

The Wrong Energy Source

Letter Opposing Gas at Narrabri NSW

Good afternoon Commissioners, I'm Scott McCalman.

This project and its huge array of potential catastrophic impacts, reminds me of the 1962 Cuban Missile Crisis. Had that crisis played out, between the Soviets & the U.S, the irreversible damage to humanity & the planet, would have changed the course of man kind's destiny forever.

The implications to Australia if this coal seam gas project goes ahead, has the same capacity to create irreversible damage & potential life changing destruction.

Commissioners, you are at the control panel & the decision you make with all the scientific evidence in regard to climate change, before you – should be a simple one.

Fidel Castro, John F. Kennedy & Nikita Khrushchev , despite the enormous tension, made the right decision & found a way out of the impasse & prosperity prevailed.

We are at this same impasse now for this region, will it be gas, or a renewable energy future?

Global divestment away from fossil fuels, is now occurring at an unprecedented rate. Global investment is now seeking renewable despatchable energy projects that mitigate climate change emissions. Fugitive emissions particularly methane, is an extremely potent greenhouse gas. The total emissions footprint of CSG should include the fugitive emissions plus the emissions generated when methane is combusted to CO2 for energy.

Farm businesses are heavily exposed to climate change risks & new developments in regional Australia should have outcomes that bias a clear & broadly accepted reduction in carbon emissions.

This gas extraction project could completely obliterate, well over thirty years of massive bipartisan projects, right across Australia, & billions of dollars in area wide rehydration projects – such as capping & piping of precious groundwater & re stabilizing water pressure in the Great Artesian Basin.

These diverse & integrated land management practices are national strategic solutions, to proactively work with Australia's dramatically changing hotter, dryer climate.

It introduces incentives for landscape management to build & maintain soil carbon, tree cover & ground cover. Most importantly it recognizes the relationship between soil, plant, animal & human health & our capacity to produce nutrient dense food for our nation & the world.

I've been involved in innovative agricultural production for over 35 years. Commissioners I cannot overstate the devastating impacts that climate change is now having on the Australian continent. *BURDEN*  
Particularly in the last twenty years. As I implement more innovative risk management strategies, the of climatic hurdles increase. *↑*

Vastly increased temperatures, huge daily transpiration & evaporation, increasing frequency & duration of drought, vastly diminished & highly variable rainfall, plant stress, die back, erosion, wild fires, monitory loss & impacts to native flora & fauna.

We do not have the luxury of high altitudes, on this continent. We do not have large highly elevated snow peaked mountain ranges & other buffering landscape features to combat elevating temperatures. Rural Australia does not have the buffering of a sea breeze.

We are seeing some very sobering figures from 24 hour weather station data loggers – compared to long historical records.

I farm on the Liverpool Plains & we are now operating at summer temperatures 330% above our long term average. Long standing average daily temperatures in summer, above 35 degrees is 20 days. In the last decade, this has risen to over 65 days.

### In Conclusion

As the smoke from our bush fires circles the earth & other developed countries express anger at our inaction on climate change, we are deluding ourselves if action on emission reductions are not implemented. Australians are now frightened and anxious and minds have moved significantly to recognize our dismal future, bestowed by Government intransience & denial.

The appalling bushfires, the severe lack of water for basic needs, and the proceeding drought parented by a degree rise in temperature, should have been a clarion call for the scientific certainty that now predicts a 2 to 4 degree rise.

In addition, we are currently getting a lesson in the vulnerability of exports to China, India & Japan, especially services like Education and Tourism- through the Covid-19 pandemic.

So Australia has suddenly been confronted with a series of external policy challenges, on top of the home grown ones.

It will require the kind of sophisticated national planning and consensus building, that has been entirely absent for well over a decade.

Is there the vision & leadership that is required to turn things around? A future vision based on national consensus? There is job security in thriving vibrant balanced communities. There are so many people looking at renewable industries & organizations doing good things in our communities.

Australians, now more than any time in history, want Local Shires, State & Federal Governments..... with vision, courage and care, to provide Leadership, that takes care of our future generations.

Scott McCalman

Thank you



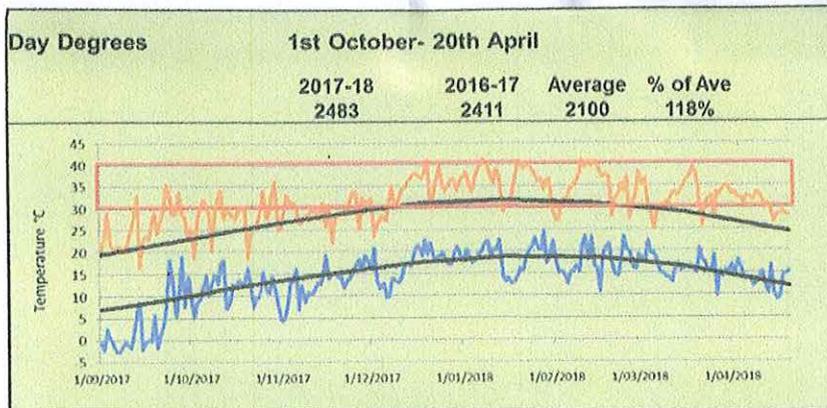
COMMISSIONERS - THIS BELOW IS HAPPENING EVERY

Gmail - Climate Graphs YEAR, ITS GETTING WORSE & UNSUSTAINABLE Page 2 of 3

\* THIS CREATES WILD FIRES & FOOD DESTRUCTION.

Temperature		1st October- 20th April		
	2017-18	2016-17	Average	% of Ave
Days > 35°C	65	64	20	333%
Days > 40°C	8	12	1	800%
Nights > 25°C	0	1	1	0%
Ave Max °C	32.5	31.6	28.8	113%
Ave Min °C	15.6	14.7	15.9	98%
Cold shock	34	67	32	106%
Ave Mean °C	24.1	23.2	22.4	108%

Temperature during 1st January - 31st March		Micronaire Period		
	2017-18	2016-17	Average	% of Ave
Days > 35°C	48	42	12	410%
Days > 40°C	7	9	1	500%
Nights > 25°C	0	1	1	0%
Ave Max °C	35	34.5	30.4	115%
Ave Min °C	18	19.0	17.7	99%
Ave Mean °C	26	26.8	24.1	109%



## 'Renewables capital of Australia'? Port Augusta shows off its green energy credentials

By Stephen Long

Updated Mon 8 Oct 2018, 1:08pm



PHOTO: A number of different solar projects have sprung up around the SA town of Port Augusta. (ABC News: Carl Saville)

**Driving towards Port Augusta, a luminous white light appears on a concrete shaft to the side of the highway.**

The giant light is a receiver; it sits among a sea of mirrors which beam the sun onto it, producing intense heat that creates steam, turns a turbine, and makes electricity. It's known as concentrating solar thermal, a new breed of energy.

Nearby, a chimney is visible in the distance across the salt pans.

