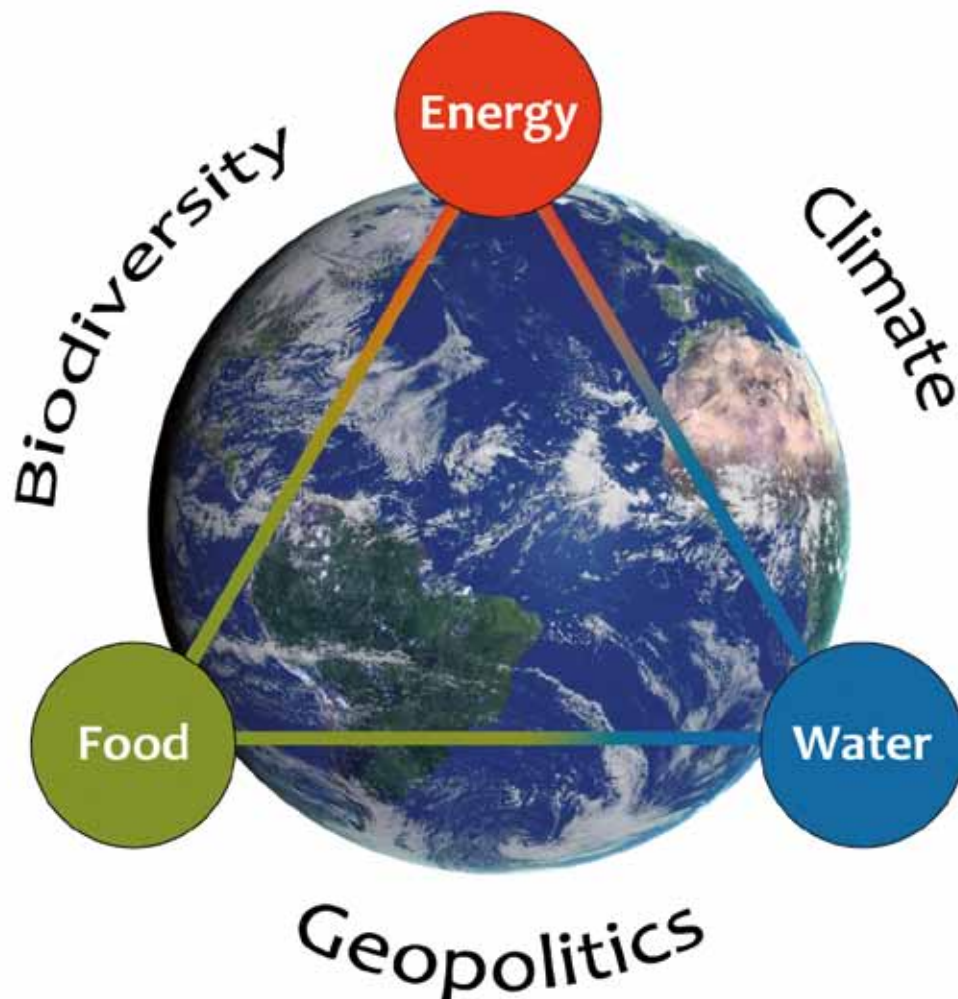


Conference Results

Enriching the Planet – Empowering Europe

The Hague, July 2010



Inhoud

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1 Conference Report and Chair's Conclusions

Enriching the Planet – Empowering Europe

Optimising the use of natural resources for a more sustainable economy

Conference Chair:
Laurens Jan Brinkhorst

Rapporteurs:
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Key conclusions drawn under the responsibility of the Chair of the Conference held in The Hague on 26 and 27 April 2010, cf.: <http://www.clingendael.nl/resource scarcity>

¹ The rapporteurs would like to thank Hannah Koutstaal, Maarten Lak, Gerrit Meester, Arnoud Passenier, Krijn Poppe, Jan Rood and Christine van Empel for their contributions to and review of this report. The final responsibility for the content lies with the rapporteurs and Chair of the seminar only.

Introduction

This report is based on presentations and discussions held at the Conference *Enriching the Planet – Empowering Europe* which was organised by the Clingendael Institute and the government of the Netherlands on 26 and 27 April 2010. The Conference focused on causes and consequences of scarcity of natural resources and on what could be done at EU level to catalyse the transition towards a more sustainable economy. About 90 participants discussed what the EU could do internally, how it could energise its sustainability agenda internationally and how it could respond to global developments and contribute to shaping global solutions. The conclusions, which where possible take the form of policy recommendations, have been distilled from the discussions between the participants, who included 3 Ministers, one EU Commissioner, senior policy-makers from various EU Member States and the European Commission, as well as distinguished experts from academia, think-tanks, the private sector and non-governmental organisations. This report can be read in conjunction with the Dutch government's report on scarcity and transition, the Clingendael discussion paper, and Conference-specific essays which were distributed to all participants in advance of the Conference.² The content of the recommendations made in this document falls under the responsibility of the Chair of the seminar and the rapporteurs. The conclusions are meant to inform policy-makers in their thinking regarding European and international discussions on scarcity of natural resources.

Scarcity of natural resources and the need for a transition to a resource-efficient economy – the EU agenda

A transition to an economy in which energy, food, water and mineral resources are used in a sustainable way so as to protect ecosystems and combat climate change and the loss of biodiversity is perhaps the biggest challenge of our time. It is crucial to start using resources much more efficiently and to consider, without delay, what could be done at EU level to catalyse the transition towards a more sustainable economy. Future claims on resources demand a paradigm shift at national, European and global level. We are all aware of the need for transition, but speeding things up proves difficult. Time is our scarcest commodity. If we want to make considerable changes before 2050, we need to start today. The changes we need to make will take time.

Resource efficiency is a cross-cutting issue which requires “umbrella” policies. Policy effectiveness (both within the EU and externally) hinges on strong cooperation between Commissioners for energy, transport, industry, trade, agriculture, fisheries, regional policy, research and foreign policy. The urgency of the upcoming food, energy, water and climate crisis in the world will force the EU Member States to deepen cooperation in all those fields by sharing knowledge, specific experience, expertise and ideas. Enhanced EU coordination will make it possible to have more influence in shaping a sustainable world economy from an ecological, economic and geopolitical perspective. If Member States fail to proceed along these lines, they will be even more dependent in the world market on resources from other states and will be confronted with higher and volatile prices – especially for energy and minerals – and have less influence in making the world more prosperous, peaceful and sustainable.

Although innovation is the key to becoming more resource efficient, in some instances it can have a rebound effect (i.e., increased use because efficiency gains lower the price). Smart measures targeted at addressing this undesirable effect, which may include fiscal measures, need to be considered. The challenge is to drastically decouple economic growth from the use of natural resources. The EU 2020 Strategy devotes attention to this issue, but could be much strengthened in this respect. For instance, it could set more criteria for measuring the efficiency of a number of resources and more explicitly include scarcity of natural resources in innovation policies directed towards substitution, recycling and the overall transition towards a more sustainable economy.

EU institutions and Member States should – from a shared vision and well-attuned strategies – move towards the development of a strong natural resources policy. The strategy should take into account the whole production and value chain and the interlinkages in the use of different resources. More specific methods for measuring resource efficiency in the product chain are still desirable. The EU is highly dependent on others for resources such as oil, neodymium and phosphates. The technologies we use today increase the pressure on rare metals and minerals. The EU needs to fully use its market power, technological know-how and creativity to innovate. It also needs to make much more use of recycling, green public procurement, pollution pricing (e.g., carbon) and sustainable waste policies (e.g., addressing the 20% of food that households currently waste).

² Cf. the report, Clingendael discussion paper and the essays:
http://www.clingendael.nl/resourcescarcity/conference_papers/

The global debate on resource scarcity

Food, water, energy and mineral scarcities can be a threat to global stability and prosperity. States and companies are searching for, securing and exploring more and more resources in politically sensitive, fragile states or in hardly accessible places. Various scarcities are closely interrelated. Energy and water scarcity can, for example, lead to a decrease in food and mineral production. Although the full interplay of such relationships is still not fully understood, the complexities should not prevent the global community and Europe from taking action.

Concurrently with growing scarcities, the global process of *shifting power relations* is shaping the global system. It is uncertain if the world is becoming more multilaterally oriented. We may be heading to a 'bipolar' era in which the US and China call the shots. The Chinese may increasingly 'own' the world instead of just producing for it. For instance, Chinese investors increasingly buy companies owning strategic intellectual property rights (IPR) instead of arguing over the rules governing IPR.

An increased perception of competition between states may lead to a scramble over resources, including land-grabbing, resource nationalism and outright conflict. Today, the rise of resource nationalism can clearly be seen in the energy and minerals sector, where sectoral trade tariffs are emerging. Export restrictions need to be addressed swiftly. Although from a European perspective, thinking about military intervention may seem undesirable, it is reviving in the US, notably in reaction to the increased Chinese military expenditure. Security considerations include the possession of and access to strategic assets, such as natural resources.

The worsening scarcities are a serious *regional threat multiplier* as they aggravate poverty, disturb international trade, finance and investment and destabilise governments. Meanwhile, climate change is expected to disproportionately affect the same fragile states and regions that are most vulnerable to scarcities. While climate change and biodiversity loss are not caused by scarcities, they operate as communicating vessels with certain aspects of scarcity, such as the lack of availability of clean fresh water and food scarcities. Despite the fact that the Stern Report and TEEB studies have made clear that ignoring climate change and biodiversity loss will be expensive,³ the market cannot solve these issues alone, and certainly not in time. Therefore, state intervention is needed to address these issues.

Concrete, *multilateral and well-attuned bilateral steps* should be taken to stabilise and adjust the global system in order to accommodate 9 billion people in 2050. With regard to the oversight over energy demand, it would help if the emerging economies would join the International Energy Agency (IEA). This may require addressing their concerns about the reporting requirements which membership of the Organisation for Economic Cooperation and Development (OECD) entails. The question remains if full IEA membership is suitable for the developing world. Temporary food scarcities could be addressed by setting up a multilateral food reserve with regional stocking facilities under the authority of a UN agency. A focal point for action should be Africa, since this continent is threatened the most by water and food scarcity and is the area where most progress can be made in sustainable agricultural production. An African 21st century green revolution, meaning considerable improvements in land and water resource management, would not only increase food availability at low cost but also render the agricultural system more sustainable and resilient to changing weather patterns. From an *economic perspective*, there is a strong plea to decouple economic activity from resource use and ecological impact. Resource efficiency benefits the economy and economic growth. Enormous efficiency gains can be made throughout the life cycle of products, more specifically in design, production and distribution. Furthermore, recycling is an economic opportunity. As an indirect result, resource efficiency would lessen the ecological effects of the economy. Gradual pricing policies are considered a suitable tool to push the economy towards resource efficiency. Moreover, such policies would circumvent the rebound effect which would otherwise level off efficiency gains. For instance, fossil fuels, water and minerals could be priced in such a way as to trigger investment and innovation. If global consensus is not reached, pricing policies may be promoted best by a coalition of the willing. For such a coalition the EU should not automatically look to the West. To deal with resource scarcity, alliances with Eastern and Southern partners may be just as or even more useful.

