



# Decarbonising Electricity

*The costs of private sector-led renewable  
energy, and opportunities for alternatives  
in Australia, Germany and India*

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Subnational regions offer great promise and many lessons for decarbonising electricity, but have so far largely relied on – and are predicted to depend on – the roll-out of large-scale privately owned renewable energy. In our examination of on the ground impacts of this private model in Germany, India and Australia, the evidence is clear that reliance on private renewables deepens inequalities and threatens democratic legitimacy for decarbonisation. However, it can also open up opportunities as the transition forces new agendas, prompting demands for local benefits, social ownership and distributed power. As with energy transitions in the past, the advent of renewables poses critical questions regarding responsibility, agency and capacity, and how we might develop a system that combines social justice with climate action.

Although the context for renewable development in Germany, India and Australia is distinct, there are surprising parallels. There are common factors in relation to enthusiasm, contestation, dialogue and regulation. There are also common technologies allowing the construction of larger wind turbines and more extensive solar farms, along with energy storage to overcome intermittency. There are new options for agri-solar, and new forms of ‘distributed’ renewable energy, allowing the aggregation of rooftop solar. There is even a mooted renewables export sector, with electricity made transportable as hydrogen or ammonia.

What is most salient in the emerging global renewable energy supply chain is the logic of corporate power and extractivism. Across all three cases we find ‘green’ neoliberalism in the ascendancy. Large-scale privately owned renewable power has become the norm. The hierarchical structure of energy production, where large generators send power to the grid, and then to the consumer, remains largely in place. Private energy operators minimise their own costs through large-scale installations and seek to capture the surplus from cheap renewable power. With ever-larger wind and solar farms the critical question is the question of land ownership and the related impact on livelihood.

Land is central to livelihood in India. In the south Indian state of Karnataka, in a village surrounded by one of the world’s largest solar farms, a local villager sums up the impact: ‘For people without land there is no benefit for them. Rather they have lost their livelihood as no one calls them for work’. The solar plant pays rent to the landowners but displaces the rest of the population: ‘A village is not just for the big landowners. There are all kinds of people, like people with livestock, labourers, small farmers, and so on. The government should support the villagers. But the situation is bad – the landless are forced to migrate and work outside’.

Likewise, in the state of Brandenburg in eastern Germany, there is some income for landholders, but the majority see no benefit from the local windfarms. As a local mayor commented: ‘There are some local residents who become actively against, others who just resign themselves to what’s happening. There are a few who are in favour – usually those who profit in some way’. The windfarms are also increasing inequality: ‘If they lease their land for a wind farm there are very substantial financial rewards, but the community as a whole doesn’t get much out of it’.

Resignation is commonplace. In Port Augusta in South Australia, an advocate for renewable energy who used to work in the local coal-fired power station suggests that ‘people are really quite sceptical, reluctant to put any skin in the game as far as even speaking in favour of new projects, let alone actually doing anything to make them happen’. This is a problem for advancing the energy transition: ‘It’s difficult to get overt public support’.

Across the three sites for major private renewable energy we find common complaints about livelihoods, ownership and inequality in the face of large-scale corporate energy projects. Contestation forces new models into view, initially through demands for more regional benefits, but quickly extending to social ownership and the need for more distributed forms of renewable energy. New sources of social power link with technological change, for instance in relation to agri-solar and forms of household and community energy storage, releasing new potential for decarbonisation.

## **Neoliberal renewables reinforces private monopolies**

The struggle to stop burning fossil fuels for electricity is central to global climate policy. Worldwide, most countries are planning to move to renewable energy, as a ‘win’ for the economy as much as for climate. Cheap renewable energy – nature’s latest ‘gift’ to industrial society – lays the basis for a new wave of ‘green’ growth. The International Renewable Energy Agency (IRENA) plans for 75% renewables for global electricity by 2050 from the current 16% – and estimates that 95% of this will be privately owned.

