

## Conference proceedings

# Degrowth of Production and Consumption Capacities for social justice, well-being and ecological sustainability

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**2nd Conference  
on Economic  
Degrowth  
For Ecological Sustainability  
and Social Equity**

**BARCELONA  
26th-29th March 2010**



## Abstract

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It is commonly perceived that economic growth is the best response to economic, environmental and social crises. In this line growth policies indirectly increase the capacities to exploit resources by lifting limits to production and consumption at the macro level. To the surprise of many, the efficiency, sufficiency and policy solutions developed in a growth context continuously failed with the increase of world production and consumption.

The degrowth movement has been challenging the centrality of economic growth as an overarching policy objective on the basis of cultural, democratic, bio-economic, environmental and well-being grounds. This article does not only challenge economic growth. It aims at identifying what actually needs to degrow. We reached the conclusion that the production and consumption capacity to exploit natural resources and humans needs to unevenly and globally degrow as a result of a fair and democratic societal decision. Done appropriately, this could prevent crises as well as the failure of efficiency, sufficiency and other political measures in general due to the so-called rebound effects. The reduction of the production and consumption capacity to exploit natural resources and humans requires a combination of frugal innovation and adjustment in three large areas, namely resources, institutions and human behaviour.

Solutions that aim at finding and developing ways to consume and produce less are defined here as frugal or rebound innovations. Rather than suppressing limits in order to increase consumption and production (done by so-called rebound innovations), frugal innovations acknowledge and work with limits, creating then “rebound”. Frugal innovations are successful only when accompanied by an adjustment, implying a macro level reduction of the consumption and production capacity. Adjustments, as defined here, are therefore the completion of the frugal innovation objective at a higher level. Degrowth adjustments adapt limiting factors (such as natural resources availability, infrastructure and time; finances and deregulation; needs satisfaction, unawareness and inequity) in order to prevent the rebound effect.

The article suggests practical examples of adjustment that can be undertaken at local and larger policy levels. Natural resource related adjustment is supported by policies that tend to leave more resources in the ground. An infrastructure adjustment policy measure would be a moratorium on road, incineration, dams, fossil energy thermal energy, cement infrastructures, etc. A time related adjustment would be a macro level reduction of working hours, or in general macro-policies that reduce the time spent on resource intensive consumption and production. Finances related adjustment would imply going out of the “debt or virtual economy” and shifting towards an economy that considers a sustainable level of resource use. It would also imply replacing world currencies by local currencies. A regulation-based adjustment would generally involve an improvement of social, environmental and product quality standards. An adjustment in the area of unfulfilled needs consists of supporting mutualisation, (in housing for example), and as well as sharing along material lives by planning reuses and recycling. A key degrowth adjustment dealing with awareness would involve restrictions to advertising. Finally, inequality adjustment could introduce measures like basic income and more social security in general, and income ceiling to reduce the difference between higher and lower salaries.

Finally, the production and consumption capacity to exploit natural resources and humans with different limiting factors brings tracks for a multidimensional quantitative and qualitative measure of the size of an economy.

## Keywords

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Rebound Effect, Limiting Factors, Economic Size, Degrowth Policy, Frugal Innovation, Rebound Strategies.

## 1 Introduction. What is degrowth?

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For a few years a new word has been coined that influences political thinking. It comes in the context of ecological, social, resource, and lately financial crisis. *Decroissance* in French, *decrescita* in Italian and lately *degrowth* in English have emerged in many ecological and social debates (see e.g. Fournier 2008; Schneider et al., 2010). The concept entered the English-speaking world at the First international Conference on Economic Degrowth for Ecological Sustainability and Social Equity that took place in Paris in April 2008 (Flipo & Schneider, 2008). Degrowth carries the idea of a voluntary reduction of the size of the economic system, which undoubtedly implies a reduction of the GDP. However the goal is not simply to challenge the centrality of GDP as the overarching policy objective but to propose a framework for transformation towards a lower and sustainable level of production and consumption. The aim is neither to turn the growth fetish into a degrowth fetish, but to find a path to social justice, well being and ecological sustainability. Degrowth involves a range of actions taken at the individual and collective level. These include oppositions & “dissensus”, voluntary simplicity and frugal innovations, theorisation & vulgarisation in science and arts that challenge the “growth religion”, actions for the change of some institutions (e.g. financial institutions) and actions to conserve some institutions (e.g. social security).

These actions involve a change of values and shift away from profit-seeking as a single objective of production (Latouche, 2006; Caillé, 1989; Rist, 1997), it is largely a concern for cultural diversity. It also involves the concern for a profound democratization of our societies (Illich, 1973; Foutopoulos 1997), challenging the impossibility of democratic choices as the path of technological development has a predetermined trajectory that is hard to influence. Degrowth is then also about people rather than technology deciding on the direction of societal evolution. It is also about giving meaning to human life which is not per se associated with conspicuous consumption and materialism (Thoreau, 1854; Rabhi, 1983; Mongeau 1985 ; Besson-Girard, 2005), a profound concern for well-being. Degrowth is also about a concern for ecosystems sustainability and future generations living conditions and access to resources. Very strong also is a concern for equality between citizens of the planet (Kempf, 2007; Sachs, 1999). For a general description of sources of degrowth see Flipo, 2007 or Bayon et al. 2010. In sum the concerns of degrowth are about the “exploitation of natural resources (including land and ecosystems) and exploitation of humans (and animals)”.

This paper focuses on argumenting and describing the idea of degrowth of the size of the economy. In effect certain elements need to degrow in order to achieve social justice, ecological sustainability and well-being. These elements however need refining. This is the gap this article wishes to fill in.

## 2 What should degrow? Dimensions of degrowth

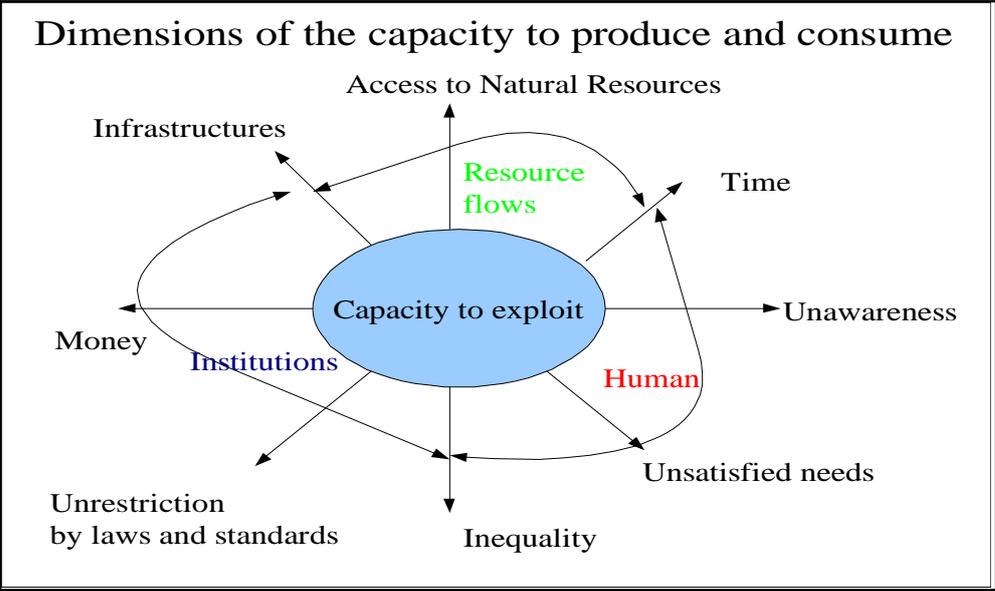
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Reduction of environmental and social problems such as climate change, ecotoxicity, loss of biodiversity, human misery in a wide sense has been a central and worldwide policy objective. Dealing with the environmental problems would imply reduction of natural resources extraction in order to preventively reduce the flows of material and energy and their emission in the form of pollution and waste, as well as land degradation, what we call reduction (or degrowth) of natural resource exploitation (Schmidt-Bleek, 1993). Dealing with social problems would require the increase of the economic means available to people that cannot satisfy their basic needs, relieving people from compulsory work to enable creative autonomy while reducing inequalities to abate social tensions. This is what reduction (or degrowth) of human exploitation implies.

