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# Economic Assessment of Proposed Solar Project in Twizel for Fast-track Substantive Application

Prepared for:  
**Nova Energy Limited**

**Authorship**

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This report has been prepared for Nova in respect of its application for all approvals under the Fast-track Approvals Act 2024 for the Twizel Solar Project. The Panel appointed to consider the application for the Twizel Solar Project may rely on this report for the purpose of making its decision under the Fast-track Approvals Act.

**Compliance**

The authors have read the Expert Witness Code of Conduct set out in the Environment Court Practice Note 2023. The authors have complied with the Code of Conduct in preparing this report. The content of the report is within the authors area of expertise, and the authors have not omitted to consider material facts known to them that might alter or detract from the opinions expressed in the report.

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# Contents

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1.	Statement of Qualifications & Experience .....	1
2.	Executive Summary.....	2
3.	Introduction .....	4
3.1.	Context.....	4
3.2.	Criteria for Assessing Substantive Applications .....	4
3.3.	Purpose of Report .....	5
3.4.	Structure of this Document .....	5
4.	About the Proposal .....	6
4.1.	Site Location and Description .....	6
4.2.	Receiving Environment .....	6
4.3.	Zoning.....	6
4.4.	About the Proposal .....	6
4.5.	Indicative Site Layout .....	7
4.6.	Anticipated Generation.....	8
5.	Economic Rationale for the Proposal.....	9
5.1.	Overview of NZ’s Electricity Supply & Demand .....	9
5.2.	Future Generation Requirements and the Role of Solar .....	9
5.3.	Fit with Location Criteria.....	10
5.4.	Alignment with Strategic Documents .....	12
6.	One-Time Impacts of Development.....	13
6.1.	Introduction .....	13
6.2.	Methodology.....	13
6.3.	Limitations.....	14
6.4.	Development Assumptions.....	14
6.5.	Summary of Development Costs .....	15
6.6.	Estimated Impacts on GDP, Jobs, and Wages.....	15
6.7.	Top 10 Industries by FTEs Employed .....	16
7.	Ongoing Impacts of Future Uses.....	18
7.1.	Introduction .....	18
7.2.	Methodology.....	18
7.3.	Limitations.....	18
7.4.	Annual GDP, Jobs, and Wages .....	18
7.5.	Wider Ongoing Employment Impacts.....	19
8.	Wider Economic Benefits.....	20
8.1.	Impacts on Renewable Energy Infrastructure .....	20
8.2.	Reduction in Reliance on Higher Carbon Alternatives.....	20
8.3.	Improved Competition in the Wholesale Electricity Market .....	21
8.4.	Reduction in Rate of Retail Electricity Price Growth.....	21
8.5.	Alignment with Government Growth Agenda .....	22
8.6.	Investment Signal Effects.....	23
8.7.	Highest and Best Use of Land .....	23

9.	Potential Economic Costs.....	24
9.1.	Displacement of Economic Activity.....	24
9.2.	Reverse Sensitivity Effects .....	24
9.3.	Foregone Rural Production .....	25
10.	Project Acceleration.....	26
10.1.	Timing of Economic Benefits.....	26
11.	Summary and Conclusion .....	27
11.1.	Conclusion.....	27
11.2.	FTAA Criteria Checklist.....	27
Appendix A: Solar Irradiation at the Site .....		29
Appendix B: Total Economic Value Analysis .....		30
11.3.	Introduction to the TEV Framework .....	30
11.4.	TEV of the Proposal.....	32
11.5.	Direct Use Value of Rural Production .....	32
11.6.	Indirect Use & Non-Use Value of Rural Production .....	34
11.7.	Comparison of Long-Term Direct Values .....	35
11.8.	TEV Summary and Conclusion .....	35

# 1. Statement of Qualifications & Experience

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## **Fraser Colegrave**

I am the Founder and Managing Director of Insight Economics, one of New Zealand's leading economic consultancies on resource management, property development, and local infrastructure. Prior to that, I was a founding director of another economics consultancy – Covec Limited – for 12 years.

I hold a first-class honours degree in economics from the University of Auckland, where I received numerous prizes and scholarships for academic excellence. Over the past 25 years, I have successfully completed more than 600 consulting projects across a wide range of sectors, including large-scale residential developments, and have appeared as an expert witness at more than 150 hearings before various judiciaries all the way up to the High Court.

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I am a Consultant at Insight Economics. I have been employed at Insight Economics since 2020. I hold a BCom (Actuarial Studies) / BAppFin from Macquarie University and a BDes (Architecture) from the University of Sydney.

I have 20 years of professional experience in insurance, consulting, and architecture, including roles as an Actuary in both Australia and France. My experience includes economic and retail impact assessments, market supply and demand studies, resource consents, and plan changes.

## **Nicholas Keith**

I am a Consultant at Insight Economics. I have been employed at Insight Economics since 2023. I hold a BSc (Statistics) from the University of Auckland and a first-class honours MSc (Analytics) from Massey University.

I have three years of professional experience in economic consulting, with a background in statistical and econometric analysis. Since joining Insight Economics I have contributed to significant projects across retail, residential, tourism, industrial, and local infrastructure sectors, including Fast-track applications for some of New Zealand's largest property developers.

We are collectively responsible for preparing this report on behalf of Insight Economics. We confirm that, in our capacities as authors of this report, we have read and agree to abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses contained in the Practice Note 2023.

For more information about Insight Economics, including our extensive experience with helping to secure planning approval for major projects (including numerous Fast-track applications), please visit our website: [www.insighteconomics.co.nz](http://www.insighteconomics.co.nz)

## 2. Executive Summary

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### Context

Nova seeks to develop the **Twizel Solar Project**, a large-scale solar generation facility near Twizel, in the Mackenzie District (the **proposal**). The proposal involves installing more than 495,000 ground-mounted solar panels with a grid export capacity of 300 MW, connected to Transpower's national grid via the existing Twizel substation.

Following approval of the referral application under the Fast-track Approvals Act 2024 (**FTAA**), Nova is now making its substantive application for all necessary approvals for the proposal. To assist the Expert Panel, this report provides an independent economic assessment of the proposal's estimated effects, particularly its impacts on GDP, employment, and household incomes, as well as a range of wider economic effects arising from its development and operation.

### Key Findings

#### *Significant One-Time Economic Impacts*

The proposal will create significant one-time boosts in GDP, jobs, and incomes, particularly during construction. Over a two-year period, including flow-on effects, we estimate that the development could have the following regional impacts:

- A one-time boost in regional GDP of around **\$85 million**;
- Around **570 FTE-years of employment** (equivalent to approximately 285 people employed full-time for two years); and
- Additional household incomes of **\$50 million**;

#### *Ongoing Economic Activity*

Once fully operational, the proposal will sustain ongoing jobs and economic activity. At full build-out, the solar facility is estimated to support the following on a permanent annual basis:

- Approximately **\$3.7 million** in annual GDP contributions;
- Around **18 permanent and contracted FTEs per year**; and
- Approximately **\$1.6 million** in annual wages and salaries.

In addition to the quantifiable one-time and ongoing economic impacts of the proposal, as just summarised above, there will also be broader economic benefits, such as:

- **Contribution to Renewable Generation Targets:** The project adds 300 MW of new renewable capacity in an area with strong solar resources, supporting national decarbonisation goals and easing pressure on hydro and thermal plants.
- **Improved Wholesale Market Competition:** The proposal increases supply diversity and reduces price volatility, especially during dry or high-demand periods. This aligns with Electricity Authority objectives and helps guard against market concentration.

- **Moderation of Retail Electricity Prices:** By adding low marginal cost generation to the grid, the proposal supports more stable and affordable retail electricity prices over time.
- **Utilisation Benefits:** Utilisation of existing grid infrastructure in the Mackenzie Basin reduces transmission losses, improves supply reliability, and supports local energy resilience.
- **Local Capability Building:** The project creates enduring employment opportunities and builds regional expertise in solar energy, helping integrate rural communities into the renewable energy economy.
- **Highest and Best Use of Land:** The project repurposes predominantly Class 6 dry stock farmland for a higher-value use, with minimal displacement of economic activity.
- **Investment Signal Effects:** The development will provide a strong signal of confidence in the local economy, which may help spur on, accelerate, or bring forward other economic development.

### **Conclusion**

Overall, we consider the proposal will deliver regionally and nationally significant economic benefits, including both short-term gains and sustained long-term benefits. It adds critical renewable generation capacity, enhances energy security, and provides a strong signal of confidence in the regional economy. The Fast-track process ensures these benefits can be realised sooner than traditional development pathways may otherwise normally allow.

## 3. Introduction

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### 3.1. Context

Nova Energy Limited (**Nova**) seeks to develop the **Twizel Solar Project**, a large-scale utility solar farm located near Twizel, Canterbury (the **proposal**). The proposal involves the installation of approximately 495,000 ground-mounted solar panels with a combined AC export capacity of around 300 megawatts (**MW**). Electricity generated by the facility will be connected to Transpower's 220 kV national grid via the existing Twizel substation.

Following the approval of a referral application, the applicant is now making its substantive application for all necessary approvals for the proposal under the Fast-track Approvals Act 2024 (**FTAA**).

### 3.2. Criteria for Assessing Substantive Applications

The FTAA establishes a permanent approvals regime designed to expedite projects that deliver significant regional or national benefits. When considering substantive applications, the Expert Panel is guided by the provisions in sections 81-85 of the FTAA, as well as the matters set out in Schedule 5.

Key provisions relevant from an economic perspective include:

- **Purpose of the Act (s3; s43(1)(b)(i); s81(2)(b))** - The central purpose of the FTAA is “*to facilitate the delivery of infrastructure and development projects with significant regional or national benefits.*” The Panel must have particular regard to whether the project contributes to that purpose.
- **Balancing Benefits and Adverse Effects (s83(1)(b); s85)** - The Panel may decline an approval if it considers the adverse impacts are out of proportion to regional or national benefits.
- **Nature and Scale of Benefits (s81(4))** - The Panel must consider the extent of the project's regional or national benefits.
- **Consistency with National Direction (s81(2)(aab))** - The Panel must also consider the extent to which a project aligns with a relevant Government policy statement, including those under the Resource Management Act 1991 (**RMA**), such as the National Policy Statement on Urban Development (**NPS-UD**).
- **Schedule 5 Requirements** - Schedule 5 of the FTAA sets out further requirements for applications for approvals relating to the RMA:
  - Clause 7 requires an assessment of the project's economic effects to be included in the Assessment of Environmental Effects (**AEE**).
  - Clause 17 specifies the criteria for assessing consent applications and directs that the greatest weight must be given to the purpose of the FTAA.

