The neglected social aspects of resource use caps

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1 Introduction

Limits of biocapacity[1] of a region or of the world as well as the minimum material/ecological requirements to sustain human life are setting the framework for resource use. Humanity uses, however, more resources than can be regenerated, but public policies still do not send clear signals to change this trend and find new ways for sustainability transitions. This seems to be the case despite the fact that post-WWII enhanced consumption trends have been coupled with neither a clear rise in subjective well-being, nor reduction in inequalities. Therefore, we can assume that current economic structure underpins unsustainable resource use patterns and the unfair share of benefits arising from resource use. Therefore, the need to re-adjust our economic model to our environmental space considering social justice is still unfulfilled.

During the time of the United Nations Conference on the Human Environment, held in 1972 was far greater acceptance of the existence of threatening environmental damage and the need for active policy to address it. It can be attributed to the "Limits to growth" movement, which strived for considering ecological limits. Due to this, the acceptance of environmental problems among decision makers was also visible. After this period, in the 80'ies however, the concepts of limits were shadowed. It can be attributed to the fact that resource optimists were dominating relevant policies with the view that technology improvement and efficiency can solve the issue. It is proven, however, by either the Ehrlichs' equation (I=PAT) (Ehrlich *et al*, 1970) or the ET=I equation based on the Global Welfare Curve (Wetzel *et al* 1995) that all such activity requires throughput thus involves environmental impact, which can be mitigated by appropriate technology, but never eliminated completely. In line with the efficiency belief trend during the 80'ies the concept of sustainability emerged, and the involvement of business in environmental management was increased convinced by that environmental

[1] Biocapacity refers to the capacity of a given biologically productive area to generate an on-going supply of renewable resources and to absorb its spillover wastes. Unsustainability occurs if the area's ecological footprint exceeds its biocapacity. Source: Greenfacts

conservation can be compatible with economic growth. Since then the social dimension of the complex challenge has largely been ignored, while individualism has been on the rise, trust, cooperation are declining. Parallel, political negotiations have still been addressing environmental challenges through enhancing efficiency. Therefore, unfortunately, not much has been achieved with regard to policy change to date and no consensus has yet emerged on the relationship between economic growth and ecological limits or social sustainability, despite the fact that scientists have been calling for such an agreement (Ekins, 1993).

Emerging environmental challenges and their related social problems need to be dealt with in combination, but this is a challenge for research communities that tend to be organised around specific groups of problems (Ropke, 2015). This is a challenge, and the question is how such a transition can be achieved within a relatively short period of time. Some transdisciplinary fields, including ecological economics, are trying to face the challenge and have an ambition to bring together at least some of these multiple crises. Due to this ecological economics has long called for attention to the unsustainable scale of human economy on Earth. They have urged for an absolute reduction of resource appropriation for consumption and for a development aiming for social justice at national and international levels. They have been also incredulous towards the consequences of introducing a per capita minimum supply of resources, which would be on one hand widespread and far-reaching but on the other hand seem to be inescapable in a finite world with an overall tendency to increase individual living standards well above the minimum required (Kocsis, 2014). Some of the ecological economists, most famously Georgescu-Roegen (1971), state that it is the increase of entropy that is the ultimate limit to physical growth and thus identifies sustainable scale. Economic activity increases entropy by depleting resources and producing wastes. Entropy on earth can only be decreased by importing low entropy resources, such as solar energy from outside it (Ekins, 1993).

Ecological economists have proposed theoretical concepts and some specific tools to tackle the complex challenge of sustainable scale as well as fair distribution of natural resources (Daly, 1992). Daly (1992) clearly sets out the preconditions for a sustainable and just economic model that constitutes the basics of ecological economics: the scale, distribution and allocation of resources. Scale refers to the amount of resources extracted and traded due to global economic activities. The physical limits of our globe, which are currently far trespassed, define the scale of sustainable resource use. This scale aspect therefore is in line with the concept of a resource capped economy. The distribution of resources and the benefits arising from natural resource use require also economic analysis and management considering that fair distribution and justice societies are preconditions for sustainability. The

third aspect of ecological economics reveals how efficient the allocation of resources is.

The goals of allocation, distribution, and scale may not be entirely independent as originally Daly (1992) seemed to be claimed (Prakash *et al* 1994). In line with the old economics wisdom, Daly (1992) called for tackling the three different issues by three different policy instruments. In contrast, Prakash suggests a three-level approach. First setting the scale (level *one),* then letting the market achieve allocative efficiency through the use of the price mechanism (level *two)* and then letting the state correct any distributional distortions through the use of fiscal policy (level *three).* The energy cap proposals assessed below aim to solve this mixed challenge of allocation, distribution, and scale through a holistic approach. Sustainable scale could be achieved through setting absolute caps, the fair distribution through equal share of energy use entitlement, the effective allocation through pushing all actors to use their limited number of entitlements in the most efficient way.

