Clean Energy Plan

Powering climate change action

Green

GREEN PARTY ELECTION PRIORITY

Summary

When all our energy comes from the sun, the wind, and the flow of rivers, there will be no need to burn the fossil fuels that are causing the climate crisis.

For decades, governments have chosen to keep burning last century's dirty fuels. Many factories still use huge coal boilers and Aotearoa's largest power plant relies on 1970s coal technology. But clean alternatives exist and the Green Party understands that change is needed. The climate crisis demands urgent action to decarbonise the energy system.

Moving from fossil fuels to clean energy will create thousands of jobs. As we reset the economy after COVID-19, investing in clean energy will help tackle the climate crisis to build a stronger, more resilient economy. The Green Party will:

1. Bring forward the Government's target for 100% renewable electricity from 2035 to 2030 and re-instate the ban on building new fossil fuel electricity generation.

2. Equip all suitable public housing with solar panels and batteries, including new public housing, saving people on their power bills and enabling them to share clean energy with their neighbours.

3. Make it 50% cheaper for everyone to upgrade to solar and batteries for their own homes, with Government finance.

4. Create a $250 million community clean energy fund to support communities, iwi, and hapū to build solar arrays and share low-cost, clean energy with their neighbours.

5. Train thousands of people for clean energy careers with a clean energy industry training plan, developed with energy companies, industry organisations, training providers, and unions.

6. Ban new fossil-fuelled industrial heating systems and boilers in our first 100 days in Government, end industrial coal use in Aotearoa by 2030, and end industrial gas use by 2035.

7. Triple existing government support for businesses to replace coal and gas with clean energy alternatives.

8. Stop issuing permits for new onshore fossil fuel extraction.

9. Update planning rules to make it easier to build new wind farms.

Situation

Aotearoa's energy system can be cleaner, more efficient, more localised, and more affordable. And it must be, because we need to halve our carbon emissions over the next ten years to achieve our Paris Agreement target of limiting global warming to 1.5C.

In Government, the Green Party has achieved the historic ban on new offshore oil and gas exploration and the requirement for Kiwisaver fund managers to stop investing in fossil fuels. The Government put in place a target for 100% renewable electricity by 2035 – now it's time to make it happen sooner. Our $200 million Clean Powered Public Service Fund has already begun helping schools and hospitals swap out their old coal heating systems for clean alternatives and we've enabled 25 schools so far to put solar panels on their roofs, with more to come. Since 1999, working with Labour and National-led Governments we've insulated 387,000 homes, reducing peoples' energy bills and making sure more households have a warm, dry place to live.

This is a time of huge uncertainty, but it is also one of opportunity. The economic stimulus the government has underway is the biggest in our lifetimes – if we can make smart investment decisions in low-emissions practices, technologies, and infrastructure, we can rebuild the economy, create jobs, and ensure people are better off both now and in the future.

- Climate Change Commission[1]

With the Zero Carbon Act and reforms to emissions pricing in the Emissions Trading Scheme, we've put in place the frameworks to tackle climate change.

Now is the time to double down and bring forward transformational investments to create jobs and reduce our impact on the climate that sustains us all. We estimate that this energy plan will reduce energy

emissions (excluding transport) by 40-45% by 2030. Other policies will be needed to reduce emissions from transport, agriculture, and waste.

Clean energy is essential to tackle climate change

The world is at a crossroads. We have only a few years to change the way we power our communities and businesses, to avoid the worst impacts of a climate breakdown. In the past three years, the Green Party in Government has achieved more to protect the climate than the governments of the past 30 years combined. But more action, and more urgency, is needed to ensure a safe climate for future generations.

In Aotearoa, energy, transport, and agriculture are our major sources of the greenhouse gases that cause climate change. When it comes to energy, industrial energy users like factories create more emissions than the electricity network that powers people's homes. That's because many industries burn coal and gas.