Taken together, these provisions confirm that substantive applications are to be assessed primarily on the extent to which they deliver significant regional or national benefits, and whether those benefits outweigh any adverse effects.

### **3.3. Purpose of Report**

This report assesses the likely economic effects of the proposal against those criteria. It focuses on the estimated economic effects of the proposal, particularly its impacts on the electricity market, GDP, employment, and household incomes. It also considers a range of wider economic effects arising from the development of the proposal. The assessment is intended to assist the Panel in determining whether the proposal provides sufficient benefit to justify approval under the FTAA.

### **3.4. Structure of this Document**

The rest of this document is structured as follows:

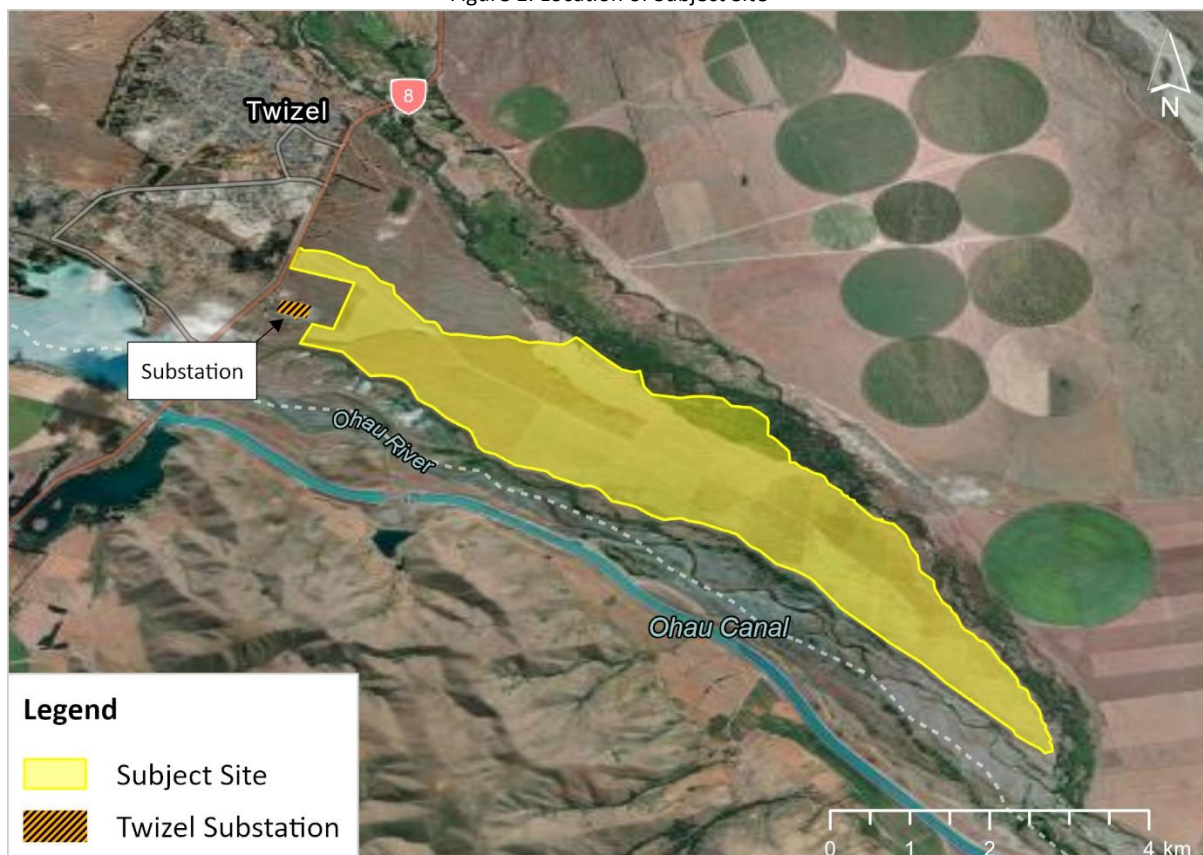
- **Section 4** identifies the subject site and describes the proposal.
- **Section 5** discusses the economic rationale for the proposal.
- **Section 6** estimates the one-time impacts of the proposal's future development.
- **Section 7** estimates the annual impacts of future activities sustained on-site.
- **Section 8** considers a range of wider economic impacts of the proposal.
- **Section 9** considers potential economic costs of the proposal.
- **Section 10** describes how the FTAA process accelerates the delivery of economic benefits.
- **Section 11** provides a summary, conclusion, and checklist against the relevant FTAA criteria.

## 4. About the Proposal

### 4.1. Site Location and Description

The subject site for the proposal is located near Twizel, in the Mackenzie District. It is bound by the Twizel and Ōhau Rivers to the north and south, with the two rivers' confluence to the east, and State Highway 8 (SH8) forming the western boundary. The site itself spans approximately 868 hectares and is largely flat with a gentle south-easterly slope. Access to the site is via an established entry road on SH8. Figure 1 below outlines the site, with the Mackenzie District's southern border delineated by the grey dashed line.

Figure 1: Location of Subject Site



### 4.2. Receiving Environment

Adjacent to the site, on the eastern side of SH8, is the Transpower Twizel substation. The site shares boundaries to the south with the Department of Conservation (DOC) and to the east with Meridian Energy. Currently, the property operates as a dry stock farm under a lease arrangement.

### 4.3. Zoning

The site is zoned General Rural Zone under the Mackenzie District Plan.

### 4.4. About the Proposal

The proposal involves the installation of approximately 495,465 ground-mounted solar panels. The project utilises a single-axis east-west tracking system for the solar panels, which automatically tilts

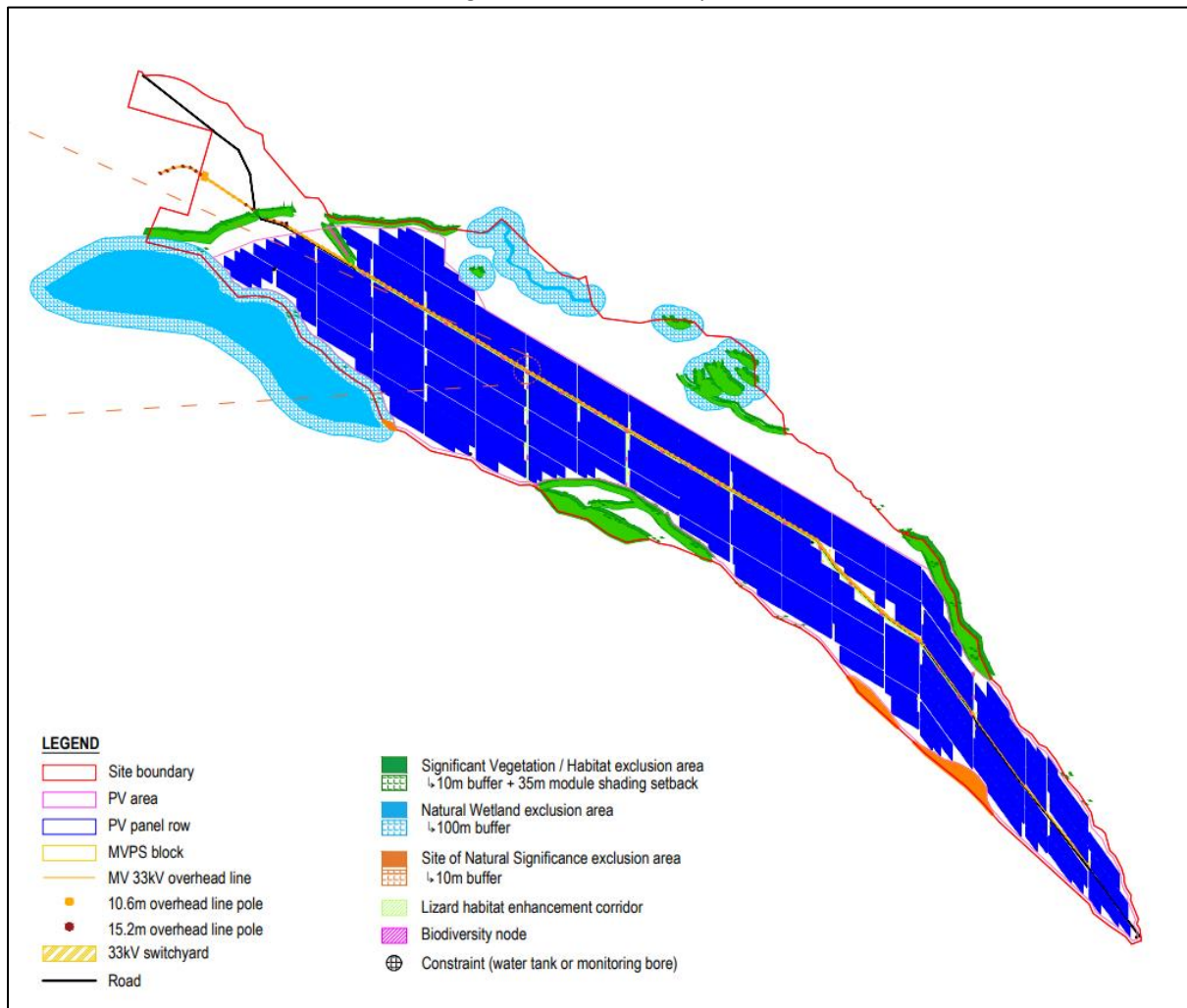
the panels to follow the sun's angle throughout the day. Central inverters convert the direct current electricity from the solar panels into high voltage 33 kV alternating current (**AC**). The 33 kV circuits will then connect to Transpower's 220 kV national grid via a new connection to the Twizel substation.

The project is proposed to be constructed as a single stage, but can be built in multiple stages if required, following site establishment and grid connection activities. The solar farm is anticipated to have an operational lifespan of at least 30 years.

#### 4.5. Indicative Site Layout

An indicative layout of the proposed development is provided in Figure 2 below. It outlines where the solar panels (denoted as PV or *Photovoltaic*) and key infrastructure will be located, while avoiding areas set aside for ecological protection. The panels are grouped into sections, each connected to a central inverter. These inverters feed into a 33 kV distribution line that connects to the main 33/220 kV power transformers to be located within the Transpower Twizel substation.

Figure 2: Indicative Site Layout



## 4.6. Anticipated Generation

The proposal is designed to make a significant contribution to New Zealand's renewable energy supply. The 495,465 solar panels are expected to deliver a combined DC capacity of approximately 340 MWp (megawatts-peak). After conversion to AC via the central inverters, the maximum grid export capacity is expected to be approximately 300 MW.