The issue if scale is also touched upon by recognising that biogeochemical cycling underpins the provision of many important services, and that these cycles, in turn, are bound to operate and function within certain physical constraints. Therefore, assessing humanity's influence on the biogeochemical cycles in order to define sustainable scale is a crucial research agenda. Different methods have been rising including the Ecological Footprint (Wackernagel *et al*, 1998) , HANPP (Imhoff *et al*, 2004) as well as the so-called ecotime approach. This latter aims to measure the overshoot of the full range of biogeochemical processes from net primary production and soil denitrification to ocean calciumcarbonate production and sediment deposition (Smith, 2014). This method shows that more than 20 years of the current rate of regeneration provided for instance by the C cycle is appropriated by the global economy within just one year. If these kinds of overshoot are persistent, or even continuously increase, then this is of significant concern as the eventual consequences may be catastrophic and irreversible.

Others focusing on, through which methods the desired economic scale would be achieved. Alcott classifies (Alcott, 2009) strategies to reduce environmental impact according to the terms of the I=PAT formula (Ehrlich, 1971). Policies limiting resource depletion and pollution (Impact) – by heavily taxing resources or rationing them on a country basis – are thus called ‘direct’ or ‘left-side’ strategies. Other so-called ‘right-side’ policies, to achieve the environmental goal of lowering Impact strive to limit Population and Affluence, or to use Technology to lower the ratio of resource inputs to goods-and-services outputs. Caps, either directly or through Pigouvian taxes would not only enable clear discussion but guarantee policy success. Population, affluence and technological adjustments at the individual level will then help us retain considerable welfare within the decided-upon limits,

even if we consciously decide to live to some degree unsustainably. In terms of I=f(P,A,T), the research argues for giving preference to direct, left-side strategies over indirect right-side strategies to reduce Impact, defined as resource depletion and environmental pollution. Lowering any of these 'right-side' factors causes or at least enables the other two to rise or 'rebound'.

When identifying the critical sustainable scale, intragenerational (space) and intergenerational (time) issues of scale also would need to be taken into account. The latter includes spatial scarcity and heterogeneity of allocation and distribution (Jordan *et al*, 2002). The other is temporal scale with respect to ecological turnover times and the rate at which humanity uses resources and dispose of wastes, together with how future generations will be affected due to environmental degradation caused by today's activities. Therefore, these two aspects of space and time would need to be taken into consideration when trying to identify sustainable scale. It is especially important since the consequences of natural capital depletion driven by economic activities cannot be ascertained immediately. Therefore, humanity unwisely use this delayed effect as an excuse for taking action towards mitigating the impacts of economic growth. On the top of the time and space aspects, topological relationships in ecological systems would need to be taken into consideration, which requires respect for, and maintenance of, their integrity and services (Jordan *et al*, 2002). The energy caps proposed in this paper are in line with Jordan's concept, since they aim to avoid the shift of environmental as well as social problems in space and time through tackle them holistically in a complex manner considering their mutually reinforcing attribute.

Important aspect is the density of population, which would need to be considered when trying to identify sustainable scale (Kocsis, 2014). This, however, does not mean cities or urban areas per se but a need for a holistic view of human settlement types. Introducing the density aspects into international negotiations where wealthy countries point to poorer ones and say that they would need to curb and reduce their populations while the poor respond by pointing to the per capita consumption of wealthy countries, might bring one step forward.

Another approach towards meeting the challenge of scale is to distinguish between maximum and optimal scale (Lawn, 2001). The maximum sustainable scale is the largest macroeconomic scale that can be sustained by a throughput of matter and energy that is within the ecosphere's regenerative and waste assimilative capacities. That is why it has biophysical reference. The optimal scale is the preferable macroeconomic scale, which is not only sustainable, but maximises the net benefits of economic activity. Thus it has macroeconomic relevance. Lawn argues (Lawn, 2001) for resolving ecological sustainability and distributional equity first through setting the optimal scale. This would internalize ecological and distributive *limits*, and not just costs, and paves the way for markets to facilitate a macroeconomic

adjustment towards the optimum through proper allocation. This is in line with the aims of the resource use caps that will be examined below. If ecological economists however ignore the notion of optimal scale and the important role that prices play in facilitating a macroeconomic adjustment towards the optimum, ecological economics speak as conventional ecologists. Relative prices and markets are also necessary to ensure the sustainable incoming resource flow is efficiently allocated to alternative product uses (Lawn, 2001)