Energy as a whole contributes 41% of Aotearoa's greenhouse gas emissions. This includes electricity, industrial energy, and transport. Industrial energy contributes 8% of total emissions and electricity generation contributes 5-6% of total emissions. If we replace the coal and gas used to generate industrial energy and electricity in the next decade, we will be well on our way to meeting our 2030 emissions reduction goal under the Zero Carbon Act – but transport emissions will need to reduce too.

> Substituting imported oil and coal with domestic renewable electricity will deliver strong and sustained economic benefits, not least through increased energy security and significantly improved long-term balance of payments.
>
> - Transpower[2]

The Interim Climate Change Committee recommended three steps to reducing emissions from industrial energy: discouraging new industrial fossil fuel use, setting a timetable for phasing out coal, and making it easier for businesses to switch to electricity.[3] This plan delivers on those recommendations.

Coal is last century's fuel, and of all the ways to produce energy, burning coal is the worst for the climate. Ending coal use urgently is central to our vision for a clean energy system. It starts with drawing a line and saying: no new coal, from now.

This is the Green Party's plan to transform the energy system, to help ensure a stable climate for future generations. We will do this by helping people and communities generate their own solar and wind electricity, freeing up capacity for industrial coal and gas users to shift to electricity from the national grid.

At the core of Aotearoa's future energy system will be our electricity network. Electricity is an efficient and adaptable power source, and can be made without producing harmful greenhouse gas emissions. An efficient, clean electricity system won't just reduce emissions from fossil fuel use in power stations: getting the national grid and local networks right is essential to enabling people to upgrade to electric vehicles and industrial processes, unlocking emissions reductions in transport and manufacturing too.

The way our electricity grid has been organised in the past, with a few central producers and millions of distributed consumers, will change. Residential and commercial customers will take a more active role, producing and storing energy onsite for their own use, or to trade with their neighbours. The old model of a few big, dirty power plants will be replaced by a multitude of small, clean energy generators, underpinned by our reliable baseload hydroelectricity and geothermal assets.

As more Kiwis buy electric vehicles and industries move to electrified heat processes, the electricity grid will need to grow and adapt. Building the distributed generation and storage necessary to begin this transition is occurring, but too slowly. Distributed energy needs to be built at scale, and we need to design the systems and technology to create an efficient, smart grid with a far wider range of participants. We need to be ready for these changes, investing in the skills and knowledge necessary to run an energy system very different to the one we know today.

Tiwai Point aluminium smelter closure

We recognise that the recently announced closure of the Tiwai Point aluminium smelter creates uncertainty for the electricity market and

energy use, and also the social impacts for Southland communities. Without the smelter using up to 13% of Aotearoa's electricity, other South Island businesses will find it easier to switch from coal to electricity.

There is also potential for new industries in Southland to use some of that energy, such as data centres and hydrogen production. We know that as electricity demand grows in the medium-long term from transport and industrial electrification nationwide, more solar generation will remain an essential part of Aotearoa's electricity mix especially in the North Island.

Solar homes and communities

Installing household and community solar panels and batteries will create thousands of jobs.

Work by Transpower[4] and the Interim Climate Change Committee[5] makes clear that solar has an important role to play in Aotearoa. At present, solar provides just 0.2% of Aotearoa's electricity, but to meet our climate change goals, by 2050 Transpower estimates that needs to grow to 13%.[6]

> With solar in a range of locations and as part of a diversified suite of generation capacity, solar can create a more robust and reliable generation profile to support the transformation of New Zealand's energy future and economy.
>
> - Transpower[7]

Solar electricity is expected to become the cheapest form of electricity in coming decades, with its cost expected to reduce by 24% over the next ten years. We can rapidly increase the amount of solar generation and storage batteries, in a way that complements the existing electricity network. Solar can take demand off the big power stations when the sun is shining, leaving the hydro lakes fuller to cover demand when it's needed, like on cold, cloudy evenings. With batteries, storing electricity while the sun is shining, we can reduce the peak evening demand on the rest of the electricity network – because when people get home to cook dinner they'll use the energy stored in their batteries.

And solar is quick to install. In most parts of Aotearoa there are minimal consenting requirements. Where big power stations take time to design and get right, solar is simple, easy, and ready to go. Installing rooftop solar also creates more jobs per megawatt than other clean energy.

