



# Australia-Asia PowerLink



**PURPOSE OF EVALUATION**  
Proposal seeking funding



**EVALUATION OUTCOME**  
Investment-ready proposal

**ASSESSMENT FRAMEWORK STAGE**



**LOCATION**

Northern Territory

**GEOGRAPHY**

Developing regions and northern Australia

**SECTOR**

Energy

**OUTCOME CATEGORY**

Energy Transformation

**PROPONENT**

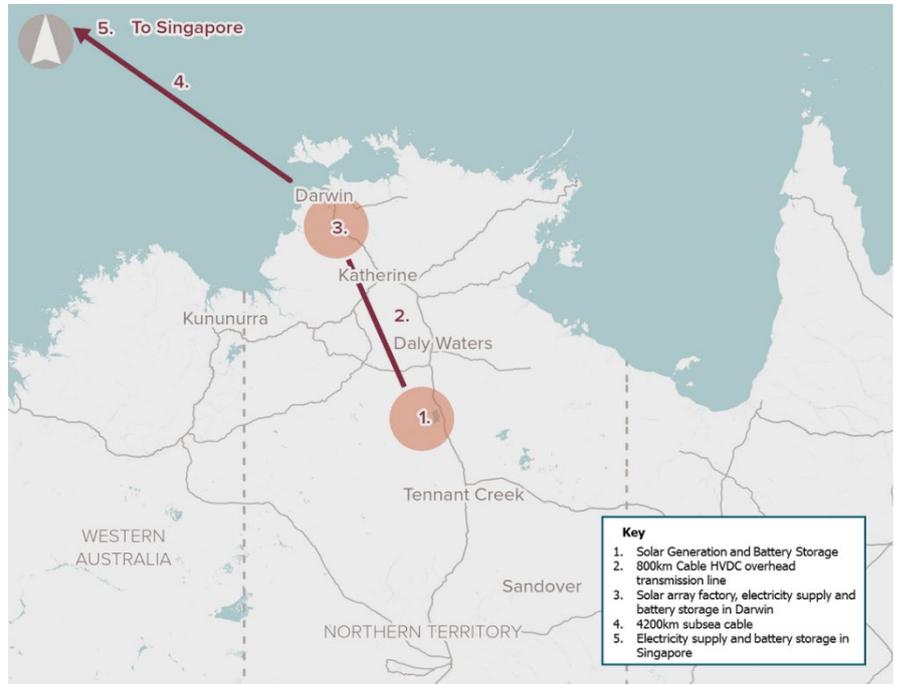
Sun Cable

**INDICATIVE DELIVERY TIMEFRAME**

Construction start: 2024  
Completion by: 2026 (Darwin offtake), 2029 (Singapore offtakes)

**EVALUATION DATE**

12 April 2022



**CAPITAL COST**

\$35 billion (outturn, whole project)  
\$4,760m (outturn, allocated to Australian consumption)

**FUNDING COMMITTED/SOUGHT**



## Review summary

Infrastructure Australia has evaluated the business case for **Australia-Asia PowerLink** in accordance with our Statement of Expectations, which requires us to evaluate project proposals that are nationally significant or where Australian Government funding of \$250 million or more is sought. As a result of our assessment, **Australia-Asia PowerLink has been updated on the *Infrastructure Priority List* to an Investment-ready (Stage 3) proposal.**

The Australia-Asia PowerLink (the "Proposal") develops northern Australia's comparative advantages in solar production to provide zero emission electricity to Darwin and Singapore. This would provide less expensive electricity to Darwin customers, reduce Australia's greenhouse gas (GHG) emissions and develop a new renewable energy export industry for northern Australia. Indirect benefits to Australia include an uplift in economic activity from spin-off industries to support the Proposal's construction and operation, as well as the potential catalyst for new industry investment to take

advantage of lower energy costs, which may include green hydrogen, electrified LNG, critical minerals processing, data centres, green ammonia, green steel, and blue hydrocarbon industries (dependent on the availability of Carbon Capture and Storage).

The Proposal is strongly aligned with government priorities around development of northern Australia and transition to less carbon intensive forms of energy.

The public benefit to the Australian community from the Australia-Asia PowerLink proposal is highly positive, including lower cost energy in the Northern Territory, catalysing a new renewable energy export sector to Southeast Asia and potentially spurring new economic activity centered around the Proposal's delivery and industrial users. The benefits are premised on the Proposal being largely developed on a commercial basis with private funding rather than underpinned by public subsidies. The realisation of benefits is dependent on the Proponent achieving contracted energy supply to enable a financial investment decision and lock in financing terms.