In line with Lawn's optimal and maximum scale dilemma, two Wetzels (Wetzel *et al*, 1995) distinguish between ecological and economic carrying capacity. Ecological carrying capacity considers how many people on Earth live, while the economic one also contains at what resource demanding standard of living they maintain. They do this differentiation through the Global Welfare Curve concept, which shows an initial acceleration then eventually flattens, afterwards reaches a maximum (carrying capacity) and is followed by declining welfare. Based on the curve, Wetzels argue that economy exceeding sustainable throughput is impossible by definition to maintain in the long run, but because of declining welfare, they are not even desirable in the short run (Wetzel *et al*, 1995). Moreover, declining welfare results not only in diminishing returns, but indeed in negative ones; making additional economic growth beyond a certain point simply irrational. This is in line also with the fact, that controlling throughput and thus enable the economy to shrink or stabilize does not result in development regression. On the contrary, it would allow innovation to flourish for the sake of enhancing well-being. Furthermore, Wetzel also stresses that all economic activity is energy driven, which gives another motive why this paper focuses on energy caps.

Considering economic and ecological carrying capacity or, in other words, reaching not only maximum but optimum scale, caps on the use of resources. Ropke argues (Ropke, 1994) that such general instruments would lead to socio-technical changes in resource, waste and provision systems. Such changes are certainly needed, however, there are limits to achievements resulting from this strategy in isolation. The challenge is that technical infrastructures, institutions, cultural expectations, and every day practices have evolved through long historical processes which favoured the substitution of labour by mainly fossil energy. During the last 200 years, the prices of natural resources, including energy have not reflected the social costs of using them, resulting in accumulated externalities (Røpke, 1994). To change the current structures, which rely mainly on price signals would take far too long, and thus transition process would be very painful. Therefore, a smoother transition would be required where price signals are combined with active planning and specific strategies targeted at different systems and institutions.

Ecological economists, especially Ekins also calls (Ekins 1993) for making a distinction in consumption patterns between the First and the Third World due to the different level of environmental impact per capita consumption. He suggests that the best and perhaps the only strategy for achieving ecological sustainability involves differentiating between Global North and South. According to his assumption, high levels of per capita income in the Global North entails that relatively small percentage growth rates result in large absolute increases in consumption and, therefore, in associated environmental impacts. This consumption pattern does not necessarily alleviate poverty even in the North 1980s (Ekins 1993). In line with this the resource cap proposals assessed below are targeting the radical consumption reduction in the North while considering social justice, which would have an indirect impact on the Global South.

Degrowth scientists (Martinez-Alier, 2009) argues that economic growth is not compatible with environmental sustainability. They also keep arguing that mainstream economists need to catch up in recognizing the importance of scale aspect in economic theory. It is clear that scale is not determined by prices, but by a social decision reflecting ecological limits. Even with all the changes of ownership forms and allocation mechanisms, plus more for restructuring the finance industry and the money creation process, economic growth remains, albeit on a much lower level. There seems to be no way of modifying the internal structures of a profit driven market economy so as to achieve a not-at-all growing economy. This is where the resource capping comes in: it provides an external limitation, a kind of environmental framework establishing a maximum physical size (Spangenberg, 2013).

The degrowth as well as ecological economics communities have also proven that economic de-growth, leading to a steady state (Spangenberg, 2013b), is a plausible objective for the rich industrial economies. The steady state economy also links to Herman Daly, who defines it as "*An economy with constant stocks of people and artifacts, maintained at some desired, sufficient levels by low rates of maintenance 'throughput', that is, by the lowest feasible flows of matter and energy from the first stage of production to the last stage of consumption."* (Daly, 1992). The throughput is limited by strict quotas, auctioned by the government, on depletion of resources. The population is limited by the equal per capita issue of transferable birth licences. And inequality of income and wealth is limited by the setting of maximum and minimum levels, with redistribution from rich to poor. A steady state economy is an economy with stable or mildly fluctuating size. The term typically refers to a national economy, but it can also be applied to a local, regional, or global economy. An economy can reach a steady state after a period of growth or after a period of downsizing or degrowth. To be sustainable, a steady state economy may not exceed ecological limits.A

market economy can survive such transformations, albeit with the need to complement it by other allocation mechanisms (Spangenberg, 2013b).

Despite the scientific findings and references listed above (further example are Malghan 2010, Pelletier 2010), in the last 20 years, the issue Daly (1992) had raised has not caught significant attention even among ecological economists The scientific community of environmental economics still asks the same questions on how to achieve wellbeing and equity within planetary boundaries, but at the same time does not explicitly stress the need to reduce our resource demand in absolute terms. It happens despite the fact that accepting limits is one of the two guiding principles identified already by the Brundtland Commission (Lorek *et al* 2013). These criteria are in line with the ones of a resource capped economy, namely accepting limits and satisfying human needs.

This paper would like to put again into the spotlight the need for considering ecological limits, while ensuring dignity and fair benefit sharing for all by examining energy resource capping proposals by critically reviewing their social aspects. We used energy as the most holistic resource, which affects all economic activity.