³ Nicholas Stern (2006), *The Economics of Climate Change*. The Stern Review (Cambridge University Press). TEEB Report for Policy Makers (2009), *Responding to the Value of Nature*, The Economics of Ecosystems and Biodiversity Reports.

How should the EU tackle resource scarcity internally?

The EU can grasp the opportunity of green economic growth. The train called economic growth is heading to the next station and Europe can still jump on board. If no action is undertaken, decline lies ahead. Some multinational corporations are already making the shift to sustainable production and fair trade and use their buying power to set new – green and fair – rules. They are convinced that this is the only way to survive in the future global economy and global information society. The shift is coherent with the EU aim to be a more resilient economy, which is evident in the broad objectives and targets set in the EU 2020 Strategy. In order to achieve this aim, it is now necessary to develop concrete proposals within the flagship project on resource efficiency. Impact assessments and flexible strategies sharpen the focus and effectiveness of our policies. Nonetheless, the EU takes too few decisions and concrete measures to operationalise its reflections and visions.

The EU has a chance to persevere in the development of green growth policies. It can gain through further resource efficiency. Strong sustainable materials management (through technological innovation and new and better markets for recycled materials) is necessary, and the sooner we have it, the sooner we can benefit from it. Furthermore, the EU can develop certain green-based industrial policies for promising sectors. Enhanced cooperation between (a limited number of) Member States is an opportunity to move ahead in one or two carefully selected sectors. A more well-attuned energy policy in the EU is necessary, not only to use our negotiating power more effectively, but also to align investments in the transition to sustainable energy production and to adjust our energy infrastructure accordingly. An option could be to develop a European gas agency. Enhanced cooperation could also contribute to reconciling our differing visions regarding the internal market.

Progress in the innovation in agricultural production offers the greatest chance to counteract food, water and energy scarcity. Agricultural land used for biofuels may be detrimental to food and water availability. Land and water resources are to be used more efficiently. Increased agricultural production may conflict with biodiversity and climate objectives. The efficiency of the protein level of products could be improved. Beef is often referred to as being unsustainable, but it could be argued that cattle production is better for biodiversity in comparison with, for instance, chicken production. This aspect is to be taken into account in the debate on a possible pricing mechanism for meat. There are chances of higher productivity

by combining bio- and nano-technological knowledge in Western European countries such as the Netherlands, with the potential to intensify agriculture in Eastern Europe. Therefore, agriculture in the EU should move towards new strategies on technology transfer and investment within the EU. More research could also be done to address technological uncertainties and on the societal acceptance of new technologies.

Because of the EU's imports and exports and its stable climate conditions, the EU itself will not face food shortages. However, it has a major global role to play in the field of research and development. Here, the EU can advance even further by deciding on subsidies that support sustainable innovations. Food is also an excellent starting point for learning to manage interlinkages between scarcities (food, water, energy, biodiversity, phosphate) in relation to climate and geopolitics. A positive example of sustainable agriculture is the recent initiative for a Round Table on Sustainable Soy.

Global realities also require adjustments in trade policies. There is a need for a more open food system in both Europe (reforming the CAP) and globally (finding agreement in the WTO Doha Development Round). It should be realised that the trade system has never been fully open and is unlikely to be so in the near future. Least Developed Countries may be well advised to kick-start growth by stimulating production through an agricultural policy. The WTO should accommodate the debate on how interventionist policies related to environmental or public goods objectives are to be balanced against the free trade objective. In some cases, rules may need to be relaxed.

A politically strategic choice is whether the EU should produce more for the Middle East and/or North Africa to address future food shortages in these regions, which could be linked to a policy to reduce political tensions. Another sensitive issue is whether Genetically Modified Organisms (GMOs), which are already used in other parts of the world, should eventually also be allowed within the EU, as is advocated by a number of EU Member States. This would also have positive effects globally since many developing countries consider it as a constraint not to be able to use GMOs because this would jeopardise exports to the EU.

With regard to *minerals*, a strong and more energetic follow-up to the Raw Materials Initiative is needed. This would require resolute cooperation between DG Trade, DG Enterprise, DG Environment and other DGs to solve inter-related issues. The initiative should contain:

- Incentives for investments to develop more knowledge about the interlinkages between minerals, energy and water use, and about the availability, substitution

possibilities, recovery costs and efficiency gains of raw materials.

- An increase in the capacity of EU-level monitoring in order to analyse the speed of depletion of minerals (listing, projections/foresights).
- The development of more knowledge about the inter-linkages between minerals and (renewable) energy, water and food, and thorough impact assessments of the choices to be made for the transition to sustainable energy and food systems.
- Market incentives to stimulate the recycling of minerals (creating the business case).
- On a global level, the EU should advance its two-tier approach, which consists of WTO talks and continued dialogue between EU and resource-rich countries.

In the field of *energy*, there are three underlying EU objectives: competitiveness, energy security and sustainability. As these goals are not always compatible, the EU has to set priorities. A more coherent external energy strategy is needed but hard to formulate because of the diversity in EU Member States' interests. Although progress has been made in this field, the best way to continue the EU's energy policy is to focus first on the internal market by strengthening market integration. Eventually, a well-attuned internal energy policy will help to phase out the differences and lead to a coherent, external EU energy policy. However, it may come about only at a time when the power of the OECD countries to set energy standards has decreased. Internally, subsidies for fossil fuels, which are still given by a number of EU Member States, need to be abolished as soon as possible.

Within the EU's research policy, more priority should be given to the issue of resource scarcities and resource efficiency. A good option would be to include it in the joint programming between the EU and the Member States. Specific attention for resource scarcity and efficiency could also be included in the proposals for the 8th Framework Programme for Research.

What should the EU do externally?

The EU is responsible for about 16% of the global environmental footprint. It has to anticipate and react to a different global situation in which access to and an efficient and sustainable use of resources are essential. Therefore, the EU needs a global plan for governance which should be coupled to the EU's and Member States' diplomacy and intensified regulatory cooperation. Economic, security and environmental considerations regarding the scarcities of energy, food, water and strategic raw materials have to be incorporated into EU foreign policy. In this respect, scepticism regarding the EU's capacity to act internationally has to be overcome, in spite of uncertainties surrounding the implementation of the Lisbon Treaty. The external pressure for a more coherent EU policy will force the Member States also to engage in strong strategic cooperation within the EU as internal and external policies are interlinked.

The food and energy price crisis has had more than one cause and clearly shows that the EU has limited controlling power over the global system. Therefore, more strategies and forward-looking orientation are needed. One fundamental element of the EU strategy could be the revival and strengthening of multilateral institutions that address resource scarcity issues. Different coalition options should be examined regarding specific scarcity-related issues. The EU should not automatically look to the US, but also to Russia, the Near East, India and Northern Africa. It can also seek to strengthen its cooperation with a country like Brazil, which wants to combine policies against climate change with policies to create economic growth. The Rio+20 Summit may be an opportunity to team up.

The EU needs greater cohesion in its policies to deal with the enormous challenges of the changing geopolitical situation coupled with resource scarcities and climate change. The practice has been that input comes from specific departments within ministries, each concerned with their particular policy area and not always best equipped to find out about the positions of other countries. In this respect, the European External Action Service (EEAS) may help to fill the 'diplomacy gap', as it is not just a simple outreach representing the EU's own positions, but would also make it possible to take account of interests of others. More importantly, ministerial departments of the Member States and Heads of Government – the European Council – need to develop collectively supported strategies upon which the EEAS can act.



CF

2 Clingendael Conference Paper

Enriching the Planet – Empowering Europe

Optimising the use of natural resources for a more sustainable economy

Authors:

Louise van Schaik, Jan Rood, Kees Homan and Barend van Wonderen

Clingendael Discussion Paper for the Conference held on 26 and 27 April 2010 in The Hague, cf.:
<http://www.clingendael.nl/resource scarcity>

Introduction

A transition to an economy in which energy, food, water and mineral resources are used in a sustainable way so as to protect ecosystems and combat climate change and loss of biodiversity is perhaps the biggest challenge of our time. The EU has traditionally been at the forefront of the debate on sustainable management of natural resources. There is a Raw Materials Strategy and a Strategy on Natural Resources. Furthermore, resource scarcity is related to the discussions on, *inter alia*, the EU 2020 Strategy, the Sustainable Development Strategy, the Energy Policy, the European Security Strategy and the Reform of the Common Agricultural Policy.

This paper is meant to give a succinct overview of most of the issues that will be discussed at the conference 'Enriching the Planet – Empowering Europe'. This conference is organised by the Clingendael Institute, in close cooperation with the government of the Netherlands, on 26 and 27 April in The Hague. In line with the conference programme, this paper will focus on the international debate on scarcity and transition, global governance options and the EU's internal and external policies related to the scarcity of natural resources. In our analysis we assume that more European cooperation and action is required to address the issue of scarcity of national resources, in addition to national initiatives. Competition between EU Member States should be avoided since the European economy is highly integrated. Besides, more cooperation on the global scene would, either way relieve the pressure on natural resources and the geopolitical tensions that may arise from these pressures.

At the conference and in this paper, our objective is to look at the issue of natural resource scarcity from an environmental, economic and geopolitical perspective. Sometimes, these perspectives may be at odds with each other. A short-term economic interest in securing access to natural resources may, for instance, contradict with the objective of stability in poorer resource-rich countries and the sustainable management of resources. Nevertheless, in the longer term, sustainable management and stability are considered essential for the EU's competitive position in a multipolar world and for the economic growth agenda. The challenge is to balance the various objectives in decisions on policy measures and to aim at identifying those options which integrate the three perspectives.

In addition to this paper, short essays are published covering specific issues dealt with in the conference programme, such as energy, food and minerals scarcity, inter-

linkages between scarcities, and future prospects.⁴ On the basis of this input and the discussions at the conference, 'Chair's Conclusions' identify possible options regarding EU action to address policy issues arising from scarcity of natural resources. These could be relevant to ongoing policy processes and related events that are on the agenda for the coming months and are listed in Annex I. Questions formulated in this paper have the purpose of providing a focus for the discussions at the conference with the intent to arrive at inspiring Conclusions.

The international debate on resource scarcity

It is predicted that by 2030, as a result of a further growth of the world population and of economic development, the world will need to produce around 50 per cent more food and energy, together with 30 per cent more fresh water, whilst mitigating and adapting to climate change and the risk of an increasing loss of biodiversity.⁵ Scarcities of food, water, energy and minerals emerge within a global context of changing geopolitical relations. Most often, the issue is not the depletion of resources, but rather a lack of access to them, which may be attributed to deficiencies in distribution and asymmetrical dependencies. Against this background, increasing scarcity of natural resources may cause greater mutual mistrust between states and regions and carries the risk of protectionism and resource nationalism.⁶ It may even lead to conflicts about scarce resources.⁷ Moreover, because of the unbalanced dependencies, some parts of the world are more vulnerable to scarcities than others, and competition may occur over, for instance, land resources in developing countries (the so-called phenomenon of 'land-grabbing'). This is at odds with the need for greater mutual trust, more cooperation and global agreements which could ensure the sustainable use of natural resources in the future.

⁴ Please visit the conference website for an overview of the essays: <http://www.clingendael.nl/resource scarcity>

⁵ J. Beddington (2009), *Food, Energy, Water and the Climate: a Perfect Storm of Global Events?*, Government Office for Science, London, p. 1.

