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Decarbonization rush? The problem of speed in the energy transition

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Abstract

From activists to investors, decarbonizing the global economy in light of the climate catastrophe is now seen as imperative. But how to achieve this in a growth regime that still depends on fossil extraction? Burning stuff remains the world economy's core wealth-creating activity while emissions continue to rise. The only way to limit global warming to 1.5-degree Celsius seems a radical and fast cut in emissions at all levels of economic activity, in order to halt and potentially reverse the effects of global warming. However, this need for a 'rapid transition' also involves another problem that is not discussed as frequently: the problem of pace embedded in the wider politics of speed. Just like a petrol car emits more CO_2 if it speeds up, growth infrastructure is more likely to cause lasting damage if built at a higher pace. Land use and mineral extractivism are just two of many examples. While socio-environmental relations suffer from various forms of accelerationism, this also includes harm done by building renewable infrastructures at high speeds. Using examples from Egypt and Morocco, this paper questions whether the suggested rapid transformation, or decarbonization rush, is indeed feasible or even conducive to the overall aim of carbon reduction and just social transformation. It identifies three core problems with debates on speed before going into the details of the respective cases and the socio-environmental issues associated with rapid transitions. It finally argues in favour of a decentralized and decelerated form of decarbonization, which carries a greater promise for environmental and energy justice.

Clemens Hoffmann, Division of History, Heritage and Politics, University of Stirling, FK9 4LA, Stirling, Scotland. E-mail: clemens.hoffmann@stir.ac.uk

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Introduction: Rapid transitions, new and old

Calls for a 'rapid' (Rockström *et al.*, 2017), a rapid *and* just transition (Newell, 2020), a 'race to zero' (Sevil *et al.*, 2022) or for accelerating the energy transition (Bond & Butler-Sloss, 2022) rightly identify the urgent need to decarbonize. Considering increased carbon emissions and associated catastrophic future scenarios 'beyond' 1.5-degree Celsius warming, speeding up decarbonization is now imperative biophysically, socially and (geo)politically. However, these rapid transition debates are rarely related to the politics of speed. Discussions on speed and acceleration as a socio-cultural phenomenon of modernity range from the imminent dangers in 'high speed trading' (Lange *et al.*, 2024), the ultimately destructive-progressive or simply apocalyptic potential in 'accelerationism' (Gardiner, 2017; Noys, 2014), or the impact of increasing the speed of the accumulation process of 'capital in motion' (Harvey, 2020) on the socio-environmental and human metabolisms (Harvey, 1998). Historically, speed is associated with modernity (Rosa, 2013, p. 3, 2003; Rosa & Scheuermann, 2010), but these cultures of speed can also be addictive. Fast vehicles, like cars, planes or trains, are part of an 'adrenaline aesthetic' with all the negative consequences of a 'come down' from a societal overdrive, or 'crash culture' (Duffy, 2009, p. 199).

In most of the just and rapid transition literature, these wider debates make place for resolutely positive associations with speed in the decarbonization and 'green growth' infrastructure transformation. 'Rapid transition' is used as a normative call to arms in the 'race' to mitigate the most destructive effects of emissions-heavy fossil growth. Few, if any, question the high-speed nature of financialized accumulation when it gets to decarbonizing global capitalism. After all, capital is key to green growth infrastructure. If anything, pace is seen as too low in a 'politics of postponement' (Wapner, 2021). Though many point to problems with a new 'renewable' mineral extractivism (Luke, 2020) and 'green imperialism' (Pedregal & Lukić, 2024), the potential damage from high-pace renewable infrastructure is not reflected. The velocity culture that has characterized hydro-carbon capital accumulation over the past 200 years is now 'greened'.

So, from activists to governments to investors, high-speed decarbonization in response to a looming climate catastrophe is now a consensus. But how to achieve this in a world economy still mainly based on mineral energy extraction – and burning? Growth still depends on small explosions of a fuel/air mixture inside millions of internal combustion engines, turning fossil into kinetic energy, but mostly heat and entropy. Internal combustion alone wastes around 50 per cent of energy (Bouras *et al.*, 2015), not accounting for losses across all energy production processes, such as refining crude oil, transport and supply chains. The only way to limit warming to 1.5-degree Celsius seems a radical end to this damaging

and wasteful energy metabolism, which intensifies with increased speeds. Yet production, exchange and almost all forms of everyday subsistence, rely on different forms of fossil energy transformation and petrochemical products (Hanieh, 2024).

Whereas the (over)use of mineral wealth in both petro and renewable supply chains is well understood, there is an under-problematization of the damage done by pace. High-speed trains become energy inefficient beyond 250 kilometres per hour as air resistance exponentially grows, especially in tunnels, yet new line design speeds now frequently exceed 350 kilometres per hour (Ćwil *et al.*, 2021). So, why invest in the higher speed infrastructure? 'Speed' is also a culture and a symbol of power. Speed and its inversion 'slowness' are socio-political categories as much as they are physical properties (Vannini, 2014). The 350 kilometres per hour train is not just marketing; it is also the result of competitive growth infrastructures in different high-speed cultures. And while various deceleration movements, such as 'slow food', or 'slow cities' (Clancy, 2017), related to degrowth movements, have joined calls to 'slow down' (Saito, 2024), few of these critical voices express concerns over rapid decarbonization.

