

A PLAN TO REPOWER OUR SCHOOLS: VICTORIA





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Location, South Geelong Primary School



A MESSAGE FROM OUR SCHOOLS PROGRAM DIRECTOR

The Australian Youth Climate Coalition has been empowering young people to solve the climate crisis for over 10 years. Throughout this time, we have visited thousands of schools, trained over 200,000 high school students and hosted 30 summits in partnership with local councils.

We do this important work because we believe that young people aren't the leaders of tomorrow, they're the leaders of today. If high school students are equipped with the knowledge about climate change, the skills to take action, and the networks to be part of something bigger - they can change the world.

And they already are - high school students in South Australia were successful in lobbying the state government to implement a \$15 million solar schools program in 2016.

Young people are the ones who will inherit the dangerous consequences of inaction on climate change - and so we are speaking up and getting started in our communities by kickstarting the transition to 100% renewable energy.

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EXECUTIVE SUMMARY

High school students - both now and in the future - have a lot to lose if the worst effects of climate change are allowed to come to pass. But instead of their education being fuelled by dirty energy contributing to climate pollution, we could be powering their school activities entirely with clean renewable energy.

Not only would this inspire our young people to see and learn about what a smarter, cleaner energy future will look like, it will mean huge savings on the giant annual energy bill currently paid for by Victorian taxpayers.

Solar power and energy efficiency measures rolled out across all public high schools in Victoria would drastically reduce their overall reliance on dirty brown coal-powered electricity. However, we can go even further and ensure that schools are 100% renewable powered, 100% of the time.

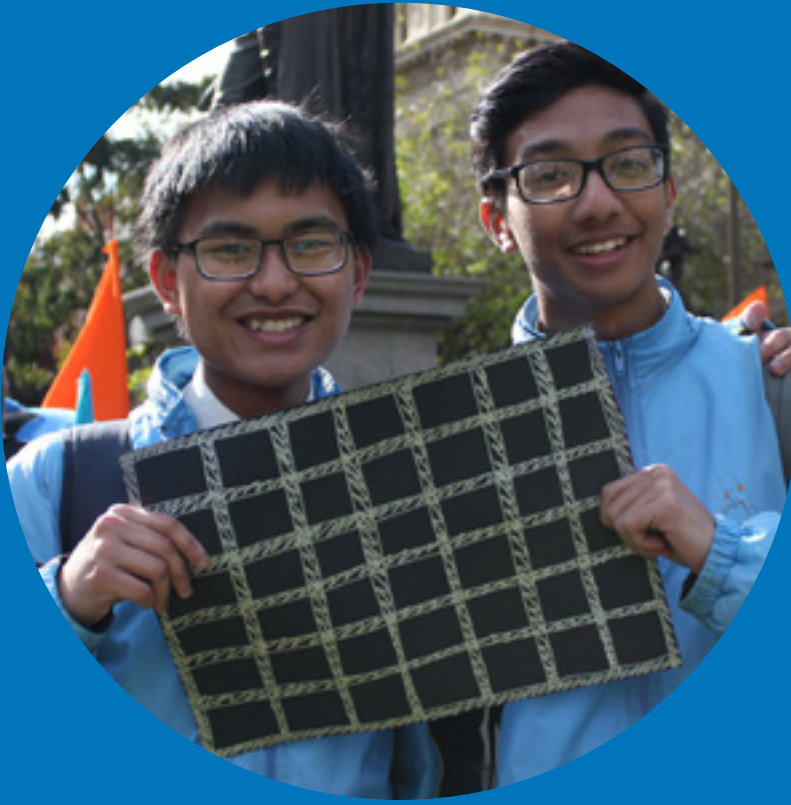
In this report we've crunched the numbers to show just how much solar energy could benefit Victorian high schools. If we were to install a 100kW solar system on all of the 418 Victorian public high schools the results would be game-changing. They include:

- Producing enough clean renewable energy to power the entire electricity needs of 134 schools - reducing the current electricity demand of Victorian public high schools by around 32%
- 50.5 gigawatt-hours (GWh) of clean renewable energy produced every year, saving 54,500 tonnes of climate-changing emissions per year. Equivalent to taking about 11,500 cars off the road.
- Savings of \$9.4million every year that can be reinvested back into climate change and clean energy education.

High schools students are our future and any career they choose will require much higher energy literacy and knowledge of how we live with and reduce climate change effects. But they're certainly not waiting around for others to lead the transition to a renewable-powered society. Students have been leading the charge to get solar on school rooftops. What they need is for governments to follow their lead and support them with visionary policies that will turbo-charge their efforts.

Our comprehensive policy package - Repower Our Schools - is a seven-point plan outlining exactly how we can deliver 100% renewable energy powered schools and turn them into clean energy hubs for the entire community. This \$97 million package is designed to maximise the multiple benefits of solar for schools including climate action, financial gains for schools and taxpayers, cutting-edge and innovative student education opportunities and positive connections to take clean energy action from the classroom to the broader community.

