REVOLVE

QUARTERLY INSIGHTS INTO A CHANGING WORLD

N° 40 | Summer 2021



The Energy Transition

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Cover image: The world's first closed-cycle geothermal heat plant in an abandoned oil well has been put in place in Kiskunhalas by the engineers of MS Energy Solutions Ltd. from Hungary, in a barren oil and gas prospecting well. This image won our Summer 2021 cover contest. See more on p68. Photo: Laszlo Kakucsi.

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Local Action, Global Goals

ARTHOURUS ZERVOS
PRESIDENT OF REN21

Cities might not take up much space geographically, but they account for an incredible three-quarters of global energy consumption. If the highest levels of consumption are happening where we live, work and travel, **we need to look to our cities for action.** Not only at national governments which is where people generally look to.

Change at city level is not only possible, it is necessary. The world is not on track to meet the Paris Agreement goals. While renewables have grown in the power sector, the shares of renewables in heating/cooling and transport remain low (around 10% and 3% respectively). Action is urgently needed – together, these sectors account for over 80% of global final energy demand. Cities are critical to decarbonize these sectors, and they've started to take up the challenge.

The time for action is now and promising signs are everywhere. We are seeing an increasing consciousness and public pressure around the importance of clean and healthy living environments - particularly in cities. Initiatives have gathered millions of people to march in the streets demanding governments take action to address climate change. At an individual level, citizens are engaging with renewable energy, forming community energy groups and becoming prosumers. Citizens are putting pressure on their local and national governments to adopt more ambitious targets and policies, and cities are listening.

And city governments are following the call for action. Many city governments have installed, purchased or contracted for renewable energy to meet the demand of their own operations. They have also continued to adopt renewable energy targets and to implement policies to incentivise local consumption and generation of renewables, have set net-zero targets and have banned fossil fuels for various uses.These inspirational stories highlight the steps being taken at local levels.

But we are a far cry away from what is needed. Some national governments underestimate the value of cities to achieve national decarbonization goals. And some city governments do not have the resources and expertise or just may not recognize their critical role to unlock their potential and shift to a renewables-based economy. In these cases, our challenge is how best to support cities in developing their own sustainable energy transition and to highlight the value of cities to national governments. Local level legislative and regulatory hurdles are easier to overcome if leaders can see that initiatives have been successfully implemented elsewhere. The key is connecting people and giving them tools to influence decision makers to act against the environmental issues we are facing.

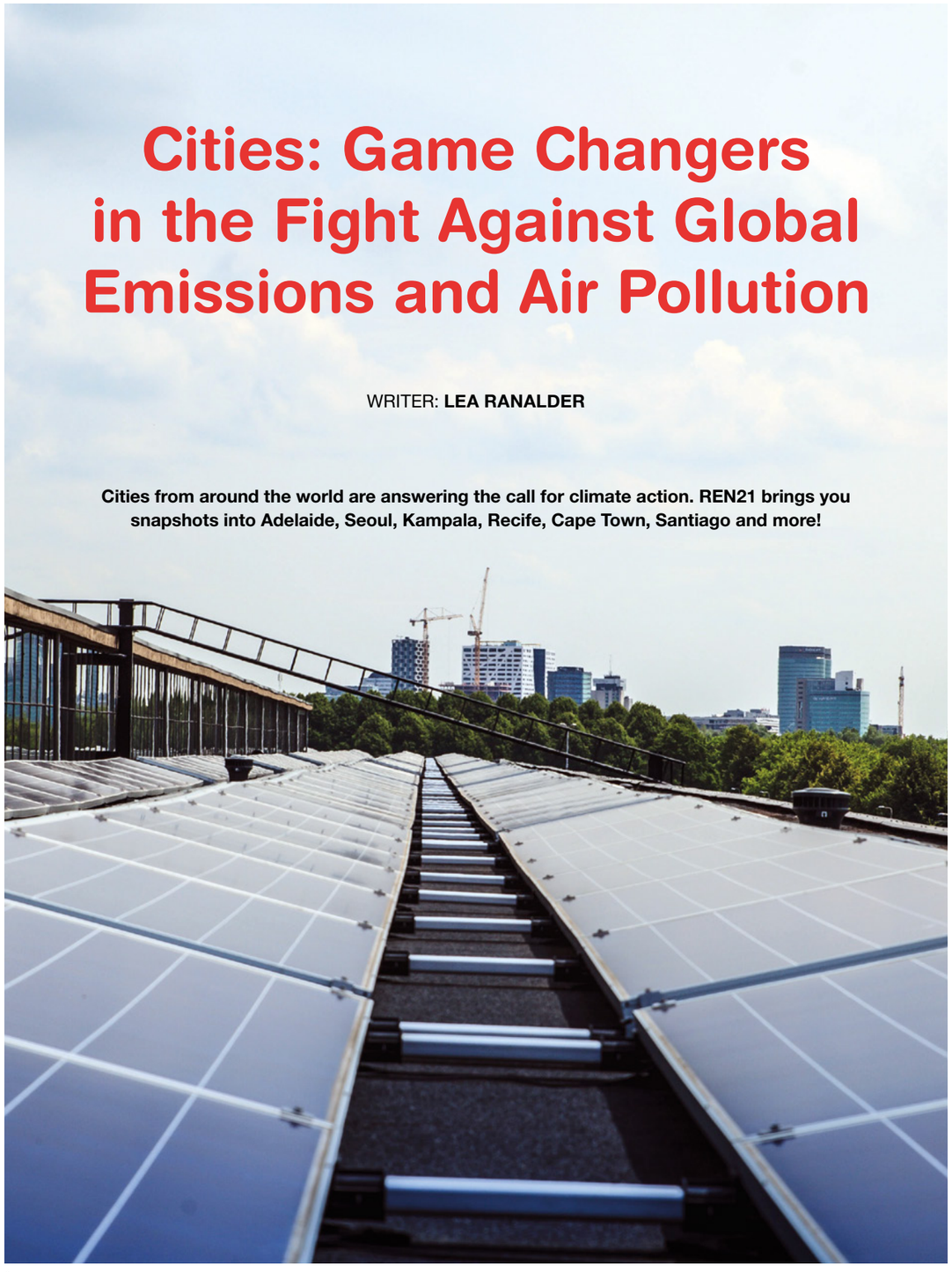
Reports like REN21's Renewables in Cities 2021 Global Status Report highlight just how much urban spaces matter in the energy transition. We need good, reliable/ trusted, and shared data and knowledge to create awareness, inform and convince decision makers, and tell the stories of renewables. The reports go beyond sharing facts and figures - they create communities, facilitating concrete action. I invite you to become part of this community, help us tell credible and inspirational stories as a way to raise awareness on the impact city-decision-makers can have.



Cities: Game Changers in the Fight Against Global Emissions and Air Pollution

WRITER: **LEA RANALDER**

Cities from around the world are answering the call for climate action. REN21 brings you snapshots into Adelaide, Seoul, Kampala, Recife, Cape Town, Santiago and more!

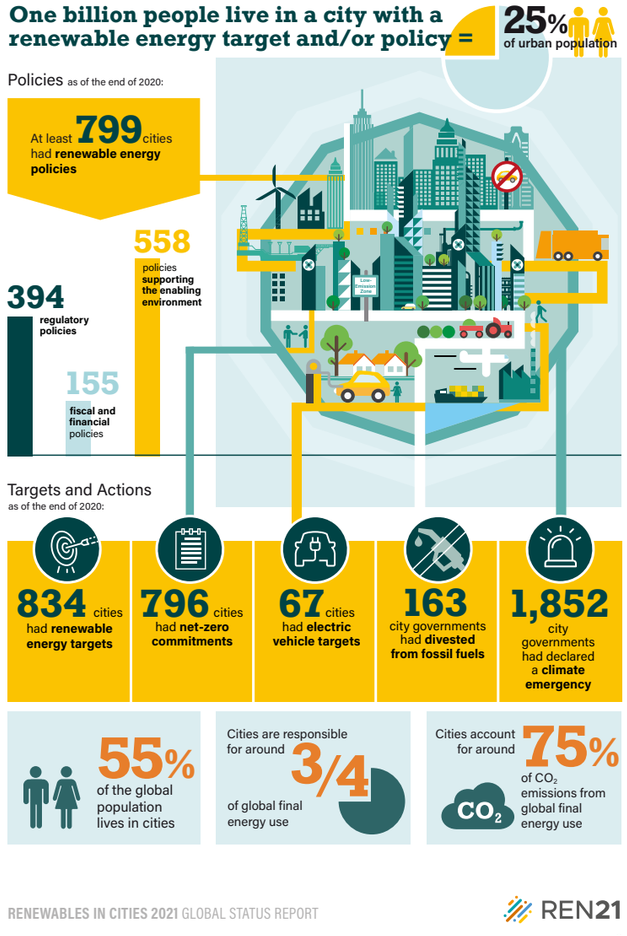


1

The pandemic has thrown into stark relief the global battle of cities for cleaner air, healthier living environments and a better future. The REN21 Renewables in Cities 2021 Global Status Report is the annual stock-take of the global transition to renewable energy at the city-level. It shows that more than 1 billion people – about 25% of the urban population – live in a city with a renewable energy target and/or policy. Over 1,300 cities have demonstrated leadership in advancing renewables beyond the power sector.

More than half of the global population live in cities, which account for three-quarters of global final energy consumption. With their impact at scale, urban areas will play an important role in accelerating the global uptake of renewables. Rapidly replacing fossil fuels with renewables across high-polluting sectors is also an urban opportunity to create sustainable, equitable and thriving cities, which are also more resilient, with more local jobs and cleaner air. To achieve this, there is an urgent need for cities to step up their game and take bolder actions on renewables, but national governments also must put money, capacity and above all legislative powers into the hands of local authorities.

Key Facts and Trends in Cities, 2020



2

Over 1,300 cities have demonstrated leadership in advancing renewables beyond the power sector.

A flavor of clean air and clear skies

Last year's lockdowns with the sudden disappearance of traffic, the complete alteration of lifestyles resulting in cleaner air and less noisy environments, have given citizens a flavor of how alternatives to packed roads and polluted skies could look. In cities 100 km away from the Himalayas, the towering mountains could be seen for the first time in 30 years. This has contributed to the growing awareness and potential of renewables to help create clean, livable and equitable cities, while advancing local economic development and improving energy access for the millions of people living in slums and informal settlements.

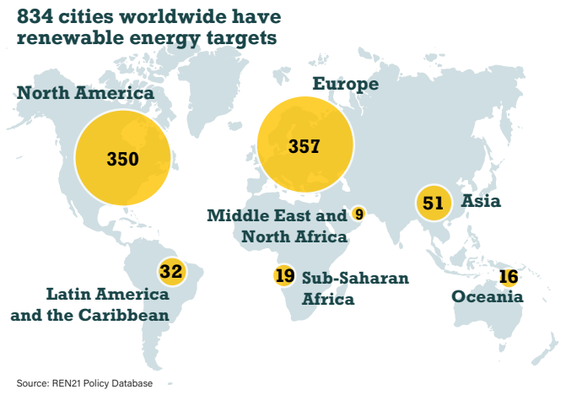
1. Solar panels on the Werkspoorfabriek in Utrecht, The Netherlands. Photo: Jeroen van de Water

2. Key Facts and Trends in Cities, 2020. Figure: REN21, *Renewables In Cities 2021 Global Status Report* (p. 24).

Renewables, net-zero and beyond

Driven by growing concerns of air pollution and public pressure for climate action among more actors, city commitments to support renewables more directly are increasing. At the end of 2020, over 830 cities in 72 countries had adopted renewable energy targets with more than 600 cities worldwide having targets for 100% renewable energy. Most of the small- and medium-sized cities have emerged as frontrunners in target-setting, but also megacities such as Beijing, Cape Town, Copenhagen, Frankfurt and Seoul are committing to renewables. While most local renewable energy targets address the power sector – similar to national-level developments – momentum has grown for policies that go beyond power and are expanding to heating and cooling and the transport sector or an integrated policy approach.

Renewable Energy Targets in Cities, 2020



REN21

3

Cities are going renewable and becoming part of the global movement towards net-zero. Commitments to transition away from fossil fuels can result indirectly in greater use of renewable energy city-wide: by 2020, over 10,500 cities had adopted targets to reduce their greenhouse gas emissions and around 800 cities had committed to net-zero emissions, with the number of such net-zero targets increasing roughly eight-fold from 2019.

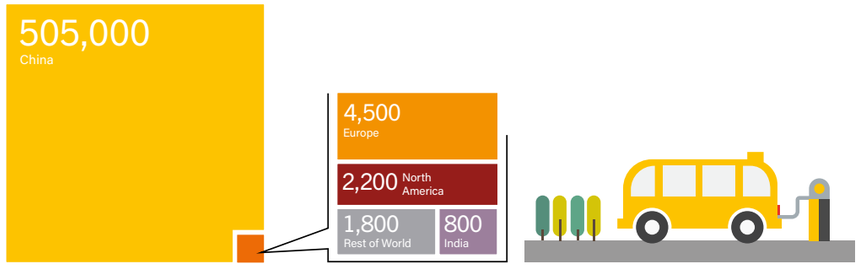
Seoul (Republic of Korea) **Renewables ambition despite space constraints**

Seoul has committed to becoming climate neutral by 2050 with an intermediate goal of 50% emission reduction by 2030. As part of this plan, the city launched the Solar City Seoul initiative, with the goal of adding 1GWp of solar power capacity by 2022. To secure enough space, the city is identifying new installation sites on public facilities and supplying PV panels to 1 million households. This will also benefit many low-income households and aims to add 4,500 new jobs by 2022.