The new development model is dominated by global energy companies and investment funds building large-scale wind and solar plants, capturing the income flow from renewable energy. Despite supply-chain bottlenecks, investors are euphoric about renewables, both for upstream ‘critical’ minerals and for downstream ‘green’ hydrogen and ammonia. National and regional governments compete to attract footloose ‘green’ finance – seeking a stake in the new sunrise industries.

Courting big capital brings big announcements while obscuring the full extent of public support and financial outlay. Renewables companies rely on government regulation to facilitate new connections to the grid, to mandate the purchase of electricity of renewable sources, and to guarantee the income streams that underpin profits. Private investors build and run the large-scale wind and solar farms, generating electricity at an agreed price. Supply agreements, termed ‘Power Purchase Agreements’ (PPAs), can run for decades, creating a safe harbour for rent-seeking investors. State authorities often invite the private sector to supply blocks of renewable energy, awarding PPAs to the lowest-cost supplier, forcing prices down. These ‘reverse auctions’ require huge economies of scale and ever-larger utilities – driving out smaller players, including community and non-profit generators, and creating a disincentive for benefit-sharing.

All this comes at a cost. Large-scale renewables create new displacements and corporate concentration drives new inequalities. Landowners in favourable locations benefit the most, entrenching their power; farming livelihoods are displaced; ecologies are transformed. Relying on private investment in renewables fuels corporate concentration and energy massification.

In Germany there has been a rapid shift from cooperative and municipal to large-scale corporate wind power. In India there has been a similar shift from small-scale wind power companies to ever-larger corporate entities, so that by 2022 there were very few Indian companies bidding for national PPAs. In South Australia we found a sharp bifurcation between household solar and the growing leverage of large corporate-led projects.

With these limitations, neoliberal renewables obscure the real potential of renewable energy. It has often been pointed out that renewable energy is scaleable, from the hand-held device to the utility-scale installation. Public infrastructure and finance could be directed for wider benefit. There is capacity and agency for distributed renewables, for energy transformations, and for new forms of energy participation and democratisation. Yet the received wisdom, from IRENA down, is that only large-scale private renewables can address the climate crisis. But whether they secure 'social legitimacy' is another matter, and a crucial component to achieving renewable energy targets.

## **Neoliberal renewables undermines decarbonisation**

Neoliberal energy transition – based on rent-seeking, and monopolisation for capital returns - can undermine decarbonisation. Renewables finance is an asset class, interchangeable with other non-renewable assets. It is not characterised by any need to reduce emissions. On the contrary, the interests of this private investment can often be in direct conflict with the abundance of renewable energy needed for climate stability. Companies rely on scarcity but with the long-term decline in renewable energy costs and virtually unlimited daytime electricity, they face a problem of maintaining profit flows.

Intermittent wind and solar power produce excess energy. In times of excess, prices fall to zero (and below). To protect investors and maintain prices, renewable energy is often switched off. This 'curtailment' or 'spilling' is commonplace – on some days in Australia up to 20% of renewable energy is spilled. The contradiction is baffling: the abundance of renewable energy becomes a problem to be limited, not a virtue to be advanced.

With this, more distributed forms of renewable energy become a threat to corporate market share. The growing prevalence of household renewables in Australia, for instance, proportionately the largest in the world, undermines the profits of utility-scale generators. Rather than supporting distributed energy, policy is geared to the major utilities. For example, in 2023 Australia announced a subsidised floor price for generators, explicitly to further de-risk investment.

Finally, there is the challenge that more industry, fuelled with cheap renewable electricity, accelerates economic growth. Increased throughput means increased emissions. For IRENA, renewables will ensure the necessary emissions cuts, but only if energy demand also falls. The annual 1.1% rise in energy use, lockstep with economic growth, has to become a 0.2% annual fall. For IRENA, growth must be delinked from energy use: a tall order when energy becomes so cheap. Experience suggests the opposite trajectory – that cheap energy fuels energy demand.