The production (consumption) capacity is the potential of an economic entity to contribute to the extraction and exploitation of natural resources and people with production (consumption) of goods and services. It concerns the industrial/economic systems, rather than the natural ecosystem.

Evidences are presented here about the importance of dealing with production and consumption capacity. The maintenance or increase high capacity to exploit natural resource and humans makes various strategies to solve environmental and social problems ineffective and this is demonstrated along different dimensions of the production and consumption capacity.

**Figure 1: Dimension of production and consumption**



**2.1 The time dimension**

Labour productivity has increased by a factor from 30 to 50 in the last century, but this did not lead to an equivalent size reduction in working time. The gains have mainly led to increasing production or scaling down of labour, creating exclusion by unemployment or unwished restrictions to consumption. Also speed has continuously increased, but time spent in travelling has remained more or less the same (quoted in Schneider et al., 2003). Computers have increased our work efficiency intensively but working hours or hours spent working has not significantly decreased, it is the nature of the work that has changed (Schneider et al., 2001)

**2.2 The extraction access dimension**

The more efficient production systems available today that use less resources per unit of service should lead to a reduction of overall resource extraction. However access to more extraction sites is provided, less concentrated ores and new non-renewable energy sources such as oil shale are sought, oil extraction in Amazonia and other fragile ecosystems is promoted. This is a self-defeating strategy as it destroys the benefits of more efficient production systems with additional extraction. This strategy will not prevent resource scarcity on the long term (Martinez-Alier, 2002).

**2.3 The Infrastructure dimension**

Maintaining or increasing the societal level of infrastructure to exploit material, energy, land and people (i.e. infrastructure to extract, transport, distribute, transform, store, consume or treat) either lead to idle infrastructure capacity or to its reallocation for new consumption and production. The planning and construction of incinerators has often been associated with increasing waste flows, undermining minimization measures because the total infrastructure to process waste has increased, ignoring any other options to scale down the production of waste. Turning roads into highways or building new ones has often not resolved traffic congestion. Many studies have shown that new congestion occurs at a higher level of traffic. The only way to reduce congestion might be to introduce traffic limits, rather than maintaining or increasing road capacity (Schneider, 2002).

## **2.4 The financial or monetary dimension**

Efficiency Strategies usually involve a reduction of production and consumption costs. However, they do not usually lead to a reduction of spending. The freed financial resources are used to produce and consume more. For example, there is an increase in energy efficiency in Europe, while the financial capacity or the amount of money available to spend on energy increases. As a result there has been an increase in the demand for energy. If the demand for energy does not change, demand for other resources would increase.

The literature on the rebound effect (Greening et al., 2000; Sanne, 2000; Binswanger, 2000; Alcott, 2005; Dimitropoulos, 2007; ...) has shown many cases where reduction of production costs through economic efficiency leads to increase of production. Monetary savings in more efficient cars, for example, may be used to travel further. Savings in household energy conservation may be used to spend more on plane travelling. This illustrates what occurs at the level of a whole economy with so called macro-rebound effect or Jevons paradox (Polimeni et al., 2008; Schneider, 2008).

## **2.5 The regulation dimension**

Regulation or rules can constitute very concrete limits to production and consumption for example by concrete emissions and extractions limits with state regulations. The regulatory framework has improved the situation in the North concerning environmental, social, and quality standards, however in the same time a growing share of production for the North is taking place in de-regularised zones of the global south.

## **2.6 The needs dimension**

Sharing goods and knowledge is one way to fulfil needs. Although there are no technical barriers to sharing, the current institutional framework prevents the mutualisation of goods and services through various property rights. There are numerous empty and hardly used houses (including seldom used secondary houses) in France and Spain, but the institutional framework does not facilitate their mutualisation or use by more people, although that could avoid the need for construction of new housing. Also the sharing of goods is prevented by what is called planned obsolescence. Although our technical level should enable us to make very solid products which could be shared along their lifetime while answering people's needs, this aspect does not seem to be sufficiently introduced in the design of products (Schneider, 1996).

## **2.7 The unawareness dimension**

Although information about environmental and social impacts of various sorts of consumption and production is more widely distributed, in parallel with increase of consciousness and concerns towards those impacts, advertising induces people into increasing consumption.

## **2.8 The inequality dimension**

Social comparison, fuelled by inequality, drives people into consuming more. Economic growth has not been making people more satisfied with their welfare. Inequalities have played a role in continuously pushing up material aspirations. With interpersonal, social group and North-South comparisons, increase of material welfare does not calm down the needs to consume more because there is always a richer reference group to be imitated (Kempf, 2007).

All the solution failures outlined above could be presented as rebound effects or Jevons paradoxes in a widened definition involving not only finance or time but also other factors (Schneider, 2002;2003a,b;2008). Although efficiency of energy used from coal could be increased by a factor 50 within the 19th century, in the same period the coal consumption has been multiplied by 2000 (Victor, 2008). Rebound effect or Jevons paradox (Polimeni et al. 2008) stands for the systemic response to the

introduction of resource-saving technologies or measures that off-set their beneficial effects . The benefits associated with the increase of monetary savings and labour productivity, the development of efficient new infrastructure in processing materials and extracting resources, the uneven increase of material welfare, the improvement of regulations, are all lost when capacities remain high.

### **3 Crises in relation to Production and Consumption Capacity**

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In the previous section, the failure of the strategies to ecological or social crises in the framework of maintaining or increasing production/consumption capacities was discussed. We further argue for the degrowth of capacities by developing that if the strategies proposed do not fail, the high capacities lead to deep economic and social crises, the same ones that these strategies were intending to resolve.

#### **3.1 Economic crisis**

Solutions to economic crisis are usually sought in the context of economic growth with measures that tend to increase the financial and other capacities to consume and produce. Examples include increased liquidity or investments in infrastructure.