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**RELATED STORY:** The reality is new coal power is not the answer for cheaper electricity bills

**RELATED STORY:** One gas plant could wipe out a year's worth of Australia's solar power emissions savings

\* THIS IS THE TYPE OF INVESTMENT NARRARRI NEEDS  
VALUE ADDING LOCAL PRODUCT, WITH THE SUN'S ENERGY.  
JOBS, EXPORT MARKETS, FOOD SECURITY, INNOVATION, ALL  
WHILE MITIGATING THE IMPACTS ON CLIMATE CHANGE,  
OUR WATER, ENVIRONMENT & OUR PEOPLE ✓✓✓

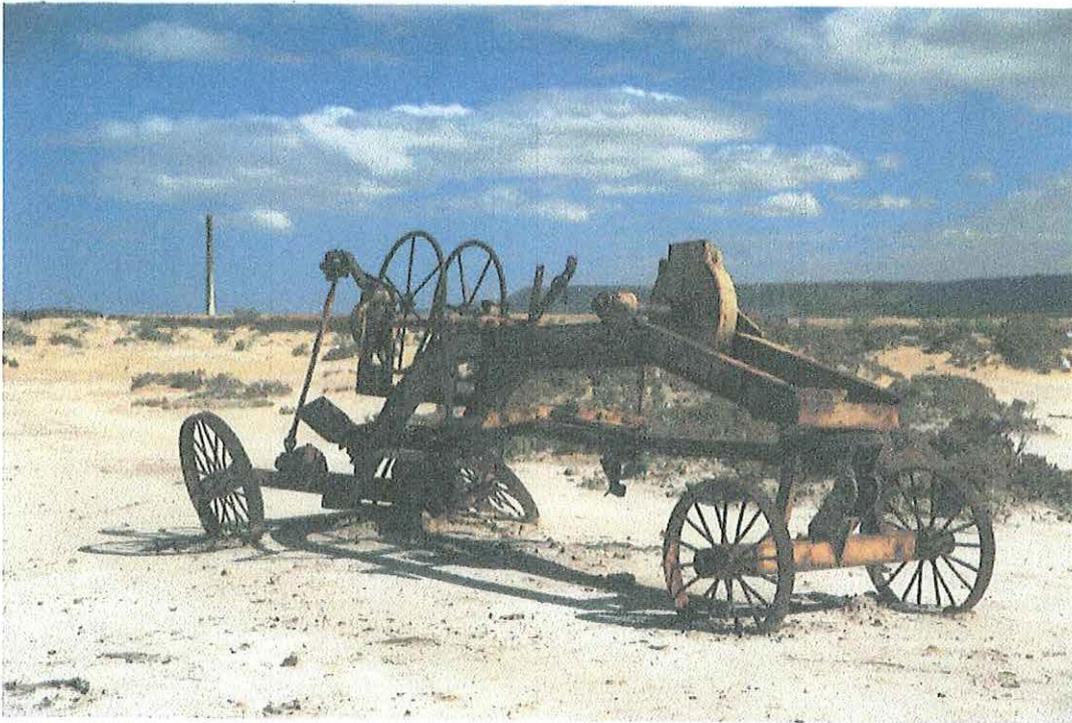


PHOTO: Looking across the saltpan to the old power plant's tower. (ABC News: Carl Saville)

It's a remnant of the Northern Power Station, one of two defunct coal-fired plants here that used to supply more than a third of South Australia's electricity. Its boilers were detonated last December.

"In 2015 when they announced the closure of the [Northern] coal-fired power station, I said that Port Augusta would become the renewables capital of Australia," Sam Johnson, the mayor of Port Augusta, said.

"Three years on, I think we have."

Or soon will be.

That white light on the outskirts of town is a mere taste of the technology coming to Port Augusta on a far grander scale.

## Renewables boom boosts Port Augusta

Thirteen renewable energy projects are underway or under consideration — from wind farms and pumped hydro-electric power to solar with storage that can shift electricity made when the sun's shining to meet peak demand in the evening.

"The one great resource we have here in Port Augusta and the upper Spencer Gulf is this wonderful natural resource called the sun," Mr Johnson said.

"It's no different to having a massive uranium deposit, a massive gold deposit, a massive copper deposit."

In a country drenched in sun, this natural resource is particularly abundant in the arid landscape around Port Augusta, and there are also plenty of flat expanses on which to build the facilities needed to exploit it.

Framed by the Flinders Ranges, stage one of the Bungala solar farm stretches over 300 hectares of land owned by the Bungala Aboriginal Corporation about 10 kilometres north-east of town.

Bungala uses a solar photovoltaic technology, with panels mounted on a tilting axis that can follow the sun's path from east to west, maximising output and efficiency.



**PHOTO:** The Bungala solar power plant currently stretches over 300 hectares of land. (ABC News: Carl Saville)

"It's not only the largest solar project in Australia," Mr Johnson said. "It's also the largest in the southern hemisphere. And it's only half complete."

When stage two is complete, the entire 300 megawatt project will cover more than 800 hectares — an expanse nearly as big as the Melbourne CBD — and generate enough electricity to power about 82,000 households, according to its owners, Italian multinational Enel Green Power and the Dutch Infrastructure Fund.

"The solar plant will only operate when the sun is shining, but when you start to incorporate battery storage and solar thermal, you then build in the energy security," Mr Johnson said.

## Solar that releases energy even when the sun doesn't shine

The Aurora project about 30 kilometres north-west of Port Augusta addresses the criticism often levelled at renewable energy — that when the sun doesn't shine, and the wind doesn't blow, the power doesn't flow.

Construction is due to start soon on the concentrated solar thermal power station. It will be able to store a massive 1,100 megawatt-hours of electricity, according to the project proponent, SolarReserve.

When it is built, an impressive sight will greet observers: a tower full of molten salt standing about 250 metres high, surrounded by more than 10,000 heliostats — movable mirrors, the size of billboards, algorithmically programmed to track the sun.

Those thousands of mirrors will reflect and concentrate sunlight, beaming it onto a receiver straddling the top of the tower.

During the day, molten salt will flow through the receiver and be heated to temperatures as high as 566 degrees Celsius, then stored in tanks overnight.

The energy will be dispatchable as electricity when needed — after dark in the evening peaks, or in the morning, hours after it was generated. It will be enough energy to power 90,000 homes, according to SolarReserve, which wants to build six of these plants in South Australia.

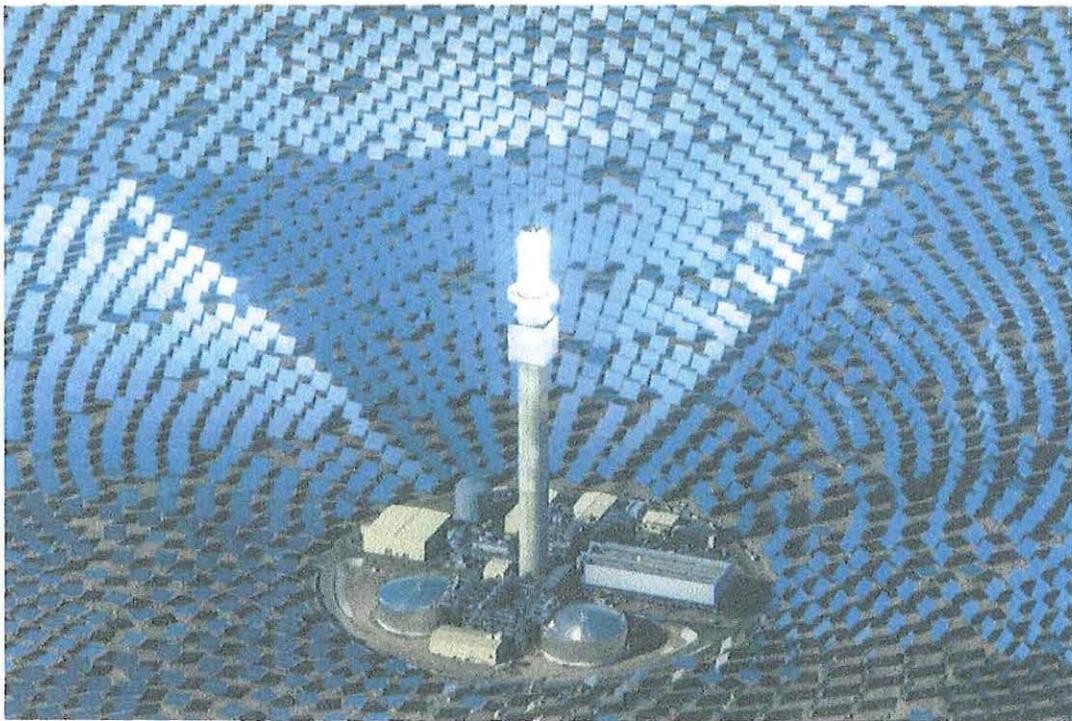


PHOTO: The Crescent Dunes solar power plant in Nevada is the same type of facility as Aurora will be. (Supplied: SolarReserve)

Crescent Dunes in the Nevada desert uses an identical technology.

