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A new framework for EU energy security: putting sustainability first

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ABSTRACT

The EU energy strategy is hard-poised to ensure energy security for the Union, mainly due to its fixation on fossil energy imports. This paper argues that energy security can holistically be addressed only in case sustainability becomes a priority goal. Such a re-conceptualisation does not only pave the way for a radical restructuring of the energy systems in Europe that can cater for the EU's energy needs in a sustainable way, but also theorises energy as a scarce resource that hence should be highly priced. On the basis of a thorough ecological tax reform, energy prices can convey accurate signals to households and enterprises and allow for a smooth function of the economy that is today frequently upset by energy price hikes and slumps. The paper aims to make a timely contribution to the current debate on the shape and priorities of the Energy Union by making a strong case for a re-ordering of priorities in EU energy strategy.

KEYWORDS

Energy Union; demand-side policies; de-carbonisation; low carbon security; renewables; ecological tax reform

Introduction

Security of supply concerns have been omnipresent in European energy strategies and have driven policies to ensure that adequate quantities reach the European market on time, and at reasonable prices. From the initial efforts to create an energy community in the 1950s to the energy crises of the 1970s and the securitisation of Russia's energy role since the 2000s, energy has been studied primarily through geopolitical and 'high politics' lenses. The empowerment of the European Commission in the energy field since the 1980s with the Single European Act marked a significant turn in European energy strategy with competitive integrated markets, common infrastructure and favourable contractual agreements becoming pillars of EU energy security (Maltby, 2013).

At the same time, the augmenting environmental concerns since the 1970s, the benchmark Brundtland Report of 1987 and the first Earth Summit in Rio de Janeiro in 1992 forced energy strategists to, at least nominally and rhetorically, incorporate environmental factors in their policy designs. The surpassing of critical planetary boundaries and, principally, climate change have led to new institutional structures and climate policies to deal with these problems. It is striking, nevertheless, how insufficiently integrated these policy

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fields have been in spite of the obvious linkages of energy and environmental issues; most importantly, instead of energy policy-making having been subdued to environmental policy-making, pro-environmental legislation and policy-making find themselves squeezed among what is considered first-order energy goals (Held & Hervey, 2011). This is quite bizarre if one thinks of the hard evidence that connects climate change with the excessive carbon emissions in the atmosphere that are principally due to fossil energy.

External and seemingly unrelated events, such as the Ukrainian crisis that has led to a continuing falling out between Russia and the EU, play a crucial role in turning the emphasis on immediate energy needs rather than long-term goals, such as the stabilisation of global temperature and the preservation of the ecosystem. At the same time, these events highlight the exposure of the EU to significant energy supply risks and price volatility despite its energy strategies prioritising precisely a secure and affordable supply. While these persist, the European climate policy remains partial and ambiguous, since even if the EU's climate goals for the benchmark years 2020 and 2030 are fulfilled, they are modest with regard to the magnitude of the climate challenge. As a result, the state of the EU's energy security remains fraught with problems, risks and crises across its three dimensions.

A holistic approach that will address the synergies and linkages of primary energy security concerns is thus badly needed (Morata & Sandoval, 2012). The paper attempts to make a timely contribution to the current debate on the shape and priorities of the Energy Union by making a strong case for a re-ordering of priorities in EU energy strategy. It argues that prioritising sustainability carries the potential both to ensure security of supply through a transformation of the EU's energy systems, and to pave the way for an ecological tax reform that will keep energy prices high for the sake of the resilience of the European economy.

The paper proceeds as follows. The next section presents the new framework for energy security. The third section explores the concept of sustainability and depicts the unsustainable character of the EU energy strategy. The fourth section examines how security of supplies can be achieved within a sustainable European energy framework. Subsequently, we suggest that affordability in the energy sector should be critically re-conceptualised. The paper concludes with summarising the benefits of the suggested policy framework.

A new framework for sustainable energy security

Energy security has three main dimensions, security of supply, affordability and sustainability. Both as a strategy and an object of scholarly analysis, however, energy security is very often equated with security of supply, which boils down to ensuring adequate fossil fuel supplies against the backdrop of intensified competition for scarce natural resources, political instability in exporting countries, resource nationalism, a shortage of alternatives, and so on. (Umbach, 2010). Affordability of energy imports features second in the agenda, especially in periods of ascending prices, as has been the case since 2003. Although the 'energy revolution' in the USA, combined with persistently low energy demand, has caused a slump in prices, a new price hike in the following years is anticipated as part of regular boom and bust energy cycles**.** Thirdly, sustainability, understood as energy use causing no further damage to the planet, has far from assumed the character of a priority, despite solid evidence-based argumentation regarding the damage

the global ecosystem suffers due to extensive fossil energy use and the contrary recommendations of the most authoritative institutions, the UN-sponsored Intergovernmental Panel for Climate Change and the OECD-sponsored International Energy Agency (IEA).