As Frederick Soddy explained as early as 1926, economic crisis might occur when natural resources are limited while financial capacity to acquire them is high. If we add to this that resource availability is actually decreasing as explained Georgescu-Roegen (1971), the conditions are definitely set for a crisis because people are not able to physically obtain the resources that match the available financial capacity. Considering the time dimension, crisis with unemployment takes place when the time available for labour is plentiful, but production and the demand for labour is low. When production and consumption infrastructure is not used there is a challenge to its existence. This occurs within the car industry that does not produce enough cars compared to its full potential as it happened with the US and Europe car production industry hit by the crisis of 2009. This also occurs with the supermarket that does not sell its products, or an incinerator that does not have enough waste to burn.

#### **3.2 Social crisis**

As the economy has grown and taken a lot of space in human lives, as relations are very much based on competition and the search of profits, as recognition is based on material possessions, people have cut themselves from important aspects of life. A crisis also strikes when society becomes informed and concerned by problems but feels unable to solve them. Clearly, trying to solve this type of crisis with more spending, more working, more infrastructure, will not solve the problem.

A second social crisis happens when the basic needs are not met. Growths of production and consumption capacity however are not directed to the right people. The consumption capacity of the rich countries is so high that it leads to extraction of resources that could otherwise provide for the basic needs of the poor in the Southern countries. A large amount of space, for example, is needed for the meat and biofuel production of the privileged. Increase of the capacity to exploit resources is needed for the ones who do not have the basic needs covered, but this should happen through redistribution of wealth and reduction of the production/consumption capacities in the North.

A third social crisis is associated with the setting of a standard based on large capacities to produce and consume. The large inequalities in terms of capacities give the impression that people do not have enough, creating endless needs and social tension. This inequality crisis is about little production and consumption in a world of high capacities. It is about having little savings in a large financial economy, little work in a world of overworking, no car in a highly car-dependent environment, little resource access in a world of high resource exploitation.

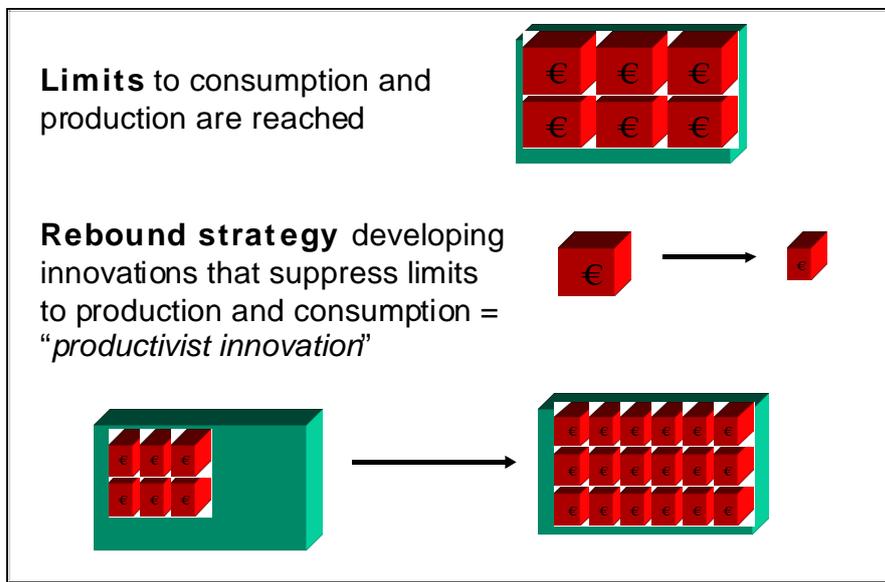
It is physically impossible that all people in the world consume like the Europeans, Americans, Japanese and Australians. A model of equity that is physically feasible is needed, without setting a norm. An equally sized growth of production/consumption capacities in the North and South is not going to solve the crisis. An expansion of capacities in the North only will aggravate the social crisis linked to north-south inequalities.

## 4 Rebound strategies and growth policies

### 4.1 Rebound strategies

Strategies (such as efficiency, sufficiency or governmental policies) are developed to respond to environmental, social and economic crises. As it is further developed, some of the strategies, however, build capacity to produce and consume by suppressing limits. These are the type of strategies that industry favours. When car companies develop more efficient cars, they use efficiency as argument to increase sales. Car efficiency, especially at the production stage, represents a strategy to gain market share. When governments propose subsidies for buyers of new and more efficient cars, this is done with the purpose of reducing pollution but also as a growth policy to support demand.

Figure 2: Rebound strategies - bottom-up strategies that build capacity to production and consumption



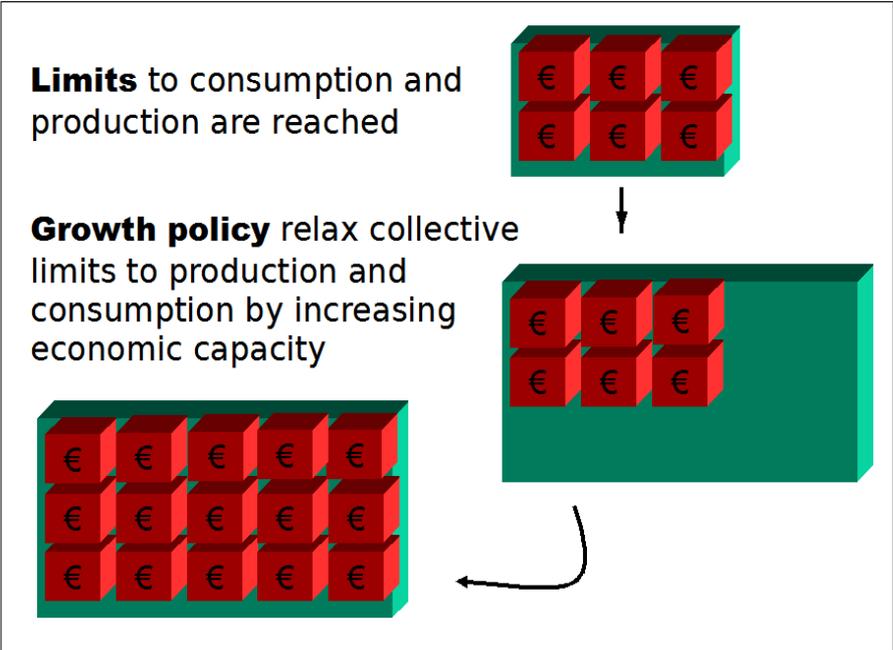
Economies of scale are often not designed to reduce absolute impacts but the reduction of costs per unit of production makes it possible to gain market share and to increase production. The development of the fast and efficient trains TGV in France, for example, has been accomplished with the goal of increasing travelling. The strategies designed to reduce limits to consumption or production in order to gain market share or develop new markets can be called "rebound strategies". These are strategies based on suppressing the limits to production and consumption at a micro level.

The demand for a product will be limited if it is too expensive, too time consuming or dangerous, if it requires too much effort, if it is bad for the health, if it uses too much space, it weighs too much and it is too complicated to use. Innovation tends to reduce all these limits to promote consumption and production. The products become cheap, fast, safe, effortless, healthy, light and small, easy to use or good for the environment, and as such, true or false, get promoted with the help of advertising. The product improvements are usually not negative, but the large-scale increase in their production and consumption off-sets the positive aspects of the innovation.