2 Policy tools for realizing resource capped economy

Policy tools have been developed in the past decade aiming for sustainable scale and fair distribution defined by ecological economics through the realization of resource capped economy. Due to their holistic approach and to the absolute ceiling of capping they try to avoid the pitfalls of shifting environmental problems in space and time as well as the threats arising from the rebound effect. Resource caps not only influence the size of the economy and thus contribute to sustainable scale, but, combined with access allocation/distribution mechanisms, they could also ensure, or hinder the necessary transformation towards a fairer distribution (Spangenberg, 2013a). Furthermore, the caps also stimulate the proper allocation of the resource concerned, since in a resource capped world, everyone is forced to use less and use resources in the most efficient way.

This paper focuses particularly upon energy resource caps and their social implications, since energy is needed to produce any of the goods and services we buy. If those resources started reaching diminishing returns, it would be harder for the economy to operate (Tverberg, 2014). Energy is a key resource that made the Industrial Revolution and all that has happened since possible by acting as a sort of multiplier to all other kinds of resource use. Furthermore, several of Nobel laureates have recently also suggested a focus on energy, including phasing out quickly ‘dirty’ fossil fuels in favor of ‘cleaner’ sources (The Guardian, 2014).

The tools under consideration involve capping the economy's fuel and electricity consumption of a country/region in line with the national/regional carbon emissions targets, and then essentially rationing out the energy available under the cap. The tools ensures that every individual receive energy units covering their fair share in using energy when undertaking activities that cause energy usage (e.g. paying a gas bill, or refuelling the car).Over and under consumers can trade with the saved units. This trade preserves what's good and popular about rationing, in other words it guarantees minimum shares for all. At the same time, the trade (while considering absolute limits) allows people to consume based on their choices regarding their lifestyles and it avoids the unnecessary criminalisation of ordinary people who wish to trade. Individuals can opt to maintain existing lifestyle choices but pay the price by purchasing allowances; or reduce their energy use through abatement measures (e.g. insulating their home) or behavioural change (e.g. driving less). Capping energy use in this way therefore has the potential to constrain energy use (by setting a cap on total allowances, which could be tightened over time) in an economically efficient, way. Since consumption must reduce, the alternative is our current system of 'rationing by price' (i.e. the richest get whatever is in short supply), with attendant inequity, suffering and resentment.

2.1 The Hungarian Climate Bill Proposal

The proposed scheme developed in Hungary aims to reduce the national non-renewable energy consumption and facilitate the shifting to renewable energy sources and higher efficiency at the same time. The system developed for national purposes, can be however implemented regionally, e.g. within the EU. The EU and national non-renewable energy use target would be progressively lowered each year, until the region it is applied refits into its ecological share. The proposed regulatory system is based on 3 + 1 pillars.

The first pillar, the Energy Entitlement would contribute directly reaching sustainable scale due to the absolute ceiling of non-renewable energy consumption. Setting an absolute limit to energy consumption have to potential to also push energy users towards the direction for using the limited energy as effective as possible. Therefore, the scheme also would contribute to the allocation aspect of ecological economics. Energy consumption entitlements of annually decreasing quantities would be allocated among the individual consumers (on an equal per capita basis for adult and varying percentage for children depending whether the individual is the first, the second, etc child in the household) and public and private consumer groups. Those, who save a part of their allocated entitlements, could sell their

remaining entitlements through an entitlement manager organization to those, who consume more than their allocated consumption entitlement. This manager organization would sell the entitlement in the national currency, and buys the remaining quota in "quota money". This currency is parallel issued to the national currency, or the currency of the region where the scheme is implemented. The national currency shall serve as collateral for quota money, based on specific legislation. Thos who do not consume their entitlements receive quota money, which can be spent on the Green Market (See the second pillar). International trade among EU Member States is realised based on the same principles.

The second pillar, the Market for Environmental Goods and Services aims to achieve sustainable scale as well as contributes to enhance socially just distribution of natural resources through the spread of sustainably produced and high human labour demanded products. The market for environmental goods and services is an open market operating according to pre-defined environmental and ethical rules including aspects of sustainability and market considerations. The "quota money" received from selling energy consumption entitlements could only be spent on this market and can be exchanged to certified products and services (e.g. organic food, insulation of buildings for energy saving, renewable energy investments) in this 'eco-labelled' secondary market.

The third pillar, the Revolving Fund aims for reducing (energy) poverty and thus enhancing social well-being through providing opportunity for everyone, both the rich and the poor to achieve savings through energy efficiency and renewable energy investments. The Revolving Fund would give interest free loan in "quota money" with a payback period adjusted to the energy savings or income generation realised through the investment.

The last pillar is the Support Service that aims to provide advice for every day citizens how they can benefit from the system if it is implemented. Advisors are supposed to be fully aware of the system benefits as well as the challenge people from each income deciles face, and would provide concrete suggestions on changing lifestyle to live more sustainable, as well as on household investment to reduce energy consumption.