To put this output into perspective, assuming (say) a capacity factor of 20%,<sup>1</sup> the solar farm could generate around 525,600 MWh (megawatt hour) of electricity per year.<sup>2</sup> This is enough to meet the annual electricity needs of approximately 75,000 New Zealand households, based on an average household consumption of 7,051 kWh per year.<sup>3</sup>

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<sup>1</sup> The capacity factor reflects the average output relative to maximum possible output, accounting for day-night cycles, weather, and system efficiency.

<sup>2</sup> Calculated as 300 MW x 8,760 hours x 20% capacity factor.

<sup>3</sup> Ministry of Business, Innovation and Employment (MBIE), *Residential sales-based electricity cost data* (March year 2025). Available at: [www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics/energy-prices/electricity-cost-and-price-monitoring/](http://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics/energy-prices/electricity-cost-and-price-monitoring/)

## 5. Economic Rationale for the Proposal

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### 5.1. Overview of NZ's Electricity Supply & Demand

New Zealand's electricity system is characterised by a high share of renewable generation, driven primarily by hydroelectric assets concentrated in the South Island. Electricity generated in the South Island is transmitted nationally, including to the North Island via the High-Voltage Direct Current (HVDC) link. In 2023, renewable sources accounted for around 88 percent of net electricity generation, with hydro the dominant contributor, supported by a growing wind and solar base.

Thermal generation (i.e., from fossil fuels) continues to play an important system role by providing baseload, backup, and peaking capacity when renewable output is constrained, such as during dry years or periods of peak demand. Most thermal generation capacity is located in the North Island, close to domestic coal, gas, and oil resources.

Electricity demand is broadly distributed across sectors. Households account for around one-third of total demand, with a further third consumed by industrial users. Tiwai Point aluminium smelter is the single largest electricity user, accounting for approximately 10 to 15 percent of national consumption. Commercial users account for around one-quarter of demand, with the balance attributable to transport, agriculture, forestry, and fishing activities.

### 5.2. Future Generation Requirements and the Role of Solar

The Ministry of Business, Innovation and Employment (MBIE) is responsible for projecting future electricity demand and ensuring there is sufficient supply to meet it. Their latest projections from July 2024<sup>4</sup> span five scenarios to capture a range of potential futures. In the most likely (reference) scenario, total electricity demand increases by 57 percent from 2023 to 2050, while three scenarios assume even higher growth, and one assumes a lower growth rate.

This demand growth is driven not just by increased population and economic activity, but also by shifts toward electrification within existing energy uses, plus increased demand from electric vehicles and large-scale datacentres. As a result, electricity's share of total energy demand is forecast to increase from just over 25 percent in 2023 to about 50 percent by 2050.

With MBIE projecting that generation capacity will need to almost double by 2050 to meet increased demand (and to offset the pending retirement of some existing generators), a significant expansion in electricity generation capacity is required. In fact, across all five MBIE scenarios, solar and wind account for the majority of this new generation capacity, with the following increases expected under the most likely (reference) scenario:

- Solar generation capacity to increase more than 11-fold from 0.4 GW now to 4.7 GW by 2050
- Wind generation capacity to increase nearly five-fold from 1.0 GW now to 4.6 GW by 2050

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<sup>4</sup> MBIE. *Electricity Demand and Generation Scenarios: Results summary*. July 2024. Available here: [www.mbie.govt.nz/assets/electricity-demand-and-generation-scenarios-report-2024.pdf](https://www.mbie.govt.nz/assets/electricity-demand-and-generation-scenarios-report-2024.pdf)

Under alternative scenarios, solar capacity is forecast to reach between 2.7 GW and 9.1 GW by 2050. This range reflects uncertainty over demand growth and technology deployment but shows that, regardless of which scenario is deemed most likely, large and sustained increases in solar generation capacity will be required to meet New Zealand’s future energy needs.

Meeting MBIE’s projected solar capacity expansion will require a material increase in land available for utility-scale solar generation. International benchmarks indicate that large solar farms typically require approximately 2-3 hectares per megawatt of installed capacity, depending on panel configuration and tracking systems.<sup>5</sup> Applying this benchmark to MBIE’s reference scenario suggests that an additional 8,000 to 13,000 hectares of land nationally may be required to support this expansion.<sup>6</sup> While this area is relatively modest in the context of New Zealand’s overall rural land base, it nevertheless highlights that solar generation will need to be accommodated across multiple suitable locations. Regions with high solar resources, available land, and proximity to existing transmission infrastructure, such as the Mackenzie Basin, are therefore likely to play an important role in enabling this expansion.

Beyond meeting projected demand growth, expanding domestic renewable generation also contributes to New Zealand’s broader economic and energy resilience. New Zealand’s electricity system remains exposed to several structural risks, including hydro-lake variability, declining domestic gas reserves, and global fuel price volatility.<sup>7</sup> These risks were highlighted during the 2024 winter period when low hydro storage and constrained gas supply contributed to sharp increases in wholesale electricity prices.<sup>8</sup> Increasing the diversity and scale of renewable generation, particularly solar and wind, reduces exposure to these shocks by expanding low-marginal-cost domestic supply and reducing reliance on imported fuels.

In this context, large-scale renewable projects such as the proposal play an important role in addressing a clearly identified national supply requirement. The proposal supports the timely expansion of generation capacity needed to meet forecast demand growth, reduce reliance on thermal generation, and maintain security of supply as the electricity system transitions toward higher electrification and lower emissions.

### 5.3. Fit with Location Criteria

The proposal aligns well with locational criteria for utility-scale solar generation. Key attributes of the site that support its suitability include:

- **Proximity to existing grid infrastructure:** The subject site is adjacent to Transpower’s Twizel substation. This proximity allows for a short, high-voltage connection to the national grid,

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<sup>5</sup> Ong, S., Campbell, C., Denholm, P., Margolis, R., & Heath, G. *Land-Use Requirements for Solar Power Plants in the United States*. National Renewable Energy Laboratory. 2013.

<sup>6</sup> Available here: <http://www.mbie.govt.nz/assets/electricity-demand-and-generation-scenarios-report-2024.pdf>. Calculated by applying an indicative land requirement of 2-3 hectares per MW of installed utility-scale solar capacity to MBIE’s projected increase in solar capacity from 0.4 GW to 4.7 GW by 2050. This implies an additional 4.3 GW (4,300 MW) of solar capacity, requiring approximately 8,600 to 12,900 hectares nationally.

<sup>7</sup> Ministry of Business, Innovation and Employment. *Electricity Demand and Generation Scenarios*. 2024.

<sup>8</sup> More information available here: <https://www.ea.govt.nz/news/eye-on-electricity/what-was-behind-high-wholesale-electricity-prices/>

minimising transmission losses and reducing capital costs associated with line construction. These efficiencies are particularly important for large-scale renewable projects seeking to maximise output and cost-effectiveness.

- **Nationally significant solar resource:** The site receives high levels of solar irradiation (a key determinant of solar farm efficiency<sup>9</sup>) relative to other areas in New Zealand. Solargis' global horizontal irradiation (**GHI**) data<sup>10</sup> shows the site receives around 1,470 kWh per square metre per year, placing it towards the upper end of the national range, which spans from approximately 450 to 1,700 kWh per square metre. A map showing the subject site in relation to New Zealand's GHI levels, together with a brief overview of the importance of solar irradiation, is provided in **Appendix A**.
- **High annual sunshine hours:** The Mackenzie Basin is among the sunniest regions in New Zealand. NIWA data<sup>11</sup> shows that Lake Tekapo recorded more than 2,500 sunshine hours per year on average between 1991 and 2020, second only to Blenheim. This high and consistent solar exposure supports the efficiency and reliability of solar energy generation. In 2023, it was the sunniest area nationally.<sup>12</sup>
- **Favourable topography:** The site comprises predominantly flat land with a gentle south-easterly slope, sloping away from the Twizel township. These characteristics reduce the scale and cost of earthworks, simplify construction logistics, and improve solar array alignment and efficiency.
- **Favourable access:** Access to the site is provided directly off SH8, which supports the efficient movement of construction and maintenance vehicles without placing pressure on local rural roads. This helps to mitigate traffic-related effects during both construction and operation.
- **Not classified as HPL:** The site is primarily (95%) LUC Class 6, with the balance classified as Class 4. It is, therefore, not subject to the National Policy Statement for Highly Productive Land (**NPS-HPL**). Although land suitable for solar generation often overlaps with productive rural land, the site is mostly non-arable and has limited suitability for alternative high-value agricultural uses.
- **Low potential for land use conflict:** The site is located in a sparsely populated rural area dominated by large farming blocks and DOC land. This low population density limits the risk of reverse sensitivity issues and reduces potential amenity impacts on nearby residents.
- **Land availability:** The site was available for purchase under a competitive tender process and has since been secured by the applicant. This ensures the site can be developed without displacement of existing high-value uses or reliance on third-party land acquisition.

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<sup>9</sup> International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS). *Performance of Photovoltaic Systems*.

<sup>10</sup> Available here: [www.solargis.com/resources/free-maps-and-gis-data?locality=new-zealand](https://www.solargis.com/resources/free-maps-and-gis-data?locality=new-zealand)

<sup>11</sup> Available here: [www.niwa.co.nz/climate-and-weather/climate-data-and-activities](https://www.niwa.co.nz/climate-and-weather/climate-data-and-activities)

<sup>12</sup> Receiving 2,658 hours or 110 days of sunshine throughout the year.

## 5.4. Alignment with Strategic Documents

Finally, the proposal is strongly aligned with the Government’s strategic direction for decarbonisation, energy security, and renewable generation. The *Emissions Reduction Plan 2026-2030* identifies electricity generation as one of four priority areas for emissions reduction, recognising that decarbonising the electricity system is critical to achieving New Zealand’s climate target of net zero by 2050.<sup>13</sup> The Plan makes a commitment to increasing the share of renewable generation and investing in the infrastructure needed to meet rising electricity demand while phasing down fossil fuels.

The proposal also gives effect to the *National Policy Statement for Renewable Electricity Generation 2011*,<sup>14</sup> which provides clear guidance for councils to recognise the national significance of renewable electricity generation, including solar. It requires that all decision-makers provide for the development, operation, maintenance, and upgrading of such generation activities, acknowledging their national and regional benefits.

While the *New Zealand Energy Strategy* is still under development, MBIE has made clear that the transition to a modern, secure, and affordable energy system will depend on large-scale investment in renewable generation, particularly wind and solar, to meet future demand.<sup>15</sup> This includes ensuring sufficient generation during periods of low hydro and variable renewables, and addressing infrastructure bottlenecks to enable rapid rollout. The Government’s approach is centred on removing barriers and aligning incentives to accelerate this transition.