4

Number of electric buses, 2019



Source: REN21 Policy Database

REN21

5

Achieving city targets by using their own assets and procurement!

Cities are answering the call for climate action. To achieve their targets, cities are trailblazers for renewable deployment and use for their own operations. Installing or purchasing renewable energy for the city's own operations, buildings or fleets is often one of the first steps that city governments take to demonstrate the business case of renewables and stimulate uptake city-wide.

There are thousands of examples of on-site renewable power generation projects in cities, most of which consist of solar PV systems installed on municipal or public buildings. In the transport sector, city governments have made strides to decarbonize municipal transport fleets and mobility infrastructure. Although some cities have continued to support the use of biofuels in fleets, urban policies and procurement increasingly have focused on the electrification of transport. Over half a million electric buses were in circulation globally. While most of them were operating in China, electrification is also gaining ground quickly in cities elsewhere in the world.

3. Renewable Energy Targets in Cities, 2020. Figure: REN21, *Renewables In Cities 2021 Global Status Report* (p. 44).

4. Lotte World Tower, Seoul, Republic of Korea. Photo: cmmellow

5. Global Electric Bus Stock, China and Selected Regions, 2015-2019. Figure: REN21, *Renewables In Cities 2021 Global Status Report* (p. 95).

6. Adelaide, Australia. Photo: myphotobank.com.au

Adelaide (Australia) **Achieving 100% targets**

In mid-2020, Adelaide achieved its target to have its municipal operations powered by 100% renewables. The city had installed 8.3 MWp of solar PV capacity on city-owned sites and signed a power purchase agreement using electricity generated from wind and solar PV farms in surrounding territories.



6

Santiago (Chile)
Electrifying urban buses

Santiago de Chile reportedly had the largest electric urban bus fleet outside of China. In 2020, the city announced a target to electrify 4,250 of its 6,600 buses by the end of 2021. The trend is similar in other Latin American cities: by late 2020, electric buses were operating in 10 countries in the region. Cities including Bogotá (Colombia), Buenos Aires (Argentina) and São Paulo (Brazil) – have started to electrify their bus fleets to address local air quality concerns.



7

Getting creative with what is under city control

Achieving urban renewable energy targets depends not only on political commitment and municipal investment in renewables, but also the city's ability to enable the uptake of renewables city-wide, by other actors. Contrary to the slow national-level trends, momentum has been growing for city-level policies that move beyond power but also support renewables in heating and cooling, the transport sector and integrated policy approaches. By the end of 2020, around 800 municipal governments had implemented regulatory policies, fiscal/financial incentives that directly support renewable energy, as well as indirect support policies that enable the uptake of renewables city-wide.

Urban policy trends for buildings include the rise of municipal codes and mandates for new buildings that require renewable energy use for electricity or heating (usually solar PV or solar thermal). Renewables for existing buildings are encouraged through financial and fiscal incentives. Momentum is growing rapidly for bans and restrictions on fossil fuels in buildings: as of 2020, a total of 53 cities spanning 10 countries had proposed or passed bans or restrictions on the use of gas, oil or coal in buildings for space and water heating and cooking – most of them apply to new buildings but some also in case of building renovations.

To support the decarbonization of transport, municipal policies supporting electrification, notably via financial subsidies have expanded to also include taxis, scooters and private cars. There is also a growing number of low-emission zones and bans on certain fuels or vehicles, which are in place in 249 and 14 cities respectively, which have helped to drive up the use of renewables in urban transport.

Building alliances with your people and unusual partners

Depending on local resources, laws and regulations, and other location-specific variables, cities may not be able to install, purchase or procure renewable energy. Working with other partners has offered many municipal governments an alternative. To scale up renewables, city governments have built alliances with partners such as electric utilities, as well as private companies, universities, banks, or community energy projects.

7. Santiago, Chile. Photo: Francisco Kemeny

8. Heidelberg, Germany. Photo: Brina Blum

9. Renewable Energy Policies in Cities, by Type and Region, 2020. Figure: REN21, *Renewables In Cities 2021 Global Status Report* (p. 56).

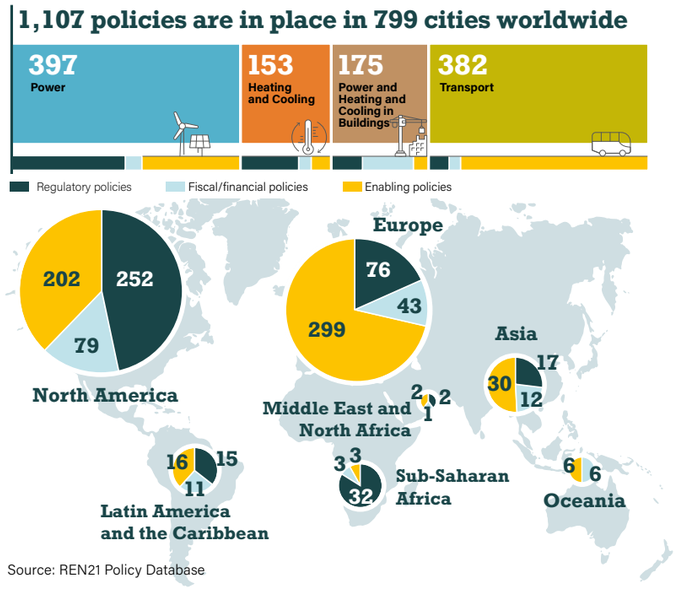
Heidelberg (Germany)
Push-and-pull for renewables

Heidelberg aims to be climate neutral and in 2019 was one of the first cities to declare a climate emergency. The municipal utility started cooperating with neighboring utilities to expand the city's solar PV and wind power supply (25 MW by 2030). In late 2020, the city passed a policy to provide financial support for distributed solar PV on all residential and commercial buildings and has passed a mandate requiring solar PV on all new buildings built on municipal plots (and requiring it on existing buildings in some neighborhoods).



8

Renewable Energy Policies in Cities,
by Type and Region, 2020



Source: REN21 Policy Database

City governments have also included their people in the design, ownership and management of energy systems, accounting for residents as both consumers and producers of renewable energy, as well as holders of rights that can shape the transition to renewables-based urban systems. In return, engaging residents at the local level increases both buy-in of the result and public awareness about renewables, and can accelerate the achievement of global climate and sustainable development goals.

Getting the national government to follow your lead

City efforts have not gone unnoticed. On the contrary: they have also pushed national governments to take stronger climate actions. For instance, city and regional governments in Japan have been leading the way in committing to net-zero by 2050. This movement has been instrumental in pushing the national government to adopt a net-zero target in late 2020. Similarly, in the Republic of Korea, 226 local governments gathered to declare a climate emergency in mid-2020. Building on this momentum, the Korean Local Governments' Action Alliance for Carbon-Neutrality was launched. These bold actions were influential for the national governments' announcement to achieve carbon neutrality by 2050.

Kampala (Uganda) **Leveraging public-private partnerships to decarbonize transport**

In Kampala, the transport sector is responsible for the highest share of energy demand and consists mostly of inefficient motorcycles and private cars running on fossil fuels. To reduce air pollution, noise and petrol demand, the Kampala Capital City Authority formed partnerships with start-ups. As a result, by 2020, more than 200 new and retrofitted electric motorcycles were introduced in the city (charged mostly from the hydropower-dominant grid).

Recife (Brazil) **Engaging residents in energy planning**

In response to its climate emergency declaration, Recife committed to becoming carbon neutral by 2050. As part of this plan, the city created a municipal forum to formulate climate change and sustainability policies. To promote greater citizen/resident participation, the city (in collaboration with the local energy company) holds public hearings where it presents future plans and results of projects in the region.



10



11

10. Kampala, Uganda. Photo: Mutegeki Cliff

11. Recife, Brazil. Photo: Denys Barabanov

12. Cape Town, South Africa. Photo: Tim Johnson



12

Cape Town (South Africa) **Pushing for a more active role in renewables**

To provide more affordable and secure energy access while tackling rapid urbanization and associated energy poverty, Cape Town started a roll-out of solar PV and solar thermal to low-income communities. The city entered into a court challenge with the national government to expand its renewable electricity supply and purchase electricity from independent power producers (and not be confined to procuring coal-fired power). In a landmark decision in late 2020, the national government amended national regulations to enable municipal to develop their own generation projects. As a result, Cape Town has begun laying the foundations for supplying renewables at scale.

National governments must give cities more power to act

Even those cities that seem ready and willing to move forward run into obstacles. Many challenges remain, such as limited regulatory and financial powers at the city-level, including lack of municipal funds and access to external funds that can support local renewable energy generation projects. Urban energy and climate strategies must be regionally and nationally anchored. This will ensure policy coherence and support between national and sub-national frameworks and action. City governments also need to be empowered to understand their vital role in the energy transition. Globally, we can increase the level of ambition and progress in meeting climate and energy goals if national governments provide cities with the support well beyond creating better financial conditions. ●

About REN21 and the Renewables in Cities Global Status Report

REN21 is the only global renewable energy community of actors from science, governments, NGOs and industry. We provide up-to-date and peer-reviewed facts, figures and analysis of global developments in technology, policies and markets. Our goal: enable decision-makers to make the shift to renewable energy happen – now.

The *Renewables in Cities Global Status Report* is an annual stock-take of the global transition to renewable energy at the city-level. The 2021 edition has been co-authored by over 330 experts and is endorsed by an Advisory Committee of 20 organizations including city networks. The complete data pack, a summary for policy-makers and the city case studies are also available for download here: www.ren21.net/cities

Investment in Skills is Key to Realizing the Clean Energy Transition

WRITER: **NICK FERRIS**

Governments worldwide are accelerating the energy transition, but a lack of skilled workers risks creating bottlenecks in the roll-out of clean technology.

1

Workers are at the heart of the energy transition – employment in the energy sector will increase from 58 million in 2017 to 100 million in 2050, predicts the International Renewable Energy Agency (IRENA). Its data also show that renewable energy job growth will significantly outweigh losses in the nuclear and fossil fuels sectors – but for this transformation to become reality, the world needs a skills and training revolution. Jobs and skills must be at the heart of every post-Covid energy transition and economic growth plan.

In the immediate term, the transfer of skills from traditional sectors to renewable energy is often possible. Around seven in ten jobs in oil and gas have at least partial overlap with skills in low-carbon industries, shows research from management consultant EY. A September 2020 survey of 1,383 oil and gas workers by environmental NGOs Platform, Greenpeace and Friends of the Earth Scotland also reveals that eight out of ten offshore workers in the UK North Sea are willing to work in other sectors. Fossil fuel jobs have generally been seen as relatively stable, with higher rates of unionization, typically because of their long existence, than their clean energy equivalents. In the US, average unionization rates for solar and wind workers are 4% and 6% respectively, compared with an average of 18% for jobs in resource extraction. However, as oil and gas industries decline in Europe and the US, workers are increasingly at risk of seeing their employment standards and protections declining. This risk has been compounded by the Covid-19-induced economic crisis that led to a tumultuous crash in oil prices and demand for the second time in five years.

The 2020 report from Platform showed that 58% of UK North Sea oil and gas workers were unhappy with their job security, while 18% were very unhappy with their workload and hours. Just 6% of those surveyed listed themselves as



2

Skills are interchangeable between fossil fuels and renewables

US tradespeople survey response as to the likelihood of them working in selected energy sectors, 2020 (%)

Role	Wind	Solar	Oil	Natural gas
Wireman	47%	63%	32%	43%
Roofer	43%	64%	36%	57%
Electrician	33%	66%	47%	50%
Construction labourer	38%	56%	64%	66%
Stationary engineer	28%	40%	64%	80%
Operation engineer	28%	46%	67%	72%

3

"very happy" with their situation. "We are talking about an increasingly difficult work environment, with contracts becoming unstable over time," says Friends of the Earth's Ryan Morrison, one of the authors of the report. "Highly skilled workers who have been working for 10, 15, 20 years are competing with less qualified new entrants. The new players are winning contracts, because they are costing companies less money and working with lower safety standards." Oil and gas is a "very volatile" industry that "goes in boom-and-bust cycles with the oil price", says Joshua Emden, from UK think tank the Institute for Public Policy Research (IPPR). "Transitioning away from the industry will help provide job stability, and rescale the workforce to fit a declining industry."

Data shows that wages tend to compare favourably across fossil fuels and renewables. An oil and gas manager in the UK can expect an average wage of £46,567 compared with £46,545 for a renewables manager, says a 2018 report for the IPPR. Engineers, meanwhile, can expect an average wage of £38,490 in oil and gas compared with £37,362 in renewables. Clean energy jobs are also more likely to be spread about the country since the natural resources they rely upon are more ubiquitous than fossil fuel extraction. A greater starting skills requirement means clean energy jobs are also likely to support higher entry-level wages, suggests a report from US advocacy group Environmental Entrepreneurs. And, put simply, more clean energy jobs are being created. Renewable energy job growth is a pillar of the post-Covid energy transition. Wind turbine technicians and solar PV installers are set to be the first and third-fastest growing jobs in the US over the next decade, says the US Bureau of Labor Statistics.

