Australia-ASEAN Power Link:

Creating an Asia renewable energy hub in Singapore

SUN CABLE

Webinar Presentation
ASEAN Energy & Utilities Digital Week
“NUSANTARA RENEWABLE GRID: HVDC UNDERSEA CABLE"
6 July 2021

About Sun Cable

- A private Australian company established in 2018
- Ambition for Australia to be global leader in renewable energy exports
- Portfolio of green energy mega projects to supply electricity to the NT and ASEAN
- Team of 42+ personnel: engineers, developers, mathematicians and project managers.
- Our vision is to build the world's first intercontinental renewable power grid, connecting Australia to Singapore.
- Indonesia is crucial to the plan as the subsea cable will traverse across Indonesian waters.

Founders and Investors

David Griffin
Chief Executive Officer

Andrew “Twiggy” Forrest
Investors

Dr Fraser Thompson
Chief Strategy Officer

Mike Cannon Brookes
Investors

MacGregor Thompson
Chief Operating Officer

Sun Cable's Project - The AAPowerLink

- Our flagship project is the Australia-ASEAN Power Link or The **AAPowerLink**.

- The AAPowerLink, consisting of solar, storage, and an HVDC transmission network, will provide Darwin and Singapore with high quality, dispatchable renewable power supply. The transmission system will be via high voltage direct current (HVDC) links, supported by battery storage systems.

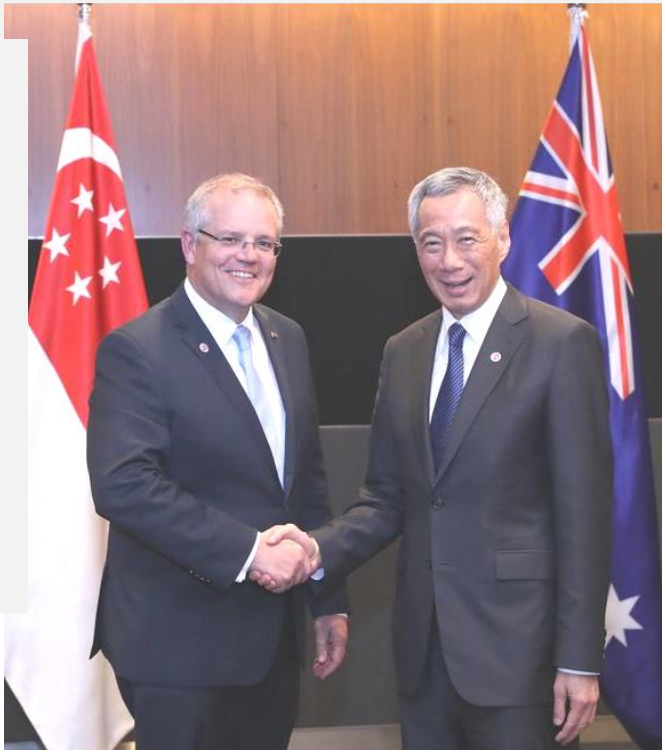
- The key aspects of the project are as follows:
  - A 14 GW solar farm with battery storage in the Northern Territory, Australia
  - Approximately 33 GWh battery to enable **24/7 dispatch**
  - 750 km, 3.2 GW HVDC overhead transmission line to Darwin
  - 2.2 GW HVDC submarine cable to Singapore
  - **about 3,300 km of the subsea cable will traverse through Indonesian waters**

Background - The AAPowerLink

Major Achievement - The AAPowerLink

- Australian Government Major Project Status (July 2020)
- Northern Territory Government Major Project Status (Jan 2021)
- Inclusion on Infrastructure Australia's "Infrastructure Australia Priority List" (Feb 2021)

- System design on schedule
- Extensive irradiance modelling conducted
- Regulatory planning at an advanced stage
- Successful SubSea Survey Phase 1 (AU waters)



Australia PM Scott Morrison with Singapore PM Lee Hsien Loong Joint Statement, June 2021

AAPowerLink - The Solar Precinct

5B developed the pre-fabricated solar array, ‘Maverick’.

Maverick is the fastest, lowest cost and lowest risk way to deploy ground mounted solar.

The systems revolutionary approach combines modular design, prefabrication and rapid deployment – streamlining engineering & procurement to achieve the lowest LCOE.

AAPowerLink - Battery Storage

Battery storage is the fastest responding source of power on grids. At full rated power, battery storage are generally designed to output for between one and several hours.

30 megawatt (MW) / 30 megawatt-hour (MWh) large-scale, grid-connected battery located at the Ballarat Area Terminal Station (BATS), Victoria, Australia.