At the district level, Mackenzie District Council’s *Long-Term Plan* also identifies renewable energy resources in Twizel as a “natural resource of significance”,<sup>16</sup> further reinforcing the strategic fit of the proposal within local development priorities.

By delivering new solar generation capacity within one of the highest GHI zones in the country, the proposal supports these national, regional, and sub-regional objectives.

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<sup>13</sup> Available here: <https://environment.govt.nz/publications/new-zealands-second-emissions-reduction-plan/>

<sup>14</sup> Available here: <https://environment.govt.nz/publications/national-policy-statement-for-renewable-electricity-generation-2011/>

<sup>15</sup> Available here: <https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-strategies-for-new-zealand/new-zealand-energy-strategy>

<sup>16</sup> Mackenzie District Council. *Long Term Plan 2024–2034: Part Four – Strategies and Policies*. p. 9.

## 6. One-Time Impacts of Development

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This section estimates the one-time impacts of the proposal.

### 6.1. Introduction

In section 4 we outlined the proposal to establish a utility-scale solar farm that could deliver nearly half a million solar panels. Delivering this outcome will require substantial development activity to transition the site from its current rural state to the proposed built form, including planning, design, and consenting work, bulk earthworks, infrastructure provision, site preparation, and construction and installation of the solar array and grid components.

This section captures the temporary increase in economic activity generated during the development phase, expressed in terms of GDP, employment, and household income. These impacts are distinct from the ongoing operational effects assessed later in the report and occur over the period in which development activity takes place. Given the scale of construction enabled by the proposal, these one-time effects represent a significant injection of activity into the regional economy, particularly across the construction, professional services, and manufacturing sectors.

### 6.2. Methodology

We quantified these one-time economic impacts using a technique called multiplier analysis, which traces the impacts of additional economic activity in one sector, such as construction, through its supply chain to estimate the overall impacts, including flow-on effects. These comprise two parts:<sup>17</sup>

- **Direct impacts** – which capture all on-site and off-site activities directly related to the proposal's development, e.g., home builders and their various subcontractors and suppliers, some of which will be on-site, and some of which will be off-site.
- **Indirect effects** – which capture additional (supply-chain) impacts arising when businesses working directly on the project source goods and services from their suppliers, who in turn may need to source goods and services from their own suppliers, and so on.

These economic impacts are measured in various ways, including:

- **Contributions to GDP (or value-added)** – GDP measures the difference between a business' inputs (excluding wages and salaries) and the value of its outputs. It captures the value that a business adds to its inputs to create its own outputs, hence the term "value-added."

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<sup>17</sup> In some applications of multiplier analysis, induced impacts are also reported. These represent the additional economic activity generated when workers employed directly or indirectly by a proposal spend their wages and salaries in the wider economy. While such spending does create some additional demand, much of it would have occurred anyway, since many workers (particularly those with specialist skills) would likely be employed elsewhere in New Zealand absent the proposal. For this reason, induced effects tend to overstate the economic benefits. Including them can also lead to implausible results, such as suggesting that every dollar of expenditure generates more than one dollar of GDP. In practice, the economy cannot expand indefinitely, as firms face limits on available labour and resources. These constraints, along with rising prices, prevent such outcomes. Accordingly, this assessment reports only direct and indirect effects.

- **Total FTEs** – which equals the total number of full-time equivalent (**FTE**) workers employed.
- **Total Jobs** – which is the total number of people employed, i.e., including both part-time and full-time workers.
- **Total wages and salaries** – which equals the total amount paid in wages and salaries.

For example, when a construction firm wins a new project, they will subcontract various parts of the build, such as earthworks and electrical installation, to a range of specialist providers. Those subcontractors, in turn, will then usually need to source additional materials and services from their suppliers, who may then need to source materials and services from their suppliers, and so on. Multiplier analysis enables the impacts of these supply chain interactions to be captured to estimate the overall impact of the new building project, including its direct and flow-on (supply chain) effects.

### 6.3. Limitations

While multiplier analysis is a widely used tool for estimating the wider economic effects of industry activity, it has several limitations that should be borne in mind when interpreting results:

- **Fixed relationships:** Models assume fixed input-output ratios between industries and do not capture technological change, substitution, or efficiency improvements over time.
- **No price or capacity constraints:** The framework assumes that supply can expand to meet increased demand without affecting prices, wages, or resource availability. In reality, constraints, such as limited skilled labour, may dampen the scale of impacts.
- **Average industry structure:** Input-output coefficients are based on national industry averages. Where a project's cost structure differs materially relative to industry norms, results may diverge from actual outcomes.
- **No feedback effects:** Broader economy-wide feedback loops (such as inflationary pressures or exchange rate effects) are not captured.

These limitations mean that multiplier analysis should be viewed as providing indicative estimates of the scale and distribution of economic impacts, rather than precise forecasts.

### 6.4. Development Assumptions

Based on the location and nature of the proposal, we assume that 90 percent of the direct and indirect national one-time impacts accrue to the Canterbury Region.<sup>18</sup>

Our analysis incorporates various assumptions about the likely scale and composition of development expenditure. The project team has advised that the total capital cost of the proposal is expected to be

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<sup>18</sup> In some countries, regional I-O tables are commonly used to estimate subnational economic impacts. However, in New Zealand, the regions are generally too small and economically interlinked to produce reliable standalone I-O tables. Regional data is often sparse, outdated, or lacks the industry granularity required for robust modelling. Accordingly, we have used national multipliers and attributed a share of national impacts to the Canterbury region.

approximately \$500 million.<sup>19</sup> Of this, a conservative estimate of around 25 percent, or \$125 million, is expected to be spent domestically on planning, earthworks, construction, equipment, and services. The remaining 75 percent likely reflects imported components such as solar panels, inverters, and tracking systems, and is excluded from modelling.

Because reliable data was provided on project expenditure, we began with that figure and then derived estimates of planning and earthworks expenditure as percentages of the total. Specifically, we allocated 2 percent of total domestic expenditure to planning and consenting activities, and 20 percent to civil works and site preparation. These allocations are broadly consistent with our experience on other large infrastructure projects elsewhere in New Zealand.

## 6.5. Summary of Development Costs

Table 1 summarises the estimated total cost of the proposal across the three key activities based on the assumptions set out above, which equal \$125 million in today’s dollars.

Table 1: Summary of Estimated Development Costs (\$ millions)

<b>Development Activity</b>	<b>\$ millions</b>
Planning, Design, and Consent	\$2.5
Civil Works and Infrastructure Provision	\$25.0
Construction & Installation	\$97.5
<b>Total Development Cost</b>	<b>\$125</b>

Finally, these costs were mapped<sup>20</sup> to sectors of the regional/national economy then overlaid with the latest economic multipliers<sup>21</sup> to derive the one-off impacts of the proposal’s development, as set out below.

## 6.6. Estimated Impacts on GDP, Jobs, and Wages

Table 2 below presents the one-time impacts of the proposal’s development based on the methodology, inputs, and assumptions described above. All activities are assumed to occur over a two-year period.

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<sup>19</sup> The capital cost estimates provided by Nova are high-level and have been informed by its involvement in another large-scale project of a similar nature, which provides a basis for estimating both the overall and domestic components of expenditure.

<sup>20</sup> While the key activities involved in solar farm development align well with sectors in the economic multipliers dataset, no single sector captures the full scope of construction and installation activities. As such, expenditure was distributed across several relevant sectors to reflect the mix of manufacturing, electrical, engineering, and civil construction services involved. Planning, design, and consenting costs were allocated across scientific, architectural, and engineering services; legal and accounting services; and advertising, market research, and management services.

<sup>21</sup> Multipliers were derived by Insight Economics using Stats NZ source data, including the Annual Enterprise Survey, Linked Employer-Employee Data, Quarterly Employment Survey, and Monthly Employment Indicators.

Table 2: One-Time Economic Impacts of the Proposal (spread over two years)

	<b>Planning &amp; Design</b>	<b>Infrastructure &amp; Civil Works</b>	<b>Construction &amp; Installation</b>	<b>Development Totals</b>
<b>Annual Jobs</b>				
Direct impacts	4	27	107	138
Indirect impacts	3	34	128	165
<b>Total</b>	<b>7</b>	<b>61</b>	<b>235</b>	<b>303</b>
<b>Annual FTEs</b>				
Direct impacts	4	26	102	132
Indirect impacts	3	32	119	154
<b>Total</b>	<b>7</b>	<b>58</b>	<b>221</b>	<b>286</b>
<b>Total Wages \$m</b>				
Direct impacts	\$1	\$5	\$17	\$23
Indirect impacts	\$1	\$6	\$21	\$28
<b>Total</b>	<b>\$2</b>	<b>\$11</b>	<b>\$38</b>	<b>\$51</b>
<b>Total GDP \$m</b>				
Direct impacts	\$1	\$7	\$28	\$36
Indirect impacts	\$1	\$10	\$38	\$49
<b>Total</b>	<b>\$2</b>	<b>\$17</b>	<b>\$66</b>	<b>\$85</b>

In summary, we estimate that:

- Future planning, design, and consenting will create full-time employment for seven people over the two-year development period, generating total wages and salaries of \$2 million;
- Land development (including infrastructure provision and all other civil works) will create full-time work for 58 people, with \$11 million paid in wages and salaries; and
- Construction will provide full-time work for more than 220 people, with \$38 million paid in wages and salaries.

Overall, the proposal’s development is estimated to provide full-time work for more than 285 people for two years, generating \$51 million in wages and salaries, and boosting GDP by \$85 million.

## 6.7. Top 10 Industries by FTEs Employed

To better understand the likely impacts of future development, Table 3 below reveals the 10 industries likely to experience the greatest employment boosts. Those top 10 industries account for nearly three-quarters of all full-time employment generated by the proposal’s development, with the balance spread across numerous other sectors.

Table 3: Top 10 Industries by Annual FTEs Generated during Development

<b>Industries</b>	<b>Annual FTEs</b>	<b>Shares</b>
Construction services	98	34%
Heavy and civil engineering construction	30	11%
Scientific, architectural, and engineering services	18	6%
Fabricated metal product manufacturing	15	5%
Non-residential building construction	13	4%
Road transport	11	4%
Electronic and electrical equipment manufacturing	9	3%
Public order, safety, and regulatory services	7	3%
Employment and other administrative services	6	2%
Legal and accounting services	5	2%
<b>Top 10 Subtotal</b>	<b>212</b>	<b>74%</b>
All Other Industries	74	26%
<b>All Industries</b>	<b>286</b>	<b>100%</b>

## 7. Ongoing Impacts of Future Uses

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This section estimates the annual impacts of the proposal's operation once built out.