### 4.2 Growth policies

A large deal of economic growth (or growth) policies are meant to increase the capacities to exploit resources by suppressing limits to production and consumption at the macro level. Economic growth here is understood as a growth of the production and purchasing power, rather than growth of the GDP or welfare. There might not be a way to quantify the growth of production and consumption capacity with a single measure, due to its multidimensional nature as was illustrated in previous section. The policies, listed below are not necessarily implemented only to boost consumption and production, but do so in practice (there is no “pro-growth conspiracy”). These policies based on different dimensions are listed below.

**Figure 3: Growth policy- top-down action to increase production/consumption capacity (to push limits to production and consumption)**



*Increase or maintenance of the time capacity.* In order to use humans or natural resources most intensively, the time-related growth policies can also follow two paths. Firstly, growth policies can include increasing maximum weekly hours, developing laws that enable night work, reducing holidays' length, suppressing restrictions on opening hours, enabling work on Sundays, phasing out feast-days, making it complicated to share work and voluntarily reduce working hours. Secondly, time-related growth policies consist of increase of capacity to exploit natural resources and other humans per hour by supporting the development of efficient technologies. Developing trade with labour-intensive manufactured goods, firing workers and externalising jobs.

*Increasing and maintaining resource availability.* Growth policies related to the exploitation of natural resources and labour include subsidizing extraction infrastructures and exploration, supporting the extraction of resources that were not exploited before, favouring trade with raw materials (including the removal of trade barriers or import subsidies, or developing agreements for trading with raw materials).

*Increasing and maintaining the infrastructure capacity.* These growth policies are related to the removal of limits stemming from the lack of infrastructure in the fields of transport, material transformation, storage, distribution, waste management. On the one side, these include investment in public infrastructure that favours high flows of resources, such as wider and longer roads, or processing more tons of certain resources. On the other side, growth policies related to this dimension, include favouring private development of infrastructure for numerous industries in all of the fields listed above.

*Increase of the monetary capacity.* The policies to increase the global capacity to exploit natural resources and labour by monetary means take two courses. The first one consists of increasing liquidity, granting rights to banks to create virtual money and suppressing restrictions about it, supporting strong currencies that can buy resources and human time in all parts of the planet. The second one consists of lowering the value of natural resources, for example by putting pressure on Southern countries to export their natural resources at low price, of producing in countries with the lowest income per hour, and generally developing policies to reduce hourly wages.

*Deregulation.* Regulations can limit the use of resources, favouring quality than quantity and preventing the exploitation of workers and nature. Deregulation is about lifting the limits to processing resources, reducing environmental and social standards or keeping them low, lowering the quality of products, especially in terms of durability. There has been some improvements relating to this dimension in the rich countries, which explains the environmental improvements that have taken place there. However imports from deregulated regions to these countries have circumvented the limits to exploit nature and people.

*Increasing and maintaining needs.* Growth policies, related to this dimension include the development of property rights and creating barriers to mutualisation. It involve also supporting the non-availability of communal houses, of clean water flowing for all, communal land for agriculture, the lack of solid and durable basic consumption items in some cases create the incentives to build more houses, sell water in plastic bottles, sell palliatives to nature and produce more.

*Maintaining or increasing unawareness.* This dimension includes primarily promotion of advertising which boosts the capacity to consume. What we could call “greenwash” is a second aspect of this dimension. As an example, forestry labelled as sustainable may be put forward as an answer to citizens' concerns with deforestation, although it may enable the continuation of logging and intensive forestry. Thirdly, despite the enormous and increasing amount of knowledge available, information is often detained by experts and technicians. This makes it too complex for people to use, apply or analyse the available technological knowledge. A fourth growth policy, related to the unawareness dimension, is favouring the outsourcing or the externalisation of activities, so that production is far away from the eyes of the final consumer.

*Maintaining or increasing inequality.* Inequalities policies relate to all previous dimensions dealing with the unequal distribution of consumption and production capacities in each of these dimensions. It includes favouring the development of products that cannot, for physical reasons, be available to all (like internet on mobile phones), permitting the existence of unregulated financial institutions.

Governments insist that all policies they implement stimulate growth. Luckily, many of the policies do not promote growth only. An example is social security systems in developed societies.

## **5 Frugal Innovation and Degrowth Adjustments**

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### **5.1 Frugal innovations**

Typical innovations developed in the market economy are usually aimed at expanding production and consumption. However innovation, meaning literally “bringing something new”, can also be about finding and developing ways to consume and produce less. These are called frugal or debound innovations, and fundamentally consist of bottom-up actions. They are innovation even if they may sometimes revisit solution to an old problem. Rather than suppressing limits to increase consumption and production (referred as rebound innovations earlier in the text), frugal innovations acknowledge and work with limits and contribute to the reduction of the production and consumption capacity to exploit natural resources and humans.

We saw that the rebound effect is the increase of impacts on the macro level related to strategies that intend to reduce impacts, typically with efficiency measures (see section 2). On the contrary, the debound effect is a decrease of the total impacts related to the reduction of the capacity to produce and consume. Frugal innovations create a debound effect (see adjustment in the next paragraph). Frugal innovations may be undertaken on the individual, enterprise or local policy level. They are always taking place at the micro level, or at the level of the subsystems of the economy as they are bottom-up actions.

Frugal innovation may contribute to the general resolution of crises on the macro level by establishing limits at the micro scale in each of the dimensions of the production and consumption capacities. They fit well in a world with limits. They are not limited to product and service innovation, but include social innovation in the form of lifestyle, societal and organizational change. That involves identifying and discouraging specific efficiency strategies that are prone to micro and macro-rebound and favouring strategies that satisfy needs while respecting the sustainability limits to the exploitation of natural resources and human labour. Frugal/debound innovations imply favouring technologies and strategies that do not create new needs, such as the “convivial tools” of Illich (1973). Certain frugal innovations can be more effective than others because they act on several dimensions at the same time.

## 5.2 Adjustments

Frugal innovations do not automatically reduce the total societal capacity to produce and consume as there is always a risk of a rebound effect. Frugal innovations will thus be successful only if they are accompanied by a macro level reduction of the consumption and production capacity, in other words by an adjustment. Adjustments, as defined here, are therefore the completion of the frugal innovation objective at a higher level. Degrowth adjustments adjust limiting factors in order to prevent the rebound effect. Adjustment can be composed of several frugal innovations that support each other and act within the same dimension at the level of the economy at large or it can be a higher-level frugal innovation. Adjustment should be done so that frugal innovation is not left alone or isolated and fail. The eventual reduction of impacts stems from the joint and collective chain of adjustments that take place at all levels of society: individual, collective, sector, state or international institutions level.

In general, adjustments are actions at the higher level that will make efficiency, sufficiency and political measures work, as the expected reduction of impacts associated with them to take place. Adjustment should also take place on several dimensions across the categories: human behavior, resources and institutions. Thus adjustment corresponds to a combination of actions at all dimension levels leading to an actual macro level reduction of the capacity to produce and consume. They are innovations with actual effects at the level of the economy at large that challenge the macro-rebound.