- 1. Find the Facts.** Through energy audits, smart meters and an online energy data portal, students and the Department of Education can get their school energy facts straight.
- 2. Solar on every School.** Install 100kW of solar on every public high school in Victoria and reinvest the savings in climate and clean-energy education.
- 3. Energy Efficiency is Essential.** A *School Energy Efficiency Revolving Fund* will save on pollution and on bills.
- 4. Give it 100%!** Through a power purchase agreement with a wind and/or solar farm, our schools can be powered by 100% renewable electricity.



5. Innovate & Educate. Schools should be supported to apply innovative clean energy solutions like batteries and demand management. We also need to upgrade the clean energy curriculum with new modules and teacher training.

6. Connect with Communities. Schools can spread the sunshine, by working in their communities to increase energy efficiency and develop innovative local clean energy initiatives.

7. Faster & Fairer. Make sure the first schools to benefit are those that need it most and that no public school is left behind.

Implementing this plan will turn our Victorian public high schools into decentralised, efficient solar powerhouses showcasing what the future can and will look like – solar on rooftops and clean energy embedded within communities.

Even more than this, it will boost the climate leadership being shown by students and equip them with the knowledge and skills they need to live and work in a renewable-powered world where energy use is both cleaner and smarter. It's time to take up these opportunities and repower our schools.



INTRODUCTION

Imagine if we could cover the large rooftops of the buildings and classrooms of *all* of the public high schools of Victoria with shimmering solar arrays and turn them into a network of decentralised renewable powerhouses.

Instead of contributing to a giant annual energy bill paid for by Victorian taxpayers, we could see our schools power their own activities with clean renewable energy from the sun. For an added bonus many schools would pump surplus clean solar electricity into the grid, making financial gains and turning schools into net providers of energy for their community.

In this report we've crunched the numbers to show just how much solar energy could be created and money could be saved if this visionary and cost-effective project were rolled out across the 418 public high schools in Victoria. We spell out the benefits from avoiding greenhouse gas emissions to providing practical opportunities at each and every school for students to learn about how we can address climate change through renewable energy technology and the smart energy system of the future.

But, we don't stop there. High school students - both now and in the future - have a lot to lose if the worst effects of climate change are allowed to come to pass. While solar power and energy efficiency measures rolled out across all high schools could drastically reduce their overall reliance on dirty coal-powered electricity, it does not go far enough. We need to ensure that schools are 100% renewable powered, 100% of the time.

As natural hubs of activity in our communities, bursting with passionate and energetic young people, there is also a huge opportunity for high schools to be magnifying their own efforts. In this report we show how schools could provide pathways for the broader community to take up clean energy opportunities.

We know that powering our schools with solar is not a new or revolutionary idea - in fact federal and state governments around Australia have recognised the multiple benefits of creating solar-powered and more energy efficient schools for years. To show the progress already made we include analysis of the existing state of solar in Victorian schools and an overview of the key policies from federal and Victorian governments that have helped nudge schools in the right direction.

But the approach to date has been fragmented and hasn't taken advantage of the major price drops for installing solar or the financial benefits from acting at scale. Certainly no policy has yet connected the dots to show the full range of benefits - for student education, innovation and community connections as well as the obvious environmental and financial rewards for schools and taxpayer energy bills.

That's why we have developed the Repower Our Schools Policy - a comprehensive policy package revealing how we can power our schools with 100% renewable energy and turn them into clean energy hubs for the entire community. We outline seven steps with policy ideas and indicative costings to show how repowering our public high school network in Victoria can become a new and exciting reality.

WHILE SOLAR POWER AND ENERGY EFFICIENCY MEASURES ROLLED OUT ACROSS ALL HIGH SCHOOLS COULD DRASTICALLY REDUCE THEIR OVERALL RELIANCE ON DIRTY COAL-POWERED ELECTRICITY, IT DOES NOT GO FAR ENOUGH. WE NEED TO ENSURE THAT SCHOOLS ARE 100% RENEWABLE POWERED, 100% OF THE TIME.

CURRENT STATE OF SOLAR IN VICTORIAN SCHOOLS

Public schools need safe and comfortable classrooms and facilities in order to provide the best possible learning environment for our students. Keeping our schools well-lit, making sure classrooms are cool in summer and warm in winter, powering the canteen, hot water systems and all the technical equipment needed for everything from science lessons to drama performances to sporting competitions are all crucial - and together they add up to high electricity needs.

Many Victorian schools are already taking the edge off their energy use thanks to their own efforts or state and federal government policies that have provided incentives for solar system installation and energy efficiency measures. In 2016-17, of more than 1500 schools (of all types), over 500 had installed solar with 124 of those being schools providing secondary level education.¹

But while plenty of schools already have some sort of solar system installed, it is typically quite small. The average system size installed in Victorian schools through the biggest policy to promote solar schools to date - the federal government's National Solar Schools Program (2008 - 2013) - was only around 7 kilowatts (kW).² On average a high school with this size system on the roof would only be getting a little over 2 percent of its electricity needs from the sun.

Every little bit helps but with huge price reductions in solar systems over the last decade and the urgent need to switch to clean renewable sources of energy to protect our climate, it is clear that we can do much better.

While funding programs have helped, in many cases the impetus to go solar has come from the school community itself. Dedicated teachers and students have been leading the charge to help their school reduce their contribution to climate change from wasted or polluting energy. So, what has been holding us back?