This has been so since energy security has traditionally been shaped in the European context by political and economic concerns. The latter have revolved around the need to ensure affordable prices and create a competitive and integrated single market for energy. The former initially reflected concerns over the growing unreliability of the Middle East; since the 2000s, they have basically to do with the perception of Russia as an unreliable partner. The 2004 enlargement had as a consequence that the traditional animosity and suspicion between 'new' Europe and Russia was transplanted in the EU setting, while bilateral Russia–Ukraine friction, ensuing supply cuts and the recent historical low in EU–Russia relations over Ukraine have accentuated fears for Russian non-accommodating energy policies. While central and east European members have been faced with Gazprom's blackmailing tactics and supply interruptions in several instances, this adding to and warranting their polemical approach vis-à-vis Russia (Larsson, 2007), one cannot turn a blind eye to the steady EU–Russia oil and gas trade for decades, with only minor exceptions. The perception of Russia as a difficult but indispensable partner in Europe is mirrored in the persistent political and corporate interest to further energy ties with Moscow, not least in plans to construct the Nord Stream 2 pipeline despite regulatory impediments in place (Casier, 2011; Proedrou, 2012, pp. 79–104; Proedrou, 2016)

What still characterises the energy security discourse is 'the separation of energy and environment', although 'the consumption of one inexorably leads to the degradation of the other' (Mulligan, 2010, p. 85). Climate change, moreover, remains significantly undertheorised in terms of both its impact on fundamental political premises (Creutzig, Hedahl, Rydge, & Szulecki, 2014, p. 10), and its synergies with economic performance (Froggatt & Levi, 2009, p. 1140). Most importantly, the relevant theoretical work has not focused on how the energy security strategy can find a balance between its core priorities, security of supply, affordability and sustainability, and serve all of them simultaneously and consistently.

This tension is evident in the EU's Energy Union, which remains 'mostly an empty box in which every stakeholder tries to put whatever is on the top of their priority list', from independence from troublesome exporters, security of imports, solidarity, and diversification to low energy prices, de-carbonisation and sustainability (Szulecki et al., 2016, p. 1). In particular, the Energy Union package outlines five priorities:

- Energy security (meaning in practice security of supply), solidarity and trust
- A fully integrated EU energy market
- Demand-side policies and improved energy efficiency
- De-carbonisation of the economy and
- Empowered research and innovation

Behind these different goals lie different players and interests, be they member-states, the corporate world and institutional infighting. In particular, the central and eastern European countries (the Visegrad Group, the Baltic states, Croatia and Romania) have been rather unaccommodating to the Commission's plans for a green transition. Poland's ample coal reserves render the biggest country of this group averse to an outstandingly

green agenda; Poland hence has risen as the natural leader of this group against overt climate-friendly energy policies. In general, most of these states prioritise gas diversification options to clean solutions and remain locked-in in traditional, dirty systems of energy use (Dilba et al., 2015). The fact that most EU Regional Development and Cohesion funds serve to reinforce such locks-in, rather than precipitate a green transition, speaks to the incongruence between the EU's contemporary policy means and actual results. To the contrary, while south European states are increasingly pursuing green policies, it is the EU's North that most impactfully pursues bold clean energy solutions, with Germany's Energiewende standing out as the most prominent example (Szulecki et al., 2015). It hence remains questionable whether the EU will manage to make the transition to a fully climate-friendly energy strategy in the face of such stark competing priorities (Siddi, 2016, p. 132). Such ambiguity is illustrated in the Conclusions of the European Council on the Energy Union, where 'the order of priority of … objectives is not specified … which leaves policy options and the very nature of the Energy Union open to future debate' (Siddi, 2016, p. 141).

Environmental, diversification and liberalisation policies (Proedrou, 2012, 2016) to master energy and climate challenges have been on the agenda and/or implemented for more than two decades now. Not only do they not work synergistically, however, but they also undermine each other, not least since one dimension is often prioritised over the others, depending on international developments. Since energy is the backbone of the European economy, the EU energy strategy seems to work on the ostensible assumption that security of supplies is the foremost goal to be pursued, even if at the cost of the other two dimensions. In accordance with the level of security of supplies, a fluctuating balance among the three pillars of energy security is established. Priority shifting has thus been a steady feature of the EU energy security strategy.

In the 1990s, the EU focused on sustainability with the main rationale being, one could reasonably allege, not only to take up action against climate change after mounting evidence for its dramatic advent had been presented, but also to build up a green economy that would outcompete that of other economic powers, which would remain reliant on the more expensive and declining fossil energy in a peak-oil world (Helm, 2014). Security of supplies, nonetheless, made an impressive comeback with the gas crises of 2006 and 2009 that emanated from the Russo–Ukrainian disputes. In the meantime, the soaring of energy prices became all the more a significant concern with regard to their impact on a European economy that was gradually slowing down since 2008–2009. Competitiveness had become the most astute priority by 2013, when the EU underlined the primacy of cheap energy, including an increased use of coal, even if this reasoning clearly contravened climate goals (European Council, 2013). The new crisis in Ukraine in late 2013 once again raised the stakes for energy security, as it alarmed the EU of the possibility of a new supply cut. In this turbulent context, supply security considerations and competitiveness concerns are very likely to outweigh the pro-environmental voices in the EU decision-making structures with regard to negotiations on the shape of the Energy Union and the respective EU energy and climate strategy.