In a region where this scheme is implemented, those who use more energy than their received entitlement can choose in different options based on their income. If rich people want to use less energy they either could change their lifestyle in order to consume less energy or they could invest in energy reduction. If poor people use more energy than their fair share due to the low quality installation of their house or to the big size of their house, they could approach the staff of the Support Service to ask for advice on how they can benefit from the system. Potentially these marginalized people would have the chance to apply for interest free loans through the Revolving Fund if the Support Service is appropriately established. They could pay the loan back

with a payback period adjusted to the energy savings or income generation realised through the investment. People who use less energy than their entitlements could sell their remaining entitlements to the manager organization, which in turn gives them quota money to be spent on sustainable product and services. Therefore, those who consume less energy could enhance their well-being through accessing healthier and sustainable products freely.

2.2 Tradable Energy Quotas from the UK

TEQs (Tradable Energy Quotas) is an electronic system for rationing energy use, designed to be implemented at the national scale, and covering all sectors of a national economy, but similarly to the Hungarian example it can be extended to the whole region of the EU. It has been the subject of extensive research over the past fifteen years.

This tool aims to guarantee achieving national carbon reduction targets, thus to contribute significantly to mitigate climate change and also to sustainable scale defined by ecological economics. Furthermore, it strives for maintaining a fair access to fuel and electricity during shortages, thus overcomes energy challenges and contributes to just distribution. TEQs similarly to its Hungarian counterpart would set an absolute limit to energy consumption, which would also push energy users towards the direction for using the limited energy as effective as possible.

The total number of units available in the country would be set out in advance in the so-called TEQs Budget. The size of the Budget would go down year-by-year – step-by-step. This would give long-term clarity to the economy and investors. The Budget in the UK would be set by the Committee on Climate Change, which is independent of the Government. The Government would be bound by the TEQs scheme; due to its role, which would be to support the country in thriving on the available carbon/energy.

TEQs would be measured in units. Every adult would receive an equal free entitlement of TEQs units each week. Other energy users (state, industry etc.) would bid for their units at a weekly auction (tender). When individuals buy fuel or energy, such as petrol for their car, units corresponding to the amount of energy they have bought would be deducted from their TEQs account, in addition to their money payment. This is the only time they would need TEQs units, and transactions would generally automatic, using credit-card or direct-debit technology.

All fuels and electricity supplies would carry a “carbon rating” in TEQs units; one unit would represents one kilogram of carbon dioxide – or the equivalent in other greenhouse gases – released in the fuel’s production and use. This aims to determine how many units would be needed to make a purchase (thus giving competitive advantage to low-carbon energy). If

someone uses less than his entitlement of units, he could sell his surplus. If he needs more, he could buy them until the set ceiling is not reached and entitlements are on the market. All trading would take place at a single national price, which would rise and fall in line with demand. Buying and selling would be as easy as topping up credit on a mobile phone.

Since the national TEQs price would be determined by national demand, it would strive for transparently and thus push everyone to help each other to reduce their energy demand, and to work together, encouraging a sense of common purpose.

In a region where this scheme is implemented, those who use more energy than their received entitlement (usually rich people) could choose in different options. If these people want to use less energy they either could their change their lifestyle in order to consume less energy or they invest in energy reduction. Marginalized people, using less energy would have the chance to sell their remaining entitlements to those who consume more and thus potentially could benefit from the scheme directly.

3 The social benefits of the Hungarian and the UK schemes

The social benefits the resource use capping tools would deliver are often forgotten. The public as well as scientific perceptions are dominated by the view that they primarily target the challenge of unsustainable resource use and thus aim to tackle environmental problems. Examining them more thoroughly, it may turn out that they contribute significantly to human well-being, especially of the poor. According to national surveys (Dresner, 2004; Centre for Sustainable Energy, 2008), TEQs, the system developed in the UK (Fleming *et al*, 2011) reward primary marginalized people who use less energy. TEQs would be a progressive policy instrument, since lower income households tend to use less energy and thus could sell surplus allowances to gain extra income. Distributional impact modelling has found that 71% of households in the lowest three income deciles would be better off under TEQs, while 55% of households in the highest three income deciles would be worse off. From a total of 24.6m UK households, 2.1m (8.5%) from the lowest income decile households would be worse off (Dresner, 2004; Thumim, 2008). However, this is an important minority, primarily because they may not be in any position to be further disadvantaged, but also because any opposition to the scheme after implementation would be likely to focus on those in difficulty. Consequently, further research has been undertaken into moderating the distributional impacts on these households, finding that all but 250,000 of the poorest 10% of households could be compensated through state measures (White, 2009). Finding ways to identify these remaining

250,000 households and target them with compensatory measures remains an area of active research (White, 2013).