Despite several innovative companies offering home rooftop solar options in Aotearoa, take-up is too slow. In Government, the Green Party will lead by example with Government support for solar.

Affordable solar systems for all

Many countries around the world have created incentives to spur the uptake of clean energy. Rooftop solar now provides 5.5% of Australia's total electricity needs. This has created a strong domestic industry across the Tasman, lowering prices for consumers, creating new jobs, and spurring more people to go solar.

The Green Party in Government will fund up to half of the cost of installing rooftop solar and batteries for people's homes. Grants will cover 50% of the upfront cost of a 4kW solar system suitable for standard-sized homes, plus an appropriate sized battery. Homes will need to remain connected to electricity networks, so the benefits of solar are achieved across whole communities.

Solar grants are an effective way to leverage private investment from homeowners, making every dollar go further, and creating thousands of clean energy jobs. This "crowding in" of private investment helps share the cost of the energy transition between the Government and homeowners. The grants would also be available to landlords to help reduce their tenants' energy bills.

Increasing the number of solar installations will increase the share of renewable energy in the grid, take pressure off our hydro dams, and displace polluting fossil fuel generation. Solar and batteries can also save households hundreds of dollars every year.

These grants will be delivered in partnership within existing solar companies, lines companies, and not-for-profit energy organisations, who already have the skills and experience needed to scale up. We estimate that if 5,000 households take up the offer in the first year this will create or sustain more than 500 jobs in the first year.

Solar grants would be funded from the COVID-19 Response and Recovery Fund, and would cost $45 million in the first year, increasing over time as more people take up the offer and the solar industry expands to meet demand. The Crown would seek to recoup half the subsidy over 15 years, from a small levy. We estimate that on average, a household that takes up the offer will save $500 a year on power bills.

Solar State Homes

Throughout Aotearoa there are 63,000 state homes. Those rooftops are an untapped opportunity to create free electricity from the sun and reduce power bills for families. The Green Party will put solar panels on every suitable state house, along with a battery pack to store the power for when it's needed, and a connection to the local lines network to share power with neighbours. New state homes would also be built with solar panels and batteries, whenever feasible. The rooftops of our public houses will become a huge Virtual Power Plant.

We estimate this will save households approximately $1,000 a year on their power bills.

Tens of thousands of Kiwis struggle with the cost of energy. As a proportion of total income, the lowest group of income earners pay more for household energy, compared to the highest income group.[8] This forces people to choose between keeping their homes warm and having food on the table. Clean energy can work for everyone, if we ensure it is the most marginalised in our communities who benefit most from the rise of new technologies.

The Virtual Power Plant will connect together thousands of small solar generators and batteries with software, feeding electricity into local electricity networks when needed. For example: on a cold but sunny afternoon, instead of firing up a big fossil fuel generator to meet demand, the Virtual Power Plant could channel energy from thousands of rooftop solar panels and household batteries into the existing electricity network, sharing clean power with everyone. There are already Virtual Power Plants in Aotearoa, at a smaller scale.[9]

The largest number of state homes are in the upper North Island, which is where Aotearoa's last remaining coal-burning power plant is. By solarising the upper North Island, we can reduce demand on the big power plants and help put an end to coal use. Once all suitable state houses have solar on their roofs, together they'll generate approximately 250 MW – the same as one of the two remaining coal-fired turbines in the Huntly power station.

The solar state home plan would be funded from the Government's COVID-19 Response and Recovery Fund at a total cost of $1.27 billion for

all 63,000 state homes. We propose that in the first year, it may be possible to install solar and batteries for 5,000 state homes, 10,000 in the second year, and 15,000 in the third year. This would see just under half of all state homes with solar and batteries at a cost of $537 million, within the next parliamentary term.

We estimate this would create 532 jobs in the first year, rising to over 1,500 jobs in the third year as solar installations increase as more people train as solar installers.