It is exactly this assumption – that security of supply has to be pursued even at the cost of affordability and sustainability – that this paper aims to disprove. In doing so, it draws principally from the ecological and steady-state economics literature, but also from the mainstream energy security discourse utilising several relevant insights that aim to

respond to pressing sustainability needs. The main argument is that a better balance can be struck and a more efficient energy security strategy designed if we adjust an ecological lens on the energy security problems of the EU, re-conceptualise and re-organise accordingly the priorities of EU energy security, and make good use of a number of novel ideas on demand management and rationalization and alternative energy use. Inertia, lock-in effects, vested interests and established modes of policy-making warrant the current unsatisfactory, albeit evolving, energy and climate strategy of the EU. While acknowledging the multiple impediments a re-ordering of policy priorities entails, we are living through extraordinary times that compel us to 'rework carboniferous capitalism into a more sustainable mode of political economy … [and] facilitate modes of production that replace fossil fuelled capitalism quickly' (Dalby, 2015, p. 440).

In this new understanding, the overarching problem of the EU energy strategy is its unsustainability. We thus maintain that the goal of solving this problem must be the first to be pursued; security of supplies and competitiveness can then be accordingly adjusted to fit the primary sustainability end goal. Developing policies for sustainable energy, it should be underlined, carries the potential of sweeping, but far from necessarily adverse, effects on both the competitiveness of the economy, and security of supplies. Such argumentation also turns the critiques of such a radical thinking, which cast doubt on its feasibility and desirability (Helm, 2012; Lomborg, 2003), on their head.

Sustainability first

Sustainability is a normative concept that rests on two pillars. Firstly, it refers to a state of affairs whereby the needs of today do not come at the cost of the needs of tomorrow. Secondly, since sustainability is a prerequisite for the possibility of sustained life, the emphasis inadvertently lies on the least well-off, whose very existence is principally endangered. In both aspects, a sense of responsibility, equity and intergenerational justice constitutes the normative content of the term (Agarwal & Narain, 1991; Wackernagel & Rees, 1998). As Cherp and Jewell (2014) succinctly argue, any theorisation of energy security cannot afford to ignore the referent object (security for whom?) and the associated costs of contemporary energy strategies (security at what cost?). Both pinpoint to the need to incorporate concerns for the plight of the future generations, the energy security (and not only) of which is gravely compromised by contemporary energy strategies that prioritise supply security and affordability and perform poorly on the sustainability front.

It is difficult to see how current governments and citizens of the Global North are not complicit in this situation as perpetuators of unsustainable policies that impact heavily on both the least well-off and the forthcoming generations (Creutzig et al., 2014, p. 7; Viktor & Jackson, 2015). The EU, in particular, is a major pillar of unsustainability, since it accounts for one-fifth of the overall global energy usage (Oettinger, 2014, p. 7). Together with the rest of the developed world, it cannot but accept the burden of the highest contribution to both climate change and resource scarcity. These are, by their nature, global issues that do not recognise borders (the extensive global trade means that most resources are bought and consumed in the global market). If the EU is serious about following a sustainable energy strategy, reversing its share in global energy consumption and carbon emissions is the ultimate priority. This can only be achieved by bold measures. The 20-20-20 policy marked a decisive starting point and the EU is well placed to meet these goals.

Two caveats, however, have to be pointed out. Economic activity, and thus also emissions, has been undermined both by the financial crisis-induced recession and sluggish growth ever since, as well as by its increasing outsourcing. While this brings the EU's carbon footprint down, it does not add to the decrease of the global carbon footprint, which is the ultimate goal (Helm, 2012).

With emissions persistently on the rise, more ambitious targets are required and the EU has risen to the challenge to revise its climate goals. The new climate targets decided upon by the EU in 2014 (a 40 per cent reduction of greenhouse gas emissions, an increase of the share of renewables by 27 per cent and the non-binding provision to increase energy efficiency by 27 per cent by 2030), however, are considered modest (Zgajewski, 2014). The 40 per cent reduction target for greenhouse gas emissions, it should be noted, refers to EU-level emissions, and breaking it down to national targets may prove controversial, time-consuming and burdensome. The efficiency and renewable targets, moreover, have been significantly watered down in the decision-making process and toppled more ambitious targets. As a result, lower and non-binding goals do not convey very strong incentives for the corporate world to move more decisively in a sustainable direction (Helm, 2014). The December 2015 climate summit also leaves most to be decided by the states themselves in the absence of any binding terms to meet the nationally determined contributions. While one would expect an upward revision of the renewables target in the aftermath of the Paris deal, such expectations have not taken flesh and bones as of yet.