In conducting the evaluation, Infrastructure Australia has not considered the commercial viability of the Proposal and has only considered the public benefit impacts relating to the Australian components of the project. Our evaluation made reasonable assumptions regarding the potential for the Proponent to seek Australian Government financing in the form of export financing or project development loans, and we are comfortable this presents a relatively low downside impact on the level of public benefit. The Proposal has a stated benefit-cost ratio (BCR) of 2.4 at a discount rate of 7%. This reflects the estimated costs and benefits that accrue to the Australian community. The Proposal also provides a range of benefits to overseas electricity consumers, GHG emissions reductions from overseas energy consumption, as well as the majority of costs being related to supplying electricity to Singapore. These have not been factored into the assessment of the Proposal from an Australian perspective and for the assessment of the benefits for this evaluation but they are critical for the Proposal's commercial viability.

## Proposal description

The Australia-Asia PowerLink (<https://suncable.energy>) is a large-scale solar farm, energy storage and transmission system to provide renewable electricity to the Northern Territory and to export to Singapore. It includes:

- a Solar Precinct in the Barkly region of the Northern Territory, covering 12,000 hectares that generates 17-20 Gigawatt (GW) (peak) from the solar photovoltaic (PV) arrays. As a comparison, Loy Yang in Victoria (A and B), which is Australia's largest power station, has a capacity of 3.6 GW, although the power generated per GW of capacity is higher for coal-fired power than for solar PV;
- 36-42 GW hours of energy storage;
- an 800km, 3 GW high voltage direct current (HVDC) overhead transmission line from the Solar Precinct to near Darwin;
- provision of approximately 800 Megawatts (MW) of electricity to the Darwin region. By comparison, Territory Generation, which is the largest electricity producer in the Northern Territory, has capacity of approximately 600 MWs; and
- provision of 1.75 GW of electricity to Singapore, via a 4,200km subsea cable, expected to represent up to approximately 15% of Singapore's energy needs.

## Review themes

### Strategic Fit

**The case for action, contribution to the achievement of stated goals, and fit with the community.**

### Case for change

The Northern Territory currently has high-cost electricity produced using gas, both in terms of the financial costs and the environmental costs from GHG emissions. It has a comparative advantage in solar energy production, because of the low opportunity cost of land, the high-quality solar resources and proximity to energy-intense markets in the Indo-Pacific region. This includes Singapore, which is seeking to transition to renewable energy sources and import renewable energy to meet its future electricity needs.

*Northern Territory large scale solar generation* was included as an Early-stage Proposal on

the [Infrastructure Priority List](#) in 2021, recognising the opportunity to harness this advantage by developing large-scale, dispatchable renewable energy generation, with transmission infrastructure to supply domestic and export markets.

<b>Alignment</b>	<p>The Proposal directly contributes to national and territory goals to reduce GHG emissions from electricity production, achieve net zero emissions by 2050 and to build new export industries based on renewable energy. The Proposal has been granted Major Project Status by the Australian Government and the Northern Territory Government, which provides recognition of the strategic significance of the Proposal to Australia and the Northern Territory.</p> <p>The Proposal will assist in facilitating private sector development related to the Northern Territory Government’s Middle Arm development precinct.</p>
<b>Network and system integration</b>	<p>The Proposal is compatible with supply to the Darwin to Katherine Interconnected System (DKIS), which is the main electricity network in the Northern Territory. The combination of large scale solar and battery technology will provide reliable energy to this system, as well as to other sources of demand such as potential industrial users, liquefied natural gas (LNG) producers and Singapore. The DKIS system is currently undergoing a market reform process, and the rules from this process (which are still being developed) are likely to apply to electricity supplied by Australia-Asia PowerLink to that system. Supply to standalone industrial customers outside of this grid is also viable.</p>
<b>Solution justification</b>	<p>As a private sector proposal, the business case has assessed a single option in detail rather than a broad range of options for addressing the Darwin region’s future electricity supply, and Singapore’s. The infrastructure proposed, such as the size of the solar precinct, battery capacity and transmission capacity, has been optimized by the Proponent to support the expected demand for different market segments.</p>
<b>Stakeholder endorsement</b>	<p>The Proposal has broad support, including from the Northern Territory Government and the Australian Government. The proposal may face sovereign and policy risk from international governments. There appears to be conditional support on the basis that environmental impacts and cultural heritage impacts are minimised, including any impacts to ocean habitats due to the laying of subsea cable. The Proponent is working through the Australian and international approvals processes currently.</p> <p>The Northern Territory Government recently passed the Solar Project (Australia-Asia Power Link) Special Provisions Bill 2022, facilitating the Proposal’s pathway forward, aligned with the Territory’s Project Development Agreement.<sup>1</sup></p> <p>Sun Cable has engaged with local stakeholder groups, including First Nations groups, from the project’s early stages. Continued community and native title consultations will be necessary to ensure community, First Nations’ cultural heritage and ecological benefits are achieved.</p> <p>The Proponent has demonstrated international support. The Indonesian Government has recommended the subsea cable route through Indonesian waters and approved the subsea survey permit, as well as indicating official support for the Proposal. The Singapore Government’s Energy Market Authority is seeking 4GW of low carbon electricity imports into Singapore. This is a competitive process, under which the Proponent is engaged.</p>
<b>Societal Impact</b>	<p><b>The social, economic and environmental value of the proposal, as demonstrated by evidence-based analysis.</b></p>
<b>Quality of life</b>	<p>The Proposal will improve the quality of life of Australians through reducing the cost of electricity in Darwin by approximately 12%. This has been valued at \$184 million in present value terms, which equates to 3% of the Proposal’s benefits. The Proposal will also improve quality of life indirectly through reducing the GHG emissions associated with electricity production and associated climate change impacts. This has been valued at</p>