Kāinga Ora would deliver the solar state home plan on a regional basis in partnership with solar retailers and energy companies, working with local lines companies to ensure coordination with local electricity networks. We expect Kāinga Ora to be able to negotiate commercial terms with regional partners, supported by the Crown's low cost of capital as necessary.

Some state homes will not be suitable for solar panels. For these households, we will investigate other ways of achieving lower power bills with local clean energy, such as shared or community solar programmes.

Once solar installations are complete, many people who currently receive the Winter Energy Payment may find their power bills have been significantly reduced. At that time, we will review whether the current Winter Energy Payment is appropriate or sufficient for those who need it, including if it could be targeted better for households who need it most.

Community Energy Projects Fund

Innovative communities around Aotearoa, including marae, are already working to take power into their own hands with small-scale clean energy projects like windfarms and community solar systems. But successive governments haven't helped, and the big industry players don't want to disrupt the status quo.

The Green Party will establish a $250 million Community Energy Fund to empower communities, iwi, hapū, and local councils to build small-scale clean electricity generation and smart grids.

Community groups will be able to apply for a grant or a loan to cover some of the cost of getting good projects built. These could be local wind turbines, community solar systems, or community-owned batteries that

store and share excess power generated by household rooftop solar panels. The Fund would also be available for people who live in apartment buildings and papakāinga who want to share access to rooftop wind or solar electricity.

Ngāti Whātua Ōrākei have installed solar panels and batteries in the 30-home Kāinga Tuatahi papakainga development. The solar and battery systems share electricity amongst the homes and the broader local electricity network. This has reduced some residents' power bills down to as low as $13 a month.[10]

Community energy projects often have local ownership, where people who have an ownership stake in the electricity generation are also supplied with that electricity. This can reduce power bills and take pressure off the national grid. It can also help achieve support for new generation, because communities are involved in the projects and can see the direct benefits.

The Community Energy Projects Fund will focus on not-for-profit projects and partnerships. However, some allowance would be made for lines companies (which are almost all publicly owned) and small innovative businesses to access the fund, as long as they are partnering with communities to deliver a project that clearly benefits the community.

Clean Energy Industry Training Plan

There are thousands of potential jobs upgrading Aotearoa to run on more clean energy. These range from labour and logistics, to licensed electricians, to energy systems engineers. All these jobs are important and the Green Party in Government will back them. The Green Party is committed to a just transition for working people, so that our clean energy future sees people and communities better off than they are today.

The Government has already moved to provide more free apprenticeships. NZQA qualifications for renewable energy exist, but only two training organisations are approved to deliver them.[11] The next step is a coordinated plan for clean energy jobs. Building on the just transitions

work already happening in Taranaki, we will work with people employed in fossil fuel energy, businesses, unions, iwi, hapū and local government to ensure a just transition for working people and their communities.

> Greening all enterprises and jobs by introducing more energy and resource efficient practices, avoiding pollution and managing natural resources sustainably leads to innovation, enhances resilience and generates savings which drive new investment and employment.
>
> - International Labour Organisation[12]

Many people in existing energy-related jobs will be able to move to clean energy jobs reasonably easily. An electrical engineer who works in mining, for example, will already have skills and knowledge that is relevant for renewable energy. Offshore oil and gas workers could be well suited to offshore wind farms. The training plan will also include in-home energy efficiency advisors, who can conduct energy audits for homes and businesses and advise on how people can reduce their power bills by using energy more efficiently. We expect the clean energy training plan to also support jobs in the forestry sector, collecting and processing wood waste so it can be burned cleanly as biomass.

To ensure we're preparing people for sustainable careers, not just jobs, Government leadership needs to clearly set a path towards more clean energy over decades. Our goal to solarise every state home and kick-start clean energy projects in communities and private homes will give workers and businesses certainty that there will be long term industry demand to sustain clean energy careers.

Clean energy for industry

The Green Party in Government will support businesses to upgrade from coal and gas to clean energy alternatives.