By contrast, I argue that speed itself is a cause of environmental, but also social harm, even if done in the name of decarbonization. Just like higher transport speeds require exponentially more energy, most of which will go to waste, the high-speed social and physical infrastructure associated with rapid decarbonization causes environmental, but also social damage that could be avoided through a systemic deceleration. The construction related carbon footprint as well as the mineral extractivism linked to renewable infrastructure are telling examples, but far from the whole story. This does not just concern countries at the lower end of the supply chain, such as the Democratic Republic of Congo (DRC), but also places where the electric power for the world's decarbonization rush is eventually generated and distributed in 'green' ways and also includes green hydrogen (Müller *et al.*, 2022).

To illustrate this point, this paper will mobilize two highspeed cultures currently being developed on the African continent. Morocco and Egypt are not only the only two African countries where high-speed trains are either running or under construction. They are also the two countries with the most ambitious plans for export-oriented renewable infrastructure development. I will ask whether their suggested rapid transformation towards low, or even zero-carbon infrastructure providers for Europe is socio-technologically feasible and conducive to energy and environmental justice.

To this end, the following will first discuss the literature on speed and identify three major shortcomings: One, the understanding of speed as linear, rather than dialectic process. Two, the under-problematization of biophysical (as opposed to discursive) speed; and three, the competitive nature of high-speed green infrastructural growth regimes. It will subsequently return to the Moroccan and Egyptian plans of making the desert bloom fast, looking at the socio-ecological contradictions of the Ouarzazate-Noor Solar Power Station and the Beneban Solar Park. It will highlight how 'rapid

transformation', in particular the need for a rapid greening of financial markets and carbon-neutrality targets, have contributed to rapid authoritarian developmentalisms at the eastern and western ends of North Africa. It will then return to the wider discussions of time, speed and its (geo)politics, concluding that developmental speed helps maintaining a politically cheap, but financially costly oversupply of energy. These 'fast-forward' forces may be welcome when it comes to decarbonizing, or 'greening' energy supply, but they also maintain, rather than disrupt the centralized hierarchical power structures underlying fossil capital accumulation. First, because they are embedded in a high-speed financialized capital accumulation regime, which increasingly depends on the 'greening' of its portfolio (Huang *et al.*, 2023; Khamitdkhanovich *et al.*, 2025). Second, because the authoritarian governments in producer countries are under pressure to meet climate mitigation targets (Abdelaty *et al.*, 2023). And third, because the rapid access to these renewable energy resources is a political imperative in the intended target markets, most notably the EU (Pinto *et al.*, 2024). These underlying social forces of speed are, however, precisely what exacerbates already existing injustices in these decarbonization projects. They are, I argue, more likely to contribute to, rather than disrupt the development towards a climate-uncertain and unjust future. And this decarbonization rush closes debates around meaningful alternatives, such as degrowth.

The problem of speed: Progress, disruption or destruction?

Admittedly, high speed green growth infrastructures are not just vehicles of capital accumulation and power projection. The presumed save 1.5-degree Celsius warming (Wolosin *et al.*, 2025) will require infrastructure investment, alongside other engineering solutions. Carbon capture and storage (CCS) (Kazlou *et al.*, 2024) is a well-known form of geo-engineering. All these policies, thus, follow a dual logic of rapid climate mitigation and green infrastructure growth. Speed, thus, maintains its progressive image, not least in distinction to the lesser developed and even more fossil dependent world (Duffy, 2009, p. 7). This is built on a longer political culture of speed. Accelerationism (Rosa, 2013) also implies a broader political economy of speed, associated with the capitalist mode of reproduction and especially its twenty-first century financialized forms.

While pace in general can be thought of as more of a transhistorical question, it is capitalist industrial modernity that gave rise to the more dedicated question of whether history as a whole is accelerating (Koselleck, 2009). From the steam engine to the internal combustion engine, this acceleration not only transformed value chains, but also local environments. It produced imperial centres and peripheries. With speed came hierarchies and increased environmental destruction, emissions and carbon debt (Matthews, 2016). Speed is equally characterized by its unintended but also its intended destructive forces, such as the rapid delivery of weapon systems (Virilio, 1977). So, speed has become integral to the practice

and performance of power in everyday life. It bears a lot of creative promise, but also a hazard, potentially instilling fears of accidents, poor decisions under pressure, and, more generally, transformations that cannot be understood, coped with or undone (Brown, 2001, p. 139).

Sociological theories of speed problematize the political culture of 'Empires of Speed' (Hassan, 2009), the disciplining effect of time and the impact on democracy. They discuss the increase in the pace of social life in modernity (Rosa, 2013, p. 25), or the impossibility of humans to cope with high-speed technology (Taylor, 2014). Despite this proliferation of literature on speed, surprisingly few, if any, working definitions of social speed and acceleration are available. In fact, most of these debates leave the accelerating dynamics of financialized capitalism and their biophysical implications underexplored. For example, Hassan (2009, p. 149), mentions the need to think quickly in technology and finance, but does not elaborate on high-speed trading. Speed is also seen as a political strategy. Left-wing accelerationism, for example, strategies about an accelerated downfall of capitalism which could be exploited for social transformation, even if right-wing forces are instrumental in this collapse. However, such a high-speed automatism is frequently seen as problematic as it would disempower progressive critical forces (Laurence, 2017), as well as negatively impact labour as the presumed agents of change (Noys, 2014). In sum, this mainly discursive treatment of speed as a modern culture leads me to identify three shortcomings: First, speed is understood mainly in linear ways; second, the material-physical and even biological impacts of speed are underexplored; and third, the geopolitically competitive nature of speed is overlooked.