There is one key difference: the price of the power.

"Pricing has come down dramatically, as it has throughout the renewable energy industry," Kevin Smith, the chief executive of SolarReserve, said.

Crescent Dunes, the first plant of its kind, began operating in 2014.

Construction was aided by a concessional loan of \$US737 million (\$1,040 million) from the US Department of Energy. Despite that subsidy, it was contracted to supply electricity to Nevada at \$190 a megawatt hour. Not cheap.

The Aurora project is receiving a much smaller concessional loan from the Australian Government — about \$110 million — but will supply energy at a fraction of the price.

SolarReserve is cagey about the precise figure (the contractual conditions are complex) but Mr Smith agreed with reports that put the cost at about \$78 a megawatt hour.

At current exchange rates, that is well under half the price of electricity from its inaugural plant in the US — and far cheaper than new coal-fired power.

"In terms of cents per kilowatt hour, we can supply electricity 30 to 40 per cent cheaper than new-build coal," Mr Smith maintained.

## A town blanketed in ash

Coal used to be Port Augusta's lifeblood.

From the middle of last century, generations of Port Augustans worked in the coal-fired plants. They burnt lignite, the lowest rank of coal, mined at Leigh Creek about 250 kilometres away.



**PHOTO:** Port Augusta was, until recently, home to two coal-fired power stations. (ABC News: Carl Saville)

The jobs buoyed the town but came at a cost: air pollution which blanketed the town, putting its citizens at risk of respiratory diseases from asthma to lung cancer.

"For 60 years the coal-fired power stations were dumping ash over the city," Lisa Lumsden, a community activist and city councillor, said. "At times in the early years up to 15 tonnes of ash a day.

"People's health suffered; asthma, respiratory disease was commonplace."

For years, no one assessed the toll the pollution was taking, but when a study finally examined lung cancer rates in Port Augusta, it found a cluster double the average rate.

Though particulate matter and other carcinogens released by burning coal is a known cause of lung cancer, the government tried to blame it on smoking.

The ABC met Lisa Lumsden in the town square by a statue of her mentor, Joy Baluch, mayor of Port Augusta for 29 years until she died in 2013.



**PHOTO:** A statue commemorates former Port Augusta mayor Joy Baluch, who died of cancer, as did her husband. (ABC News: Carl Saville)

Ms Baluch took to politics because of her son's severe asthma. For decades, she battled to cut the city's air pollution.

Her husband worked in the power stations. He died of lung cancer 16 years before her, though he did not smoke.

Ms Baluch campaigned for solar thermal technology to replace the ageing coal-fired electricity generators.

Through the community group Repower Port Augusta, Ms Lumsden took on the mantle.

"[In] 2011 we started the campaign — well before the power station announced its closure," she said.

"The community could see that there was a short future. We could see that it was likely that in a world of climate change and dirty coal ash and a 60-year-old power station, change was going to come.

"We researched and found that solar thermal technology was exactly suited to the environment here, started a local campaign, then a state campaign, then a national campaign, and we won."

Ms Lumsden acknowledged the closure of the coal plants had been tough for locals.

"We lost 200 jobs. It brought huge stability to our community — great, secure, well paid jobs — but it was no longer economically viable," she said.

"We had to embrace the options we have.

"We have incredible geography. We have everything we need to become the renewables capital of the world."

An exaggeration? Maybe, but it's not far off the mark.

The arid-zone landscape of the upper Spencer Gulf has solar resources ideally suited for concentrating solar thermal power, wind in abundance at speeds well suited for turbines, and a coastal location that opens the possibility of pumped hydro energy using seawater.

What you won't find are fields of fruit and vegetables — but where there's a will, there's a way.



**PHOTO:** Sundrop Farm on the outskirts of Port Augusta, which uses solar energy to desalinate water and grow tomatoes. (ABC News: Carl Saville)

That white beacon of light on the edge of town? It's a solar thermal power plant that runs a massive greenhouse that grows truss tomatoes.

Sundrop Farm is using the solar thermal electricity to desalinate water, create electricity to power the operation, and pump heat through 60 kilometres of pipe around the vines.

It's a testament to human ingenuity, like much of what's happening in the renewal of Port Augusta.

Topics: alternative-energy, electricity-energy-and-utilities, solar-energy, port-augusta-5700, sa, australia



## IEEFA Australia: Renewables or gas – which will we choose?

It's crunch time for the future of the north west of New South Wales, Australia. Will the region choose gas, or a renewable future? Jobs and investment are needed in the North West now, not in a decade's time.

Let's look at what's on the table. We've just seen the New South Wales government announce a new renewable energy zone for New England, which will bring \$12.7 billion in investment, support 2000 construction jobs and 1300 ongoing jobs.

The New England Renewables Zone will be three times the size of the recently announced Central West zone, which has had an overwhelming response from investors. The tender for new renewables projects was oversubscribed by nine times.

The message is clear – investors are crying out for the opportunity to invest in renewables, right now. On the other hand, we have the gas industry.

In the lead up to the Narrabri Gas Project Independent Planning Committee hearing, Santos is spruiking its ability to provide jobs and investment for the North West. But let's look at the facts – in the present that is simply not possible.

**THE COVID-19 PANDEMIC HAS HIGHLIGHTED THE WEAK INVESTMENT CASE FOR GAS.** Globally there is a massive surplus of gas, with prices at all-time lows. Gas dependent manufacturing faces a crisis of overcapacity. Major oil companies are withdrawing from the local gas industry.

*Globally there is a massive surplus of gas*

Conoco Philips sold its Northern Territory assets last year and Shell, Chevron and Exxon are looking to exit \$11 billion worth of assets. The domestic gas companies, Woodside, Santos and Origin, are cutting exploration and project budgets as they struggle to survive low prices.

The Chair of the Australian Energy Regulator recently warned that if the gas pipeline industry did not convert to green hydrogen it faced a shortened economic

life.

For the Narrabri gas project, this doesn't paint a promising picture. Narrabri gas will be expensive to extract, with AEMO calculating production cost at the wellhead at \$7.40 per gigajoule.

In a world swimming in cheap gas, it's difficult to see how this could possibly be economically viable. As an investor, it's not an appealing prospect.

**THE GAS INDUSTRY IS FACING INCREASING SCRUTINY**, with a closer look at the industry showing it is no better than coal for greenhouse gas emissions. Investors are increasingly pulling away from projects that contribute to climate change – just this week First State Super, the country's second largest superannuation fund, announced it will step away from thermal coal investment.

*Narrabri gas will be expensive to extract*

Renewables are the future of this region. It's time to embrace them, and leave the dwindling gas industry in the dust.

*Bruce Robertson is an LNG/gas analyst with the Institute for Energy Economics and Financial Analysis.*

This commentary first appeared in [The Northern Daily Leader](#).

### Related articles:

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Until there is consensus that fugitive emissions are being measured independently, accurately and for the entire CSG life cycle, the whole CSG proposition is far too much risk for regional Australian's who are seeking meaningful climate change adaptation.

This small German town took back the power - and went fully renewable

Page 1 of 6

## THE CONVERSATION

Academic rigour, journalistic flair



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# This small German town took back the power – and went fully renewable

December 6, 2019 9.26pm AEDT

The case for ambitious and transformative environmental policy is being made with increasing fervour and a series of “Green New Deals” – a reference to Roosevelt’s economic reform programme in the 1930s – have been proposed over the past 12 months in the US, Europe, and the UK. Such policies would involve massive state investment in the development of renewable energy infrastructure, retrofitting buildings to improve energy efficiency, and efficient and high-speed public transport.

