

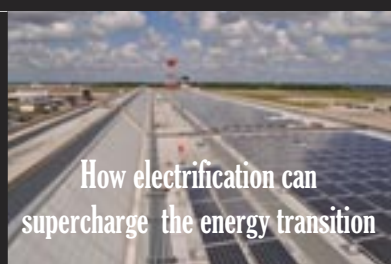
The long road towards a more environmental energy system



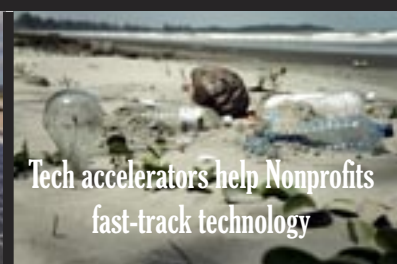
If Ebola
becomes the norm



Defying Dystopia:
shaping the climate future we want



How electrification can
supercharge the energy transition



Tech accelerators help Nonprofits
fast-track technology



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- 4** Towards a more environmental energy system
- 10** How electrification can supercharge the energy transition
- 12** How a Japanese system can help African cities adapt to climate change
- 14** Defying Dystopia: shaping the climate future we want
- 20** If Ebola becomes the norm
- 24** Tech accelerators help Nonprofits fast-track technology aimed at solving environmental challenges
- 28** Merkel puts contentious CCS technology back on German agenda
- 32** Last stand: White Bay Power Station



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The Nigerian student Segun Oyeyiola has converted a Volkswagen Beetle, using mainly scrap parts donated by friends and family, into a \$6000 wind and solar powered car. (Photo: Venturesafrica.com)

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The long road towards a more environmental energy system

Implementing the Green New Deal means that whole system will change. There are precedents for the US government guiding economic policy - investing in it will be expensive but there are various ways to pay for it.

By LENORE HITCHLER
ONE

Imagine that you want to heal the earth from the ravages caused by global climate change. You received diagnostic reports from the Intergovernmental Panel on Climate Change (IPCC) and the Fourth National Climate Assessment. These scientific findings confirm that our ongoing climate emergency is going to get much worse. The use of fossil fuels leads to the greenhouse effect, which causes climate change.

Climate change includes rising temperatures and disasters such as extreme storms, floods, severe hurricanes, heat waves, droughts, wildfires, melting glaciers and polar ice caps, and surging sea levels.

These calamities have led climate change activists to initiate and promote the Green New Deal (GND) - in ONE's April-June 2019 issue Jez Abbott explained the political scenario behind the deal. The GND is a congressional resolution which serves as a framework for future legislation to slow down climate change and improve social conditions. Its goals are to guarantee clean air, water, healthy food and ecosystems for all, clean up toxic chemicals, end poverty and inequality, provide a decent education and income for all, and increase justice for Native Americans and other people of color. The ultimate goal is a more ecological and sustainable society that is more equal and just.

The GND is based on the original New Deal which excluded African Americans and thus reinforced inequality. The GND is designed to prevent this from reoccurring. Minorities and the impoverished consume less and are disproportionately harmed by climate

change.

Slowing down climate change and fixing social problems is expensive. However, scrimping today will eventually cost more than action now. A few examples highlight the massive cost of climate change. In 2017, the cost of hurricanes, fires, and other disasters in the US was \$306 billion. A 2017 study by David Coady of the International Monetary Fund estimated that air pollution from fossil fuels costs the US \$206 billion annually.

The Green New Deal will eventually save money by increasing the use of solar and wind power with the result that as more are used, they become less expensive. For example, the International Renewable Energy Agency found that between 2010 and 2019 the price of solar power dropped by more than a factor of 5 while offshore wind power dropped by a factor of 3.

Moreover, switching to both renewable energy and energy efficiency creates millions of family-supporting jobs. According to the report, "Sizing the Clean Economy: A National and Regional Green Jobs Assessment," 2.7 million green jobs already exist. Median wages are 13% higher in green jobs than in other occupations. The GND will accelerate the number of these new jobs and boost the economy. Economist Robert Pollin calculated that every \$1 million invested in renewables

produces 16.8 jobs. Contrast this with an equal amount spent on fossil fuel investment, which yields 5.2 jobs.

Besides creating new jobs, energy efficiency will reduce greenhouse

Economist Robert Pollin calculated that every \$1 million invested in renewables produces 16.8 jobs. An equal amount spent on fossil fuel investment yields 5.2 jobs.

People attempt to cool off near a damaged water pipe in Karachi, Pakistan on June 25, 2015. PHOTO: EPA



gases. For instance, weatherization is predicted to decrease annual emissions by around 2.65 metric tons of carbon dioxide (CO₂) per home.

Initially investing in the Green New Deal will be expensive. However, there are various ways to pay for it. The GND resolution proposed creating public banks similar to the use of the New Deal's Reconstruction Finance Corporation, which served the function of a bank and lent money to states and companies. Federal Reserve and government bonds could provide funding as well. Also, how energy is distributed affects pricing. Public and cooperatively owned energy is cheaper than for-profit power.

Federal and state governments should abolish subsidies, including tax breaks, to the fossil fuel industry, freeing up billions for the GND. The US and individual states provided \$20.5 billion a year in 2015 and 2016 to the oil, gas and coal industries. In the past, Alaska provided \$200 million per year for oil and gas drilling subsidies.

More money would also be available for the GND if financial institutions eliminated funding for the fossil fuel industry as many of them currently do. According to the report "Banking on Climate Change," between 2016 and 2018, J.P. Morgan Chase provided funding of over \$195 billion, Wells Fargo provided over \$151 billion, Bank of America provided over \$106 billion, and Goldman Sachs provided over \$59 billion.

Extensive support already exists for the principles of the Green New Deal. The Yale Program on Climate Change Communications surveyed attitudes based on the laws of the GND. They found 92% support among Democrats, 64% among Republicans, and 57% among conservative Republicans. The GND is also popular with environmental and social justice groups - 626 organizations signed a letter to Congress urging lawmakers to implement some GND policies.

In general, there is widespread support for creating a more environmental energy system. Americans endorse regulation of fossil fuels. For example, 69% want limits imposed on CO₂ emissions, and 64% of all registered voters think that Congress should be doing more to address global warming. Expanding alternative energy production is also supported by a majority of Americans. 76% support utilities increasing the use of solar power with 71% supporting more wind power. 82% support tax breaks for purchasing energy-efficient vehicles or solar panels. One faction in the US asserts that the government should not interfere in the "free market."

However, from the very beginning, there are precedents for the US government guiding economic policy. Even the *Preamble of the Constitution* refers to promoting the general welfare which the GND certainly does. According to Robinson Meyer, staff writer at the Atlantic, Treasury Secretary Alexander Hamilton supported a stable federal government which would guide the economy. Meyer stated that Hamilton "is the father of American industrial policy, which includes the set of laws and regulations

that say the federal government can guide economic growth." According to Stephen Cohen, professor of city and regional planning at UC Berkeley, Hamilton fought for creating an infrastructure for the country and a robust financial system. Cohen added that later economic policy included providing land to build the transcontinental railroad. President Eisenhower's administration built the interstate-highway system leading to suburbanization and the predominance of private automobiles.

Another precedent is President Roosevelt's *New Deal*, which was extremely popular, and had many accomplishments, including employing millions, mandating a minimum wage, establishing unemployment insurance and supporting the right to form unions. The Rural Electrification Administration brought electricity to 95% of rural America. A massive public works program built thousands of bridges and highways and additionally engaged in environmental restoration. The Civilian Conservation Corps planted more than 3.5 billion trees which represent over half of total US reforestation. More than 800 new state parks were established.

Besides creating the New Deal, President Roosevelt led the US in World War II. Warfare is a terrible burden for both the environment and humanity and is certainly not recommended as a way to change society. However, it demonstrates that emergencies can be handled rapidly. Government policy during World War II changed the entire focus of manufacturing. Thomas Morgan published *"The Industrial Mobilization of World War II: America Goes to War"* in Army History. He stated that the US produced 310,000 planes, 124,000 ships of all types, 100,000 tanks and armoured vehicles, 2.4 million other vehicles, 434,000 tons of steel, and 41 billion rounds of ammunition. By 1944, 18.7 million more people were employed than in 1939.

To conserve resources for the war effort, the government rationed many items including metals, rubber, fuel oil, firewood, coal, paper, sugar, cooking oil, butter, cheese, meat, and processed food. The entire country's acceptance of such hardships shows that under the right circumstances, citizens will accept massive changes in their lifestyles.

