Yuliya Yurchenko

The Energy Sector and Socio-Ecological Transformation: Europe in the Global Context

Abstract Global climate change politics is moving ahead, while policy effectiveness lags behind. The overwhelmingly capitalogenic climate change (Moore 2015; Street 2016) necessitates a global ecosocialist transformation (Yurchenko 2020). In many ways, the EU is a champion of green politics and policy, although its decarbonisation framework has been criticised for being ill-conceived, ill-prescribed and insufficient, especially in the context of internationalised production and consumption of Green House Gas (GHG) emissions. A radically socio-ecological transformation of 'global' Europe, and the decarbonisation of the EU energy sector as a complex socio-ecological system are needed (SES; Ostrom 2012). Focusing on some 20 years of EU energy market reforms, I argue that decarbonisation aims are jeopardised without (1) public national, local and collective forms of ownership and financing of energy (generation and supply) as a common pool resource (CPR)/commons, and (2) a polycentric mode of governance (Ostrom 2010).

Keywords ecosocialism, global climate change, socio-ecological systems, commons, Ostrom, polycentricity

1. Introduction

Global economy as a system is underpinned by policy models – international and national – derived from economic theories that, since the Industrial Revolution, have assumed exponential economic growth (Jones 2015). Predominantly quantitative, such growth is materialised via industrialisation, increasingly mechanised and digitised production, and a faster consumption of goods with increasingly shorter lifespans in increasingly capitalist economies (Malm 2017). Those processes require increasing amounts of predominantly fossil energy and thus any climate action must involve an examination of the relationship between society and nature (Malm 2017), grasping the role of the capitalocene – "a system of power, profit and re/production in the web of life" (Moore 2017: 1) – in the current environmental catastrophe, while imagining and designing alternative systems of generation, distribution, ownership, and governance of energy systems. This entails the dismantling of the growth models required for capitalism to function that produce a capitalogenic – i.e. driven by capitalism – climate change (Moore 2015; Street 2016). The consensus among (green) Marxists resonates with Kovel and Löwys' (2001) declaration, made in "An Ecosocialist Manifesto", that the end of capitalism can be the only hope for our own and for many other species. And indeed, even by its own, neoclassical economic reductionist metrics and standards, the capitalist market is failing to deliver decarbonisation, let alone sustainability or the fixing of the metabolic rift between human economic systems and nature (Foster 2016; Yurchenko 2020).

The case of the energy sector is a testimony to the need for a systemic policy approach. It binds other sectors, keeping them 'alive' through the grids and wires. In the EU alone it "employs close to 2.122 million people, spread over 90,000 enterprises[…]??, representing 2% of total added value" (EC 2019). Between 1994 and 2004 in the EU-15, 246,000 jobs were lost in electricity and 23,000 in gas across 20 member states (ECOTEC 2007). In the energy sector as a whole, 197,400 jobs were lost between 2010 and 2016 (EC 2017) due to the compound effects of liberalisation, decarbonisation, digitalisation and automation (Heyes/Lewis 2014). Many workers in fossil and nuclear industries in the EU (and beyond) are losing jobs, and only few of them find new employment in renewable energy (RE) or energy efficiency industries (IRENA 2017: 168). The transformation thus needs to be carefully thought through, as jobs and livelihoods of millions of workers in related sectors also depend on the shape of change to come.

In 2017, EU marked a 20 year anniversary since member states' energy markets began to liberalise and move towards a single energy market. In those 20 years, significant progress in global climate talks and in the EU decarbonisation effort have been achieved. The global financial crisis of 2007-9 led to an economic recession and austerity, both of which put constraints on individual (e.g. affordability) and governmental (e.g. budgetary and policy choice constraints, not least ideological) action towards sustainability. Despite this, the Paris Climate Agreement was signed in 2015. Now, the COVID-19 disruption, following the School Strike and the Extinction Rebellion (Hesters 2020), has placed climate politics centre-stage globally, while spurring the EU to organise the climate-focused Next Generation EU recovery plan (FT 27 May 2020).