## Three cases

The focus of our research has been on the states of Karnataka in India, Brandenburg in Germany and South Australia – all are leading renewable energy regions yet are very different in terms of their history and location in the global economy.

Across all three contexts, early promises have given way to active engagement with the prevailing corporate model of large-scale renewable energy development. Campaigners, community organisations and interest groups have evolved a range of political tactics, strategies and aims to contest the private model and the state's de-risking policies that underpin it. In response, governments and companies have adjusted regulations and offered concessions in a dynamic, contested and constantly evolving landscape.

### 1. Karnataka

Karnataka is now one of the leading renewable energy states in India, such that in May 2023, 54% of installed capacity was from wind and solar power; this compares with 31% coal, 12% hydropower and 3% nuclear (Central Electricity Authority, 2023). Small-scale wind energy predominated until the mid-2000s, when Karnataka became a leading state for utility-scale solar power. Virtually all its renewable energy is privately owned, contrasting with 'legacy' coal and hydropower which are mainly state-owned. Large companies predominate: ten corporates own 58% of solar capacity and 30% of wind power.

Karnataka has had a proactive renewables policy since the late 1990s. The state aimed to attract private investment and reduce energy costs for loss-making state-owned power distribution companies (which provide price subsidies, especially for rural areas). The state has favourable solar and wind conditions and was a net importer of coal-fired power, since reversed with renewables. Renewable power developers now bid for long-term power supply contracts with the distribution companies via reverse auctions overseen by the renewable energy state agency, the Karnataka Renewable Energy Development Limited (KREDL).

KREDL plays a key role mediating between private developers, landowners, distribution companies and transmission networks. Its income comes from a levy on project proponents and it promises to secure all approvals for them within 60 days. It has also set up joint 'special purpose' agencies with the federal government, such as the Karnataka Solar Power Development Corporation Limited (KSPDCL), which established the 2GW Pavagada solar project – the biggest in the world when completed in 2019. KREDL is now planning to more than double the size of the Pavagada plant, to 5GW, and is establishing another 5GW hybrid wind-solar-battery facility in Shimoga, in the north of Karnataka.

The Pavagada example encapsulates the tensions and possibilities of renewable energy development in India. The park spreads across 4,856 hectares (ha) encompassing five villages with a population of 10,000. The area is arid and drought-prone, with high levels of poverty, particularly among women and Scheduled Caste and Tribal communities, and has seen struggles over land rights and redistribution. Land holding remains highly stratified, with some large landowners and many smallholdings, while about half of the population is landless.

The KSPDCL aggregated land from 1,422 different landowners by signing 28-year leases at a fixed price with set incremental increases for this whole period. State authorities auctioned off a number of 25-year PPAs for developers, with the price steadily declining to less than half the average price of coal-fired power. There was some World Bank and Asian Development Bank support and the park attracted large private renewables companies such as Tata, Fortum, Adani, ReNew and Softbank.

Pavagada's land-leasing model contrasts with other approaches to land acquisition that essentially remove people from the land, creating an ostensibly empty space for renewables. Co-existence with landowners offers a better approach, but it poses new questions. Leasing benefits landowners but sharpens inequality. As a landless person said to us, 'people who had more land become wealthier. We are where we are, landless people'.

Leases were negotiated during a drought and landowners felt pressured to agree: 'They came, they asked, we were hungry, we gave it to them'. Rental income for smallholders is not enough to live on, and food security has suffered. As one farmer said, 'If we grew lentils for a year, we would use it for household consumption up to two years... now for every small thing, we are dependent on the market'.

But the landless are the main losers. They have historically relied on seasonal agricultural labour and small-scale animal husbandry, which have been displaced by the solar park. A landless person we interviewed said: 'Before solar it was very good for our sheep. After solar there are difficulties... There is no space for grazing'.