Reflecting the understanding that climate change demands deep systemic changes to the

### Author



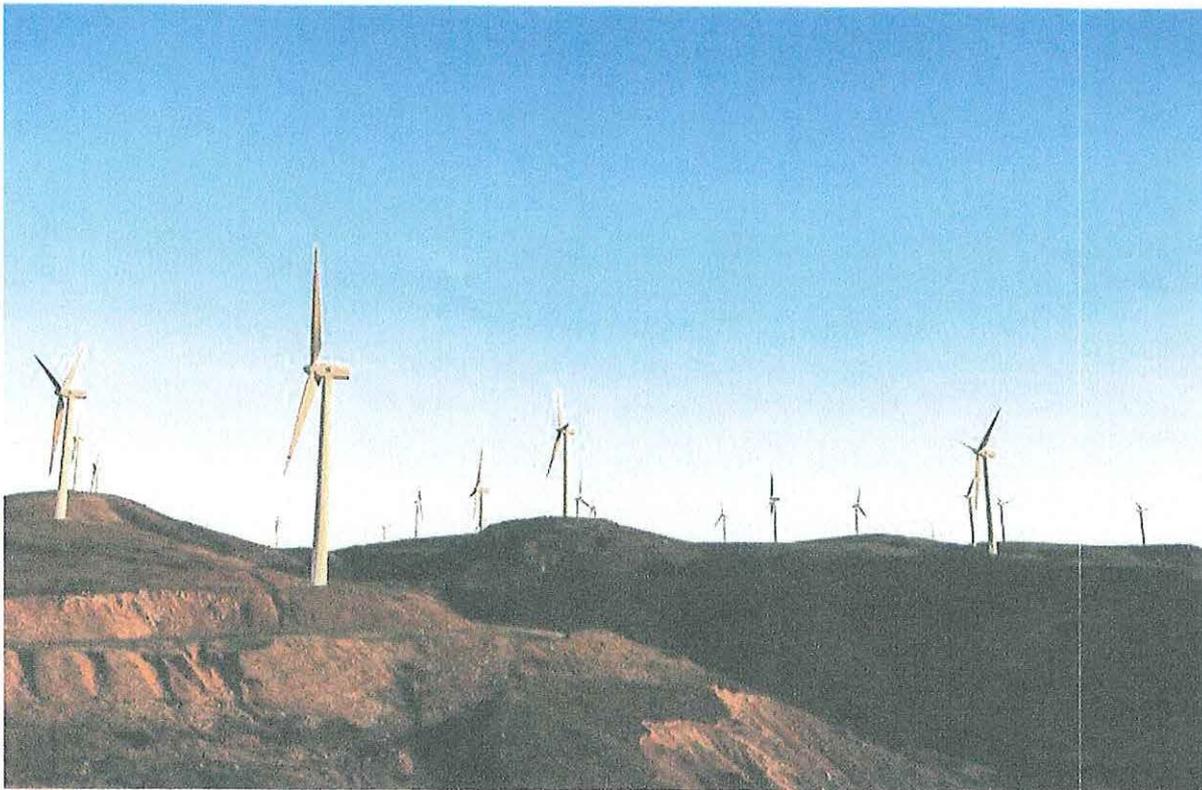
**Bertie Russell**

Research Associate, Urban Institute,  
University of Sheffield

Serious commitments to decarbonise infrastructure at scale are no doubt essential. But climate justice theorists have long argued that technical fixes will be insufficient without a parallel transition to a global economy that does not rely on constant growth.

Addressing the climate emergency demands huge amounts of investment, but it also requires drastic changes to the forms of ownership and governance that underpin the contemporary capitalist economy. We need to move towards models of economic democracy, where everything from investment decisions to wages are decided democratically by workers and citizens.

***Read more: Economic democracy: why handing power back to the people will fix our broken system***



Transitioning to renewable energy can be motivated on a local, as well as national, level. Jason Blackeye/Unsplash, FAL

Confronting an abstract concept such as the “global economy” can seem like a daunting challenge. But shifting our perspective to the level of our towns and cities, innovative models of economic democracy are already empowering people to deliver real solutions to the climate emergency.

With 100% of its electricity coming from renewable sources (and more to spare), the German town of Wolfhagen is particularly demonstrative of what can be achieved when municipalities adopt innovative approaches to the ownership and governance of key infrastructure. Significant lessons can

be drawn from Wolfhagen's hybrid model of ownership, which can – and must – be applied to sectors beyond energy production.

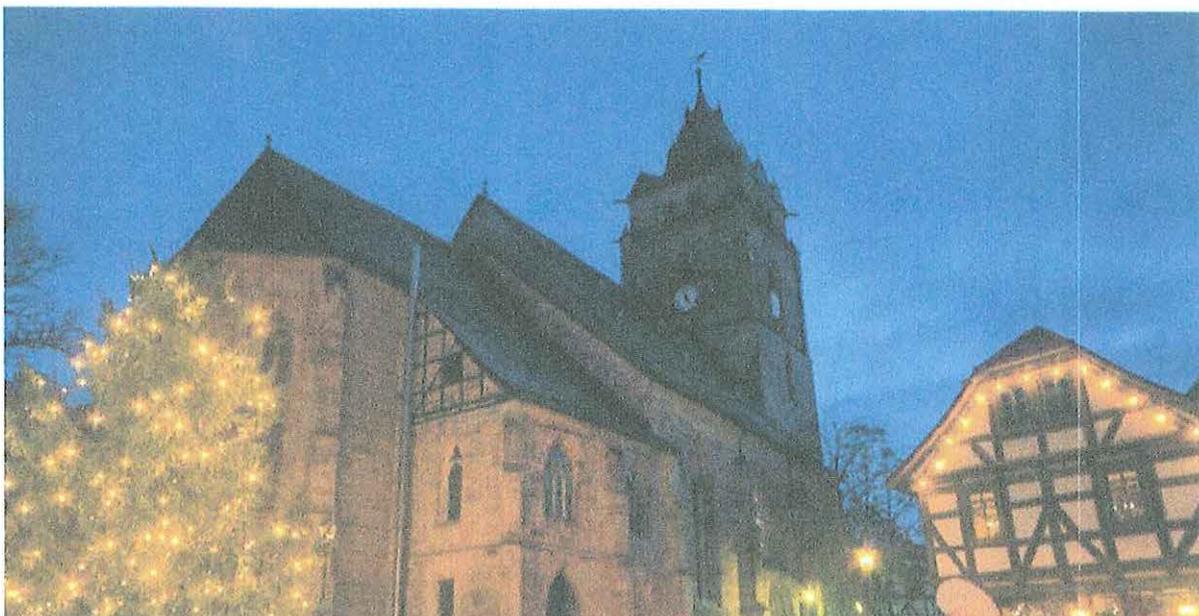
## Energy democracy

Triggered by the Fukushima disaster – and coupled with long-established social movements against fossil fuels – in 2011 the centre-right German government announced it was pursuing a national policy of *Energiewende*: energy transition. Yet in Wolfhagen, a town in central Germany with a population of around 14,000, this transition was already well underway.

Back in 2005, the local authority decided to take back the power. In what became the first steps to fulfilling Wolfhagen's plan to become fully self-sufficient on renewable energy, the city government decided not to renew the private company E.ON's licensing agreement, instead putting a public company – *Stadtwerke Wolfhagen* – in charge. Followed a 2008 decision that all household electricity would be provided from local renewable resources by 2015, the town committed to building a solar power park and a wind farm.

Driven partly by lack of financial resources, and partly by a vision of a co-produced and co-owned energy system, Wolfhagen decided to pursue an innovative form of “cooperative participation” that would put energy into the joint ownership of the municipality and a new citizen-led cooperative - BEG Wolfhagen. Speaking in 2011, the director of the public company Martin Rühl explained:

*Through the cooperative participation we want to make the citizens not only co-owners and co-earners, but through the form of a direct participation in the Stadtwerke also co-decision-makers. For future projects, citizens and electricity customers will be at the table from the very beginning.*





Wolfhagen at Christmas. Torsten Lorenz/Shutterstock.com

Formed in 2012 by citizens who had been campaigning in favour of the wind farm development, the cooperative now owns 25% of the energy company. With more than 800 members and wealth of more than €3.9 million, the cooperative does more than just let citizens own a share in the towns energy company – it also lets them control it. The cooperative has two of the nine seats on the board of the energy company, providing citizens with voting rights on all issues concerning electricity production and supply in the region, ranging from the setting of energy prices through to reinvestment in new capacity.