1. Worker at the National Wind Technology Center at National Renewable Energy Laboratory. Photo: NREL

2. Workers on an oil pad, North Dakota, USA. Photo: Heidi Heitkamp

3. Source: North America's Building Trades Unions survey

4. Man at work on the installation of solar panels, Zurich, Switzerland. Photo: Ricardo Gomez Angel

5. Wind turbines manufacturing - Nordex USA manufacturing facility - Jonesboro, Arkansas. Photo: U.S. Department of Energy

Renewable energy skills shortage

However, companies are concerned they may not be able to fill job vacancies. A UK survey in the Open University's annual Business Barometer shows 85% of respondents in the mining and energy sector reporting a skills shortage – despite FOE Scotland's 2020 report suggesting four out of five workers in oil and gas would be willing to move to other parts of the energy industry. In a December 2020 report into the feasibility of achieving net zero in the North Sea, the IPPR highlights various challenges facing the UK's skills system. These include "insufficient funding for adult retraining", "lack of foresight over future skills" in national policy, "lack of commonly recognized accreditation", and "insufficient devolved powers" to allow local governments that best understand skills needs to tailor solutions to local populations.

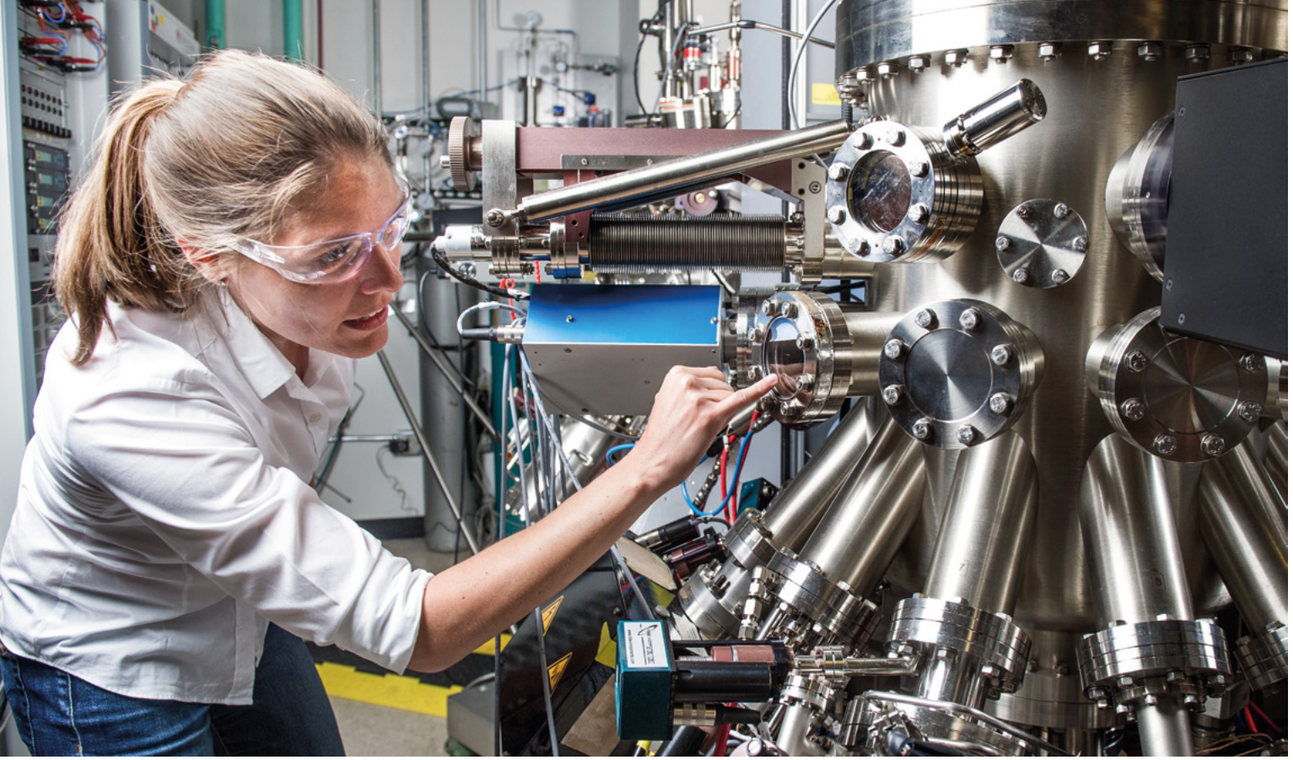
There was an estimated annual shortfall of between 83,000 and 110,000 people working in core and related engineering roles in the UK in 2018, says industry body EngineeringUK. Some 77% of EU firms say a lack of skilled staff is a barrier to investment, and 25% of SMEs



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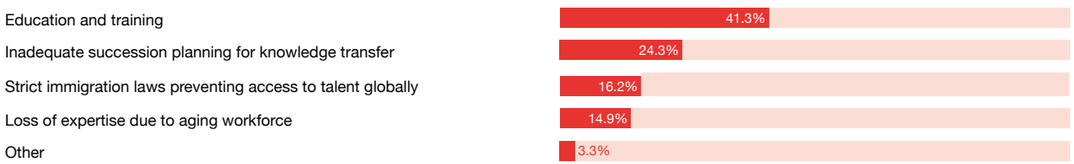
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A lack of education and training is the leading reason for skills shortages in energy

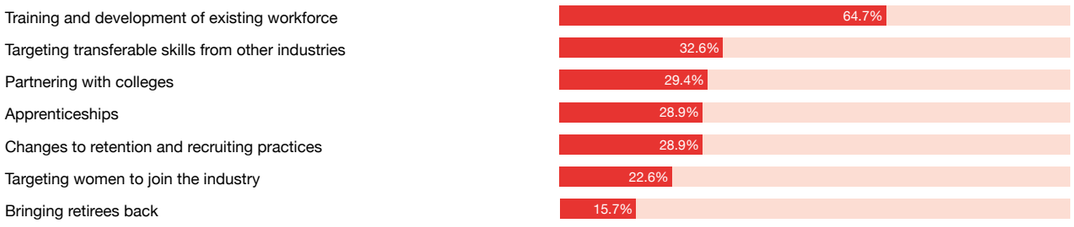
Share of international survey responses from companies citing reasons for skills shortages in energy (%)



7

Companies are prioritising the retraining of the existing energy workforce

Share of international survey responses from companies citing how they are looking to overcome the skills gap (%)



8

say it is their most important problem, shows data from European electrical contractors' industry group EuropeON.

Sweden estimates it will need to hire an estimated 28,000 workers over the next five years to help install new infrastructure like new electric vehicle charging points and PV panels. "The risk of not having enough skilled workers is a possible bottleneck in the roll-out of clean energy," says EuropeOn's Federico Fucci. "Already in certain regions you might struggle to find an installer qualified enough to install and operate new technologies. "It is a two-sided issue: the workforce on the one hand, and the skills on the other. And there is a general feeling among electrical contractors and other kinds of technical workers that there are simply not enough people."

The battle for offshore talent

One sector that could face such a renewable energy skills shortage is offshore wind. The sector has only experienced a limited roll-out globally, but massive growth is predicted in the near future. Just six countries – China, Japan, South Korea, Taiwan, the US, and Vietnam – are set to install a total of 30,819MW of capacity between 2020 and 2024, leading to 77,048 new skilled jobs, predicts the Global Wind Energy Council. Renewables recruitment agency Taylor Hopkinson anticipates that demand for wind industry roles requiring industry experience of three or more years will increase by 3.5 times in Europe, 14.3 times in North America, and 14.7 times in Asia-Pacific between 2021 and 2030. Such high demand for highly skilled workers when the industry remains nascent poses serious risks of bottlenecks in the development of offshore wind globally, says company CEO Tom Hopkinson.

"If you are going to become fully competent as a project director in offshore wind, you are going to have to deliver at least one or two wind farms, which will take you four or five years," says



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6. NREL scientist uses a Compound Semiconductor Molecular Beam Epitaxy System to grow semiconductor samples in the Semiconductor Growth lab at the Solar Energy Research Facility at NREL. Photo: NREL

7. Source: Brunel University Energy Outlook 2021

8. Respondents selected all that applied so answers exceed 100%. Source: Brunel University Energy Outlook 2021.

9. Rampion Offshore Wind Farm, United Kingdom. Photo: Nicholas Doherty

10. Technician and electric vehicle at the Power Systems Lab in the Energy systems Integration Facility (ESIF). Photo: NREL

Hopkinson. “And the number of projects kicking off globally a year at the moment is anywhere between four and ten. For countries like the UK that have developed this kind of expertise the export opportunity is huge.” He adds: “Now we have all these other countries kicking off their offshore wind industries, demand for these workers will be extremely high. Countries are willing to pay a lot of money [for them].” Hopkinson estimates there are “46 people in the world” who are qualified to work as offshore wind project directors – and it will take several years of industry experience to increase this pool. European companies like Shell and Equinor are transferring top talent from Europe to the US to help develop huge offshore projects to meet Biden’s new green agenda; a situation that could lead to a brain drain from Europe, he says. Ross Gould, vice-president of supply chain development at the US Business Network for Offshore Wind, concurs that “in its beginning phase and as it starts its growth, the US offshore wind industry will rely on the transfer of skills from knowledgeable and experienced workers coming out of Europe.”

Boosting the skills agenda

In May 2020, during the first wave of the coronavirus pandemic in Europe, clean energy actors including Schneider Electric, EuropeOn, Lighting Europe and the European Heat Pump Association wrote to the European Commission calling for it to “intertwine skills and climate in the upcoming EU and national recovery plans”. Funding should be made available for member states to “develop, circulate and incentivise skills for climate across Europe,” they said.

Since the national plans were only due at the end of April, it remains unclear to what extent different member states will prioritise skills, Fucci says. The technical professional education needed for the energy transition is often deemed by society in general to be less worthy than a university education, he adds. This misconception must be addressed, believes EuropeOn.

“We need good training centres, which are often underfunded with teachers who are not really incentivised to take pride in their job,” Fucci continues. ”We need more apprenticeships that are sold as a genuine alternative to university education and we need to attract workers from other sectors, particularly fossil fuel industries, and engage them in effective reskilling programmes.”

Hopkinson adds: “Industry, academia and government funding should work together to make sure everything that is done is fit for purpose.”

Reskilling for renewable energy job growth

Data from energy company surveys shows many companies are seeking to upskill existing workforces to meet their energy transition needs. Brunel University’s 2021 Energy Outlook revealed 64.7% of international companies were prioritising the “training and development of existing workforces” to fill the skills gap.

11. Respondents selected all that applied so answers exceed 100%. Source: Deloitte Renewable Energy Transition Survey

12. Source: GWEC

13. Workers rappel more than 300 feet off the ground from a 3 megawatt wind turbine at the National Wind Technology Center, Colorado. Photo: NREL

Lack of skilled staff is one of the main challenges for companies during the energy transition

Challenges cited by companies in Deloitte Energy Transition Survey (%)

Challenge	Share of responses
Lack of available renewable energy resources	16.9%
Electric vehicles too costly	16.2%
Difficulty in attracting, training and retaining talent with the right skills	15.6%
Intermittent renewable sources needing backup power	15.6%
Complexity of energy markets to procure renewables	14.9%
Lack of experience/knowledge about energy sources and markets	14.9%
Some processes cannot be electrified	14.6%
Complexity of power purchase agreement contracts	14%
Lack of overall strategy framework	14%
Insufficient funding or financing for projects	13.6%
Renewables difficult to access	13.3%
Lack of shareholder/investor interest	12%

11

77,000 more offshore wind workers will be needed across six leading markets by 2024

Forecast installations for key markets 2020–24 and associated workforce requirements

Market	Forecast installations (MW)	Calculated workforce requirements
US	5,720	14,300
China	19,000	47,500
Taiwan	3,579	8,948
Japan	860	2,150
Vietnam	1,100	2,750
South Korea	560	1,400
Total	30,819	77,048

12

13



In the UK, North Sea oil and gas workers are often seen as priority in the UK reskilling process. In 2019, 30,600 were directly employed in oil and gas in the UK. Scotland launched a £12m Transition Training Fund in 2016, followed by a £25m National Transition Training Fund and a £62m Energy Transition Fund in 2020.

"Most people on the ground would say these funds are hard to apply for, and the money is pretty limited considering the scale of the transition challenge," says Emden. "Retraining takes a long time, which these funds tend not to address. The sense is that these are usually more like a quick fix than a long-term strategy." Platform and FOE's 2020 survey of oil workers revealed that 91% of workers had not even heard of a "just transition".

Reshaping higher education

As well as retraining blue collar workers, there are moves to develop a new generation of graduates to lead the post-Covid clean energy transition. Durham University in the north-east of the UK, for example, is setting up a new Master of Energy Systems Management course to start in September 2021.

"There is a gap in the marketplace," says Joanna Berry, who established the course."It is not just about upskilling anymore. There are new skills required and these new skills sit at the interface of engineering, business and technology, with a bit of big data and a little bit of economics. There really aren't any qualifications out there that give people exposure to all of this."

The skills shortage could also be addressed by expanding the pool of potential workers away from the traditionally white, male demographic that tends to dominate positions in the energy sector.

"More diverse teams[…] are more innovative," says Jennie Stephens at Northeastern University in the US. "We know that when women, people of colour, indigenous folks and others who have been historically excluded are given opportunities for leadership, we bring different life experiences, different priorities and different perceptions of risk."