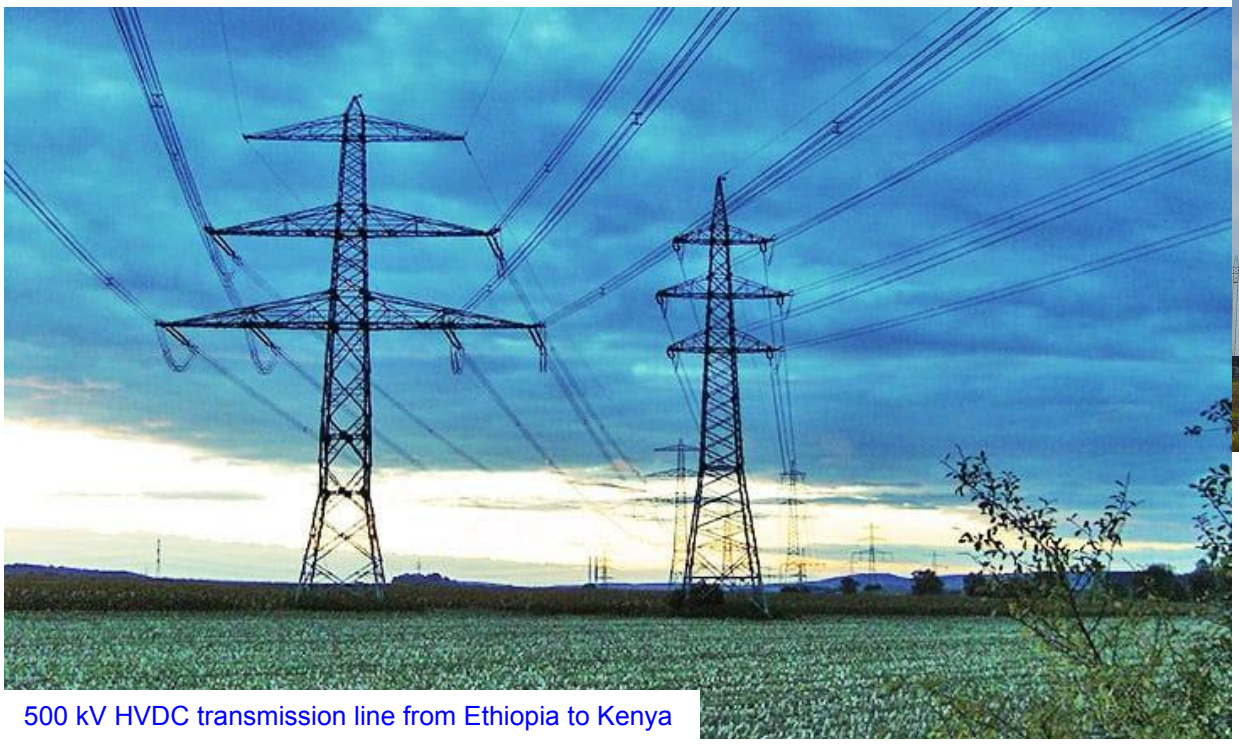
AAPowerLink - Transmission Line

The HVDC transmission will likely occur at circa 525kV, in a bipole configuration with metallic return.

The design of the transmission towers will vary subject to the surrounding land use, local environmental conditions and geotechnical conditions at each tower.

There are a variety of tower designs that will be employed to recognise the unique conditions at each tower location.

HVDC tower, Nelson River Bipole adjacent to Dorsey Converter Station, Canada



500 kV HVDC transmission line from Ethiopia to Kenya

An optical ground wire (OPGW) is crucial for this transmission line, given the level of lightning strikes incurred along the route, especially from Elliott to Darwin.

AAPowerLink - Voltage Source Converter

The Voltage Source Converter based High Voltage Direct Current (VSC-HVDC) is the newest generation of HVDC technology.

Direct current is a more efficient means to transmit electricity over long distances (circa >400km), compared to alternating current, i.e. the losses incurred are materially less and the transmission capacity materially higher.

Direct current is the only practical means of transmitting over long distance under water.

The AAPowerLink will require VSCs to be installed at the solar precinct, Darwin and Singapore.