According to the Strategic Environmental Assessment (SEA) of the Hungarian Climate Bill proposal (Tombácz, 2009) the poorest third of the Hungarian population will not consume their entitlements for quite long time. Thus, they will definitely have some spared quotas, which they could spend on improving their livelihoods and well-being. The middle class would definitely feel the impacts of the progressively decreasing number of quotas due to the annual drop of the cap on non-renewable energy resources. They however could choose whether they will start economizing or investing or paying for the surplus quotas. Due to the fact that saving can happen only until some extent without investments, choice will narrow between investing and buying the surplus to satisfy their energy demand. The richest class would be the most disadvantaged from the quota schemes, since they consume the most according to the SEA. At the same time, they have the opportunity to invest in energy reduction such as building eco-houses or energy saver insulation from own sources. What they need to do would be only to change their attitude, see the opportunities of the system and use them properly.

The expenses of households could be reduced if these kinds of schemes are implemented. On one hand, those who consume less energy than the fairly shared units under the energy cap would gain extra income from the systems through selling their received, unused units for those who consume more than their share. The systems would contain assistance (Gyulai, 2010, Center for Sustainable Energy, 2009) for those poor people who consume more energy due to cheap and inefficient appliances or to lack of control over home insulation either through providing interest free loans (in Hungary) or governmental support (in the UK). With these kinds of income gained they could invest in energy reduction, thus lower their energy use and reduce their household costs. On the other hand, due to the absolute limit set for energy use people who consume more than their fair share would be forced to use less, and thus to invest in energy reduction or to simply change their attitudes and behavior, both of which would result in energy cost reduction.

According to the SEA of the Hungarian Climate Bill Proposal, this energy capping tool creates jobs directly in the construction; renewable energy and energy efficiency sectors. Namely, only in the construction sector 40.000 new work places would be created (Tombácz, 2009). Due to the increased level of investments in these sectors, further demand for related products and human labour would occur. Due to the newly created jobs, from the wages people would have higher demand for vital goods, which leads to further job creation. Besides, the stimulus of these energy sectors would have the potential to pose further demand increase in other related industrial and service provider sectors. Furthermore, new jobs would be also directly established in the Support System set to provide proper life-style related recommendations for

citizens affected by the schemes. Moreover, due to the spread of sustainable, labor intensive practices and the income generation of the quota underconsumers, access to environmentally friendly goods and services would be enhanced, which contributes to enhanced wellbeing. The increasing number of consumers of the Market for Environmental Goods and Services would drive further job creation for satisfying this emerging demand towards sustainable products. Besides, after each transaction taken place in the market or in the concerned energy sectors, tax would enrich the state budget. This tax would moderate the amount of loan provided from the central bank to the commercial banks to covering the initial expenditures of the revolving fund. Thus, the whole process results in added value in terms of reusing currently unused productive capacities and idle human labour. Even though new jobs are created and people who could not afford consuming can do so, the overall system will move towards sustainability due to the absolute consumption ceiling, which is constantly decreasing.

Behavioral studies have consistently shown that intrinsic motivation drives us more than extrinsic motivation. This point could be valid also to environmental issues (Crompton, 2010) in terms of being more environmental aware and consume more environmentally friendly. These schemes being aware of this may contribute to the transformation of values and consumer behavior through creating individual as well as common motivation with the limit set and the units distributed. It is in all's interest to assist each other and to work cooperatively to reduce their energy demand and stay within the set caps on energy consumption. Based on the studies revealing common purpose, actions which benefit the individual are also of benefit to the wider community, and vice versa could encourage a sense of common purpose. This common purpose would be also need to meet the requirement of the set energy caps. There would be an intrinsic motivation created in reducing energy demand once the nature of energy use is widely understood. Meeting the annually decreasing energy caps would provide a proper measure of how well a community affected by the proposed scheme is progressing towards a sustainable energy future. The established Support Service in the Hungarian scheme as well as the enhanced partnership along the common purpose might have the potential to bring this reality home to people in a clear and unambiguous way, encouraging them to plan ahead, to cooperate with others and to take the risk on inventive solutions. If the targets set are not going to be met, would provide a clear signal that people affected collectively need to do more. It might also motivate people to peer pressure and assist their fellow citizens as well as local institutions, e.g. schools, authorities, companies, etc. to take their fair share in reducing energy demand of the whole community.

4 Implications on the social aspects of the schemes

Both social and environmental stakeholders welcome the Hungarian scheme (Social and green NGOs project, 2009) due to the fact that they agree in that the current, only market interest driven economy is not sustainable any more. They both struggle for the necessary change, for which the Hungarian Climate Bill proposal is supposed to provide a solution due to its efforts to contribute to social justice.