Diversity is very much at the heart of Berry's Master's programme. "I want to make it as mixed an international programme as possible," she says. "An increase in equality in a corporate environment means people work with people they would never otherwise work with. That is when the sparks fly. That's when new ideas and innovation happen." ●

This article was first published on energymonitor.ai.



14. Workers installing mirrored parabolic trough collectors. Workers construct one of a dozen thermos like molten salt tanks at Abengoa's Solana Plant. Solana is a 280 megawatt utility scale solar power plant (CSP) under construction in Gila Bend, Arizona, USA. When finished it will generate 280MW's providing over 70,000 Arizona homes with clean, sustainable power.
Photo: U.S. Department of Energy

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Renewable Energy Communities to Boost the Energy Transition in the Mediterranean

WRITER: **MARTA CASTILLO**

Two-thirds of global greenhouse gas emissions come from energy use, making energy the natural starting point for increasing our efforts to mitigate climate change. An effective energy transition requires active citizen engagement, and renewable energy communities (RECs) can play a key role in putting citizens at the center.

1

The renewable energy community of Monachil (Granada, Spain) brings together local residents to produce their own renewable energy sources (RES), whilst sharing surplus with other communities. Likewise, the Italian town of Magliano Alpi is another example of a town whose inhabitants are working together to make their town part of the energy transition through the establishment of a REC. Initiatives like the ones in Monachil and Magliano Alpi have multiplied in recent years, especially since the European Union (EU) introduced the concept of energy communities into its legislation through the Clean Energy for all Europeans package.

The 2019 European Directive for an internal electricity market introduced new rules to engage citizens in energy production, either individually or through energy communities, "by generating, consuming, sharing or selling electricity, or by providing flexibility services through demand-response and storage". Furthermore, the revised EU Renewable Energy Directive (RED II) – part of the Clean Energy for all Europeans package – included new provisions to support RES 'self-consumption' – i.e., consumers' production of their own energy.

The RED II established the EU's target of ensuring that 32% of Europe's energy supply come from RES by 2030, in line with the EU Green Deal's goal of cutting overall greenhouse gas emissions by 55% by 2030. Some progress has already been made, with 20% of energy usage coming from RES in 2020. However, there is a long way to go to reach the EU Green Deal's target of making Europe the first climate-neutral continent by 2050.

What is a renewable energy community?

The definition of an RES may change according to the local context, but the European Commission Joint Research Centre offers the widely accepted definition of "collective energy actions that foster citizens' participation across the energy system". The degree of community involvement varies, but RECs' commonality is the participants' willingness to work together to meet their own energy needs, offering renewable energy to the community's members at affordable prices.

1. Placing solar panels on the roof, part of the photovoltaic system at the off-grid Almacen, Riocaliente, Asturias, Spain. Photo: Neil Cummings

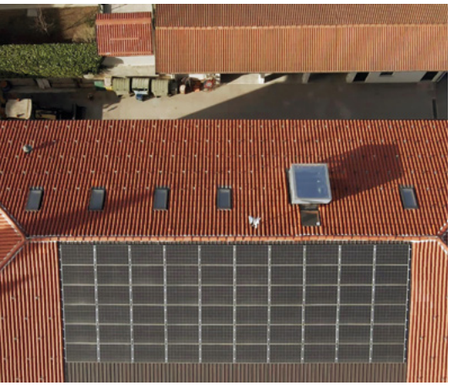
2. Barrio de la Vega, Monachil. Photo: Sigmagno



Renewable energy communities' commonality is the participants' willingness to work together to meet their own energy needs.



3



4

Among the many benefits of RECs – such as cutting emissions or reducing members' electricity bills – is the possibility of reducing energy poverty. Energy poverty occurs when a household has insufficient energy resources to fulfill their basic needs. This challenge has gained prominence in recent years, as it is estimated that over 50 million households in the EU experience energy poverty, according to the EU Energy Poverty Observatory. Access to energy services is essential to guarantee a decent standard of living and health for all citizens. High energy costs, low household income and inefficient buildings are the main causes of energy poverty, and the establishment of RECs can help tackle at least one of these.

RECs also have a positive effect on the economy, creating jobs and business opportunities. Sergio Olivero – Head of Business & Finance Innovation at the Energy Center of the Politecnico di Torino – affirms that "two months since the launch of the REC in Magliano Alpi, we have significantly increased the number of photovoltaic installations, supporting the local economy through their involvement in the installation and maintenance of the RES facilities, thus boosting local service supply chains and boosting local economic growth – especially important in the context of COVID-19". Olivero also confirmed that local energy production "fights energy poverty", as part of the value created can be shared with people who need energy support.

However, RECs are still a recent concept legally at the EU level, as they were only officially recognized in 2019. To establish a REC, the RED II must be adapted and integrated into the national laws of each member state – a long process that can delay the application of these laws at the local level. For example, in Spain the RED II and the Directive for internal electricity market have not yet been integrated into national law. The Royal Decree-Law approved in 2020 regulates the collective self-consumption of RECs, recognizing that these are autonomous legal entities that provide open and voluntary participation with democratic governance. Even though a complete regulatory framework is not yet in place, this decree provides a minimum legal framework for RECs to flourish across the country, such as in Monachil and the Vall d'en Bas.

The situation in Italy runs in parallel to that in Spain. In 2020 Italy legally recognized collective self-consumption of RES in its so-called 'decreto Milleproroghe' – roughly translatable to 'decree of a thousand extensions'. Magliano Alpi is a leading example in Italy, highlighted by ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development) as a REC model to be replicated in the future. In December 2020 Magliano Alpi established its REC 'Energy City Hall'. With its 20-kWh photovoltaic system installed on the roof of the town hall, the municipality shares the energy produced, acting as coordinator of the REC, as well as an energy producer and consumer.

Whilst focus has typically been put on renewable energy infrastructure, citizens' participation in the energy transition has been largely ignored – until the launch of the European Commission's Clean Energy Package. But regardless of this legal recognition, according to an Interreg Europe policy brief: "community-owned infrastructure remains an underappreciated approach in many countries, despite the many benefits compared to the current energy system, which primarily benefits large corporations at the expense of communities and citizens".

Renewable Energy Communities in the Mediterranean

Monachil and Magliano Alpi are two of the nine Mediterranean municipalities that have been selected by the Interreg MED Renewable Energy community to become Flagship Cases to implement and mainstream the project's multilevel governance model: the Ecosystemic Transition Unit (ETU). The town of Ragusa in Sicily (Italy) and the rural municipality of Vall d'en Bas in Catalonia (Spain) are the other flagship cases focusing on establishing RECs in their

3. Panoramic view of the valley where the municipality of Vall d'en Bas is located. Photo: Municipality of Vall d'en Bas

4,5. View of the municipality of Magliano Alpi with the photovoltaic installation in the town hall roof. Photo: REC Magliano Alpi

6. Panoramic view of the old town of Ragusa. Photo: Jonas Tebbe



5



6

municipalities. Ragusa and Vall d'en Bas – unlike Monachil and Magliano Alpi – don't yet have active RECs, but with the support of experts from the Interreg MED Renewable Energy Community, they are engaging with their citizens to achieve this goal.

The ETU – with a set of open-access practical tools – acts as a roadmap for municipalities in rural and island areas to join the green energy transition, based on social innovation. Rural and island communities are especially vulnerable to climate change, as many of their livelihoods – such as agriculture – depend on the environment. Building resilience and promoting renewable energy in these areas requires a particular approach, using the energy transition to generate jobs, and revitalize rural areas.

Monachil, Magliano Alpi, Vall d'en Bas and Ragusa – together with Procida in Italy, Brdovec in Croatia, and the Greek islands of Naxos, Small Cyclades, and Skopelos – are receiving personalized support from the Interreg MED Renewable Energy community to adapt and apply the ETU Toolbox to elaborate or update energy policies, projects or campaigns to boost the green energy transition in their territories. Experts from the community's network are adapting the ETU tools and methodologies to the needs and interests of each case, supporting participants in becoming leaders in their region's energy transition.

The Energy Community of Los Pedroches in Spain is also participating in the ETU mainstreaming process, as an Assessment Case, due to its unique territorial characteristics. Los Pedroches is made up of 17 municipalities which aim to establish up to 20 local energy communities, six of which will have a biogas plant to use livestock waste to generate RES, making the most of their local resources and creating a circular economy energy production.

The Consortium Oltrepò Mantovano is also joining the ETU Initiative as an Assessment Case. Oltrepò Mantovano – an area in the Italian region of Lombardy – is made up of 20 municipalities that with the support of the ETU Initiative's experts, will create a REC to coordinate local energy production and consumption. The Consortium also aims to design a Sustainable Energy and Climate Action Plan (SECAP) for the region, following a bottom-up approach to strategically plan climate change mitigation and adaptation actions until 2030.

The mainstreaming exercise of the ETU Initiative through these nine unique municipalities across the Mediterranean provides an opportunity to boost the renewable energy transition in rural and island areas, whilst putting citizens at the forefront. However, governments need to move fast to update legislation, paving the way for RECs to maximize their potential to reduce greenhouse gas emissions, revitalize local economies, and bring together local communities.

Learn more about the ETU Initiative – run by the Interreg MED Renewable Energy project – at: etuinitiative.eu



7. Photovoltaic plant ground mounted with string inverters in Italy. Photo: Sungrow EMEA

ECOSYSTEMIC TRANSITION UNIT ETU

HOW CAN WE BRING RURAL AND ISLAND AREAS TO THE CENTRE OF THE ENERGY TRANSITION?

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The ETU Initiative is based on five principles:

- **Holistic response to climate change**
- **Territorial equity**
- **Social innovation**
- **Green economy**
- **Cooperation & Commitment**

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Join the ETU Initiative! Sign our Letter of Commitment to support the mainstreaming of the ETU model and the energy transition in your region.

Together we'll create a resilient future.

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VIEWS

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↑ **Lille, France**

Since the end of 2020, the heating network in Lille, connected to the metropolitan energy recovery center, has been able to produce electricity and supply hot water to public facilities such as town halls, swimming pools and social housing, thanks to the combustion of household waste in Halluin waste-to-energy center.

Photo: Vincent Lecigne / Métropole Européenne de Lille

↑ **Lille, France**

This "heat highway" of 20 kilometers of pipes makes it possible to reach 60% of energy from renewable sources and to supply the equivalent of nearly 25,900 homes, a supply that will continue to increase gradually.

Photo: Vincent Lecigne / Métropole Européenne de Lille

↑ Vienna, Austria

The new “Neues Leben” in Vienna is the first subsidised housing project to use concrete core activation. A highly ecological, resource-efficient energy system supplies this project with heat, cooling and hot water. Photo: C. Fürthner / City of Vienna

↓ Pau, France

Fébus, the world's first 18-meters-long hydrogen powered bus, designed for and with the city of Pau. Photo: Cyril Garrabos / CAPBPB

↑ Striano, Italy

The city of Striano is leading the charging infrastructure and electric car sharing services set up as part of the e-mobility plan undersigned by 8 neighbouring municipalities in the Metropolitan City of Naples. Photo: Luigi Acquaviva

↓ Frankurt Am Main, Germany

The newly rebuilt Dom-Römer area combines the “old look” with new energetic requirements and consumes between 1/3 and 1/4 of the heat energy of new buildings, even with the strict requirements of heritage protection. Photo: Salome Roessler

↑ **Rijeka, Croatia**

System of public electric-bicycles. It consists of 4 terminals and 28 e-bicycles. They are used on average 400 times a month.

Photo: City of Rijeka

↓ Pau, France

Fébus, the world's first 18-meters-long hydrogen powered bus, designed for and with the city of Pau.

Photo: Cyril Garrabos / CAPBPB

↓ Pau, France

The Halls of Pau: an efficient and ecological lighting system, highlighting the architecture In accordance with the principles of the City of Pau lighting plan.

Photo: Adrien Basse-Cathalinat / CAPBPB

↑ Vienna, Austria

The electricity generated by this solar power plant is used to power the on-site pumping station, which supplies Vienna's drinking water. Around 600 households are supplied with the locally generated solar power. Photo: C. Fürthner / City of Vienna

↓ Frederikshavn, Denmark

Saeby District heating plant, where the company has successfully integrated solar heat for the production of district heating and thereby displaced the combustion of large amounts of fossil fuel in the form of natural gas. Photo: Pouli S. Rugholt

↑ Rijeka, Croatia

This solar roof was the first crowd-lending project in Croatia for the first citizen energy project. The required amount was collected in ten days by 53 small investors, based on a micro-loans model. Photo: Green Energy Cooperative

↓ Rijeka, Croatia

A new kindergarten with solar collectors for the preparation of hot water and a photovoltaic power station. Both rainwater and the electricity produced are used in the building. Photo: La Vie Studio / City of Rijeka

↑ Koprivnica, Croatia

A wooden kindergarten in Koprivnica Croatia, after an extensive, innovative transformation to both its exterior and interior.

Photo: Regional Energy Agency North, Croatia



↓ Pau, France

Deployment of a 44km heating network to accelerate the decarbonization of the Pau municipality by promoting renewable energies in its territory.

Photo: Cyril Garrabos / CAPBPB

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Circular Appliances: Building a More Sustainable EU Market.