First, speed is frequently associated with a linear and progressive modernity. At worst, it is seen as a teleology to a point of ultimate salvation (in this case in the form of decarbonization) or creative destruction, rather than looking at a relational dialectic between slow and fast movement (Nealon, 2002). High-speed infrastructure is as much disruptive as it is progressive not only to the environment within and from which it is built, but also to human and non-human actors subject to these transformations, most importantly labour. From rupturing livelihoods to the G-forces of a high velocity vehicle, speed causes 'unruly rhythms of ruination', for example in Serbia's new high-speed railway (Neuman Stanivuković, 2025). Politically, increased speeds are met with both positive ('lightspeed' development), as well as negative reactions. In other words, deceleration is built into the concept of social acceleration as its negation. Speed/slowness is more of a social, but also physical dialectic (Pieters, 2023), rather than a linear progression.

Second, the material dimension of speed, the biophysical properties of pace and rapid transformation are frequently underemphasized. This especially relates to the acceleration intrinsic in an extractive financialized capital accumulation process. The continued growth of destructive economic forms is tied to the need for fast returns. Financial markets expect a quick return on investment. Marx and Engels describe this extensively in relation to the destructive forces of fertilized capitalist agriculture (Saito, 2024, p. 20) and already identify

a 'metabolic rift'. Fertilizers are required to repay loans through increased agricultural yields. This leads to the exhaustion of soils and their nutrients, and, in turn, to the appropriation of previously untapped land and water resources. This applies to all forms of productivity increases and certainly those based on fossil extraction and burning (Foster, 2013). Yet, most discussions on speed focus on the pace of light-speed trade (MacKenzie, 2021), when the biophysical basis for it remains the extraction, financializaton, but also metabolization of fossil energy.

On the other hand, capital accumulation is now 'greening' and investors need to comply with Environment, Social and Governance (ESG) standards (Maechler & Boisvert, 2025). This green growth imperative remains, however, conditioned by the political economy of debt, making it, as Furlong (2025) puts it in this issue, 'a growth/debt machine'. So, if a debt spiral is to be avoided, speed is of the essence (Selowsky & Van Der Tak, 1986). This is by no means a new phenomenon, especially for developing countries, or cities like Medellín, but this conditions a green debt-growth-speed mechanism. While this could work for rapid decarbonization and climate mitigation policies by financiers, consumers and producers of renewable power alike, it by no means excludes fossil growth. Nor does it account for the resource use and carbon expense of green growth.

Third, this process is not just transnational and global. It is also an inter-state, multilateral process. It is competitive, or geopolitical, and, more generally, socially relational. The most distinct aspect for the purposes of this argument is the characterization by inter-state and developmental competition in a post-colonial context. Rapid infrastructures, once operational, remain instruments of global capital circulation, transporting power, matter, humans, animals, data and all other goods – at higher speeds than before. As our thinking about speed emerges either from modernity's accelerationism, or a globalized political economy, it also relates to the questions of imperialism, both as inter-imperial competition, as well as the development of modern racist hierarchical thought. The scramble for Africa implies a competitive pressure to move with force and speed. This 'scramble' for North Africa's renewable megaprojects paradoxically implies abundance and scarcity of the available resources (land, labour, minerals) and provokes debates around renewable 'energy colonialism' (Batel, 2021).

Both in global capitalism's peripheries, but also in the centre and especially in the post-colonial world, developmental needs frequently translate into transformative and infrastructural speeds. Usually, the projects implemented are of such a large scale that they are meant to be geopolitically visible (sometimes literally from space) to project power. The hydro-electric dams in the Nile Valley, from Aswan to the Grand Ethiopian Renaissance Dam (GERD) are telling examples. 'Rapid' large-scale decarbonization projects also serve competitive developmentalist (sometimes liquid) power projection (Swyngedouw, 2015) but also offer fast, short-term capital returns. Thus, global capital circulation is mediated by geopolitically competitive developmental regimes 'on the ground'.

Speed and acceleration can, and do, also imply forms of authoritarianism (De Derian, 1990, p. 306), reminiscent of a unilinear and uniformly positive association of acceleration. The future is fast was exactly the implication of Futurismo. Though the current paper points to the increased developmental issues associated with a speedy transition, this should not be confused with a neo-Malthusian argument about the exhaustion of limited, finite mineral and other resources. After all, the world's socio-ecological metabolism is renewable 'by nature'. But in the sense of exhausting socio-ecological relations. These cannot sustain the pace of high-speed global geo-economic circulation and accumulation especially not if based on democratic deliberation, rather than top-down authoritarian developmentalism. Considering this understanding of speed as a non-linear dialectic, with biophysical as well as political properties, the following empirical section will explore two examples of 'rapid' transitions. It will investigate the internal and external contradictions of decarbonization infrastructures in Morocco and Egypt before returning to questions of deceleration, decentralization and degrowth as political alternatives.