Having built a reputation of being a champion of climate politics (Oberthür and Kelly 2008), the EU has been pursuing decarbonisation policies by means of an integrated energy market and its four policy packages to date, that (it was hoped) would improve efficiency, empower consumers, and attract green investment. The apogee of such commitment to date was the European Commission President Ursula von der Leyen's unveiling of the European Green Deal on December 11, 2019, defining it as Europe's "'man on the moon' moment" (Euronews 11 Dec 2019). Yet, is the plan fit for the task? And what role do the energy systems play in it, and in the context of a wider socio-economic and ecological transformation?

In this paper, I deploy Ostrom's model of socio-ecological systems (SESs) and common pool resource (CPR)/commons governance in analysing the EU energy market and its decarbonisation frameworks. The carbon-intensity makeup of energy systems directly affects our global commons (not unlike other systems, but especiallyfor its high carbon footprint). Thus, any analytical exercise on any energy system must include the international dimension; in our case, it is the international impact of the EU decarbonisation effort. The use of global commons as a polycentric super-structure in its own right needs to be assessed separately, subject to the same principles; suffice to say here that the inability to arrive at a decisive coordinated action on climate change mitigation on a global level, signals that the global commons' system governance is undeniably malfunctioning – a reason not least, why global leadership in such efforts shall be progressive and systemic.

This paper assesses the pathway of the EU energy market reform in the context of global sustainability transition tasks and challenges, globalised emissions production and consumption, and historic responsibilities.

Energy, markets and Elinor Ostrom

A sustainable and decarbonised world economy must be achieved in less than a decade, and that means an urgent move away from fossil fuel dependency (Pirani 2018) while energy intensity of human economic systems is determined by "five main energy-related anthropogenic legacies [that shaped our energy dependency and related challenges]: growth in fossil fuel consumption, 'atom for peace', RE development surfing on non-energy science and technology, the move to sustainable development, and climate change" (Verbruggen and Yurchenko 201: 2-3). It thus becomes crucial to review the architecture put in place to achieve sustainability and decarbonisation. New energy spaces are emerging outside energy policy domain (strictly speaking) i.e. "novel combinations of energy systems and social relations across space – that is, a process of uneven development – rather than an interest in only certain energy technologies (e.g. those associated with decarbonization)" (Bridge and Gailing 2020: 1038), where decarbonisation can and should occur, e.g. low energy-intensity production lines of various goods and services, lower carbon supply chains, etc. Acceptance of the need for "'economy-wide' perspectives calls for deep decarbonization beyond the energy sector, and typically align decarbonization with broader social goals such as improving societal welfare and reducing socio-spatial inequalities" (Ibid.).

The EU is seen as a global leader in climate politics (Wurzel and Connely 2012; 2016), and its energy market is being deepened with a declared aim to decarbonise via an integrated and more efficient market that empowers consumers and attracts green investment (EC 2019b inter alia). Despite there being, 15 years later, little evidence of the effectiveness of the liberalised market approach (Thomas 2013), the EC rolled out its Fourth Energy Package, or the Clean Energy Package, built in the likeness of the first three. The EU institutional framework has marketisation and economic growth dogmas hardwired into its neoliberalised policy infrastructure, and that translates into multi-level policy-making and performance targets. As a result, some contradict one another and thus create mutual implementation obstacles – thus, state aid is at odds with the competition law, anti-monopoly legislation contradicts the logic of natural monopolies and has not prevented the formation of oligopolies, while private ownership and financing initiatives are structurally favoured over public ones (Yurchenko and Thomas 2015), despite the EU law clearly stating that its institutions must remain neutral on the question of state vs private ownership (Hall 2016). The European Green Deal (EGD) unveiled in December 2019 resonates with the Four energy packages in its approach. However, together with the current revision of the State Aid rules to spearhead green investment, and governments stepping in on a global level with (post)COVID-19 economic recovery packages, a historic possibility is opening up for a more democratic, sustainable transformation of the sector; but only if the lessons of past failures are not repeated once more and a neoliberal, financialised marketisation approach to implementing change is revised or, indeed, abandoned. A new, meaningfully sustainable system shall be delivered on principles of (1) "energy democracy" – a "socially just energy system, with universal access, fair prices and secure, unionised and well-paid jobs" (ED