⁶ For instance, over the last decade, transnational corporations have lost ground to state-owned companies. I. Bremmer and R. Johnston (2009), 'The Rise and Fall of Resource Nationalism', *Survival*, Vol. 51 no. 2, April-May 2009, p. 149; and M.T. Klare (2008), *Rising Powers, Shrinking Planet, The New Geopolitics of Energy*, New York, Henry Holt & Company.

⁷ See M.T. Klare (2002), *Resource Wars – The New Landscape of Global Conflict*, Henry Holt and Company, New York, pp. 289.

The various scarcities and their causes present many similarities and interlinkages. Therefore, an integrated approach is called for to enable a transition to a sustainable world economy and society. For instance, an increased share of animal products in the global diet, coupled with an already growing demand for food, will exponentially increase land and phosphate requirements for food production.⁸ These resource *linkages* can severely constrain potential solutions.⁹ Because all major resource categories are somehow challenged, a quantitative understanding of the complexity of scarcities, their interrelations and how they can be managed is required to explore the pathways towards sustainable development.

In the meantime, *climate change* has appeared as a new phenomenon on the resources agenda, which already included other pollution issues. Unabated climate change can induce degradation of freshwater resources, decline in food production, increase in storm and flood disasters, and environmentally induced migration. Climate change is considered as a threat to global security.¹⁰ The former High Representative and the European Commission perceive climate change as a threat multiplier which exacerbates existing trends, tensions and thereby worldwide instability.¹¹ They consider conflict over resources as a type of conflict driven by climate change. The overall effect is that climate change can fuel existing conflicts over depleting resources, especially where access to those resources is politicised.

Questions for discussion at the conference:

- What are the largest political risks regarding geopolitical, economic and ecological aspects of the resource scarcity issue?
- In what areas is there still a need to improve our understanding of the effects of resource scarcities and linkages between them? What measures could be taken to improve the functioning of resource markets so as to lower prices and increase access, without harming the environment?

The international debate on the need for transitions

There is a growing awareness that in order to do more with limited resources, transitions are required, i.e., fundamental long-term changes to systems to reduce and help control the problem of the complex of scarcities.¹² However, there are many obstacles hampering such changes. To cope with the challenge of these transitions, solutions can primarily be found in the areas of technological innovation and in changes in consumer and producer behaviour, production systems and the market. Important questions in this regard are to what extent the market forces will do the job, i.e., an increase in prices will reduce demand and stimulate the use of alternatives and of technological innovation, and to what extent government action – on both a national and international scale – is needed to bring about transitions. In this regard it may be useful to look at innovative methods and other ideas that have been applied elsewhere (e.g., in the IT sector). In doing so, it is important to acquire a clear insight not only into the links between different scarcities, but also into the underlying mechanisms which may hamper transitions (such as the wrong market incentives, lock-ins in policy, an unfriendly innovation climate or protectionist conservation policies). Successful strategies should make use of the innovative power of people, groups, companies and institutions. One also has to keep in mind that transitions call for considerable policy change, often going one step at a time, as system changes tend to affect large, established interests. New stakeholders may need to be supported to experiment and to contribute to regime shifts.

⁸ J. Bakkes, et al. (2009), *Getting into the Right Lane for 2050: A Primer for EU Debate*, Bilthoven, Netherlands Environmental Assessment Agency and Stockholm Resilience Centre.

⁹ See E. van der Voet and T.E. Graedel (2009), 'The Emerging Importance of Linkages', in T.E. Graedel and E. van der Voet (eds.), *Linkages of Sustainability*, Strüngmann Forum Reports, November 2009, pp. 1-11. The Netherlands Environmental Assessment Agency (PBL) conducts outlook studies, analyses and evaluations in this field, in which an integrated approach is paramount.

¹⁰ See *World in Transition: Climate Change as a Security Risk*, Global Advisory Council on Global Change (WBGU), Summary for Policy-Makers, Berlin, 29 May 2007, pp. 2-3; and J. Mazo (2010), *Climate Conflict, How Global Warming Threatens Security and What to Do About It*, The International Institute for Strategic Studies, London, pp. 166.

¹¹ *Climate Change and International Security*, Paper from the High Representative and the European Commission to the European Council, S113/08, Brussels, 14 March 2008, pp. 2.

¹² See for different perspectives on scarcity, *Scarcity and Transition, Research Questions for Future Policy* (2009), Ministry of Foreign Affairs and Ministry of Housing, Spatial Planning and the Environment, The Hague, p. 17.

Roughly speaking, transitions are conceivable in three areas:

- New technologies that deliver greater efficiency, recycling and higher productivity (e.g., cleaner cars or precision fertilisation or biotechnology);
- New technologies that lead to substitution (e.g., renewable energy or green chemistry based on agriculture); and
- Changes in institutional or consumer behaviour (e.g., driving less, eating less meat, reducing food losses and waste).

It is clear that the management of our natural resources has become an urgent issue at national, regional and international level. There is growing interest in a global resource management regime among both politicians and the business community. A road map for developing global resource management could encompass resource-rich developing countries as the target group (through 'resource funds'), bi- and multilateral cooperation ('resources for development' programmes) and governments and the corporate sector ('increasing resource productivity'). Transparency and standards are identified as overarching elements. Transparency of payments and revenues is an important goal of good governance. An example is the Extractive Industries Transparency Initiative (EITI), which is supported by the EU.¹³ Appropriate sustainability standards and certification applicable to end products and raw materials should also be developed and implemented throughout the whole life cycle of consumer products.

In the literature on scarcity issues, there is a certain tendency to use the concept *public goods* when talking of scarcity of energy, water, food or other scarce resources.¹⁴ It seems, though, that these issues, precisely because they are scarce, do not fully meet the criteria of a public good. People or countries can be *excluded* from the access to and use of these items, although from a human rights perspective this is impermissible. Moreover, they also lack the element of *non-rivalry*, i.e., in the case of scarcity, consumption by one actor reduces the overall availability of the specific item. In other words, as far as energy, food, etc., could be analysed in terms of public goods, they should certainly not be considered as *pure* public goods.¹⁵ At best,

they could be considered common-pool resources that have similar management problems as public goods.

Due to their (potential) scarcity, there is a substantial risk of negative externalities in the case of the access to and consumption of food, energy and other resources, resulting in rivalry, conflicts, asymmetric interdependencies and a sharpening of divisions between rich and poor in the world. This underlines the need for collective action regarding the access to and use of scarce resources. This becomes even more prominent in the light of the linkages between the usage of natural resources, on the one hand, and issues such as climate change and biodiversity, i.e., the issue of sustainability, on the other. There is consensus in the literature that due to the anarchic nature of the international system, and in accordance with the logic of the tragedy of the commons, this collective action will not emerge spontaneously. It needs to be organised.¹⁶

Questions for discussion at the conference:

- What transitions are needed and how could they be catalysed?
- How can insights into resource scarcity be better integrated into policy-making practice that aims at promoting transition?

The quest for a global framework of governance

In the past decades, various efforts have been made within the framework of the system of multilateral governance to establish fora for consultation and cooperation concerning water, energy, food, minerals and other natural resources. Often, EU Member States have been the driving force behind these efforts. One of the reasons for this is of course that the EU is very much dependent on the import of, inter alia, energy and a number of (precious) metals and minerals. Whether the international community will be successful in dealing with resource scarcity-related issues will heavily depend on the kind of international system that will be in place. In view of the shifts that are taking place in the international power relationships, the ongoing crisis of the multilateral system and the highly complex international agenda, it is difficult to predict what kind of international system will emerge. However, it is obvious that in terms of scenarios, the required level of global governance will be much more difficult to attain

¹³ R. Bleischwitz and S. Bringezu (2007), *Global Resource Management, Conflict Potential and Characteristics of a Global Governance Regime*, Policy Paper 27, Development and Peace Foundation, Bonn, pp. 6-7

¹⁴ G. Hardin (1968), 'The Tragedy of the Commons', *Science*, Vol. 162 No. 3859, pp. 1243-1248; E. Ostrom, T. Dietz, N. Dolzak, P. Strom, S. Stonich and E. Weber, eds. (2002), *The Drama of the Commons*, National Academy Press, Washington.

¹⁵ See, *inter alia*, D. Long and F. Woolley (2009), 'Global Public Goods: Critique of a UN Discourse', in: *Global Governance* 15, pp. 107-122.

¹⁶ See various contributions for a discussion of the link between governance and sustainability: W.N. Adler and A. Jordan (eds.) (2009), *Governing Sustainability*, Cambridge, Cambridge University Press.

in a multipolar scenario or in a scenario of disintegration and competing blocs, than in a multilateral scenario (see Figure 1).

Figure 1 – Four scenarios for global governance

		States	
Uncooperative	Multipolar:	<ul style="list-style-type: none"> • Superpowers and power blocs • Economic and political competition • Protectionism 	Multilateral:
	Fragmentation:	<ul style="list-style-type: none"> • Stagnation of the globalisation process • Societies become less safe • Identity is paramount 	<ul style="list-style-type: none"> • West in strong position; emergence of BRIC countries • Reform of global governance • Ongoing globalisation
		Various actors	
		Network:	Cooperative
		<ul style="list-style-type: none"> • Non-polar world order • Global market economy and civil society • Inherent unpredictability 	

Source: Inter-ministerial project *Scarcity and Transition*, The Hague, 2010.

With regard to the existing framework of multilateral governance on scarcity issues, the dominant view is that the global players are too fragmented to be effective and that the governance system currently in place insufficiently reflects the emerging power relationships. Only in matters of food and climate policies are there global and more or less permanent frameworks for consultation and cooperation. In particular the FAO has, in response to the Millennium Development Goals, made an effort to develop an integrated approach to the risk of food scarcity by linking sustainable agricultural development to issues of water, food security, climate change, biodiversity and bio-energy. Within the context of the UN Framework Convention on Climate Change (UNFCCC), agreements to reduce emissions and to adapt to climate change have been concluded (*inter alia*, the Kyoto Protocol and the Copenhagen Accord). In the case of biodiversity, the Convention on Biological Diversity stipulates that the conservation of biodiversity is a 'common concern to humankind', but it lacks legal instruments for nature preservation.

As regards other scarcity issues, the overall picture is more dispersed and fragmented. The World Water Forum meets once every three years to discuss water scarcity issues and other water-related concerns. In September 2010, water scarcity will moreover be discussed during the World Water Week in Stockholm. Regarding energy, only for nuclear energy does a global forum exist, the IAEA. Various groups of producers and exporters (OPEC and GECF) and OECD countries that constitute a group of importers (IEA) have assembled themselves. Within the IEA, a mechanism has been agreed upon for the stocking of oil (the require-

ment to keep a reserve for 90 days of oil consumption). In addition, various UN agencies are directly or indirectly involved in issues concerning scarcity but often lack the necessary competences and means. In 2007, UNEP established a panel on sustainable resource management whose main objective is to assess the environmental impact of natural resources (*inter alia*, biofuels and metals). This panel mainly focuses on the environmental dimension of the extraction and usage of potentially scarce resources. Other multilateral organisations, like the WTO, World Bank and IMF, are to some extent involved in issues of scarcity as well. The WTO in particular is paying more attention to trade in non-renewable resources, notably the impact of export restrictions, the existence of producers' cartels and the impact of governments or state-related agencies on trade in natural resources.¹⁷ The WTO will devote its World Trade Report 2010 to trade in natural resources. It is also involved where it concerns trade in food, focusing on liberalisation of markets.