The loss of livelihoods is not offset by employment at the plant. There are some local jobs in security, cleaning and grass-cutting, but not enough. This has particularly affected women from low-caste and Tribal communities, who have lost sources of financial autonomy. As one woman said, 'we have to depend on our husbands' income and they control us more'. They were promised better education, training and jobs: 'We do not want our children to lead a life like us. We want to give them better education, so that they can make a life for themselves'.

Authorities say they had been learning lessons and that a new phase in renewables planning is emerging in the extension to Pavagada and in a proposed 5GW hybrid plant. In Pavagada, a stronger commitment to funding local schools and social infrastructure is reported. However the promised training programmes and jobs have yet to be delivered, although there are proposals for mixed-use, agri-solar energy, to allow farming to co-exist with solar plants. The anticipated partnership with local people remains undeveloped.

The proposed hybrid plant will need to co-exist with local agriculture as northern Karnataka is more fertile and land is more evenly distributed: the land reform movement was successful in this part of the state, and there are fewer landless people. The proposal for a more variegated 'hybrid' model, linking wind, agri-solar and battery capacity, rather than a uniform expanse of solar panels, potentially offers more space for farming. There are also possibilities for co-management, potentially building on established village councils (Panchayats) that have extensive local governance capacity.

## 2. Brandenburg

Like Karnataka, Brandenburg has a strong commitment to renewable energy. In 2023 it obtained 70% of its electricity from renewables, mainly from wind power. Its 2022 Energy Strategy planned for 100% renewables by 2030. To this end it has proposed a shift to solar: wind generation is set to double, from 8GW to 15GW, but solar is expected to quadruple, from 4GW to 18GW.

A solar rush is now underway. Early in 2023 a government survey found extensive potential for rooftop solar (29GW), solar on degraded or low-value lands (33GW) and also for car-park, water-mounted and agri-solar (up to 270GW). In August 2023 the state announced a 'solar expansion offensive' with a focus on local-level land-use planning initiatives and municipal-led distributed solar, including a local solar levy to flow to affected communities, and subsidies and training to expand the local workforce.

The solar offensive marks the latest phase in Brandenburg's renewable energy trajectory. From the 1990s renewable energy in Germany had a strong focus on cooperative and municipal wind-power initiatives, especially in the west of the country. In Brandenburg, however, larger-scale private wind farms were more common, and this became the norm across the country after the 2017 federal Renewable Energy Law required competitive bidding for all power supply contracts, favouring larger private operators.

A fall-off in the approvals for wind power followed as proposed installations were increasingly contested at the local level. As the federal 'Energy of the Future' panel found in 2021, challenges in rural areas had become 'very considerable'. Legal action was delaying and annulling projects as local people mobilised against large corporate-owned wind farms. There was a shortage of available sites as land-use regulation defined allowable proximity to residential areas, and limited availability of forest lands for instance.

Wind power can co-exist with other forms of rural land use, yet there is increasing disenchantment, especially as the turbines have become larger. Focusing on the southern region of Teltow-Fläming, we found declining local acceptance, as 'gradually, you start to feel surrounded'. There was little local awareness of what was coming. As one resident put it, 'we only really realised it was happening when the towers were there all of a sudden'.

In 1997 the state had prioritised wind power in land-use planning and in 2003 federal legislation required designated 'wind suitability areas'. With this, Brandenburg's five regional planning bodies drew up land-use mappings for wind power. Local critics of wind power had been elected to the local councils, and with a range of union, environment and community stakeholders had effectively re-regulated wind power allocations. As a result, wind power is now restricted to about 2% of the land area, concentrating the industry in particular zones.

The planning process led to more active local engagement and deeper contestation of regional planning. This can be read as a democratising process, where regional and state-level decision-making on energy and 'green' industrialisation became more politicised and scrutinised. Ironically, the advent of large-scale corporate wind power was instigating local involvement, articulated through local governance structures. Importantly, the process was

based on dialogue rather than outright opposition: the group 'Country Life', for instance, favoured 'harmony' with wind power, seeking local benefit from it.