### 7.1. Introduction

In addition to the one-off impacts of construction just estimated, the proposal's long-term operation is expected to support a range of permanent roles that will likely span both on-site and off-site functions, with around half dedicated to site-based operations and maintenance (such as vegetation control, panel cleaning, equipment preventative maintenance, inspections and repair, and monitoring), and the remainder focused on management and administrative functions including stakeholder engagement, compliance, property and lease management, accounting, and market operations. Contracted roles are expected to cover a range of specialist and periodic support services.

### 7.2. Methodology

We estimated the potential annual economic impacts of ongoing operations by:

1. Inputting the likely operational workforce supported at full build-out, as follows:
  - i. **Permanent Roles:** As advised by the project team, the solar farm is expected to support a total of 8 FTE positions on an ongoing basis. This includes 4 FTEs in on-site operations and maintenance, and 4 FTEs in off-site management and administration.
  - ii. **Contracted Support Services:** Estimated at approximately 12 FTEs.<sup>22</sup>
2. Allocating those roles to their respective input-output industries.
3. Applying the same economic multipliers from the previous section to translate future ongoing employment into corresponding measures of annual GDP and wages/salaries.

### 7.3. Limitations

All figures represent the total scale of economic activity that could occur onsite once fully established. It is important to note that the results presented here are **gross impacts**, a portion of which may have occurred elsewhere in the absence of the proposal. We have not attempted to quantifying the extent of this displacement.

### 7.4. Annual GDP, Jobs, and Wages

Table 4 below summarises the annual economic impacts of future activity in terms of FTEs employed, GDP contributed, and wages generated.

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<sup>22</sup> Based on a conservative benchmark of 4 FTEs per 100,000 panels, derived from a review of more than twenty comparable solar farm projects. Applied to the Twizel project's 495,465 panels, this implies a total of approximately 20 FTEs. After accounting for the 8 permanent roles advised by the project team, the remaining 12 FTEs have been attributed to contracted support services.

Table 4: Estimated Annual Economic Impacts of the Proposal (at full build-out)

Solar Operation & Maintenance	Jobs	FTEs	GDP \$m	Wages \$m
Permanent Roles	9	8	1.9	0.8
Contracted Support Services	13	12	2.3	1.0
<b>Totals</b>	<b>21</b>	<b>20</b>	<b>4.1</b>	<b>1.8</b>

In summary, the proposal’s future operation and maintenance could sustain the following activity at full build-out:

- Full-time employment for 20 people;
- Annual GDP of more than \$4 million; and
- \$1.8 million paid annually in salaries and wages.

## 7.5. Wider Ongoing Employment Impacts

Importantly, the jobs supported by the proposal will provide more than just ongoing employment; they will also contribute to local capability building, industry diversification, and regional workforce development. For example:

- **Skill Development and Training:** On-the-job training in solar infrastructure, electrical systems, and remote monitoring will support workforce upskilling and build long-term technical capability in the region.
- **Pathways into the Energy Sector:** The operational roles, ranging from entry-level vegetation management to specialised electrical servicing, offer pathways into the growing renewable energy industry, which is expected to expand nationally as part of the energy transition.
- **Stable, Long-Term Employment:** Unlike construction jobs, these roles are ongoing and year-round, providing permanent and contracted employment in a typically rural and seasonally affected labour market.
- **Support for Local Service Providers:** Contracted services such as panel cleaning, inspection, and maintenance may be delivered by locally based firms, helping to build and sustain regional businesses and trades.
- **Broader Economic Linkages:** The solar farm will generate indirect employment through its demand for support services, consumables, and monitoring technology, as well as engagement with local suppliers and consultants.

Overall, by anchoring long-term operational activity and connecting regional workers and businesses to the renewable energy economy, the proposal is expected to deliver lasting employment and economic development benefits.

## 8. Wider Economic Benefits

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This section considers a range of wider economic benefits of the proposal.

### 8.1. Impacts on Renewable Energy Infrastructure

The proposal strengthens the resilience and efficiency of New Zealand’s electricity system by adding large-scale solar generation that is complementary to existing renewable assets, particularly hydro generation in the Upper Waitaki catchment. Solar has a distinct production profile, with output concentrated during daylight hours and typically strongest in summer months. This profile differs from, and usefully complements, both hydro and wind generation.

In the Upper Waitaki system, daytime solar generation reduces the need to dispatch hydro generation during periods of strong solar output. This allows water to be retained in southern hydro lakes during daylight hours and summer periods, effectively increasing stored energy available for later use. That stored water can then be utilised during evening peaks and winter periods when electricity demand is higher and solar generation is limited. In this way, solar generation acts as a form of “virtual rain”, enhancing the effective storage value of existing hydro infrastructure.

This interaction improves overall system flexibility and supports more efficient utilisation of existing generation and transmission assets. Rather than displacing hydro generation, the proposal enables hydro resources to be deployed more strategically across time, reducing reliance on higher-cost or higher-emissions generation during peak demand or dry-year conditions.

The proposal also contributes to greater technological and geographic diversity within the national generation mix. Increasing diversity reduces exposure to correlated risks associated with reliance on a narrower set of generation types or climatic conditions. As electricity demand grows and the system transitions toward higher shares of variable renewable generation, the ability to combine complementary technologies becomes increasingly important.

### 8.2. Reduction in Reliance on Higher Carbon Alternatives

According to the Ministry for the Environment’s *Greenhouse Gas Inventory Snapshot 1990–2023*,<sup>23</sup> the energy sector is the second-largest contributor to New Zealand’s gross greenhouse gas emissions, accounting for 38 percent of the total in 2023. These emissions are primarily carbon dioxide, originating from the combustion of fossil fuels across electricity generation, transport, and industrial processes. Between 2021 and 2023, however, energy emissions decreased by nearly nine percent, largely due to wetter conditions boosting hydro generation and the displacement of coal and gas use in the electricity sector.

The proposed solar development supports this emissions trajectory by further reducing the need for fossil fuel-based electricity generation. Natural gas, for instance, still supplies up to 23 percent of New Zealand’s electricity,<sup>24</sup> and displacing this with solar generation provides a direct emissions benefit,

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<sup>23</sup> Available here: [www.environment.govt.nz/assets/publications/GhG-Inventory/GHG-Inventory-2025/GHG-inventory-2025-Snapshot.pdf](http://www.environment.govt.nz/assets/publications/GhG-Inventory/GHG-Inventory-2025/GHG-inventory-2025-Snapshot.pdf)

<sup>24</sup> [www.ea.govt.nz/news/eye-on-electricity/natural-gas-and-the-electricity-sector-transition/](http://www.ea.govt.nz/news/eye-on-electricity/natural-gas-and-the-electricity-sector-transition/)

while also having positive implications for other industries. For instance, sectors like fertiliser production, exemplified by companies such as Ballance Agri-Nutrients, depend on natural gas as a feedstock. By decreasing the power sector's gas consumption, more natural gas becomes available for these industrial processes, supporting their operations and contributing to economic stability.

More broadly, expanding renewable capacity improves energy security and reduces exposure to volatile fossil fuel markets, especially as domestic gas reserves continue to decline.<sup>25</sup> Projects like the proposal therefore contribute not only to emissions reductions, but also to long-term system resilience and industrial continuity.

### **8.3. Improved Competition in the Wholesale Electricity Market**

The introduction of a large-scale solar farm into the national grid increases overall supply, which in turn enhances competition among wholesale electricity generators. By adding significant renewable capacity, the proposal increases supply diversity and puts downward pressure on wholesale prices by reducing reliance on higher-cost, fossil fuel-based peaking plants. This additional supply can help to alleviate wholesale price pressures, especially during periods of high demand or dry years.

The Electricity Authority has emphasised that increasing generation capacity is critical for fostering competition and improving price outcomes. In a 2023 paper,<sup>26</sup> the Authority notes that a more dynamic generation market is essential to counteract high and volatile electricity prices and to prevent excessive market concentration. This was reinforced by the sharp spike in wholesale spot prices in August 2024, when constrained gas supply, low hydro storage, and reduced wind generation drove prices from around \$300/MWh to more than \$800/MWh.<sup>27</sup> While prices stabilised quickly, the event highlighted the market's vulnerability to supply shocks and the importance of accelerating new renewable generation. The Authority also notes that the shift toward renewables can help reduce barriers for new entrants and support a more competitive and flexible market structure.

In this context, the proposal contributes to national objectives of affordability, reliability, and sustainability. It aligns with the work of the newly established Energy Competition Taskforce,<sup>28</sup> which is focused on enabling greater participation from independent generators and retailers, with the ultimate aim of delivering better outcomes for electricity consumers.

### **8.4. Reduction in Rate of Retail Electricity Price Growth**

While retail electricity prices in New Zealand are influenced by a range of factors, including transmission, distribution, and retail costs, increasing renewable generation can help moderate upward price pressures over time. The proposal contributes to this by adding low marginal cost generation to the grid, which reduces reliance on more expensive peaking plants and improves supply

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<sup>25</sup> [www.argusmedia.com/en/news-and-insights/latest-market-news/2691119-new-zealand-to-invest-119mn-in-gas-fields](https://www.argusmedia.com/en/news-and-insights/latest-market-news/2691119-new-zealand-to-invest-119mn-in-gas-fields)

<sup>26</sup> Available here: [www.ea.govt.nz/documents/3017/Decision\\_paper\\_promoting\\_competition\\_through\\_the\\_transition.pdf](https://www.ea.govt.nz/documents/3017/Decision_paper_promoting_competition_through_the_transition.pdf)

<sup>27</sup> <https://www.ea.govt.nz/news/eye-on-electricity/what-was-behind-high-wholesale-electricity-prices/>

<sup>28</sup> A jointly established task force between the Electricity Authority and the Commerce Commission to investigate ways to improve the performance of the electricity market.

security. This can flatten wholesale price volatility, which in turn helps mitigate flow-through effects on retail pricing, especially as electricity demand grows with electrification across various sectors.

## 8.5. Alignment with Government Growth Agenda

The Government's *Going for Growth* agenda, launched in early 2025, sets out a long-term strategy to lift national productivity and living standards. It is structured around five interrelated pillars: developing talent; building competitive business settings; promoting trade and investment; driving innovation, science and technology; and investing in infrastructure for growth.

