

Capping resource use

*Proposal for a reduction of non-renewable energy use
within the EU*



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Foreword

Nobel Prize winner Paul Crutzen calls it “Anthropocene”: the era of this Earth, in which *homo sapiens* is the cause of the most massive and most visible changes of climate, biodiversity, landscapes, aquatic life, and reserves of minerals. The current rate of natural resource exploitation is driven by today’s economic system, based on constant growth. Notwithstanding some efforts made in resource efficiency, the use of natural resource has been increasing, which tends to lead to resource scarcity. So far, mostly the global “North” has been causing resource extraction. This asymmetry is often called the “ecological debt” of the North towards the South. But as the South is catching up, chiefly in the “BRICS” states (Brazil, Russia, India, China, South Africa), with three times more people than in the OECD countries, the world is facing even in the global “South” unsustainable levels of resource use, threatening the prospects of well-being of all future generations. In other words, humanity has to shift swiftly onto a novel path of sustainability, leaving behind the “dinosaur” patterns of technologies and indeed lifestyles.

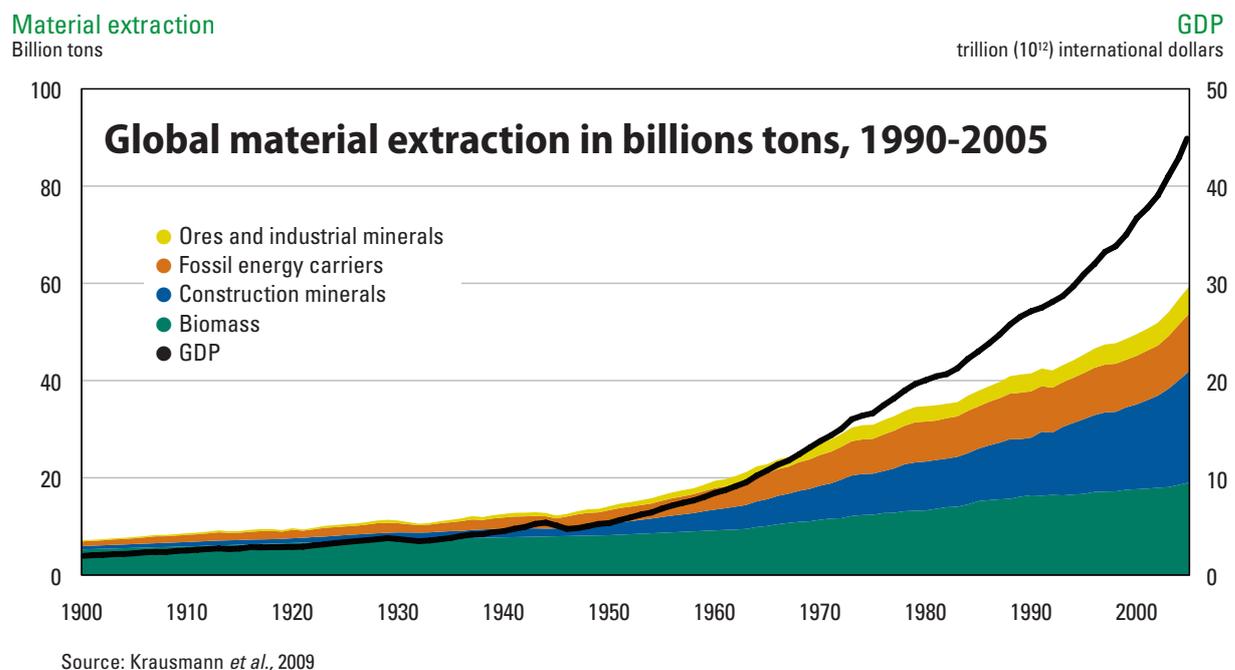
The European wide Resource Cap Coalition has been engaged in finding solutions for the sustainable and fair management of scarce natural resources. To become meaningful, a truly gigantic improvement of resource productivity has to be aimed at. Also the question of lifestyles will have to be addressed, because in the past essentially all efficiency gains have been gobbled up by additional consumption, which is the so-called *Jevons’ Paradox*.

I am glad to see that the partners of this platform are dedicated to develop innovative policy options, aiming both at ecological sustainability and a fair distribution between North and South in terms of the treasures of nature. The enthusiastic work of the Resource Cap Coalition has the potential, therefore, to play a very significant role in reaching the necessary shift to sustainable development worldwide.

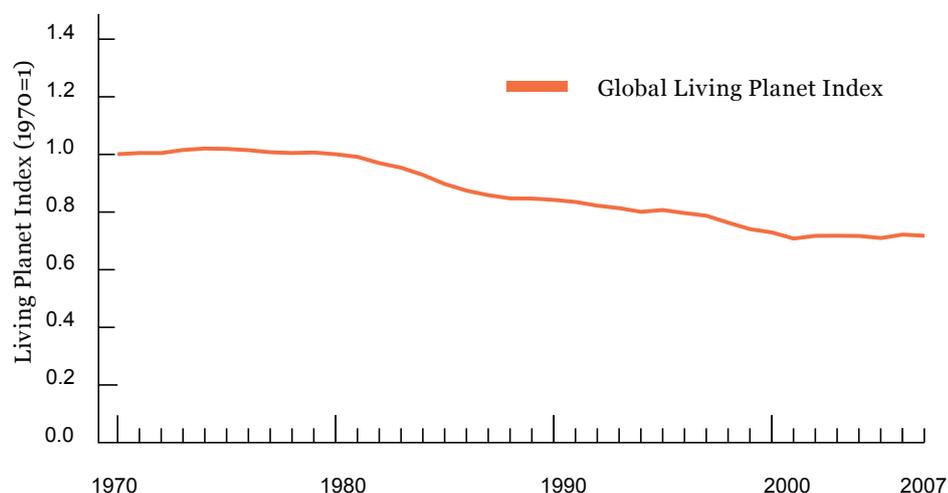
Dr. Ernst Ulrich von Weizsäcker
Co-Chair of UNEP’s International Resource Panel
Co-President of The Club of Rome

Why do we need to cap our resource use?

