A PLAN TO REPOWER OUR SCHOOLS: NEW SOUTH WALES

AYCC SWITCHED ON SCHOOLS

community power agency

Cover image by Mik Aidt, Geelong Sustainability
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.

Laura Sykes
AYCC Schools Program Director

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About the authors
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Disclaimer
In compiling this report information on the energy usage and provision for government schools was sought but not forthcoming from the New South Wales Department of Education. Calculations were undertaken using the best information publicly available about NSW high schools and, where necessary, comparative data from the Victorian Department of Education.


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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 NSW taxpayers.

Solar power and energy efficiency measures rolled out across all public high schools in NSW would drastically reduce their overall reliance on dirty 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 NSW high schools. If we were to install a 100kW solar system on all of the 519 NSW public high schools the results would be game-changing. They include:

- Producing enough clean renewable energy to power the entire electricity needs of 191 schools - reducing the current electricity demand of NSW public high schools by more than 35%
- 72 gigawatt-hours (GWh) of clean renewable energy produced every year, saving 60,000 tonnes of climate-changing emissions per year. Equivalent to taking about 13,000 cars off the road.
- Savings of $7 million 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 $114 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 100kWs of solar on every high school in NSW 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 NSW 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.


REPOWER
OUR SCHOOLS


In 10 years our
100%

INTRODUCTION

Imagine if we could cover the large rooftops of the buildings and classrooms of all of the public high schools of NSW 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 NSW 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 519 public high schools in NSW. 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 NSW schools and an overview of the key policies from federal and NSW 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 NSW 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 NSW 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 NSW schools are already taking the edge off their energy use thanks to state and federal government policies that have provided incentives for solar system installation and energy efficiency measures. Of all of the roughly 2200 public primary and secondary schools in NSW, 1,421 of these had installed solar as of May 2017.[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 NSW schools through the biggest policy to promote solar schools to date - the federal government's National Solar Schools Program (2008 - 2013) - was only around 5 kilowatts (kW).[2] On average a high school with this size system on the roof would only be getting about 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] Hoh, A. 2017, 'Sydney's eastern suburbs welcome first school to go solar with plenty more to come' *ABC News online*, 15 June, accessed 30 August 2018 <http://www.abc.net.au/news/2017-06-14/sydney-eastern-suburbs-schools-sign-up-for-solar-panels/8616450>

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

CASE STUDY

STUDENTS SHINE A LIGHT ON BENEFITS OF SOLAR AT WILEY PARK GIRLS HIGH

Wiley Park Girls High, a school in Western Sydney, pledged to switch their school to 100% renewables in 2017, with a commitment to install 100kW of solar and transition to LED lighting.

The campaign was led by passionate students at the school, who were empowered after attending an AYCC Climate Justice Summit in Canterbury Bankstown in June 2017. They built support for solar through events, assembly presentations, a solar fundraiser and social media, gathering support from over 300 students and teachers. Key to the campaign success was students doing the modelling for solar as part of their STEM studies, and doing research into how installing solar could reduce the impact of the urban heat island effect facing Western Sydney.

Students used the launch of the solar panels as a way to educate other school students in their local community about renewables, inviting five local schools to attend a day of workshops and speeches about their journey, and why installing solar has such a positive impact for a school.

Installing 100kW of solar has reduced their power bills by over 30% already, and embedded climate change and sustainability as a core part of student learning at the school.

THE OPPORTUNITY

Right now, public high schools are getting most of their electricity from the grid which, in NSW, still relies on 76 percent dirty coal 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 NSW 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 NSW Government decided to install a 100kW solar system at each of the 519 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 72 gigawatt-hours (GWh) of electricity every year. This is enough to power around 14,000 NSW homes.

  NSW 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 that state in 2016-17 was 378 megawatt-hours (MWh) per year.[5] 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 more than 35 percent.

  In effect, the electricity needs of 191 NSW high schools would be completely met by clean solar power.

- **How would this help avoid climate-changing pollution?**

  Around 60,000 tonnes of greenhouse gas emissions would be saved every year if all NSW public high schools were generating this level of solar energy. This is equal to taking about 13,000 cars off the road.

- **How much would it cost?**

  The average commercial price for installation of a 100kW solar system in Sydney at August 2018 is $108,000.[6] 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 NSW public high schools would be in the ballpark of $63 million.

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

  Analysis of a typical NSW high school electricity bill suggests that putting a 100kW solar system on the roof could save roughly $13,500 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] McDonald, P. 2017, 'Renewable energy makes 'record-breaking' contribution to NSW electricity', *ABC News online*, 29 September, accessed 1 September 2018 <http://www.abc.net.au/news/2017-09-28/renewables-make-record-breaking-contribution-to-nsw-electricity/8998290>

[4] This analysis is based on 519 public schools delivering secondary education services in NSW. Notes on the methodology and assumptions made throughout this report are included in Appendix A.

[5] The NSW Department of Education did not provide figures for this analysis. This average is from Victorian Department of Education figures on average high school electricity consumption in 2016-17.