The proposal aligns well with several of these priorities:

- **Developing Talent:** The construction and operation of a large-scale solar farm will support skilled employment across civil works, electrical installation, engineering, and asset management. As set out above, construction activity is estimated to support approximately 285 full-time equivalent roles over a two-year period, while ongoing operation and maintenance is expected to sustain around 20 FTEs on an ongoing basis. These roles contribute to workforce capability in renewable energy and associated infrastructure, supporting the development of transferable skills that are increasingly in demand as electrification accelerates.
- **Building Competitive Business Settings:** By adding low marginal cost generation to the national grid, the proposal supports competition in the wholesale electricity market and helps reduce reliance on higher-cost generation during peak and dry-year conditions. This contributes to a more competitive energy input for businesses, which is a key determinant of productivity across the wider economy.
- **Promoting Trade and Investment:** The proposal represents a substantial private sector investment in nationally significant energy infrastructure. Total development expenditure is estimated at approximately \$125 million in domestic spending, reflecting significant capital commitment to planning, construction, and installation activities within New Zealand. Delivery of this scale of capital-intensive renewable generation provides a positive investment signal, demonstrating confidence in the electricity market and in New Zealand's capacity to support large-scale infrastructure development within a stable regulatory environment.
- **Driving Innovation, Science and Technology:** Utility-scale solar development incorporates advanced generation, monitoring, and grid-integration technologies. The proposal contributes to the deployment and normalisation of these technologies within New Zealand's electricity system, supporting innovation in energy system management and renewable integration.
- **Investing in Infrastructure for Growth:** Electricity generation is foundational infrastructure. The proposal directly expands generation capacity in a location with strong solar resources and existing transmission assets, supporting future growth in electricity demand driven by electrification of transport, industry, and households.

In these ways, the proposal is aligned with the Government’s *Going for Growth* agenda, advancing national objectives by supporting productivity, strengthening infrastructure capacity, and enabling conditions for sustained economic growth through a more resilient and competitive electricity system.

## 8.6. Investment Signal Effects

The development will provide a clear signal of confidence in the region’s medium- to long-term economic outlook. Large, capital-intensive projects typically require extensive due diligence, long investment horizons, and confidence in future population growth, labour supply, and infrastructure provision. Their delivery can therefore signal to other investors that underlying economic conditions are sufficiently robust to support further activity.

These signalling effects are particularly relevant in sectors with high upfront costs and long payback periods, where investment decisions are sensitive to perceptions of risk and uncertainty. By demonstrating that funding, consenting, and delivery barriers can be navigated, the project may reduce perceived market risk. Over time, this can help bring forward complementary investment. While indirect and not readily quantifiable, such effects are widely recognised in economic development literature as a secondary benefit of major private investment and contribute to broader economic momentum.<sup>29</sup>

## 8.7. Highest and Best Use of Land

Finally, while the proposal involves a change in the way the subject land is utilised, it does not necessarily entail the complete loss of existing rural production. The site currently operates as a low-intensity dry stock farm, and the proposed solar development is potentially compatible with continued grazing and other forms of low-intensity rural activity through agrivoltaic use of the land. This shift toward higher-intensity activity represents a more efficient allocation of the subject land, which is a precondition for economic efficiency to hold in the underlying land market.

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<sup>29</sup> See, for example, Porter, M.E. (2000) *Location, Competition, and Economic Development: Local Clusters in a Global Economy*, and Turok, I. (1992) *Property-led urban regeneration: panacea or palliative?*, which discuss how large or “anchor” investments can reduce perceived risk, alter market perceptions, and catalyse follow-on private investment through “demonstration effects”.

## 9. Potential Economic Costs

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This section identifies potential economic costs of the proposal.

### 9.1. Displacement of Economic Activity

A potential economic cost is whether the economic activity enabled by the proposal would merely displace that which might otherwise be delivered by other providers in the region, thereby reducing net regional or national benefit.

From an economic perspective, this risk is low. Arguments supporting the notion of displacement implicitly assume that a comparable scale of generation would be delivered within a similar timeframe in the absence of the proposal. In practice, and as recognised in recent FTAA decisions and supporting legal advice,<sup>30</sup> the timing and delivery of large-scale projects are uncertain and depend on various factors, such as site availability, grid access, financing, consenting risk, and delivery capability. Without project-specific evidence, assumptions that equivalent generation will occur elsewhere are speculative.

It is also important to distinguish between displacement as an economic disbenefit and competition as a normal and anticipated outcome. The FTAA is expressly facilitative and does not seek to protect existing or prospective projects from competitive effects. Increased competition between generators, accelerated delivery of new capacity, and diversification of supply are consistent with the purpose of the FTAA and are recognised benefits in their own right. Treating potential substitution between projects as a reason to discount significance would risk a protectionist outcome that is inconsistent with the FTAA framework.

In our view, where displacement is raised, it is relevant only to the scale and timing of benefits, not as an adverse effect in its own right. To materially diminish the proposal's benefits, displacement would need to be shown, on the balance of probabilities, to be tangible, significant, and likely to occur within a comparable timeframe. By contrast, the proposal has a defined site, secured grid connection, and a clear delivery pathway, which provides a high degree of certainty.

### 9.2. Reverse Sensitivity Effects

Reverse sensitivity effects arise where a new activity constrains the operation of existing or anticipated activities or gives rise to wider economic costs through operational restrictions or compliance burdens. The proposal involves a low-intensity, non-noise-sensitive form of infrastructure located in a predominantly rural environment. Utility-scale solar generation has minimal ongoing operational effects and does not rely on conditions that are typically vulnerable to reverse sensitivity constraints.

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<sup>30</sup> See legal advice provided by Jeremy Brabant, barrister, to the Ashbourne Expert Consenting Panel in January 2026 in relation to the Ashbourne Project (FTAA-2507-1087), which addressed the treatment of alleged displacement when assessing significant regional benefits under the FTAA 2024.

Any potential reverse sensitivity matters, including noise, landscape, traffic, or land use compatibility, are likely to be addressed through specialist technical and planning assessments. From an economic perspective, there is no evident pathway by which surrounding land uses could materially constrain the operation of the solar farm, or by which the proposal would impose constraints on existing activities in the area. Accordingly, in our view, reverse sensitivity does not represent a significant adverse economic effect.

### 9.3. Foregone Rural Production

Another potential economic cost of the proposal is the partial loss of the subject site for ongoing rural production. The site is currently used for dry stock grazing, which is a low-intensity and low-value form of land use. As such, the baseline level of economic output generated by the site is limited.

Importantly, the site is not classified as Highly Productive Land under the NPS-HPL. Accordingly, the proposal does not result in the loss of land that is formally recognised as highly productive for food and fibre production under the NPS-HPL framework.

In addition, as previously discussed, the proposal does not necessarily entail the complete loss of rural production. Activities such as grazing can be retained on the site, meaning that some rural production can continue alongside electricity generation. This materially reduces the extent of foregone production relative to a full land use conversion.

Even where grazing activity is reduced or constrained, the opportunity cost associated with foregone rural production remains limited. Dry stock grazing generates relatively low levels of output, employment, and income per hectare, particularly when compared with the economic value generated by utility-scale renewable electricity infrastructure. In this context, the proposal represents a shift from a single, low-intensity land use to a dual-use configuration that layers nationally significant infrastructure over an existing rural activity.

On this basis, any economic cost associated with foregone rural production is expected to be less than minor in scale. The proposal utilises land currently supporting low-value activity, does not remove land from high-value or intensive primary production, and enables continued rural use where practicable.

For completeness, however, **Appendix B** provides a Total Economic Value analysis that assesses the opportunity cost of removing the site from rural production relative to the economic benefits generated by the proposal. That analysis demonstrates that, even under conservative assumptions, the net economic value of the proposal substantially exceeds the value of the most likely alternative rural land uses.

# 10. Project Acceleration

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This section describes how the FTAA process would accelerate delivery of the proposal.

## 10.1. Timing of Economic Benefits

Not only will the proposal provide meaningful employment for a wide range of local workers, but it will also progress considerably faster through the FTAA. The FTAA establishes a streamlined approvals pathway with tighter statutory timeframes, coordinated decision-making, and, importantly, no merits-based appeals on decisions made by Fast-track Panels.

The FTAA (as strengthened by the Fast-track Approvals Amendment Act 2025) is specifically designed to accelerate nationally and regionally significant projects, reduce consenting uncertainty, and bring forward the timing of economic activity. For the proposal, this means enabling the project to commence much sooner than under a conventional consenting pathway, thereby pulling forward both the one-off construction-related stimulus and the ongoing operational economic benefits outlined in this report.

# 11. Summary and Conclusion

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## 11.1. Conclusion

This report has assessed the estimated economic effects of the proposed utility-scale solar farm near Twizel. The analysis confirms that the proposal is expected to deliver a mix of short-term and enduring economic benefits, both regionally and nationally.

Over the two-year construction period, the project is estimated to generate a one-time regional GDP boost of around \$85 million, support the equivalent of 570 full-time job-years, and contribute \$51 million in wages. Once operational, the solar farm will sustain around 18 FTEs annually, contributing \$3.7 million to GDP and \$1.6 million in wages each year.

Beyond these quantifiable effects, the proposal is expected to deliver a range of wider benefits:

- It strengthens the resilience and competitiveness of New Zealand’s electricity market by adding 300 MW of new generation capacity in a high-irradiation location.
- It supports the decarbonisation of the energy system, reducing reliance on fossil fuels and contributing to emissions targets under the Emissions Reduction Plan.
- It helps moderate electricity price volatility and supports security of supply, especially during dry years or fuel shortages.
- It makes productive use of rural land with limited existing economic yield, and aligns with district- and national-level planning documents promoting renewable energy development.

## 11.2. FTAA Criteria Checklist

The following table identifies where the report addresses each of the criteria in sections 81 - 85 of the FTAA and the matters set out in Schedule 5.