Global resource consumption is steeply on the rise, and we are now extracting 34 times more material resources than we did a hundred years ago.



During the whole life cycle of associated goods and services, resource use poses growing pressure on the Earth's ecosystems. This in turn diminishes their ability to provide services such as climate regulation, food provision and water purification, which underpin all economic and social processes. Thus our livelihood, cultural heritage and human well-being on the whole are more and more threatened. Resource extraction is also contributing to biodiversity loss, which at present is between 1.000-10.000 times higher than its natural course.



Living Planet Index: The global index shows that vertebrate species populations declined by almost 30% between 1970 and 2007 (Zoological Society of London/WWF, 2010)

However, the exponential economic growth in industrialized countries, fuelled by this increasing resource extraction did not eliminate social inequalities, hunger and poverty neither in Europe nor anywhere else in the world. Today we face growing global competition over resources and price increase, and this has negative consequences for the poor population segment of both developing and developed countries.

Industrial economies, such as the European Union, use much more resources than the developing countries, and thus they play a major role in degrading the planet's environment. Moreover, most fossil fuels, minerals, and biomass consumed in Europe are extracted in other countries. Hence the EU owes an "ecological debt" to impoverished countries for the use of their resources and ecological space.

According to the International Resource Panel¹, absolute reduction of resource use on a global level is necessary to make progress towards a sustainable economy. Under a tough contraction and convergence scenario industrialized countries should reduce their per capita resource use (average metabolic rate) by 66-80%, while 10–20% reduction in developing (non-industrialized) countries would also be need.

Such a scenario, which in fact would only mean going back to levels of global resource consumption in 2000, would be consistent, in terms of carbon per capita, with the IPPC recommendation to keep global warming below 2°C.

			Scenario 1: Business as usual	Scenario 2: Moderate contraction and convergence	Scenario 3: Tough contraction and convergence
		Year	2000	2050	2050
World population (Billions)			6.0	8.9	8.9
World Metabolic rate (Tons/capita/year)			8	16	8
World Metabolic scale (Billion tons/year)			49	141	70
Metabolic rate	Industrialized High density		13	13	6.5
	Industrialized Low density		24	24	12
	Developing High density		5	13	6.5
	Developing Low density		9	24	12

Metabolic scales and rates: overview of scenario analysis (Source: UNEP, International Resource Panel)

1. UNEP (2011) Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel

Why current policy responses are insufficient?

Policy efforts addressing resource use only focus on achieving higher efficiency. Nevertheless, this will not solve by itself the present and oncoming scarcity and the accompanying social and environmental problems.

Economic growth will relentlessly outstrip those gains, meaning a total rise in resource use. Political decisions must deal with the so-called rebound effect when they target resource efficiency in order to clamp down on overall resource depletion. The rebound effect can be observed in the case of below cost efficiency increase (when the efficiency increase reduces total costs of production or use). This can include direct rebound effect (when the consumer uses more resources because overall it has become cheaper), indirect rebound effect (when the savings from reduced resource costs are invested in other forms of consumption – also resulting in increased resource use) and macroeconomic rebound due to more rapid economic growth because of the increasing efficiency of the economy. As growing evidence suggests² rebound is most significant through indirect and macroeconomic mechanisms on national and global scale - which typically cannot be tackled through the tools suggested in current policies (such as the European Commission's Roadmap to a Resource Efficient Europe³).

2. Energy emergence - rebound & backfire as emergent phenomena, A review of literature, J. Jenkins et al, Breakthrough Institute, 2011

3. COM(2011) 571

What principles should guide the resource use cap?

We need to set a cap on the use of resources including all types of raw materials if we want to effectively bring down their consumption in the EU and re-adjust our economy within sustainable ecological boundaries. Defining general principles for the determination of caps is difficult, as resources are very different from one another. Some are renewable, while some are limited. Some stocks decrease fast, while others are relatively abundant. One resource can be scarce in some areas, while there is no major constraints to the amount of its extraction in other parts of the world. Some resources are present almost everywhere, while others (like fossil fuels) are concentrated in some countries. However, the complexity of the access and distribution of natural resources should not stop us from taking urgent and significant action.

At the same time we are convinced that the resource cap should be guided by the following principles:

- ▶ aim to realise an absolute reduction in resource use,
- ▶ be progressively lowered year after year,
- ▶ be based on an interdisciplinary analysis including sound scientific information and a social debate applying bottom-up approaches as far as possible,
- ▶ be defined through clear indicators and transparency of information,
- ▶ be underpinned by clear rules and strong public support, monitoring and enforcement,
- ▶ transform the production and consumption patterns in favor of products and services with low input,
- ▶ contribute to re-localizing the economy with shorter economic cycles, higher self-sufficiency, higher adaptation to local availability of resources and less transport needs,
- ▶ fully consider environmental justice and ecological debt (from the North to the South) caused by centuries of social and economic exploitation,
- ▶ take into account the social concerns so that the poor, vulnerable and marginalized benefit from it,
- ▶ better balance the share of human labour and machine labour,
- ▶ be accompanied by complementary measures (effective regulation of pollution and land use, taxation, basic access warranties, etc.)
- ▶ not allow any financial speculation within the new structure of resource scarcity.

Defining caps: a need for physical accounting of resources

In order to set adequate caps for resource use in a comprehensive manner, it is a crucial step to know what amount of resources we have and how much we currently use, while also considering the aspects of distribution and access. Hence scientific analysis and social debate shall jointly form the basis of effective and legitimate resource use policies. As also stated in the Roadmap to a Resource Efficient Europe a process involving all key stakeholders is needed to discuss and agree on indicators and targets by the end of 2013. This would entail developing a 'dashboard' of indicators on water, land, materials and carbon, indicators that measure environmental impacts on the natural capital and ecosystems within Europe and worldwide. Therefore, to define stocks and the various aspects of their use we need to carry out an interdisciplinary analysis.

For this, a large set of indicators currently available can be used to acknowledge the dynamics that underlay resource extraction and use such as the life cycle analysis (LCA), Material and Energy Flow Analysis (MEFA, or MFA), Ecological Rucksacks, Virtual Water, as well as the effects of these uses on the environment like the human appropriation of net primary production (HANPP) and Ecological Footprint. Indicators will need to be robust, easily understandable and widely accepted in order to continuously measure progress in downshifting resource exploitation and environmental degradation. Therefore new indicators should be developed, although the need for further data and indicators should not prevent from introducing a cap for the selected resource at current levels.