Making all deserts bloom: North Africa's decarbonization rush

Especially in developing countries, speed in general and rapid decarbonization in particular are also seen as opportunities. Abundant renewable power resources, sourced from North African winds and sun decrease the price of renewables in Europe (Moore *et al.*, 2024). Perhaps unsurprisingly, all North Africa, except for war-torn Libya, has now initiated large-scale projects, even fossil exporters like Algeria. Renewables create jobs, economic growth and revenue for debt ridden governments. Some even involve community projects, teaching valuable skills to vulnerable groups in rural areas. So, what is not to like? How come renewable energy projects are now labelled 'energy colonialism' (Müller, 2024; Schuetze, 2024)?

Investment, as argued above, seeks fast returns. And this investment is primarily in land earmarked for infrastructure development. As land, labour is also presumed to be abundant. And while some skill development may occur in the context of these projects, surplus will return to public and private investors. So do profits from technology exports as well as the majority of the energy produced. Simply put, the markets that justify the scale and speed of these projects, as well as the surplus value-added lie mostly in Europe. However, it is this proximity to mature European industrial markets, combined with a presumed abundance of land and labour that make renewable developmentalism attractive. The ill-fated Desertec (Carafa & Escribano, 2016; Schmitt, 2018) tried to harvest this potential already in the early 2000s under the leadership of Munich Re, the world's largest re-insurance company naturally concerned with catastrophic climate change. As with today's export-oriented projects, its promise was to generate a transcontinental mega-infrastructure that produces cheap renewables which, in turn generate growth and employment in

socially troubled areas amenable to unrest and insecurity. In other words, the promise was quite literally to 'make all deserts bloom' – quickly (Plonski & Holtermann, 2024). But why did it fail? Paradoxically many blame the unrest the project was meant to address during the Arab Spring (Schmitt, 2018) for its failure. Others have shown that the large scale and ambitious speed of the project exacerbated its internal contradictions. In other words, fast, top-down, centralized developmentalism played a part in its initial failure.

That said, many of the envisaged sub-projects from Morocco's Atlantic coast to Egypt's Suez Canal are now in the process of being realized. A good mix of regime types, from a constitutional monarchy in Rabat, to semi-democratic military rulers in Algiers and Turnis to the military regime of New Cairo have jumped on the renewable bandwagon. The promise of 'green' GDP growth seems doubly attractive as it complies with ESG standards and, thus, attracts new green capital, including a range of international investors form the World Bank to China's Green BRI state financiers (Ponte, 2019). These projects also help meeting the Nationally Defined Contributions (NDCs) under the Paris Agreement. Though some export routes remain geopolitically contested (Kambas, 2024), such as the EuroAfrica power connector between Egypt, Cyprus and Greece; a new gas pipeline along the same corridor; gas, hydrogen and electricity connectors to Algeria and Tunisa; and perhaps the most ambitious and purely privately funded Morocco-Devon XLinks undersea power cable to the UK's western shores (Tanchum *et al.*, 2024). A secondary development is the export of this energy through green hydrogen. These projects are not just green investments, or purely private 'green' investment decisions. They are wedded to rapid decarbonization policies and strategies, both in Europe and the MENA region. Together they form a new geopolitical economy of green energy transfers. And these follow, by definition, ambitious timelines.

The following will investigate Morocco's and Egypt's rapid renewable export ambitions not without, however, mentioning Tunisia's and Algeria's plans for context. Tunisia's ElMed and TurNur projects aim to build much shorter connector cables to export solar electricity to Italy. These are politically supported by Tunisa's own Solar Plan, but mostly privately financed. Algeria, by contrast, remains wedded to its large hydro-carbon sector and aims to benefit from the continued strong demand for gas in Europe. Its renewable ambitions are also led by its national oil and gas sector, but aim to develop the country's solar capacity. Both Tunisia and Algeria also started marketing their green hydrogen potential to various European partners. By following these policies, North African leaders aim to 'speed up the transition towards a reliable, sustainable and low-carbon energy system' (Ouedraogo, 2020, p. 72).

Morocco's ambitious 'Solar Plan'

Arguably the most advanced and ambitious programme is run by Algeria's arch-rival, the Kingdom of Morocco. France's 2024 decision to recognize Moroccan