WRITER: **PAOLO FALCIONI**



The home appliance sector pursues circularity throughout the entire product' lifecycle. The routes to circularity are many. In the EU, a circular economy that works for its citizens must build on a coherent EU policy framework that pursues a higher degree of sustainability, while preserving the Single Market, promoting industrial competition and innovation.

1

Over the last few decades, home appliances have delivered increasingly higher efficiency standards. Circularity, in fact, is enhanced throughout all the life stages of a device: it starts with raw materials followed by the design of the product, through production, use and consumption, repair, and recycling. At this latter stage, recycled waste is injected back into the economy as a secondary raw material and the cycle begins again. In a circular economy, products serve their purpose for as long as possible and then are turned into other home appliances or different tools including benches or bicycles, continuing to offer a service to users. There are a variety of ways to drive resource efficiency and manufacture sustainable products that advance the circular economy: targeting at-source material efficiency, for instance by reducing the quantity of material used in the creation of products, increasing the efficiency of products during their use phase, using more sustainable materials, designing for durability and repair as well as for recovery. Moreover, a whole new range of sustainable alternatives such as product-as-service models and digital solutions, for instance, are underway and can contribute to a better quality of life, innovative jobs and upgraded knowledge and skills. These new sustainable goods, services and businesses, together with traditional sales models, can contribute to foster more sustainable consumption patterns.

Product durability

Long lasting products reduce resource consumption and waste. Product durability is a key aspect to consider, it is a central element of Europe's approach towards circularity, and it is fully supported by the home appliance sector. It is also in the interest of manufacturers to sell products that last, as their brand reputation could be at stake. Therefore, enhancing products' durability is a desirable goal for all.

With regards to the repair phase, home appliances are repairable today. According to data collected from the membership of APPLiA – a Brussels-based trade association that provides a single, consensual voice for the home appliance industry in Europe – 91% of requests to manufacturers for a repair of a product resulted in an actual repair in 2018. In this context, consumer protection and safety are key elements for maintaining trust with consumers and not to jeopardize efforts for implementation of the circular economy. It is not enough for a product to be repaired; it must be repaired right. In fact, the repair of products needs appropriate technical skills that most consumers or non-professional repairers do not have. If an appliance is not properly repaired, and safety testing procedures are not respected, consumer safety within the home could be indeed compromised.



2

A circular culture

At the recycling stage, there are gaps to be closed. Today, 90% of the materials coming from the officially collected appliances, when they have reached their end of life, are recovered, recycled and ready to enter again into manufacturing loops. For this to happen all waste would need to be effectively tracked and reported. However, two-thirds of precious resources remain undocumented and is not coming back into material loops as secondary raw materials, making it unclear how this waste is collected and thereafter treated. The waste market should set the right requirements ensuring that all waste is correctly collected, reported, and treated, providing a sufficient competitive economic environment for all involved actors.

All of this builds up what APPLiA calls a "circular culture". Achieving it entails a circular process as applied through all the life stages of appliances. With the purpose of facilitating its implementation, APPLiA has developed a central website for the public, providing several supportive pieces of information and guiding EU citizens through a product's lifecycle, building upon concrete data. With this culture at the heart of its processes, the Association continues to play an active role in making products placed on the EU market more sustainable.

1. Photo: Carlos Lindner

2. Photo: APPLIA

The Importance of Small Business to the Energy Transition

WRITER: **JOSH FRANKLIN-MANN**

Climate change is accelerating, which, according to scientists, reflects both our government's and our society's inability to fully embrace the growing urgency of the climate crisis. Now, as we focus on politicians and 'big-business' to lead the way in the pursuit of zero-carbon emissions, it is vital that small businesses are not left behind in the energy transition.

1

Focus of the energy transition

With the public and political rhetoric surrounding 'the energy transition' predominantly focused on the way in which we generate energy, we are neglecting that our entire society needs significant reforms if we are to achieve zero carbon emissions. Of course, turning our back on fossil fuels is important, but changing the practices of both businesses and citizens and creating a more energy efficient society is also crucial if we are to achieve the climate targets that are now slipping ever further out of reach.

Yet if the climate goals set out in the Paris Agreement can still be achieved, energy efficiency will play a key role as we embark on this transformation. There have already been several actions from the EU related to this topic, not least the Energy Efficiency Directive first published in 2012. Energy efficiency is also recognized by 89% of EU citizens as a vital issue that needs to be reflected in government targets.

Transforming our energy production methods is long overdue. Even though there are still significant investments in fossil fuels, public opinion in Europe leans heavily in support of renewable energy sources. According to the special EU barometer survey on climate change conducted in 2019, 92% of Europeans recognize the climate crisis and the urgency with which we need to transition to clean energy.

It is no surprise then, that the EU has responded in recent years by setting out its vision of a global energy sector based largely on renewables by 2050. The wording may be deliberately *largely* vague, but it represents a coordinated political effort towards cleaner, greener energy production, that is also finally seeing increased support in the United States.



2

As well as the environmental benefits that come with decreased energy use, there are economic gains to be made, too. Big businesses spend billions of euros on energy each year, making energy efficiency a big business in itself.

This is not something new. Over the last decade companies such as IKEA and Walmart have made moves to make their businesses self-sufficient in terms of their energy supply, using solar panels, biomass, and biofuel to power their operations. Now, with the increased benefit of the visibility among consumers that comes with 'going green', energy efficiency is more profitable than ever for big businesses.

But these businesses have both the resources in terms of capital and manpower to be able to achieve these efficiency updates to their business. As far back as 2013, global companies such as Holcim, a Swiss building materials company, were spending huge sums solely on becoming more energy efficient (Holcim were spending over €85 million on their energy efficiency department). Since 2009 IKEA has also invested over €2 billion in renewable energy and energy efficiency.



Yet while big businesses are spending big to become more energy efficient, citizens and small businesses are falling behind. According to the 2019 EU climate change survey, while many citizens are taking simple steps such as replacing light bulbs with LEDs, just 12% of citizens are taking bigger steps such as choosing cars with more efficient fuel consumption, and just 16% are installing any kind of equipment in their homes to reduce their overall energy consumption.

1. Solar powered irrigation pump on a cattle farm. The cost of three of the new solar panels was covered through government funding.
Photo: Lance Cheung / USDA

2. IKEA Southampton's solar PV rooftop array.
Photo: Department of Energy and Climate Change UK

3. A retro lamp with LED filament to get the look of ancient filament bulbs. Photo: Mika Baumeister

4. 105 solar panels being installed at a veterinary hospital. The hospital received a grant to have solar panels installed to help reduce their carbon footprint and to have cost effective electric power for the hospital. Photo: USDA

So, if big businesses are acting when it comes to energy efficiency, why are citizens and small businesses not taking similar action? And why are they important to the energy transition?

What is an SME?

- Has under 250 employees
- Has an annual turnover less than €50 million euros, or a balance sheet under €43 million.

The heart of the European economy

Small and medium-sized enterprises (SMEs) make up 99% of all businesses in the EU, with 86% of those classified as a micro business (fewer than 10 employees). They also employ 60% of the total workforce and account for 13% of global energy demand. This may appear to be a low number, but it is far from insignificant, with his energy demand equating to approximately 10 billion barrels of oil – annually.

Cost-effective energy efficiency measures have the potential to reduce SME energy consumption by as much as 30%, more energy than Japan and South Korea consume annually combined.



4

Not only would these measures represent huge savings in terms of carbon emissions, but would also be a boon financially for business that are struggling in the wake of the COVID-19 pandemic. Yet despite the benefits, many SMEs are not taking the necessary steps to take advantage of these savings.

Barriers to energy efficiency

Data from the Carbon Trust shows that while 80% of SMEs are taking some action on energy efficiency (mainly 'low hanging fruit' actions such as replacing lightbulbs), over two-thirds of businesses do not have any kind of documented energy efficiency policy. Without any clear structured plan, any savings that are made will be unsustainable.

The reality is that most SMEs simply do not have the resources on their own to pursue significant, lasting energy efficiency changes to their business. They do not have specialist energy efficiency departments or managers, do not have the spare capital to invest in the infrastructure needed to maximize energy savings, and simply do not have the time it takes to implement changes to their businesses while they are struggling with the day-to-day tasks required to keep their businesses afloat.

The conclusion is: small businesses need more support to become energy efficient.

Helping SMEs find the support they need

Support programs for SMEs do exist at both the EU and national level, yet many SMEs are unaware that these programs exist, find the application processes to confusing, or simply lack the manpower to pursue the funding available.

The confusion for SMEs is hardly surprising. Supporting measures are spread across several funding programs both at National and European levels. Policy-making and policy implementation on SMEs also involve several Ministries (national level) or DGs (European level). Energy policy in small-medium sized businesses is at least interrelated with other issues such as environment, safety, competitiveness, digitalization, all covered by different managing Authorities. Even those well versed in European politics struggle to untangle the web of agencies within the EU, so it is impossible to expect a small business to do so to get funding for potential future savings.

With this complex network of representation reflected across the EU at a national level, it becomes a significant barrier for SMEs to get access to the funding available to them.

The first step to making better policies for energy efficiency in SMEs is to provide policy makers with clear data and evidence-based assessments. Without data, impartial assessments, and a clear view of the real needs of the enterprises, any policy has high chances of failure or at very minimum a lack in effectiveness.

Enrico Biele, LEAP4SME Project Coordinator, ENEA

5. Business owner qualified for help with the photovoltaic array (solar panels) to reduce the cost of operating his storage facility. Photo: USDA



Clear and effective policies

The EU is recognizing that more needs to be done to get clear, effective policies in place to help SMEs become more energy efficient. For example, the Horizon 2020 funded project – LEAP4SME – is working towards creating effective policies for SMEs to undergo energy audits, and in-so-doing implement cost-effective, recommended energy-saving measures.

The project recently completed its initial research, mapping SMEs in Europe, breaking down their sectors, employment levels and their total value added to the economy. Given the diversity of SMEs, from small corner shops to larger manufacturers, this is vital work if we are to be able to optimize funding pathways and unlock both future energy savings and economic benefits.

Cost-effective energy efficiency measures have the potential to reduce SME energy consumption by as much as 30%, more energy than Japan and South Korea consume annually combined.

No 'one-size-fits-all' approach

SMEs are an integral part of our economies and our communities. In many parts of Europe, they are the heartbeat of towns and villages and bring us all together. Supporting them in their efforts to increase energy efficiency can help galvanize these communities behind a common goal of being more sustainable in our energy usage.

Some municipalities have been trying to do just that. A study conducted in Sweden showed two examples of programs designed to help SMEs become more energy efficient and implemented by municipalities. One offered free energy audits and offered an investment plan for businesses taking part in the project. SMEs did not have to have to offer any of their own resources and the municipality managed everything every step of the way, including providing energy consultants, setting audit costs, choosing suppliers, and providing SMEs with information. This top-down method, described by participating businesses as 'rigid', had limited success in the uptake of energy efficiency measures.

Energy efficiency networks

Meanwhile a second study focused more on a network-based approach where participating businesses received an energy audit, but then analyzed each other to learn from the mistakes being made. This method, which resulted in active learning and gave each SME leadership over the process, yielded far better results than the top-down approach. Energy-saving measures that were relevant to each SME were implemented, rather than attempting a 'one-size-fits-all' set of changes that would have faced resistance amongst the businesses taking part.

Projects like LEAP4SME are trying to learn from examples such as these – through capacity building activities and analytical research we can better understand the needs of SMEs, and the challenges that they face. With this information policies can be developed at the EU, national and regional levels that can truly create lasting, sustainable change.

If we as a society are to truly embrace the energy transition, it is essential that we foster practices of sustainable energy use at all levels of society, from households to small business to multinationals – we all must work to create a fairer, greener society that lasts the test of time. ●

LEAP4 SME

ENERGY AUDIT POLICIES TO DRIVE ENERGY EFFICIENCY

Identifying the barriers for unlocking energy efficiency measures

Mobilising private stakeholders

Proposing effective solutions to realise both energy and non-energy benefits



LEAP4SME is supporting EU Member States and the UK in establishing or improving effective policies for small and medium-sized enterprises to undergo energy audits and implement cost-effective, recommended energy-saving measures.

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The Rising Tide of Energy Communities

WRITERS: **SARA TACHELET AND HELEEN SCHOCKAERT, RESCOOP.EU**



1

Community energy is key to action on the climate crisis. It can empower people, boost local economies, and reinvigorate communities. Community-led initiatives play an important part in the transition towards a just and 100% renewable energy future. Success stories of community energy projects can be found all over Europe. Telling and sharing these stories can accelerate the movement towards a cleaner and more democratic system by inspiring others.

COMPILE, a H2020 project that is supporting the set-up of energy communities in closed or poorly connected systems, has collected a set of best practices from community energy projects across Europe. The aim is to democratize the European energy system by providing solutions for energy communities to grow and flourish. To support this aim, the project has developed a Best Practice Guide, which brings together experiences from the community energy movement across the continent and provides ideas and inspiration to take action.

Setting direction, inspiring change

The guide is built to inspire existing energy communities to broaden their scope and consider new activities and innovative collective models to engage in energy transition projects. These examples may also inspire other organizations and citizens to find the direction they want for themselves when trying to define their role in the energy market. Moreover, they can inspire national policy makers to put in place national policy frameworks that foster the emergence of energy communities. Finally, local authorities – including cities and municipalities – may find the examples useful and relevant to consider when making and implementing sustainable energy and climate action plans at the local level.