The cooperative itself also has an energy-saving fund, which receives its funds directly from the profitable energy company. Governed by an Energy Advisory Board - comprised of nine cooperative members alongside one each from the local energy agency, the Stadtwerk, and the municipality - the fund is designed to support strategies and initiatives aimed at increasing energy efficiency among its members. In practice, this means citizen-led solutions to decarbonisation have now been provided with a regular and democratically controlled source of funding.

### **A just transition**

What the experience of Wolfhagen shows is that the rapid decarbonisation of our energy supply is wholly compatible with new models of economic democracy. Strong and effective action to address the climate crisis can be met through processes of collective empowerment, without resorting to ecological authoritarianism.

Hybrid models of ownership not only have the potential to provide capital beyond that which can be provided by the state, but to do so in a way that is committed to the common interest. This flies in the face of the logic of private companies that are committed to the bottom line of delivering shareholder profits.

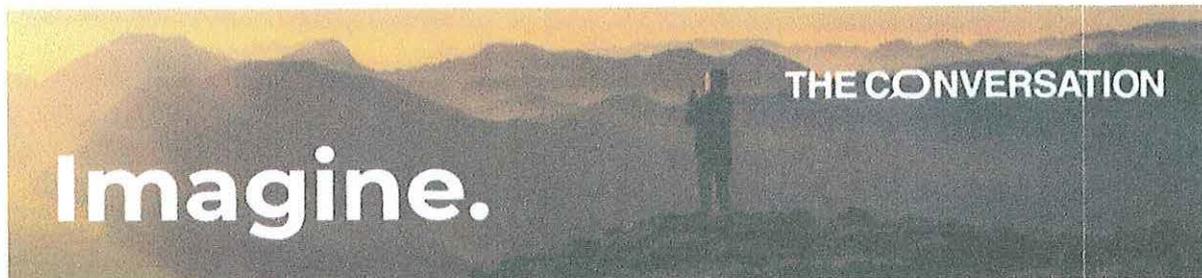
While national government funding is unquestionably needed, given the scale of the climate emergency, it does not have to be an absolute barrier to towns and cities taking action. Local governments shouldn't use national government as an excuse for their own inaction.

If we're really going to address the climate emergency, we're going to need to drastically expand the number and diversity of spaces for meaningful democratic engagement. This doesn't just mean engaging people in government decisions, but creating and funding spaces where citizens (along with

government actors and social business initiatives) can collaborate in delivering radical alternatives across our economy.

Ultimately, the urgency and scale of transition required to meaningfully address our climate emergency demands that national governments pursue many of the ambitious plans for investment envisioned by supporters of a Green New Deal.

But Wolfhagen demonstrates that innovative approaches to the ownership and governance of utilities can not only unlock further cooperative capital investment, but also create new forms of democratic engagement in their governance. It's precisely the creation of these democratic spaces that can enable citizens to move beyond individualistic efforts to "reduce their carbon footprint", and instead place them at the core of innovation in delivering a just transition to a sustainable and democratic economy.



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### **Before you go...**

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Scott and Jo McCalman &lt;jedburghfarming@gmail.com&gt;

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**fugitive emissions**

1 message

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**Greg Butler** <gregorydbutler71@gmail.com>  
To: Jo McCalman <jedburghfarming@gmail.com>

Fri, Jun 19, 2020 at 2:15 PM

Hi Scott, Jo,

Here are some words for your consideration. Choose to use, not use or modify as you see fit.

Farm businesses are heavily exposed to climate change risks and new developments in regional Australia should have outcomes that bias a clear and broadly accepted reduction in carbon emissions.

The proposition that methane from fossil fuel sources is a transition fuel to a clean economy has been widely criticised. Moreover, there are concerns that the National Greenhouse and Energy Reporting (NGER), governed by the National Greenhouse and Energy Reporting Act 2007 underestimates CSG emissions.

Most of the criticism is directed at fugitive emissions and it's easy to see why.

Fugitive emissions occur where methane escapes to the atmosphere in any part of the drilling, fracking, extraction, processing or transportation process.

Around the world, fugitive emissions of methane are estimated between 0.3% and 17% of total methane production, with the variability depending on the independence of the reporting body, the extraction technology employed, the monitoring technique, the landscape and the extent of the life-cycle that has been accounted for.

Compared to carbon dioxide, methane is a much more potent greenhouse gas with 20 – 25 times more global warming potential.

The total emissions footprint of CSG should include the fugitive emissions plus the emissions that are generated when methane is combusted to carbon dioxide for energy.

At a point where fugitive emissions are 5%, the global warming potential is higher from the 5% of fugitive emissions of methane than from actually burning the other 95% of methane to carbon dioxide for energy.

For Example; if we have a deposit of CSG and, if the fugitive emissions are 5%, then.

Fugitive emissions = 5% x 20 CO<sub>2</sub>e = 100.

Energy emissions = 95% x 1 CO<sub>2</sub>e = 95.