From cooking and sterilising, to melting, moulding, and curing, heat is one of the key drivers of our economy. But 60% of industrial heat is generated by burning fossil fuels, making it Aotearoa's second biggest energy-related contributor to climate change (transport energy is the biggest).[13] Lots of local businesses burn coal and gas to generate this heat – including to dry milk powder.

Coal is last century's fuel and of all the energy sources, it's the worst for our climate. In our first 100 days in Government, the Green Party will put in place a requirement for any new industrial equipment, like boilers and heating systems, to be powered by renewable energy or electricity rather than fossil fuels.

By 2030, all existing industrial coal technology will be replaced with clean alternatives (except for in steel production, where we will work with steel producers so they can embrace zero-emissions steel techniques as they become available). By 2035, all existing industrial gas use will be replaced with clean alternatives.

Clean, electric alternatives to coal and gas exist now, and the Green Party will help Kiwi businesses make the switch. Replacing coal with clean alternatives like electricity, biofuels, and green hydrogen is one of the best ways to reduce Aotearoa's greenhouse gas emissions quickly, according to the Interim Climate Change Committee and the Productivity Commission.

The planned closure of the Tiwai Point aluminium smelter is likely to free up capacity for more businesses to switch from fossil fuels to clean electricity, especially in the South Island.

Supporting businesses to upgrade

The Green Party in Government will triple the Government's financial support for businesses making the switch to clean energy, from $33

million to $100 million a year. For local manufacturers replacing their polluting coal or gas technology, a small grant or low-cost loan to cover some of the cost of clean alternatives can make the difference between the status quo and an electric alternative.

The benefits of businesses making the switch go beyond just emissions savings. Electric heat is often more efficient and flexible, saving firms money and improving productivity. More productive firms can employ more people, and low-carbon producers will have an edge in an increasingly carbon constrained world.

Switching from burning coal to wood-biomass has saved a major Southland industrial laundry and dry-cleaning company over $300,000 in annual energy costs, and reduced carbon emissions by 1,426 tonnes a year, the equivalent of taking 300 cars off the road.[14]

Government finance in the form of grants and loans would initially be delivered through EECA's existing energy management services for SMEs and its Energy Transition Accelerator Programme for large companies. This includes comprehensive energy efficiency and technology advice, with wraparound services to help firms make the most of their clean energy investments.

Smaller firms often lack access to the low-cost capital larger companies can use to finance equipment upgrades, so a combination of grants and loans is likely to be necessary to drive timely technology upgrades. We expect larger firms would only be eligible for loans. As with current EECA finance options which cover up to 40% of the cost of an energy project, we expect firms to cover more than half the investment themselves.

Work has already begun to show what the best options are for alternatives to coal, for different businesses in different parts of the country.[15] We expect many businesses to choose electricity, but burning biomass and wood waste will be an option for others, and some may prefer new technologies like hydrogen.

Clean baseload electricity generation

Solar and other small-scale clean electricity projects will get us part of the way to 100% renewable electricity, but we're going to increase other types of renewable electricity generation at large scale too. By 2050, Aotearoa will need 56% more electricity generation capacity compared to today even with the Tiwai Point smelter closing[16] – and all of this needs to be clean and renewable.

> As much generation will need to be built in the next 15 years as was built in the past 40 years
>
> - Transpower[17]

The Green Party will open the door to new renewable power plants, creating thousands of jobs in their construction over the coming decades. As the electricity market faces uncertainty due to the planned closure of the Tiwai Point smelter, it's vital that the next Government acts swiftly to ensure that investment in new renewable generation continues at an appropriate speed to match demand and replace fossil fuel generation.

An important safeguard to ensure new generation is clean and renewable is to re-instate the ban on new thermal generation that was repealed by the National government in 2008. This will be achieved by amending the Electricity Act 1992.

The hands-off, one size fits all approach to market regulation hasn't worked. 3000MW of renewable generation such as planned wind farms and geothermal developments, is consented and ready to be built – more than three times the capacity of the Huntly coal and gas power plant.[18] The Green Party will change that. We will work with innovative electricity companies and iwi organisations who have interests in geothermal resources, to support them to build clean generation.