AAPowerLink - Submarine Cable

The cable system configuration is a Bipole with Metallic Return, hence **3 cables in total**:

- Positive pole (Pole 1)
- Negative pole (Pole 2)
- Metallic return

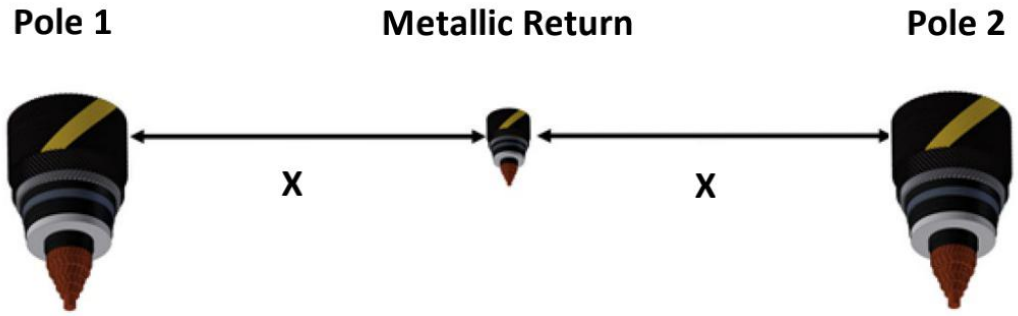


Figure 5 Typical arrangement of a Bipole with Metallic Return in individual lay

AAPowerLink cables are each approx. **161 - 176 mm in diameter** and weight approx. **66 - 85 kg/m**

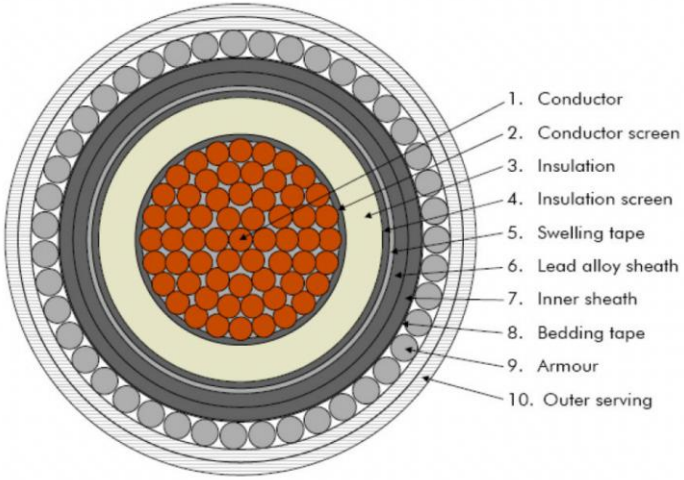
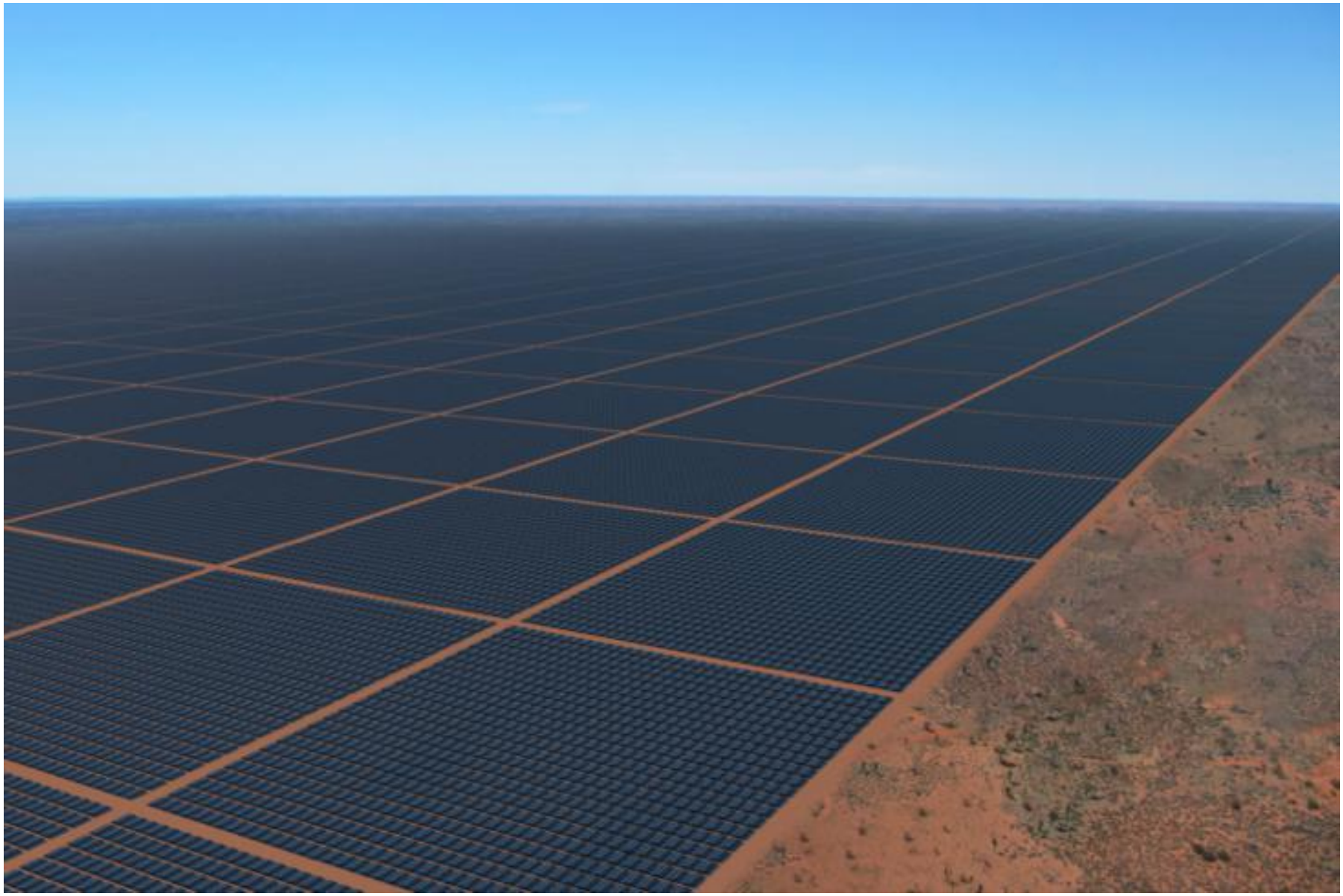