Benefit distribution is a key issue. Virtually all of the 350 wind farms operating in the state are privately owned; only ten are locally-owned. Ownership inequality produces financial inequality. Landowners stand to benefit, as one resident stated: 'I can get 30,000 Euros a year for a hectare of land if I lease it, for some people that means they wouldn't have to work any more'. Localities then bear the cost. To offset this, from 2019 the state government required wind companies to pay a levy of €10,000 a year to local councils; this was strengthened in 2021 with a federal community subsidy of €0.2 per kWh.

Our research found companies were also responding to pressures, with more sophisticated efforts at anticipating and preventing opposition. Companies were initiating consultation at conception stage, rather than waiting until the end of the planning process as allowed under planning law, and were offering wider community benefits. One company had been consulting on the use forest lands for a wind farm, offering a '20:80' model, with community funding set at four times the land rental cost.

Wind energy has precipitated new forms of energy governance, and these are now informing the current introduction of solar power. Solar panels pose a threat to pre-existing land use, and this accounts for the state's current focus on unused roof space, car parks and water surfaces, and on under-used land. The state government is making efforts to address the impacts on agriculture through land-use planning and there is a growing interest in agri-solar that can co-exist with agriculture. There is likely to be some loss of agricultural land, although it is estimated that some 15% of farming is for biofuels, and substituting solar would be more efficient.

Revenue for solar is as much as ten times greater than for cropping: we found landlords being offered 30-year leases at €2,500 per hectare, compared with €400 per hectare for farming. The dangers are clear for leasehold farmers, who can be evicted when their landlords choose solar. This poses a major threat as 73% of farmland in the state is leasehold.

There are economies of scale for solar, just as for wind power, with an often-quoted minimum viable size estimated at 50 ha for a solar farm. There is already a scaling-up. In 2021 the largest solar park in the state, and in Germany, was just 164 ha at Werneuchen near Berlin. A year later there were 55 solar projects approved in the state, covering 2,800 ha. Authorities in Teltow-Fläming had been approached by a developer proposing a 1,000-hectare solar farm. As a solar farm developer put it, there are 'no limits on size, at least no legal limits'. That caveat is important as regulatory responses will be critical in determining the outcome.

Certainly, recent commitments made by the state government on solar energy suggest the possibilities for benefit-sharing are gaining ground. There is a new shift from viewing 'social acceptance' of renewables as imposing a limitation on renewable energy installation, to seeing it as a means to enable wider uptake. State proposals for solar emphasise distributed and municipal initiatives for unused space for solar panels; and there is also a greater acceptance of local-level delivery and planning, including local revenues and re-skilling.



There are new dangers in solar power, but arguably it offers new potential for socially owned and distributed provision. The current state response reflects the several decades of mobilisation, engagement and institutional innovation regarding wind power. Contestation has allowed greater participation in energy governance: the process of 'strategic warfare' over renewables, as one resident described it, is set to continue on new terrain.

### **3. South Australia**

Like Brandenburg, South Australia also aspires to achieve 100% renewable electricity by 2033. In 2023 non-hydro renewable energy supplies about 66% of the state's electricity, 24% from solar power and 44% from wind power. Growth has been rapid: in 2000 renewables supplied just 1% of the state's electricity needs.

In 2002 the State Government had planned for 26% of combined wind and solar, launching a coordinated effort linking investors, locations and supply contracts. There was an early focus on the Upper Spencer Gulf and the so-called 'Iron Triangle' across Port Pirie (with a lead smelter), Whyalla (with a steel plant), and Port Augusta (with a coal-fired power plant, closed in 2016). The Gulf has very good potential for wind and solar power and is well connected to transmission lines, it also has an industrial labour force (albeit with marked social-economic disadvantage) – all factors making it attractive for renewables investors.