[6] '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 8 years to pay back.[7] 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 $63 million to install the solar systems on high schools across the state there could be savings of around $7 million per year - or $175 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 NSW PUBLIC HIGH SCHOOL

ENERGY PRODUCED	NUMBER OF NSW HIGH SCHOOLS THIS COULD POWER	TOTAL CARBON EMISSIONS SAVED	SCHOOL ELECTRICITY BILL SAVINGS
72 GWh EVERY YEAR	191 SCHOOLS	60,000 TONNES CO2-E EVERY YEAR	$7 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!

[7] Simple payback calculated from adapted Nature Conservation Council of NSW Solar Schools IRR calculator - see Appendix A for assumptions.

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 NSW, 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.[8] Uptake was strong but, as noted above, system sizes were small with an average system size in NSW of only around 5kW.

The NSW government has recognised the need for investing in upgrades to make sure schools are using energy efficiently - bringing down costs and ensuring comfortable teaching environments. Their NSW School Energy Efficiency Program (2007 - 2012) provided lighting retrofits to 126 schools.[9] The recent announcement of the Cooler Classrooms policy is pitched at addressing comfort concerns with smart energy technology, funding air conditioning systems to be powered by solar and battery storage where possible in schools in the hottest parts of NSW.

Then there is also the Solar my Schools program[10] delivered by the councils in the Eastern Suburbs of Sydney that is supporting schools in their community to go solar.

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.

Furthermore, with the exception of Solar my Schools, most programs have been top down and have not involved much consultation or engagement with the school community prior to installation. This limits the benefits and leads to challenges with ongoing maintenance of the solar.

The new NSW Cooler Classrooms program is certainly at a scale that it should make classrooms more comfortable learning environments, particularly as summers get hotter. However, the focus on only one technology solution is limiting. 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.

[8] Department of Energy, Resources and Tourism, 2013, p. 9

[9] State of NSW and Office of Environment and Heritage, 2014, *NSW Energy Efficiency Programs - 2012 Evaluation Report*, Sydney, p. 50

[10] Solar my Schools, https://www.solarmyschool.org.au/#

TABLE 2

Key policies assisting NSW public high schools to install solar or become more energy efficient

GOVERNMENT	POLICY NAME AND TIMEFRAME	INCENTIVES	NO. OF PARTICIPATING NSW 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[11]
NSW Government	NSW Department of Education and Communities Energy Savings Project (2017)	Lighting efficiency or solar installation projects	27 NSW public high schools[12]
NSW Government	NSW School Energy Efficiency Program (2007-2012)	Lighting retrofits	126 NSW schools[13]
NSW Government	Cooler Classrooms (2018-2023)	$500 million for air conditioning systems (powered by solar and battery storage where possible) in hottest areas of NSW. Includes installation of 'smart systems' that offer heating, cooling and CO2 level monitoring and control.	Policy in progress - no figures available

[11] Department of Energy, Resources and Tourism, 2013, p. 9 https://web.archive.org/web/20140812181306/http:/www.industry.gov.au/Energy/EnergyEfficiency/Documents/NSSP-Evaluation-Report-Final.pdf

[12] 'Ecosave saves tax payers $1.4m annually in energy costs in 33 government schools across *NSW' Ecosave*, accessed 23 August 2018 <https://ecosave.com.au/news-insights/case-study/department-of-education-nsw/>

[13] 'State of NSW and Office of Environment and Heritage, 2014, p. 50

CASE STUDY

A SCHOOL THAT BENEFITED FROM A POLICY

Earlier in 2018, Brigidine College in Randwick installed 208 solar panels (56kW) on the roof of the school's buildings to help power student learning, thanks to a local council-led program, Solar My School.

The program offers free solar feasibility report to assess the size and location of the system, as well as costs and savings. It also helps to facilitate the tender process and installation, and provides a curriculum-linked educational guide for students to learn about renewable energy. This program enabled the student-led environment team to gain the tools and knowledge to propose getting solar panels to their principal and school board, as well as providing them with valuable learning in areas of maths, science, humanities and technology.

"Without Solar my School's assistance, we would not have had the hard facts in our hands and the clarity to make the decision to install solar," said Brigidine teacher Richard Hainsworth.

Brigidine's solar power system will help reduce the school's energy bills by 30 per cent, with over $14,000 in annual savings which they are planning to divert into programs for students to learn about climate change and renewable energy.

REPOWER OUR SCHOOLS POLICY FOR NSW

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 NSW 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.

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 NSW 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 NSW public high school. Smart meters will allow both the school and NSW 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 NSW 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:* $3.9million

2. Solar on every School

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

To keep the program simple we propose that the NSW Government should provide grant funding for every high school to install a 100kW solar system at an average cost of $108,000 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*: $63 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 NSW Government is already rolling out will help ensure students everywhere have comfortable environments in which to focus on learning.