Figure 3 Submarine cable typical cross section

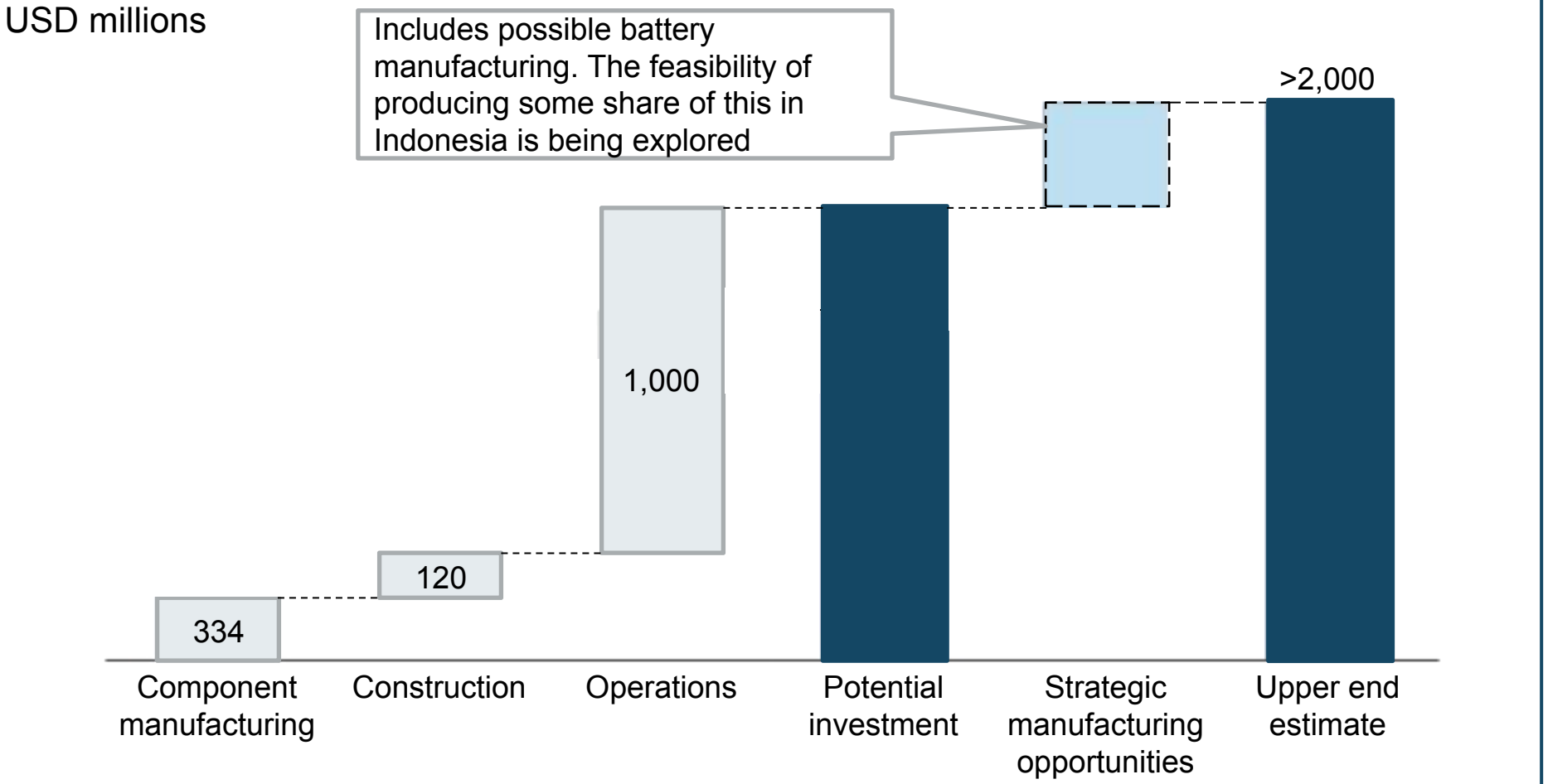
Figure 4 Example of double armoured cable