As in Karnataka and Brandenburg, renewable energy in South Australia has gone through various stages. There was initial enthusiasm, especially in Port Augusta where it was seen as offering a 'just transition' away from dependence on coal-fired power. The local power station had been a major employer and when its private owner, Alinta, announced closure in 2015, a local campaign demanded a new large-scale solar thermal power plant to replace it.

Alinta closed the plant early, in 2016, with no direct transition to renewables. Yet the campaign had wider effects as the region became a focus for renewable investors. This led to the construction of several large private windfarms including at Lincoln Gap, with 101 turbines on 20,000 ha, and at the Port Augusta Renewable Park, with 50 turbines on 5,000 ha. Large solar is less common, though there is an 800-ha solar farm near Port Augusta, owned by the Bungala Aboriginal Corporation, and a 20-ha solar thermal plant, Sundrop, dedicated to desalination and heating for greenhouse tomatoes.

After an initial wave of investment, state regulations were tightened in 2019, with rules on cumulative impacts, proximity to townships and on access to 'areas of high environmental, scenic or cultural value'. There were also measures on public notification, decommissioning, grid stability, noise levels and wildlife corridors, and, with this, an increase in the allowable height for turbines height from 150 to 240 metres. These measures coincided with a decline in applications, in part with the announcement of a 900-km interconnector to New South Wales due to be completed in 2025, which appeared to draw proposals to the west of the state.

A third phase in renewables development has now come to the region with a growing focus on 'downstream' uses, especially for renewables-based 'green' hydrogen, both for export and for use 'on-shore', such as at the Whyalla steel plant. The state government's Hydrogen Jobs Plan announced in 2023 is now seen as generating a new wave of interest in renewables in the region.

Renewables planning in South Australia has been centralised in the State Commission Assessment Panel, which runs consultations and public hearings. Companies seek to define their projects as state-significant ‘Crown Developments’, preventing any appeal to the minister’s final decision; with this they have access to an expedited ‘pre-lodgement service’ with a sponsoring department, identifying ‘essential State infrastructure’.

Local authorities are sidestepped by the State-level planning process though could they enable more community participation and involvement. Councils collaborate in a Spencer Gulf Cities group, which recently promoted the area as a ‘renewable energy “powerhouse”’. Their formal role is limited and they do not even receive tax revenue from renewables as electricity is exempted from local rates. Local councils produced a report in 2018 to challenge this exemption, but the state government has refused to address it.

The tax question, which sees local ratepayers subsidising large-scale global renewables companies, has been a lightning-rod for discontent. Concerns centre on the lack of local benefits, especially in terms of employment. Contractors bring their own workforce and draw on the local labour market only for low-skilled workers, employed on a casual basis. There is no local labour force plan and work is intermittent, though some local employment agencies establish recurring contracts.

Reflecting decades of regional disadvantage, the region has very few businesses able to take up work in the industry. State-level policy does little to address the skills gaps. Planners rely on claims that anticipated downstream industries will bring the jobs, rather than the renewables sector. In the meantime, most of the new jobs come indirectly, in terms of health, transport, retail and hospitality.

As in Karnataka and Brandenburg, host landowners are the main beneficiaries. Lands are arid and wind power has minimal impact on farm income. Each turbine can earn an annual rental income of up to AUS25,000 for about 30 years; 40% of the state is on pastoral leases, land appropriated from local Indigenous peoples and granted to settlers by the colonial authorities. These landowners now benefit the most from renewable energy, re-affirming colonial dispossession and exacerbating inequality.

There is change, though, as land rights gain recognition. The Federal Government was forced to recognise Native Title with the 1992 Mabo case and federal legislation in 1994 enabled Aboriginal Peoples to claim title to lands. After a 28-year struggle the Nukunu and Barnjarla peoples gained Native Title in the region from 2016. Some state-owned ‘Crown lands’ have been returned and Traditional Owners have gained some negotiating rights over leased state lands whenever there is any change in tenure arrangements, such as for renewable energy.