The NSW 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*: $20million (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 NSW 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 BlueScope sourcing off-site solar for the Port Kembla Steelworks to the University of Technology Sydney's solar array in the Hunter Valley, there is a growing trend of large energy users signing power purchase agreements (PPAs) with renewable energy projects and governments are no exception. The NSW Government ensured that the Sydney Desalination plant was powered by

renewables – the Capital Wind Farm - and is working to power the new North-west Rail Link with renewables. Schools should not be left out.

As such, when the State Purchasing Contracts are close to renewal, the NSW 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 NSW 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 35MW wind farm.[14]

To maximise the educational benefits the NSW 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 are at least two basic clean energy and sustainability high school curriculum modules. 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 NSW 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 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*: $6.95million

[14] 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 NSW Government making money, depending on the solar or wind price secured and how that differs from the wholesale cost of electricity..


REPOWER

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 NSW 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.[15] 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*: $20 million

7. Faster & Fairer

Supporting all 519 NSW 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 NSW 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 NSW 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 NSW Department of Education should identify schools that are experiencing the worst impacts of climate change right now (for example those experiencing extreme heat in Western Sydney), those schools who are in communities transitioning away from fossil fuels (like those in the Hunter 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.

[15] Jackson, M., Dunstan, C., Dovey, C., Moy, C., McEwan, T., Atherton, A. & Manning, D. (2012) *Climate Clubs 2011, Final Report*.

POLICY COST BREAKDOWN

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

TABLE 3

POLICY ELEMENT	COST
Finding the Facts	$3.9 million
Solar on Every School	$63 million
Energy Efficiency is Essential	$21 million
Innovate & Educate	$6.95 million
Connect with Communities	$20 million
Total	$114.85 million

"SCHOOLS SWITCHING TO RENEWABLE ENERGY WOULD BENEFIT EVERYONE; STUDENTS, TEACHERS AND THE ENVIRONMENT"

Elisha | Hurlstone Agricultural High School

AYCC SWITCHED ON SCHOOLS

community power agency

APPENDIX A

ASSUMPTIONS UNDERPINNING A PLAN TO REPOWER OUR SCHOOLS: NSW

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

DESCRIPTION	ASSUMPTIONS, METHODOLOGY AND VALUES
State secondary schools in NSW	Includes all NSW state government schools (data at August 2017[1]) performing secondary education activities except those classified as 'hospital schools', 'environment education centres' and those 'schools for specific purposes' with less than 50 students. Total = 519
Solar output from 100 kW on every school	Sum for all 519 schools of 100kW x solar zone rating factors[2] allocated by school postcode as per above dataset = 72,146.6 MWh p.a.
Average existing NSW school solar system size	Average system size in NSW from largest solar schools roll-out program to date, National Solar Schools Program, = approximately 5kW[3]
Average electricity demand for a NSW high school	Data was sought from but not provided by NSW Department of Education. Average high school electricity consumption in 2016-17 of 378 MWh p.a. provided by the Victorian Department of Education was used as a proxy.
NSW household energy use	AER/ACIL Allen benchmarks for average annual household electricity consumption in 2017[4] where NSW = 5,172 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 NSW = 0.83[5] = 59,882 tonnes CO2e
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]

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1 Centre for Education Statistics and Evaluation, 2017 'Master dataset: NSW government school locations and student enrolment numbers' NSW Department of Education, accessed 25 July 2018 <https://data.cese.nsw.gov.au/data/dataset/nsw-public-schools-master-dataset>

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	$110,000 per system based on • average price for a fully installed commercial 100kW system in Sydney at August 2018 = $108,000 including RET incentives and GST[7] • assume additional meter and installation costs of $2,000 per installation 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 $63,000,000
Savings on school electricity bills	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: • Installation cost = $110,000 • Inverter replacement cost (year 10) = $300/kw • Degradation rate = 0.5% • Capacity factor = 15.8% • Generation per year = 138.2 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 = 10.68 c/kWh • Proportion sold = 46% • Feed-in tariff = 8 c/kWh • Demand fee = $10.46/kVA/month • Demand charge reduction = 5% Calculator shows average school electricity bill savings of = $13,687 p.a. resulting in 8 years simple payback period for the solar installation and total savings across all 519 schools of $7.1 million p.a.
Size of solar or wind farm	According to solar expert Jonathan Prendergast (the person behind the first corporate solar PPA in Australia), a 60MW solar farm in NSW or 35MW wind farm with a reasonable wind resource would generate ~124GWh 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.

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 $300k for research and evaluation e.g. cost projections	$1,900,000
- Smart Meters	$2000 per school	$1,000,000
- Database/portal		$1,000,000
2. Solar on every School	See assumptions above.	$63,000,000
3. Energy Efficiency is Essential (revolving loan fund)	$40,000 upgrade per school	$21,000,000
5. Innovate & Educate		
- Innovate	$10,000 in additional clean energy technology grant per school	$5,200,000
- Curriculum update		$1,000,000
- Teacher professional development	$600 for a day training, 2 teachers per school + 100000 for course design.	$750,000
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
		$114,850,000