One could envisage the G-20 or UN General Assembly discussing economic, ecological and geopolitical dimensions of scarcity of natural resources. This would be most useful if such discussions were linked to organisational structures that would secure implementation (i.e., involving a delegation of tasks to the FAO, IEA, UNEP, WTO and World Bank).

The segmented and rather weak international governance infrastructure for the issue of natural resource scarcity reflects the state of the multilateral system in general. The most significant problems include:

1. The non-existence of rules or mechanisms to deal with a number of important scarcities. Only in the case of food does the FAO offer, on a global level, a forum for consultation and cooperation.
2. A lack of an effective toolbox to deal with issues concerning scarcity, in particular where it concerns agreeing on binding rules and ensuring compliance with these rules.
3. A lack of an integrated approach towards the issue of scarcity. Such an approach is pivotal in view of the linkages between scarcities and the geopolitical relations in the world.

¹⁷ P. Collier and A.J. Venables (2010), *International Rules for Trade in Natural Resources*, WTO, Staff Working Paper ERSD-2010-6 (January 2010); regarding the WTO and trade in energy: G. Marceau (2010), 'The WTO in the Emerging Energy Governance Debate', in: *Global Trade and Customs Journal*, Vol. 5 (2010)3, pp. 83-93.

In search of appropriate global governance structures

The question is to what extent an integrated approach towards scarcity and transition is possible and what governance options could be envisaged. Important factors in this regard are:

1. The level at which measures need to be taken. To what extent is a global approach – i.e., the creation of global institutions and rules – feasible and appropriate? Taking into account the often regional or local and very diverse nature of the effects and causes of scarcity, and the very different views of countries regarding the preferred solutions, a more pragmatic and partial process of governance could be more effective as well as legitimate. This would also be in accordance with the principle of subsidiarity.
2. The governance modes/instruments to be applied. To what extent should rule-based (binding) approaches be preferred (within the framework of the WTO), or are market forces an appropriate tool to deal with specific issues of scarcity and transition?
3. The actors to be involved. It is clear that the issue of scarcity and of the transition to a more sustainable economy requires the participation of a wide range of non-governmental stakeholders. An important question in this regard is how inclusive the process of (global) governance should be and how it is to be organised in order to guarantee the involvement of the various stakeholders.
4. The role of the EU in the process of (global) governance and scarcity. As an important consumer of scarce resources, the EU claims a leading role regarding issues of scarcity. To what extent can the EU play a leading role in this area?

In academic and policy circles a number of recommendations have been made to improve global governance on scarcity issues. They focus in particular on the need to raise the level of awareness regarding the urgency of scarcity-related problems. These recommendations are the following:¹⁸

- Build shared awareness at the highest political level – through heads of government and international agencies spending more time together, but less of it in highly formal, choreographed interactions.
- Move from part-time sherpas to virtual secretariats in processes to prepare summit agendas, with the underlying objective of creating more ‘bandwidth’ for develop-

ing shared ideas and joint options to go to the political leaders’ level.

- Work towards a culture of interoperability – not just at political leaders’ level, but throughout governments and international agencies, both within and across them, through a culture of secondments and joint exercises, such as scenario building.
- Establish joint scientific research programmes and intensify international cooperation on research on scarcity issues. For instance, the production of a World Resources Outlook could be considered. There are already World Outlook reports on energy, food, water and (through the IPCC) climate change – but there is no report that connects the dots between them. Commissioning one would force relevant agencies to work together, and potentially open political space and drive policy development.

With regard to a global governance regime for the management of the world’s natural resources, three options have been proposed as put forward by Bleischwitz and Bringezu:¹⁹

1. International Panel for Sustainable Resource Management. This idea has already been put into practice through the establishment of the UNEP Resource Panel in 2008. The road map for the establishment of this Panel was agreed on the initiative of the European Commission;
2. International convention on sustainable resource management. In the longer term, an internationally legally binding convention on sustainable resource management may be required;
3. International agency for sustainable resource management. An international agency for sustainable resource management may be necessary to ensure that the agreed tasks can be performed effectively and sustainably.

Questions for discussion at the conference:

- What international governance arrangements are needed to promote the transition to sustainable management of natural resources?
- How can non-governmental organisations and the private sector be involved in the search for appropriate global governance arrangements?
- Is there a need for a new overarching global framework in order to guarantee an integrated approach towards the issue of scarcity and the transition to a sustainable use of resources, as has been advocated by some?

¹⁸ A. Evans and D. Stevens (2008), ‘Towards a Theory of Influence for Twenty-First Century Foreign Policy: Public Diplomacy in a Globalised World’, in: *Engagement: Public Diplomacy in a Globalised World*, Foreign & Commonwealth Office.

¹⁹ R. Bleischwitz and S. Bringezu (2007), *Global Resource Management, Conflict Potential and Characteristics of a Global Governance Regime*, Policy Paper 27, Development and Peace Foundation, Bonn, p. 9.

Resource scarcity and EU policy debates

This section discusses major ongoing EU policy debates and how they relate to the issue of resource scarcity and transition. At the moment, the EU's role is dispersed while its policies and legislation depend on a wide range of competences.

The issue of natural resources is related to various objectives and competences defined in the Treaty on European Union (TEU) and the Treaty on the Functioning of the Union (TFU). With regard to food, the objectives of the Common Agricultural Policy (CAP) include the availability of supplies and a reasonable price for consumers.²⁰ The Lisbon Treaty has introduced co-decision powers for the European Parliament on agricultural measures, which may lead to a change of focus in adopted measures. The EU's industrial policy aims to secure conditions necessary for the competitiveness of the Union's industry.²¹ The objective of a 'prudent and rational utilisation of natural resources' is part of the environment chapter of the TFU.²² Member States have been sensitive about their competences regarding energy, water and land resources. Through Article 192 TFU, they have secured their national veto over EU measures on these resources and have excluded decision-making powers of the European Parliament. Promoting energy efficiency, renewable energy and security of energy supply in the Union are objectives laid down in the chapter on energy.²³ Furthermore, the general EU provision on the possibility of establishing principles and setting conditions for services of general economic interest, and of providing, commissioning or funding such services, may have relevance for natural resources as well.²⁴

The EU has the objective and the competence to protect the environment through sustainable management of natural resources, to secure food and energy availability and to secure its competitive position. However, when it comes to real competence in the area of energy, land and water resources, national vetoes impede the swift adoption of new measures.²⁵ Member States may still be willing to watch over the availability and sustainable use of these resources without common EU policies, but are probably less concerned with cross-border effects. Below, we will

first introduce the issue of resource scarcity in relation to overarching EU policies and subsequently look at more specific EU policy measures.

The link between resource scarcity and overarching EU strategies

In the *Europe 2020 Strategy*, as proposed by the European Commission in March 2010, the issue of resource scarcity takes a prominent position.²⁶ Pressure on natural resources is identified as one of the three long-term challenges confronting the EU, the others being globalisation and aging. One of the seven flagship initiatives is 'Resource-Efficient Europe', which aims at decoupling economic growth from the availability of resources. The Commission's proposal reiterates the climate and renewable energy targets which were implemented through legislation agreed upon in 2008. In the initiative reference is made to the broader issue of natural resource protection and Europe's dependency on raw materials from abroad, but these issues are not yet translated into indicators. Perhaps this is an issue that could be included in the June European Summit when the indicators will be on the agenda. In the framework of the Europe 2020 Strategy, strategic initiatives will be developed through internal coordination, supported by inter-departmental working groups.

The *EU Sustainable Development Strategy* is another horizontal EU strategy, which was developed in 2001, renewed in 2006, reported on in 2007 and reviewed in 2009.²⁷ The SDS considers climate change and clean energy, sustainable transport, sustainable consumption and production and the conservation and management of natural resources as key EU challenges. In December 2009, the European Council stated that the SDS would continue to provide a long-term vision and constitute the overarching policy framework for all Union policies and strategies.²⁸

There have been ideas to merge the SDS strategy and the Lisbon Strategy into the new Europe 2020 Strategy, as it has always remained rather unclear how the two strategies are related and which of them will take precedence in case of conflicting objectives. This is problematic since both the SDS and the Lisbon Strategy were presented as

²⁰ Article 39:1d-e, TFU.

²¹ Article 173:1, TFU.

²² Article 191:1, TFU.

²³ Article 192, TFU.

²⁴ Article 14, TFU.

²⁵ L.G. Van Schaik, M.T.J. Kok and A.C. Petersen (2009), 'Adapting EU Governance for a More Sustainable Future', background paper to *Getting into the Right Lane for 2050*, Clingendael Institute and Netherlands Environmental Assessment Agency.

²⁶ European Commission Communication, *Europe 2020: A strategy for smart, sustainable and inclusive growth*, COM(2010) 2020.

²⁷ Council of the European Union, *Review of the EU Sustainable Development Strategy*, No. 10917/06, 26 June 2006; Commission Staff Working Document, *Progress Report on the European Union sustainable development strategy*, COM(2007) 1416; European Commission Communication, *Mainstreaming sustainable development into EU policies: 2009 Review of the European Union Strategy for Sustainable Development*, COM(2009) 400.

²⁸ European Council Conclusions, 10/11 December 2009, EUCO 6/09.

'cross-cutting' strategies. From this perspective, it is noteworthy that the concepts of 'sustainability' and 'resource efficiency' take a prominent place in the EU 2020 Strategy. At the same time, 'environmentalists' still seem to prefer a continuation of the SDS, which implies that the ambiguity between the two strategies, representing, respectively, the EU's economic and environmental agenda, is still unsolved. In the Commission Working Programme of 2010, a revision of the SDS is not foreseen. The Region of Flanders, on behalf of the Belgian EU Presidency, will devote an event to the issue of sustainable development in October 2010.

The issue of resource scarcity, notably food scarcity, plays a role in the debate on the *reform of the Common Agricultural Policy*. Securing a sufficient supply of food for the European population was one of the main reasons why the CAP was created in the aftermath of the Second World War. Today's debate on CAP reform focuses on phasing out subsidies, thereby decoupling subsidies and production, and shifting funds to rural development and nature conservation. The idea is to further liberalise the market and to provide more direct income support to farmers.²⁹

There are various linkages between the issue of resource scarcity and CAP reform. First of all, the CAP influences global food availability and food prices, as well as land use in third countries. These issues are discussed below in the section on the EU's external policies. Secondly, agricultural production requires large amounts of water and minerals (i.e., fertilisers which include phosphate³⁰). This can pose a threat to biodiversity and may cause soil degradation jeopardising future food production. Phosphate availability is limited and is concentrated in very few countries, which may cause political tensions. Thirdly, agriculture is related to climate change, which changes the environmental circumstances for food production. Moreover, the production of biofuels, which is seen as an alternative to oil, is considered a competitor of food production.³¹ Recently, EU Environment Commissioner Potočník suggested that the EU should head to an integrated Common Agricultural and Environmental Policy, stressing the necessity of profoundly

greening the CAP.³² Further reform of the CAP in the direction of environmental objectives and the preservation of rural public goods has also been argued for in various studies.³³ Fourthly, although severe food shortages no longer exist in the EU, there is still a debate over availability and prices of food within the EU. A focus on food security and prices could be used to justify a continued focus on low-cost production of agricultural products within the EU. There are still large increases in resource efficiency in European agriculture. Notably in Central and Eastern Europe there is still scope for production increases.³⁴

In summary, the debate on CAP reform involves arguments of those focusing on the agricultural contribution of the farm sector and of those focusing on its environmental contribution. Proponents of the agricultural viewpoint argue for a continuation of product subsidies in order to, *inter alia*, ensure food security within Europe. Proponents of the environmental viewpoint prefer the CAP to subsidise rural and ecological services with a view to managing resources, such as water, land and minerals in a sustainable way. In addition, some call for an economic perspective with increased liberalisation in order to improve the functioning of the food market.