2016) – through a process of (2) "just transition", a term developed by trade unions and activist movements and now adopted by the United Nations Framework Convention on Climate Change (UNFCCC), which denotes a transition that is delivered in a "socially balanced way whereby the inevitable burdens and costs are fairly shared by all major actors" (ILO 2014: 218).

How does one remedy the EU energy market problems in the context of decarbonisation. The EU energy market is a large, coordinated, interconnected and centralised system of systems involving actors, entities and infrastructure of varying size and capacity, from high voltage network operators to medium/small systems and actors – e.g. low voltage decentralised networks and generators; put differently, it is a polycentric system (Ostrom 1990). The evolution of the EU decarbonisation framework is a clear record of the growing acknowledgment and acceptance of, and attempts at, grasping, (on the level of policy of complex systems within which energy systems are embedded, in the words of Elinor Ostrom we are talking of "social-ecological systems" (SES), i.e. systems in which all resources used by humans are embedded). Tackling climate change requires diagnoses by "cumulative capacities" of the problems and potentialities of the complex SESs (Berkes and Folke 1998, Liu et al. 2007) and the necessity of development of such capacities substantiated by Ostrom (2007; 2009). Energy union, market and systems are polycentric sub-systems of the global SES, and, according to Yurchenko (2020) must be understood as an integral part of such, as part of the dialectical circulation of matter and energy. With that in mind, one must accept that energy market systems must be decarbonised as part of the responsible, sustainable use of the global commons. Energy market transformation in the context of a transition towards sustainable energy production, and the utilisation and consumption of energy resources shall then be treated as a social-ecological system which is best governed by the principles of Polycentricity, as laid out in Ostrom's Nobel prize winning framework (1990). The latter calls for abandoning the state-market dualism, instead open the space for (self-)management via the relative autonomy of agents of various ranks in a system of negotiations, balancing, and monitoring of collective governance (Ostrom 1994; 2010). Such systems prove to be the most resilient, robust, adaptable and sustainable. It is not through the excesses of top-down monitoring and exogenous prescription but through informed, careful and negotiated application and combination of scientific and local knowledge that systems are best managed by their long-term users (Ostrom emphasized the efficiency of systems run by long-term users in one of her last public appearances, Hayek Lecture in June 2012).

Ostrom('s)[i] framework is a testimony to the necessity of the energy democracy and just transition if sustainability is to be achieved and maintained. It proposes experiential solutions, and examples of what makes multi-stakeholder and polycentric models successful in governing common pool resources (CPRs) or commons, summarised in eight mutually reinforcing principles. These are: (1) commons need to have clearly defined boundaries; (2) rules should fit local circumstances; (3) participatory decision-making is vital; (4) commons must be monitored; (5) sanctions for those who abuse the commons should be graduated; (6) conflict resolution should be easily accessible; (7) commons need require the right to organise; and (8) commons work best when nested within larger networks (Wall 2017; Williams 2018; Trebeck and Williams 2018).

Few publications – let alone policies – treat energy systems as CPRs/commons (Laerhoven, Schoon and Villamayor-Tomas 2020), and that needs to change. The collective forms of financing, ownership and management that follow such approach are precisely what is needed for a full and rapid transformation of the sector and the EGD delivery, as is advocated by the Just Transition.

Let's now examine the evolution of the (neo)liberalising energy market architecture, identifying its successes and pitfalls through the contextualising lens of Polycentricity and the criteria for successful governing of the CPRs.