Implementing the Green New Deal means that whole system will change. For example, the GND resolution includes changes to the transportation system, which consumes massive amounts of fossil fuels. As of 2015, shipping emissions accounted for 3% of global CO₂. Also, to save energy, cross-country trucking should be replaced with freight railways.

Public transportation should be expanded as it conserves an estimated 4.16 billion gallons of gas per year. Commuting to work by subway emits 73% less CO₂ than by car. Four times as much federal money goes into roads than public transport. Analysis by Smart Growth America, the Center for Neighborhood Technology and US PIRG found that every billion dollars spent on public transportation produced 16,419 jobs. Only 8,781 jobs are created for the same amount of money spent on highway infrastructure.

Rural Electrification Administration lineman working on a pole as farmers watch.
Photo: FDR Presidential Library & Museum



Reliance on private vehicles should be decreased by providing convenient and pleasant alternatives. For every mile driven, one pound of CO₂ is produced. Each gallon of gasoline emits 28 pounds of CO₂ in the production process and actual use.

More sustainable cars such as hybrids are already on the market. Innovations are constantly added. One example is Segun Oyeyiola of Nigeria's reconditioned car. He placed a solar

panel on top and added a wind turbine under the hood. He explained that this allows air to flow while moving, turning the turbine's rotors and charging the battery.

The Green New Deal will also improve the agricultural system. Changes must be made in how food is produced so that the use of fossil fuels is reduced. As opposed to farmers being forced to leave agriculture for financial reasons, labour-intensive car-



The Nigerian student Segun Oyeyiola has converted a Volkswagen Beetle, using mainly scrap parts donated by friends and family, into a \$6000 wind and solar powered car. Photo: Venturesafrica.com

bon farming would create many new jobs. Current harmful agricultural practices have caused the world's cultivated soils to lose between 50 and 70% of their original carbon stock, which has oxidized to become CO₂. According to Rattan Lal, director of Ohio State University's Carbon Management and Sequestration Center, one-third of the carbon in the atmosphere was originally found in the soil.

By relying on natural processes, carbon farming takes excess carbon out of the atmosphere and stores it in the soil. More fertile the soil, more carbon it holds. John Norman, University of Wisconsin soil scientist, found the carbon farm that he studied stored around 80 tons of carbon per acre, whereas the typical farm stores 10 to 20 tons of carbon per acre. Incentives, such as tax breaks, should be provided for switching to carbon farming.

According to author Carolyn Fortuna, PhD, "Some scientists project that 75 to 100 parts per million of CO₂ could be drawn out of the atmosphere over the next century if existing farms, pastures, and forestry systems were managed to maximize carbon sequestration."

In addition to carbon farming, there are many other ways for the food system to become more sustainable. Purchasing local produce and planting family gardens reduce fossil fuel-based transportation. During WWII, there were 20 million victory gardens

which supplied 40% of the country's fruits and vegetables. Planting vertical gardens is another way to increase yields.

Using trees in agriculture would be more ecological and increase sustainability. Trees with legume pods could feed livestock. Since they are perennials, they would not have to be sown yearly and would replace tilling, which adds CO₂ to the atmosphere. The amount of land and energy devoted to grains for livestock would be reduced. One-third of all food that is grown is wasted and correcting this would lead to saving both land and energy.

Energy efficient buildings are another feature of the GND. A new policy should include mandates to use passive solar designs, which use much less energy, for new buildings. Power should also be produced onsite. Solar panels or green roofs should be used on both new buildings and retrofitted on old

buildings — solar water heaters lower water heating bills from 50% to 80%.

Clean energy production includes geothermal heating, ventilating and air conditioning systems which do not burn fossil fuels to heat and cool but transfer heat to and from the earth. Concentrated solar power, using mirrors to concentrate the sun's energy, can replace fossil fuel power plants.

Many wasteful practices should be eliminated. The government has abolished specific production before in an emergency. In 1942, President Roosevelt outlawed the production of passenger cars. Planned obsolescence and manufacturing items that can't be repaired should cease.

Producing and transporting these wasteful products to landfills and then manufacturing replacements use too many resources and energy. Products such as plastic straws, bags, and bottles, which use too much petroleum while being made and pollute

the environment, should be banned. Recycling saves resources and energy. By 2020, recycling alone could generate 2.5 million jobs.

The government should forbid fossil fuel campaign funding so that new legislation benefiting the fossil fuel industry will be not be enacted.

In the 2015-2016 campaign cycle, oil, gas, and coal companies spent \$354 million in campaign

contributions and lobbying. According to Oil Change International, the 88 senators who didn't support the GND received almost \$59 million from the fossil fuel industry.

There are even more changes that would help slow down climate change. Ending reliance on oil from the Mideast would result in less spending on preparation and implementation of wars for oil. Ending deforestation is also mandatory as it is responsible for about 20% of global CO₂.

The prognosis for stopping climate change before it stops us is not good. However, the Green New Deal is an attempt to initiate various remedies. It prescribes new ways to slow down climate change and create a healthier environment. Intertwined with environmental improvements are poverty reduction, the creation of millions of family-supporting jobs, and increased justice for minorities. **ONE**

**Energy efficient buildings
are another feature
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How electrification can supercharge the energy transition

By DAVIDE PUGLIELLI
World Economic Forum

No matter which country you're in, the energy transition is underway. It is taking slightly different shapes and may progress from different starting points depending on the area, but it's clear we've now reached a stage where, globally, we're all engaged in a shared challenge.

In the past, the world has gone through several energy transitions that have marked different “industrial eras”: from wood to coal, from oil to gas and nuclear. Now, the world is engaged in a massive shift towards renewables. On contrast to previous transitions, the current switch is driven by collective awareness of environmental and climate concerns, and was mainly ignited by policymakers rather than market forces.

However, the pace of technological innovation and the decrease in costs are creating room for market dynamics to drive forward the energy transition, and thus reinforce the global policy initiative. In the electricity sector in particular, the average generation cost of solar PV has decreased by over 70% since 2010. As of today, in some regions, it is cheaper to generate a kWh with renewable energy than it is with fossil fuels.

The need for speed

Despite that, the real challenge we face in this transition is not potential, but time. Time is the resource we are running short of. The frequency and degree of physical disruption brought by global warming and extreme weather events keeps providing evidence that the pace of greenhouse-gas (GHG) emission reduction by the world's economies will have to accelerate.

Action on addressing climate change lags behind because, despite the pledges made by countries, planned policies still fall short of reaching the Paris Agreement's goals. The Intergovernmental Panel on Climate Change's 2018 special report called for increased urgency of action and reiterated the need to attain zero GHG emissions, in order to avert significant climate-related consequences for ecosystems, human communities and economies.

This state of play is confirmed by the World Economic Forum's *Fostering Effective Energy Transition 2019* report. Every year, the report ranks 115 countries in terms of their performance and readiness for transition. What stands out in 2019 is that the year-on-year increase of the global average score was the lowest of the last five years. Moreover, considering the score evolution

over the period 2014–2019, the dimension of “environmental sustainability” shows almost no enhancement. In short, the pace of energy transition is globally much too slow.

If this were not enough, data from 2018 further proves the urgency of required action. As was recently reported by the International Energy Agency (IEA), energy-related CO₂ emissions rose by 1.7% from 2017, to a high of 33.1 gigatonnes, with coal-fired power plants, mostly in Asia, being the main contributor to the increase. The counterbalance in emissions avoided through use of renewables and other clean energy technologies was important but still not to cover the surge.

Decarbonization efforts need to accelerate in all sectors, from electricity generation to transport, building and industry.

The role of electrification

According to the Forum report, electrification is critical for decarbonization. It points out that, today, electricity only makes up 19% of total final energy consumption. However, considering its growth from 15% in 2000, this figure has the potential to grow massively in future.

The power sector has already significantly reduced its GHG emissions, becoming a leading actor in the fight against climate change. Now, electrification of end uses allows for a higher potential in GHG emissions reduction as a result of both energy savings – due to the higher efficiency of electricity-based technologies – and an increasing share of renewables in electricity generation.