The debate on CAP reform has recently intensified as the Commission is expected to submit its legislative proposals on the post-2013 CAP regime in the second half of 2010. In its Work Programme 2010, the Commission declares that 'a sustainable, productive and competitive agriculture can make an important contribution to the Europe 2020 Strategy, while guaranteeing food security'. Its proposals will be closely linked to the debate on the EU's budget, which will result in a proposal for a new Multiannual

²⁹ A. Oskam, G. Meester and H. Silvis (eds.) (2010), *EU Policy for Agriculture, Food and Rural Areas*, Wageningen Academic Publishers, available at <http://www.wageningenacademic.com/eupolicy>.

³⁰ *Scarcity and transition – Research questions for future policy* (2010), Report of an inter-ministerial project group on 'scarcity and transition' of the government of the Netherlands.

³¹ A. Evans (2009), *The Feeding of the Nine Billion*, The Royal Institute of International Affairs, Chatham House, London, pp. 24–27.

³² European Commissioner for Environment Janez Potočník, 'Can the CAP Bring Considerable Benefits to Our Environment?', speech at the 3rd Forum for the Future of Agriculture, Brussels, 16 March 2010. Last visited on 2 April 2010 at <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/10/99&format=DOC&aged=0&language=EN&guiLanguage=en>. Euractiv, 17 March 2010, 'Potočník Calls for 'Profound Greening' of EU Farm Policies, last visited on 29 March 2010 at <http://www.euractiv.com/en/cap/ffa-2010-news-348530>.

³³ T. Cooper, K. Hart and D. Baldock (2009), 'Provision of Public Goods through Agriculture in the European Union', *Institute for European Environmental Policy*, last visited on 29 March 2010 at http://ec.europa.eu/agriculture/analysis/external/public-goods/report_en.pdf, pp. 14; J.-Ch. Bureau and L.-P. Mahé (2008), 'CAP Reform beyond 2013: An Idea for a Longer View', *Notre Europe*, last visited on 29 March 2010 at http://www.notre-europe.eu/uploads/tx_publication/Etude64-CAP-Propositions-EN_01.pdf, pp. 13–14.

³⁴ N.B.J. Koning, et al. (2008), 'Long-term Global Availability of Food: Continued Abundance or New Scarcity?', *NJAS Wageningen Journal of Life Sciences* 55(3), pp. 229–292.

Financial Framework.³⁵ A renewed CAP is due to enter into operation in 2014.

Attention for the issue of resource scarcity is also increasing in the EU's *research policy* agenda, to which an ever-increasing share of the EU's budget is devoted (about one third). Most of the funds are disbursed through the 7th Framework Programme (FP7). FP7 runs from 2007 until 2013 with a budget of €7217 million per annum, i.e., €50,521 million in total.³⁶ Across all these themes, support for transnational cooperation will be implemented through collaborative research, joint technology initiatives, coordination of non-Community research programmes and international cooperation. Research is, *inter alia*, conducted on the subjects of Food and Agriculture (€1935 million), Energy (€2350 million) and Environment (€1890 million). Regarding the activities under the heading of Environment, special attention goes to climate change and the sustainable management of resources.³⁷ A specific FP7-related initiative is the European Technology Platform on Sustainable Mineral Resources, which is a relatively small platform for cooperation and exchange of knowledge for the mineral industry.³⁸ Currently, the 8th FP is under preparation and will be launched in 2014. It has been stated that long-term trends deserve more attention in the EU's research and innovation policy.³⁹

Part of the EU's research policy involves joint programming in research. This means that the Member States will define common objectives and join forces for research and innovation on major challenges.⁴⁰ It could be argued that food safety, climate change and energy make a reasonable subject for joint programming in the light of the future scarcity-related challenges that surround them and their interlinkages.

It can be expected that management of natural resources will occupy a prominent place in the still to be developed 7th *Environmental Action Programme* (EAP), which will provide the environmental policy frame. The 6th EAP was launched in 2002 and will be in place until 2012; it consists of thematic strategies that will be discussed in the next section. In relation to natural resources, the 6th EAP aims at increased resource efficiency and resource and waste management in order to decouple resource use from economic growth.⁴¹ A final assessment of progress made is expected in 2012. Proposals for the 7th EAP, which will run from 2012 to 2022, are expected in 2011.

Questions for discussion at the conference:

- How is resource scarcity related to the EU's economic growth agenda?
- What would be appropriate indicators for monitoring EU progress in becoming less dependent on scarce resources from abroad?
- In what way and to what extent are scarcity of water, minerals and food important considerations for the future of the CAP?
- How are measures to work towards a more sustainable use of natural resources linked to the EU's research and innovation agenda?
- Will a strengthened SDS and 7th EAP be required to further an issue such as resource scarcity and to secure its environmental focus?

The link between resource scarcity and specific, thematic EU strategies

The *Raw Materials Strategy* was developed in the face of the increasing scarcity of minerals and aims at safeguarding their supply to the European market.⁴² It rests on three pillars: undistorted access to raw materials on world markets (which will be further discussed in the next chapter on the EU's external policy), supporting resource extraction within Europe and reducing the EU's consumption of raw materials by increasing resource efficiency and recycling. A result of the initiative is the publication of a list of 39 critically scarce raw materials. The Commission is expected to report on the implementation of this Raw Materials Initiative in May 2010. Moreover, in June 2010, the Spanish EU Presidency will organise the 'European Minerals Conference Madrid 2010', which will result in the 'Madrid Raw Materials Declaration 2010'.

³⁵ European Commission Communication, Commission Work Programme 2010 – Time to act, COM(2010) 135.

³⁶ European Parliament and Council Decision No. 1982/2006/EC concerning the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007–2013).

³⁷ European Parliament and Council Decision No. 1982/2006/EC concerning the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007–2013), , pp. 21.

³⁸ Last visited on 8 April at <http://www.etpsmr.org/>.

³⁹ Joint statement of 5 expert groups on research, development and innovation policy to the European Parliament on 7 December 2009, last visited on 8 April 2010 at <http://www.suschem.org/media.php?mId=6649>.

⁴⁰ European Commission Communication, Towards joint programming in research: working together to tackle common challenges more effectively, COM(2008) 468.

⁴¹ European Parliament and Council Decision No. 1600/2002/EC laying down the Sixth Environment Action Programme.

⁴² European Commission Communication, The Raw Materials Initiative – Meeting our critical needs for growth and jobs in Europe, COM(2008) 699.

Two thematic strategies of the Sustainable Development Strategy are specifically devoted to the issue of scarcity of natural resources: the thematic strategy on *the sustainable use of natural resources* and that on *the prevention and recycling of waste*. Both strategies are also part of the 6th Environmental Action Programme.

The thematic strategy on *the sustainable use of natural resources* sets out an analytical framework with the goal to allow the environmental impact of resource use to be taken into account in EU policies.⁴³ The strategy is directed at improving resource productivity and reducing its environmental impact. Thus far, studies have been completed on the ecological footprint and on trade flows of natural resources; it lacks concrete measures to implement these objectives. In 2009, a preparatory study for the review of the thematic strategy on the sustainable use of natural resources was launched. The final report is expected in August 2010.⁴⁴

The long-term thematic strategy on *the prevention and recycling of waste* is directed at the efficient and environmentally friendly usage of resources.⁴⁵ Recycled waste becomes a resource for industry and thereby indirectly reduces the need for natural resources. The directives in place⁴⁶ mainly aim at safe and environmentally friendly waste management. The strategy aims at further developing existing legislation, improving the implementation of waste legislation, introducing the life-cycle mantra⁴⁷ into policy and business and developing minimum recycling standards in the EU. The long-term goal of the thematic strategy is most relevant to natural resources, while it targets the recycling of more and better materials and the creation of compost and aims at energy recovery.

The Commission published an *Action Plan on sustainable consumption and production* in July 2008.⁴⁸ The Action Plan targets our production and consumption patterns aiming to reduce global warming, pollution, material use and the dependency on natural resources. It is linked to other initiatives, such as the *Environmental Technologies Action Plan* and the *Integrated Product Policy*, and to the two thematic

strategies on natural resources and environmental protection set out above.⁴⁹

A phenomenon that has received increasing attention within the southern EU Member States is the issue of water scarcity. The *Water Framework Directive* (WFD) of 2000 aims at clean water and groundwater in the EU through environmental measures and a water price policy.⁵⁰ The Directive has a six-year monitoring cycle. More specifically, the Commission addressed the issue of water scarcity in a Communication of 2007.⁵¹ In 2009, water scarcity remained on the EU agenda as one of the sectoral papers accompanying the White Paper 'Adapting to climate change: Towards a European framework for action'⁵² addressed the issue of water scarcity and climate change in more depth. The White Paper stipulates that the Commission will conduct annual European assessments of water scarcity and droughts and will review the strategy in 2012. The issue of water scarcity and global water policy will be discussed in September 2010 during the World Water Week in Stockholm.

The *European Energy Policy* is developed to increase security of supply, to ensure the competitiveness of European economies and the availability of energy at affordable prices and to promote environmental sustainability and combat climate change. The EU Summit of March 2007 addressed energy policy and climate change and set the so-called triple-20 targets: a 20% reduction in greenhouse gases, a 20% share of renewable energy and a 20% increase in energy efficiency in 2020. The conclusions of the Summit featured an Energy Policy for Europe.⁵³ In 2008, the Commission developed the issue of energy security in a strategic review.⁵⁴ Overall, the EU's energy security policy has three main underlying objectives: sustainability, competitiveness and security of supply. The more detailed objectives of the EU energy policy are to diversify energy

⁴³ European Commission Communication, Thematic Strategy on the sustainable use of natural resources, COM(2005) 670.

⁴⁴ Information on the study available at <http://www.eu-smr.eu/tssrm/>.

⁴⁵ European Commission Communication, Thematic Strategy on the prevention and recycling of waste, COM(2005) 666.

⁴⁶ Such as the Waste Framework Directive, the Hazardous Waste Directive and the Landfill and Incineration Directives.

⁴⁷ The International Reference Life Cycle Data System Handbook was launched by the European Commission on 12 March 2010.

⁴⁸ European Commission Communication, Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan, COM(2008) 397.