Therefore, we need policy indications striving for:

- ▶ **comprehensive collection of biogeophysical data.** Scientific debate in this field needs to be promoted to make the most effective use of already existing data and methods. Furthermore, data gaps should be identified for getting a clear picture on the current stocks of natural resources, their depletion and the environmental impacts..
- ▶ **understanding the biogeophysical processes associated with regeneration of resources in order to put the cap right.** This implies using non-traditional indicators on the regeneration rate of renewable resources and the various economic and non-economic values linked to them, which shall provide the basis for sustainable resource management. For example, the existing EU legislation for groundwater management states that extracted volumes should never exceed groundwater recharge capacity⁴. In case of non renewable resources, for example fossil fuel, a good reference could be the method proposed in the Rimini Protocol (see Annex).

4. Directive 80/68/EEC

Public debate about resources use and resource cap

Wide public debate should develop a shared view of the problem and a better understanding of the imperative reasons of introducing caps. In order to achieve this public participation should be robust and of good quality, including sufficient and impartial information and specific capacity building. The outcomes should contribute to decision making on the regulatory and normative aspects of resource use.

All this public debate and scientific analysis should underpin the drawing up of new action plans for resource use, including the introduction of caps. The definition of caps should take into account the carrying capacity of the ecosystems and the impact of resource use on peoples' livelihood.

Our proposal: capping non-renewable energy use in the EU

Socio-economic transition to a more sustainable society requires the introduction of caps in order re-adjust our economy within sustainable ecological boundaries. While additional caps can be studied and progressively implemented to complete such transition, we propose to start with measures addressed to cap non-renewable energy. While nuclear power should be urgently outphased, the use of non-renewable energy shall be reduced through direct savings, increasing efficiency, or shifting to renewable energy sources. Energy is a horizontal resource that affects the whole production and consumption system and can also have an impact in other resources. Thus the Resource Cap Coalition is advocating for an overarching regulatory framework that can reach different objectives, which should include the tools detailed below.

1. Non-renewable energy quota scheme

The proposed scheme (see also Annex I.) aims to reduce non-renewable energy consumption at EU level and facilitate the shift to renewable energy sources and higher efficiency at the same time. The EU and national non-renewable energy use target should be progressively lowered each year, until the EU re-adjusts within reasonable ecological boundaries. The proposed regulatory system is based on 3 + 1 pillars.

Pillar 1: The Energy Quota

Energy consumption entitlements of annually decreasing quantities would be allocated among individual consumers (on an equal per capita basis) and public and private consumer groups. Those, who save a part of their allocated entitlements, can sell their remaining entitlements through a quota manager organization to those, who consume more than their allocated consumption entitlement. The quota manager organization sells the quota in the national currency, and buys the remaining quota in "quota money". International trade among EU MSs is realised based on the same principles.

Pillar 2: Market for Environmental Goods and Services

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 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.

Pillar 3: The Revolving Fund

The Revolving Fund provides the opportunity for everyone, both energy producers and consumers, to achieve savings through energy efficiency and renewable energy investments. The Revolving Fund provides interest free loan in "quota money" with a payback period adjusted to the energy

savings or income generation realised through the investment.

Pillar +1: Support Service

The Support Service aims to provide advice on lifestyle, planning, social and environmental issues.

The trade of quotas among consumers using “quota money” would allow underconsumers (such as poor and marginalized groups and environmentally conscious consumers) to increase their wellbeing (e.g. through accessing goods and services that they could not afford otherwise, in the secondary market using their savings in the form of “quota money”). At the same time overconsumers would be forced to comply with the stricter and stricter targets through decreasing their consumption. This would not only help achieving environmental targets, but also contribute to realizing social justice.

2. Rimini Protocol - An Oil Depletion Protocol

Fossil fuels represent almost 80% of EU primary energy consumption, out of which oil stands for 48%⁵. Our economy is heavily based on oil consumption (energy, industry, transportation, food production, trade, etc.), and currently there is no alternative of cheap, concentrated, efficient and massive energy source to replace oil. The International Energy Agency is already talking about threats of shortages of (cheap and accessible) oil, while global demand for oil keeps scaling up and the EU's dependency on oil imports is rising.

In addition to the need to fight climate change, it is essential to reduce our oil dependency and to facilitate our transition to a post-oil society. The world needs to adjust its oil demand to the oil production capacity taking into account future environmental and socio-economic changes, also related to oil shortages. For this reason part of the scientific community has developed a proposal known as Rimini Protocol⁶ (see Annex II.), also known as the Uppsala Protocol. It proposes an oil depletion “adaptation programme”, suggesting the limitation of the national rate of extraction and consumption to the global depletion rate (GDR) and the current national (NDR) respectively, depending on whether a particular country is an oil exporter or importer.

The overall result is that oil consumption and production is frozen at current levels and then reduced accordingly year after year in line with the depletion rate. It is therefore not a cap itself, but it gives instead indication of the level of the cap (a progressive cap). The idea is to provide the level to which oil flows should be restricted in order to soften the reduction of its availability, facilitating the transition to a post-oil society and reducing dependency.

We encourage the EU to promote this protocol at international level. The adoption of such agreement will undoubtedly bring benefits in the fight against climate change and biodiversity loss, making it possible to achieve the needed reductions in environmental pressures, such as greenhouse gas emissions.

⁵ <http://www.eea.europa.eu/data-and-maps/figures/primary-energy-consumption-by-fuel-1>

⁶ “The Rimini Protocol - An oil depletion protocol” proposed by the Association for the Study of Peak Oil and Gas (ASPO), a network of scientists and others, having an interest in determining the date and impact of the peak and decline of the world's production of oil and gas, due to resource constraints.

Strengthening international governance for sustainable resource use

When designing sustainable resource use policies we need to recognise that the crises we face are multiple and complex, and that existing institutions are inadequate to tackle these challenges to humanity. Changes that follow the subsidiarity principle will be needed at every level, but action at the global and intergovernmental level will provide critical leadership in this process of change.