More wind farms are an obvious choice for countries like Aotearoa, but the lack of clear nationwide planning rules has held them back. The Interim Climate Change Committee suggested we will need around four times more wind farms than we have today.[19]

In Government, the Green Party will develop a National Environmental Standard for wind energy generation, including community-scale wind generation, so councils have the guidance they need to support new wind farms. And we'll revise the existing National Policy Statement for Renewable Electricity Generation to make it easier to upgrade existing wind farms with new technology like larger blades to create more electricity, from the same wind farm. These planning updates will recognise the important role of mana whenua in land use planning.

We will also take action on the Interim Climate Change Committee's recommendation to investigate pumped hydro as a way of managing the intermittency of renewable generation and the winter peak storage challenge. Any future pumped hydro developments would be subject to appropriate safeguards to protect local ecosystems.

Encouraging energy efficiency

Energy efficiency is an important part of getting to 100% renewable electricity. Using electricity more efficiently often has greater environmental and economic benefits than building new renewable electricity generation.

Peak electricity demand drives costs and emissions up across the electricity system. We need enough generation to meet peak demand and the lines networks need enough capacity to carry peak electricity, even though most of the time some of this goes unused. It is at peak time that Aotearoa generally burns the most fossil fuels to generate electricity, because renewable generation can't currently cover demand by itself.

Simple changes can help reduce peak electricity demand, lowering costs and emissions. EECA has been trialling LED lighting in low income households. The Green Party will expand this to fund five highly efficient LED lightbulbs for every household in Aotearoa. At a cost of just $21 million to the Government, swapping out the five most-used lightbulbs for LEDs in every home will save Aotearoa $105 million every year in electricity bills. It is estimated to reduce carbon emissions by 177,000 tonnes every year, the equivalent of taking 38,000 cars off the road.[20]

Modernising the poles and wires

Households and business that want to build clean energy or switch away from fossil fuels are often held back by the rules that govern the electricity network. First movers get disadvantaged by having to pay for their own network upgrades. For example, if there are three coal-burning factories close together, the first one to upgrade to clean electricity instead of coal often has to cover the network costs that enable all three factories to switch. This can hold back change.

The Green Party in Government will work with Transpower to solve this problem so grid upgrades can happen faster and their costs get shared fairly. Sometimes, it will be a better idea to build more localised, distributed generation than connecting to the grid.

Lines companies also have a role to play. But with 29 lines companies across Aotearoa, coordinated approaches are difficult. The Electricity Network Association's *Network Transformation Roadmap* sets a pathways for lines companies to adopt new clean energy technologies, but in many parts of the country this isn't happening. Lines companies should be required to work together to achieve shared benefits, in a way similar to how section 17A of the Local Government Act requires councils to consider working together and joint service models.

By cooperating more, lines companies will be able to work together to consider alternatives to just building more poles and wires. We will require lines companies to consider all options for providing reliable, affordable electricity to customers on a level playing field – such as using distributed generation and storage, not just building more poles and wires.

To help make community energy projects and person-to-person energy sharing work more easily, we'll change the rules so that individual power meters (ICPs) can be used more flexibly. Currently there can only be one retailer per ICP connection, and meters are controlled by the retailer. Supporting the uptake of community solar requires coordination between many different parties – and our regulation needs to enable, rather than inhibit, coordination. This may require changes to the Electricity Authority's Multiple Trading Relationships rules.

Coordinating government agencies

The transition to 100% renewables requires a new level of coordination across the economy and government policy making.

Currently, many government agencies have roles: the Electricity Authority, EECA, MBIE, the Ministry of Transport, New Zealand Green Investment Finance Limited (NZGIF), the Commerce Commission, and Crown Research Institutes (CRI) like Scion and Manaaki Whenua Landcare Research. Transpower plays a role with electricity system coordination.

There are also gaps in the system around new emerging clean energy technologies. EECA and NZGIF both focus on helping businesses adopt existing mainstream clean energy technologies. Innovative clean energy solutions developed by CRIs have often not actually been adopted at scale by the industries that would benefit from them.