2. From liberalisation of energy market to the European Green Deal – what could go wrong?

In the 1990s, the EU decided to get rid of state monopolies in energy and start to gradually open markets to competition, and has since produced four energy policy packages. The First Package (1998) required member states to introduce wholesale markets for electricity and gas and to give consumers the choice of supplier with the objective of creating 'Single Markets' across the EU for electricity and gas. The Second Package (2003) allowed industrial and domestic consumers to freely "choose their own gas and electricity suppliers from a wider range of competitors" (Europarl 2009). The Third Package was the first to go beyond the extended energy market liberalisation and included climate action goals – it set the 20-20-20 targets, which identified the three main climate objectives for 2020, namely: (1) "a 20% reduction in EU greenhouse gas emissions from 1990 level; (2) raising the share of EU energy consumption produced from renewable resources (RES) to 20%; and (3) a 20% improvement in the EU's energy efficiency" (EC 2007/9). Yet, by 2016 the EU's view/conclusion on electricity market was that it had to "be remodelled (after three iterations already) in such a way that would ensure support for the EU's policy objectives by encouraging investments in flexible low-carbon electricity generation and in a stable and adaptable grid that is fit for a growing share of RE in the supply and for new uses of electricity. This was done by incentivising the use of energy-efficient equipment and consumer goods, and by providing affordable energy for industry and households" (EC 2007/9). The result was the Fourth and latest package, also known as the Clean Energy Directive, presented on 30 November 2016. It was "intended to help the EU energy sector become more stable, more competitive, and more sustainable, and fit for the 21st century" (EC 2016) and help deliver the EU's Paris Agreement commitments. The three main goals of the package are: (1) "putting energy efficiency first, (2) achieving global leadership in RE, and (3) providing a fair deal for consumers" (Ibid). The goals are to be achieved via "five mutually reinforcing and closely interrelated dimensions" laid out in the Energy Union strategy (COM/2015/080) towards "secure, sustainable, competitive and affordable energy published on 25 February 2015: solidarity and trust; a fully integrated European energy market; energy efficiency contributing to moderation of demand; decarbonising the economy; and research, innovation and competitiveness (EC 2016).

The two main themes of the fourth package are decarbonisation and Europeanisation. The first one focuses on "adapting market and regulatory structures to make them fit for the

decarbonised energy system of the future (with more decentralised sources, more intermittent power, more active consumers and so on)" (Buchan and Keay 2016: 2). The second signifies a move away "from national approaches to energy towards regional and EU-wide frameworks (e.g. regional operations centres; cross-border capacity and RE payments; strengthening of regulatory coordination)" (Ibid.). And, underneath it all, implied in the delivery mechanisms, is further marketisation.

The EU Green Deal (EGD), rolled out at the end of 2019, reinforces goals set out in the Fourth Package and contains a number of promising objectives: (a) "Climate 'neutral' Europe, Circular economy, Building renovation, Zero-pollution, Ecosystems and biodiversity, Farm to fork strategy, Transport, Money, R&D and innovation and External relations" (EC 2019). The EGD is supported by the Sustainable Europe Investment Plan, which aims "to mobilise public investment and help to unlock private funds through the EU budget and associated instruments", with the overall objective of mobilising "at least €1 trillion of sustainability-related investments over the next decade" (EC 2020: 4). The Plan is part of the Renewed Sustainable Finance Strategy that built on the "10 actions of the EC's '2018 Action Plan on Financing Sustainable Growth', which laid down the foundations for channelling private capital towards sustainable investments" (Ibid.). A source of concern is the existence of the Energy Charter Treaty (FOEE 2019), which secures rights of corporations over rights of citizens and contradicts the EU law aimed at "protecting public interests and EU citizens who are expected to bear the cost of the long-term carbon neutrality target" (Saheb 2019: 2 *et passim*).

EGD estimates assume that the goal of reducing Green House Gas (GHG) emissions by 40% by 2030 will require additional annual investments of €260 billion, while Wildauer, Leitch and Kapeller (2020) estimate that some €855 billion will be required (excluding transport) for the goals to be met. In the context of COVID-19 disruption, ongoing State Aid rules (consultation) large-scale investment by the states to aid economic recovery, it becomes clear that the largest investment and/or subsidies/incentives will be funded by the taxpayer, (who shall be included as decision-makers and shareholders in return for their "investment"). Otherwise, the market failures, to which I turn next, will continue.