⁴⁹ The strategies on natural resources and on the prevention and recycling of waste were adopted following the provisions of the 6th Environmental Action Programme, Decision No. 1600/2002/EC of the European Parliament and the Council, Sixth Community Environment Action Programme.

⁵⁰ Water Framework Directive, Directive 2000/60/EC of the European Parliament and the EU Council.

⁵¹ European Commission Communication, Addressing the challenge of water scarcity and droughts in the European Union, COM(2007) 414.

⁵² European Commission Staff Working Paper, Adapting to climate change: Towards a European framework for action, COM(2009) 386, European Commission Staff Working Document, Climate Change and Water, Coasts and Marine Issues, SEC(2009) 386.

⁵³ Council of the European Union Conclusions, Presidency Conclusions of the Brussels European Council of 8/9 March 2007, 7224/1/07, pp. 10-23.

⁵⁴ European Commission Communication, Second Strategic Review; an EU energy security and solidarity action plan, COM(2008) 281.

sources, further develop the energy network and improve resource distraction.

In 2008, new legislation to reduce greenhouse gas emissions and promote renewable energy was proposed and agreed upon. The so-called Climate Action and Renewable Energy Package included various measures which together will reduce emissions by 20% compared to 1990 levels and will increase the renewable energy share to 20% in 2020. The most significant measures are: i) a revised version of the emissions trade scheme that sets emission ceilings for about 40% of EU emissions which stem from large industry;⁵⁵ ii) an effort-sharing decision that sets greenhouse gas emission reduction targets per Member State for the remaining sectors⁵⁶ (i.e., not covered by the ETS), and iii) a Renewable Energy Directive that sets legally binding national renewable energy targets.⁵⁷

The Renewable Energy Directive includes a 10% target for biofuels in the energy mix and guidelines for their sustainable production. A trading mechanism has been established in which countries can sell their renewable energy to other countries in case they overachieve their target. However, countries with intensive subsidy programmes for renewable energy can prohibit this. The fact that various national subsidy schemes are in place complicates the establishment of an equal level playing field for renewable energy production.⁵⁸ On the basis of the current EU budget, a common European subsidy scheme seems too costly, although the EU, through its Strategic Energy Technology Plan, already supports some activities.⁵⁹ A tax on fossil fuels is an alternative, but politically may be very difficult to agree upon, given the consensus requirement for European taxes, vested interests and because this could be considered an open acknowledgement that the ETS is not effective enough.

Energy efficiency is often referred to as the forgotten objective of the EU's energy policy. In the context of the 'Resource-Efficient Europe' flagship initiative of the Europe 2020 Strategy, the Commission has indicated that it will define the key actions necessary to achieve the energy saving potential of 20%. A Revised Energy Efficiency Action Plan and an Energy Action Plan 2011-2020 are major proposals in preparation for which initiating communications are expected by the end of 2010. In addition, a White Paper on the future of transport will be decided on. The Commission will moreover lay down a road map to set out a coherent framework of policies and actions to ensure a resource-efficient and low-carbon Europe in 2020.⁶⁰

Questions for discussion at the conference:

- Should the raw materials strategy and strategy on natural resources remain separate or become integrated? On what aspects do they cover different issues and on what elements do they overlap and are they possibly in conflict?
- What is the (possible) contribution of mining, recycling and product substitution to decreasing the EU's dependency on natural resources from abroad?
- Should the EU develop a more elaborate water scarcity policy?
- Should the EU have a more elaborate renewable energy policy?
- What options exist to increase energy efficiency and should they be promoted by new European initiatives?

The role of the EU in addressing the issue of resource scarcity at international level

EU policies and the EU's external action have implications for, and have the opportunity to influence, the international debate on resource scarcity and on the stimulation of the global transition to a more sustainable economy. Currently, the system of EU external relations is undergoing a major reform with the implementation of the new provisions of the Lisbon Treaty. This may provide opportunities to increase the attention for resource scarcity in the EU's geopolitical positioning and step up the efforts it invests in promoting sustainable management of natural resources at international level. More specifically, the question is whether and how scarcity considerations will be incorporated into the tasks and remit of the new EU foreign policy actors: the High Representative of the Union for Foreign Affairs and Security Policy, who is also a Vice-

⁵⁵ Directive 2009/29/EC of the European Parliament and of the Council to improve and extend the greenhouse gas emission allowance trading scheme of the Community.

⁵⁶ Decision 2009/27/EC of the European Parliament and the Council on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.

⁵⁷ Directive 2009/28/EC of the European Parliament and the Council on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

⁵⁸ J. de Jong and L. van Schaik (2009), *EU Renewable Energy Policies: What Can Be Done Nationally, What Should Be Done Supranationally?*, Clingendael Institute, The Hague.

⁵⁹ European Commission Communication, Investing in the Development of Low Carbon Technologies (SET- Plan), COM(2009) 519 final.

⁶⁰ European Commission Communication, Commission Work Programme 2010 – Time to act, COM(2010) 135, p. 15.

President of the European Commission and Chair of the Foreign Affairs Council (HR/VP); and the yet to be established European External Action Service (EEAS), which will be composed of civil servants from the EU institutions and the Member States, and will support the HR/VP.

The issue of energy, climate change and the competition for natural resources was referred to in a recent speech by HR/VP Catherine Ashton. She emphasised the need for a grand EU foreign policy strategy to, *inter alia*, secure the supply of energy and other vital natural resources and a sustainable environment in the face of an increasingly multi-polar world.⁶¹ It is not yet clear to what extent the EEAS will obtain competence and capacity regarding the issue of resource scarcity. In a proposal of the HR/VP that was presented in March 2010, it is put forward that the EEAS should develop 'geographical desks' covering all the countries of the world, and 'thematic desks', as well as units responsible for multilateral issues.⁶² This implies that the role of the EEAS with regard to the issue of resource scarcity depends on whether it will be included in the tasks of these desks and/or whether a specific thematic desk will be devoted to the issue. A non-paper of the European Parliament stipulates that the EEAS should include competences on 'environment – through contribution to the development of international measures for sustainable management of global resources'.⁶³ Attention for the issue may thus become a task of the EEAS. Its work in the field of early warning may also be strengthened through the inclusion of expertise on resource scarcity because it can be a contributing factor to political tension and conflict. The necessity of devoting more attention to resource scarcity has already been underlined in EU foreign policy documents and is starting to be incorporated into external relations instruments. However, these developments are still at an early stage.

The *European Security Strategy* (ESS) was developed in 2003 and reported on in 2008.⁶⁴ In the introduction of the ESS, water scarcity is referred to as a factor that 'is likely to create further turbulence and migratory movement in various regions'. Moreover, energy dependency is highlighted as a European security issue. The ESS implementation report of 2008 puts forward energy security and climate change

as security threats. In the section on the security and development nexus, the report argues that the increasing tensions over water and raw materials require multilateral solutions. EU action should aim at preventing threats from becoming sources of conflict. In a resolution of the European Parliament on the ESS, energy scarcity was mentioned as a key topic.⁶⁵ Once the decision on the set-up of the EEAS is taken, the new HR/VP may propose a revision of the ESS.

The external dimension of the debate on resource scarcity is also present in the Europe 2020 Strategy and Sustainable Development Strategy. The Europe 2020 Strategy has the objective to increase the EU's competitiveness, amongst others by strengthening its leadership in the market for green technologies and by becoming more resource efficient. This objective should also reduce the EU's dependency on the import of raw materials and other commodities.⁶⁶ This line of reasoning builds upon earlier initiatives, notably those formulated in the Communication on the Raw Materials Initiative⁶⁷ and the External Dimension of the Lisbon Strategy.⁶⁸

The EU has the exclusive competence to conduct a common external trade policy.⁶⁹ According to Article 206 of the TFEU, the EU aims to contribute to 'the harmonious development of world trade' and 'the progressive abolition of restrictions on international trade'. This is the EU's legal basis for its efforts against restrictions of trade in raw materials. Because of increasing restrictions on the free trade of raw materials, it is currently a key issue for DG Trade. The Raw Materials Initiative of 2008 includes a 'raw material diplomacy'.⁷⁰ The objectives are to reinforce dialogue with resource-rich countries (in Africa, and Russia and China), to identify common interests with other resource-dependent countries (Japan and the United States) and to promote enhanced international cooperation in global fora such as the G20, OECD, UNCTAD, UNEP and the World Bank. Moreover, the Raw Materials

⁶¹ Speech by Catherine Ashton at the Munich Security Conference on 6 February 2010. Last visited on 1 April 2010 at http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/EN/foraff/112774.pdf.

⁶² Proposal for a Council decision establishing the organisation and functioning of the European External Action Service, 25 March 2010; Bulletin Quotidien Europe 10106, 23 March 2010.

⁶³ G. Verhofstadt and E. Brok (2010), Non-paper EEAS, 18 March 2010.

⁶⁴ European Security Strategy, A Secure Europe in a Better World (Brussels, 12 December 2003). Report on the Implementation of the European Security Strategy (Brussels, 11 December 2008).

⁶⁵ European Parliament Resolution on the implementation of the European Security Strategy and the Common Security and Defence Policy, 2009/2198(INI).

⁶⁶ European Commission Communication, Europe 2020: A strategy for smart, sustainable and inclusive growth, COM(2010) 2020.

⁶⁷ European Commission Communication, The Raw Materials Initiative – Meeting our critical needs for growth and jobs in Europe, COM(2008) 699.

⁶⁸ European Commission Communication on the external dimension of the Lisbon Strategy for Growth and Jobs: Reporting on market access and setting the framework for more effective international regulatory cooperation, COM(2008) 874 final.

⁶⁹ Art. 3(e), TFEU.

⁷⁰ European Commission Communication, The Raw Materials Initiative – Meeting our critical needs for growth and jobs in Europe, COM(2008) 699.

Initiative targets the global regulatory framework by stating that the EU should promote new rules on sustainable access to raw materials, include rules on export restrictions in all bilateral negotiations and ensure compliance with international commitments, bilaterally and in the WTO. In this regard, the EU requested a WTO panel on Chinese export restrictions on raw materials.⁷¹

The SDS is not only considered to provide environmental direction to all EU policies but also to specifically aim at integrating environmental concerns into development cooperation and other external policies. The SDS reiterates the importance which the EU attaches to the *Millennium Development Goals* (MDGs). MDG 7 is targeted at ensuring environmental sustainability and is often referred to as the forgotten MDG. It is difficult for developing countries to obtain ownership of the EU's sustainable development agenda, as they consider it primarily an environmental agenda whereas their own priorities lie elsewhere. The issue of resource scarcity complicates the matter of ownership, while developing countries are suspicious about the EU's interest in securing access to their raw materials. The economic interest – which is present – hampers the EU's capacity to argue that it opposes unsustainable extraction. Another complicating factor is that the Chinese, in their assistance to, for instance, Africa, are less strict about environmental standards.

The EU's objective is to ensure that the external impacts of its domestic policies do not undermine its development cooperation objectives (cf. Article 208 TFU). In November 2009, seven so-called Policy Coherence for Development (PCD) priority areas were adopted by the Council; one concerns climate change in relation to promoting renewable energy and the protection of biodiversity; another is ensuring global food security. A PCD Work Programme, developed by the European Commission, is expected in April 2010.