There are also arguments whether the social benefits of the Hungarian scheme would include the increased level of access to energy resources, and thus living conditions through the Revolving Fund, which would be theoretically available for everyone regardless his or her income due to the information hub provided by the staff of the Support Service. The scheme might not moderate definitely the level of inequalities due to that energy use is not correlating the level of income. Namely, that in Hungary there is no significant difference in the amount of energy used by the rich and by the poor (Herpainé Márkus *et al*, 2009). The level of inequalities might stay the same on other hand due to that the information hub of the Support Service might not reach the most disadvantages groups. In other words, the absolute poverty might decrease, well-being increase, housing and energy poverty can be moderated, but relative poverty would remain due to the still existing inequality. In order to tackle this contradiction, the Hungarian Climate Bill proposal would need to aim to enhance equality not only reducing absolute poverty through tackling the potential shortcomings of the Support Service and considering the energy use pattern of the Hungarian population. Furthermore, aiming for moderating inequalities more focused and compensative mechanisms would be needed instead of the equal distribution of quotas. Further research would be needed to reveal these mechanisms and also to collect data of other energy consumption, such as car usage and other non-renewable energy resource use.

There are also concerns whether the schemes would decrease definitely household energy cost. In Hungary, household's energy demand is defined mostly by the type, the size and the heating scheme of the house (Herpainé Márkus *et al*, 2009). Energy costs of the households are almost the same throughout the country, independent from the number, as well as from the income of people living in it and from the type of energy used. This is because urban households are usually smaller and are in better conditions, but at the same time they are heated by the more expensive gas and have often district heating. While in the rural areas, households are bigger and outdated, have often expensive electric boiler and insufficient insulation, but have individual room heating mostly with cheaper wood. Due to these facts, we could not assume that poor households consume significantly less energy than the richer ones. Therefore, it is arguable whether the poor would definitely have surplus

and thus be able to sell their remaining entitlements for the rich due to the specific domestic household structure, current insufficient energy efficiency of the households and the high use rate of non-renewable energy. On one hand the Revolving Fund however aims to open up opportunities also for the marginalized people through providing interest free loans. On the other hand, the Support Service might have the potential to inform them that these funds are available for them and provide professional advice on how to transform their energy consumptions. As stated above, marginalized people might not be able to access the opportunities provided by the Revolving Fund. Therefore, the Revolving Fund as well as the Support Service of the Hungarian Climate Bill proposal would need to pay extra attention to those disadvantages households, which consume more due to their outdated conditions and lack of investment choices.

In the UK, however, lower income households (Centre for Sustainable Energy, 2008, 2009) tend to use less energy and thus could sell surplus allowances to gain extra income providing a clearer picture than in Hungary.

Unfortunately in the UK (BBC news, 2015) as well as in Hungary (Portfolio, 2014) the number of people under the poverty line is increasing. Therefore, both proposals would need to also pay extra attention to those slipping into poverty currently. They already cannot afford those environmental friendly, energy efficient solutions, which are affordable for the rich, but they have already created living conditions and consumption habits far before becoming poor, thus they definitely will easily consume their entitlements soon and thus need special attention. The Revolving Fund, however might have the potential to solve this problem, through providing interest free loans for these people.

In the UK the percentage of people living in relative and in absolute low income is lower in rural areas than in urban areas, but nevertheless many thousands of individuals living in rural areas are in households below average income (Department for Environment, Food & Rural Affairs, 2014). In Hungary, however, this is not the case. As most poor and marginalized people in Hungary live (Herpainé Márkus *et al*, 2009) in the countryside, rural energy is posing a big issue to solve. Hungarian researchers are convinced that the rural energy related problems could be solved through energy efficiency improvements, decentralized energy production and simple renewable energy technologies (Conference recommendations, 2009). Decentralized energy system would allow cheaper production of energy and the establishment of workplaces through solar energy and community owned, low performance biomass related investments. The Revolving Fund would also contribute to solve rural energy related problems through enhancing the livelihood of poor families through supporting the local, community based use of renewable energy related investments.

In terms of the impacts of the scheme on middle class people, who can choose between investing in energy reduction or simply change their way of living, their choice would need to be examined more deeply. Arguments would support choosing investing due to that it does not require any additional expenditure (contrary to the entitlement purchase), it has added value and avoids future quota shortage problems. On one hand it would be very beneficial, since it is assumed that implementing the scheme would result in significant reduction of energy use. On the other hand, it would mean that everyone would choose the investment and not the quota purchase, which would result in the lack of utilization of the quotas saved by under consumers. To solve this contradiction is a big challenge. A combination of setting the ceiling of investment cost might be needed following a local practice in the UK (Warm Front, 2010)[2].

IN the UK, the richest class would be the most disadvantaged from the schemes, since they consume the most. At the same time, they have the opportunity to invest in energy reduction such as building eco-houses or energy saver insulation from own sources. What they need to do is only to change their attitude, see the opportunities of the system and use them properly.