sovereignty over western Sahara demonstrates how rapid decarbonization also carries major geopolitical implications. The Kingdom's renewable ambitions date back to its 2009 'Solar Plan' to produce renewable power in the desert for domestic emission reduction, export, green hydrogen, but also sustainable development more broadly. The projects are pooled in its Agency for Sustainable Energy (renamed from Solar Energy in 2016; MASEN). Solar plants are developed at the fringes of the Sahara, onshore wind along the Atlantic in the south and western Sahara, one of the most constant wind sites worldwide. This is complemented by hydro-electric dams in the High Atlas Mountains. The motivation for these ambitious policies is socio-economic growth, development and climate mitigation. Given its large agricultural sector, Morocco is highly vulnerable to the effects of climate change and has set out an ambitious emission reduction target of 45.5 per cent by 2030 (Fragkos, 2023; Ongoma *et al.*, 2024). The renewable energy sector is key for achieving Morocco's NDCs which aim at 52 per cent of electricity production coming from renewables within the next five years (UNFCCC, 2022a). This equates to 2,000 megawatt-hour each from wind, solar and hydro developments. MASEN has identified five development sites in Ouarzazate on the southern slopes of the Atlas. Morocco successfully positioned itself as a perceived global leader in renewable and now green hydrogen production (El Hafdaoui *et al.*, 2024). Local and rural sustainable development are key components of the solar development plan (Royaume Du Maroc, 2009). Unlike the more widely known photovoltaic (PV) installations, the Ouarzazate concentrated solar power (CSP) plant generates power through large parabolic mirrors which heat synthetic oil in pipes, which heats high pressure water vapour to drive turbines. While it avoids mineral and energy intensive production of PV cells, the operation requires more maintenance, most of which is automated (Ceurstemont, 2016), and, crucially, water. Rural development programmes for agriculture, healthcare, social and education projects are said to have benefitted 34,000 local inhabitants (WRI, 2021). Not least due to the developmental dimension of its zero-carbon transition, Morocco has been praised for its leadership. This 'model' of 'synergetic' development for the entire region attracted global public and private investors, including the Climate Investment Funds ($435 million), the German Bank for Reconstruction and Development ($1 billion), the European Investment Bank ($596 million), the World Bank ($400 million) and the African Development Bank. Given this assumed high potential as a renewable energy producer and exporter, it also attracts financing from a wider range of private ESG investments (Belcaid, 2024). In sum, a compelling case for a fast transition, despite the geopolitical risks involved in the occupied western Sahara, where Moroccan sovereignty remains mostly unrecognized.

Apart from the large scale of these developments, it is the speed of the transformation which puts Morocco in the spotlight for accusations of 'green grabbing' (Hamouchene, 2016) and harming, rather than benefitting local communities (Ryser, 2019). The more recent green hydrogen offering via royal decree (MASEN, 2024), is even more directly related to accusations of

'green imperialism'. While the first phase of solar expansion required 480 hectares of land, the final design will go up to 2,500 hectares. The green hydrogen offers earmarks a further one billion hectares for renewable energy and hydrogen production. This includes both generation and conversion (or splitting), though additional space will be needed for desalination capacity, including offshore. In western Sahara these plans are actively opposed as forms of Moroccan 'green colonialism' in the region (Haag, 2022; WSRW, 2023).

A minimum of three energy justice issues arises. One around land, one around water and one around human labour through the local sustainable development projects. The conventional environmental orientalist assumption of most developers, including the Moroccan state agencies, remains that this 'empty' desert land sits idle, not used by human or non-human life (Hoffmann, 2018). Even if land usage is generally accepted, it is characterized as unproductive or even destructive in line with a legacy French colonial understanding of 'development' (Davis, 2004). Apart from the risk of violent conflict with the Polisario Front, the western Saharan insurgency group resisting Moroccan occupation, it is especially the fast implementation of projects that put rural communities at risk. The Solar Plan's rural development dimension, drafted by internationally trained consultants, is implemented top-down, fulfilling ESG standards, but evidence for its effectiveness in terms of social mobility remains scarce. It would likely benefit from a slower-paced local analysis of socio-environmental relations.

Water abstraction for the CSP plant from the Eddahbi reservoir (one of the deciding factors in building the plant in this location) caused downstream water shortages on the Draa River affecting a range of pastoralists, pomegranate and date producers (Ceurstemont, 2016; Rignall, 2016). This left them with two hours per day for irrigation (Günay *et al.*, 2018). A more time-consuming hydrological modelling that includes both climate forecasts (Johannsen *et al.*, 2016) and CSP water demand, rather than a fast implementation of capacities planned (and marketed) by Rabat, could have mitigated this. The solution to use pressurized air for cleaning and cooling is only implemented in the expansion of the plant (Ceurstemont, 2016) but could have addressed these issues from the start with more time for the environmental impact assessment. Similarly, statistics quickly confirming the success of rural development projects are based on taxable formal wage labour only. A slower-paced analysis could have included the effects on informal, traditional livelihoods, and be more sensitive to gender issues. The faster these local livelihoods are transformed, the more severely they are disrupted with little to no time to adapt to water shortages, disrupted animal and local trading routes, loss of other resources or the introduction of formalized and taxed labour market relations. So, both, the scale combined with the speed of these projects have earned Morocco's Solar Plan the 'neo-colonialism' label with a particularly detrimental impact on women (MENAFEM & Greenpeace, 2025).

In sum, Morocco's 'Solar Plan' has rapidly evolved into a global zero-carbon powerhouse strategically located at the Atlantic and the Mediterranean. It is

attractive to public and private investors alike despite its geopolitical risk associated with the occupation of western Sahara and the poor relations with Algeria. To a point where France (though not the EU) has now clearly realigned itself with the Kingdom. The attractive green investment climate spurs a rapid development of renewable energy projects which comes at the expense of socio-ecological contradictions. Authoritarian monarchic leadership and the successful marketing of a rapid green developmentalism by a Western trained expert consultancy driven 'greening' administration also help Morocco's reputation as a climate mitigator. Especially those in the ecosystem with no voice, from local farmers to pastoralist communities let alone non-human actors (Schapper *et al.*, 2022) quite literally have no time to meaningfully oppose the speed of these developments.