3. Have energy packages delivered promised results?

(De)monopolisation: Demonopolisation has failed, and instead of state-run monopolies, privately run monopolies and oligopolies have emerged. While there is a growing number of prosumers, i.e. consumers who also produce and feed energy back to the grid, such as cooperative-producers, and SME energy companies, they are crowded out by the big energy companies (Prospex 2016; EC 2019) and they do not guarantee good quality jobs, protection of workers' rights or security of supply – all of which are crucial conditions of a just transition. The biggest industry players are in the fossil fuel business?? and have little to negligible RE in their energy mix, especially when nuclear and gas are discounted as low-carbon options – which they are not (Verbruggen and Yurchenko 2017). Moreover, despite the EU decarbonisation agenda, it is the fossil energy 'experts' who form the bulk of advisory committees on the future energy – a fact partly responsible for over-investment in gas pipelines (CEO 2016; 2019). The elephant in the room is the (il)liberalised market, i.e. a

market with the illusion of providing free access to new entrants and working on a principle of fair competition.

Market mechanisms and their effectiveness: The aims of liberalisation were ambitious – "unbundled and liberalised electricity systems were expected to be more efficient because of the competition resulting from the creation of wholesale and retail markets" – yet there is little evidence that the private sector yields higher efficiency (Hall 2016: 5; Thomas 2013, 2015). A number of instruments were suggested while just a few tried across the EU to 'aid' the achievement of the RE capacity and decarbonisation targets. These were: Feed-in-Tariffs (FiTs), emissions trading, capacity auctions, RE obligations, and a carbon floor price (see Yurchenko and Thomas (2015) for their analysis).

Historical evidence shows that state aid and subsidies are crucial in the deployment of RE capacity (Yurchenko and Thomas 2015). However, when austerity and competition law combine, a double squeeze is applied whereby the states have little budgetary capacity or policy choice options, as austerity spells means 'thou shalt not spend', while competition law is at odds with state aid mechanisms (Ibid.). Anti-monopoly legislation in natural monopoly industries, combined with market competition legislation, leads to states losing ownership, control and thus ability to direct RE transition of the split energy enterprises (Thomas 2013).

Efficiency: EU energy market optimisation was aimed at cost efficiency and efficiency of consumption; while at the same time the investment into the energy efficiency of the households, for example, stands at €134bn out of needed €214bn (Holmes, Jess, and Genard 2017). Ultimately, the EU Efficiency Directive and its proposed policies "are likely to be insufficient" to meet their own targets (E3G 2017: 17). The efficient use of energy and of public money are very important, but efficiency and efficacy of service are important too. Free market efficiency – a foundation of EU economic models – "is completely unconcerned with distribution of utilities (or of incomes or anything else), and is quite uninterested in equity", according to Sen (1993: 521). Moreover, the liberalised energy market is really illiberal in such modelling, as it prohibits the possibility "to rearrange the resource distributions freely" (Sen 1993: 522). The reverse also applies – it is impossible to achieve even limited "market efficiency" when "any given initial distribution of resources" takes place (Ibid.). So, freedom of the market comes at the expense of freedom of distribution, which makes that market inefficient.

Cost reduction: The electricity price landscape in EU is uneven, with prices being higher in the states with more liberalised markets. This creates affordability problems when the Purchasing Power Parity principle is applied, and leads to higher levels of energy poverty in some states, e.g. Greece, than in others, e.g. France. On the whole, energy prices are rising for both industrial and household consumers, with the latter paying more (EC 2019), while fossil and nuclear energy companies are subsidised (Verbruggen 2014). Affordability and carbon efficiency are key for sustainable transition, while the dominance of private suppliers means payment of dividends and interest, that effectively add to the final cost of electricity (Hall 2016: 4). According to a report by Corporate Watch in 2015, "the annual savings from bringing the energy, water and rail sectors into public ownership could be £6.5 billion [or £248 per household] in the UK" alone (Corporate Watch 2014).