There are a handful of major barriers that have been preventing more schools from making the switch to solar power. These include:

- Capital for purchasing panels needs to be raised upfront. While some schools can afford to fundraise for this, not all can. It's unfair that schools from less affluent areas are therefore more likely to miss out.
- Savings on school electricity bills are not directly accessible to the school community itself due to the way utilities are paid for by the Department of Education. This could and should be overcome by designing incentives to split the solar savings rewards between individual public schools and the Department as a whole;
- Schools cannot choose their own electricity provider so cannot shop around for the best deals and solar feed-in-tariff rates;
- Learning about solar power and the transformation of the electricity grid required to address climate change is not embedded in the curriculum making it more difficult to unlock the educational benefits of having a solar system on site.

Not only do we need to ramp up the scale but we need to make it fairer so that all schools can benefit from switching to solar power.

¹ Data provided by the Victorian Department of Education and Training in August 2018

² Department of Energy, Resources and Tourism, 2013, *National Solar Schools Program - Evaluation Report*, Australian Government, Canberra, p. 67, <<https://web.archive.org/web/20140812181306/http://www.industry.gov.au/Energy/EnergyEfficiency/Documents/NSSP-Evaluation-Report-Final.pdf>>

WHO PAYS SCHOOL ELECTRICITY BILLS?

The Victorian Government negotiates retail electricity contracts for all public schools across the state. Currently there are two different providers.

Powerdirect provides electricity to schools with an annual usage of less than 40 MWh with a contract that ends on December 31, 2018. Red Energy is the provider for schools with higher energy use under a contract that ends in June 2019. The Department of Education and Training provides utilities funding as a cash allocation as part of a school's Student Resource Package which is distributed to schools through quarterly cash grants. This system means that schools do not benefit directly from decreasing their energy use through installing solar power.

CASE STUDY



Students at Melbourne Girls College (MGC) have been leading a campaign to repower their school with renewables, with the aim of being carbon neutral by 2020. To reach this goal, students worked on a campaign to install a 37 kw solar system that spells the school's initials on the gym roof and are working to crowdfund to expand the system.

The school has also established a lighting retrofit program and converted their training bikes and rowing machines to generate electricity. Students at MGC have also embedded their commitment to 100% renewables in the classroom, running an annual climate change conference to educate students from local high schools, delivering workshops on renewable energy and sustainability with junior year levels, and learning about clean energy in their science and technology classes.

THE OPPORTUNITY

Right now, public high schools are getting most of their electricity from the grid which, in Victoria, still relies on more than 85 percent dirty fossil fuel power.³ In the process they are racking up a huge bill for taxpayers and fuelling dangerous climate change.

We know that most schools have large sunny properties that could easily host large solar systems on site but just what kind of system would make sense? How much energy could we be generating by switching all of our Victorian public high schools to solar? And does it stack up financially? Below we crunch the numbers to find out.

SOLAR FOR EVERY SCHOOL

Let's imagine that the Victorian Government decided to install a 100kW solar system at each of the 418 public high schools in the state.⁴ This is the biggest solar array for which upfront cost incentives are currently available and would mean each school gets around 400 shiny new solar panels to mount in their sunniest spots.

- How much solar energy would this pump out?

Together, these solar high schools would be generating a total of 50.5 gigawatt-hours (GWh) of electricity every year. This is enough to power around 11,000 Victorian homes.

Victorian public high schools currently consume a lot of electricity. According to figures from the Victorian Department of Education, the average electricity

consumption for a high school in 2016-17 was 378 megawatt-hours (MWh) per year. If this was being offset by a solar roll-out to put a 100kW system on every high school the total electricity needs would reduce by around 32 percent.

In effect, the electricity needs of 134 Victorian high schools would be completely met by clean solar power.

- How would this help avoid climate-changing pollution?

More than 54,000 tonnes of greenhouse gas emissions would be saved every year if all Victorian public high schools were generating this level of solar energy. This is equal to taking more than 11,500 cars off the road.

- How much would it cost?

The average commercial price for installation of a 100kW solar system in Melbourne at August 2018 is \$117,000.⁵ Assuming additional program costs for government procurement, project management and quality assurance and a small discount for a bulk purchase agreement, the total installation cost across all Victorian public high schools would be in the ballpark of \$55 million.

- How much money would it save on school electricity bills?

Analysis of a typical Victorian high school electricity bill (on the Red Energy Contract) suggests that putting a 100kW solar system on the roof could save roughly \$22,600 per year due to avoided grid electricity costs and feed-in-tariff income for solar electricity not consumed on site during weekends and school holidays.

³ Department of Environment, Land, Water and Planning, 2018 'Energy', Victorian Government, accessed 1 September 2018 <<https://www.energy.vic.gov.au/>>

⁴ This analysis is based on 418 public schools delivering secondary education services in Victoria. Notes on the methodology and assumptions made throughout this report are included in Appendix A.

⁵ 'Commercial Solar PV Price Index for August 2018' *Solar Choice*, 3 August 2018, accessed 14 August 2018 <<https://www.solarchoice.net.au/blog/commercial-solar-pv-price-index-for-august-2018/>>

With these annual savings the installation cost of the school's shiny new solar array would take only 5.3 years to pay back.⁶ Add energy efficiency measures to this and we will cut the energy bills and climate pollution of all high schools in the state even further.