The systems are based on the principle of equal per capita allowances for all, with the guaranteed regular entitlement of energy units for every individual designed to ensure that energy use reduction is safeguarded as society adapts to a low or no non-renewable energy future. The energy use ceiling pushes the decline of luxurious energy consumption, since people with luxurious demands are forced to consume less. What constitutes luxurious, however, is highly culturally subjective and subject to change over longer periods, but the examined energy resource use capping tools incorporate these shifting perspectives by leaving the freedom of choosing with the energy consumer. This entails that if a citizen wishes to consume more than her share she may do so – and without compromising the integrity of the energy cap – but only if she pays those who use less for the privilege of doing so. And if others wish to be exceptionally energy-thrifty, they can expect to be rewarded for this. This freedom would give the opportunity for individuals, families and communities to decide for themselves what is essential and what is not is critical both politically and practically. Furthermore, the set caps strive to motivate people to work together towards meeting the set limits. Sharing ownership of the problem across society encourages both active, engaged participation in creatively reducing energy demand, and a sense of legitimacy around the tools' framework, which can be seen guaranteeing entitlements to

[2] Warm Front is an essential programme that helps to eradicate fuel poverty through providing energy efficiency investments to those who urgently need help to heat their homes and also considering some rate of co-financing. In the UK the necessary co-financing can be obtained for this initiative from state support in case of poorer households.

essential energy while controlling luxurious consumption as well as defending people's independence from excessive top-down regulation and/or taxation.

Furthermore, the schemes provide an alternative to the casual and popular 'rationing by price' approach currently in effect. While the energy cap tools incorporate a market mechanism to do what markets do best – finding a price for scarce goods and facilitating exchange – they would not be market-based frameworks. The ongoing financial crises of recent times show all too clearly that markets are not good at regulating their own appetites. Rather, they create framework within which the market would be constrained, in line with the set energy use ceiling.

5 Conclusions

Humanity uses much more resources than can be regenerated. Notwithstanding the unsustainable resource use driven by unlimited economic growth has not deliver social justice. In order to solve this emerging complex challenge, holistic approach is needed requiring also that scientific communities think multidisciplinary.

Scientific platforms, such as ecological economics have been calling for the needed change since at least Herman Daly's famous article on scale, distribution and allocation (Daly, 1992). Even though many papers and arguments have been advocating for the necessary action, which should be taken, this group of scientists still ask the same questions, namely how to live just in a finite planet.

In this paper, we have tried to reveal the advantages of two proposals in contributing to solve the mixed, multidisciplinary challenge of today. The two energy cap proposals are supposed to control the use of natural resources through setting an absolute limit for energy resource use and providing equal per capita amount of energy quotas to satisfy their needs. Therefore, they are mostly negotiated by environmental communities. On the other hand, however, both of the schemes are supposed to deliver social enhancement, which benefits are often forgotten. Thus, this paper aimed to reveal not only how they contribute to reach sustainable scale, but also how they strive for achieving fairer distribution of benefits arising from resource use.

Based on our findings, we could assume that both schemes would enhance well-being through the intent to provide opportunities for all to reduce their energy consumptions and thus mitigate their housing cost. Those who consume so less originally or manage to change their consumption patterns so much, that they are or become energy unit savers; they benefit directly financially from the systems. Namely, they receive financial support for their saved energy units. Furthermore, there are assumptions that due to the set

energy caps the schemes would favor human labor intensive practices, such as organic agriculture, sustainable tourism, but also fossil fuel energy reduction related industries such as renewable or energy efficiency companies. Within these sectors new jobs could be created, additionally to the workplaces evolved in the administration parts of the systems. Furthermore, setting absolute limit for energy consumption would enhance cooperation through forcing members of society to work together towards meeting the requirement appointed by the set limit.

Both systems would leave the choice at the consumer whether he would continue to consume as he has been doing or he would change their consumption habits either through changing behavior or through energy reduction investments. This kind of freedom of choice however, can result in that everyone would choose being more environment and thus energy conscious and no one would use more energy until than his share. This challenge need further research to be undertaken.

We, however, need to distinguish between social impacts of the Hungarian Climate Bill proposal and the TEQs scheme developed in the UK. It is due to the fact that energy consumption patterns in different income groups as well as the access to information differ in these two countries. In Hungary there is no significant difference in the amount of energy use between the poor and the rich, due to the low level installation and relative big size of marginalized people living mostly in the country side. Furthermore, these people might not fully be able to use the benefits of the Hungarian proposal due to the lack of information and their limited ability to access the information. This challenge need further research to be undertaken. The situation is quite different in the UK. Marginalized people use significantly less energy than the rich ones. While the poor rather live in urban areas, access to information might be easier for them and thus they could be informed about the benefits of the energy cap scheme smoother.

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