In what follows frugal/debound innovations and adjustments that correspond to the various dimensions of the capacities to produce and consume are explored in some detail.

### 5.2.1 Reducing the time for production and consumption activities

#### *Time-related frugal innovation*

The debound innovations, associated with the time dimension, consist of developing actions at the micro level that require less time for consumption and production and more for social activities, human relations, connecting with the natural environment, and for arts in their wide understanding. All activities which are slow and environmentally friendly like gardening, hiking and long meals put a natural limit on the time available for other more polluting ones, contributing to a “time rebound”. In terms of production, time-related frugal innovation consists of reducing working hours and enabling work-sharing. An example could be the provision of subsidies to enterprises that reduce working hours and production. Frugal innovation also includes choosing slower transport modes, such as walking, cycling and policies reducing the velocity of transport, or promoting bicycle transportation for the employees of a particular enterprise. These time-related debound innovations could be the reduction of the time spent on motorized transportation by bringing different activities closer together or having work places, shopping areas and holiday places closer to living area.

#### *Time-related adjustment*

A time-related adjustment means an overall reduction of the time spent on production and consumption. It can be achieved by a bottom-up or top-down action. Bottom-up is about combining frugal innovations. Even though each frugal innovation contributes to time adjustment, in isolation it would not suppress the risk of rebound effect. With the debound adjustment process the time spent does not create the need and space for more consumption and production. Having many time related frugal innovations take place at the same time creates a general bottom-up adjustment. An example would be combination of having most activities closer by; working and using motorized transport less; using the time saved on cycling, long meals, gardening, walks in nature, social activities. Generally, a time adjustment would combine a reduction of the time spent on activities with high consumption and production capacities to exploit natural resources and humans, and increasing the time spent on less energy, material and space-intense activities such as spending time with friends, cooking, knitting, reading or even thinking.

A top-down time related adjustment would be, for example, a macro level reduction of working hours to 24 hours a week, or in general macro-policies that reduce time spent on resource intensive consumption and production.

### 5.2.2 Degrowth of total access to natural resources

#### *Natural resources related frugal innovation*

The first frugal innovation concerns the resources we use. Instead of using natural resources recycled, resources at their lowest quality possible for their purpose (basic law of making a recycling cascade see Schneider 1996) should be used. This implies for example building on land that is already built. Recycled resources have natural limits in quantity. If natural resources are used, they should be renewable in the strict sense: a large dam or an industrial forest exploitation are not renewable. Here again the strict renewability imperative creates limits in terms of total possible flow, giving it a propensity for debound instead of rebound (these are uses that create limits). Strict renewability implies small scale projects and limits in the amount of resources used and energy generated, as if it is too large it is not compatible with the ecosystem reproduction. Natural resource frugal innovations would be favouring solar energy within some size limits. Solar energy bears some natural limits due to natural limits in the amount of sun energy that reach the planet every day. Resource debound involves also avoidance of building on fertile or ecologically sensitive land. Generally, natural resource related frugal innovation involves using less space, less fossil fuels and minerals, less electricity and energy. Then concerning resource use it is about giving up on developing the exploitation of new mineral resources, or searches to find new virgin resources. Debund innovation is also about lifting local subsidies to extraction infrastructures and exploration, stopping or forbidding extraction from certain zones, setting-up of trade barriers or lifting of import subsidies in general and developing policies to reduce trade of raw materials.

#### *Resource related adjustment*

An adjustment of capacity within the natural resource domain would involve limiting the resources available for consumption and production (including materials, space and energy input parameters). A successful adjustment would translate in a macro level reduction of extractors (Schneider & Niza, 2003). On the consumption side, successful adjustment would mean reducing settlement areas, food miles or number of cars per person (see Lorek & Spangenberg, 2001). These need to be supported by policies that demand leaving more resources in the ground, such as the Yasuni proposal (mentioned in Martinez-Alier, 2002) or material certificates (mentioned in Schneider et al., 2001).

### 5.2.3 Degrowth of total infrastructure capacity

#### *Infrastructure related frugal innovation*

Infrastructure related frugal innovation occurs when individuals reduce or stop the use of a specific product and technology, such as televisions, microwaves, mobile phones, meat and animal products, GMOs. As a result demand for these goods would decrease together with the infrastructure capacity required for their production. Avoiding the use of heavy-chained equipment such as bulldozers and excavators, explosives and cyanides are frugal innovations that act directly on the capacity to extract resources, and therefore create a debound. Choosing modes of transport which correspond to a socio-technical system that is more social, participatory and environmentally-friendly and permanently abandoning others is another example of an individual debound innovation. Frugal innovations can also be using public transport, bicycle and train; quitting personal cars, motor-boat, abstaining from plane travel; supporting artisan and quality production, which is local, long-lasting and organic and distributed via small-scale shops and permanently avoiding supermarkets. Frugal innovations within this category involve policies that suppress road infrastructure, incinerators, large-scale dams and reducing other.

#### *Infrastructure related adjustment*

Infrastructure is a good example illustrating the chain of adjustments that need to take place. This chain occurs along the lives of material and energy from extraction to final waste. When the infrastructure of one element of the production chain decreases the other processes along the chain have to decrease as well. The capacity is actually defined by the smallest capacity along the chain. Reducing infrastructure capacity would thus involve reducing extraction, transformation, storages, distribution, road, waste management infrastructure. A typical adjustment policy measure would be a moratorium on road, incineration, dams, fossil energy thermal energy, ski resorts, cement infrastructures. Infrastructure related adjustment also includes adjustment from the micro to the macro levels. For example, consuming organic vegetables would imply less pesticides and herbicides used in agriculture, scaling down industrial agriculture, resulting in lower demand for chemical fertilizers, leading to a reduction of amoniac industry and less extraction of nitrogen from the air (Schneider, 2008b). Generally a decrease in water use is adjusted with lower water debit, smaller and less production of canalization and water taps, smaller and reduced industry that produces them, etc.

#### **5.2.4 Degrowth of total monetary capacity**

##### *Monetary frugal innovation.*

Debound innovations related to the monetary capacity dimension involve the voluntary reduction of earnings by reducing the number of hours, done at an individual or enterprise level. Another example is a company switching to operating to cover costs and break-even, rather than to accumulate profits and expand. Sharing salaries, developing local currencies, taking part in reciprocal exchanges (LETS systems and swaps) are other examples of frugal innovations. Buying less and more high-quality (but expensive) goods, which are organic or artisanal could be a frugal innovation that acts on reducing the monetary capacity and limits the budget for polluting goods. Eco-taxes are another example of frugal innovation that reduces the monetary capacity. As Ariès puts it, such as a policy would make “mis-use” very expensive (following a democratic deliberation) (Ariès, 2007)

##### *Monetary capacity adjustment*

An adjustment of the monetary capacity involves developing policies that reduce the collective financial capacity to gain natural resources. This would represent a post Keynesian degrowth policy that is based on budget and currencies to reduce the demand instead of increasing it, reducing the monetary mass while distributing wealth more evenly, reducing investments on an absolute basis. It is a reduction of the financial capacity to exploit. This means that frugal innovation such as strict policies on where investment goes (for example, choosing organic agriculture instead of intensive one; solar energy instead of nuclear or fossil fuel energy; public transport and bicycle lanes instead of road infrastructures etc...) is necessarily complemented by adjustments that shrink the amount of money available and reduce the capacity of private and public banks to create money.. This also involves a democratic process of money creation in order to ensure a fair distribution and a sustainable capacity to exploit natural resources. In general terms this would imply going out of the “debt economy” (or virtual economy (Soddy, 1926)) towards an economy based on actual resources available, or considering the resource sustainability frontiers. Monetary adjustment would also be about replacing world currencies by local currencies. Following economic crises monetary adjustments are occurring, but in order to avoid social crises they would need to be complemented by adjustments at the level of other dimensions and multi-dimensional frugal innovation.