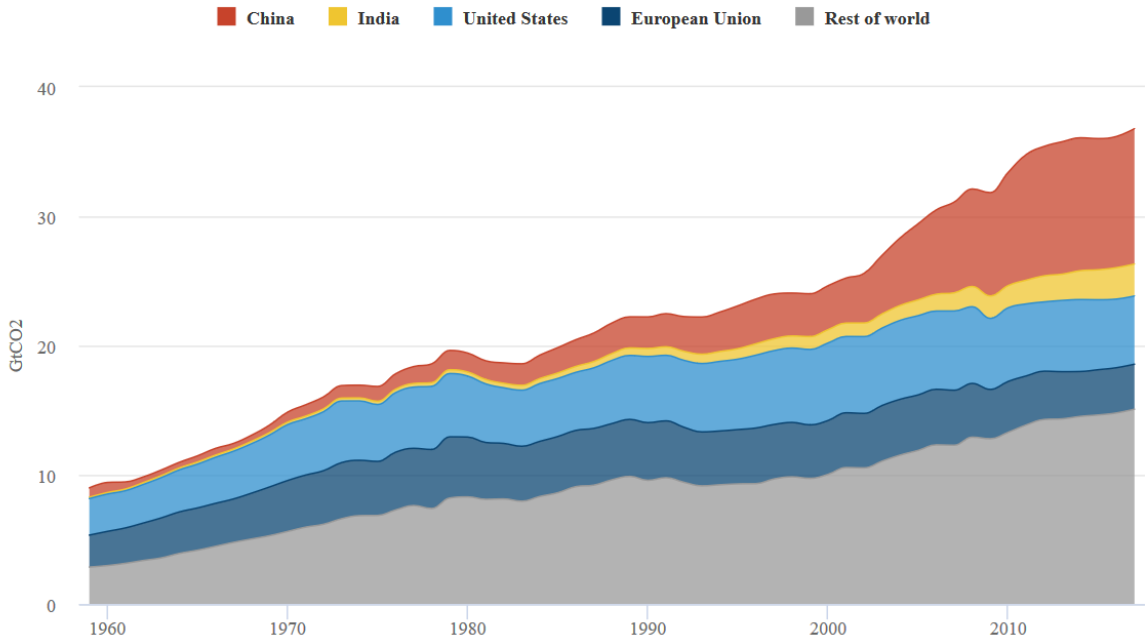
Security of supply: The liberalisation of markets failed to guarantee security of supply on the basis of affordability and of access to supply, as fuel import dependency is growing, not falling (EC 2019a). In 2018, "almost three quarters of the EU's imports of natural gas came from Russia (40 %), Norway (18 %) and Algeria (11 %), while almost three quarters of solid fuel (mostly coal) imports originated from Russia (42 %), the United States (18 %) and Colombia (13 %)" (Eurostat 2020). This creates not only interdependence but also potential geopolitical tensions between the states who import/export/consume various types of fuel and those that produce nuclear fuel and store nuclear waste.

4. The international dimension: the long shadow of market-based growth

There is a direct relationship between growth, trade, globalisation and environmental damage from fossil fuels, a relationship which threatens a green future. The infamous 1991 World Bank internal memo signed by Chief Economist Lawrence Summers (Johnson, Pecquet, and Taylor 2007), where he urged other World Bank members to "*encourage* pollution intensive industry [to] migrate to developing countries", is a reminder that is increasingly relevant (McAusland 2008). A cross-section study of 63 countries and instruments for trade intensity and income by Managi (2004) calculated "the scale, technique and composition effects of trade and concludes that the combined effect of a 1% increase in trade leads to a 0.58% increase in CO2 emissions for the average country in [the] sample" (in McAusland 2008). Findings by Frankel and Rose (2002, 2005), Neumayer (2004), Holtz-Eakin and Selden (1995), and Schmalensee et al. (1998) confirm a direct correlation between trade, income and carbon emissions (Ibid.).