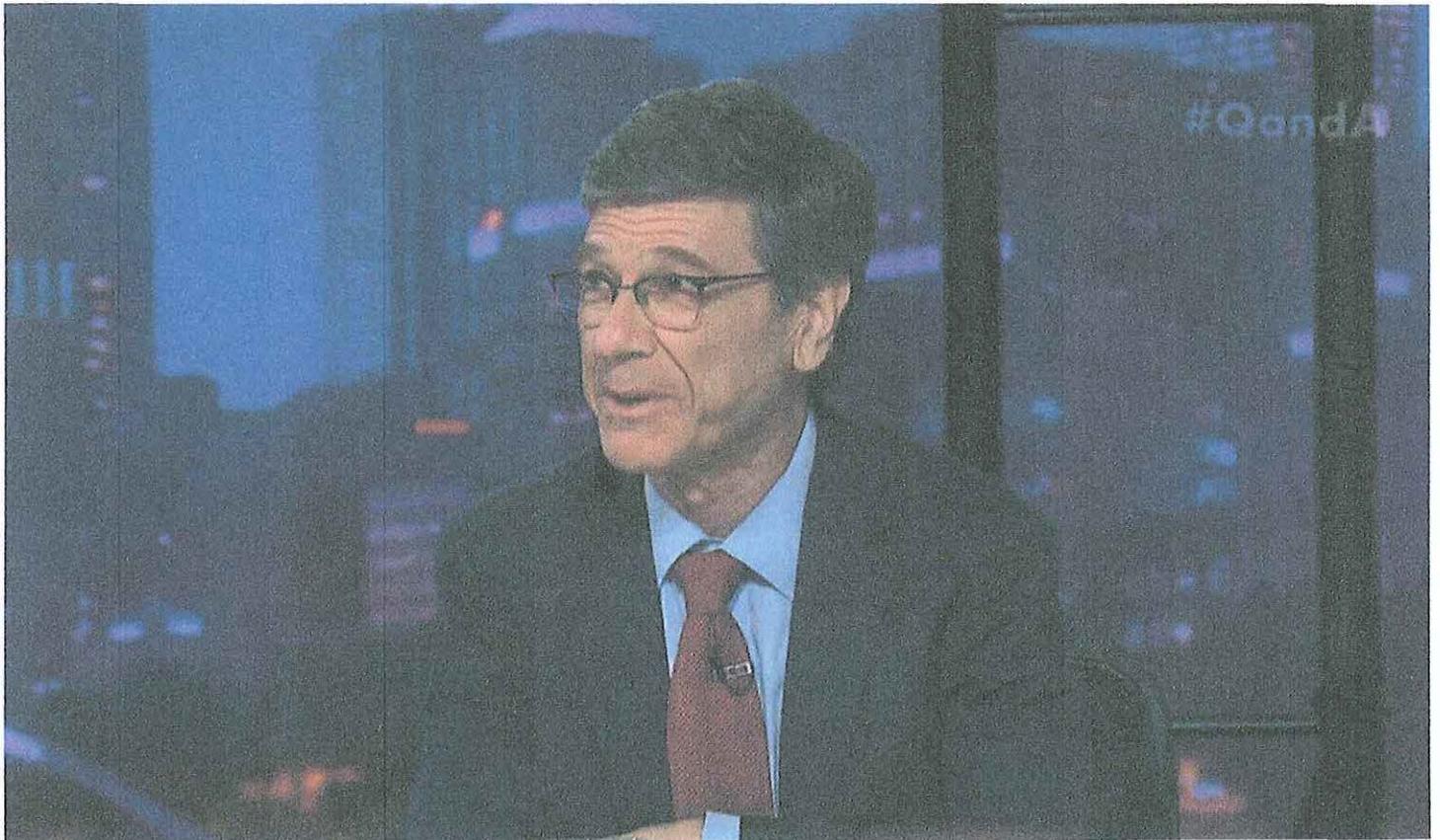
TOTAL EMISSIONS = 195%

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Until there is consensus that fugitive emissions are being measured independently, accurately and for the entire CSG life cycle, the whole CSG proposition is far too much risk for regional Australian's who are seeking meaningful climate change adaptation.

AUSTRALIA EXPORTING SUNSHINE NOT COAL + GAS  
AUSTRALIA SHOULD BE EXPORTING SUNSHINE, NOT COAL, economist Jeffrey Sachs tells Q&A CO<sup>2</sup> REDUCTION MUST COMMENCE.

US analyst criticises successive governments for defending coal in wake of alarming IPCC report on climate change



Economist Jeffrey Sachs has urged Australia to 'make a plan, make a timeline, tell the world how you're going to decarbonise.'  
Photograph: Q&A

### Calla Wahlquist

Tue 16 Oct 2018 07:47 AEDT

Economist Jeffrey Sachs has criticised successive Australian governments for “defending a 19th or 20th century industry” rather than taking decisive action on climate change, saying Australia should be “exporting sunshine, not coal”. ~~AND GAS.~~

“Make a plan, make a timeline, tell the world how you’re going to decarbonise, and then we’ll all be happy to hear from Australia that there’s really a plan,” Sachs said on the ABC’s Q&A program on Monday night. “All we see is one PM after another falling over this issue.”

Also on the panel were UK conservative writer James Bartholomew, Victorian Liberal party senator James Paterson, Labor frontbencher Terri Butler and data science teacher Linda

McIver.

The debate followed the release last week of an alarming report by the UN Intergovernmental Panel on Climate Change (IPCC), which warned that fossil fuels would have to be urgently phased out in order to achieve a global reduction in carbon pollution of 45% by 2030, the level required to ensure the planet only warmed by between 1.5C and 2C.

The Australian government has rejected the warning to phase out coal by 2050. Paterson told Q&A the environment was "one of many priorities" for the Morrison government, with another being power prices.

About 60% of Australia's baseload power is currently generated by coal-fired power generators, but the proportion of renewable energy is increasing thanks to energy auctions in Victoria and South Australia, the Tesla battery in South Australia, and reduced cost of renewable technologies. Labor has committed to 50% renewable energy by 2030.

Sachs said the IPCC report showed the world was "running out of time" to avoid catastrophic climate change and blamed corporate interests and the domination of the Murdoch press for "propounding nonsense" and "telling lies" about climate science and policy.

He said Australia ought to capitalise on its affinity for solar power.

"This wonderful country has so much sunshine, you cannot even believe - you could power the whole world from your desert," he said. "So the idea that you don't have alternatives ... I don't know who could possibly believe this. You should be exporting sunshine actually, not coal."

Bartholomew questioned the IPCC figures, saying that he "knew a scientist" who did not agree with it.

"The IPCC report is based on thousands of scientific reports," host Tony Jones said in response to Bartholomew's scepticism. "Six thousand scientific reports and 91 authors and review editors from 40 countries. I mean, balancing that out against the one scientist you know, does it mean that we have to think about consensus?"

McIver said her year 10 students had been modelling data from the IPCC report, and even they could see the figures were robust.

"The idea there is not consensus around climate change is outrageous," she said.


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Commissioners:-

I've included this information, because I cannot stress enough about the impacts of climate change on Australia & its agricultural production.

We need frank & open dialogue & very simply we need strategies that work together for better outcomes.

There is amazing, innovative, risk management strategies being implemented area wide, directly combating climate change.

CO<sup>2</sup> emissions reductions are critical.

This is why, renewable energy projects, in combination with hydrogen & electric vehicle plant forms, landscape rehydration projects, water conservation (piping & capping bores) & revegetation, cover crops, soil sequestration & biological nutrition programs are so important - our future depends on it.

We have to start systems to combat the "very extreme heat", heat stress to crops, pastures & native flora & fauna & the catastrophic wild fires.

\* We have to all be heading in the same direction.

C.S.G & all its potential problems & especially potent emissions - simply does not fit in combating climate change.

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## Cover Crops and Carbon Sequestration

An overview of cover crop impacts on U.S. cropland carbon sequestration.

[Download this fact sheet \(PDF\)](#). This fact sheet is part of the [Ecosystem Services from Cover Crops](#) fact sheet series.



### The Soil as a Carbon Reservoir

Sequestering atmospheric carbon (CO<sub>2</sub>) in the soil helps to offset greenhouse gas emissions, such as the carbon dioxide emitted by cars, power plants and other burning of fossil fuels. The soil has significant potential to store carbon<sup>3</sup> and to mitigate the effects of climate change. Farmers, scientists and policymakers across the globe are particularly interested in the potential contribution of agricultural practices, like cover crops, to the sequestration of carbon in the soil.<sup>4</sup>

### Cover Crop Contributions to Carbon Sequestration

Cover crops are an important soil carbon sequestration strategy. The roots and shoots of cover crops feed bacteria, fungi, earthworms and other soil organisms, which increases soil carbon levels over time. Some farmers think of this sequestration as "restoring" their soil carbon to the level that it was before cultivation or the initial plowing of the soil for agricultural production. Others are calling themselves "carbon farmers" or are expressing the importance of soil health in general by referring to their responsibility to care for the "herds" of microorganisms in the soil.

Though research has addressed the impact of cover crops on carbon sequestration on a global scale, the effect across the United States has not been thoroughly assessed. To address this question, a review and analysis was conducted of five literature sources that included data from 26 separate research trials.<sup>5</sup> Each trial was required to have a minimum soil sampling depth of two inches and to have included soil carbon measurements before cover crop management began. For each research trial, a baseline method of analysis was used to understand the carbon sequestration factor associated with cover crop use. Those factors were then aggregated and the low, median and high values obtained. The results of the analysis show that cover crops have the potential to sequester approximately 60 million metric tons of CO<sub>2</sub>-equivalent per year when planted across 20 million acres (8.1 million hectares), offsetting the emissions from 12.8 million passenger vehicles.<sup>6</sup>

### Achieving a Greater Understanding of What's Possible

Through this analysis, it became clear that there are some important research needs that must be met to

#### About Cover Crops

Cover crops are tools to keep the soil in place, bolster soil health, improve water quality and reduce pollution from agricultural activities.

- They include cereals, brassicas, legumes and other broadleaf species, and can be annual or perennial plants. Cover crops can be adapted to fit almost any production system.
- Popular cover crops include cereal rye, crimson clover and oilseed radish. Familiar small grain crops, like winter wheat and barley, can also be adapted for use as cover crops.

#### Rapid Growth in Cover Crop Acreage

In 2012, the USDA reported 10.3 million acres of U.S. cropland planted to cover crops.<sup>2</sup>

more clearly address the effect of cover crops on soil carbon.