While more detailed costing is required, ballpark figures suggest that for an upfront cost of just \$55 million to install the solar systems on high schools across the state there could be savings of around \$9.4 million per year - or \$235 million over the 25 year (at least) lifetime of the solar panels. This is an incredible bargain that we really can't afford to ignore.

- What about the educational benefits?

With around 400 shining solar panels a 100kW solar system is a thing to behold. Having the system on site would mean it could act as a demonstration facility with, for example, live generation displays and online data portals able to be used in science, maths, business and sustainability lesson plans.

TABLE 1

BENEFITS OF INSTALLING 100KW SOLAR SYSTEM ON EVERY VICTORIAN PUBLIC HIGH SCHOOL

ENERGY PRODUCED	NUMBER OF VICTORIAN HIGH SCHOOLS THIS COULD POWER	TOTAL CARBON EMISSIONS SAVED	SCHOOL ELECTRICITY BILL SAVINGS
50.5 GWh EVERY YEAR	134 SCHOOLS	54,000 TONNES CO2-E EVERY YEAR	\$9.4 MILLION EVERY YEAR

There is enormous untapped potential sitting right above the heads of our high school students. It's time to cover our school rooftops with shimmering solar arrays and start to reap the rewards of sun-powered schools!

⁶ Simple payback calculated from adapted Nature Conservation Council of NSW Solar Schools IRR calculator - see Appendix A for assumptions. Note this is based on the Red Energy electricity contract, this will soon be renegotiated, it is likely that the payback periods will be longer under a new electricity contract. Currently, the Red Energy electricity contract has a high volumetric (c/kwh) charge and a low daily charge, we would expect that to change and that would make the payback period for solar slightly longer.

SOLAR SCHOOLS POLICIES

Given the barriers schools face in installing and benefiting from solar, policy intervention is needed to realise the potential of repowering our schools with clean renewable energy.

POLICIES TO DATE

Across the country there have been numerous solar schools and sustainable energy programs. In Victoria, there are four main programs that schools have benefited from (see Table 2).

The biggest roll-out of solar on schools took place through the federal government's National Solar Schools Program (NSSP) which ran from July 2008 to June 2013. The program saw solar installations funded at 4,897 schools around Australia.⁷ Uptake was strong but, as noted above, system sizes were small with an average system size in Victoria of only around 7kW.

The Victorian government has recognised the need for investing in both solar and upgrades to make sure schools are using energy efficiently - bringing down costs and ensuring comfortable teaching environments. Their Energy Efficiency Grants Program (2011 - 2014) provided 400 public primary and secondary schools with \$10,000 energy efficiency grants.⁸ While the Victorian Solar Schools Initiative (2007-2011) saw 328 schools install small solar arrays.

The Victorian School Building Association's Greener Government School Buildings program is currently working to roll-out energy efficiency upgrades and rooftop solar to schools across the state, however it is only currently being piloting with 6 high schools. This is a good program that urgently needs to be expanded in scope.

For the most part, these programs have achieved what they set-out to. The National Solar Schools program helped expand the rooftop solar industry beyond households and saw schools starting to play a role in clean energy. However, solar programs since then have been smaller in scale and piecemeal and none of them have sufficient focus on the integration of clean energy and educational outcomes.

The new Greener Government School Buildings program could certainly be scaled to cover all high schools across the state. It also shows promise, as multiple technologies are included. This is a step forward, as the majority of school solar and energy efficiency programs to date have tended to focus on simplicity of implementation at the expense of securing the multiple outcomes and benefits that can come from combining practical and educational action around clean energy.

Furthermore, most programs have been top down and have not involved much consultation or engagement with the school community prior to installation. While some have included an expression of interest process, we feel that more engagement would be beneficial. The past approach limits the benefits and leads to challenges with ongoing maintenance of the solar.

⁷ Department of Energy, Resources and Tourism, 2013, p. 9

⁸ Department of Education and Early Childhood Development, 2012, *Energy Efficiency Grants Program for Victorian Schools*, State of Victoria, Melbourne, p. 3

TABLE 2**Key policies assisting Victorian public high schools to install solar or become more energy efficient**

GOVERNMENT	POLICY NAME AND TIMEFRAME	INCENTIVES	NO. OF PARTICIPATING VICTORIAN PUBLIC HIGH SCHOOLS
Federal Government	National Solar Schools Program (2008-2013)	Grants of up to \$50,000 per school for solar panels, solar hot water or energy efficiency measures	\$217m to 5,300 schools for solar or efficiency projects. 4,897 schools installed solar across Australia including 789 projects in Victorian government school ⁹
Victorian Government	Victorian Solar in Schools Initiative (2007-2011)	Rebates initially between \$6,000 - \$15,000, then up to \$5,000, for new solar power systems and student learning resources.	328 schools (including primary and secondary) and community groups ¹⁰
Victorian Government	Energy Efficiency Grants (2011-2014)	One-off payments of up to \$10,000 for 400 schools joining the ResourceSmart AuSSI Vic framework for energy audits and efficiency measures ¹¹	Available to 400 schools (including primary and secondary)
Victorian Government	Greener Government Buildings Program (2017-18)	Funding for schools for solar installation or energy efficiency projects such as lighting upgrades. Schools pay back the upfront costs over a five-year period then keep half of the savings generated. ¹²	100 schools in pilot program including 6 secondary schools ¹³