A sustainable energy system, to the contrary, entails strict caps on carbon emissions so that climate change will be efficiently tackled; caps on the use of fossil fuels are not necessary since they would be effected by prior caps on carbon emissions. The caps set on carbon emissions through the EU Emissions Trading System, however, underperform due to a high ceiling on overall emissions, the granting of permits for free to various industries, an oversupply of permits, and the lower prices for permits due to the financial crisis (Creutzig et al., 2014, p. 7). Instead, what states around the world, with the EU hardly being an exception, are doing is developing, to varying degrees and with varying priorities, technologies on new exploration schemes (such as shale gas production). One could raise the objection that contrary to the USA, which has been investing heavily in shale oil and gas extraction, most EU member-states remain loathe to follow suit. The UK and Poland feature as the great exceptions here, having declared their intent to pursue shale energy. Moreover, the EU has refrained from setting clear guidelines; the Energy Union strategy reflects this vagueness of intent (European Commission, 2015, p. 5). Even if one assumes that the EU will eventually obstruct shale explorations in its soil, nevertheless, this will have hardly any effect on climate change goals in case the EU imports US shale gas, as it is currently planning to do so, thus creating demand for it and facilitating further shale gas explorations.

It should also be pointed out here that tapping unconventional reserves is not only more capital-intensive, but also demands higher inputs in terms of energy, leading this way to energy cannibalism (Mulligan, 2010, p. 93). The impact of fracking techniques on the depletion and pollution of water resources has been established; at the same time, how fracking will interfere with and disturb ecosystems' operation, and create new positive feedback loops and chain reactions to the detriment of the environment remains to be seen, since this is an unprecedented experiment.

Such policies only serve to further diminish crucial natural capital at the same time that they aggravate the earth's sinks even further. Limits of sustainability may be pushed further, but they are not diminished. Fossil energy cannot continue to be available for centuries, and this seems like a prudent temporal benchmark for sustainability (Douthwaite, 1996).

Both climate change and resource scarcity, as a result, continue unabated. Therefore, the stagnant progress in protecting the earth's sinks, combined with the development of new technologies to extract even more natural resources from the subsoil, is not only ecologically destructive, but also morally questionable; in other words, it is virtually unsustainable.

Sustainable supply security

The question arises then as to how the EU can cope with its energy needs. The imposition of strict emissions and depletion quotas will have as a result that less fossil energy will be available for use and that it will be more expensive. The hidden assumption of the current security of supplies dogma seems to be that we are taking the unsustainability path out of pure necessity. In the absence of alternatives that would not severely compromise our living standards, we cannot but maintain our current rate of fossil energy consumption.

Stirling (2014), however, refutes such claims by highlighting the central role of choice in the decision-making process. As he puts it,

> the obstacles to an entirely renewable global energy system are not … about intrinsic limits on resources, technologies or economics. Repeated detailed assessments show that the energy service needs of a more heavily populated and equitable world enjoying radically higher levels of wellbeing, can be cost-effectively met … entirely and solely through diverse currently available technological and organisational innovations around wind, solar, biomass, hydro, ocean and geothermal power.

Hence, he concludes that 'transformations in global energy services based entirely around renewables are at least realistic in the sense that these trajectories are in principle technically practicable, economically feasible, socially viable – and so potentially historically realizable' (Stirling, 2014, p. 86). As a result, the current non-decarbonisation policy is due to institutional, cultural, epistemic and normative obstacles. Green transformations have currently much more to do with societal change and decision-making rather than material factors.

The resource substitution discourse remains trapped in the discussion of what will replace and be equal to/better than fossil energy. Fossil energy, especially oil, it should be underlined, is by far the most efficient source of energy we have discovered, and thus it is reasonable to lean towards sticking to it in the foreseeable future. In other words, if we compare renewable resources with fossil fuels, we cannot but appreciate the former's inferior potential. There is, nevertheless, another way to look at the issue. This entails, first of all, looking at *needs*, and how they can be served, rather than the properties of fuels themselves (Jackson, 1996). Secondly, our social, economic and, by extension, energy structures have been shaped by industrialisation and concentration dynamics. We have created central energy systems running on fossil energy. It is this structure that, due to its unsustainable nature, calls for reshaping. Reconceptualising our energy

systems can unravel us from the current energy architecture we are trapped in (James & Patomaki, 2008; Proedrou, 2012, pp. 135–137). Thirdly, there is untapped potential with regard to energy efficiency. There is ample space for an increase of both resource productivity and energy savings, which translates into doing the same things with much less energy. Our economies can be largely de-materialised, thus lessening the impact material consumption bears on both carbon emissions and resource scarcity (Jackson, 1996, 2009).