<sup>1</sup> See [Progressing the world’s largest renewable energy system | NT Rebound](#), accessed 20/04/2022

\$3,149 billion (44% of benefits).

<b>Productivity</b>	The Proposal will improve the productivity of the economy, by reducing the costs of electricity production (included in community electricity savings above) and by providing opportunities for profitable business activities in northern Australia. The latter includes opportunities for added industrial activities currently constrained by the high cost of electricity (valued at \$655m), the producer surplus of the Proposal itself (with producer surplus valued at \$800m above capital costs), as well as the opportunity for the Proposal to export electricity to Singapore. The Proposal is expected to reduce the cost of electricity for industrial users by around 20%.
<b>Environment</b>	Infrastructure Australia understands the Environmental Impact Statement to the Northern Territory Environment Protection Authority (NTEPA) is under assessment. <sup>2</sup> The Proposal will have positive environmental impacts through reducing GHG emissions from electricity production and the associated climate change impacts. The electricity supplied for consumption in Australia would abate approximately 2.5 million tonnes of CO2 equivalent per year. The electricity consumed in Singapore would abate a further 6 million tonnes of CO2 equivalent per year. However, several environmental impacts are currently uncertain. There may be environmental risks to laying 4,200km of subsea cable, as well as land-based risks to local flora and fauna, waterways and aquifers. Adverse environmental impacts will need to be mitigated, offset or avoided.
<b>Sustainability</b>	The Proposal provides a sustainable solution through its positive environmental impacts. At the time of this assessment, the final route for transmission and the subsea cable has not been finalised. The Proposal will need to mitigate and offset potential impacts to marine flora and fauna and land-based impacts. Sun Cable lodged an Environmental Impact Statement with the NTEPA in April 2022 that addresses how environmental and cultural impacts for the Australian components of the project are mitigated and managed. This will now be assessed by the NTEPA, including a public submission process open until July 2022.
<b>Resilience</b>	The Proposal is expected to increase the resilience of the Northern Territory electricity supply system through the combination of solar and battery technologies. Positioning the Northern Territory as a renewable energy exporter would also increase resilience to shocks to existing fossil fuel-based industries.
<b>Deliverability</b>	<b>The capability to deliver the proposal successfully, with risks being identified and sufficiently mitigated.</b>
<b>Ease of implementation</b>	<p>The Proposal represents the largest solar farm ever developed globally, largest battery and longest subsea power cables. With such scale, implementation will undoubtedly have challenges, including the challenges of obtaining approvals across multiple jurisdictions and achieving contracted supply to finance the Proposal.</p> <p>Sun Cable recently achieved Series B Capital Raise (AUD\$210 million), which indicates a level of early private equity interest in the Proposal, providing an early positive indication of commerciality. The Proponent is targeting financial close in 2024.</p>
<b>Capability &amp; capacity</b>	<p>The Proponent is a company established in 2018 to deliver this particular proposal. The executive and partners have demonstrated experience in delivering renewable energy projects in Australia and overseas, although nothing of the scale of Australia-Asia PowerLink has been undertaken. However, the business itself does not have a track record because this is its first project.</p> <p>The approach to delivery includes the appointment of a Project Advisory Partner (PAP), Project Delivery Partner (PDP) and Risk Management Partner (RMP) at an early stage in development to enable Sun Cable to leverage others' expertise:</p> <ul style="list-style-type: none"> <li>• procurement and commercial expertise of PwC as the PAP,</li> </ul>

<sup>2</sup> See [Australia-Asia PowerLink Project | NTEPA](#), accessed 20/04/2022

- the global project delivery expertise of the consortium of Bechtel, Hatch and SMEC as the PDP (each of these firms has a global presence, employing, 50,000, 9,000 and 5,000 people respectively),
- the risk management and insurance advisory expertise of Marsh as the RMP (Marsh operates globally with around 45,000 professionals).