But to reap the full benefits of electrification, it is crucial to accelerate the transition from fossil fuel to emission-free generation. Unlike fossil-fuel electricity generation, renewables-based electricity is totally shielded from the volatility of commodity prices and is produced at a zero variable cost. This means zero-emitting renewables can displace high-emitting thermal generation because of its lower cost and lower price variability. A decarbonized electricity – more affordable, sustainable and efficient – is thus the best candidate energy carrier to forge the path towards our shared long-term goals.

If we managed to actually accelerate and “meet Paris”, electricity would necessarily be a key part of the recipe. According to the International Renewable Energy Agency's *Remap Scenario*, by



Some of the 2,534 solar photovoltaic (PV) panels installed on the roof of Naval Air Station Jacksonville's Hangar 1122 to help reduce the building's conventional energy usage and promote environmental sustainability. Photo by: U.S. Navy - Clark Pierce/Released

2050 the share of electricity in total final energy consumption will rise from 19% to about 44%, with electricity taking on an increasing role in transport and construction. Moreover, the share of renewable in the electricity generation mix will grow to about 85% in 2050, up from the current 25%.

The year 2018 saw a 4% rise in global electricity demand – the largest yearly increase since 2010 – with renewables meeting 45% of the increase. But on top of the growth in renewable generation, power generation from coal and gas also grew, causing a 2.5% net increase in emissions from the sector.

What matters is that the IEA assessed that 20% of the increase in electricity demand was due to climate change, which is driving up the need for both cooling (2018 was the fourth hottest year on record) and heating. We should expect this trend to continue.

Above increased efficiency and reduced GHG emissions, electrification of end uses paired with decarbonization of the generation mix enables a set of other benefits, among them improved energy security and urban air quality, as well as employment opportunities.

Therefore, where possible, efforts should be made to promote a steep increase in renewable generation as well as avoiding the risk of locking in new fossil fuel-based assets – which is especially the case for coal plants in some areas of the world. As stated above, the increase in CO₂ emissions in 2018 was mainly driven by coal power, mostly in Asia.

Consequences for the industry

The energy "transition" we require may as well be re-branded a "revolution". In fact, substantial changes are to be expected in the very shape of the energy industry itself. A higher electrifica-

tion of end-uses will most probably trigger a substantial shift in value pools in several industrial sectors, whose positioning might be heavily affected. The decarbonization of the economy, the electrification of energy consumption, the urgency of climate change and the mounting investor push towards fossil fuel divestment are putting increasing pressure on players in the energy sector and in others. As an example, oil and gas companies are beginning to re-tune their strategies and work towards some significant portfolio reshufflings.

In fact, we are witnessing more early moves in parts of the electricity value chain, by players including oil and gas companies, but also tech giants and car manufacturers – who, to date, have several partnerships with utilities to offer bundled solutions for renewable electricity supply and smart home devices or distributed energy solutions.

Three encouraging signs

Our shared long term goals are ambitious, but we have three main encouraging signs: the ever-decreasing cost of renewable technologies; the increasing role of electricity as an energy carrier for end uses; and the growing appetite of the energy (and non-energy) industry for electrification.

These three tendencies are likely to be non-linear and to show potentially exponential ramp-up rates. This will help speed up the process of transition, but all stakeholders need to remain focused and committed to steer energy provision in the correct direction.

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How a Japanese system can help African cities adapt to climate change

By SETH ASARE OKYERE, MATTHEW ABUNYEWAH, STEPHEN KOFI DIKO
The Conversation

Sub-Saharan Africa is already experiencing the realities of a changing climate — and the situation is only going to get worse.

The reasons for this are complex. And they're exacerbated by deficits in the region's infrastructure, services and socio-economic dynamics. Urbanisation is another major factor. The continent's current urban population is only 43% — but it's rising fast. About 10 million people move into towns and cities each year.

It's a well established fact that good climate change adaptation strategies can reduce urban areas' vulnerability and strengthen cities' resilience.

But there's a problem.

Global agendas acknowledge the critical role that urban adaptation plays towards sustainable development and poverty reduction. However, they focus on national governments and to a lesser extent urban governments. Citizens and civil society end up in subsidiary roles. This flies in the face of established evidence: urban adaptation to climate change is more effective where local citizens participate and own the process.

How can this participation and ownership be nurtured? Our research examined the conditions that can support citizen led urban climate adaption in Sub-Saharan Africa through the lens of "machizukuri". This is a Japanese term which literally translates as "community building". It sees citizens and residents take ownership of the issues that affect their local environment.

We assessed Japan's successful Machizukuri system to unearth the key principles needed to engage urban residents in climate adaptation in urban Africa. We found that there is potential for citizen-led urban adaptation in sub-Saharan Africa. Learning from the Machizukuri system, we can improve existing pockets

of local activities, like tree planting and recycling, and identify new ones for climate adaptation.

The research

The Machizukuri system is considered to have emerged from Japan's citizen environmental movements in the 1960s and 1970s.

In essence, this system underlines two critical points. First, that national governments must prioritise the role of citizens in urban climate adaptation. And second, the state should demonstrate commitment by actively working with citizens, community organisations and other stakeholders.

By studying the system, we were able to draw out four key points. These could be considered by governments in sub-Saharan Africa that want to centralise the role of citizens in urban climate change adaptation.

First, there's the need for support networks and cooperation. Support networks include community groups or associations, civil society, local government, business organisations, researchers and professionals. Cooperation among these groups can strengthen technical support. It can also build local adaptive capacity and provide legitimacy to citizens' role.

Secondly, urban climate change adaptation planning and processes must integrate existing citizen activities. This is crucial for legitimacy. It is a prerequisite to build trust and cooperation between communities and local government or related agencies. It also promotes a sense of value. Local people come to feel that their opinions and initiatives matter.

Thirdly, social capital in local areas could be harnessed to support citizens' collective activities for urban climate change adaptation. Strong social ties and relationships in local urban



The Shiga prefecture in Japan is a good example of green areas restoration: cleaning its rivers and encouraging recycling. Photo: Flickr - Go.Biwako

communities can be highly beneficial. The Yasu city of Shiga prefecture in Japan offers a good example. Its local government worked with the leaders of residents' networks to draw attention to climate change issues and communicate with individuals within these networks. This made it possible for different residents' groups to organise around various interest areas. They then initiated various environmental activities. These included restoring the city's green areas, cleaning its rivers and encouraging recycling.

Harnessing social capital in this way also fosters collective organising. It keeps communities enthusiastic about what they're doing.

Finally, the extent to which citizen-led urban climate change adaptation could be prioritised depends on the availability of resources – especially financial support. Access to regular finance is important for sustaining citizen-led urban climate change adaptation. Governments that are prepared to bring citizens on board in a meaningful way must also be willing to provide at least some of the money they need to be sustainable and successful.

Applications in Africa

There are already some examples of citizen engagement in climate adaptation in a few African cities.

Malawi, Kenya, Tanzania and Zambia are tackling seasonal drought and its effects by forming community networks and associations. In some cases, governments have noticed these initiatives and partnered with communities. They've provided technical and financial support to successfully implement the projects.

This suggests that the Machizukuri system, or variations of it, hold great promise for African cities. As Africa continues to experiment with different ways to ensure adequate citizen engagement in climate adaptation, the Machizukuri system offers a useful blueprint. Citizen-led action can make all the difference for cities trying to adapt to the realities of climate change.

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April 25, 2019*

Defying Dystopia: shaping the climate future we want

To counter the injustice of climate change, we must oppose the disempowering visions of the future laid out for us by military planners and Malthusians alike.

By NICK BUXTON
Roar Magazine

We live in an age of dystopias on demand. Whether it's *Black Mirror*, *The Hunger Games* or *The Handmaid's Tale*, there is no limit to satiating our desires for dark, apocalyptic visions of the future. Unfortunately the scariest experience does not involve the world of the imaginary; it just requires reading the latest climate science.

In one such piece in July 2017, *New York Magazine* managed to pull together all the possible worst-case climate scenarios in a longread called "The Uninhabitable Earth." Through interviews with climate scientists, it painted a world of bacterial plagues escaping from melting ice, devastating droughts and floods so frequent they are just called "weather," and biblical-like tableaux of entire nations on the move. The piece is bleaker than the darkest of sci-fi, because there is no way of dismissing it as fiction.

Facing our fears of climate crisis is one of the biggest challenges we face as activists. Not a week goes by without warnings of an "ice apocalypse" or a "point of no return." We are bombarded with bleak visions of the future. And it's a challenge that we continue to struggle with — one we have mainly filled with demands for action. For a long time, the answer was to provide easy actions that people could take so they could feel empowered. But it was soon evident that no amount of energy-saving lightbulbs was going to halt the capitalist juggernaut. Now the answer, from the left at least, is that we must confront capitalism to overcome climate change. Yet this can hardly be described as an easy win, or likely to allay our fears of a dangerous future.