⁹ Department of Energy, Resources and Tourism, 2013, p. 9 and 128

¹⁰ Commissioner Environmental Sustainability Victoria, 2010, *Strategic Audit: Addressing Our Future Environmental Management Systems*, State of Victoria, Melbourne, p. 56

¹¹ Department of Education and Early Childhood Development, 2012, p. 3

¹² Bloch, M. 2018 '100 Schools Join Victoria's Greener Government School Buildings Pilot', 30 March 2018, accessed 30 August, 2018 <<https://www.solarquotes.com.au/blog/victoria-schools-solar-energy-mb0526/>>

¹³ Advice from Department of Education and Training, see also Victorian School Building Authority, 2018, 'Greener Government School Buildings' State of Victoria, accessed 30 August, 2018 <<https://www.schoolbuildings.vic.gov.au/blog/Pages/Greener-Government-Buildings-Program.aspx>>

CASE STUDY



A SCHOOL THAT BENEFITED FROM A POLICY

Geelong High School was one of the 789 Victorian government schools to benefit from the National Solar Schools Program, being successful in obtaining support for a number of small scale energy efficiency measures, and an audit of their annual electricity use.

This enabled the school to start analysing their energy use and ways to reduce costs and emissions, leading to the beginning of a student-led environment group focussed on improving the sustainability across the school.

The environment team has participated in the AYCC Switched on Schools program since 2012, building skills and gathering support from the school community to transition to renewable energy. In early 2017, the students were successful in getting approval to install 100KW of solar on the school roof, comprising 384 solar panels.

The 100KW of solar covers over 40% of the schools electricity needs, and is now used as an educational tool, with two inverters installed in the school science lab for students to access real time data and monitoring to use in lesson plans and projects on renewable energy.

¹⁴ We assume that the vast majority of Victorian public high schools do not have smart meters as they do not fit into the household or small business categories that participated in the mandated rollout of smart meters.

REPOWER OUR SCHOOLS POLICY FOR VICTORIA

To date sustainable and renewable schools programs have been piecemeal and have not lived up to the potential of what a comprehensive clean energy schools policy could deliver.

The inconvenient truth is that past and current generations have left future generations to clean up the global mess that is climate change. At least 1 degree of warming is locked into our climate system; as such we have a duty to school students - today and in the future - to equip them to best respond to all the challenges we face in a warmer, more unstable world.

In whatever role or career they choose to take on students will need high energy literacy. They will need to understand what it will take to mitigate the worst extremes of climate and be supported to adapt to the existing impacts already occurring or in store. A powerful and effective solar schools policy package must therefore combine practical action such as energy efficiency measures, solar and storage with first-rate sustainability and climate education.

In reality, high school students are already stepping up and leading the charge to see their schools and our society more broadly transition to renewables. What they need is for governments to follow their lead and support them with a comprehensive policy framework that will work to turbo-charge their efforts rather than stifle them.

For these reasons we have pulled together the Repower our Schools Policy - a 7-point plan to turn Victorian high schools into centres for community energy and climate change leadership. Under this plan our schools will showcase what the future can and will look like – solar on rooftops and clean energy embedded within communities - and will equip students with the knowledge and skills they need to live and work in a climate changed world. This policy package could be integrated into an expanded version of the current Greener Government School Buildings program.

LET'S BREAK IT DOWN...

1. Find the Facts

First we need to get our facts straight. Without taking stock of energy usage baselines and localised factors affecting clean energy opportunities, it will be impossible for either Department of Education staff or students to design appropriate interventions to repower our schools.

To find the facts we need to do three things:

- Conduct *energy audits* of all Victorian public high schools. Energy audits will identify where solar is best located on each school, what energy efficiency and energy comfort opportunities exist, what small behavioural changes could be made to reduce energy use. The audit reports should then be used as an education tool. Students as an assignment could do an energy audit of their high school and compare it to the official report, potentially identifying additional actions that could be taken and funded through the savings from installing solar.
- Install *smart meters* at every Victorian public high school.¹⁴ Smart meters will allow both the school and Victorian Education Department to access high quality data on energy use and solar production in real time. This will both assist in designing the appropriate suite of clean energy options for the school as well as open up numerous education opportunities.
- Create a *database and data portal* of Victorian high school energy data. This database should have individual school energy use data and aggregated data from across the state. This data should be made accessible to students, educators and the public for education purposes through a data portal.

**Estimated cost of Finding the Facts:
\$3.45million**

2. Solar on every School

Solar makes sense! It lowers bills and lowers emissions. Every high school in Victoria should have rooftop solar and should be able to directly benefit from the installation.

To keep the program simple we propose that the Victorian Government should provide grant funding for each of the 418 public high schools in the state to install a 100kW solar system at an average cost of \$117,000 per school. The energy audit process will support the design of the solar system.