Thus we urge governments to establish a global sustainable development coordinating mechanism and parallel institutions at the national level, empowered to pursue system-wide policy coherence also in relation to resource use policies. A Council of the UN General Assembly on sustainable development should ensure that governance for sustainable development is at the top of the UN agenda. UNEP should be upgraded to the status of specialised agency in the UN system.

The International Panel of the Sustainable Use of Natural Resources should be also upgraded. To implement a "resource capped economy" this panel has to define the sustainable extraction limits on a series of resources and define the fair share of distribution/capping of these resources.

These institutions shall facilitate the introduction of resource cap on global level, while ensuring global social justice and the elimination of ecological debt from the North to the South.



What is the Resource Cap Coalition?

The Resource Cap Coalition (RCC) is an open platform for organisations advocating for a global resource cap. The RCC was initiated by ANPED, CEEweb for Biodiversity and Ecologistas en Acción in 2010. It lobbies for the introduction of a resource cap with a view to ensure social justice and staying within the earth's carrying capacity. It also provides a discussion platform that supports the elaboration of strategies and tools required for the achievement of the coalition's targets.

More detail can be found at: www.ceeweb.org/rcc

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Annex I

Non-renewable energy quota scheme for Europe

The non-renewable energy quota scheme is a means to achieve an absolute reduction of non-renewable energy use at EU level with a progressive reduction rate each year, where everybody has the same share. It aims to

- ▶ provide a **comprehensive** set of tools for getting to the roots of the problems related to climate change, and mitigating the causes of climate change and other environmental problems,
- ▶ gradually **reduce non-renewable energy use** in Europe,
- ▶ promote **energy saving, energy efficiency and renewable energy resources** through providing **incentives and interest free loans** for citizens, communities and economies to realise necessary investments,
- ▶ enhance **environmental consciousness** for the necessary structural change.

The proposed regulatory system is based on 3 + 1 pillars, which together can reach the environmental goals while taking into account social considerations.

This scheme does not take into account the non-renewable energy included in EU imports. While specific mechanisms should be developed in the future to cover this consumption at EU level, Member States should be encouraged to establish national targets with a view to reduce their ecological footprints, running in parallel to the national caps on non-renewable energy consumption, in order to reduce their global impact.

Pillar 1: The Energy Quota

The energy quota means a yearly consumption entitlement for the entire economy and for every consumer individually in the European Union. Every year, the scheme aims to reduce the use of non-renewable energy resources at EU level by a rate defined in comparison to the consumption figures corresponding to the preceding year. The year before the scheme starts shall be the reference year.

The rate of reduction shall be determined in line with scientific recommendations, among others taking into account the tough contraction and convergence scenario of the Decoupling Report of UNEP's International Resource Panel focusing on fossil fuels, minerals, metals and biomass. This scenario requires far reaching absolute resource use reductions in the industrialized countries, by a factor of 3 to 5 by 2050, which is consistent with the 2.2 tons of carbon per capita recommended by the IPCC as the convergence point that could prevent warming by more than 2 degrees centigrade.

Taking into account scientific recommendations the European Parliament defines the target for the next ten-year-period in order to enable long term economic planning, while the yearly rate of reduction is published by 15 January each year defining the total amount of energy quota in PJ

(petajoules) for that year.

The total amount of quotas is allocated for free among EU Member States based on their own non-renewable energy use in the reference year and the yearly national reduction rate. The national reduction rates should be based on the EU reduction rate, while they should also take into account the differences in the per capita non-renewable energy use among the countries, in order to design a fair system. In this respect those countries which have lower consumption levels in general and those which have made greater progress in shifting to renewable energy use, would be rewarded. This would allow a more harmonised European transition toward a common European reduction target on non-renewable energy use, where eventually everybody in the EU receives the same amount of quotas.

The national quotas shall be distributed among different consumers within the MSs, therefore the national governments define consumer groups. Except for the general population, the consumer groups (agriculture, transport - except individual transport -, industry, state bodies, etc.) receive quotas before 31 January each year. With the aim of protecting public interest, civil society should be entitled to contribute to this definition and the allocation process.

At the same time, each adult over 18 shall be granted equal consumer rights, while quotas for children would be determined on the basis of their household structures. In the case of people constrained in their decision-making abilities, it is the appointed guardian who shall be in charge of the consumption entitlement. The quota can only be used in harmony with the needs of the entitled person. The general basis of the system is an equal per capita-share. Considering the fact that not everybody starts from the same energy need, development of society level responses (e.g. developing public transport) is essential to offering its citizens equal chances of reducing their non-renewable energy consumption. In other words, it is not just the individuals but society as a whole that shall also adapt to the new system on a community level. However, the correction of personal quotas, carried out in a case by case approach, could be justified under certain circumstances, if community level responses are not capable of promoting social justice.

The yearly quota (consumption entitlement, consumer rights) shall be expressed in megajoules (MJ). The consumption entitlement shall cover the sum of the consumption of households in terms of primary heating energy (gas, coal), electricity, as well as fuel used for individual transportation. The quota managing organisation records the consumption entitlement for all consumers on an individual energy allocation card with a personalised PIN code by 31 January each year. The energy allocation card is a running account which indicates the available amount of non-renewable energy for that year, where the energy providers register the consumed energy quantity at each payment, when energy is purchased (monthly energy bills, buying fuel at petrol stations). This does not affect the payment obligations between the contractual partners. The card shall allow for checking the balance at all times, and thus for monitoring the yearly consumption. Opportunities of and restrictions on buying fuel abroad as well as energy and fuel allocations for foreign individuals shall be governed by specific regulations.

A quota managing organisation for the allocation and monitoring of quotas should be established both at a national and at EU level. The national quota manager organisation keeps parallel accounts for all consumers. Parallel accounting is designed to ensure data security, to allow for the replacement of lost cards and the day-to-day traceability of all accounts. The quota manager shall observe confidentiality regulations regarding the personal data managed, and shall not divulge individual consumption data. The quota manager shall regularly send out notifications about the balance showing the level of consumption. The EU level quota manager organisation keeps record of the non-renewable energy consumption of each EU MS.