Table 5: Assessment Against FTAA Criteria

Criterion	Signpost	Assessment Summary	Level of Contribution
Contributes to the purpose of the Act – facilitates projects with significant regional or national benefits (s3; s83(1)(b); Sch 5 cl 17)	Section 5 – 8 and 10	The proposal delivers significant regional and national benefits through the timely addition of large-scale renewable electricity generation, substantial construction-phase employment and GDP impacts, ongoing operational employment, and system-level benefits for energy security and resilience. These outcomes align directly with the FTAA’s purpose of facilitating development with significant regional or national benefits.	■■■■■
A panel may decline approval if there are adverse impacts which are sufficiently significant to be out of proportion to the project’s regional or national benefits (s85(3))	Sections 6 – 9	The economic benefits of the proposal are substantial, well-evidenced, and durable. Identified adverse economic effects, including potential displacement, foregone rural production, and reverse sensitivity effects, are limited in scale, speculative or manageable, and not material in economic terms.	■■■■□
The extent of the proposal’s regional or national benefits (s81(4))	Sections 6 – 8	The proposal delivers significant economic and employment benefits at both regional and national levels, alongside wider benefits through increased renewable generation capacity, improved system resilience, and reduced reliance on higher-emissions generation. Environmental, cultural, and social matters are addressed separately within the AEE and specialist evidence.	■■■■■
Consistency with national direction and planning documents, including under the RMA (s81(2)(aab))	Sections 5 and 8	The proposal is strongly aligned with national direction supporting renewable electricity generation, emissions reduction, and energy security, including the National Policy Statement for Renewable Electricity Generation and the Emissions Reduction Plan. Detailed statutory planning matters are addressed in planning evidence.	■■■■□
Greatest weight given to purpose of FTAA (Sch 5 cl 17(a))	Section 10	The proposal directly advances the FTAA’s purpose by facilitating nationally significant renewable energy infrastructure and accelerating delivery of associated economic and system benefits. The scale, certainty, and timing of these benefits warrant substantial weight.	■■■■■

**Legend:**

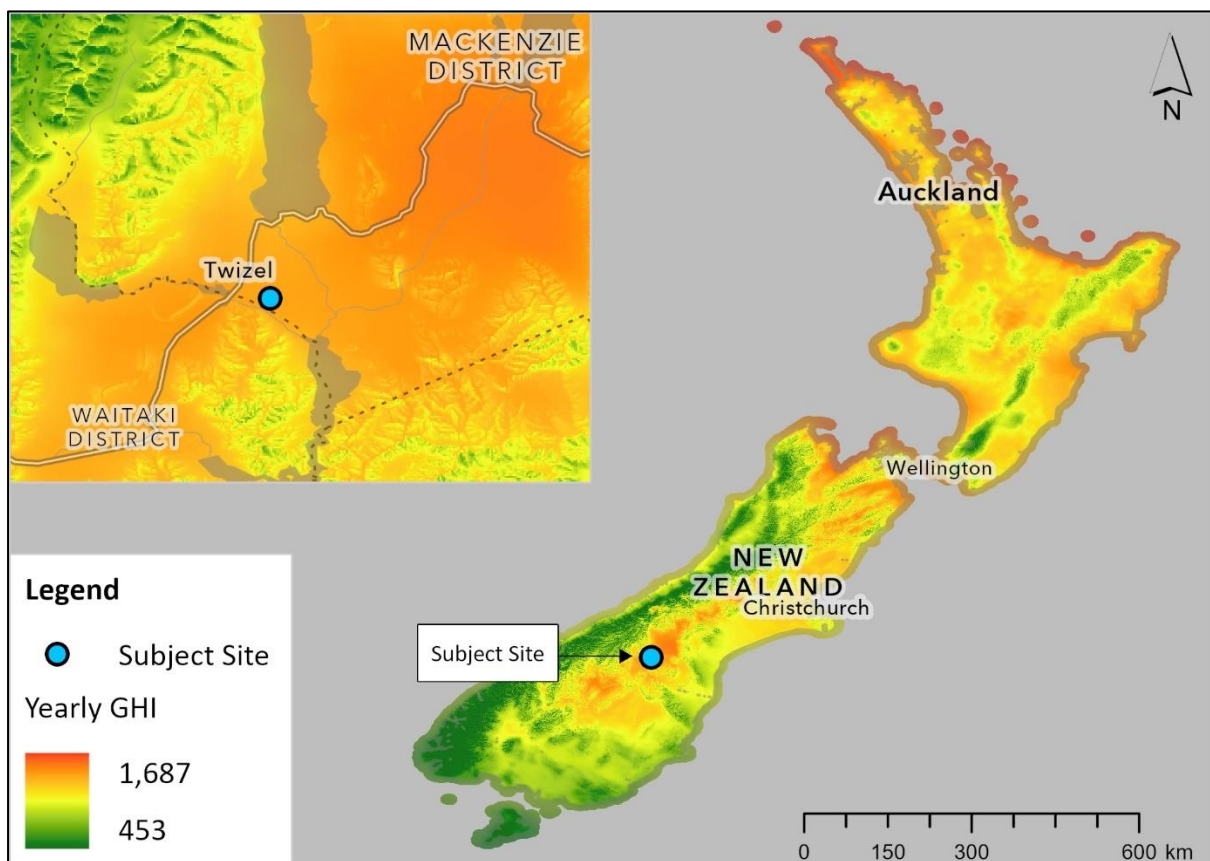
- = Strong
- = Moderate
- = Limited
- = Minor
- = Very minor

# Appendix A: Solar Irradiation at the Site

The figure below shows average yearly global horizontal irradiation across New Zealand, based on long-term satellite-derived data from Solargis. The subject site is marked in blue and is centrally located within one of the highest GHI zones in the country, receiving approximately 1,470 kWh per square metre per year. This level of solar resource places the site well above the national average and highlights its suitability for utility-scale solar generation.

Solar output is strongly influenced by solar irradiation. In simple terms, annual electricity generation reflects the amount of solar energy available at the site together with panel efficiency, system performance, and the area of panels installed. Sites with higher irradiation generally achieve higher capacity factors, meaning a greater share of their installed capacity is converted into electricity over the year. Higher capacity factors increase annual generation and reduce the cost per MWh for a given capital investment.<sup>31</sup> Even modest differences in solar resource can therefore have a material effect on the commercial viability and long-term productivity of a solar farm. The Mackenzie Basin’s high irradiation levels therefore provide a significant locational advantage for utility-scale solar generation.

Figure 3: Global Horizontal Irradiation (GHI) across New Zealand



<sup>31</sup> National Renewable Energy Laboratory (NREL). *PVWatts Calculator Documentation and Solar Resource Fundamentals*. Available here: <https://docs.nrel.gov/docs/fy14osti/62641.pdf>

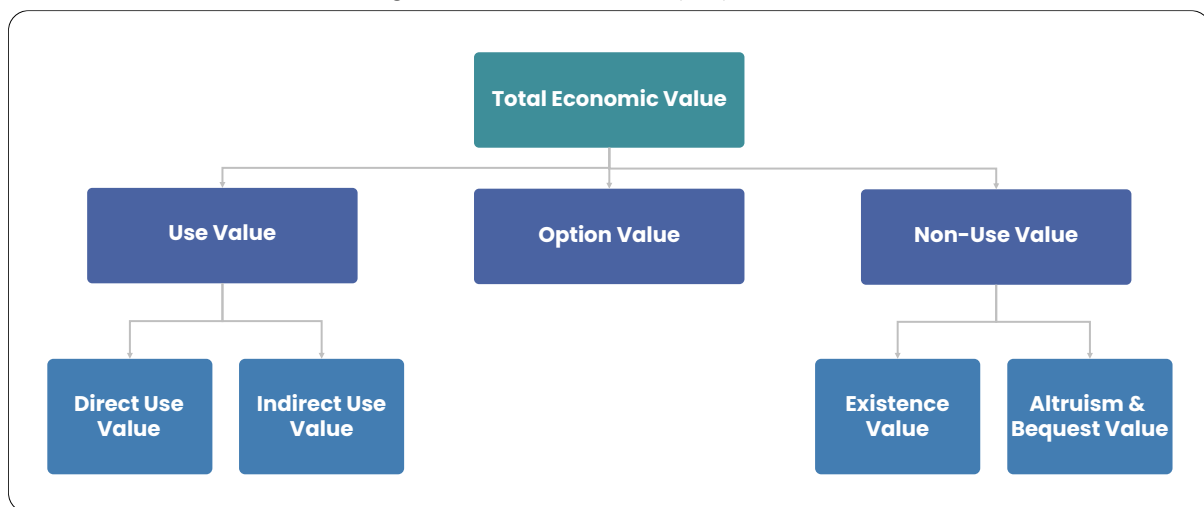
# Appendix B: Total Economic Value Analysis

This section assesses the economic implications of removing the subject site from rural production.

## 11.3. Introduction to the TEV Framework

This assessment adopts the total economic value (TEV) framework<sup>32</sup>, which has been widely used in environmental economics since the 1980s to help capture the full spectrum of economic effects, not just those that are readily quantifiable. While the exact structure of the TEV framework often differs from one study to the next, the figure below shows its key components.

Figure 4: Total Economic Value (TEV) Framework



In the TEV framework, economic value is divided into values arising from both the use and non-use of resources, including possible future use (known as option value).

Use values are subdivided into those that flow directly from use, such as food production, and those that flow indirectly, such as changes in air or water quality due to agricultural practices.

Non-use values include the benefit that people receive from knowing that something exists, even if they never plan to visit it (existence), plus the benefit of preserving things for the benefit of others both now (altruism), and in future (bequest).

Patterson (2013) applies this framework to 12 land-based ecosystems to quantify the economic value that each provides. They split use values into the following four parts to reflect the delivery of different ecosystem services:

- **Provisioning services** – such as the growing of arable/horticultural crops, plus the rearing of animals for meat and/or milk production.

<sup>32</sup> As outlined in *Total Economic Value of New Zealand's Land-Based Ecosystems and Their Services* (Patterson, 2013), which is widely cited and appears to be the most comprehensive and up-to-date assessment of its kind. This study is therefore relied on for the estimates used here.

- **Regulation services** – which refers to the regulation of biophysical and ecological processes to support life and provide a suitable habitat for human existence.
- **Cultural services** – which includes spiritual fulfilment, aesthetics, education, scientific knowledge, and cultural wellbeing.
- **Support services** – which support provisioning and regulating services nutrient cycling, soil formation, and the provision of habitat. However, these are usually excluded from the calculation of TEV because they are already included elsewhere and cause double-counting.

The table below summarises the TEV's estimated by Patterson (2013) using this approach.