While most high schools will use the majority of electricity generated by the solar systems to power their own operations, there may be some times particularly in school holidays where solar electricity is being exported to the grid. As such, should the network company raise an issue associated with energy export (as they are increasingly doing), the same funding should be provided, but for a slightly smaller solar array coupled with a battery to ensure more of the solar is used on site.

Solar arrays will save schools significant funds in electricity bills. Currently these bills are paid for by a utility payment from the Education Department. We propose that the utility payment should stay the same and schools be required to reinvest the solar savings in climate and clean energy education initiatives.

Estimated cost of Solar on every School: \$55 million

3. Energy efficiency is essential

The cheapest and cleanest energy is the energy we don't use. Energy efficiency is essential to lowering bills, lowering emissions and making classrooms more comfortable and conducive for learning. Many classrooms are too hot in summer and too cold in winter. Insulation, draft proofing and other efficiency measures combined with the air conditioning program the Victorian Government is

already rolling out will help ensure students everywhere have comfortable environments in which to focus on learning.

The Victorian Government should establish a *School Energy Efficiency Revolving Fund* for high school energy efficiency upgrades. The energy audit in Finding the Facts should identify a range of energy efficiency opportunities for each school. The Education Department should organise to automatically undertake any energy efficiency opportunity identified that has a 5-year or less payback. The money to pay for the upgrade should be through a zero interest loan from the Revolving Fund; the funds should then be recouped from savings in school electricity bills.

Whereas schools will be able to keep the savings from solar, we propose that the Education Department be able to recoup the savings from energy efficiency upgrades in the form of lower utility payments. These savings will first be used to repay the loan from the Revolving Fund and then will be savings for the Government. Since there is a split incentive between schools and the Department, we believe this is a good approach to splitting the benefit.

Estimated cost of the School Energy Efficiency Revolving Fund: \$17million (note this will all be recouped).

4. Give it 100%!

While rooftop solar and energy efficiency will go a significant way to lowering the climate impact of Victorian high schools, school students want to see action on climate and that means giving it 100%. The fourth step in the Repower our Schools policy is for all schools to go to 100% renewables.

From Nectar Farms going 100% renewables through purchasing off-site solar and wind power PPA,¹⁵ to 14 Victorian-based corporations and local governments jointly

¹⁵ Parkinson, G. 2017. Nectar Farms on 100% renewables: "Why would you do it any other way?" *RenewEconomy*, Accessed 7 September 2018 at <<https://reneweconomy.com.au/nectar-farms-on-100-renewables-why-would-you-do-it-any-other-way-79279/>>

purchasing the output of the 80MW Crowlands Wind Farm near Ararat,¹⁶ there is a growing trend of large energy users signing power purchase agreements (PPAs) with renewable energy projects and governments are no exception. The Victorian Government has purchased it's quota of Renewable Certificates directly from 280MWs of Victorian renewables projects, including 35MWs of solar for the Melbourne tram network.¹⁷ The Victorian Government should go further and purchase the electricity needs of all Victorian public high schools from renewables projects.

As such, when the State Purchasing Contracts are close to renewal, the Victorian Department of Education should *enter into a PPA with a large-scale renewables project*, ideally a project that showcases multiple renewable technologies - solar, wind and a battery for storage. This PPA for renewables should be scaled to meet the remaining energy needs of all Victorian high schools accounting for the reduction in electricity from comprehensive solar and efficiency upgrades.

After the rooftop solar install, but without accounting for energy efficiency upgrades, it is estimated the remaining electricity use could be achieved through contracting with a 60MW solar farm or 30MW wind farm.¹⁸

To maximise the educational benefits the Victorian Government could co-locate a clean energy education centre with the renewables project and could encourage and support school trips to the centre.

5. Innovate & Educate

Innovation is essential to the future of Australia and tackling climate change, we should be supporting students to learn

and innovate. To do that, the Repower our Schools Program should support innovation as well as education.

Innovate

This means supporting high schools to benefit from other clean energy technologies and services such as batteries, demand management contracts and more, while tying in education opportunities at every step along the way. The energy audits should identify innovative clean energy opportunities as well as the solar and energy efficiency fundamentals.

Educate

There is a Resource Smart energy module for high school students. These we understand are in need of an update to expand their links to humanities, geography, maths and business studies. For example, in maths and business studies students can look at the current electricity bills and model savings based on current solar costs, in science they can research the carbon emission reductions and investigate the urban heat island effect and the impact of renewables, while in the humanities students can look at how solar and renewables can lead to energy affordability and research issues of energy poverty.

As part of the Repower our Schools program the Victorian Department of Education should commission new or updated clean energy modules. These modules should tie in with the push for increased STEM literacy and participation as well as be linked to climate change education. The modules should also take advantage of the information that will be provided through the rest of the Repower our Schools program including smart meter

¹⁶ City of Melbourne. 2018. *Melbourne Renewable Energy Project: A new generation of energy*. Accessed 7 September 2018 at <www.melbourne.vic.gov.au/business/sustainable-business/mrep/Pages/melbourne-renewable-energy-project.aspx>

¹⁷ Victorian Government. 2018. *Government renewable purchasing project*. Accessed 7 September 2018 at <www.energy.vic.gov.au/renewable-energy/victorias-renewable-energy-roadmap/government-renewable-energy-purchasing>

¹⁸ Assumptions for this are set out in Appendix A. Note cost is not estimated for this, as the contract for difference process that we recommend can actually lead to the Victorian Government making money, depending on the solar or wind price secured and how that differs from the wholesale cost of electricity.



data, solar data, energy audit reports, school visits to clean energy innovation centres including the one proposed above. Through the Connect with Communities program, the clean energy modules could also present learning opportunities in business, innovation and enterprise skills.