If there is a surplus on the accounts due to under-consumption, this surplus is credited to these accounts by the quota manager in the form of **quota money**. Consumers are only allowed to use more non-renewable energy than their allocated quotas, if they purchase the missing consumer rights through the quota manager. Trading of quotas is possible both among MSs at EU level and

among all consumers at a national level based on the same principles.

Consumers (also including MSs) that purchase extra quotas pay in the national currency for the extra consumer rights, which shall serve as collateral for quota money, managed by the quota manager based on specific legislation. The trade in consumption rights shall be managed through the quota manager, and shall be conducted between all consumer groups, i.e. not limited to the population. In this way, the quota manager trades in the consumption entitlements of **over-consumers and under-consumers**.

The quota money shall be adjusted to the prevailing energy prices to ensure that fluctuations of the latter shall not put the actors on the quota market at a disadvantage. Even so, the (currency) rate of the quota shall be determined by the quota manager, according to whether society as a whole has met the nationally defined consumption reduction target.

If there is over-consumption of non-renewable energy compared to the national target originally defined, the over-consumers shall pay a premium over the current quota price, which shall be fed into the Revolving Fund. The premium, equivalent to the rate of consumption, shall be established progressively: the greater the degree of excess, the higher the premium. The premium may only be imposed for the consumption in excess of the total allowed consumption as defined at the national level. Over-consumers shall pay a premium proportional to the excess consumption, with higher excesses implying progressively greater costs. The rate of the premium should be set flexibly, taking account of any objective circumstances (e.g. reasons of over-consumption). The yearly reduction of the national target and the progressive costs of the premium shall ensure that the total use of non-renewable energy is gradually reduced in absolute terms.

It is an important characteristic of the system that even if society cannot meet the annual national reduction target, the accumulation of the premiums paid within the Revolving Fund provides a negative feedback to society. Namely the Revolving Fund provides financial tools to realise non-renewable energy savings through efficiency improvement and switching to renewable energy, and thus meet the national target in the future (see more below). This way an ambitious reduction target is not simply a burden, but also an aid for reaching further long term reduction goals.

The operating costs of the system as a whole, including costs of the quota manager, shall be covered by 0.5% of the amount of the purchase transactions.

Pillar 2: The Market for Environmental Goods and Services

The market for environmental goods and services is an **open market** operating according to environmental and ethical rules including sustainability and market considerations. EU regulations shall specify the conditions based on the principle that it is always the goods and services requiring the lowest material and energy consumption which can be placed on this market from among all goods and services. The principle underlying the **ethical rules** is that the economic activities on the market serve the common good by realising an existing product, process or service with least negative social and environmental externalities.

The **environmental aspects** entail that products and services are provided with the least environmental pressure (energy and material use, transport needs, waste and pollution, etc.) using the best available technologies. Among the **social aspects**, priority shall be given to a high rate of human labour used, especially in cases where disadvantaged people are involved in the process.

Compliance with these conditions shall be verified by a product certification council, issuing a

certificate for products on the market. The market of environmental goods and services is open to any market actor who fulfils the conditions imposed on the market and acquires the certificate.

The currency of the market is the **quota money**. The quota money has **no interest** and is alternative currency existing in the form of electronic signs. The national currency shall provide the collateral for the quota money through the purchase of quota for national currency by those who over-consume. Besides, the quota money can be converted to national currency with a 20% commission. Moreover, it is allowed to pay taxes and social contributions in quota money. In each transaction where the quota money is used the customer pays via the electronic card.

Pillar 3. The Revolving Fund

The scheme includes a Revolving Fund, which is designed to allow for providing loans to individual consumers and market actors offering environmentally friendly products and services. Therefore, the Fund serves the transformation of production and consumption patterns towards less material and energy use, stimulates the market for environmental goods and services and propels innovation, allowing socially disadvantaged people to realise low energy, energy efficient investments, and promoting the introduction of renewable energy sources on the market.

The Fund provides **interest-free loans** for anyone whose investments aim to increase energy and material efficiency and whose goods and services meet the rules of the market for environmental goods and services. The basic accounting instrument of the Fund is **quota money**. The repayment rate depends on the pace of income generation from the investment of the producers. If the investment financed by the Revolving Fund is aimed at increasing energy efficiency or switching to renewable resources, repayment of the loan is achieved through the savings on the energy consumption rights used throughout the year.

Operational costs of the Fund are covered by a transaction charge amounting to 0.5% of credit transactions, to be paid back by the debtors from their savings, as part of the loan. The assets of the Fund are provided by the state from public funds as collateral for the quota money.

Pillar +1: Support Service

In order to support the rational decisions of citizens and market actors in general, the scheme includes a Support Service, which operates on a not-for-profit basis. The financial basis for the functioning of the Service is ensured by the payments of the clients using the Revolving Fund, who pay 1.5% of the total credit amount over and beyond the 0.5% transaction fee charged.

The Support Service provides advice on lifestyle, planning, social and environmental issues related to the operation of the quota scheme. The knowledge, qualifications of the staff, the operations of the service and establishing the service are governed by specific regulations.

Annex II:

The Rimini Protocol (an Oil Depletion Protocol)

Heading Off Economic Chaos and Political Conflict During the Second Half of the Age of Oil

(As proposed at the 2003 Pio Manzu Conference, and to be the central theme of the next Pio Manzu Conference, Rimini, Italy on October 28-30, 2005)

Introduction

Soaring oil prices have drawn attention to the issue of the relative supply and demand for crude oil, which is the World's premier fuel, having a central place in the modern economy.

Knowledge of petroleum geology has made great advances in recent years, such that the conditions under which this resource was formed in Nature are now well understood. In fact, it transpires that the bulk of the World's current production comes from deposits formed in two brief and exceptional epochs, 90 and 150 million years ago. This fact alone tells us that oil is a finite resource, which in turn means that it is subject to depletion.