Egypt's militarized zero carbon growth

At the other, Eastern end of Africa's north, lies another large 'Solar Power', albeit one where the parameters are vastly different. This starts from a different technology mix, which is centred on PV, thus, requiring less water. It is shaped by a rather different power constellation with the military regime at its centre. Egypt, too, is a low-income country with lots of potential and proximity to markets. Located at a crossroad of global trade, it is naturally a destination for infrastructure investments. Egypt, too, has high climate mitigation ambitions. Renewables play a major role in its National Climate Change Strategy 2050 with the largest mitigation projects (by investment volume) being wind at $40,526, solar PV at $23,754 and solar CUP capacity at $18,109 (UNFCCC, 2022b, p. 31). Compared to Morocco, Egypt receives more Chinese Foreign Direct Investment (FDI) in its renewable sector, given its location at a key Belt-and-Road trade route (Altun & Ergenc, 2023) and different geopolitical outlook. Like in Morocco, the remnants of Desertec and other European infrastructure alongside Egypt's native bourgeoning solar start-up scene were absorbed into these larger projects (Hoffmann & Ergenc, 2023). Egypt was one of the first African countries to issue a green sovereign bond in 2020 to achieve its Vision 2030, which offer a 5.25 per cent interest over five years (Kiyasseh, 2024, p. 93).

One of the most powerful symbols of this ambition is Egypt's Benban PV solar park, making Egypt a showcase of (PV) solar expansion, which is cheap, easy and, not least, fast. Technologically more challenging, yet also more efficient CSP plants are, for the time being, the exception rather than the rule with only one operational plant in Kuraymat. PV plants are, not only faster to build and cheaper to run, but also entrench the dependency on the world's largest PV producer, China. It is also by far the largest contributor to Egyptian electricity generation plans with 22 per cent planned by 2035, as compared to 4 per cent CSP, 14 per cent wind and 2 per cent hydropower mainly from the existing Aswan Dam (Arab Republic of Egypt, 2024).

The latter project is perhaps the best example of how the Egyptian government maintains the politically opportune narrative of providing rural development, employment and, above all, food and energy security to the marginalized communities in Aswan. Despite this, the top-down, rapid realization of these projects carry local developmental contradictions which are suppressed by a strong authoritarian legislation against any civil society activism. Like in Morocco, local environmental NGOs have been side-lined in the decision-making process (Halawa, 2020). While Egyptian solar start-ups are more interested in working with NGOs locally, for example providing rooftop PV for local consumption avoiding the grid (Africa News, 2021), centralized large infrastructure remains privileged by state support as part of the overall growth regime. Even if, as claimed, local communities find employment, it is Chinese state-owned enterprises (SOE's) and other investors which sell energy back to the Egyptian state – at a profit, even though there is an electricity glut in the market. So, a classic case of surplus extraction from local sources. However, given Egypt's centralized power structures and current neoliberal energy laws, the large projects offering overcapacity are faster to implement than the small-scale projects (Desouki & El-Haddad, 2024). A slower approach would allow for an adjustment in the legal infrastructure, which could privilege the ideas of local start-ups and NGOs over the centralized FDI based geo-strategically motivated and socio-environmentally more disruptive infrastructure.

So, Egypt's rapid expansion of renewable and conventional electricity generation capacity does not simply address the energy needs of a growing population. It is also part of a geo-strategic energy tie-up with Beijing, the West and the EU, but also Russia, which will provide nuclear capacities. More than anything, though, it is the logical outcome of the liberalization of financial markets since the 1970s. A fully liberalized market now sees a debt-driven surplus of power production (Suleiman, 2024) while electricity remains unaffordable for many Egyptians. This makes renewables not only profitable energy investments. They are also part of the military's broader strategy of projecting infrastructural power, which can be seen from the widening of the Suez Canal to a new capital in the desert, both financed by a mix of Gulf and Chinese investment, with little public service provision, but serving the purpose of cementing military rule (Noll, 2017).

The current military dictatorship under Al-Sisi remains an authoritarian developmental state *par excellence* and speedy renewable infrastructure development is yet another signifier of this (Jenss & Schuetze, 2024). The similarly fast expansion of the Suez Canal has demonstrated the regime's determination to maintain and expand its role as a global infrastructure hub. The large natural gas discoveries off its northern coast have fuelled a strategy to become an energy hub, rather than necessarily a global decarbonization leader. Both, fossil and renewable infrastructures help entrenching power, making Egypt a 'transformative energy hub among three continents' (ElMaamoun & Xydis, 2022).

Especially since Egypt went through the IMF's structural adjustment programme, like in power production, projects are increasingly globalized and financialized. The Toshka project is a good example of how FDI and labour market reforms have fundamentally altered Egypt's geography and its urban-rural social relations. Beyond agriculture, the specific political economy of authoritarian financialized development of the Al-Sisi regime has focused on property, urbanization and infrastructure. Pouring concrete into the desert is the default strategy of Egypt's military rulers, whether in the form of Chinese funded PV foundations or Gulf funded real estate. So, far from meeting housing and energy needs and realizing export potentials, perhaps the most significant driver of Egypt's renewable revolution is the internal political economy of the Al-Sisi military-industrial regime. What has been labelled the 'military-urban' nexus elsewhere (Dekel, 2023) is very pronounced in Egypt: Military-led, foreign-funded, large-scale developments, geared towards rent-extraction by the armed forces themselves (Smierciak, 2021). An operation by 'Military Inc' to fund their 'state within the state'.