In addition to updating the curriculum, *new professional development training* will need to be provided for high school teaching staff, to ensure that teachers are supported to develop their proficiency in clean energy education.

**Estimated cost of *Innovate & Educate*:
\$5.8 million**

6. Connect with Communities

Schools are at the heart of their community. They are places that not only connect young people but teachers, parents and other community members. The Repower our Schools policy recognises the powerful connection role that schools play and leverages this for the benefit of the whole community. We propose that the Victorian Education Department should establish two sub-programs:

- Spread the Sunshine grants program. In this program school clubs, classes or P&Cs will be able to apply for a small grant (up to \$15,000) to develop or implement a clean energy program that benefits their community. This might be a community clean energy education event, or an innovative plan to support a local community organisation go solar. The sky's the limit of the innovative ideas that young people can come up with to help their community repower with clean energy. This program will help make these ideas a reality.
- Climate Clubs: A school energy savings competition. Schools love a good competition. This was the basis for a program developed and piloted by the Institute for Sustainable Futures at the

University of Technology Sydney in 2011 with 12 primary schools.¹⁹ The Climate Clubs program involves each school creating a climate club team of at least 20 students and their families. Then over the course of six months those team members work to lower their electricity use in their own homes. Savings are monitored by a third-party and the winning teams are those that lower their energy usage the most and win a cash prize for their school. The pilot of this program saw 5% reductions in energy usage. However, with higher electricity prices and more awareness, it is likely these savings would be greater today.

**Estimated cost of *Connect with Communities*:
\$16 million**

7. Faster & Fairer

Supporting all 418 Victorian public high schools to become centres for sustainability, powered by solar and other clean energy technologies will take a little bit of time. The majority of the Repower our Schools Policy should be delivered within the next 4-year term of government. However, there are some program elements such as the School Energy Efficiency Revolving Fund that should continue beyond the next term of government.

The Victorian Government must ensure no public school is left behind. A key design feature of this policy will therefore be identifying which schools will benefit first. The basic principles behind this program should be faster and fairer. The Victorian Department of Education should start with schools that are most enthusiastic (faster) and those most in need (fairer).

Schools should be invited to put in a very short expression of interest to be the first schools to participate. Simultaneously, the Victorian Department of Education should identify schools that are experiencing the

¹⁹ Jackson, M., Dunstan, C., Dovey, C., Moy, C., McEwan, T., Atherton, A. & Manning, D. 2012, *Climate Clubs 2011, Final Report*.

worst impacts of climate change right now (for example those least equipped to deal with climate change impacts like extreme heat), those schools who are in communities transitioning away from fossil fuels (like those in the Latrobe Valley) and those schools in communities with high levels of disadvantage.

Fairness - both between and within generations - must be at the heart of the responses we make to climate change as a society. Policies to help us transition to clean energy must therefore aim to be both fast and fair and the Repower our Schools Policy is no exception.

POLICY COST BREAKDOWN

Table 3 sets out the estimated costs for the different Victorian Repower our Schools policy elements over the next 4-year term of government.

TABLE 3

POLICY ELEMENT	COST
Finding the Facts	\$3.45 million
Solar on Every School	\$55 million
Energy Efficiency is Essential	\$17 million
Innovate & Educate	\$5.8 million
Connect with Communities	\$16 million
Total	\$97.25 million

***“SCHOOLS SWITCHING
TO RENEWABLE ENERGY
WOULD BENEFIT EVERYONE;
STUDENTS, TEACHERS AND
THE ENVIRONMENT”***

Elisha | Hurlstone Agricultural High School





APPENDIX A

ASSUMPTIONS UNDERPINNING A PLAN TO REPOWER OUR SCHOOLS: VICTORIA

Analysis included in A Plan to Repower Our Schools: Victoria is based on the following assumptions, calculations and data sources.

DESCRIPTION	ASSUMPTIONS, METHODOLOGY AND VALUES
State secondary schools in Victoria	Includes all Victorian state government schools (data at February 2018) performing secondary education activities except those classified as 'camp schools'. Total = 418
Solar output from 100 kW on every school	Sum for all 418 schools of 100kW x solar zone rating factors ² allocated by school postcode as per above dataset = 50,458.9 MWh p.a.
Average existing school solar system size in Victoria	Average system size in Victoria from largest solar schools roll-out program to date, National Solar Schools Program, = approximately 7kW ³
Average electricity demand for a Victorian high school	Average high school electricity consumption in 2016-17 was 378 MWh p.a. Data supplied by Victorian Department of Education and Training.
Victorian household energy use	AER/ACIL Allen benchmarks for average annual household electricity consumption in 2017 ⁴ where Victoria = 4,627 kWh p.a.
Greenhouse gas emission savings from 100kW on every school	Amount of solar energy produced as per above x National Greenhouse and Energy Reporting indirect (scope 2) emissions factor for Victoria = 1.08 ⁵ = 54,496 tonnes CO ₂ e
Greenhouse gas emissions from cars	Emissions from a typical passenger vehicle = 4.6 tonnes carbon dioxide p.a. according to US EPA figures from 2018 ⁶