In the anxious void, we have often not engaged or challenged the visions of the future described by climate scientists or environmentalists. And I don't mean questioning the science, but assessing their expectations of humanity's response to those climate impacts. Do they accurately describe how people behave in the face of disaster? Do they countenance the idea that people might respond in a way that doesn't fit the model of the dystopian dog-eat-dog world? Is it possible that their expectations actually serve the purpose of those determined to repress alternative futures?

APOCALYPTIC STORY-TELLING

I started wondering about this after studying military and corporate strategies for dealing with climate change impacts whose apocalyptic language often mirrors that of the *New York Magazine* piece. In 2007, the Pentagon produced its report, *Age of Consequences*, that looked at varying scenarios for climate change based on different temperature increases. Its mid-level scenario predicted that nations around the world would be "overwhelmed by the scale of change and pernicious challenges, such as pandemic disease." It also warned that "armed conflict between nations over resources, such as the Nile and its tributaries, is likely and nuclear war is possible. The social consequences range from increased religious fervor to outright chaos." A year later, the oil giant Shell released a report, *Scramble and Blueprint*, that forecast a similar Malthusian scramble for resources.

What is striking about all these forecasts of the future is the overwhelming sense of powerlessness that they provoke. This is partly a result of the fear-based narratives that, as



behavioral science research has shown, tend to engender hopelessness. But it's also a result of completely ignoring the political structures in which climate change impacts occur, as well as the potential for people to remake those systems.

Rather like a Hollywood disaster movie, such scenarios treat climate change as an all-encompassing dark threat on the horizon that threatens us all, where no one is culpable for what happens next and where no one can truly prepare for and change its impacts. Their sketches of a future in which millions starve from increased temperatures, for example, ignore the reality that the present highly concentrated global system of food production and distribution generates more than enough to eat, yet still leaves 815 million people hungry tonight. They similarly ignore how a radical restructuring of our global food regime could pro-

vide a much more resilient and effective system for producing and fairly distributing the necessities of life during a time of escalating climate instability.

In short, the climate futures they describe obscure the fact that the impact of climate change will ultimately not be determined by levels of CO₂, but by structures of power. In other words, the exact impact of a climate disaster will depend on political decisions, economic wealth and social systems.

SYRIA: A CLIMATE WAR?

Syria's civil war today is a salutary example of the dangers of envisioning climate futures without consideration of power. In recent years, it has become highly fashionable to describe Syria as a "climate war" and a sign of the conflicts we might expect. The narrative is that extreme drought in

the mid-2000s, caused by climate change, forced the migration of farmers, herders and other rural dwellers to the major cities of Damascus and Homs, putting massive pressure on these cities' infrastructure and creating competition for jobs. This then laid the seeds for unrest, instability and ultimately civil war. This story — with varying degrees of nuance — was widely adopted from the US military to Friends of the Earth.

Besides the fact that there is very little evidence to back up the hypothesis, many mainstream accounts conveniently ignore factors such as the role of the Syrian government's neoliberal economic policies in creating social divisions. But the biggest problem is that this explanation diverts attention away from how Assad chose to respond to that unrest, which of course was massive repression of initially peaceful protests that led many groups to turn to violence.

Climate change will undoubtedly have a destabilizing influence on food production, water availability and human livelihoods, but whether any of this transforms into conflict will depend on how political structures respond. An extensive recent study of eleven conflicts in the Mediterranean, Middle East and Sahel confirmed this, showing that rather than climate change, it was the way that governments responded both politically and economically to social and environmental crises, and the lack of democratic participation, that generated conflict.

In the case of Syria, people fleeing the country in the wake of the civil war faced new levels of vulnerability and suffering as refugees. And again, it wasn't the weather but the European Union's hostile border regime that caused the worst impacts. With almost no safe legal routes to Europe, desperate refugees were forced to risk life and limb to migrate.

This has led to a horrific death toll, with European policymakers effectively agreeing to turn the Mediterranean into a graveyard to supposedly discourage others. Given that migration is likely to be a critical form of adaptation in the future, the failure by the world's richest countries to deal justly with existing refugees or even to abide by international human rights laws, is a disturbing precedent.

Meanwhile, ten countries outside of the European Union, accounting for less than 2.5 percent of world GDP, have taken in more than half of the world's refugees, showing that economic resources are not the fundamental determination of social support and solidarity.

SECURITY FOR WHOM?

Of course a storytelling that removes politics from the picture serves a purpose, as it strengthens the position of those in power and denies our collective agency to remake the world in a different image. The Pentagon and EU security strategies, developed from these doomsday scenarios, have deemed climate change a "threat multiplier" that will exacerbate conflicts, terrorism and instability. Through the lens of national security, they never question the unjust structuring of power relations that led to the climate crisis. Instead, their plans are about how to protect this unjust order from the instability it has created.

The storytelling in their war-gaming scenarios turns the victims into an amorphous mass, normally quiescent but at the time of climate change potentially restive and a threat. The victims of climate change become "threats" — causes of likely instability and conflict or mass migrations that could overwhelm the borders of the world's richest countries. This further compounds the profound

injustice at the heart of climate change that those who contributed the least to causing the crisis will suffer the most. Now, with a "security" response to climate change, the victims face an additional injustice, treated now as threats, to be managed, controlled or eliminated. This tendency looks set to consolidate an existing disturbing global trend in which governments already "treat protest as at best an inconvenience to be controlled or discouraged, and at worst a threat to be extinguished."

By contrast, a storytelling that did consider power relations would turn very quickly to the existing structural causes of climate change. It would show how the United States' vast imperial war machine makes it the world's single largest organizational user of petroleum, and how just 90 corporations are responsible for two-thirds of carbon dioxide in the atmosphere. It would articulate how a just response to cli-

In the case of Syria, it wasn't the weather but the European Union's hostile border regime that caused the worst impacts. With no safe legal routes to Europe, desperate refugees were forced to risk life and limb to migrate.

mate change would be impossible without tackling these underlying causes. Instead, by predicting scarcity and promising security at a time of chaos, corporate power remains unchallenged and the world's bloated militaries can win even more funding to secure an unjust world order.

It should be no surprise to anyone that military-led climate security strategies are the only vestige of climate policy that has survived under the Trump regime. Trump is merely continuing a dominant dynamic of US policy that has emphasized control of climate change impacts rather than undertaking real solutions based on ambitious, radical reductions of greenhouse gases.

BEYOND LEFT CATASTROPHISM

The left have not been immune to these cultural currents of disempowering doomsaying. There are plenty of leftist and environmentalist writers who seem to relish the catastrophe that approaches us. Take this quote by US journalist Chris Hedges, for example: "We stand on the cusp of one of the bleakest periods in human history when the bright lights of a civilization blink out and we will descend for decades, if not centuries, into barbarity." The quote not only is nihilistic in its outlook, it is misanthropic in its view of humanity.

The authors of *Catastrophism: The Apocalyptic Politics of Collapse and Rebirth* show how many of these authors draw on either a Malthusian politics (long an affliction of some environmentalists) or a structural-determinist ideology that sees doomsday scenarios as evidence of the impending collapse of capitalism. "Catastrophists tend to believe that an ever-intensified rhetoric of disaster will awaken the masses from their long slumber — if the mechanical failure of the system does not make such struggles superfluous," writes Sasha Lilley.

On the other side of the coin, many environmentalists have sometimes shied away from discussing climate futures all together. This may have been because of fears of looking honestly at the future, or more often because it implicitly suggested defeat from the more urgent task of preventing worsening climate change. However, in so doing, we have left the terrain of the future in the hands of the climate dystopians. The truth is that we cannot avoid facing climate futures, because they are already unfolding now. We can see some of the consequences vividly on our TV screens, such as the hurricanes that swept the Caribbean this summer, or Iran registering a world record-shattering 54 degree Celsius heat wave. But a great deal also happens silently and out of

sight, such as the gradual impact that increased heat is having on food production, particularly in tropical areas.