EU policy-making related to de-carbonisation has been carried out principally in the power sector. In particular, loading renewable energy in power networks, at the expense of coal and gas, promised high environmental returns. This has led to a significant increase in the share of renewables in the energy mix, which has, in the last decade, increased from 8 per cent to 15 per cent; the EU as a whole, as a result, remains on a path to fulfil the goal of the 20 per cent renewables share in 2020 (Eurostat, 2015). The lower than expected returns in energy output compared to the height of public investments, paid in the main by feed-in tariffs, nevertheless, made energy overall more expensive and have thus not unjustifiably attracted severe criticism (Helm, 2012). Also, the first-generation renewables have not been as efficient as initially expected; as a result, the affordability–sustainability tension damaged the push for further investments on renewables (Lesser & Su, 2008). It should be noted, nevertheless, that the subsidies for renewables are competing with the subsidies that the EU governments amply provide to non-renewable energy sectors. While in absolute terms subsidies for renewables have as of 2012 surpassed those for fossil fuels (Alberici et al., 2014; Bárány & Grigonytė, 2015), two caveats are worth further elaboration. First of all, these statistics exclude the fuels-dominated transport sector. Secondly, on environmental grounds, no straight comparison between renewable and non-renewable energy can hold ground. Fossil fuels have a high externalised hidden environmental cost (air pollution, congestion and global climate change), and their price should thus be accordingly rather high. Supporting and subsidising this kind of energy thus lacks any rationale in our highly burdened ecosystem. On the other hand, renewable energy brings multiple environmental and social benefits; subsidies on renewables hence make much sense, not least since the economics of renewables are steadily improving and promise higher returns.[1] Renewables, hence, can render the energy mix for electricity generation greener, although costs remain significant. What is much more crucial is adjusting to the properties of renewable resources and accordingly reshaping our energy systems. Though inferior substitutes to fossil fuels, solar, wind, geothermal, hydro and biomass energy can contribute significant amounts of energy on a local basis. Instead of creating energy potential for the central system, it is preferable to take advantage of energy locally in order to cater for energy needs at the place of energy generation. In particular, solar panels and wind turbines can cater for heating, cooling and other energy needs of houses, neighbourhoods and districts. Due to their complementary nature, combined investments can ensure significant amounts of energy with limited deviations induced by climate conditions. Furthermore, bio-gas digesters are apt for neighbourhood heating. Small-scale installations are not worth linking to the grids, but have a higher energy output if used locally. The point here is that we have overlooked the most important aspect of renewable energy – that of putting it into use for local needs. On the other hand, mid-volume installations, as well as high-volume renewable installations in more remote areas, will naturally be connected to the grid. In this context, the EU goal of just 10 per cent interconnection of

national energy systems is modest and hinders flexibility, resilience and competitiveness (Siddi, 2016, p. 140). Smart local, national and regional networks can coexist in a renewables-run society.

The timing for undertaking such large-scale investments on renewable sources of energy is perfect since both exploration and infrastructure modernisation needs (pipelines, storage facilities, refineries, etc.) are high, the cost of which is calculated at billions of dollars (Goldthau & Sovacool, 2012, p. 235; Umbach, 2010, p. 1232). Despite the hard fiscal situation in Europe, energy investments constitute a priority for all governments and thus cannot be postponed for long. This cost factor, along with climate, price and import reliability considerations, should provide ample reasoning for a switch away from fossil energy envisaging low-carbon security (Proedrou, 2015; Raines & Tomlinson, 2016, p. 18). In this context, it is essential to revisit the EU's well-entrenched gas first approach, which is supported by a number of plans for new pipelines and LNG plants, since it threatens to lock-in the EU market in increased unsustainable gas consumption up to mid-century, reducing at the same time motives for a switch to clean energy (Raines & Tomlinson, 2016, p. 17).

Within this context, what is at stake is a large-scale energy transformation towards an integrated EU energy market of 'prosumers' (Raines & Tomlinson, 2016, p. 25). As Goldthau and Sovacool (2012, pp. 236–237) succinctly argue,

> energy systems need to be fundamentally overhauled … 'smart networks' are the key to such an overhaul. Such networks would make participants both producers and consumers of energy; enable a highly efficient use of available energy; communicate individual energy choices to all other participants, allowing them to respond timely and intelligently; and make variable energy sources compete against each other. This would require transforming centralized energy systems, characterized by bulky converters and energy flowing one-way from producer to consumer, into highly decentralized arrangements … Decentralizing energy systems is largely viewed as being a key to achieving a low carbon future, empowering individuals to make smart energy choices by at the same time embedding end-users in an 'intelligent' network of energy production, consumption, and use.

It is estimated that third-generation renewable energy can become even more efficient in light of the use of new, smarter technologies. One scenario revolves around a worthwhile cost reduction that would make solar energy not only competitive, but also preferable to all other forms of energy by means of capturing more energy and using electric cars, when immobile, as big energy batteries. The other scenario is much more optimistic and boils down to all surfaces, not just solar plants, acting as energy absorbers. In this scenario, the sun would be rendered the omnipresent fuel on which the economy and our lives would be run (The Economist, 2015b).

Within this revised framework, energy efficiency holds a central place. Not only does it simultaneously address climate and energy security concerns, but it also brings co-benefits to the economy at low costs and in short time frames (Froggatt & Levi, 2009, p. 1129). This 'hidden fuel' (OECD/IEA, 2014) has already saved incredible amounts of energy since the outbreak of the first energy crisis in 1973 (more energy than each single source of energy has contributed throughout these four decades), and further research and development (R&D) could make it continue working towards the same goal. TV sets, light bulbs and domestic appliances of all sorts have substantially reduced energy consumption by being more energy efficient.