People ask: *Are we running out of oil?* The simple answer is: *Yes, we started doing that when we produced the first barrel.* But *Running Out* is not the main issue as the resource will not be finally exhausted for very many years. The much more relevant question is: *When will production reach a peak and begin to decline?*

Depletion: Growth, Peak and Decline

Much debate and study has focused on the calculation of the date of peak, but this too misses the main point. It is not an isolated or pronounced peak but merely the highest point on a long and gentle production curve. It matters little if the actual peak came last year, if it will be passed this year, or in a few years' time. The shock is the perception of the long, remorseless and terminal decline that follows, which can hardly fail but have a major impact on the future of Mankind.

Without quibbling over precise dates, it is now evident that the First Half of the Age of Oil draws to a close. It lasted 150 years since the first wells were drilled for oil in Pennsylvania and on the shores of the Caspian, and saw the rapid expansion of industry, transport, trade and agriculture, allowing the World's population to expand six-fold, exactly in parallel with oil. In addition, it made possible the growth of financial capital as banks lent more money than they had on deposit, confident that Tomorrow's Economic Expansion offered collateral for To-day's Debt. Many people came to think that it was money that made the world go round, when in reality it was a cheap and abundant

supply of oil-based energy.

Distribution and Categories of Oil

The World's oil is unevenly distributed for well-understood geological reasons, and some countries are more depleted than others. In fact, five countries bordering the Persian Gulf own almost half of the *Regular Conventional Oil* that is left to produce.

This category of oil has provided most to-date and will dominate all supply far into the future. Accordingly, the onset of its decline will have the greatest impact on the World situation. The other categories, including the tar-sands and heavy oils of Canada and Venezuela, deepwater oil, polar oil, and liquids derived from natural gas, are important too, primarily because they can ameliorate the rate of overall decline after peak.

Unreliable Information

If reliable information on past production and reserves in known fields were freely available in the public domain, the issues of peak production and the onset of decline would be entirely self-evident. Estimating the size of an oilfield early in its life poses no particular scientific or technical challenge, such estimates being routinely made by the oil industry.

The reporting of reserves is another matter, being much influenced by political and commercial pressures. Simply stated, the oil companies reported commercial reserves under strict Stock Exchange rules that were designed to prevent fraudulent exaggeration but smiled on conservative reporting as laudable prudence. The companies, quite rightly, reported cautiously, preferring to smooth their assets and revise their reported reserves upwards over time, which gave a comforting, but very misleading, image of steady growth. It was widely, but wrongly, attributed to the remarkable technological progress that was achieved as well as to the scale of investment, when in reality it was primarily an artefact of reporting. The main impact of technology was to hold production higher for longer, which in fact accelerated depletion. The days of under-reporting are however now over, leading the major companies to merge and in some cases revise their reported reserves downwards.

Several major producing countries nationalised their oil industries in the 1970s, and found themselves in the uncomfortable position of having to cut production to support price, when they faced competition from growing production brought in by the international companies from new areas. In those days, there were still large new provinces to bring in, especially offshore. The Organisation of Oil Exporting Countries (OPEC) introduced a quota system to manage the allocation of production amongst its members. Reserve estimates became effectively State secrets in these countries. In the 1980s, some of them announced massive overnight increases in reported reserves, although nothing particular had changed in the oilfields themselves. It transpires that they may have been reporting the total found, not the remaining reserves, which would explain why the reports have barely changed since, despite substantial production.

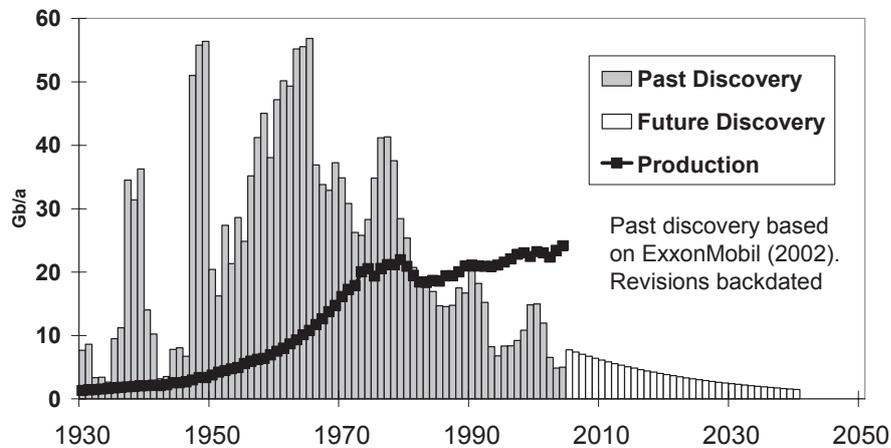
Although the skills of a detective are called for to obtain reliable information, the general position can be determined within reasonable limits to permit and justify appropriate policy decisions and responses (See Appendix 1).

You have to find it before you can produce it

It is axiomatic to state that oil has to be found before it can be produced, meaning that production mirrors discovery after a time-lag. When a new area was opened to exploration, the first step was for the industry to secure the rights from the government concerned. The next step was to investigate the geology, examining the rocks at the surface, scanning the depths with seismic surveys and drilling exploratory boreholes, known as *wildcats*. This work proceeded until a moment-of-truth

was reached when the area either delivered its first discovery or was found to lack the essential geology, in which case it remained forever barren, no matter how much investment was applied. It was normal for the larger fields to come in first, being too large to miss.

THE GROWING GAP Regular Conventional Oil



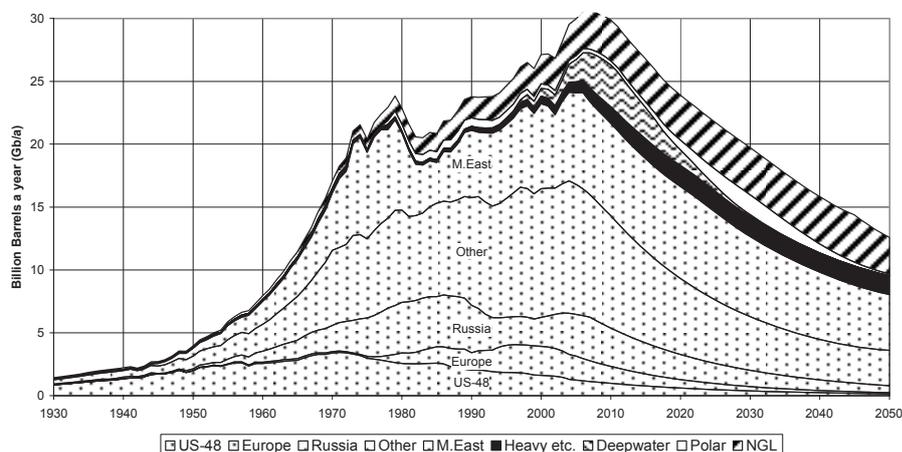
For these reasons, the production in any country tends to reach a peak close to the Midpoint of Depletion, when half the total endowment has been produced. The subsequent decline may be modelling on the assumption that production will continue to fall at the current Depletion Rate, namely annual production as a percentage of what is left. There are of course exceptional situations that have to be assessed on their merits.