Everything we can do to reduce emissions now — climate mitigation — will reduce how negative the consequences will be. However, we also need to advance a clear radical agenda on how to cope with the inevitable climate change that is already "locked in," drawing attention to issues of redistribution of wealth and resources that will be so critical to responding justly. This is where an anti-capitalist and anti-militarist critique is even more relevant, because transnational corporations, whose very *raison d'être* is profit and plunder, and the military and police, whose *raison d'être* is to protect the current system, are the last institutions any sane person would trust to justly manage climate change impacts. It is why movements, such as the Movement for Black Lives, that challenge state violence and demand that police forces are either accountable or replaced, are so important to support. After all, the ever-more militarized police will be mobilized disproportionately against marginalized communities — as they have always been — in order to protect wealth and property during times of climate instability.

As the environmental activist Tim DeChristopher has argued, "when things get ugly, and access to resources becomes difficult, we want to have trust that those making decisions will act justly, and not just favor the strong. . . . We need to start working now on putting in place power structures that share our values as we enter difficult times."

GLOBAL JUSTICE: THE ONLY SOLUTION

There is considerable evidence that putting more democratic power structures in place will not only ensure a more just response, but also prove to be more resilient to climate change impacts. Research on communities coping with climate change shows that those that maximize participation and inclusion are far more likely to provide the flexibility, creativity and collective strength to cope with fast, multiple changes and stresses. By contrast, unequal societies are far less resilient as they lack interpersonal trust and have weak social bonds, which make collective organizing all the more difficult. In addition, there is growing evidence that gender equity is particularly important for finding peaceful resolutions to resource challenges.

The historical evidence from past weather-related or natural disasters suggests that crises and disasters, far from prompting a dystopian scramble for resources as suggested by military planners, are far more likely to prompt outpourings

of support, solidarity and creative community-building efforts. Rebecca Solnit, in *A Paradise Built in Hell*, examining five major natural disasters in the twentieth century, recovers amazing stories of people without resources undertaking heroic efforts to protect vulnerable neighbors, developing brilliant collective systems to rebuild communities, and most surprisingly of all finding joy as they weave new meaningful relationships amidst disaster.

In fact, she shows how many disasters lead to the building of “mini-utopias” by those most affected. The panic and fear is mainly expressed by elites who assume that the majority are dangerous and a threat to them, evidenced by the media scaremongering of “looting” that appears in the wake of every disaster. Of course, recognizing this does not mean welcoming disasters with their deadly tolls and the disproportionate impact on the most vulnerable. But we can certainly welcome the revolutionary human spirit that emerges in such situations. “If paradise now arises in hell,” says Rebecca Solnit, “it’s because in the suspension of the usual order and the failure of most systems, we are free to live and act another way.”

A belief that communities are best suited to finding their own solutions to the crises and disasters that unfold from climate change means that we can start with a far more empowering and proactive approach to climate disruption, embedded in values of solidarity rather than security. We can learn from Cuba, where highly organized local civil defense committees, backed by central government resources and communications, remain constantly mobilized and prepared for extreme weather. When hurricanes batter the Caribbean nation, as they do with ever greater frequency and ferocity, they ensure that the most vulnerable are kept safe and in the aftermath mobilize the whole community to house the affected and rebuild their homes. When the impoverished country confronted its most powerful hurricane ever, Hurricane Irma in 2017, ten people died — in contrast to its far richer neighbor, the United States, where the same hurricane, although weaker in terms of wind speed, killed over 70. In the US, an alliance of grassroots community organizations is seeking to implement a similar community-driven response to climate change preparation. It is led by grassroots community justice groups on the front-lines of climate change, such as the multi-racial Gulf South Rising movement that brings together African-American cooperative workers with Vietnamese fisher folk on the Gulf Coast. They argue that just climate resilience will only

emerge if cities go beyond consultations and vulnerability assessments to identifying the root systemic causes of vulnerability and embracing leadership and solutions from those communities most likely to suffer climate impacts.

Taj James, a leader within the alliance, says true community resilience is built when there is a “shared collective sense of understanding of where that community is trying to go, and a sense of ownership and agency, . . . [including the support] of other communities that are working towards their own self-determination, and understanding of limits of the bioregion in which they are operating.”

WALKING TOGETHER, QUESTIONING

None of this is to suggest that the future is rosy or that we can put aside our fears. We need honesty and transparency to move forward. An honest assessment shows that climate destabilization over the coming decades will be incredibly disruptive of the environment on which we depend. It will be a formidable challenge to overcome the entrenched powers that will use this moment to build a militarized eco-apartheid. We also know it will be very costly for the millions of people, disproportionately in the Global South, who will face the most severe consequences. This means learning how to deal with the very real and quite rational emotions of fear and anxiety while unravelling the structures and ideologies that have appropriated that fear.

However, a starting point must be to oppose the disempowering visions of the future laid out for us, whether by military planners or environmentalists. We must reclaim our agency over the future, knowing that the climate crisis has exposed more starkly than ever before the larger crisis of capitalism and imperial power. And that therefore this is a critical opportunity to change direction, both to prevent a worsening climate crisis and to better respond to its impacts. It will require an articulation of a politics that consistently confronts capital and military might, and that looks to return power of all kinds to people. None of this provides guarantees of a better future, but it does kindle hope, which as the late John Berger once said is “a form of energy, and very frequently that energy is strongest in circumstances that are very dark.”

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If Ebola becomes the norm

By ALICE MASILI
ONE

Climate change interferes, directly and indirectly, with a wide variety of diseases by acting as a multiplying force for the diffusion of infectious diseases. Global warming promotes the spread of insects that behave as vectors, transmitting the pathogen. In addition, temperature changes can facilitate or inhibit the proliferation of bacterial or parasitic species.

"We are not facing an Andromeda Strain that will wipe everybody out on the planet" said Daniel Brooks, referring to the 1971 science fiction film about a deadly pathogen. "There will be a lot of localised outbreaks putting pressure on medical and veterinary health systems."

In the last decade, there has been a substantial global increase in the capacity of *A. Aegypti* and *A. Albopictus* mosquitoes to transmit the Dengue virus. Likewise, mainly due to the rise in temperatures and the degree of salinity of marine waters, the risk of transmission of cholera has also increased. The same can be said of malaria, whose transmission increased about 20% over the last 60 years. Malaria is perhaps the most transmissible disease that has been studied with climate change, and there is evidence of its spread (but also contraction) outside the areas where it is endemic.

The mortality estimates for climate-related diseases, calculated by the *Global Burden of Disease Study* (2015), show how climate change affects not only the transmission of infectious diseases but also others within certain geographical areas and demographic profiles. For example, the mortality from melanoma, pathogenetically associated with exposure to ultraviolet rays, has sharply increased in Europe, America and the Western Pacific countries. A researcher team from Columbia University and the Harvard School of Public Health also analysed the link between flu strains, migratory routes of wild birds and

the abnormal weather conditions due to the impact of man on nature. In the article, published in *Proceedings of the National Academy of Sciences*, the scientists verified that each pandemic was associated with phenomena attributable to "El Niño", a series of changes in normal climatic conditions identified periodically in the Pacific Ocean. This happened before the pandemics of 1918, 1957, 1968 and 2009.

Studying the ocean temperatures recorded in the equatorial Pacific before the four pandemics, American researchers found that, in all four cases, they were lower than usual, according to a phase of the periodic climatic oscillation known as ENSO (the El Niño-Southern Oscillation). But how does this cause a change in the patterns of spreading flu strains? When such climatic conditions occur, the migrations, stopping times and contact opportunities that wild birds have with other migratory species or domestic animals are modified. These alterations support the transmission of viruses and phenomena of genetic reassortment, a mechanism that stimulates the development of variants and consequently the appearance of potentially lethal flu strains. It means that, if climate change takes on higher intensity, localised outbreaks, such as Ebola, could become the norm rather than the exception. This escalation in unexpected places will put a strain on the ability of doctors and health professionals to deal with them.

Last December, *The Lancet* published a report dedicated to climate change and health. "The Lancet Countdown," is the result of the collaboration of the leading experts in the field of climate science, ecology, geography, economics, energy, nutrition, political and social sciences and medicine from various academic institutions, the United Nations and multiple intergovernmental agencies from five continents. According to the report, because of global warming, the most vulnerable subgroups of the population, the el-

An *Aedes albopictus* female mosquito. In the last decade, there has been a substantial global increase in the capacity of mosquitoes to transmit the Dengue virus
Photo: James Gathany/U.S. CDC



derly, those with cardiovascular disease, diabetes, chronic respiratory diseases and those living in urban areas, are exposed to higher risks in all regions of the world. Europe and the eastern Mediterranean show a higher vulnerability than Africa and south-east Asia. This is probably related to the older population living in the urban areas of those regions.