In 2008, in a joint paper of the High Representative and the European Commission, the EU acknowledged that the effects of climate change, such as desertification, may lead to armed conflicts about scarce resources (e.g., water). This in turn may result in 'climate refugees' seeking new homes, which could destabilise entire regions of the world. Climate change was identified as a security 'threat multiplier'.⁷² While there are already first indications

of such problems, they are essentially potential future threats. In December 2009, the Council devoted specific Council Conclusions to the issues, emphasising the need to increase the EU's energy security position and to hone and sharpen the EU's crisis management capabilities relevant to the issue of climate change and international security.⁷³

The rising food prices in 2007 and 2008 and the food riots they caused in developing countries have resulted in the return of *food security* on the European agenda. A European Parliament Resolution on Common Agricultural Policy and Global Food Security puts forward that the CAP should take a central position in targeting global food security.⁷⁴ The European Parliament suggests that the CAP should be transformed in order to meet global food security concerns. In addition, the Parliament and the Council adopted a *Food Facility* for developing countries to help them in their response to volatile food prices.⁷⁵ It is directed towards strengthening the productive capacities and the governance of the agricultural sector. The amount of resources available is €1 billion. In May 2009, the first contribution agreements of the Food Facility were signed.⁷⁶

Just recently, in March 2010, the European Commission presented a new strategic framework to help developing countries deal with the problem of food security, whether in emergency situations or long term.⁷⁷ The aim is to make progress in achieving the MDGs that are associated with the eradication of poverty and hunger. The Commission is advising on a sustainable agricultural model that respects the environment and is adapted to the reality of developing countries and their markets. It is recognised that hunger and malnutrition have gained ground worldwide over the last few years, endangering human development as well as social and political stability. In the coming months, the European Commission is expected to present a generic communication on the EU's contribution to achieving the MDGs. In this respect, it may be relevant to acknowledge to a larger extent the need to address the driving factors behind the rise in food prices in 2007 and 2008, such as the high oil price, which increased the costs of agricultural production, fertilisers and transport.

⁷¹ Press release 'EU Requests WTO Panel on Chinese Export Restrictions on Raw Materials', 4 November 2009, last visited on 17 April 2010 at <http://trade.ec.europa.eu/doclib/press/index.cfm?id=481>.

⁷² *Climate Change and International Security*, Paper from the High Representative and the European Commission to the European Council, S113/08, Brussels, 14 March 2008.

⁷³ Council Conclusions on Climate Change and Security, 2985th Foreign Affairs Council meeting, Brussels, 8 December 2009.

⁷⁴ European Parliament Resolution, The Common Agricultural Policy and Global Food Security, 2008/2153(INI).

⁷⁵ Regulation No. 1337/2008 of the European Parliament and the Council, establishing a facility for rapid response to soaring food prices in developing countries, OJ L 354, 31.12.2008.

⁷⁶ 'EU €1 Billion 'Food Facility': Commission Signs the First Contribution Agreements with UN Partner Agencies', 15 May 2009, Brussels, IP/09/797.

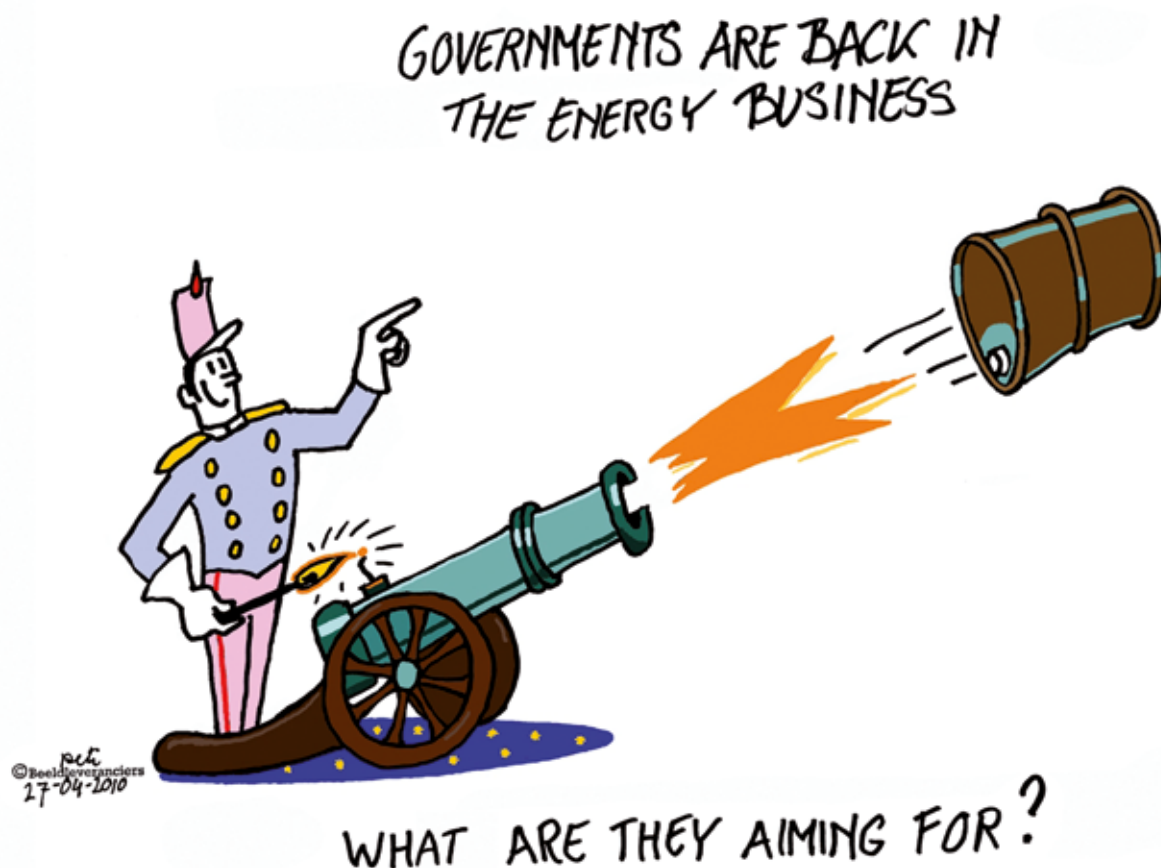
⁷⁷ European Commission Communication, An EU policy framework to assist developing countries in addressing food security challenges, COM(2010) 127 final.

In addition, there are a number of specific EU policies and international agreements to which the EU is firmly committed that are related to resources which are already scarce or could become scarce in the future, such as water, wood,⁷⁸ diamonds, energy, arable land, etc.

Questions for discussion at the conference:

- Should analysis of resource scarcity in relation to (potential) conflicts be included in EU security assessments?
- Should the EEAS obtain a role in promoting the issue of sustainable management of natural resources outside the EU? Should it obtain final or co-responsibility over this issue? Should a thematic desk be devoted to it?
- What can the EU do to secure access to raw materials? Would there possibly be a role for trade instruments or intensified political dialogue?
- Are external implications of the Common Agricultural Policy for international food security sufficiently understood and taken into account in the debate on CAP reform?
- How could resource scarcity be integrated into EU development cooperation, notably in the debate on the MDGs?

⁷⁸ For instance, the Action Plan for Forest Law Enforcement, Governance and Trade (FLEGT) and proposals to combat deforestation and illegal logging in the context of the EU's biodiversity policy and the international climate negotiations.



Annex I – Upcoming events on scarcity of natural resources and EU policies

Date	Venue	Organiser	Event & theme
10-11 May 2010	Brussels	European Union	European Foreign Affairs Council on Development
26-27 May 2010	Paris	OECD	OECD Forum 2010, 'Road to Recovery: Innovation, Jobs & Clean Growth'
1-4 June 2010	Brussels	European Commission	Green Week: Conference on Biodiversity, Climate Change and Sustainable Growth
16-18 June 2010	Madrid	Spanish Presidency	European Minerals Conference Madrid 2010
12-13 July 2010	Brussels	Belgian EU Presidency	Informal Environment Council on the sustainable use of materials
5-11 September 2010	Stockholm	Stockholm International Water Institute	World Water Week, 'The Water Quality Challenge – Prevention, Wise Use and Abatement'
20-22 September 2010	New York	UN	Millennium Development Goals Summit. Launch of the Millennium Development Report 'Keeping the Promise' in June
11-13 October 2010	Ostend	Belgian Presidency/ Region of Flanders	Regions and Sustainable Development
14-16 October 2010	Bruges	EEAC / Walloon Council for Sustainable Development / Belgian Federal Council for Sustainable Development	European Environment and Sustainable Development Advisory Councils (EEAC), Annual Conference entitled 'Sustainable Land Use'
22 December 2010	Brussels	EU	Environment Council Meeting

3 Conference Essays

Increasing Scarcities of Natural Resources in the Coming Decades: Trends and Policy Options

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Essay for the Conference:

Enriching the Planet, Empowering Europe – Optimising the use of natural resources for a more sustainable economy,
The Hague, 26 & 27 April 2010, cf.: <http://www.clingendael.nl/resource scarcity>

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Introduction

Scarcity is again on political agendas worldwide. Concerns about the availability of natural resources have been triggered by the recent boom in prices of energy, food and other commodities. Furthermore, disruptions in Russian gas supply and Chinese export restrictions on rare earth elements have added to the concerns over resource security. This has prompted many observers to consider whether the global economy is moving into a new era characterised by relative shortage and permanently higher commodity prices.

This essay addresses two key questions:

- If present trends continue, what scarcities should we be concerned about?
- What are the policy options to deal with future scarcities?

Scarcity is defined as having three dimensions. In physical terms, scarcity is about resources availability and depletion (how much is left?). In economic terms, scarcity is about tensions between supply and demand (what will it cost?). From a geopolitical perspective, scarcity is about national dependencies and risks (who is in control?). These three dimensions are interdependent. No single indicator captures all aspects of scarcity. Although important, price is flawed as an indicator because it does not take adequate account of political risks, and some resources – water, biodiversity and land – are not properly priced.

World views largely determine how the problem of increasing scarcities is conceived, what policy actions are considered primarily appropriate and to whom these actions should apply. World views also determine whether action is directed principally at OECD or EU Member States' own interests, or whether there is room for more altruistic action, for instance, support for Least Developed Countries.

This essay focuses on food and energy, with some attention to water, land and minerals. We draw on earlier work by the Netherlands Environmental Assessment Agency PBL. In *Growing within Limits*,⁸⁰ PBL addressed two key challenges to ensuring sustainable energy supply and food security while avoiding climate change and preventing dramatic biodiversity losses. We also anticipate the results of ongoing research. In 2010, PBL will publish a detailed analysis of the physical, economic and political dimensions of scarcity.

If present trends continue

If the world continues to develop according to current trends, pressures on natural resources will further increase. Although long-term projections suggest that the main factors driving demand will slow down, concerns over food and energy security in the coming decades are warranted.

World population is projected to increase by at least a further 2 billion in the coming decades to over 9 billion in 2050. Almost all of this increase will take place in Africa and Asia. Rising population is accompanied by increasing incomes among a large proportion of the world's population. Purchasing power per capita will increase from 40% in some regions to more than 600% in others, with emerging economies in Asia, particularly China, being the main engines of growth.