#### **5.2.5 Degrowth of deregulations**

##### *Regulation-related frugal innovation*

Examples of frugal innovation here include introducing rules that ease sharing, and prohibit certain production or consumption by promoting smoking-free zones, carfree-zones, GMO free zones; or forbid

car-racing and incineration for example. Rules could also favour alternatives, but in order to be frugal they need to integrate limits. Again rules that favour bicycles is an example as they have a naturally built-in limit in terms of the human power required to pass certain distance (due to the human power limitations), or laws favouring use of recycled resources or strictly renewable resources. On the human side, degrowth policies, related to this dimension include stricter work legislation of people, as well as individuals from far away.

#### *Regulation-related adjustment*

This aspect is already largely developed by present policies that focus on pollution standards, labour regulations, and quality norms. Property rights are certainly strong limiting factors. They fundamentally represent rights to exploit. Reducing property rights on biota, soil and minerals would also reduce the capacity to exploit. See the discussion of Griethuysen, 2008.

### **5.2.6 Degrowth of needs un-fulfilment**

#### *Needs related frugal innovation*

Fulfilment of basic needs while integrating limits can be done by sharing. The range of products and infrastructures associated with the fulfilment of basic needs is very large, but its most important categories are water, air, space, and access to agriculture land. Frugal innovation in the context of the needs dimension implies sharing of all these. Sharing a product does not induce the need for more products: sharing is a type of “efficiency” that generates little or no rebound effect. Sharing of cars tends to reduce their use for example. When everybody has a share all needs are fulfilled and a natural limitation in terms of product use is set up.

#### *Needs related adjustment*

Needs adjustments consist of supporting mutualisation, reducing the number of houses that are not shared, the number of secondary houses, reducing the number of products and the production units of these products that have a very short lifetime. Supporting the planning of reuse and recycling of products and materials along their lifespan is an adjustment that challenges planned obsolescence.

### **5.2.7 Degrowth of unawareness of impacts and rebound effects**

#### *Awareness related frugal innovation*

It is about developing and disseminating information on impacts of production and consumption, and about restricting advertising in private and public spaces, at the level of the enterprises and at larger scales. Generally it is about awareness about the rebound effect and especially about the insufficiency of single measures, and the importance to deal with all dimensions of degrowth. It is about having less complex products which require less knowledge specialisation. It is also about consuming and producing locally so that information about negative externalities can be easily identified and spread among people..

#### *Awareness related adjustment*

Information and understanding about impacts and strategies would need to happen at the societal level. Information on the rebound effect, which destroys ecological and social progress should be documented and disseminated. This includes information or ways to develop knowledge about more environmentally friendly choices per Euro to spend or per hour of activity. Greening et al (2000) have for example noted that awareness of rebound could reduce rebound. It is a conscious reduction of the desire to exploit. The advertising industry obviously does not provide objective information. Raising awareness would then imply restrictions on this industry as a key degrowth policy measure.

### 5.2.8 Degrowth of inequalities

#### *Inequalities related frugal innovation*

In the dimension of inequalities, acting at the level of inequalities would imply to reduce disparities within the enterprise, increasing hourly salary for the disadvantaged and reducing it for the advantaged. Sharing tasks and work, be it paid or unpaid is another form of frugal innovation in the context of degrowth.

#### *Inequality adjustment.*

The inequality aspect calls for measures along all dimensions. A typical proposal for inequality adjustment would be basic income and ceiling to income. This should not be expressed only in terms of money. In general it should be about access to basic services implying free “use” for what fair participative democratic process has defined as basic needs (Ariès, 2007). It also implies a ceiling to the individual capacity to exploit within all dimensions.

In conclusion, the adjustment that appear at the level of several dimensions tend to be the most successful ones. We have discussed the frugal innovations in each dimension. Adjustment of capacities, however, should be multidimensional, or involving all dimensions of the production and consumption capacities.

## 6 Discussion: Economic Degrowth for Sustainability and Equity

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Reducing exploitation of nature and humans involved challenging our collective capacity to exploit natural resources and humans. It has been shown that even strategies that aim to limit the exploitation of natural resources and humans can fail when implemented in the context of growth policies. Good strategies would be effective if they are developed in the context of economic degrowth for sustainability and equity (Schneider 2008). Economic degrowth is a reduction of the collective capacity to exploit resources and humans. It is not an end in itself, but rather a path for sustainability, well-being and equity at the same time.

Degrowth can be negative, if it involves a recession or increase of inequalities. The process of degrowth, the “degrowth transformation” that is put forward here involves a reduction of the capacity to produce and consume in a way that is sustainable, balanced, democratic, convivial, ecological, social, positive, cultural, equitable, innovative, diversified, targeted, local & global and transitory (see Schneider 2008).

We need a few clarifications in relation to economic degrowth.

#### *GDP*

In order to calculate GDP, total consumer expenditures on final goods and services, firm investment, governmental procurement and net exports of a country are summed up. Policies that support GDP growth usually encourage the increase of the capacity to exploit natural resources and humans. We could however imagine extreme cases where transaction that could contribute to the increase of GDP do not add to the increase of the capacity to exploit. This would be in the case of exchanging services reciprocally without using material inputs. Teaching a language to a neighbour, who does baby-sitting in return, is an illustration. If GDP would value these fair and reciprocal material-free transaction at a very high price and if the capacities to exploit would decrease, an economic degrowth that involves an increase of GDP could be possible. This illustrates that an increase or decrease of GDP is not a meaningful way to measure growth or degrowth. What needs to be considered is the capacity to produce and consume by exploiting resources and humans.

Finally, getting rid of GDP growth as a goal is insufficient. GDP growth was only adopted as a target after 1950 (Victor, 2008). Economic growth has nevertheless been taking place from the beginning of the industrial revolution or even much earlier. Growth and degrowth are multidimensional processes, that need to be described in many ways

#### *Recession*

Economic degrowth and recession carry distinctly different meaning. Economic degrowth is about finding a different path to avoid recession.

#### *Society of services*

A society based on services and so-called immaterial growth, is not a solution if it remains in the context of growth of the capacity to exploit natural resources and humans. This failure is experienced in the current economy where an increase of services neither lead to a more egalitarian society exploiting less humans, nor to a reduction of natural resources use. Furthermore, a movement towards 'immaterial' source of revenues would still generate revenues that can be used for obtaining products. A trainer in personal development might still buy a swimming pool. Lastly, behind the paper-free office of a service-based company there could be a large amount of resources used, when a life-cycle perspective is taken. Product services systems, such as renting cars or sharing computers, can be a successful strategy for avoiding crises only in the context of reducing the capacity to consume and produce.