Similarly, the dossier published in *Proceedings of the American Thoracic Society* by an international team of pulmonologists and paediatricians, supports a connection between the modification of the world climate and the increase in the incidence of many diseases, primarily respiratory asthma, but also of cardiovascular nature. Examples of pathologies present in places that until a few years ago were substantially immune emerge from the dossier. One among these is the case of mould spores typical of Central America, which are now also found in Canada, where they have given rise to relevant allergic phenomena.

Dr. Kent Pinkerton, professor of paediatrics at the University of California at Davis, claims that there are some vector-borne diseases caused by some types of parasites or organisms whose range has expanded owing to the effects of climate change. People will become increasingly sensitive to the impact of global climate change, especially infants and young children, people with asthma or chronic obstructive pulmonary disease (COPD), and the elderly, who have compromised immune systems.

Several studies on climate change, carried out over the last 25 years, have shown a marked increase in the frequency of floods and extreme temperatures. Climate change will result in an annual increase of 1.4 billion cases of drought and 2 billion flood cases by the end of the century. If it is easy to think of the direct consequences of this phenomenon on people's health, it is less obvious to associate it with indirect, but equally important, risks that can affect humans. In fact, climate change is associated with a sharp decline in food security – ease of access, quantity and quality -, leading to malnutrition, as food production is threatened by adverse weather conditions that should become increasingly frequent and devastating.

The Lancet report explains that climate-related risks are so strong that they can overcome the food benefits of new agricultural production technologies and poverty reduction. Despite a reduction in the prevalence and absolute values of malnutrition compared to recent decades, in past years,

there has been a turnaround in this trend. Not only agriculture but also fishing and marine breeding are threatened: between 2003 and 2015 there was an increase in the average temperature of marine waters in 16 of the 21 basins analysed, resulting in coral bleaching due to thermal stress and an annual reduction of the amount of fish caught.

Every inhabitant of the earth should have access to sufficient good quality, uncontaminated and non-stagnant water. We know this is not the case. By 2025 about half of the world's population will live in conditions of extreme water scarcity, and the quality of water is declining in many parts of the world. Approximately 50% of the wet areas have been lost, along with their characteristic flora and fauna, while at the same time 70% of the available reserves are used for irrigation.

There is a robust component of social inequity, not only for the obvious consideration that those who do not have access to good quality water are the poorest but also because the richer ones are responsible for colossal squandering. Think of golf courses irrigation in very arid areas such as Kuwait or Qatar. Apart from the diseases directly linked to the scarcity of good quality water, drought is itself a cause of various diseases. In large areas of China, where drought is becoming an acute problem, airborne diseases are more likely to spread. This effect is combined with the increase of particulate pollution in urban areas; while in rural areas sand storms are more severe due to soil erosion.

Although prolonged drought remains one of the most important causes of malnutrition and early mortality, in some geographical areas such as South America and Africa, natural disasters are becoming increasingly important. According to The Lancet, 15% of deaths related to natural disasters are caused directly by excessive rainfall. This is not including potentially serious long-term consequences such as depression, mental illness and infectious diseases.

It is important to note that the change in the distribution of transmissible diseases as a result of climate change is not a phenomenon that will only affect low-income countries, although these will be the most affected.

The time has come to gain greater awareness of the fact climate change is one of the main enemies for individual and public health. **ONE**



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Tech accelerators help Nonprofits fast-track technology aimed at solving environmental challenges

By MEG WILCOX

Ensia

Imagine a solar panel that could pull moisture from the air and create clean drinking water, using only the power of the sun, for hundreds of millions of people worldwide who currently rely on unsafe or temporary water supplies. And now imagine that technology helping to curb the plastic waste clogging our oceans because people whose sole source of clean drinking water today is bottled could switch to this solar-powered source.

Imagine no more, because the technology exists. It's called Source, the brainchild of Arizona State University professor Cody Friesen. Even though it's not perfect — Source "hydropanels" are expensive and don't produce large volumes of water — the technology is drawing interest from around the world. Source is now being deployed on homes, schools and hospitals in 20 countries, including the U.S., by the company Friesen founded, Zero Mass Water. A hospital in Jamaica, seeking to end its reliance on expensive bottled water, is one of the latest to install Source. Made of a water-absorbing material, the hydropanels collect water vapor into a reservoir, add minerals for taste, then pipe the water to indoor taps. Purification isn't necessary because only water molecules can pass through the material.

Source is the type of innovation that Conservation International hopes to help scale up to address global water, agriculture and biodiversity concerns through its new partnership with a so-called "tech accelerator," Elemental Excelsator, that helps early-stage businesses, such as Zero Mass Water, reach scale.

Conservation International launched the partnership to help channel Silicon Valley smarts towards solving urgent environmental problems. It's the fourth large, global environmental organization to take this new tack in the past two years, following The Nature Conservancy (TNC), Ocean Conservancy and WWF. With governments worldwide dragging their heels at responding to climate change, ocean plastic waste and other environmental crises, can these new partnerships help to catalyze on-the-ground change at the pace and scale needed — and ultimately prove to policy makers that solutions are at hand?

Race for Our Lives

"We're all struggling with, 'How do we change things, how do we get scale in a compressed time frame?'," says Agustin Silvani, vice president of the Conservation Finance Division at Conservation International. "If you look at all the climate studies, we have basically 10 years to solve these issues, so we're laser focused on that and are throwing whatever we can at it. We need new ideas and innovation to change these trajectories."

"We're really in the race for our lives," says August Ritter, program director of the sustainability accelerator at TNC. "Conservationists are looking around and saying, 'Hey, why is there so much [tech] disruption in all these other industries?' We need to be taking a more serious role and being more intentional about driving tech innovation in conservation, to drive the outcomes we are all shooting for."

And as they seek to develop that new role, the two are comparing notes. “Being in close communication, as we learn from one another is going to be critical because we’re all pretty new at this,” says Ritter.

While each conservation group has developed its own unique partnership with a tech accelerator, they share a common desire to meld their decades of environmental expertise and on-the-ground contacts with the entrepreneurial savvy and business connections of the accelerator world — and, more pointedly, to steer the tech sector toward solving real environmental problems.

“It’s the kind of collaboration that needs to happen more, bringing different worlds together.”
Agustin Silvani

Tech accelerators in isolation can “create solutions for problems that don’t exist, or solutions in search of problems,” says Silvani. “By partnering with us, we’re able to say, ‘These are the problems that we’re facing, the real-world issues related to how we produce our food or use water, without wrecking the planet. Now use your tech tools to help address those problems.’ It’s the kind of collaboration that needs to happen more, bringing different worlds together.”

Think, for example, of some questionable tech inventions, like robot bartenders or smart toilets. Or Snapchat. “What problem does a company like Snapchat truly solve?” asks Andrew Winston, business sustainability expert and author. Winston says the most compelling aspect of the new trend is the NGO attempt to direct Silicon Valley attention to urgent environmental and social problems. “Fun and innovation for their own sake can be great, but we need all hands on deck — creators, innovators, investors and entrepreneurs — focused on the fact that our time to avoid species-level catastrophe is running short.”

Driving Innovation

Tech accelerators are a relatively new phenomenon, beginning with the first, Y Combinator, in 2005. Run by business advisors, they provide coaching, capital and connections to a select group of entrepreneurs to help them bring their ideas to market. In ex-

change, they receive a portion of the startup’s equity or stocks.

Founded in 2012 to help Hawaii reach its ambitious renewable energy goals, Elemental Excelsator is different from other accelerators in that it works exclusively with businesses that have an environmental or justice focus. It receives funding from several sources, including the U.S. Department of Defense, the Emerson Collective (an LLC focused on social change), and corporations like National Grid that are interested in investing in the startups in Elemental Excelsator’s orbit. Elemental Excelsator also takes an equity share of 1 to 6 percent, but only when the fledgling businesses are acquired by a larger company, says Danya Hakeem, a portfolio manager at Elemental Excelsator.