If we aspire to further energy efficiency tomorrow, it is essential to direct more investments to R&D today with particular emphasis on energy-saving technologies. Special mention should be made of smart appliances that can curtail energy costs. The installation of smart meters across Europe that can rationalise and manage energy consumption is the first step. Smart household appliances, such as solar energy chargers (for mobile phones and other small electronic devices on sun-lit balconies), can, at a first level, only reduce energy consumption. At a second level, nevertheless, they can pave the way for a whole generation of smart devices that can use renewable energy for many minor household functions that together make up most of one's electricity bill. Such innovations can work side by side with a vast programme of energy savings. These can derive from an emphasis on (and investments in) the building of passive houses, and the replacement of less efficient, more energy-intensive natural resources with more efficient and less energy-intensive ones (Von Weizsäcker, 2014, pp. 21–22). The problem with such reforms, however, is that the energy sector is characterised by 'stickiness', 'lock-in' effects and a strong mutual feedback loop between individual energy choices and the system's organisational principles and characteristics. In the words of Goldthau and Sovacool (2012, pp. 234–235),

> power systems … exhibit strong path dependencies due to the large investments made into grids and plants, perpetuating a mostly fossil fuel based system of electricity production and consumption … [and] a 'carbon lock-in' of industrial economies arising from a long term systemic interaction and positive feedback loops between fossil fuel-based energy and transportation systems and the societal and economic actors creating and using them … [hence] alternative or new technological options, even if coming with higher performance or lower costs, remain 'locked out', notably due to vested interests.

These difficulties notwithstanding, it is important to examine what societal changes can render renewable energy the fuel of the twenty-first century. Emphasis on localities can act as a push for local generation of energy capacity. In particular, building on the deregulation of the energy sector in the past two decades, there is now ample space for local generators to become pillars of the grid, sell and purchase energy within it and cater for the energy security of the members of the locality. At another level, imported goods and services carry hidden fuel costs in terms of transport, which is usually generously subsidised (Daly, 1996). A renewed emphasis on local life, through having employees work closer to and/or from home, and selling and purchasing goods and services from one's locality could substantially bring overall energy consumption down. Adjusting consumption and trade patterns to the new energy reality can thus facilitate energy security (Daly, 1996; Douthwaite, 1996).

Transportation, by and large, remains one of the four main energy-intensive sectors of the economy. Its carbon footprint is overwhelming in a resource-restrained and sink-filled world. Building human- and not car-centred smart cities is thus an enormous challenge. Rationalisation of energy consumption in this sector can be attained by means of switching away from society's car addiction and towards public transportation means. Such a shift will boost demand for relevant green investments. Clean energy-fuelled means of public transportation can greatly decrease our energy usage and cover our needs in a much less energy-intensive mode (Brown, 2009).

One question, however, remains: What can propel a switch to all the above measures? In the crisis-ridden EU, capital is short, so one cannot anticipate an automatic wave of investments on renewables. One could even argue that such a move would be damaging to the economy, since it would deprive other sectors of the economy of liquidity. Firms and individual customers all act on the basis of the sticks and carrots framework that the central authorities provide. The most important part of this framework is tax regulation. In order for sound energy demand management, consumption rationalisation and ensuing savings to materialise, it is of central importance to provide incentives towards this direction and place penalties on contrary activities. Ecological tax reform takes into account the increasing burdens of economic activity on the environment, and accordingly places taxes on energy use and pollution in order to tackle resource scarcity and climate change. High taxes on fossil energy, supplemented by tax breaks and incentives for green investments, can lead to a greener tomorrow. This comes contrary to the current state of the art, where subsidies of fossil fuels are still high and thus contribute to a distorted competition that does not bring fossil energy consumption down and hence maintains high carbon emissions. Initiating an eco-tax reform carries the potential to cater for our energy needs without further encumbering the planet (Lawn, 2007).

A competitive European economy running on high energy prices

Taxes on energy mean that energy prices will be high, and thus less affordable. How then can such a tax regime fulfil the goal of affordability of energy and competitiveness? It is important not to conflate the means with the goals. The goal is not per se cheap energy, but a competitive and efficient economy. It is essential thus to consider the economy holistically, as a system within which benefits and losses move within sectors and groups of citizens/consumers within society. It is exactly due to the centrality of energy to economic activity that energy is subsidised and care is taken that to the greatest extent possible energy prices remain low so that economic activity is not negatively impacted upon. A reverse understanding would be that on environmental grounds, energy should be expensive in order to reflect its scarcity in the biosphere. This way, constant pressure on society will be afforded to better manage, rationalise and decrease its energy usage (Daly, 1996; Lawn, 2007; Wackernagel & Rees, 1998). A crucial distinction should be drawn at this point. Some of these activities are indeed too expensive and/or environmentally harmful, and only through proper reflection on environmental (and social) costs can we hope to rationalise them, or do away with them in case they are overall impoverishing and non-affordable. Some others are overall positive; through higher energy taxation, it is envisaged to improve their economic chain/logistics so that they will live up to both more efficient energy and higher environmental standards (Jackson, 1996).