AAPowerLink – Linear Optimisation Model



Direct investment up to USD 2 billion in Indonesia could potentially be supported by the AAPowerLink

Potential investment in Indonesia related to the Australia ASEAN Power Link (AAPowerLink)[1]



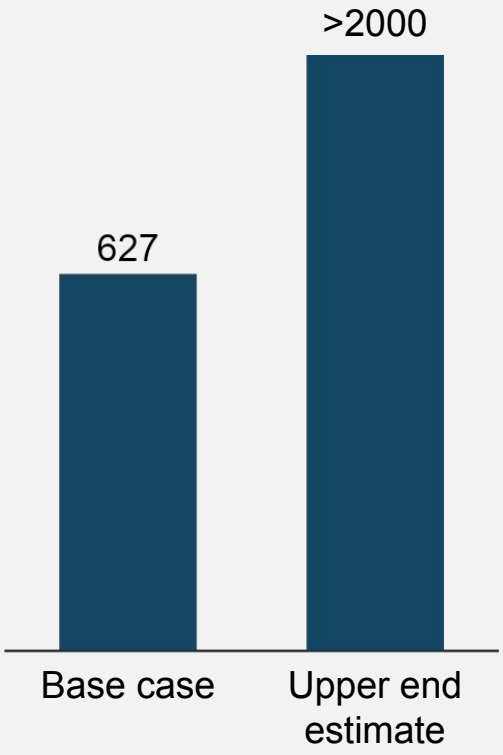
1. These are preliminary estimates that will be refined based on Sun Cable engagement with local suppliers. They reflect the total investment over the project lifetime, including both capital investment and operational expenditure.

SOURCE: Sun Cable analysis

Between 4,700 – 15,000 jobs could potentially be created in Indonesia due to the AAPowerLink investment in the country

Total investment in Indonesia

USD millions



Jobs multiplier related to investment

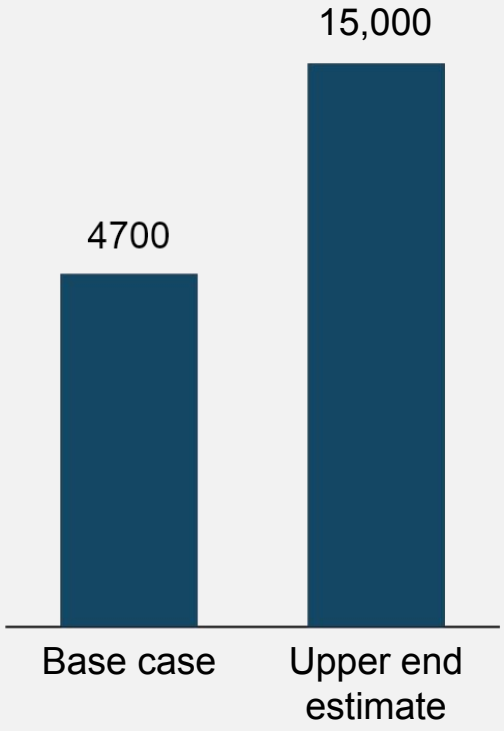
Jobs created, directly and indirectly, per USD1 million in spending[1]

Renewable technologies
(wind, solar, bio-energy, geothermal, hydro)

7.49 jobs

Potential jobs created

Total Indonesian jobs linked to AAPL investment in the country



1 Excludes induced jobs, which refer to jobs that are created as a result of increased demand for goods and services, that in turn arise from the specific economic impact.

SOURCE: Heidi Garett-Pelter (2017); McKinsey & Company (2020)

Terima Kasih