To date, Elemental Excelsator has accepted 82 companies into its program. These have since raised \$US550 million in investments, and 89 percent are still in business or have been acquired by a larger company, according to Hakeem. In the business world, being acquired, or bought out by a larger company, is considered the true measure of success because the startup may never reach scale without it. But that’s not always the case and some entrepreneurs choose to stick with their business as it grows, rather than move on to their next idea. Businesses supported by Elemental Excelsator range from Ampaire, a creator of electric-powered aircraft; to TerViva, which has commercialized a tree crop, native to India, called pongamia that thrives on depleted agricultural land and whose lima-bean-size seedpods produce 10 times the oil and three times the protein of soybeans per acre; to BioCellection, the developer of a technique that breaks plastic waste into simple chemicals that can be easily reused.

Small, new companies like these generally drive innovation says Winston. “The large companies are good for taking the technologies and spreading them wide, but there’s at least a couple of stages in the early funding and culling of ideas that the big guys aren’t going to have the manpower and capabilities to do.”

Every year, Elemental Excelsator accepts 15 to 20 companies into its program from a pool of hundreds



of applicants. Conservation International will now help to identify and vet potential companies and ensure that the solutions they're creating are environmentally and socially sound, and — importantly for the conservation group — ensure that the solutions can be applied to developing world situations. As to what Elemental Excelsior gets from the partnership, Hakeem says, "We see CI as a cornerstone partner based on their deep expertise and in-country network and connections. They're really plugged into the solutions and know where the opportunities are." Furthermore, Conservation International's investment fund offers potential follow-on funding for companies in the Elemental program.

Affordable Technology

Zero Mass Water got into the accelerator program last year and has received coaching and funding from Elemental Excelsior to help it expand into Australia. The Australian project is expected to displace over 30 million plastic bottles, and have a "huge environmental and CO2 impact," says Rob Bartrop, executive vice president at Zero Mass Water. "We're growing at a far faster pace because of the support from Elemental."

The hydropanels are expensive, however, for the developing world. A set of two panels costs about US\$6,000 and produces 4 to 10 liters (1 to almost 3 gallons) of water daily, depending on geographic and weather conditions. The cost of water works out to US\$0.15 per liter, according to Bartrop — far less than the cost of bottled water, or of building new infrastructure to provide drinking water where none exists, but costly nevertheless. Conservation International is now working with Zero Mass Water to figure out how to make the technology affordable for

a remote, offshore fishing village in East Timor, says Silvani. The village that lacks access to drinking water and must bring in containers of water from the mainland by boat, which is expensive, creates plastic waste and uses diesel fuel.

Over time, Silvani envisions helping to bring the technology to other water-stressed regions, such as Cape Town, South Africa, and Kenya.

Bartrop says Source is also a short- to medium-term, cost-effective alternative to bottled water for schools in communities like Flint, with lead in their drinking water, or for communities recovering from natural disasters or hurricanes, such as Puerto Rico.

No Silver Bullet

Silvani is quick to point out that Zero Mass Water is "only part of the solution to our mounting water crisis" and that regulation, improved efficiency and watershed management are important pieces of the puzzle.

There is no "silver bullet solution," he says, to solving today's massive environmental challenges. But, he stresses, "We need more showcases of success. That's what we're hoping to do ... have real measurable impact and hopefully motivate others to move quickly as well."

TNC and the Ocean Conservancy similarly view their accelerator partnerships as catalytic. Ocean Conservancy, for example, formed a partnership with the Incubator Network in 2018 to accelerate solutions to plastic waste in oceans. The partnership emerged from years of research to understand the causes and sources of ocean trash, as



well as Ocean Conservancy's prior efforts to help finance plastic waste management through the Circulate Capital Fund. Now Ocean Conservancy has launched Urban Ocean, a collaborative effort to showcase the ventures that emerge from its incubator partnership to municipalities in five emerging Asian economies responsible for more than half of the world's ocean trash. Participants will be selected this summer, according to Chever Voltmer, plastics initiative director at Ocean Conservancy.

"In our dream world, we bring this suite of tools to our first cohort of cities, and we are so successful that we then have other cities lining up who want to be part of this work, and we have others entering the space to do the same kind of work," says Voltmer. "What we're really trying to do is show how you can develop solutions to deal with the problem."

Similarly, Ritter says that the technologies that emerge from TNC's partnership with TechStars Sustainability will help provide the science and data needed to convince policy-makers and natural resource managers to make smart environmental management decisions. For example, one of the first 10 businesses selected by the TNC-TechStars partnership is StormSensor. The startup developed a stormwater monitoring system to provide cities with information in real time during storm events. Stormwater is one of the fastest growing urban pollutants of riverways, says Ritter. Many cities have ineffective, poorly monitored systems, and StormSensor's tool provides them the data they need to know how to improve their systems. Jersey City,

New Jersey, and Seattle, Washington, are now deploying the tool.

"More broadly," Ritter emphasizes, "what a lot of us are trying to do is inspire a new generation of technology entrepreneurs and investors to focus on sustainability issues in a much more serious way than they have to date."

In the case of climate change mitigation, they'll have to do that quickly. The 10- to 11-year hurdle means we need to cut carbon emissions in half in 10 to 11 years, Winston says. For example, he says, "we have to beat to the punch, someone building a traditional grid or gas pipeline and we have to get to scale before the traditional infrastructure does."

As to whether NGO-accelerator partnerships can help achieve that tall order without government intervention, Silvani responds, "We need to act without permission, in the absence of government action let's show what can be done and hopefully government can move and take it to the next level."

And indeed, the Australian Renewable Energy Agency has followed Zero Mass Water's lead and kicked in nearly half-a-million Australian dollars to expand its reach to drought-stricken communities. Imagine the potential.

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Merkel puts contentious CCS technology back on German agenda

By JULIAN WETTENGEL
Clean Energy Wire

Chancellor Angela Merkel called the controversial carbon capture and storage (CCS) a potentially key element for the country's efforts to tackle climate change. The country can only become climate-neutral by 2050 if it is willing to employ CCS to deal with unavoidable emissions, Merkel said in an interview with *Süddeutsche Zeitung*, published in cooperation with other major European newspapers, including the Guardian.

Several European countries have started an initiative aiming for net-zero greenhouse gas emissions by mid-century. "I am firmly convinced that this can only be done if one is willing to capture and store CO₂. The countries in question do not deny this. The method is called CCS – and for many in Germany it is a highly charged term,"

Merkel said.

Until now, CCS – a technology that captures carbon emissions and stores them underground so they are not released into the atmosphere, where they contribute to climate change – has been off-limits in Germany because of public criticism over the involved costs and risks for the environment. Answering the question whether the CCS debate wasn't already dead in Germany, Merkel said: "Now it is back." The country needs a "wide debate in society" and CCS will also be on the agenda of her climate cabinet, she added.

A renewed public debate on the controversial technology looks set to become an uphill battle for Merkel's gover-

ment. While many researchers continue to point to a likely necessity of CCS, politicians have largely stayed away from the topic in recent years. Merkel's remarks could be a first "test balloon" for a renewed debate, wrote Silke Kersting in an opinion piece in German business daily *Handelsblatt* about Merkel's first mention of CCS at the Petersberg Climate



Angela Merkel during CDU Wahlkampf Heidelberg at Universitätsplatz Heidelberg, Baden-Württemberg, Germany.
Photo: Sven Mande

Dialogue in Berlin. In what German media called “a nod” to French President Emmanuel Macron, the chancellor came out in her speech in support of a net-zero target, but said afforestation and CO₂ storage would be necessary. Her environment minister, Svenja Schulze (SPD), also said Germany needed to reopen the debate about carbon storage.

Other governments have been pushing ahead with research funding and pilot project support. Norway is developing plans to capture and store huge amounts of CO₂ from European neighbours in empty gas fields under the seabed off its North Sea coast. UK energy minister Claire Perry recently announced that her ambition was for her country to become a global technology leader in carbon capture.

The energy transition in Germany meanwhile is in full swing and the country aims to become largely greenhouse gas neutral by mid-century. The official goal is to cut greenhouse gas emissions by 80 to 95 percent by 2050. Merkel’s call for Germany to now aim for net-zero emissions would imply an orientation towards the upper end of the corridor – something her environment minister has been advocating in her first draft for a climate protection act.

CCS is controversial because critics see it as an expensive technology that could ultimately perpetuate rather than reduce reliance on fossil fuels. In Germany, research and even some environmental NGOs support the idea of using carbon storage if it is not employed to extend coal and gas-fired power generation. In September of last year, an alliance of German experts from science, industry, government and environmental organisations called for an immediate and open public debate on whether and how carbon capture and utilisation (CCU) and storage (CCS) should be used as climate protection instruments for unavoidable industrial processes. At the moment, however, those technologies are still much too expensive, and a scale-up would require government support and the right regulations. German industry representatives have said that a higher price on CO₂ emissions is necessary for the technology to become a business

case.