Displaying laudable frankness, a Director of the World's largest oil company has reported that the peak of world discovery, based on industry data with reserve revisions being properly backdated, was passed in the 1960s. (see Longwell H., 2002, *The future of the oil and gas industry: past approaches, new challenges*; World Energy 5/3). This information alone leaves little doubt that the corresponding peak of production is now imminent. The World started consuming more than it found in 1981, and the gap is widening, as illustrated in the above figure.

The Dawn of the Second Half of the Age of Oil

Putting it all together, with the best information available and a realistic depletion model, based on appropriate Depletion Rates, gives the following general picture as a sound and prudent basis for planning, notwithstanding the remaining uncertainties of detail.

OIL AND GAS LIQUIDS 2004 Scenario



The evidence demonstrates that the Second Half of the Age of Oil is dawning. It will be characterised by the decline of oil, and all that depends upon it. The decline itself is gradual at no more than 2-3% a year, such that production by 2020 will have fallen to approximately what it was in 1990. This, in itself, does not speak of any direct catastrophic collapse in supply, but the onset of decline does represent a turning point in history of unprecedented proportions.

Financial Implications

The First Half of the Age of Oil saw the growth of industrialisation and World trade, which was accompanied by the development of world trading currencies, provided first by the pound sterling and later the United States dollar. Control of such currencies became one of the principal benefits of empire as they delivered a hidden rental to the issuing country. Financial constructions cloud the issue. For example, the physical import of oil to the United States has been exactly matched by the expansion of domestic credit, which itself was little more than an expression of confidence in the current financial system. In a certain sense, the country obtained its supply of oil for free, paid for by debt based on the assumption of onward economic growth, whose validity is now put into question by declining energy supply.

The subject of Economics was devised to understand and manage finance and investment in this epoch of a growing economy. It was premised on the view that the Planet had near-limitless resources to be converted to Man's use by his skill and enterprise. A liberalised market was held to ensure that supply must always match demand, and that one resource would seamlessly replace another as the need arose. Indeed, the *Stone Age did not end for want of Stones*, as Man moved on in a natural progression to use bronze, iron and steel for better tools and weapons. Yet, oil declines during the Second Half of the Age of Oil due to resource constraints without sight of a better alternative, suggesting that some basic reappraisal of economic thinking is called for, given the fundamental role of oil as a fuel for most economic activity. Indeed, new schools of thought are emerging that better address the reality imposed by Nature.

Economic and Political Impact

The Economics of the First Half of the Age of Oil had a major influence on the political evolution of this chapter in history. Many countries adopted democratic forms of government primarily dedicated to fostering economic growth in a competitive global market. Prosperity came to some countries that found themselves in control of the system, while poverty remained the lot of others, being exacerbated by the growth of large urban populations. A perception of a new world of finite resources now presents itself, implying that one man's wealth must mean another's poverty.

This closing chapter in history was marked by two world wars, which, whatever the immediate causes, reflected the pressures and ambitions of economic hegemony. They were followed by the Cold War as the believers in free markets and central planning faced each other with threatening postures, each seeking to support its particular economic system and power. Lastly in its turn has come the so-called War of Terror as the United States seeks to support Israel and bring Middle East oil supplies under its control, facing many increasingly alienated peoples.

The 21st Century has dawned with these new tensions that, despite the many remarkable achievements, reflect a certain sense of excess and instability. The power of electronic communication has brought everyone into a global environment. Simple but happy people, previously living in relative isolation, have become subjected to relentless television imagery, making them feel resentful of the prosperous glitter of distant places. Cities everywhere have become choked with traffic, while vapour trails fill the sky from Rome to Rio. Population pressures have led to growing migration, which at first the wealthy nations welcomed as a means of holding down wages.

This brief chapter of history occurred at a time of high oil production, which in fact made the excesses possible. But now, no more than five years into the new Century, soaring oil demand, es-

pecially from the new industrial societies of India and China, begins to exceed productive capacity, leading to a radical increase in the price of oil, which has doubled in less than twelve months. It is important to stress that such high prices represent unintentional profiteering from shortage by oil companies and, especially, Middle East Governments, as the cost of production itself has not increased materially.

Under conventional economic reasoning, the high prices will themselves trigger new discovery and higher production rates, but in reality they may not do so. Even modest oilfields are profitable under low prices, so high prices make viable only the smallest new discoveries, adding a negligible amount to World supply. High oil price may not encourage oil companies to produce at higher rates because it allows them to deliver satisfactory financial results while conserving their largely irreplaceable reserves. The Middle East governments, for their part, have little incentive to increase production, even if they had the resources to do so, as that would serve to lower World prices and hence their revenues.

It remains to be seen if further military intervention in the Middle East will occur and lead to sufficiently stable conditions for foreign oil companies to step in. An ironic silver lining attends continued instability insofar as more oil will be left in the ground for the future, when it will be desperately needed.

Although these few words hardly do justice to the many difficult circumstances facing the modern World, they do serve to emphasise the arrival of a turning point, which in turn imposes new responsibilities on Governments everywhere. The long-term decline of oil supply in the years ahead is not in doubt. The peak of production will not be evident as such until some years after it has occurred. It follows that Governments are well-advised to prepare rather than react, and begin to give serious attention to the management of the transition from the First to the Second Half of the Age of Oil, which threatens to be a time of great tension.

The most obvious objective is to cut consumption to match declining production. A Protocol to so achieve is laid out below in draft form.