To date, renewables companies have been responsible for a range of ad hoc and highly divisive ‘consent’ arrangements. As one Native Title holder stated, ‘I’ve had no good experience with renewable energy yet, just a lot of indignity and pain’. An exception is the Bungala solar farm which brought benefit via a lease agreement to employ Aboriginal workers and contractors.

With the Native Title outcome, the Barnjarla Traditional Owners (BDAC) signed a groundbreaking land-use agreement in 2022, securing co-ownership as well as leasehold income

from a large solar farm on Crown lands. Royalty payments from mining companies are often paid to Traditional Owners but shared ownership is virtually unknown, except in a growing range of renewable energy projects.

The Barngarla outcome is seen as a major breakthrough. The equity stake means that 'not only are BDAC the landholders and landlords for the entire project, but we will also have a shareholding in the project, making us – the local First Nations People for the area – part-owners of one of the largest renewable energy plants in the State'. With this, arguably a new phase of co-ownership in renewable energy development will be opened.

With 40% of renewable energy at the national level to be located on Indigenous lands, co-ownership has grown. In 2023 there were a dozen renewable energy projects jointly owned with local Indigenous groups; the National Native Title Council stated this required a 're-conceptualisation of the role of First Nations in development'. There is no reason why this model for social ownership should not be extended to other local populations or organisations, redefining renewable energy for regional development.

## **Possibilities**

Land ownership is the key issue for large-scale renewable energy development. Renewables investors seek an empty space for accumulation, exemplified in the sea of solar panels, from horizon to horizon, in the Pavagada solar park. The Australian Energy Infrastructure Commissioner told us that renewable investors favour 'large acreages and a small number of landowners, and no neighbours, no towns or other settlements'. In doing so they operationalise existing land inequalities, from Australia's myth of 'terra nullius' to India's failures in land reform.

Against the creation of new renewables-based landed elite, and the inequality this brings, we have found local people pushing for a more democratic partnership. Narratives of regional renewables reveal a clear imperative to democratise the transition process, to realise its fullest potential for social transformation. Key components would be revenue-sharing, co-ownership of power facilities and co-management of land, better employment and a solar design that co-exists with agriculture. As one farmer in India put it, 'The energy production will continue, the structures cannot be dismantled. Therefore, they should give us partnership'.

Local people argue that renewable energy should be treated as a regional development project – not simply as a power project. It should not displace existing livelihoods and should offer meaningful local benefits. The enormous financial surplus gained from renewable energy is extracted primarily for the power companies: local people recognise this as a great injustice and demand a change in the model. When we visited wind and solar farms we were often told this was work in progress. The manager at Pavagada said that the plant was a 'university' in which new ideas were being tested.

This 'work in progress' is being forced in new directions. Contestation has created new demands for regulation, expanded engagement on regional development, and new initiatives in decarbonisation. At the same time, distributed energy is persisting. Renewables have already established a new household and community energy sector, an energy 'commons' founded on energy autonomy.

There is always the possibility of delay. Energy transition is an inevitability, but its calendar is contested. There is still a dependence on fossil fuels, with substantial lock-in, not least in electricity. Strong public backing is needed to overcome these pressures: displacement, disenfranchisement and disenchantment can only slow the transition. Social ownership and participatory regulation remain weak yet can be the foundation for public support.

The advent of renewables 'socialises' climate change and climatise energy. It plays a key role in advancing emerging social imaginaries in the search for climate agency, and the required ethics of climate-affected life. As with energy transitions in the past, the current juncture offers manifold (still undreamt-of) possibilities.

Contestations force stronger democratic participation and point to a transition based on common ownership, beyond corporate power. The imperative is clear: social control of renewables is now a foundation for climate stability, on a par with any 'common heritage' of humankind.

#### AUTHORS

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