“Misguided” debate in Germany

For geological reasons, storage potentials in Germany are mostly under inhabited areas, not the ocean floor – which does little to dampen public criticism.

According to Erika Bellmann, climate and energy expert at environmental NGO WWF, the debate leading up to the technology’s earlier rejection was misguided. “It did not centre on small amounts of residual emissions in industry, but was essentially about saving coal-fired power generation and the fossil energy industry. That led to many misgivings which cannot be dispelled overnight,” Bellmann recently told Clean Energy Wire.

After strong public opposition, Germany introduced a law in 2012 that gives federal states a veto right regarding carbon storage on their land. Merkel’s administration dropped plans earlier this decade to support carbon capture amid voter protest. At its formation last year, her coalition agreed to consider limited CCS for industrial processes but declined to reconsider scaled-up plans to store poisonous emissions underground.

CCS has not featured in recent polls on the public’s acceptance of technologies needed as part of the energy transition because the subject has been widely seen as a no-go. Researchers at the Fraunhofer ISI institute concluded in an analysis of public acceptance published in 2015 that the technology has barely any support. “The results indicate that Germany’s citizens assess CCS as a high risk technology and do not perceive its benefits,” they wrote.

In a survey in 2011, 59 percent said they would be concerned or very concerned should a CO₂-storage facility open within a 5 km radius of their home; 18 percent said they would not be concerned very much, while only six percent said they would not be concerned at all.

Mixed reactions by German government and opposition politicians

Members of the German federal parliament are split on the issue. Replying to questions by Clean Energy Wire,

Georg Nüßlein – deputy parliamentary group head of Merkel’s conservative coalition partner CSU – said Germany should now focus the “here and now” and implement climate action measures to reach 2030 targets, such as a tax bonus for energy-efficient building modernisation. “Apart from that, we believe that CCS is an outdated technology if we manage to establish a circular CO₂ economy. If we manage to create intelligent CO₂ cycles, this will benefit the climate and help to conserve resources in the economy,” he said.

Joachim Pfeiffer from Merkel’s Christian Democratic Union (CDU) said the fact Germany has a “de facto ban” on CCS is a “technological and climate policy mistake”. CCS and CCU could be “an important contribution to reaching climate targets” and deal with unavoidable industry emissions, he told CLEW. “If we do not want to deindustrialise Germany and at the same time take our climate protection goals seriously, we cannot give up these technologies in the long term.”

Lisa Badum, climate policy spokesperson of the Green group, told Clean Energy Wire that Merkel bringing CCS back into the debate gave reason to suspect that the chancellor aims to “camouflage climate policy inaction”. Badum said there was currently no profitable pilot project in Germany, and all federal states with suitable geological conditions had adopted parliamentary resolutions that reject CCS on their land. “This has also been done with the Union’s (CDU/CSU) consent. The debate around CCS therefore has ended a long time ago.”

“The Green Party is open to all technological solutions for climate action. However, the following conditions have to be met: technically feasible, safe, economically sound and accepted by the population. CCS meets none of these criteria. That’s why it’s factually dead in Germany.”

Lukas Köhler from the business-friendly Free Democratic Party voiced support for the use of carbon capture. “We want to make it possible to use CCS for unavoidable industry process emissions,” he told Clean Energy Wire. “However, the FDP rejects CCS for the energy industry,

as there are emissions-free alternatives for this sector. In general, we prefer avoiding CO₂ emissions altogether, but storing is still better than emitting.” Köhler also called for adjusting the legal framework. “In particular, we have to do away with the deadline for applying for new CO₂ storages that ended in late 2016.”

Left Party politician Lorenz Gösta Beutin rejected the technology outright. “CCS is a risky technology which does not solve problems, but creates new ones – an expensive and dangerous dead end.” Reducing emissions by 95 percent by 2050 was possible without the technology, as shown by an UBA study. Beutin welcomed the current laws. “Still, a ban on CCS would send a clearer message.”

The need for CCS, and warnings of potential risks
Energy and climate scientists say CCS will likely be needed in the future. While emissions in the energy sector could be reduced to zero with renewable sources, some emissions from industrial processes or in agriculture will be unavoidable in the long term.

The scenarios to limit global warming to 1.5 degrees presented by the United Nations Intergovernmental Panel on Climate Change (IPCC) in their latest report also included some form of CCS, said Sabine Fuss, researcher at the Mercator Research Institute on Global Commons and Climate Change (MCC).

“That’s not to replace the reduction of emissions,” she stressed. Measures such as direct CO₂ capture or the form combining bio-energy and capture (BECCS) will be necessary on top of efforts to cut emissions in order to get CO₂ that has been already emitted out of the atmosphere. “In a way it’s a sign that we are already late.”

Fuss said that other countries like Switzerland or Norway invested in the technology, potentially putting Germany on the back foot. “We cannot afford to not talk about such technologies,” she said. “Whether they will be deployed in Germany itself is a different matter.”

The UK’s Committee on Climate Change (CCC) stated that “CCS is a necessity not an option” for reaching net-zero emissions in its report from early May, which called



Lignite Power Plant Weisweiler in the Rhineland, Germany.
Photo: Amaltheus

on the government to aim for climate neutrality. Studies on the future of the German energy system see an increased use of CCS the more ambitious the greenhouse gas reduction target is set in the scenarios.

The Federation of German Industries (BDI), Germany's powerful industry lobby, said in its landmark study on possible paths to reduce greenhouse gas emissions in the economy that reaching the upper 95-percent-reduction goal would require exponentially larger sums of investments and the use of "currently unpopular technologies such as CCS," particularly in tackling industry emissions.

However, the BDI also calls CCS "non-sustainable" in the long run, stressing the need for new game-changing technologies and pointing to hefty resistance. Scenarios in other studies do not rely on CCS at all for a 100-percent renewable global energy system.

The Federal Environment Agency (UBA) considers it risky to rely on partly unexplored and untested CO₂ removal and storage technologies, it said in a recent posi-

tion paper on carbon dioxide removal (CDR).

"Depending on the site, geological CO₂ storage comprises potential risks, for example acidification of ground water or generating local seismic activity. Most CDR methods still require further research and testing before it is possible to apply them," the UBA wrote.

Technologies aimed at removing carbon dioxide from the atmosphere are not yet technically mature enough to contribute to climate action, the German government said in an answer to a parliamentary inquiry at the beginning of the year.

In an evaluation report of the current CO₂ storage legislation from December 2018, the federal government called for an assessment of CCS to reach long term climate targets especially in the industry sector. However, at the time it did not see a necessity to change legislation.

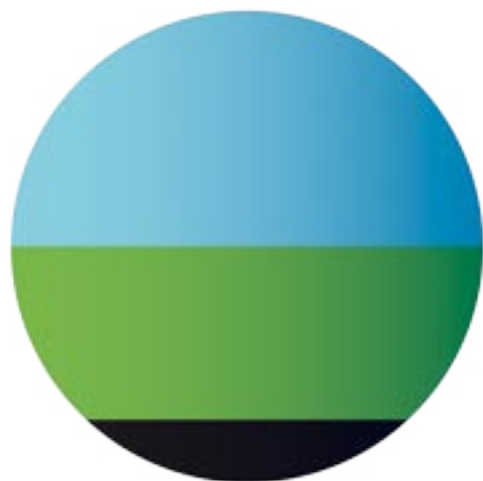
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Photo credit: Andrew Mitchell

WHITE BAY POWER STATION

White Bay is a significant item of industrial heritage associated with the evolving pattern of power generation in NSW and Australia. It is characteristic of coal fired power stations from the early twentieth century which serviced the expansion of Australia's major cities. None of these stations remain intact today. It predates the formation of the Electricity Commission (and Pacific Power), dating back to a time when localised and vested interest in the power industry hampered expansion of industry and commerce and, public access to a commodity (electricity) which we now take for granted. As the last remaining metropolitan power station from this era, the site must be considered rare. Given the substantial changes in industrial relations which have occurred in Australia and particularly NSW over the last 70 years, White Bay Power Station is also evidence of social and industrial practices no longer in use today. © State of New South Wales and Office of Environment and Heritage.

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