Dresner, Dunne, Clinch, and Beuermann (2006) have highlighted in their seminal study the reasons behind an unreceptive political constituency in Europe for such a reform. Among others, low levels of awareness, trust and understanding of what is at stake, unpersuasive modes of political communication, technical jargon, visibility of costs and invisibility of benefits, and little understanding of how such a scheme would actually work in practice elucidate low levels of political acceptability. While some national audiences are more receptive than others, in general, such a reform seems to entail significant

costs for governments that wish to undertake it and thus render its materialisation a more distant eventuality. This, however, should be neither surprising, nor distressing. Low political acceptability is the rule rather than the exception for most reforms governments wish to go ahead with (see, for example, labour reforms across Europe). Hence, fresh governments, preferably grand coalition governments with solid majority and backing in their parliaments, would be best suited to undertake such a reform. A welfare fund, established at the timing of the inauguration of the reform and tasked with the distribution of dividends according to pre-established criteria, would facilitate the smooth recycling of eco-taxes-induced revenues. The key point is to envisage direct, visible benefits from the beginning that will win the constituencies over within the first years of the reform.

Indeed, an ecological tax reform would be overall destructive and undesirable if it just meant adding new burdens to household and industrial budgets. To the contrary, the key to its success is a proper recycling of the energy tax-born revenues back into economic activity. First of all, an increase in energy taxes should be supplemented by a corresponding decrease in labour and income taxes. Organising the political communication of the reform around the central issue of relief from one's main personal expense is of critical significance to its success. Leaving aside the positive feedback loops this can have for lessening unemployment and yielding further incentives to grow one's income against the backdrop of lower income taxation, this will provide society and corporations with clear signals as to what kinds of expenses have to be minimised/rationalised (Lawn, 2007). Such a move would bring economic and environmental priorities into a close fit with each other (Helm, 2012). As Von Weizsäcker (2014, p. 22) rightly alleges, it is a matter of policy-making to provide incentives towards increased energy efficiency. While shifting to more energy-efficient modes of production and consumption is, in many cases, manageable but not profitable today, different price signals would urge corporate players and households to move in this direction, thus evading the classic Mikado situation. Such a tax shift would also vindicate and reward the few that have taken the energy efficiency path despite scarce nudges to do so. Keeping energy prices at high levels can then achieve a number of important goals. In particular:

- Lower energy consumption, and hence also less money being spent on energy imports from the unreliable Middle East and Russia, among others.
- Fewer carbon emissions due to lower energy consumption.
- Fulfilling climate change goals also means avoiding additional costs that climate change mitigation entails.
- Omnipresent nudges for perpetual improvement of energy efficiency, energy savings and rationalised energy consumption. Positive feedback loops are thus created for perpetual improvement on energy security and the economy.
- Overall budgets for households and corporations would not go up, since they would be proportionately relieved from labour and income taxation. This would come in contrast to, *ceteris paribus*, the rising energy bills in most EU member-states in the last decade.
- EU corporations would not be forced or hard poised to flee Europe in search of lower energy costs, since overall costs would remain down. When Sweden enforced its environmental taxes two decades ago, the practice of recycling revenues from these taxes back into the tax-paying companies in other forms allowed them to retain their

economic activities in Sweden. Both economic and climate goals were thus achieved in this case (Von Weizsäcker, 2014, p. 22).

- Positive feedback loops would be created for tackling unemployment, the rise of which destabilises EU member-states' societies and foments the resurgence of political extremism.

The proposed reforms might strike some as problematic, inefficient or even needless in the context of the energy revolution of the USA that has created a slump in energy prices (and this despite the fact that the turbulent situation in North Africa and the Middle East, as well as the continuing tension in Ukraine, works in the contrary direction). The most convincing counter-argumentation derives exactly from the shale revolution's own empirical evidence. While the exploration of shale oil and gas deposits has provoked a significant rise in global energy supply, its offshoot, namely the fall of energy prices, endangers the perpetuation of such exploration schemes. With the oil price at levels around 45$ per barrel, and OPEC's strategic decision not to cut production but sustain it so that the least efficient producers will be outcompeted (despite the recent Russia–Saudi decision to limit output that drove a slight price increase), drilling profitability has been jeopardised, since shale oil and gas exploration *presupposes* high energy prices (Jordan, 2015; OPEC, 2015; Rowell, 2015). This situation also reveals a deeper structural problem with energy prices: instability and abrupt fluctuations are an inherent part of the problematic nature of global energy markets and their pricing mechanisms (Stevens, 2010). While peak-oil theorists claim that we have more or less reached the plateau of peak-oil production and we will hence only be able to drill less and less oil in the next decades until we reach the depletion point (Heinberg, 2005; Hubbert, 1969; Mulligan, 2010), super cycle theorists claim that high energy prices incentivise further energy exploration. Periods of low prices depress investments. This leads at a later point to tighter market conditions and an inadequate supply. This new supply–demand balance is then reflected in higher prices, which provide good ground for energy companies to invest further with an eye to capture high revenues. Thus, limits to peak oil are extended further, and prices fluctuate systematically (Tonnesson & Kolas, 2006, p. 57). The super cycle theorists' analysis confirms the inevitable truism that energy prices *cannot* remain stable for long. Once supply becomes excessive and prices drop, energy production will stall for some time, thus creating a new price hike. As a result, 'until the fuel base of the global economy changes, that economy will keep "banging its head" against the ceiling of affordable energy prices' (Mulligan, 2010, p. 90). Importers/consumers' defensive toolset (holding energy reserves, swap deals, enhanced infrastructural and interconnectedness capacity, etc.) may ameliorate the repercussions of heightened energy prices, but it does not nullify them. The current global energy system's inherent instability, it should be noted, is problematic for economic performance since fluctuations in prices provide mixed, contradictory and perplexing signals to corporations and households. Even more importantly, periods of high energy prices are usually translated into periods of economic recession (Deese, 1979).