- **Sampling at greater depths.** The average soil sampling depth referenced in this study was 14.8 inches, but research has shown the need for soil samples to be taken at depths of at least 30 inches to accurately understand the response of soil carbon to management practices.<sup>7,8</sup> Otherwise, results may fail to account for 30 percent to 61 percent of the carbon stock that exists deeper into the root zone.<sup>9,10</sup>
- **Pre-treatment measurements needed.** Standard practices must be put into place that encourage researchers to take baseline, pre-treatment measurements of soil properties, including soil carbon content. If not, the sequestration potential of various management practices cannot be accurately determined.

### Digging Deeper

Planting practices are changing so that cover crops can be grown for longer period of time with increased biomass accumulation. Practices such as interseeding cover crops into standing cash crops or “planting green” (planting a cash crop directly into a living cover crop) can extend the cover crop growing season, allowing for greater root and biomass growth.<sup>11</sup> As cover crop acreage increases and more farmers adopt practices that maximize cover crop growth and ground coverage, the potential for biological carbon sequestration will grow.

### The Ecosystem Services from Cover Crops Fact Sheet Series

This fact sheet is from the series [Ecosystem Services from Cover Crops](#). Together, these resources address the role of cover crops in nutrient management, erosion, infiltration, soil organic matter, supporting wildlife and beneficial insects, and carbon sequestration. They are available for use by educators, farmers and others interested in sharing information about the role of cover crops in protecting water quality. Fact sheets in the series include:

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<sup>1</sup> Myers, R. and C. Watts. 2015. Progress and perspectives with cover crops: interpreting three years of farmer surveys on cover crops. *J. Soil Water Conserv.* 70(6): 125A–129A.

<sup>2</sup> Acreage 06/20/2016. National Agricultural Statistics Service. <http://www.usda.gov/nass/PUBS/TODAYRPT/acrg0616.pdf>.

<sup>3</sup> Batjes, N.H. 1996. Total carbon and nitrogen in the soils of the world. *Eur. J. Soil Sci.* 47:151–163.

<sup>4</sup> Lal, R. 2015. Cover cropping and the “4 per Thousand” proposal. *J. Soil Water Conserv.* 70(6): 141A.

- Recent surveys by the SARE Program and the Conservation Technology Information Center (CTIC) suggest that cover crop acreage is increasing and illustrate that U.S. agricultural producers are intrigued by this conservation practice.
- These results suggest that 20 million acres (8.1 million hectares) across the United States are likely to be planted in cover crops by the year 2020.
- With about 267 million acres of row crop agriculture in the U.S., the potential for cover crop adoption is quite higher than what has actually been achieved to date.<sup>3</sup>

[Learn more in the Cover Crops Topic Room.](#)

<sup>5</sup> This review was part of a larger assessment of cover crop effects on soil carbon, which assessed the results of 22 different studies and 78 total research trials, and explored cover crop impacts on preventing soil loss and associated emissions.

<sup>6</sup> Greenhouse gas equivalencies calculator. Environmental Protection Agency.  
<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>.

<sup>7</sup> Lal, R. 2006. Carbon management in agricultural soils. *Mitig. Adapt. Strat. Glob. Change* 12: 303–322.

<sup>8</sup> Olson, K.R. and M.M. Al-Kaisi. 2015. The importance of soil sampling depth for accurate account of soil organic carbon sequestration, storage, retention and loss. *Catena* 125: 33–37.

<sup>9</sup> Follet, R.F. 2009. US agriculture's relationship to soil carbon. *J. Soil Water Conserv.* 64(6): 159A–165A.

<sup>10</sup> Jobbágy, E.G. and R.B. Jackson. 2000. The vertical distribution of soil organic carbon and its relation to climate and vegetation. *Ecol. Appl.* 10(2): 423–436.

<sup>11</sup> Report of the 2016–2017 Cover Crop Survey. Joint publication of the Conservation Technology Information Center and the North Central Region Sustainable Agriculture Research and Education Program. Conservation Technology Information Center.  
<http://www.sare.org/Learning-Center/Topic-Rooms/Cover-Crops/Cover-Crop-Surveys>.

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\* THIS INNOVATION OF SOIL SEQUESTRATION IS TAKING OFF IN AUSTRALIA - STORED CO<sup>2</sup> CAN RETURN \$\$\$ TO COMMUNITIES WHILE MITIGATING CLIMATE IMPACTS.

- PLEASE DO NOT ALLOW CSG TO CREATE HAVIC & UNDO ALL THIS WORK - ITS VITAL.

## 10 Ways Cover Crops Enhance Soil Health

[Download this fact sheet \(PDF\)](#). This fact sheet is part of the [Ecosystem Services from Cover Crops](#) fact sheet series.



The USDA Natural Resources Conservation Service (NRCS) has identified four basic principles or approaches for maintaining and improving soil health:

- *Keep the soil covered as much as possible*
- *Disturb the soil as little as possible*
- *Keep plants growing throughout the year to feed the soil*
- *Diversify crop rotations as much as possible, including cover crops*

Farmers can support these principles by using cover crops, which are conservation plantings of fast-growing annuals such as rye, clovers, vetches and radishes. Cover crops protect and improve the soil when a cash crop is not growing. In the case of summer commodity crops like corn and soybeans, cover crops can keep the soil covered in fall, winter and early spring. They make it easier to use no-till or other conservation tillage approaches that disturb the soil less, and they help with weed control. Plant diversity is helpful for soil organisms because it gives them a greater variety of food sources, and cover crops are an easy way to diversify a crop rotation that may otherwise see only one or two crops grown in a field. Adding cover crops to a rotation can greatly increase the portion of the year when living roots are present for soil organisms to feed on.

### 10 Key Impacts of Cover Crops on Soil Health

Besides contributing to the four basic goals or principles for soil health, there are a number of specific ways that cover crops lead to better soil health and potentially better farm profits.

#### 1. Cover crops feed many types of soil organisms

Most fungi and bacteria that exist in the soil are actually beneficial to crops. Many of these soil fungi and bacteria feed on carbohydrates that plants exude (release) through their roots. In return, some fungi and bacteria will trade other nutrients, such as nitrogen or phosphorous, to the crop roots. While cover crops directly feed bacteria and fungi, many other soil organisms eat the fungi and bacteria, including earthworms and arthropods (insects and small crustaceans like the "roly poly"). Thus cover crops can help support the entire soil food web throughout the year.

#### 2. Cover crops increase the number of earthworms

Earthworms are usually the most visible of the many organisms living in the soil. Cover crops typically lead to much greater earthworm numbers and even the types of earthworms. Some earthworms, like nightcrawlers, tunnel vertically, while other smaller earthworms, like redworms, tunnel more horizontally. Both create growth channels for crop roots and for rainfall and air to move into the soil.

#### 3. Cover crops build soil carbon and soil organic matter

Like all plants, cover crops use sunlight and carbon dioxide to make carbon-based molecules. This process causes a buildup of carbon in the soil. Some of that carbon is rapidly cycled through the many organisms in the soil, but some eventually becomes humic substances that

can gradually build soil organic matter. A higher level of soil organic matter improves both the availability of nutrients and soil moisture for crops.

#### ***4. Cover crops contribute to better management of soil nutrients***

By building soil organic matter, cover crops can gradually impact the need for some types of fertilizer. Just as important to nutrient management is the way cover crops can scavenge or collect any nutrients left at the end of a growing season, such as nitrogen left in the field after corn is done growing. The cover crop will hold that nitrogen rather than letting it escape into tile lines leading to rivers and lakes or drain away into groundwater. Eventually that nitrogen will be released the next season to help the next year's cash crops.

#### ***5. Cover crops help keep the soil covered***

When it rains on bare soil, the soil is much more likely to erode, form an impermeable crust and then overheat in summer when exposed to direct sun. Some bare soils can reach 140 degrees, hot enough to kill soil organisms and stress the crop from both heat and excessive soil moisture evaporation. The residue of a cover crop like cereal rye can protect the soil while cash crops are getting established and keep it from getting too hot.