This militarized regime of accumulation is, inevitably, also internationalized, making renewable energy growth infrastructure a strategic commodity, a source to project and maintain power. In sum, the Egyptian motivation remains one that is embedded in an infrastructure-dependent developmental path. And it is these underlying power structures that generate a need for speed, making resistance futile, or like in Morocco's case, too late to make a difference. Simultaneously, the rapid provision of new low-skilled employment opportunities is seen as a useful channel for Egypt's unemployed youth in a deepening economic crisis. For Egypt and China alike, the rapid expansion of Egypt's solar sector goes far beyond a simple return on investment or reducing carbon emissions, though it is also that. And all these objectives are much more achievable through the application of speed, both discursively, as well as materially, as a physical reality of fast infrastructure implementation.

However, no analysis of the green transition in North Africa is complete without at least briefly discussing the political background behind the prime export market. The rapid implementation of climate mitigation policies is not just conditioned by authoritarian regimes. The EU's European Green Deal (EGD), too, has rearticulated the focus on North Africa as a source of renewable energy. Since 2007, the European Investment Bank and the World Bank have successfully developed a green bond market, which was the vehicle of earlier investments in green energy infrastructure. Various green financing mechanism have been developed by public and private banks since and the European Commission has launched the 'REPowerEU' programme in reaction to the loss of Russian energy imports. This pledges to 'fast-forward the clean transition', with various international partners, but also indicates a hydrogen strategy, involving Egypt and Morocco specifically (European Commission, 2022).

Thus, the rapid growth of renewable capacities seems to be a policy target on both sides of the Mediterranean. However, as Greenpeace and other NGOs

illustrate, not only does this happen in a quasi – neo-colonial fashion, but this is marred by the simultaneous expansion of fossil capacity. Egypt is a more drastic example than Morocco in this case, but REPowerEU clearly states the need to secure fossil 'transition' fuels, too. So, the rapid growth imperative appears to override the rapid climate mitigation in Egypt and Morocco but also the EU in light of the post-2022 energy crisis. This urgency is met by intricate public-private financing structures, as well as a geopolitically competitive thinking, especially *vis-à-vis* Chinese investment (Tanchum *et al.*, 2024), further adding to the 'imperative' of speed. However, the projected capacities are also not a reflection of energy security needs but determined by the reproduction of finance and the thinking of a competitive decarbonization rush, accelerating the implementation of large-scale projects, both renewable and fossil, with all its actual or potentially social and environmental contradictions. This clearly demonstrates that a decarbonization rush reproduces and complements, rather than challenges, fossil-era power hierarchies. It is wedded to the mainstream use of speed as an economic imperative alongside competitive growth. Acceleration produces economies of scale. Rapid scaling-up reduces the cost of transformation (Moore *et al.*, 2024). However, maintaining this economic orthodoxy also helps maintaining fossil structures of power.

Conclusion: The question of speed in decarbonization infrastructures

Given the current state of the global climate, the accelerationism of the decarbonization rush may be attractive. Reducing carbon emissions at high speeds does seem imperative. However, as these examples of high-value high-speed transformations demonstrate, this compulsion also locks us into relationships of dependency on capital, technology and power, without which such large-scale transformations seem impossible. Higher speeds imply leaving global power hierarchies in place. However, even the goal of emission reduction is in doubt given the heavy carbon cost associated with large and rapid transformation, while fossil infrastructure is simultaneously maintained or even expanded in the name of energy security.

These contradictions in rapid decarbonization show that speed is not uniformly progressive. They demonstrate that the reproduction of capital and economic growth are underlying problems. This asks for a critical review of conventional climate mitigation through 'green growth' arguments as well as an awareness of the geopolitically competitive nature of rapid decarbonization projects, many of which are born out of path-dependent developmentalist trajectories. The European Union's challenge to replace Russian fossil imports means that rapid decarbonization projects are at least as much motivated by energy substitution and geopolitical energy supply diversification as they are by climate mitigation. Industrial decline, as perhaps desired by leftwing accelerationist thinkers, may be socially too disruptive

at a time of rising right-wing populism, so the energy question remains a major political battleground.

Renewable energy storage and distribution constitute additional costly geopolitical challenges. These capacities must be built from scratch, on land not as readily available as policymakers suggest and, above all, at a high carbon expense. Developmental promises are also vague. Western finance and technology imports entrench relationships of dependency. Hence, rapid decarbonization is more likely to consolidate domestic as well as global fossil-era power hierarchies than leading to just transitions. Environmental and climate justice do not become policy priorities because energy is produced and stored differently (Jenss & Schuetze, 2024; Levenda *et al.*, 2021; Müller *et al.*, 2022). And the stalling of socio-economic transformation is aided by speed. Green financial accumulation, energy supply chain diversification, geo-economically competitive thinking with China, as well as carbon reduction and climate mitigation policies, all imply a structural imperative of speed, at the expense of participation and deliberation.