To ensure coordination, we will review the various roles of these agencies with a goal of improving coordination and strengthening the government's focus on decarbonisation of the energy sector. This review will consider the case for creating a standalone Ministry of Energy and Decarbonisation to provide focus and leadership for Aotearoa's clean energy transition. It will also consider what agency would be best to accelerate the adoption of innovative new energy technologies.

Following this review, the appropriate agency will be tasked with creating and implementing regional and nationwide plans for biofuels, biomass, hydrogen, and new electricity generation to match demand. These plans will include just transitions components focused on creating new careers for people and communities who have been employed in the fossil fuel sector.

Building on the $200 million Clean Powered Public Service fund announced by the Government in January 2020, we will continue upgrading government buildings to be more energy efficient. This will include replacing fossil fuel heating in schools and hospitals, and identifying opportunities for solar on public buildings.

How we'll pay for it

The cost of doing nothing to stop climate change would far exceed the costs of upgrading to clean energy. Increased droughts, floods, and storms are already taking an economic toll on Aotearoa, and around the world.[21]

Additionally, renewable energy such as household solar saves people money, which they can then spend in their local communities. Better energy management in firms improves productivity and can therefore increase the government's tax revenue over time. We have not attempted to quantify these benefits.

Continuing to reduce the government's own energy bills will also save money. EECA has estimated that the Government could save $390 million a year on its own energy bills, by using energy more efficiently.

However, upgrading to clean energy does require some upfront investment. Most components of this plan would be funded from the Government's COVID-19 Response and Recovery Fund (CRRF), because they will create new jobs and help transform the economy to be more sustainable.

We expect the cost to scale up over time as more households, marae, communities, and businesses embrace clean energy opportunities. Activity is also expected to increase as more people become trained to install solar panels and undertake industrial clean energy upgrades.

We calculate that the total cost of installing 4kW solar and battery systems on all 63,000 state homes would be $1.27 billion. However, not all state homes will be suitable for solar, so the actual cost will be lower. In addition, the industry is unlikely to have capacity to complete 63,000 installations in the next three years. The proposed clean industry training plan will help address this over time. In the first year, it may be possible to install solar and batteries for 5,000 state homes, 10,000 in the second year, and 15,000 in the third year. This would see just under half of all state homes with solar and batteries at a cost of $537 million, within the next parliamentary term.

Forecast costs over next parliamentary term

	2021/22	2022/23	2023/24
Solar social homes	$89.5m (5,000 homes)	$179m (10,000 homes)	$268.5m (15,000 homes)
Solar home grants*	$44.8m (5,000 homes)	$89.5m (10,000 homes)	$134.5m (15,000 homes)
Business clean energy finance**	$77m	$77m	$77m
Community energy fund	$50m	$100m	$100m
LED subsidies	$21.4m	-	-
Development of training plan	$2.5m	$2.5m	-
TOTAL	$285.2m	$448m	$580m

*The Crown would seek to recoup half the cost of each grant over a fifteen year period, though a small levy. Even with the levy, we estimate that households would still save $500 a year on their power bills on average.

**$77 million new annual funding is in addition to the existing $33.7 million annual funding for EECA's existing programmes as at Budget 2020, taking the total annual funding to $100 million. Depending on the structure of grants and loans, EECA receives some of this back from businesses over time.

Solar technology and financial assumptions

Average Solar PV install (kW)	4
Average battery install (kWh)	6.2
Solar PV cost ($/kW)	2,500
Battery cost (total $ per install)	7,900
Total solar & battery cost per home	$17,900
PV employment (job years/MW)	15
Battery employment (job years/MWh)	7.5
Retail electricity price ($/kWh)	0.29

Expected power bill reductions are calculated using the average 1kW solar install in Wellington, generating 1200 kWh annually. A 4kW system would generate 4800 kWh annually. At a retail price of $0.29 per kWh for electricity purchased from the grid, this would save a household $1,392 a year if they consumed all the electricity they generated themselves. In practice, some of this would be exported not consumed onsite, so actual savings are likely to be lower than $1,392.