Starting small, taking it slow

Before diving into already existing cases of successful community energy projects, the Best Practice Guide lists some general tips and trends on how cooperatives tend to get up and running in the European context.

The first question to ask yourself when embarking on a cooperative adventure is 'what is the service you want to provide to your community?'. Cooperatives are created for many different reasons: to tackle climate change, to change energy systems, to create neighborhood action groups, etc. However, a common thread among energy communities is the commitment to create social innovation and to engage in economic activities with non-commercial aims. That social embeddedness of energy communities is often already apparent in the origin stories of these initiatives, with many community energy stories starting with conversations across a kitchen table, at the counter of a local café or in a parent-school board discussion. It is with this strong social rooting that most of them found themselves and were able to grow and expand their activities and reach by starting small and taking it slow.

However, the commitment to non-commercial aims and social engagement does not mean that money and profits are of no concern for community energy projects. Dirk Vansintjan, President of REScoop.eu, the European federation of citizen energy cooperatives, suggests that projects "start with a small but profitable investment project" and "try to find a project that will bring money to the cooperative, in order to finance staff time, which is crucial for the development of future projects."

The next questions for a community energy project are how to decide on the activity or activities to get your community involved in and how to make those activities future-proof.

A wide scope of activities

Community energy initiatives perform a wide range of activities across the energy sector in order to provide services or other socio-economic benefits to their members and local community. Today, we have cooperatives dealing with renewable energy generation, provision of energy efficiency services (including buildings renovations), retail supply, distribution (of both heat and electricity), storage, flexibility services, aggregation, and electro-mobility services. The Best Practice Guide provides examples of all these types of activities, energy services and citizen-led partnerships to inspire people to take action.

Limitless ingenuity

By taking a closer look at existing energy communities, the Best Practice Guide reveals that they are incredibly diverse when it comes to ownership, governance, organizational structure, scale of activities, type of activities, energy sources used, financing mix, etc. However, what these examples have in common is an immense and limitless ingenuity to cope with the (sometimes difficult) context in which they sprout, and later, try to expand. Examples of successful community energy stories cleverly taking root in different contexts are already abundant in the energy sector.

The need for climate action has never been greater and the potential for community energy across Europe is enormous. Research conducted by CE Delft in 2016 revealed that over 264 million European citizens (about half of the European population) could be producing their own energy by 2050 at home or together in energy communities. The COMPILE Best Practice Guide demonstrates the importance and effectiveness of the community energy movement in tapping into this great potential. ●

1. Westmill Solar Co-operative members celebrate their successful share raise to buy what was (at the time) the world's largest solar energy cooperative. The landowner and green activist and his wife, who worked so hard to make the project a reality are in the centre of the picture along with some of the 1,600 members who raised the funds for the project. Westmill in Oxfordshire (UK) - 2013. Photo: Westmill Solar Co-operative.

2. Visit of some Som Energia cooperative members to the Fontivsolar solar plant. The plant was built thanks to the contributions of 3,745 people and it produces electricity to supply 690 homes. Fontiveros, Ávila (Spain) - 2018. Photo: Som Energia Cooperativa.



Energetic Women Taking a Stand

WRITERS: **SARA TACHELET AND HELEEN SCHOCKAERT, RESCOOP.EU**

According to a 2019 IRENA study, women represent only 32% of the renewable energy sector and 22% of the oil and gas industry. The same study reveals that, on average, only one-third of senior management positions are occupied by women. These bleak trends and numbers are just some examples of the many gender disparities that are still prevalent within the energy sector. They are evidence of the significant barriers women still face within the energy field.

Gender (in)equality in energy cooperatives

What goes for the overall energy sector, is unfortunately also true for the community energy sector. Within these citizen-led initiatives, too, despite the progress made, a gender gap still exists concerning female participation, average ownership rate, visibility, and representation in management positions. Moreover, energy communities often struggle to attract female members, especially women from vulnerable groups. Addressing gender gaps within the energy sector will be crucial in tackling energy poverty, a phenomenon that disproportionately affects women.

In recent years, however, energy cooperatives have increased their efforts to close the gender gap within the energy sector. In line with this, REScoop.eu has signed the Charter of Commitment on Equality between Women and Men in Cooperatives by Cooperatives Europe:

"Cooperatives provide decent employment and help reduce inequalities that affect the most vulnerable people, including women. The equality between women and men and for all is at the core of the cooperative identity and as well as of the European Union."

The power of gender

Gender-just energy communities increase social acceptance and trust, tend to be more effective and have a broader scope of activities. Involving people of all genders in the energy transition means that more expertise and capacity becomes available, something that is needed for the transformation of our energy system. In fact, a gender perspective on the energy transition offers the opportunity to develop a socially-just energy sector that is free from any form of oppression related to race, age, class, ethnicity, nationality, abilities, and global North/South divide. Gender-just energy communities help reduce emissions while addressing inequality through job creation and improved access to energy.

An inspiring example

The example of Troya Energy Cooperative is an inspiring story about the power of women in the energy sector. It is a story of hope in a country where women's rights are currently at stake amidst a tumultuous public and political debate.

Troya Energy Cooperative was established in May 2017 in the north of the Çanakkale province in Turkey. Back in 2009 common concerns over the changing climate led to the establishment of the Troya Environment Association. The aim of the Association was to strengthen local communities in climate protection activities. The impetus was plans to establish 13 coal-fired thermal power plants in the region.

As the local communities were looking for ways to protect their local environment against these plans, the concept of a renewable energy cooperative caught their attention. At that time, no such initiatives existed in Turkey, but examples from Europe inspired them to research the possibility of producing their own green and sustainable energy and establishing their own renewable energy cooperative.

A legislative boost

In March 2016, thanks to the unwavering commitment of community energy advocates, not least the three women who would later form the board of directors of Troya Cooperative, the concept of renewable energy cooperative was introduced into Turkish law. This created promising perspectives for citizens who wanted to take matters into their own hands. That same year, the Troya Association started organizing international conferences on energy cooperatives, inviting guests and experts from all over Europe. The aim of these conferences was and is to develop and strengthen the community energy movement across Turkey and Eastern Europe. Strikingly, over the years, half of all participants were women, even though women in Turkey are still highly underrepresented in the energy sector compared to other economic sectors.

Empowering Women

This brings us back to May 2017. Eight members of the Association not only founded the first energy cooperative in Turkey, but also placed women at the center stage. Oral Kaya, general manager of Troya, emphasizes the importance of women's participation in their cooperative and beyond:

"Not only does our entire board consist of women, 57% of our cooperative members are women. We want to set an example and inspire (Turkish) women to become part of the energy transition. We hope that the women in our cooperative, as change agents, can open doors for women participation in other sectors of the economy as well."

On International Women's Day 2020, the Turkish Association of Energy Economics awarded the board of directors of Troya Cooperative as 'Energetic Women of the Year'. They were applauded for their role in bringing about the 2016 legislative changes and their continued efforts to support the movement and empowering other women to become active participants in the transition towards a sustainable future.

A bumpy road

Unfortunately, the path towards a sustainable and just future is never free of obstacles. In 2019, plans were being finalized to kick off the cooperatives' first solar park. However, legislation changed again, leading to the cancellation of the project and disrupting the plan to become their own renewable energy producer. Only a handful of community initiatives managed to complete their renewable energy project before the amendment. However, many other Turkish energy cooperatives, including Troya, can only keep on fighting. Despite the drawback, the cooperative keeps on avidly promoting the use of renewable energy and advocating for the empowerment of women in the energy sector.

The path towards a gender-just energy transition

REScoop.eu, the European federation of citizen energy cooperatives, a growing network of 1900 cooperatives and their 1,250,000 citizens who are active in the energy transition is committed to strengthen and coordinate the network's activities in closing the gender gap in the energy transition.

Energy communities from all over Europe share the vision for a future where "women are deeply involved in their local energy communities and actively contribute to the development of decentralized citizen-centered renewables systems". A future in which "more female faces supporting the mission and day-to-day operations of renewable energy cooperatives will become visible", and in which the sector will go beyond the issue of representation, and be able to consider, evaluate, and "benefit from the specific added value of women".

The gender-just energy transition will only succeed if citizens and their communities are involved.


Solar heat. Photo: GREENoneTEC


COOPS. Photo: Westmill Solar Co-operative


Heat pump. Photo: Thomas Nowak

The Energy Transition

For this year's energy issue REVOLVE reached out to its partners at DecarbEurope for images that best represented the energy transition in their industries. The result is a cross-section of the work being done across a range of sectors – from geothermal energy to heat pumps – all pushing Europe towards a low-carbon economy.

DecarbEurope engages decision-makers in policy and industry with solutions that can, in a cost-effective manner, decarbonize Europe. With a growing membership representing more than 20 sectors, the initiative connects technologies, policies and markets to drive the energy transition. To learn more visit decarbeurope.org