Overall, EU CO_2 emissions are declineing but the global emissions are growing, reaching 32.8 billion tons of CO_2 by 2017, even if that dynamic has temporarily been stalled by the COVID-19 lockdowns. The biggest emitters in 2017 (and 2018 based on preliminary data; IEA 2019) were: China (the People's Republic of China and Hong Kong, China; (28%), the United States (14%), the European Union as a whole (10%), India (7%), the Russian Federation (5%), Japan (3%), Korea (2%), Canada (2%), Indonesia (2%), and Iran (2%). The substantial presence of US and China in the global historic emissions record (Figure 1) reminds is a reminder of their role in producing and in the necessary halting of the global heating.

Figure 1. Annual CO2 emissions from fossil fuels by country, 1959-2017



Source: Annual CO2 emissions from fossil fuels by major country and rest of world from 1959-2017, in gigatons of CO2 per year (GtCO2). Note that 2017 numbers are preliminary estimates. Data from the Global Carbon Project.

The EU decarbonisation effort delivers promising results in decreasing the production and export of emissions, while this appears to be partly achieved by "outsourcing" those as in 2015 "the ratio between import- and export-embodied emissions was 3:1 for the EU-28" (Fezzigna et al 2019: 10). Richer countries and consumers drive global overconsumption (Wiedmann et al 2020). Workers' movement is regulated by visa regimes, economic, military, and social conditions while customers can be reached anywhere. The "sites of production can be dissociated from sites of consumption, and capital can choose between national economies for establishing export platforms" Malm (2012: 154), leaving workers in poorer production sites with CO2 and other forms of pollution to metabolise. Economic growth requires "mass production of commodities by means of machines and transportation of commodities by means of various vehicles", even trade in non-material goods still involves physical spaces and machinery is required to facilitate services and transfers, and high carbon footprint technology (Ibid. *et passim*). Decisions about sustainable consumption corridors (Di Giulio and Fuchs 2014), de-growth (Gough 2017; 2020), and the politics of consumption must be made, and need to be supported by a policy-enabled transformation of consumption praxis to become sustainable as well as accessible and affordable levelling along the axis of needs (Isenhour et al. 2019: 1-18 et passim). According to Malm, production, is not "a neutral element [that responds] passively to consumer demand, owners and managers of production" must be made visible (Malm 2012: 151), and supply chains decarbonised without blaming low-income households for their carbon-intensive non-choices when just 10% of the world's richest produce some 50% of the world's emissions (Oxfam 2015). Historic and current responsibilities for the environmental destruction need to be

acknowledged in an ecosocialist transformation, and (needlessly) consumed emissions drastically reduced.

The rights of workers and citizens, not merely corporate profitability and market efficiency, are to be accounted for when green transformation is designed; to which I turn next.

5. Policy options for ecosocialism, energy democracy and just transition

The polycentric approach advocates the combination of large scale centralised elements of energy systems and natural monopolies with decentralised, local generators and consumers and for a devolution of decision-making power and authority. Ostrom's framework on CPR governance showed that the most effective are the systems that combine multiple levels of authority distribution, and she documents examples from across Europe to prove the effectiveness of such an approach.

Looking at the above dimensions of the energy market as a cluster of SESs within the planetary SES and energy as a CPR, there are problems and hope alike. So, (1) the energy market does have clearly defined boundaries, yet rules about who produces and sells what at what price and when are much less clear; the market – not people – decide; (2) rules fit local circumstances in some cases, while in others they create problems, e.g. electricity price-setting hurts poorer households; (3) participatory decision-making is malfunctioning, not least due to the inadequacy of power dynamics in the Social Dialogue framework (EPSU 2019); (4) commons are being monitored, yet both monitoring and targets are riddled with problems, not least due to the complex internationalised character of emission-making; (5) sanctions for those who abuse the commons exist, yet fossil industries are still subsidised; (6) conflict resolution can be costly and time/expertise consuming (EPSU 2019); (7) the right – and the socio-economic ability – of commons to organise varies from country to country, and that needs to be more coordinated and supported; yet, (8) energy commons work best when nested within larger networks and in the EU Energy community they are – a lot of necessary institutional, policy, and infrastructural architecture is in place; next, what is needed is democratisation of the functions. In the Ruhr region in Germany, for example, "a cooperative industrial structure with active roles for the government, the municipalities, the employers and the trade unions [evidently served as] a prerequisite for a successful and just transformation" (ILO 2014: 237) – for a just transition and energy democracy.