#### *Green growth*

Green growth contains the idea that consumption and production can be both done in environmentally friendly way and still be increasing. Green growth implies investment in solar energy, sustainable forestry, wind mills, bio-fuels in the context of increasing capacities to exploit natural resources and on the long term labour. There is no doubt that green strategies are necessary, they would however only be effective if green growth combines an increase of green solutions and a decrease of the capacities to extract resources. The same principle applies to the concepts of "green new deal", "sustainable development", "cleaner technologies". As an illustration, the success fossil energy saving techniques has to be accompanied by a degrowth of the number of refineries and overall extraction and fossil-fuel based infrastructure.

#### *Well-being*

Well-being is the overall satisfaction with life, which differs across individuals and periods in life. There is ample evidence that economic growth does not go together with well-being (Easterlin, 1974). It is therefore believed, that the measurement of economic growth should take into account well-being (Stiglitz et al., 2009). This prevents the exploration of a different path, based on increasing well-being and reducing production and consumption capacity simultaneously.

Increase of material wealth in a finite world is likely to exacerbate well-being due to the stronger effect of social comparison. On the contrary widespread consumption decrease that corrects for inequalities, might increase well-being because rivalry and strive for income increase would be tempered (Sekulova, van den Bergh, 2010). A related concept, while still different, is the concept of creative autonomy. It is widely felt that creative capacity increases with the increase of production and consumption capacity. Illich (1973) supports the opposite by suggesting that above a multidimensional threshold, that has been largely passed already, the assumption that creative capacity increases with the increase of production and consumption capacity does not hold. Collectively agreed limits might be liberating. For example a car free city opens space for pedestrians, children, other means of transportation creating more liberty for the majority. A degrowth of exploitation capacity is thus a possible path for making creative autonomy possible.

#### *Population*

The population solution is rather limited and questionable on the short term, as well as a subject to a rebound effect, as fewer people would still consume the same if the consumption per capita increases (Alcott 2005). Economic degrowth here refers to the reduction of the economy rather than the reduction of human population.

#### *Equity*

Growth has been put forwards as a path to reduce inequalities, both internationally and domestically. The Western mode of consumption, however, is not possible or feasible in all parts of the world due to physical limits. Unequal wealth distribution is one of the dimensions of production and consumption capacity mentioned in the previous sections. Degrowth actually enables equity. This implies both reduction and redistribution of material wealth. Self-limitation by the West would give other societies room to explore their own political space and develop appropriate systems of production and social organization (Sachs, 1999).

#### *Steady state*

The idea of degrowth is not incompatible with the idea of steady state as developed by Daly (1972). Degrowth is not an end in itself but a transition to a steady state at an appropriate scale. One of the conclusions of the Paris conference is that degrowth is a transition to a mildly fluctuating and multidimensional steady state, which is at a sustainable level of production/consumption capacity. However strategies that do not involve degrowth would not prevent rebound effects (Schneider, 2008).

#### *Regulation of finance*

Adopting stricter financial regulation after the crises of 2008-2009 has been a hot topic, implying that

financial markets can continue operating as before but in a regulated manner. Financial regulation, however, needs to take into account the physical availability of resources. Increasing financial capacity or virtual growth, when physical assets are declining (Georgescu-Roegen, 1971) would imply that owners of funds are misled about the actual capacities of their funds. “Moralizing” finance, after president Sarkozy at the beginning of the financial crisis in 2008 should be sought in the domain of degrowth of monetary capacities and redistribution of monetary wealth (Crumley, 2008). It is understandable that money creation should continue in social and ecological areas, however in total the monetary capacity to exploit natural resources and humans should decrease.

#### *Democracy*

Crises put democracy at risk. Degrowth itself has not been considered as a possible policy option in mainstream democratic processes. The technological developments and the processes of globalisation have not been a subject to a democratic debate. Technological developments and the expansion of the capacity to produce and consume are seen as unavoidable by governments and are discussed at neither community, nor enterprise level. Illich shows that above a certain level of technological development democracy is faked because technology obtains a monopoly. Growth policies that are not democratically discussed, thus, create more dependence upon technologies.

Degrowth can come through a crisis, or through a democratic process. Wallenborn (2008) shows that degrowth makes cooperation feasible because there would be resources for all. However degrowth for sustainability and equity advocates and requires a broader democratic framework involving all levels of society and a bigger diversity of subjects. Participatory processes are needed to link local actions with macro policies. All dimensions of the capacities to produce and consume, including the monetary capacity, infrastructure, resource availability, time and labour, needs, etc. need to be dealt with in a democratic way. Generally, a discussion and participatory process around how to set limit, redistribute material wealth and organize our societies are needed. This is related to the writings of Paul Ariès (2007), who makes a distinction between use and misuse of goods and services. Whether a personal car is a misuse because of its social and environmental impacts, and sharing a car with several people is a use could be a possible debate. The understanding of needs that motivate actions as defined by Max Neef, 1991 would be helpful in this context. Similarly, the concept of “post-normal science” of Funtowicz and Ravetz (1991) based on the need to include civil society involvement in scientific choices is also relevant here.

## **7 Conclusion**

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This research developed that growth or degrowth are about increasing or decreasing the capacity to exploit resources or humans and that these are multidimensional concepts. Focussing only on strategies issued from the IPAT equation has not been the right approach because it does not prevent the rebound effect along different capacity dimensions, and if the capacities are not decreasing they actually lead to crises, which explains that they have not been seriously taken into account. Maintaining or increasing high production and consumption capacity in the global North is not a solution to environmental, social and economic problems. It is also not practically possible. It is now time to question the supremacy of growth economics and growth objectives, and design and implement degrowth economics involving frugal innovation and capacity adjustment in the “global North”, in general in affluent and influential parts of the world.

This enables to develop clear proposals for degrowth which propose to combine bottom-up and top-down approaches, based on frugal innovation on one hand and adjustments on the other hand. Adjustments should involve all dimensions if we want to avoid both crises and rebound effects.

Production and consumption capacity brings a track for an alternative and multidimensional measure of the size of the economy, relevant then as an alternative to GDP for growth, or degrowth of the economy. It could also be a tool for social justice: production and consumption capacities should be evenly distributed (but the ways to achieve this may be of a wide diversity).