¹ Data.vic.gov.au, 'School Locations: Data and Resources', Department of Education and Training, Victorian Government, accessed 25 July 2018 <<https://www.data.vic.gov.au/data/dataset/school-locations-2018>>

² Renewable Energy (Electricity) (Zone Ratings and Zones for Solar (Photovoltaic) Systems) Instrument 2018, Australian Government, available at <<https://www.legislation.gov.au/Details/F2018L00588>> accessed 1 August 2018

³ Department of Energy, Resources and Tourism, 2013, National Solar Schools Program - Evaluation Report, Australian Government, Canberra, p. 67

⁴ Acil Allen Consulting, 2017 Energy Consumption Benchmarks: Electricity and Gas for Residential Customers - Report to Australian Energy Regulator, 13 October 2017, accessed 1 August 2018 <<https://www.aer.gov.au/system/files/ACIL%20Allen%20Energy%20benchmarks%20report%202017%20-%20updated%205%20June%202018.pdf>>

⁵ Department of the Environment and Energy, 2017, National Greenhouse Accounts Factors - July 2017, Australian Government, p.20 <<https://www.environment.gov.au/system/files/resources/5a169bfb-f417-4b00-9b70-6ba328ea8671/files/national-greenhouse-accounts-factors-july-2017.pdf>>

⁶ United States Environmental Protection Agency, 2018 'Emissions from a Typical Passenger Vehicle', accessed 1 September 2018 <<https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>>

Installation costing	<p>\$119,000 per system based on</p> <ul style="list-style-type: none"> • average price for a fully installed commercial 100kW system in Melbourne at August 2018 = \$117,000 including RET incentives and GST⁷ • assume additional meter and installation costs of \$2,000 per installation <p>Add 15% to total cost for procurement, project management and quality assurance costs. Assume 5% discount through bulk contracts due to program efficiency and competitive tender process. Total = approx. \$55,000,000</p>
Savings on school electricity bills	<p>Assumptions adapted from the Nature Conservation Council of NSW Solar Schools IRR Calculator for a 100kW solar system using unit costs from an example school electricity bill on the Red Energy deal:</p> <ul style="list-style-type: none"> • Installation cost = \$119,000 • Inverter replacement cost (year 10) = \$300/kw • Degradation rate = 0.5% • Capacity factor = 13.5% • Generation per year = 118.5 MWh • Proportion used = 54% (assumes 40 weeks (not including weekends) at 90% self-consumption plus 12 weeks of holidays (including weekends) at 10% self-consumption) • Grid electricity cost = 26.82 c/kWh • Proportion sold = 46% • Feed-in tariff = 9.9 c/kWh (current flat FiT rate as set by the Essential Services Commission of Victoria) <p>Calculator shows average school electricity bill savings of = \$22,600 p.a. (rounded) resulting in 5.3 years simple payback period for the solar installation and total savings across all 418 schools of \$9.4million p.a.</p>
Size of solar or wind farm	<p>According to solar expert Jonathan Prendergast (the person behind the first corporate solar PPA in Australia), a 60MW solar farm in Victoria or 30MW wind farm with a reasonable wind resource would generate ~103GWh of electricity. This is the remaining electricity required to power NSW schools, after taking into account rooftop solar generation, based on the above assumptions around school electricity usage.</p>

POLICY COSTING ASSUMPTIONS NEXT PAGE

⁷ 'Commercial Solar PV Price Index for August 2018' *Solar Choice*, 3 August 2018, accessed 14 August 2018 <<https://www.solarchoice.net.au/blog/commercial-solar-pv-price-index-for-august-2018/>>

POLICY COSTING ASSUMPTIONS

The following table outlines the assumptions made behind the policy costings. These numbers were then rounded up, as all costings should be taken as estimates.

DESCRIPTION	ASSUMPTIONS	COST
1. Find the Facts		
- Audits + baseline assessment	\$3000 per school for the audits \$500k for research and evaluation e.g. cost projections	\$1,600,000
- Smart Meters	\$2000 per school	\$850,000
- Database/portal		\$1,000,000
2. Solar on every School		
	See assumptions above.	\$55,000,000
3. Energy Efficiency is Essential (revolving loan fund)		
	\$40,000 upgrade per school	\$17,000,000
5. Innovate & Educate		
- Innovate	\$10,000 in additional clean energy technology grant per school	\$4,200,000
- Curriculum update		\$1,000,000
- Teacher professional development	\$600 for a day training, 2 teachers per school + 100000 for course design.	\$600,000
6. Connect to the community		
- Community energy program	\$1m per year for 4 year	\$4,000,000
- Climate Clubs	\$3m per year for 4 years	\$12,000,000
		\$97,250,000