#### ***6. Cover crops improve the biodiversity in farm fields***

Generally, the more plant diversity in a field and the longer that living roots are growing, the more biodiversity there will be in soil organisms, leading to healthier soil. Growing mixes of cover crops or adding a few different cover crop species to an overall crop rotation—such as cereal rye before soybeans, and oats, radishes or crimson clover before corn—improves diversity. Many Corn Belt commodity farmers are adding a third cash crop to their rotation, usually a small grain such as wheat, and then using the earlier harvest of wheat to grow a more diverse mix of covers for several months. They sometimes graze those cover crop mixes for extra profit and because animal manure benefits soil biology.

#### ***7. Cover crops aerate the soil and help rain go into the soil***

It's not just earthworms that open up soil channels for rain, but also the roots of the cover crops themselves. This is particularly the case where soil disturbance is minimal from tillage. The extra rain that gets into the soil instead of running off can make a big difference for crop yields, such as in mid-to-late summer in the Midwest, when the rain can come fast in thunderstorms and be followed by long dry spells. The extra aeration created by cover crop roots and earthworms also benefits crop roots and other soil organisms.

#### ***8. Cover crops reduce soil compaction and improve the structure and strength of the soil***

The typical solution to compaction from heavy farm equipment has been more tillage, but that provides only the briefest of benefits while compounding the problem in the long term. Excess tillage destroys soil structure, while cover crops and the soil organisms they feed create the glue (glomalin) that binds soil particles together, leading to better soil aggregation and strong soil structure. Research has shown that cover crops (with an assist from earthworms) help loosen compacted soil even more effectively than subsoiling equipment, which takes a lot of diesel fuel. A field with cover crops and minimal tillage, or better yet no-till, will lead to much better soil structure without compaction issues.

#### ***9. Cover crops make it easier to integrate livestock with field crops***

Beef cattle and other livestock are usually kept in pastures and out of crop fields, which has some conveniences but is not ideal for soil health. Think of buffalo herds foraging on prairies and you can see how natural systems evolved to have an integration of plants and grazing animals. The manure from livestock grazing on cover crops in a grain field can be beneficial for building organic matter and soil health. It is also a great way to get immediate profit from cover crops, as certain cover crop species can be very high-quality forage in late fall or early spring.

#### ***10. Cover crops greatly reduce soil erosion and loss***

On many fields that have some slope to them, half the topsoil has already been lost from the days when they were first farmed. The future success of farming and our food supply depends on keeping the topsoil we still have, and cover crops are exceptional at helping stop erosion. Using no-till with cover crops can reduce erosion to a tiny fraction of what it would otherwise be in a conventional corn and soybean system. Even with some light tillage, a field

with cover crops is still much better protected, especially with winter annual cover crops like cereal rye.

### ***About Soil Health***

Soil health is a hot topic these days, one that is justifiably receiving considerable attention from farmers and their farm advisors. Whereas in the past, soil testing and evaluation focused more on chemical and physical measures, new research has shown that the biology of the soil is very important to its overall health and productivity. An incredible diversity of bacteria, protozoa, arthropods, nematodes, fungi and earthworms create a hidden food web in the soil that affects how crops grow, how soil nutrients are cycled and whether rainfall is quickly absorbed into the soil and stays where crop roots can access that moisture.

### ***Summary***

Methods of improving soil health come back to the core principles identified by NRCS, including a greater diversity of plants, keeping the soil covered, having living roots in the soil throughout the year and disturbing the soil less. As we learn more about soil biology, it's clear that even modest use of cover crops makes a big difference for soil health. Further information on cover crops, including publications and videos of farmers talking about cover crops and soil health, are available from SARE at [www.sare.org/covercrops](http://www.sare.org/covercrops). More information and fact sheets on soil health are available [from NRCS](#) and [from the Soil Health Institute](#).

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# An Aussie-made hydrogen tractor could be a reality

## H2X Australia keen to revive local vehicle manufacturing

In a move that no one saw coming, vehicle manufacturing company H2X Australia has announced its official launch today with its sights set on producing hydrogen fuel-cell vehicles on local soil.

One of its prototype models is the Snowy SUV with a 60kW fuel cell and an overall power output of 190kW.



H2X Australia's Snowy SUV concept

But passenger cars are not the only weapons in the company's arsenal, with H2X Australia revealing it is also developing hydrogen powered heavy vehicles such as trucks, buses and even tractors.

Not much has been revealed about the tractor except that it will be based on the smaller platform that the Snowy SUV is built on, according to [@AuManufacturing](#).

If all goes to plan, H2X will be the first company to manufacture farm tractors on Australian soil since 1986, when International Harvester closed its factory doors in Geelong, VIC.

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H2X Australia's initial base will be Port Kembla, near Wollongong on the NSW south coast, which is a deep-water port and also the location of a green hydrogen project.

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"Today we launch our company which not only demonstrates the advanced technology and engineering capabilities of Australia in the clean energy arena but also provides a real clean alternative in terms of transportation," said H2X CEO, Brendan Norman.

"With the development of many Green Energy projects in Australia at the moment we have a unique opportunity to bring a significant manufacturing operation back into the country."



H2X Australia is also developing a tractor based on its smaller vehicle platform which its Snowy SUV is built on

While Snowy was the first vehicle to be revealed to the public, H2X said it will instead be releasing heavy vehicles first in the form of buses and trucks. The heavy vehicles will be built on a second, larger platform that can accommodate two fuel cell units to bring power output up to 300 to 550kW.

H2X anticipates the heavy vehicles will go into production as soon as July 2021.

The H2X line-up will be powered by a hybrid powertrain leveraging kinetic energy through battery and ultra-capacitor technology with strong focus on hydrogen. In its media release issued today, H2X said the system can vary between power sources depending on the journey.

The CEO of H2X, Brendan Norman, an Australian former BMW and Volkswagen executive, said the company was "focussed on reaching Massey Ferguson MF 8S "new" in the tractor market down



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The first H2X vehicles will be based on an imported chassis from a third party paired with a powertrain already in use in Asia. They will be mated with locally manufactured bodies and interior parts. The goal is 80 per cent localisation by 2025.

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With no publicly available hydrogen refuelling network in Australia at the moment, selling a vehicle using hydrogen fuel-cell vehicles is certainly a challenge. That might explain why H2X's initial focus will be on fleet vehicles that can access "renewable energy hubs".

But H2X seems intent on helping overcome hydrogen supply issues. Its release referred to projects the company was already involved with for rail, marine, stationery power and heavy vehicles that will soon come to market.



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"This will give significant support to the hydrogen production industry," the release stated.

Key backing for H2X in its start-up phase is coming from former motor racing driver Ken Mathews' renewable energy company Denzo PL and Elvin Group Renewables, best known for environmentally progressive concrete production.

Behind the wheel of the ambitious company are several of Australia's most revered automotive industry veterans. Joining CEO Brendan Norman is Chief Design Officer, Chris Reitz who has worked for the likes of Audi, VW, Nissan and Fiat; and powertrain chief Peter Zienau who worked at General Motors. Chief Technical Officer Ian Thompson's background includes Lotus and Aston Martin and Chief of corporate strategy is former Toyota

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Sequestering Soil Carbon via roller crimping (green cover crops) protecting and enhancing soil fertilising in drought times

[https://www.youtube.com/watch?v=KGIAggMRc\\_Y](https://www.youtube.com/watch?v=KGIAggMRc_Y) **Crimping Soil Health Cover Crop 1**



Chevron Pattern Roller Crimper – terminating green cover crop without herbicide

**Crimping 6ft Cereal Rye & Planting Soybeans** <https://www.youtube.com/watch?v=hpt2gZB3318>



Planting directly into cover crops (see crimper in front of planter) a game changer as a risk management tool in Australia's heating climate!

**Crimping 6ft Cereal Rye & Planting Soybeans** <https://www.youtube.com/watch?v=hpt2gZB3318>