## References

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- Alcott, B., 2005. Jevons Paradox. *Ecological Economics*;54:9-21.
- Ariès, P., 2007. *Mésusage, Essai sur l'hypercapitalisme*. Lyon: Parangon/Vs, 2007.
- Bayon, D., Flipo, F., Schneider, F., 2010. *La décroissance en questions*, Editions la Découverte.
- Besson-Girard, J.C., 2005. *Decrescendo Cantabile*. Parangon/Vs, Lyon, France.
- Binswanger M., 2001. Technological progress and sustainable development: what about the rebound effect? *Ecological Economics*;36:119–132.
- Caillé, A., 1989. *Critique de la raison utilitaire – Manifeste du Mauss*. La Découverte, Paris.
- Crumley, B., 2008. Muted Hopes for Global Finance Summit, Paris. London: Times, Thursday, Oct. 23, 2008, <http://www.time.com/time/business/article/0,8599,1852869,00.html>
- Daly, H., 1972. *Toward a Steady-State Economy*. Freeman, San Francisco.
- Dimitropoulos, J., 2007. Energy productivity improvements and the rebound effect: An overview of the state of knowledge. *Energy Policy*;35(12):6354-6363.
- Easterlin, R., 1974. Does Economic Growth Improve the Human Lot? Some Empirical Evidence, in *Nations and Households in Economic Growth: Essays in Honour of Moses Abramovitz*, edited by P. David and M. Reder, Academic Press: New York and London.
- Flipo, F., 2007. Voyage dans la galaxie décroissante. *Mouvements*, numéro 50.
- Flipo, F., Schneider, F. (Eds.), 2008. *Proceedings of the First Conference for Ecological Sustainability and Social Equity*. Research & Degrowth, Telecom Sud-Paris, Paris.
- Fotopoulos, T., 1997. *Towards an Inclusive Democracy – The Crisis of the Growth Economy and the Need for a New Liberatory Project*. Cassell, London.
- Fournier, V., 2008. Escaping from the economy: the politics of degrowth. *International Journal of Sociology and Social Policy* 11/12 (28), 528–545.
- Funtowicz, S., Ravetz, J., 1991. A new scientific methodology for global environmental issues. In: Costanza R, editor. *Ecological Economics-The Science and Management of Sustainability*. New York: Columbia University Press.
- Georgescu-Roegen, N., 1971. *The Entropy Law and the Economic Process*. Cambridge: Harvard University Press.
- Greening, LA., Greene, DL., Difiglio C., 2000. Energy efficiency and consumption — the rebound effect a survey. *Energy Policy* 2000;28(6-7):389-401.
- Gruythuisen, P., 2008. Involutive development of the West. In: Flipo F, Schneider F, editors. *Proceedings of degrowth conference*. Paris: Telecom Sud-Paris/Research & Degrowth.
- Illich, I., 1973. *Tools for Conviviality*. Calder and Boyars, London.
- Kempf, H., 2007. *Comment les riches détruisent la planète*. Paris: Seuil.
- Latouche, S., 2006. *Le pari de la Décroissance*. Fayard, Paris.

- Lorek, S., Spangenberg, J., 2001. Indicators for Environmentally Sustainable Household Consumption. Wuppertal (Germany): Wuppertal institute, Vienna (Austria): SERI.
- Martinez-Alier, J., 2002. The Environmentalism of the Poor. A Study of Ecological. Conflicts and Valuation. Cheltenham (UK): Edward Elgar.
- Max-Neef, MA., Elizald, A., Hopenhayn, M., 1991. Development and human needs. In: Max-Neef MA, editor. Human Scale Development: Conception, Application and Further Reflections. New York: The Apex Press, pp13–54.
- Mongeau, S., 1985. La simplicité volontaire. Editions Québec/Amérique, Montréal.
- Polimeni, JM, Mayumi, K, Giampietro, M, Alcott, B., 2008. The Jevons Paradox and the Myth of Resource Efficiency Improvements. Earthscan, London, Sterling, VA, US.
- Rabhi, P., 1983. Du Sahara aux Cevennes. Albin Michel, Paris.
- Rist, G., 1997. The History of Development, From Western Origins to Global Faith. London & New York: Zed Books, 276p.
- Sachs, W., 1999. Planet Dialectics: Explorations in Environment and Development. – London: Zed Books.
- Sanne, C., 2000. Dealing with environmental savings in a dynamical economy- how to stop chasing your tail in the pursuit of sustainability. Energy Policy;28(6-7):487-96.
- Schmidt-Bleek, F., 1993. Wieviel Umwelt braucht der Mensch - MIPS, das Mass für oekologisches Wirtschaften. Basel, Boston, Berlin: Birkhaeuser.
- Schneider, F., 1996. Analyse des réemplois, recyclages, valorisations de déchets par l'étude de systèmes cascade (Analysis of Reuse, Recycling, Waste Recovery involving the Study of Cascade Systems), PhD thesis, INSA de Lyon, 1996, 318p.
- Schneider, F., Hinterberger, F., Mesicek, R., Luks, F., 2001. Eco-info-society: strategies for an ecological information society. In: Hilty, M.L., Gilgen, P.W. (Eds.), Sustainability in the Information Society. Metropolis-Verlag, Marburg, pp. 831–839.
- Schneider, F., 2002. Point d'efficacité sans sobriété. Silence 2002;280.
- Schneider, F., 2003a. L'effet Rebond (Rebound Effect). l'Ecologiste 2003;4(3):45.
- Schneider, F., 2003b. Growth and Rebound Effect; Degrowth and rebound effect. Presentation at Lyon Degrowth Conference available at [http://www.decroissance.org/francois/recherche/schneider\\_lyon\\_english.pdf](http://www.decroissance.org/francois/recherche/schneider_lyon_english.pdf)
- Schneider F., Niza S., 2003. Development of Input indicators based on extraction equipments. In: Workshop Quo vadis MFA? Material Flow Analysis – Where do we go? Issues, Trends and Perspectives of Research for Sustainable Resource Use. Wuppertal (Germany): Conaccount, 2003.
- Schneider, F., 2008. Macroscopic rebound effects as argument for economic degrowth. In: Proceedings of the First Degrowth Conference for Ecological Sustainability and Social Equity. Research & Degrowth, Telecom Sud-Paris, Paris.
- Schneider, F. 2008b. Degrowth of Haber-Bosch. In: Proceedings of the First Degrowth Conference for Ecological Sustainability and Social Equity. Research & Degrowth, Telecom Sud-Paris, Paris.
- Schneider, F., Kallis, G., Martinez-Alier, J., 2010. Crisis or opportunity? Economic degrowth for social equity

and ecological sustainability. *Journal of Cleaner Production* 18 (2010) 511–518.

Sekulova, van den Bergh, 2010. The happiness costs and benefits of climate change. Forthcoming.

Soddy, F., 1926. *Wealth, Virtual Wealth and Debt. The solution of the economic paradox.* George Allen & Unwin Ed.

Stiglitz, JE. et al., 2009. Report of the Commission of Experts of the UN General Assembly on Reforms of the International Monetary and Financial System, New York, September.

Thoreau, H.D., 1854. *Walden or Life in the Woods.* Ticknor and Fields, Boston.

van den Bergh, JCJM., 2009. The GDP paradox. *Journal of Economic Psychology*, 2009

Victor, P. 2008. *Managing Without Growth: Slower by Design, Not Disaster.* Northampton, MA: Edward Elgar.

Wallenborn, G., 2008. Degrowth vs. sustainable development: how to open the space of ontological negotiation? In: Flipo F, Schneider F, editors. *Proceedings of degrowth conference.* Paris: Telecom Sud-Paris/Research & Degrowth.



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