COOPS. Photo: Som Energia Cooperativa

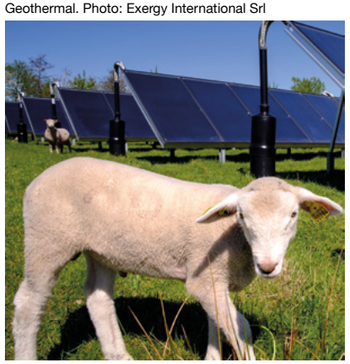

Solar heat. Photo: GREENoneTEC


Solar heat. Photo: GREENoneTEC

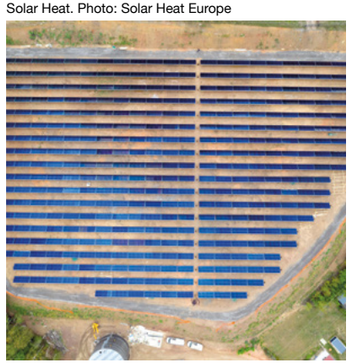

Geothermal. Photo: Exergy International Srl


Ocean Energy. Photo: Colin Keldie / Ocean_2G


Solar Heat. Photo: Solar Heat Europe

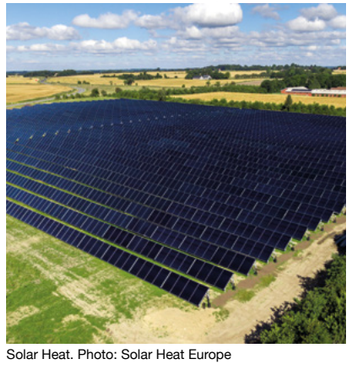

Solar heat. Photo: GREENoneTEC


Ocean Energy. Photo: Colin Keldie / Ocean_2G

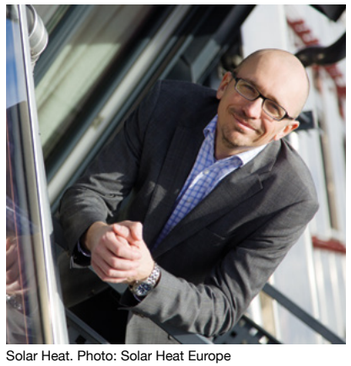

Solar Heat. Photo: Solar Heat Europe

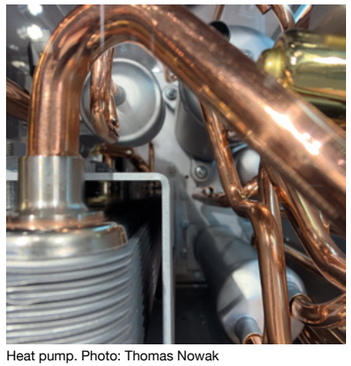

Geothermal. Photo: Exergy International Srl


Heat & Power. Photo: Vattenfall Wärme / Euroheat & Power


Solar Heat. Photo: Solar Heat Europe


Green hydrogen. Photo: Colin Keldie / EMEC

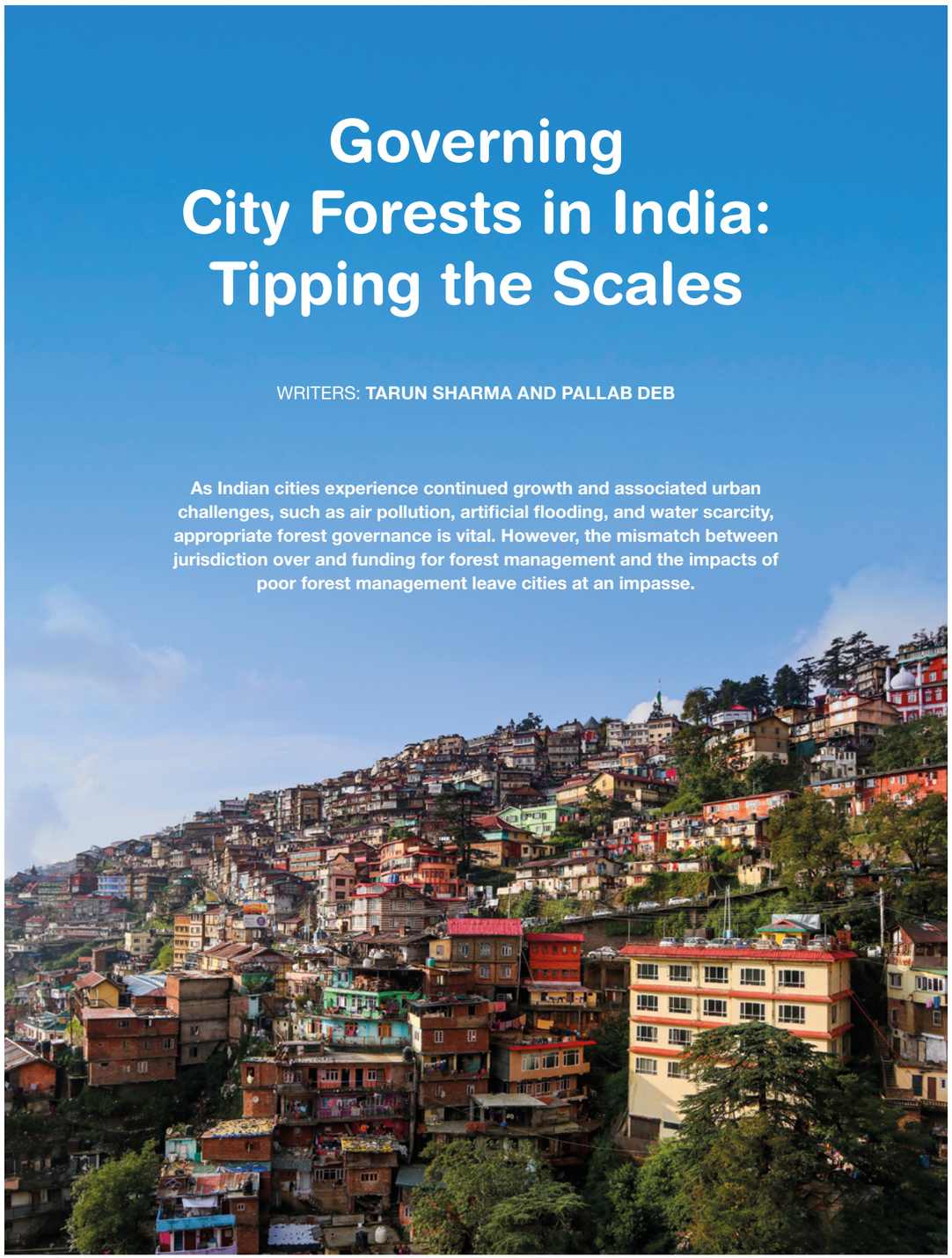

Solar Heat. Photo: Solar Heat Europe


Heat pump. Photo: Thomas Nowak

Governing City Forests in India: Tipping the Scales

WRITERS: **TARUN SHARMA AND PALLAB DEB**

As Indian cities experience continued growth and associated urban challenges, such as air pollution, artificial flooding, and water scarcity, appropriate forest governance is vital. However, the mismatch between jurisdiction over and funding for forest management and the impacts of poor forest management leave cities at an impasse.



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The last few years has seen the Indian government introduce multiple policies and national programs for urban renewal and development. These policies seek to make cities smart, with better infrastructure and service provisions, but there have been none that are solely focused on the environmental aspects of the cities. It is no surprise that Indian cities have been regularly featured in the lists of most polluted cities in the world and water-rich cities have begun to run out of water. However, though cities face the brunt of these problems, city governments are seldom able to do much on their own given jurisdiction and resource constraints.

These limitations continue despite the watershed 74th Constitutional Amendment Act (CAA), 1994, which recommended transfer of 18 broad categories of services from state governments to city governments. The 74th CAA also made legislative space for a corresponding transfer of funds and functionaries, however, as multiple studies have shown, this transfer has been incomplete. State governments across the country continue to perform most of the functions and have only devolved some functions such as solid waste management and issuance of birth and death certificates to city governments.

One of these un-devolved functions is 'Urban Forestry, Protection of The Environment and Promotion of Ecological Aspects', and further, the CAA itself does not define the activities under this function. According to a pan-India study on decentralized urban governance undertaken by Nagrika, city officials reported the development and maintenance of public parks and gardens, and city beautification as 'urban forestry'. Most of the trees that various municipal governments are responsible for are those along the roadsides. Based on our research at Nagrika, some of the key functions under Urban Forestry as per the state municipal acts and the actual functions performed by the cities are as follows:

1. City beautification
2. Greenery drives
3. Maintenance of existing forests
4. Promoting social forestry
5. Planting of trees
6. Relocation of trees
7. Environmental awareness
8. Removing noxious vegetation

CITY	FOREST COVER	CITY AREA
Haridwar	2.83%	23.56 sq km
Guwahati	9%	219.06 sq km
Ranchi	12.8-15.59%	175.12 sq km
Chandigarh	19.32%	105.68 sq km
Shimla	25%	35.34 sq km
Dharamshala	39.43%	12.3 sq km



2

Who Takes Care of Urban Forests?

State governments' forest departments are the governmental bodies most frequently tasked with the management of urban forestry. As per our research, other institutions involved include Environment and Wildlife Departments, Development Authorities, and State Pollution Control Boards - all under varying control of the state governments. Interaction between these bodies and city governments remain tense, with minimal collaboration between them even in areas of overlapping jurisdictions.

On the left are five cities with varying population ranges (0.05 million to 2.4 million) as well as varying forest cover (3% to 40%) but **none of them have an institutionalized department for forests.**

1. Shimla, Himachal Pradesh, India. Photo: Sreehari Devadas

2. Sukhna Lake Reserved Forest, Chandigarh, India. Photo: Sukhsimrat Pal

In fact, most city governments in India do not have specific departments dedicated to urban forestry. This is more so in small and medium-size cities, which suffer from an even greater lack of resources to undertake urban forestry responsibilities and an increased control by state governments. In the case of Shimla Municipal Corporation, responsibility for local urban forest lands was taken by the state government in 2006, then partially returned to the city in 2010, only to be taken back in 2013. The reasons cited for the transfer to the state government include the lack of resources and expertise at the city government level to properly manage forests and protect them from encroachment.

How are forests defined?

Part of the governance issues around urban forests arise from the lack of a national definition for 'forests' in India. The Parliamentary Standing Committee on Science, Technology, Environment and Forests uses the 1996 Supreme Court definition, which states: "The word 'forest' must be understood according to its dictionary meaning", and will also include "any area recorded as forest in the government record irrespective of the ownership".

A recent communique by the Ministry of Environment, Forest and Climate Change (MoEFCC) to the states, referred to the observations of the Forest Advisory Committees that different states need to have different criteria (to be decided by themselves) to define their forests since various regions have different "geo-physical units and "soil-climatic conditions". Further, the definition of 'urban areas' is equally non-uniform, and also defined by respective state governments. **Since there is no uniform definition for 'forests' or 'urban areas', there is none for urban forests either.**

In recent times, there have been some national-level policy efforts to define what the term 'urban forests' can refer to. The Draft National Forest Policy 2018 recommends the management of "woodlands, wetlands, parks, wood in institutional areas, gardens, avenue plantations, block plantations etc. in such areas" as 'urban forests'. A press release document for the central government's recent Nagar Van Udyan (Urban Forests) Program defines urban forests as "tree populations in urban settings for the purpose of improving the urban environment" and "an environment of trees and related organisms, structures and people". While both can be seen as working definitions, they are vague and do not describe the physical characteristics of the intended urban forests.

3. Parakeets in urban forest, Chandigarh, India. Photo: Yadwinder Singh

4. Guwahati, India. Photo: Arun Chandran



3



4

The rapid pace of urbanization is likely to cause increased ecological degradation, and finding balance between urban and ecological needs will be a critical challenge for cities in the Global South.

City Governments Taking Charge

Despite the limitations of definitions, jurisdiction and funding, some city governments have been proactive in the governance of their urban forests. These are usually bigger cities with larger revenues and hence more independence to undertake work that is beyond the mandated provision of basic services. Often these endeavors are in partnership with the state governments or civil society organizations, where the responsibilities are more democratically shared.

City governments such as Gurugram Municipal Corporation and Chennai City Corporation have started to develop urban forests within their city boundaries. The land the forests are developed on are under public ownership, mostly the municipal bodies themselves. Developing forests on them not only helps the cities counter pollution and ecological loss but aids the local governments in checking encroachment. However, even though these may be considered 'urban forests' by the city governments, they require recognition by state governments to be legally considered so.

Another example can be seen with the Pune Municipal Corporation (PMC), which has a Tree Authority Department under it. Unlike most city governments, which limit themselves to planting of trees saplings and development and maintenance of parks, the PMC undertakes tree censuses and environmental assessment reports, as well as projects around soil and biodiversity conservation. This approach can be seen as successful with the city now home to more trees than human residents.

Though cities face the brunt of environmental problems in India, city governments are seldom able to do much on their own given jurisdiction and resource constraints.

Municipal corporations are increasingly opening up to Civil Society Organizations and corporates in both developing and maintaining urban forests, as in the case of the Aravalli Biodiversity Park in Gurgaon. These non-governmental bodies not only offer the introduction of newer and more efficient methods, such as the Miyawaki technique, but also help relieve at least parts of the capital investment required.

Going Forward

By 2050, 68% of the world's population is projected to live in urban areas, with Asia and Africa driving the global urbanization trend. India alone will have 814 million urban dwellers by then, compared to approximately 471 million in 2019. This rapid pace of urbanization is likely to cause increased ecological degradation, and finding balance between urban and ecological needs will be a critical challenge for cities in the Global South.

As smaller cities become bigger, and bigger cities turn into megacities, it is vital for us to pay attention to how even the smallest of cities are managing their forests, recognizing that public parks and street trees are not a replacement for actual forests. For too long, we have conceptualized the 'urban' in contrast to the 'rural; and its characteristics; an artificial landscape that has been stripped of natural forests, ecosystems, and biodiversity. However, as cities struggle increasingly with flooding, water scarcity, and air pollution, it is clear that this binary definition is not working and that we need to see urban areas not as separate, but rather as parts of the same whole.

There is global evidence that points to the fact that urban forestry management by city governments suffer due to lack of capacity, expertise, and funds. At the same time, it is also evident that a centralized governance system is not capable of managing micro, city-level demands. As city governments deal with managing city services, they are coming into conflict with forest lands, making the case for forest management to be definitively under their jurisdiction to manage these trade-offs. There have been incidents of such conflicts between forest departments and municipal governments over dumping of waste (garbage, sewage, septage) or cutting or relocation of trees for road widening, or for various infrastructure projects. Local governments need to have autonomy, both financial and functional, to take informed decisions to manage urban forests lying within their jurisdiction as well as support the efforts of other departments doing the same.



5. A pair of Black Drongo in the Aravalli Biodiversity Park Gurgaon, Haryana, India.
Photo: T. R. Shankar Raman

The Circular Economy: Societal Transformation or Economic Fairytale?

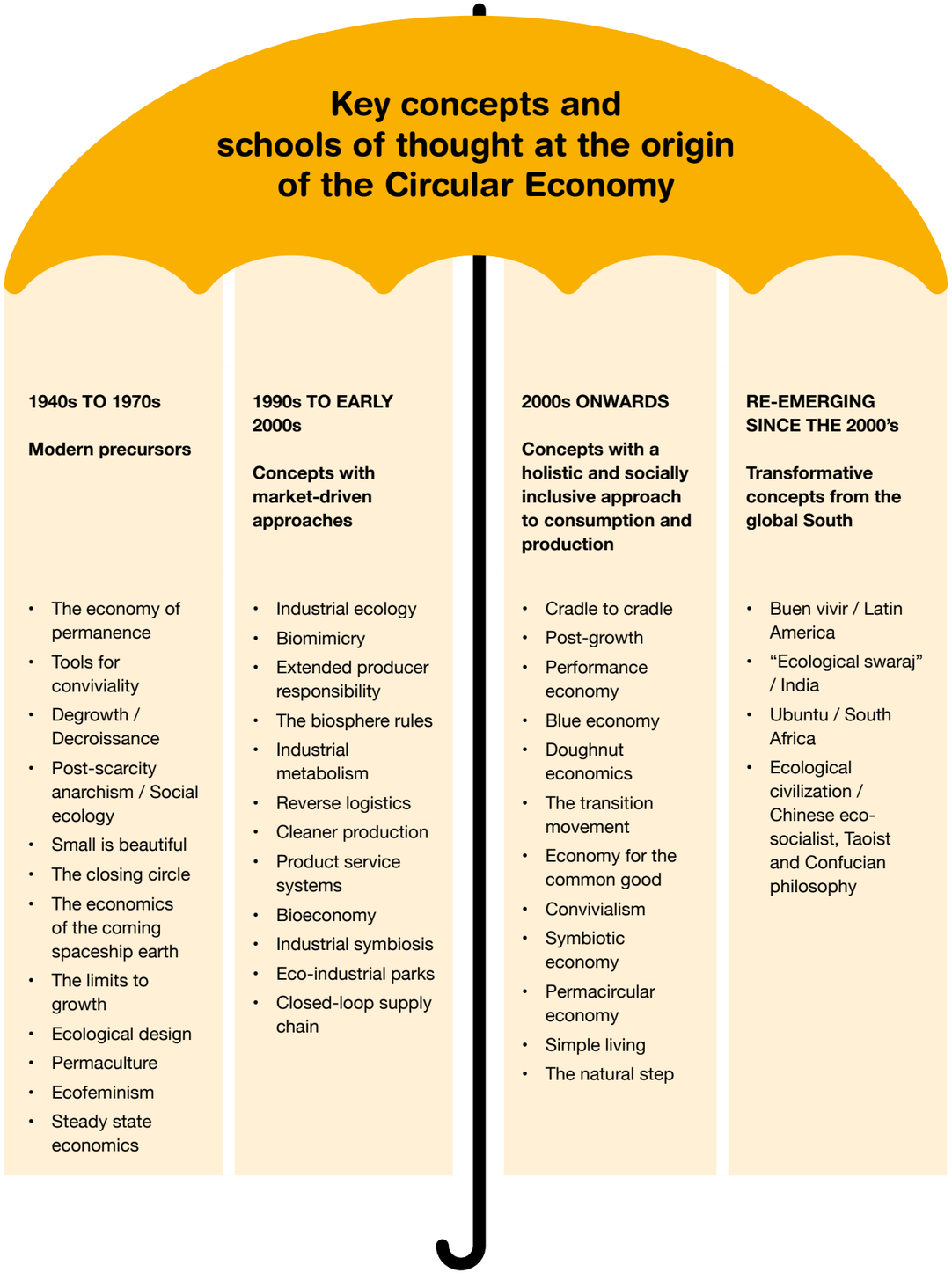
INTERVIEW WITH **MARTIN CALISTO FRIANT**

In recent years, the concept of the 'Circular Economy' has moved to the center of political and academic discourse on sustainability, industrial innovation, eco-efficiency and socio-ecological change. But what do people really mean when they talk about the Circular Economy? There are very few studies that compare and clearly differentiate the multitude of different circular economy discourses and visions. Martin Calisto Friant, PhD researcher at the University of Utrecht in the Netherlands, addressed this key knowledge gap by developing the first typology of Circular Economy discourses, which reviews and conceptually classifies over 70 circularity concepts from the early 1950s to the present day. REVOLVE Circular sat down with him to learn more.