Estimated job creation uses figures from the Australian Clean Energy Council.[22]

LED lightbulb assumptions

LEDs (mix of mostly standard 10W non-dimmable bulbs and a smaller number of dimmable and recessed downlight bulbs, at wholesale prices)	$15.7 million
Administration costs	$5.66 million
Total	$21.4 million

LED assumptions are based on Stats NZ and EECA household energy use data. Costs assume 70% of households take up the offer for five free LED bulbs each, and use these for at least three hours a day to replace their most used non-LED bulbs. This results in an estimated 155MW electricity network peak load reduction.

Sources

[1] Climate Change Commission, letter to ministers in response to Budget 2020, https://www.climatecommission.govt.nz/what-we-do/our-advice/

[2] Transpower, *Whakamana i te Mauri Hiko: Empowering Our Energy Future,* https://www.transpower.co.nz/sites/default/files/publications/resources/TP%20Whakamana%20i%20Te%20Mauri%20Hiko.pdf

[3] Interim Climate Change Committee, *Accelerated Electrification,* https://www.iccc.mfe.govt.nz/what-we-do/energy/electricity-inquiry-final-report/

[4] Transpower, *The Sun Rises on a Solar Energy Future,* https://www.transpower.co.nz/sites/default/files/plain-page/attachments/Te%20Mauri%20Hiko%20%E2%80%93%20the%20sun%20rises%20-%20published.pdf

[5] Interim Climate Change Committee, *Accelerated Electrification*

[6] Transpower, *Whakamana i te Mauri Hiko: Empowering Our Energy Future*

[7] Transpower, *The Sun Rises on a Solar Energy Future*

[8] Stats NZ, *Investigating different measures of energy hardship in New Zealand,* 2017 http://archive.stats.govt.nz/browse_for_stats/people_and_communities/Households/energy-hardship-report.aspx#gsc.tab=0

[9] For example, solar companies like SolarCity run on a Virtual Power Plant model, and Genesis Energy is trialling a Virtual Power Plant in Wairarapa https://www.genesisenergy.co.nz/about/media/news/genesis-launches-virtual-power-plant-in-south-wair

[10] https://www.vector.co.nz/articles/powering-a-real-sense-of-community

[11] https://www.nzqa.govt.nz/providers/index.do?frameworkId=1782666116

[12] Peter Poschen/International Labour Organisation, *Decent Work, Green Jobs and the Sustainable Economy: Solutions for Climate Change and Sustainable Development,* Routledge, 2017

[13] https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/low-emissions-economy/process-heat-in-new-zealand/

[14] EECA case study https://static1.squarespace.com/static/5418fdb3e4b0ca2f107e0262/t/54224ee4e4b06733ce009213/1411534564849/mccallum-group-builds-future-with-wood-chips-may-10.pdf

[15] MBIE, *Accelerating renewable energy and energy efficiency*, December 2019, https://www.mbie.govt.nz/have-your-say/accelerating-renewable-energy-and-energy-efficiency/

[16] Transpower, *Whakamana i te Mauri Hiko: Empowering Our Energy Future*

[17] Transpower, *Whakamana i te Mauri Hiko: Empowering Our Energy Future*

[18] Latest Electricity Authority data (September 2019) https://www.emi.ea.govt.nz/Wholesale/Datasets/Generation/Generation_fleet/Proposed

[19] MBIE, *Accelerating renewable energy and energy efficiency*

[20] Based on modelling provided to the Green Party by a leading energy efficiency company, summarised on page 20

[21] https://www.oecd.org/fr/environnement/climate-change-consequences-of-inaction.htm

[22] Clean Energy Council figures, quoted in The Australia Institute's *Will-o'-the-ISP Estimating renewable energy employment under the Integrated System Plan,* 2018 https://www.tai.org.au/sites/default/files/P648%20Renewable%20job%20estimate%20%5BWeb%5D.pdf

www.greens.org.nz/clean-energy-plan

Green

Authorised by James Shaw, Parliament Buildings, Wellington