Breaking this vicious cycle of energy (non-)affordability can derive from a re-conceptualisation of energy and its central role in the nexus of energy security and economic performance. Sustainable communities can only exist against the backdrop of a secure, sustainable supply of energy at a more or less stable price (with taxation twisting the

prices for reasons of further economisation, rationalisation and savings) (Douthwaite, 1996). The current energy system is unstable and thus contravenes this goal. In addition, pricing oil in dollars is problematic on two fronts. Firstly, it requires ample foreign exchange, a condition which has, as of late, become more problematic for some specific members, groups and citizens of the EU. Secondly, when the dollar is depressed, the wrong signal of cheaper energy and ample availability of fossil fuels in the biosphere is conveyed (Daly, 1996). Furthermore, as Douthwaite (1996, pp. 128–129) maintains,

> energy imports weaken local economies through the loss of direct spending (leakage) and the loss of that spending's respending (the multiplier effect). By contrast, the money for both the energy-saving equipment as well as the moneys saved through improved energy efficiency will most likely be spent locally thus stimulating the local economy … The ability of renewable energy projects to facilitate the local retention of wealth is a potentially significant indirect benefit.

Conclusion

The EU is currently at a critical juncture. The Eurozone crisis and the still-to-come economic recovery place it under strenuous pressure. This, it has to be pointed out, severely impacts on the attractiveness of its political and economic model. At the same time, as a member of the Global North, the EU faces tremendous global challenges, with the international community and the Global South resting a lot of hope in the EU's political and diplomatic input in their efficient treatment. Climate and energy issues cut across the internal–external nexus of these challenges (Proedrou, 2015). Unless the EU both acquires a more central role in global climate politics and ensures its security of supplies at affordable prices, its place in the world will be severely jeopardised. States that build their economies and societies within the Earth's regenerative and absorptive capacities will enjoy a significant advantage vis-à-vis the ones that will move in this direction late, or not at all. Going sustainable thus seems to be the passport for the future (Wackernagel, Moran, White, & Murray, 2006).

In the face of the inadequacy of the current crisis-fraught, unreliable and imports-based security of supplies strategy, which fails to ensure energy security across its three dimensions, it is imperative to seek for alternative understandings and theorisations.

Starting from the urgent need to render our economic systems sustainable, this paper argues that once sustainability becomes a policy priority, there is space for both security of supply and energy affordability within a new political and economic framework. To reiterate, strong controls on fossil fuels' use tackle both climate change and resource scarcity, and carry the potential to lock us out of the detrimental inertia that characterises energy policy and derives 'from the fact that human life and socio-economic activity is deeply embedded in and dependent on energy input', and thus 'reinforces the mutual feedback loop between individual choices and the energy system's characteristics' (Goldthau & Sovacool, 2012, p. 235). Demand-management policies with an emphasis on de-centralisation, smart systems and appliances, R&D and the institutionalisation of an ecological tax system are the building blocks in the transition to a low-carbon economy that will ensure security of supplies from within, rather than through unsustainable imports and ensuing dependencies. Such a theorisation also offers radical insights as to the pricing of energy. While conventional energy strategies exercise state intervention

to distort and suppress prices, our understanding is that energy should be expensive, like all scarce goods. The key issue here is a dual process of identifying opportunities for winners and compensating losers (Goldthau & Sovacool, 2012, p. 238). The recycling of energy-born revenues back into society and the corporate world, without conveying wrong signals about cheap and adequate energy and revoking nudges to save on energy, is an enhancing factor for a sustainable economy that will not be hampered by price hikes and slumps as is the case today.

Note

1. It is indicative that the price of crystalline-silicon photovoltaic cells has fallen from 80$ per watt in 1977 to around 1$ today (The Economist, 2015a). It is thus no wonder that in many cases, solar panels can produce 1 kWh of electricity for less than a dollar (0.08$), while the rate for wind energy is even more competitive at 0.05$ for the same amount of energy. The corresponding price for fossil fuels ranges from 0.045$ to 0.14$ for 1 kWh (IRENA, 2015).

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