These underlying forces of the decarbonization rush, most of which are not progressive, have led me to question its politics. I started with a challenge to how pace and acceleration are understood as positive, linear elements of a progressive modernity. I continued arguing that speed and its opposite, slowness, must be thought of as socially dialectic rather than a (false) positive/negative dichotomy. I have criticized the omission of speed as a biophysical force on human and non-human metabolisms and society at large. Last, I have emphasized the geopolitically competitive nature of high-speed developmental infrastructures. Using examples from North Africa, I have demonstrated that those rapid decarbonized infrastructure transitions are driven by processes of green financial accumulation, carbon mitigation and competitive developmentalism.

This acceleration, I argued, undermines the potential for a just transition. This can be understood as a 'speed paradox'. Rapid decarbonization is imperative, yet doing so will exacerbate injustices and likely solidify the very power structures that gave rise to emission-based climate change. This means that, for now, the expansion of decarbonized energy infrastructure happens simultaneously with, rather than instead of fossil growth. Green infrastructure growth is 'on top', not 'instead'. At the same time, the discourse of an imperative speed forecloses the necessary debate on reducing *demand* for energy alongside a political agenda for deceleration, decentralization and degrowth. In other words, the authoritarian power structures woven into high-speed societies disable a more meaningful debate and transformation towards a decelerated post-growth society. For fast not only means environmentally damaging, but also a minimization of any democratic or participatory decision-making process (Upham *et al.*, 2022). Quick technofixes seem attractive in a velocity culture, but they bear political risks and in light of rising global emissions, it is clear that they merely complement, rather than replace fossil infrastructures as additional tools for growth (York & Bell, 2019).

Does this mean speed is all bad? Again, to limit warming to 1.5 degree Celsius, a rapid transition seems inevitable. However, the key question a lot

of the rapid transition literature seems to evade is: rapid transition towards which society? If it would be a speedy transition to a radical form of energy justice, decentralization and deceleration, so a paradoxical 'fast' slowing down, speed would be much welcome. Taking this thinking about environmental justice one step further, one may think about a right to deceleration, or a 'slowness justice'. This rather than a fossil-capital driven rapid decarbonization may be more suitable for limiting global warming to 1.5 degree Celsius. But decarbonizing global energy supply chains happens in a Promethean spirit, whereby speed becomes a welcome tool to silence debate, replacing meaningful climate action by quick technofixes (Dillet & Hatzisavvidou, 2021; Huesmann & Huesmann, 2011; Zumbraegel, 2024). This potentially subjects yet more communities and ecologies to a violence of speed.

Even a more orthodox understanding of energy economics suggests problems in fast green growth infrastructures. As Egypt shows, there is a risk of generating an oversupply of energy if growth paradigms remain unchallenged, thus, disincentivizing energy efficiency. And even if infrastructure produces 'green' energy, it may still take decades to fully amortize the carbon cost of its construction. Given the current geopolitical climate, the unpredictable future of the polycrisis may make it harder to build and operate these infrastructures profitably. As in many other instances, it seems maintaining politically cheap, but financially costly oversupply of energy determines 'fast forward' forces into a more than uncertain future.

Returning to the social acceleration–deceleration dialectic, the closing section is dedicated to a deceleration and decentralization future. This would, first and foremost, mean a strategic reduction in energy demand. Efficiency should, thus, no longer only be seen as economies of scale in renewable power production from presumed abundant sources in the Global South through which capital is accumulated. Rather, the decentralization of production, like Egyptian solar rooftops, and reduction of global demand seem to be the key in achieving a broader socio-ecological transformation. Politically, the imperative of decarbonization remains in place, but this can be achieved through a reduction of global dependencies on growth-based consumption imperatives and entropy heavy mega networks (on megaprojects see also Durrant, 2025). The political economy of growth itself is of course something that has been challenged by degrowth economics for a while, though with limited uptake by policymakers (Kallis *et al.*, 2024). Last, addressing the growth-debt relation seems only possible through a globally coordinated debt relief which, in turn, implies a power struggle with finance, for which debt is a key (high-speed) accumulation strategy (Morgan, 2020, p. 120).

Above all this hovers the political decisions of legislators and sovereigns, who themselves are accumulators of debt and deeply entrenched in a competitive developmental growth regime, now tasked with rapidly decarbonizing 'their' energy metabolisms. This, alongside the vested interests of fossil capital means that they remain committed to energy supply policies and growth-based decarbonization, if any at all (Soener, 2024). The discourse and policies

of rapid decarbonization avoid these admittedly difficult political contestations and, indeed, imperative, tasks. A politically more ambitious, but in the long run cheaper transformation towards a decentralized post-growth and decelerated political economy reducing energy demand would address not only environmental, but also societal stress emanating from speed.

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ORCID

Clemens Hoffmann http://orcid.org/0000-0001-8476-8102

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Clemens Hoffmann is a senior lecturer in International Politics at the University of Stirling in Scotland. He works on the geo-political ecology of the Middle East, understanding the regional nature-society relations as conditioned by geopolitically competitive metabolic regimes.