The Depletion Protocol

- ▶ WHEREAS the passage of history has recorded an increasing pace of change, such that the demand for energy has grown rapidly in parallel with the world population over the past two hundred years since the Industrial Revolution;
- ▶ WHEREAS the energy supply required by the population has come mainly from coal and petroleum, having been formed but rarely in the geological past, such resources being inevitably subject to depletion;
- ▶ WHEREAS oil provides ninety percent of transport fuel, essential to trade, and plays a critical role in agriculture, needed to feed an expanding population;
- ▶ WHEREAS oil is unevenly distributed on the Planet for well-understood geological reasons, with much being concentrated in five countries, bordering the Persian Gulf;
- ▶ WHEREAS all the major productive provinces of the World have been identified with the help of advanced technology and growing geological knowledge, it being now evident that discovery reached a peak in the 1960s, despite technological progress, and a diligent search;
- ▶ WHEREAS the past peak of discovery inevitably leads to a corresponding peak in production during the early years of the 21st Century, assuming no radical decline in demand;
- ▶ WHEREAS the onset of the decline of this critical resource affects all aspects of modern life, such having grave political and geopolitical implications;

- ▶ WHEREAS it is expedient to plan an orderly transition to the new World environment of reduced energy supply, making early provisions to avoid the waste of energy, stimulate the entry of substitute energies, and extend the life of the remaining oil;
- ▶ WHEREAS it is desirable to meet the challenges so arising in a co-operative and equitable manner, such as address related climate change concerns, economic and financial stability and the threats of conflicts for access to critical resources.

NOW IT IS PROPOSED THAT

A Convention of Nations shall be called to consider the issue with a view to agreeing an Accord with the following objectives:

- ▶ to avoid profiteering from shortage, such that World oil prices may remain in reasonable relationship with production cost;
 - to allow poor countries to afford their imports;
 - to avoid destabilising financial flows arising from excessive oil prices;
 - to encourage consumers to avoid waste;
 - to stimulate the development of alternative energies.
- ▶ Such an Accord shall have the following outline provisions:
 - No country shall produce oil at above its current Depletion Rate, such being defined as annual production as a percentage of the estimated amount left to produce;
 - Each importing country shall reduce its imports to match the current World Depletion Rate, deducting any indigenous production.
- ▶ Detailed provisions shall cover the definition of the several categories of oil, exemptions and qualifications, and the scientific procedures for the estimation of Depletion Rate.
- ▶ The signatory countries shall cooperate in providing information on their reserves, allowing full technical audit, such that the Depletion Rate may be accurately determined.
- ▶ The signatory countries shall have the right to appeal their assessed Depletion Rate in the event of changed circumstances.

The challenge of negotiation and agreement

The foregoing is no more than an outline draft to try to stimulate interest. What is needed is an imaginative senior politician, or national leader, who would grasp the essentials of what is described. He would likely have a scientific or technical background, or at least an open, inquiring and logical mind. He is unlikely to have had a training in classical economics.

The first step for him would be to look into the matter more closely, and try to assemble proper data and knowledge of the resource base, as outlined in Appendix 1. Here, he will meet his first challenge because official institutions will likely deliver bland “business-as-usual” scenarios, not themselves being fully qualified to delve into the inner workings of the oil industry. If he approaches the oil companies direct he will be met by a façade of public relations. So, his best hope is to step behind the scenes and search out oil men who no longer have a vested interest in confusing the issue. The data provided in Appendix 1, including calculated Depletion Rates, may be taken as a starting point to be progressively revised and improved on the basis of proper technical audits of reserves and new transparency by countries supporting the initiative.

If he can overcome these first obstacles, he will find his eyes opening as he begins to understand the simple message the unpacked facts deliver. He will find himself immensely encouraged and enthusiastic to follow the trail as more and more pieces in the puzzle fit together. That in turn will be followed by a certain sense of foreboding and depression, as he begins to appreciate the wider implications for the future of Mankind. He may at this point abandon the mission in despair, but if he has the stamina to continue, he will find his resolve strengthened by a new urgency to take action. He will remember his responsibilities as a politician to lead and help his people prepare. He may start holding public meetings to address his constituents on the subject. If so, he may be surprised at their positive reaction: far from drumming him out of town, he will find himself touching a nerve in the intuitive common sense of ordinary people. He will be reminded of the famous words of Winston Churchill who proclaimed *Put your trust in the people* as he tried to persuade his country to prepare to defend itself from the advancing threat of war.

If, by good fortune, he should represent a relatively small country, he might find it possible to bring his colleagues in government on board to host a Conference. The response from others at first sight might be lukewarm but as he marches ahead he will find that other nations and institutions will not wish to be left out and ignored. A positive development comes when communities, cities and provinces take steps to cut energy consumption paving the way for national responses.

A certain momentum will build until a proper meeting of World leaders is convened. A draft Protocol will be tabled and meet general approval subject to further clarification and negotiation.

The first thrust of such negotiation will be to start to try to determine Depletion Rates for the principal countries. Depletion Rate is annual production as a percentage of what is left, that being Reserves plus the Yet-to-Find. The numbers at first may be uncertain, or fall within a range, but as the calculations are made, it will soon become apparent that production does have a defined depletion profile with peak followed by decline. The data in Appendix 1 may serve as a starting point. Asking these simple questions will make the need for such a protocol entirely self-evident.

The detailed aspects of the practical implementation will need to be discussed. For example, it might be found expedient to exempt the Heavy Oils of Canada and Venezuela. Means of fair allocation to respect existing commercial rights will have to be ironed out. The wider impacts on the economy and environment will have to be addressed.

At the end of the day, the countries of the world will be invited to sign up. Not all will do so, but this need not deter those that do, for they will clearly see that they emerge better prepared than the non-signatories living in the past.

As the politician, who launched the endeavour, looks back over the months of hard work, setbacks, frustrations and rare successes, he will be able to console himself with the thought that it was a much needed job, well done. His grandchildren will come to be very proud of him, recognising how from a difficult and humble beginning he changed the course of history.

Capping resource use

*Proposal for a reduction of non-renewable energy use
within the EU*