The EU energy market is run by the member states, which "operate within a hybrid institutional framework combining supranational and intergovernmental elements, in which formal and informal authority distribution is unstable and contested"; a system Bocquillon and Maltby (2020) describe as "embedded intergovernmentalism", which is also a form of SES. With increasing participation from smaller actors, prosumers, and the diversification of generation and type of energy in the interconnected grids, the mode of governance of the system needs to be transformed. Blomkvist and Larsson showed that it is important to include "the [common pool resources] (CPR) in legislation and that government agencies support the CPR in alignment with the large technical systems (LTSs)" (2013: 114). The CPR institution and the LTSs are practically connected and mutually interdependent, and the currently

transforming EU energy market architecture is attempting to enhance that connection, yet much more has to be done. A multilevel system of policy-shaping and implementation agents of various sizes is necessary, with "citizens assemblies and forums" (e.g. the Convention Citoyenne pour le Climat in France (Mellier-Wilson 2020) and similar in Ireland, UK and Canada) and their growing experience of bringing experts and citizens together (Gough 2020), especially relating to matters where local knowledge and understanding are key, those related to the needs of communities they represent (as Ostrom's work has extensively shown).

There are several issues that need to be addressed if economic, social and environmental gains are to be achieved. Universal access, stability and security of supply must be guaranteed, while RE capacity must be deployed rapidly and on the basis of just transition and energy democracy. This can be achieved via public ownership of energy systems, as, despite the liberalisation mantras, "there are often significant improvements in productivity when separate parts of a system are merged under public ownership, because transaction costs are reduced" (Hall 2016: 3). There are several alternative approaches already in existence, including public financing for sustainability enhancing projects, that would enable cost saving in the long run (Marois 2017; TUED 2017).

Ecosocialism, just transition, and energy democracy can be achieved if the EU 'multi-stakeholder' model is made meaningfully functional and includes a deep and constructive dialogue between local communities, workers, trade unions, civil society organisations, municipalities, etc.: if energy is treated as a CPR/commons and the energy market as an SES. It cannot operate in a system where 'independent' consultation committees are made up of big shots from the gas industry, for example (CEO 2019). Indeed, the close relationship between energy and growth means that energy politics always embody high politics, affording large providers of energy a degree of structural power in state decision-making, which they have exercised repeatedly in the area of climate change politics (Newell/Paterson, 1998). The EU trade unions, and some political parties, have on multiple occasions voiced their concerns about fossil energy, supported decarbonisation, and come up with thorough, economically viable policy plans – EPSU/EU, ETUC, UNISON and TUC from the UK, FNME-CGT/France, the International Transport Workers' Federation, etc. for example; however, their concerns are often trumped by the interests of fossil industries and the EC and EU's growth obsession, both of which shall be abandoned for sustainable future to have a chance. The transition must occur under public and democratic control of energy generating and distributing enterprises, in a polycentric system of governance of energy systems as a commons.

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Yuliya Yurchenko is Senior Lecturer in Political Economy at the University of Greenwich, Political Economy, Governance, Finance and Accountability Institute and a vice-chair of Critical Political Economy Research Network, ESA. Her research interests lie in transnational historical materialist analysis of relations between state, society, and capital, human-nature dialect, with a geographical focus on (global) Europe, post-Soviet space and Ukraine.

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[i] Elinor Ostrom worked alongside her husband, Vincent, and famously commented on the Nobel prize being an achievement for their and their team of researchers' collective work over the years.