With the scale of expected capital expenditure, and the fact that this is a newly formed organisation, there is delay risks for the Proposal's timetable.

### **Project governance**

The project governance involves:

- the formal arranging of Sun Cable, the PAP, the PDP and the RMP into the Integrated Project Delivery Team (IPDT) to capture the collective experience and capabilities of these companies, and
- the formation of an Integrated Project Steering Committee (IPSC) which consists of a senior representative of each of the abovementioned companies, the CEO and COO of Sun Cable and the Australia-Asia PowerLink Project Director to oversee the development and delivery of the Proposal.

Sun Cable itself is a multinational group of private companies founded in Australia and Singapore in 2018. The commercial governance model is suitable for delivery of the Proposal.

The planning and environmental approvals are not yet in place.

### **Risk**

The Proposal is high risk because of the scale envisaged and with Sun Cable being a newly established company. Key risks include:

- demand risk — whether offtake agreements are secured for enough of the energy produced by the Proposal at prices that make it capable of a commercial return. The Australian energy demand includes several untested components:
  - spill energy (excess electricity that can be produced at the solar farm but is unable to be dispatched through the Australia-Asia PowerLink transmission system to Darwin or Singapore), which may not be easily sold because of its location,
  - demand from LNG producers, who will face substantial costs to switch to using solar electricity,
  - induced industrial demand in Darwin, which does not yet exist,
  - demand from existing businesses and households within the DKIS, which is more certain, and
  - demand from Singapore – until offtake agreements are in place, related to Singapore demand, there is a risk that the Proposal will not reach financial close;
- technical risks, particularly the subsea cable and the use of components that are at the forefront of technology and will need qualification;
- sovereign and regulatory risks, given the need to obtain approvals in Australia, Indonesia and Singapore;
- environmental and cultural heritage impacts, as the Environmental Impact Statement process is still underway; and
- scale risk — the level of capital expenditure required in a short period is very high, peaking at AUD\$12 billion in 2027-28. The capex is predominantly related to serving the Singapore market. The sheer size of the capex suggests that there is a high risk of delays and in finding sufficient resources.

The governance arrangement has a specific Risk Management Partner. Sun Cable would be expected to have appropriately mitigated most risks prior to committing to construction, such as having obtained requisite approvals, signed offtake agreements and tested components.

### **Lessons learnt**

Proposal assumptions and choices have been informed by previous projects. Due to the scale of the Proposal and the integration of existing technologies, untested at this scale,

there are aspects of the Proposal that cannot be informed from past project experience. The Proponent has worked extensively to review HVDC subsea cable projects that are currently operational.

## Economic appraisal results (preferred option)

The Proposal has a stated benefit-cost ratio (BCR) of 2.4 at a discount rate of 7%. This is the estimated costs and benefits that accrue to the Australian community. The Proposal also provides a range of benefits to overseas electricity consumers, GHG emissions reductions from overseas energy consumption, as well as the majority of costs being related to supplying electricity to Singapore. These have not been factored into the assessment of the Proposal from an Australian perspective and for the assessment of the benefits for this evaluation but are critical for the Proposal's commercial viability.

The main risk for the economic analysis relates to demand, which is the subject of commercial offtake negotiations. This is the critical enabler for the Proposal's success and ultimately benefits realisation. Within Australia, demand risks include:

- whether the demand from LNG producers eventuates, because these producers will face costs to adjust from using gas to using solar electricity for LNG production,
- whether and when induced industrial activity at Darwin occurs, which is expected to be a major demand for the Proposal's electricity. This includes the benefits for the project in contributing to the development of the Northern Territory Government's Middle Arm precinct in Darwin, and
- whether the spill energy that cannot be transported is used at the site of the solar farm and substitutes for thermal energy use. This spill energy equals 50% of the total emission benefits, as well as contributing to producer surplus. The commercial case proposed by the Proponent is that the very low price will enable activities on site such as hydrogen, green methane and sustainable aviation fuel. Spill energy contributes one third of the benefits, and in the absence of the use of this spill energy, or if this does not substitute for thermal energy use, the Proposal's BCR falls by 0.8 to 1.6 – however the BCR is still positive and substantially over 1 not to present a risk to the overall public benefit of the Proposal.

