no-1-asean-power-grid

Figure 3.2.2: West Kalimantan Power Grid Strengthening Project Organization Structure



PIU = project implementation unit, PMU = project management unit.

[1] Sumatera II Regional Transmission Construction Unit.

[2] West Kalimantan Regional Unit.

Source: ADB. 2013. *Project Administration Manual: West Kalimantan Power Grid Strengthening Project in Indonesia.* Manila.

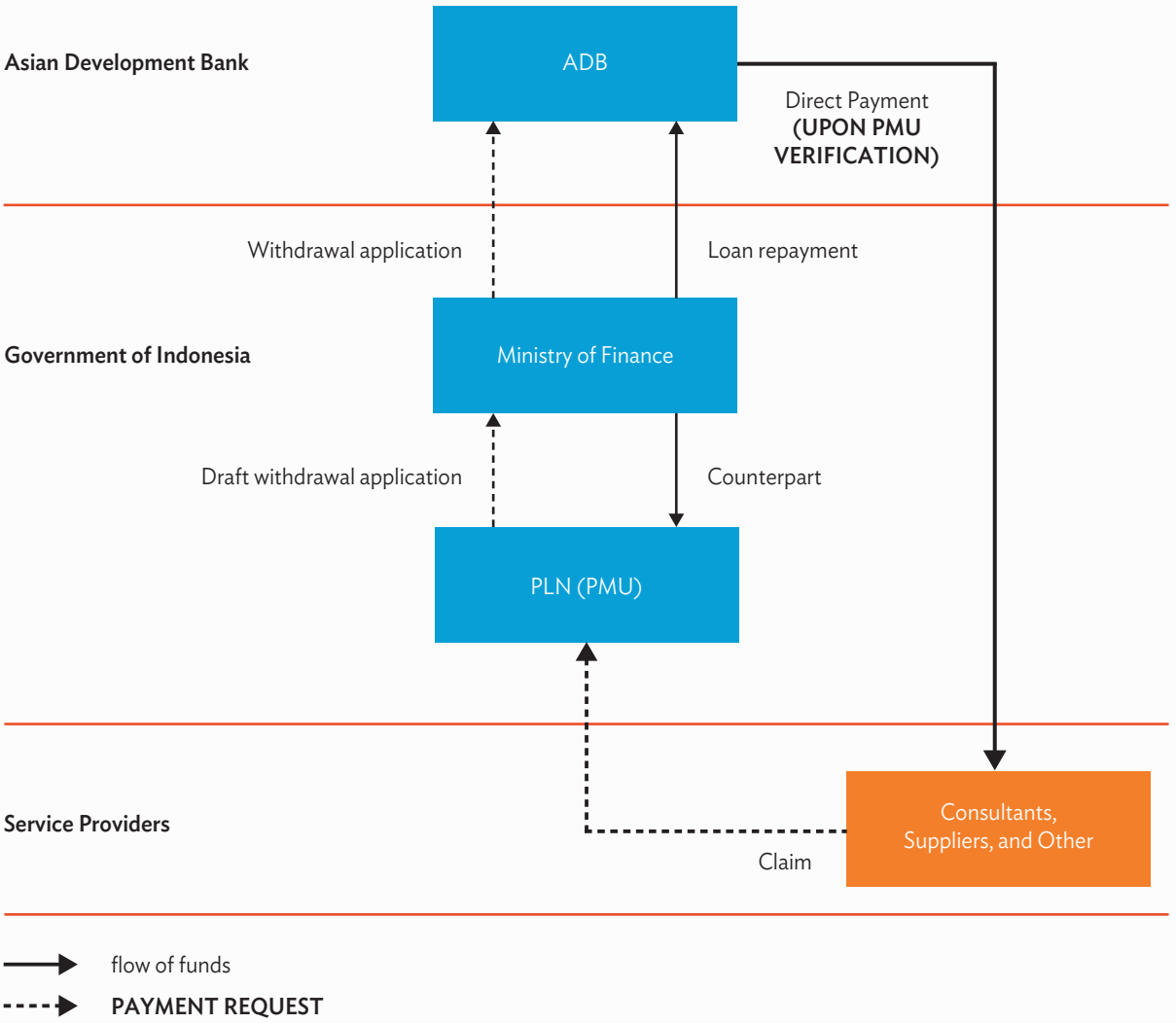
for low-income groups. Increased access to electricity will improve basic public services such as education, health, and water supply (footnote 1).

Increased income and exporting power for Malaysia. This interconnection project will also benefit Malaysia, which has long-term plans for power export. Low-cost power generation will earn Sarawak about $33 million (footnote 1).

Reduced cost of electricity production. Imported electricity will help West Kalimantan reduce the marginal cost of electricity production, from more than $0.25 per kilowatt-hour to about $0.18 per kilowatt-hour. Depending on oil prices, PLN potentially will save about $100 million and reduce its government subsidies.

Reduced carbon footprint. Indonesia heavily relies on oil for power, especially for West Kalimantan. Power from Malaysia will significantly reduce West Kalimantan's reliance on oil-fueled power plants. The project will help the island of Borneo reduce its carbon footprint by avoiding emissions that would otherwise have been produced by oil-based power generation plants.

Figure 3.2.3: West Kalimantan Power Grid Strengthening Project Fund Flow



ADB = Asian Development Bank, PLN = P.T. Perusahaan Listrik Negara, PMU = project management unit.

Source: ADB. 2013. *Project Administration Manual: West Kalimantan Power Grid Strengthening Project in Indonesia.* Manila.

LESSONS

Reducing fossil-fuel dependency through regional cooperation. Many countries in Asia remain heavily dependent on fossil fuels (e.g., oil and coal) for power generation. Overreliance increases vulnerability to price shocks, carbon emissions, and pollution. With surging power demand, increased use of fossil fuels and lack of budget to maintain and rehabilitate distribution assets will further aggravate these effects. In Indonesia, exorbitant prices led to power outages in late 2000. Project implementers should consider renewable alternatives to power generation, within the country and elsewhere. Although West Kalimantan could continue to develop coal-fired power plants locally, it opted to access electricity from cleaner hydropower in Malaysia; lower prices and a smaller carbon footprint will offset the initial investments. Moreover, grid interconnection, in this case, can be implemented faster than coal power development, which could take about 7–10 years.

Careful planning. Project implementers planned the transmission corridor carefully to minimize the impact of construction and operation on farmland, communities, and international borders. They also implemented mitigation measures and a rigorous environmental evaluation to minimize environmental impact and avoid relocations.

Development of power trade and regional cooperation. As demand for energy continues to increase in many countries, development of local energy sectors may lag, thus causing power gaps. Countries may encounter difficulty in providing adequate energy, due to insufficient or absent finance or energy resources. International power trade may help solve these issues.

Power trade can yield both regional and national benefits, including regional cooperation. A regional grid such as that planned for the ASEAN Power Grid Interconnection Development Project, can tap the energy resources of member states and improve quality of life by accessing various sources of energy from other countries.

Keywords

Energy, energy trade, power trade, power grid, power grid interconnection, regional cooperation, hydropower, Indonesia, Malaysia

For further reading

- http://www.adb.org/news/adbs-first-bimp-eaga-project-bring-clean-energy-west-kalimantan
- http://www.adb.org/projects/documents/strengthening-west-kalimantan-power-grid-initial-environmental-examination
- http://www.adb.org/projects/documents/west-kalimantan-power-grid-strengthening-project-rrp

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