Table 6: TEV of Land-Based Ecosystems from Patterson (2013)

Ecosystem type	Use value				Passive value	Gross value <sup>33</sup>	Net value <sup>34</sup>
	Supporting value	Regulating value	Provisioning & cultural value	Total			
<b>Standard ecosystems</b>							
Horticulture & cropping	23	3	2,265	2,291	<i>n/a</i>	2,291	2,268
Agriculture	7,751	3,345	9,075	20,171	<i>n/a</i>	20,171	12,420
Intermediate agri-scrub	1,897	1,630	1,112	4,639	<i>n/a</i>	4,639	2,742
Scrub	609	531	5	1,144	<i>n/a</i>	1,144	535
Intermediate agri-forest	402	352	218	973	<i>n/a</i>	973	571
Forest-scrub	704	614	129	1,447	<i>n/a</i>	1,447	743
Forest	3,495	3,056	7,631	14,182	<i>n/a</i>	14,182	10,687
Wetlands	3,599	4,103	1,020	8,722	350	9,072	5,473
Estuaries	1,026	314	109	1,449	211	1,659	634
Mangroves	0	103	0	103	41	144	144
Lakes	1,735	544	4,671	6,950	885	7,836	6,101
Rivers	1,289	404	3,470	5,164	1,434	6,597	5,309
<b>Heritage ecosystems</b>							
National parks	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	7,164	7,164	7,164
Forest parks	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	743	743	743
Land reserves	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	1,218	1,218	1,218
<b>Total</b>	<b>22,530</b>	<b>15,000</b>	<b>29,705</b>	<b>67,235</b>	<b>12,045</b>	<b>79,280</b>	<b>56,749</b>

We now use this framework to compare the likely economic costs and benefits of the proposal to potential rural production. We begin with the TEV of the proposal.

<sup>33</sup> Gross value = use value + passive value

<sup>34</sup> Net value = use value + passive value – supporting value

## 11.4. TEV of the Proposal

Construction and operation of the proposed solar farm will generate a range of economic benefits that are captured as direct use values within the TEV framework. These benefits arise from both the one-time development of the project and its ongoing operation.

As quantified in Section 6, development of the proposal is estimated to generate a one-time increase in GDP of approximately \$85 million, including flow-on effects, support around 285 full-time equivalent roles over a two-year construction period, and generate approximately \$51 million in wages and salaries.

In addition to these one-time effects, the ongoing operation of the solar farm will generate enduring economic benefits. As set out in Section 7, the proposal is expected to sustain around 20 FTEs on an ongoing basis, contribute approximately \$4 million per annum to GDP, and generate around \$1.8 million in annual wages and salaries.

The proposal also generates wider economic benefits that will not be realised via rural production and are likely to be classified as indirect use values within the TEV framework. These include:

- Increasing electricity supply to help meet current and projected future demand growth;
- Improving resilience and diversity within the national electricity system through complementary solar generation;
- Reducing reliance on higher-emissions generation during peak and dry-year conditions; and
- Supporting more competitive and efficient electricity markets over time.

## 11.5. Direct Use Value of Rural Production

To assess the direct use value of foregone rural production, we first define the appropriate counterfactual. The subject site is currently used for dry stock grazing, which is a low-intensity form of rural production. However, for the purposes of assessing the maximum potential economic cost associated with removing the site from rural production, the analysis below adopts a deliberately conservative approach. Rather than modelling only the site's current use, we estimate the level of rural production that could theoretically occur if the site were used entirely for rural purposes and operated at the upper end of plausible productivity for the area.

To provide a representative range of this potential cost, we quantify the direct use values associated with three rural land uses that are commonly observed in the wider rural environment, and which span a broad range of production intensities:

- Hay and baleage;
- Sheep and beef farming; and
- Dairy farming.

National-level metrics of production per hectare for the first activity were extracted from a recent report by Beef + Lamb NZ (Cost of Feed),<sup>35</sup> while region-specific data for the others were sourced from Beef + Lamb NZ,<sup>36</sup> and the NZ DairyBase,<sup>37</sup> respectively. The table below shows the resulting estimates of rural production per hectare.

Table 7: Production Metrics per Hectare (for Subject Site)

Productive Use	Output \$	GDP \$	FTEs	Wages \$
Hay and Baleage	3,400	780	0.004	250
Sheep and Beef	3,795	870	0.005	270
Dairy <sup>38</sup>	14,505	3,390	0.018	1,160
<b>Average</b>	<b>7,235</b>	<b>1,700</b>	<b>0.009</b>	<b>560</b>

For modelling purposes, we base our analysis on the site's total land area of 868 hectares. We conservatively assume that this land could be farmed in its entirety.<sup>39</sup> Table 8 below shows the estimated activity foregone if this land were used exclusively for rural production.

Table 8: Estimated Annual Rural Production for Subject Site (868 hectares)

Productive Use	Output \$	GDP \$	FTEs	Wages \$
Hay and Baleage	2,951,200	677,000	3.6	217,000
Sheep and Beef	3,295,500	755,200	4.0	234,400
Dairy	12,590,300	2,942,500	15.2	1,006,900
<b>Average</b>	<b>6,279,000</b>	<b>1,458,000</b>	<b>7.6</b>	<b>486,000</b>

Taking the average of the three scenarios assessed, the subject site could theoretically sustain the following annual economic activity if used solely for rural production:

- Output/revenue of \$6.3 million;
- GDP of \$1.5 million;
- Employment for approximately 8 FTEs; and
- Wages and salaries of \$0.5 million.

These values are negligible, providing full time employment for just eight people. By comparison, development enabled by the proposal would provide a substantial boost in employment during development of approximately 285 people for two years.

<sup>35</sup> Available here: <https://beeflambnz.com/sites/default/files/factsheets/pdfs/fact-sheet-260-Cost%20of%20Feed.pdf>

<sup>36</sup> Available here: <https://beeflambnz.com/industry-data/farm-data-and-industry-production/sheep-beef-farm-survey>

<sup>37</sup> Available here: <https://connect.dairynz.co.nz/EconTracker/>

<sup>38</sup> The assumed dairy output of \$14,505 per hectare is based on the latest farmgate price of \$9.50 (\$8.50 - \$9.50 range high) per kg of milk solids. Lower prices will lead to lower output per hectare, and vice versa.

<sup>39</sup> In practice, not all of the land would be available or suitable for productive use due to physical, access, and infrastructure constraints, as well as non-productive areas such as setbacks, waterways, flood-prone areas, and shelter belts. The estimate therefore represents an upper-bound scenario for potential rural production activity.

## 11.6. Indirect Use & Non-Use Value of Rural Production

Patterson (2013) provide estimates of indirect and non-use (passive) values for each of the 12 ecosystems in their study (as reproduced above). Of those 12 ecosystems, only the first two – horticulture/cropping and agriculture – are relevant here. According to Patterson (2013), the indirect and non-use values of these ecosystems are not particularly significant. This is conveyed in the two tables below.

Table 9: Use Value of Ecosystem Services Derived from **Agriculture** Ecosystems (\$2012 million)

Ecosystem service	Supporting value	Regulating value	Provisioning & cultural value	Provisioning & cultural excl. GDP	Gross value	Net value
Water provisioning			85	68	85	85
Food production			8,363		8,363	8,363
Raw materials			514		514	514
Recreation			57	57	57	57
Cultural			57	57	57	57
Gas regulation		200		200	200	200
Waste treatment		2,488		2,488	2,488	2,488
Biological control		657		657	657	657
Soil formation	28			28	28	0
Erosion control	7,008			7,008	7,008	0
Pollination	715			715	715	0
<b>Total</b>	<b>7,751</b>	<b>3,345</b>	<b>9,076</b>	<b>11,278</b>	<b>20,172</b>	<b>12,421</b>

Table 10: Use Value of Ecosystem Services Derived from **Horticulture-Cropping** Ecosystems (\$2012 million)

Ecosystem service	Supporting value	Regulating value	Provisioning & cultural value	Provisioning & cultural excl. GDP	Gross value	Net value
Water provisioning			2	2	2	2
Food production			2,263		2,263	2,263
Climate regulation		3		3	3	3
Erosion control	12			12	12	
Pollination	11			11	11	
<b>Total</b>	<b>23</b>	<b>3</b>	<b>2,265</b>	<b>28</b>	<b>2,291</b>	<b>2,268</b>

As revealed above, provisioning services (which we have estimated just above) equal 99.8 percent of TEV for horticulture/cropping<sup>40</sup>, and 67 percent for agriculture.<sup>41</sup> As a result, our estimates of the GDP, jobs, and incomes estimated for hay and baleage will account for virtually all (99.8%) of the TEV of that type of rural production. However, our corresponding estimates of GDP, jobs, and incomes for sheep/beef and dairy will account for only two-thirds of TEV. Thus, to derive the TEV of those scenarios, we need to scale-up our estimates of food production benefits by nearly 50 percent to capture the other elements of TEV.<sup>42</sup>

<sup>40</sup> Calculated as 2,263 net value of food production divided by 2,268 total net value.

<sup>41</sup> Calculated as 8,363 net value of food production divided by 12,421 total net value.

<sup>42</sup> The 50% scalar equals the total net value of 12,421 for agriculture divided by the net value of food production of 8,363. This results in a scalar of 48.5% to capture the other elements of TEV over and above our estimates of food production.

## 11.7. Comparison of Long-Term Direct Values

To complete our assessment, we compared the long-term *direct use values* of the proposal to the three rural production scenarios above. To ensure that the value of foregone rural production is maximised, **we model it over a 50-year period**. In addition, we assume that the current recorded farm-gate price of \$9.50 prevails under the dairy scenario).<sup>43</sup> Finally, future rural production values are converted to present value (current dollar) terms at a discount rate of 8 percent.

Table 11: Comparison of Direct Use Values over 50 years (NPV @ 8%)

Productive Use	GDP \$	FTE-Years	Wages \$
Hay and Baleage	8,280,000	180	2,650,000
Sheep and Beef	9,240,000	201	2,870,000
Dairy	36,000,000	760	12,320,000
<b>Proposed Development</b>	<b>85,000,000</b>	<b>572</b>	<b>51,000,000</b>

The table above shows that activity generated by the proposal results in substantially higher GDP and wage outcomes than any of the rural production scenarios assessed, even when the latter are considered over a long period, such as 50 years.

In employment terms, only the dairy scenario results in a higher number of cumulative FTE-years than the proposal. This outcome reflects the relatively higher labour-intensity of dairy farming and assumed continuous operations over a 50-year period. By contrast, the proposal's employment profile is characterised by a concentrated two-year construction phase, delivering materially higher economic value per worker. In addition, the potential for continued grazing through agrivoltaic use further reduces any net employment displacement.

Taken together, the results confirm that the proposal represents a higher-value economic use of the site, even under conservative assumptions that maximise the estimated value of foregone rural production.

With these direct use values representing 99.8 percent of TEV for hay and baleage production, and 67 percent for sheep/beef and dairy, the inclusion of the other facets of TEV has no material impact on the comparison.

## 11.8. TEV Summary and Conclusion

The analysis above shows that the proposal will generate far higher impacts than rural production, and that the inclusion of other TEV facets has little effect on these figures. Thus, overall, we consider the proposed use represents a higher and better economic use of the site.

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<sup>43</sup> While rural production can potentially be sustained for longer, production beyond 50 years is worth very little in present value terms (~a few cents in the dollar) so is largely immaterial.