The provision of renewable electricity will operate within markets for electricity supply, and hence compete against other proposals to generate electricity and renewable electricity. While the natural advantages of the Proposal are significant, such as the opportunity cost of land and high-quality solar resources, because of the scale of transmission (both overhead HVDC and subsea cable) the costs of transmission infrastructure are substantial. On balance, the prices expected to be charged in the Australian context are competitive. Infrastructure Australia has not reviewed the commercial viability of the Proposal against other potential renewable energy options.

The following table presents the core evaluation results and identifies key benefits and observations.

	Discount rate:	4%	7% (central)	10%
<b>Core evaluation results</b>	<b>BCR:</b>	3.4	2.4	1.8
	<b>NPV (\$m):</b>	8,192	4,222	2,200
<b>Key benefits measured:</b>	Avoided GHG emissions			
	Reduced electricity costs for Northern Territory community			
	Producer surplus for Sun Cable			
	Induced industrial activity from lower electricity prices			

**Key observations and issues**

Noting the below, the BCR is robust to large changes in assumptions.

The Proposal has substantial benefits to the community from reduced electricity prices, reduced GHG emissions and the potential for additional industrial activity in Darwin. Overall, the Proposal has economic merit so long as it does not require significant public subsidy equal to or greater than the value of public benefits. If considerable subsidies are required, then this would be inconsistent with the estimates to date, which indicate that the producer surplus is above the capital cost. It does not appear likely at this stage that the Proposal would require or have access to a level of public subsidy at which its economic merit would become questionable. The most likely forms of Australian Government support are financing through the Northern Australia Infrastructure Facility (NAIF), the Clean Energy Finance Corporation (CEFC) and/or Export Finance Australia (EFA). Infrastructure Australia has undertaken an assessment of a reasonable level of public financing, of which only the concessional portion would be considered a subsidy, and at the level assumed, the considerable GHG emissions reduction benefits would continue to indicate economic merit for the Proposal.

The Proposal's commercial success will depend on its ability to lock in offtake agreements at prices that recover its costs. The strength of these commercials, as reflected in the status of offtake agreements and the estimates of costs, have not been reviewed in detail by Infrastructure Australia.

The allocation of costs and benefits to Australia is not a straightforward exercise. It is likely, and the modeling undertaken for the Proposal confirms this, that there will be some further spillover benefits to Australia in relation to employment demand, for example.

**Proposal development**

The business case presents a single option, comprising a solar precinct, battery system, transmission infrastructure and subsea cable to Singapore. Because this is a private sector proponent, Infrastructure Australia acknowledges that it is focused on its specific approach that is privately funded and is expected to deliver a commercial rate of return, and consequently does not require a consideration of a broad range of options. The Proponent has undertaken optimisation of its project to ensure that the sizing, design and route alignment will best match demand and commercial needs.

**Proposal engagement history****Detailed economic appraisal results**

The following table presents a breakdown of the benefits and costs as stated in the business case. These have been measured for a period of 40 years from full completion of the project.

**Benefits and costs breakdown**

Proponent's stated benefits and costs	Present value (\$m, 2021/22)			% of total for 7% results
	4%	7%	10%	
<b>Discount rate (real)</b>	<b>4%</b>	<b>7%</b>	<b>10%</b>	
<b>Benefits</b>				
Avoided GHG emissions	5,204	3,149	2,061	44%
Producer surplus	6,202	3,831	2,541	53%
Community energy savings	313	184	118	3%

Induced industrial activity	1,115	655	419	9%
Residual value of assets	68	18	5	0%
Costs to LNG producers	-1,289	-638	-337	-9%
<b>Total Benefits<sup>1</sup></b>	<b>11,613</b>	<b>7,198</b>	<b>4,806</b>	<b>100%</b>
<b>Costs</b>				
Total capital costs	-3,421	-2,976	-2,606	100%
Operating costs – these have been subtracted from revenue in producer surplus rather than reported separately	NA	NA	NA	NA
<b>Total Costs<sup>1</sup></b>	<b>-3,421</b>	<b>-2,976</b>	<b>-2,606</b>	<b>100%</b>
<b>Net benefits - Net present value (NPV)<sup>2</sup></b>	<b>8,192</b>	<b>4,222</b>	<b>2,200</b>	<b>n/a</b>
<b>Benefit-cost ratio (BCR)<sup>3</sup></b>	<b>3.4</b>	<b>2.4</b>	<b>1.8</b>	<b>n/a</b>

Source: Proponent's business case

- (1) Totals may not sum due to rounding.  
(2) The net present value is calculated as the present value of total benefits less the present value of total costs.  
(3) The benefit-cost ratio is calculated as the present value of total benefits divided by the present value of total costs.