What were the origins of the Circular Economy, and how did it gain popularity?

The Circular Economy is nothing new. For the greatest part of humanity's presence on Earth, we lived in circular societies where material and energy flows circulated sustainably, in harmony with the natural cycles of the earth. It is only during the industrial revolution that we broke this balance, through the creation of growth-dependent economic structures and the increasing use of fossil fuels. A new set of literature thus started to investigate the consequences of industrial capitalism for the Earth and its human and natural ecosystems. This is when the modern precursors to the Circular Economy concepts emerged, with key publications from the 1940s to the 1970s including "the Economy of Permanence" by J.C. Kumarappa (1945), "Tools for Conviviality" by Ivan Illich (1973) or "Ecology as Politics" by André Gorz (1979) and many others. "The Closing Circle" by Barry Commoner in 1971, is perhaps the first book to use the metaphor of a circle to illustrate a society, where material and resource flows circulate sustainably, and are democratically redistributed to ensure social fairness and equity.

Another key historical period was from 1990 to the early 2000s; during which the field of "industrial ecology" emerged, and other new Circular Economy concepts were developed, such as "Biomimicry" by Janine Benyus, "Extended Producer Responsibility" by Thomas Lindhqvist or "Industrial metabolism" by Robert Ayres and Udo Simonis. This literature emerged at the same time as neoliberal economic thinking; therefore, these concepts have market-driven approaches, which did not give much attention to considerations of social justice and equity. Nonetheless, they brought important insights on new technologies and innovations to recover industrial and household wastes, and to improve the environmental performance of products and services.



Last but not least, in the 2000s new Circular Economy concepts – with a more holistic and socially inclusive approach to consumption and production – were developed. Amongst the most prominent ones are Cradle to Cradle by William McDonough and Michael Braungart, the Performance Economy by Walter Stahel, doughnut economics by Kate Raworth and post-growth by Tim Jackson. In addition, a number of transformative concepts from the Global South re-emerged during this time such as "Buen vivir" by Latin American indigenous movements, "Ecological swaraj" by Ashish Kothari in India or "Ubuntu" from South African philosophy.

Considering the diverse history and the variety of concepts related to the circular economy, it can be best understood as an "umbrella concept" which combines and embraces many key elements of sustainability thinking.

Your research has resulted in the identification of four main "circularity discourse types" – what are they and what circular vision do they propose?

My research led to the development of a 2 × 2 circularity discourse typology to help navigate the rich history and diversity of Circular Economy concepts and ideas. This typology divides circularity discourses in two main criteria: first, it distinguishes **segmented** discourses, which focus on the technical and business components of circularity, from **holistic** discourses, which include social justice and political empowerment. Second, it divides **optimist** and **skeptical** perspectives regarding the possibility of decoupling environmental degradation from economic growth, so-called eco-economic decoupling. Different combinations of these two criteria lead to four main circularity discourse types.

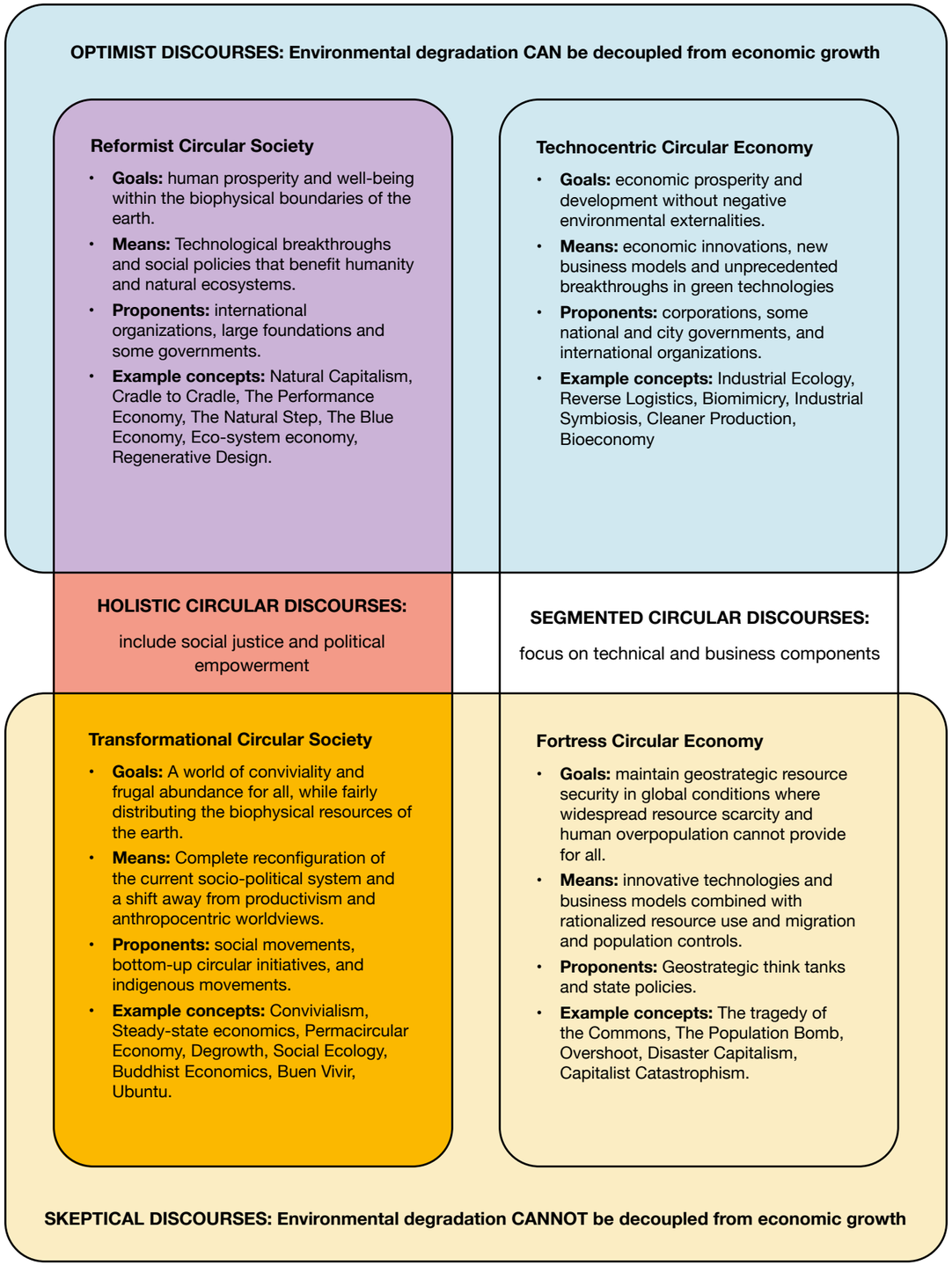
There is a key contrast between the way that academics understand circularity and how businesses and governments are implementing it.

Reformist Circular Society – optimist and holistic – discourses seek to create a sustainable circular future through a combination of innovative business models, social policies and technological breakthroughs. **Technocentric Circular Economy** – optimist and segmented – discourses seek to reconcile economic development with ecological sustainability through innovative business models and technologies. **Transformational Circular Society** – skeptical and holistic – discourses seek to re-localize, democratize, and redistribute power, wealth and knowledge to create a sustainable post-capitalist future where humanity and nature live in mutual harmony. **Fortress Circular Economy** – skeptical and segmented discourses seek to ensure biophysical stability and geostrategic resource security through top-down migration controls, technological innovations and economic rationalism.

Which is the most prominent circular discourse? Who uses which?

By far the most prominent discourse type is Technocentric Circular Economy. Our analysis of 120 Circular Economy definitions has found that 84% fall in this discourse type. Technocentric Circular Economy discourses are particularly widespread in government policies as well as in business consultancies and corporate circular economy strategies. For instance, in our recent academic analysis of the EU's implementation of the circular economy, we have found that the Commission's policies follow a Technocentric Circular Economy approach, which focuses on technical solutions and market innovations while disregarding social justice and equity. Their focus on technocentric approaches to circularity is at odds with the academic background, history and diversity of circularity thinking. In fact, our research has found that the majority of circularity concepts from the literature fall in the Transformational or Reformist Circular Society discourse types. There is therefore a key contrast between the way that academics understand circularity and how businesses and governments are implementing it.

As a response to the dominance of technocentric propositions, there is a rising movement promoting a holistic Circular



Society vision, especially in European civil society sectors. Utrecht University and the Dutch Degrowth Platform have organized a Circular Society Symposium in May 2020; and two Circular Society Forums have been organized by the Hans Sauer Foundation and TU Berlin in 2020 and 2021. These Circular Society visions are gaining greater support, especially from those which have criticized mainstream Circular Economy propositions for focusing too much on economic growth and competitiveness and too little on social and environmental justice. Indeed, many see hegemonic circular economy propositions as forms of greenwashing, which create the illusion that "green technologies" will allow us to overcome biophysical limits of the Earth and continue growing our economies forever. Yet, there is now a clear academic consensus showing that the decoupling of economic growth from environmental degradation is impossible and this technocentric approach to the ecological crisis is thus nothing more than a Circular Economy "fairy tale".

As we are learning from you how different stakeholders use and convey substantially different "Circular Economies": is that good news or bad news?

Conceptual diversity is, in itself, not a problem. The issue is if one discourse dominates the others and does not allow for a plural democratic debate to occur on the topic. We now see a situation where governments and businesses only listen to a depoliticized and uncontroversial Circular Economy discourse, that does not address fundamental issues regarding social equity, political empowerment, and the biophysical limits to economic growth. This influences the debate and prevents a plural, open and fair discussion to occur regarding what circular future we want and how we want to get there. It means that we are not openly talking about key issues such as who pays for the transition, who owns the technologies and innovations and who governs and directs this transformation. This lack of open discussion can easily lead to the imposition of a technocentric circular future – against the wishes and needs of most people. Research on citizen perspectives on circularity has indeed found that most people and civil society organizations have a more holistic and socially inclusive vision than what governments and companies are implementing. A recent survey in France, for example, found that 54% of French citizens prefer a degrowth-oriented ecological transition than a green-growth one; another survey found similar results with 55% of French people preferring a "sufficiency oriented" rather than a "techno-liberal" (15%) or a "traditionalist" (30%) ecological transition. Thus, while technocentric circular economy discourses are a key part of the transition, as they can envision innovative technological solutions, they should not dominate the debate, especially when many other discourses with wide-spread social support exist.

How do you see the future development of the Circular Economy concept?

The Circular Economy is in what some researchers call a "validity challenge" period – this means that it must confront its key challenges and limitations to remain relevant, or it might be rejected as a new form of corporate greenwashing. To prevent this, we must shift our debate from visions of a Circular Economy to those of a holistic Circular Society. A Circular Society not only circulates material and energy resources, but also circulates wealth, power, knowledge, and technology in radically democratic and redistributive manners.

If the circular economy debate remains stuck in "fairy tales" of "green growth" and doesn't embrace a strong social justice agenda, it will lose its social appeal and systemic validity, especially considering the rising inequalities and social injustices brought by over thirty years of neoliberal globalization. As we continue to overshoot the ecological limits of the biosphere, and the impacts of climate change rise year after year, it will become harder and harder to argue for failed technocentric solutions. Systemic socio-political change will be necessary, whether we like it or not. Yet, faced with an impending socio-ecological collapse, visions of a Fortress Circular Economy will also become more and more appealing. Indeed, as we confront stronger natural disasters and shortages of key natural resources, many conservative voices will start arguing for greater nationalism and top-down control over resources and populations. As an alternative to this, we must build alliances amongst social movements, academics and civil-society organizations across the world to propose an appealing alternative: a fair, democratic, de-colonial and sustainable Circular Society where nature and humans live in mutual harmony.

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