Food

Increasing population and growing purchasing power result in greater food consumption as well as in dietary changes to include a higher proportion of meat. The potential to step up food production is enormous. Higher yields could be possible in large parts of the world. However, to this end, inputs such as water and energy have to be increased, thus impacting on water and energy scarcity. In addition, climate change can affect productivity through an increase in extreme weather events, including floods and droughts.

Land and water

Large areas suitable for agriculture could be brought under cultivation to increase food production. However, currently, most of such unused areas either are used by marginal population groups or are natural areas that are being transformed for agriculture with negative impacts on biodiversity and carbon uptake. Current projections show that an additional 700 million ha – an area more than ten times the size of France – will be needed until 2050 to support growth in food production. Yet in Asia, nearly 95% of the potential cropland is already in use. Furthermore, there is a growing trend worldwide to convert cropland to other uses due to increasing urbanisation, industrialisation, energy demand and population growth.

Water is one of the most limiting factors in increasing agricultural production. The physical reserve of water is more or less constant, which also holds for the fluctuations over seasons. Yet current projections suggest that water demand is likely to double by 2050. Water demand will rise especially in Asia because of high requirements for irrigation in populated arid regions, mainly in China and India. Water availability for downstream users is especially affected by human activities including economic produc-

⁸⁰ PBL, 2009, *Growing within Limits*, Report No. 500201001, Bilthoven/The Hague.

tion as well as by land-use change and climate change. Water deficit is also threatening food security in poor countries with rapid population growth and groundwater depletion.

Phosphate

Another potential scarcity involves phosphate, which could become a serious concern in the long term. Phosphate is an essential, non-renewable resource required as chemical fertiliser for agricultural production. There are no real substitutes for it.

Energy

Demand for energy will more than double by 2050. Future demand is expected to be dominated by strong growth in emerging economies (China, India, Brazil, Indonesia and Russia). This demand is expected to be met mostly by fossil fuels (oil, gas and coal). Based on current proven reserves and present production rates, global reserves of conventional oil will deplete within 40 years and gas reserves within 60 years, while coal reserves will last for more than 100 years. These estimates do not take into account new discoveries, the upgrading of probable or inferred reserves to proven reserves, an increase in the recovery factor, changes in production rates and exploitation of non-conventional resources such as oil sands and shales. All of these factors carry a degree of uncertainty.

Probably no physical limits . . .

It seems that physical reserves are sufficient to meet a global increase in demand over the coming decades. The world is unlikely to run out of oil, metals and minerals in the foreseeable future. Physical resources are unlikely to be exhausted because as resources become scarcer, prices will rise, consumption will decline and once uneconomic alternatives are substituted for the scarce and expensive commodity. However, markets function improperly and not all commodities are priced. At a regional level, problems may occur with land and water resources.

. . . but large uncertainties

Scarcities depend on a number of uncertain factors. For instance, demand is projected to increase because of uncertainties about income growth and dietary changes. And past productivity gains are an imperfect indicator.

Agricultural yields in many developing countries are threatened by climate change, although most of this effect is not likely to be felt before 2030. Simulations show that reduced yield growth due to climate change will probably affect regions that have limited options to expand agricultural land areas, such as Northern Africa, the Middle East, India and China. Furthermore, on world markets, prices of wheat, rice and other grains are rising, resulting in more poverty and hunger.

With regard to energy, there is also considerable uncertainty about resource availability and extraction costs. Higher oil prices have a direct impact on poverty and growth, especially in developing regions, while biofuel production to substitute for oil has an indirect impact. A higher proportion of biofuel crops reduces available cropland for food production and also has an effect on food prices.

Physical scarcity due to increasing demand and other factors lies at the basis of the tighter markets that have caused recent price peaks. It is also the basis of political scarcities, as the reserves of some resources are concentrated in a few countries that are regarded suspiciously by countries where demand is concentrated.

Mismatch between supply and demand

Physical depletion of resources may not be an immediate risk. However, serious mismatches between resource demand and supply will continue to exist in the coming decades because of poorly functioning markets. This can be illustrated by projections for undernourishment – hunger being the basic indicator of food scarcity. Until 2050, the number of people suffering from hunger will reduce only slightly and will remain over 700 million in the coming decades, especially in Sub-Saharan Africa and India.

An important limiting factor in food production in Africa is constituted by lagging yields. Increase in productivity depends on factors such as incentives for individual farmers to increase production, e.g., price transmissions, clarity regarding tenure or entitlements, and possibilities for farmers, such as access to inputs and knowledge.

Increase in demand requires some regions to expand the production of food and energy or to import these commodities. Most developing countries that currently depend on imports of energy and food are located in Asia and Africa. These regions have the most people living in poverty.

World markets are increasingly becoming globally integrated so that developments in one region have impacts on others. Of the resources considered, energy, minerals and food are traded on global markets, whereas the consequences of water scarcity are felt mainly regionally. Therefore, impacts of developments occurring on the world market are higher in countries that depend on imports of food and energy. Besides, the number of consumers (e.g., countries) that play a role on the world market is increasing.

Power shifts

Besides mismatches between resource demand and supply, another element in the present discussion on scarcities

is the political dimension. The role of emerging economies is increasing in the world economy through their rising share in the demand for resources and also because of their control of some essential resources. Many of these economies hold major reserves of essential resources, which is causing concern in OECD countries.

Whereas previously, OECD countries were the main consumers of resources and developing countries often the main suppliers, this bipolar situation has changed. Developing countries are no longer considered as one group but now range from Least Developed Countries at one extreme to Emerging Economies at the other. The Least Developed Countries are still considered by OECD countries for development aid, while the Emerging Economies are increasingly seen as competitors in the worldwide quest for remaining resources.

Policy options to address future scarcities

Systematic analysis of policy options to address resource scarcities reveals many different policies, which can be grouped roughly into three categories corresponding to the different dimensions of scarcity.

The first category of policy options concerns the physical aspects of scarcities and is directed at increasing the physical reserve base, reducing structural long-term demand and finding substitutes for scarce resources. Options regarding reserves include, for instance, policies aimed at finding and exploring new reserves. Demand policies comprise possibilities such as reducing end-user demand by promoting lifestyle changes and more efficient production, and can even include population and demographic policies. Policies directed at resource substitution consist primarily of research and development regarding alternative sources. Direct regulation, economic incentives or softer instruments such as information and persuasion can be used as tools in this context.

Assessments show that further increases in agricultural yields, dietary changes and reduction in post-harvest losses can lead to a substantial reduction in land claim from agriculture. More R&D could contribute to boosting yield rates by 40%. The lion's share of global agricultural land (80%) is used for meat – especially beef – production. A transition towards less meat-intensive diets would be an effective way of reducing demand for land. Decreasing post-harvest losses – estimated to be around 30% – is another way to ease the pressure on land.

Regarding the use of fossil energy, the potential for increasing energy efficiency is considerable. Fossil-fuel technologies can be replaced by solar, wind and nuclear power. In general, options to reduce fossil-fuel demand mesh well with ambitions to decrease greenhouse gas emissions. However, this is not the case with carbon capture and storage, which serves the goal of emission reduction but does not address the increasing scarcity of fossil fuels.

A second set of policy approaches tackles scarcity mainly as a problem of poorly functioning markets. Such policies thus primarily aim at making markets work better and include pricing non-priced commodities (water), removing subsidies and trade barriers, and improving infrastructure as a physical precondition for markets to develop. At multilateral level, the WTO is an arena where such policies can be pursued. The EU's focus on electricity and gas transmission infrastructure is a more regional example of this approach.

The third set of policies approaches scarcity as a political problem. Potential policies include improving international relations, referring to multilateral organisations like the Security Council, and options such as emergency response mechanisms. For instance, the European external energy policy but also China's bilateral relations with several African countries are directed at the political dimension of scarcities. Likewise, the International Energy Agency was founded in 1974 to prevent future oil crises by coordinating the policies of the main oil-importing countries at that time.

The three policy approaches are interdependent, as are scarcities of energy, food, water and minerals. Thus, attention needs to be given to ensuring that a solution to one scarcity does not have negative impacts on others. A well-known example is biofuels, which aim to reduce scarcity of fossil fuels but increase food scarcity through competitive claims on fertile lands.

Which policy approach is best suited to address concerns about scarcities depends on political choices, which, in turn, often depend on deeper underlying world views. Based on the fundamental uncertainties of the market versus government, and national versus multilateral action, four world views can be distinguished, each with a vision on the origin of scarcities and the best suited policy strategy:

- The '*market forces logic*' seeks the solution to scarcities of natural resources primarily in better functioning markets. If markets work well and prices properly reflect economic scarcity, the resource scarcity problem will be solved. Resources that are physically scarce will be

substituted in time, and political scarcities cannot occur as long as countries are so interconnected that attempts at political domination of reserves of one resource will have immediate repercussions on other economic fields. In this logic, the WTO is a key to addressing scarcities. OECD countries can help LDCs in this respect by making their markets work better. However, fundamental distributional inequalities are not dealt with in this logic.

- The '*fortress world logic*' seeks policy solutions for scarcities mainly in bilateral agreements that assure consuming nations access to remaining reserves and producing nations a guaranteed demand. According to this logic, export restrictions and import protection ('border taxes') play an important role, as does preparation for political crises. However, this logic gives relatively little attention to the overall exhaustion of global resources. In this view, LDCs benefit from exclusive bilateral economic and political relations with OECD countries.
- The '*global governance logic*' takes global physical exhaustion of natural resources as a starting point and seeks a fair distribution of remaining reserves through multi-lateral agreements in a variety of fields. The main levers to address scarcities are the United Nations institutions and treaties. In this logic, LDCs are helped through better integration into the global governance system. However, the focus on cooperation and consensus in this logic might lead to excessive bureaucracy and inertia.
- The '*civic society logic*' focuses primarily on regional solutions and internal societal reform towards self-sufficiency as the key approach to scarcities. The main interest is physical exhaustion as well, and in this regard internal demand reduction and stimulation of domestic production are considered primary policy options. Due to the isolationist tendency in this logic, development aid to LDCs receives relatively little attention. Where international contacts are unavoidable or national interests overlap with those of other nations, conflicts seem likely.

Each of these 'logics' bears risks. The European Union, traditionally having a preference for the global governance logic, now seems to prepare policies for a fortress world as well.⁸¹ However, a clear view as to what future world would be worthwhile preparing for seems to be lacking. Nor does there appear to be much attention for trade-offs between the different approaches or for their effects on the different dimensions of scarcities. Thus, the time appears right for the EU to develop an overall, comprehensive strategy to address scarcities of natural resources.

Any such approach should first identify which dimension of scarcity is to be addressed. Secondly, attention should be given to whether the policy focus is on short- or long-term solutions. Thirdly, any policy-maker should investigate the implications of the strategy for other regions. Finally, politicians should realise that any strategy chosen necessarily contains a purely subjective assessment of the 'risk' constituted by the concentration of the reserves of a resource in certain countries. These four elements together should contribute to a sound and robust EU policy strategy that deals comprehensively with increasing scarcities worldwide.

⁸¹ L. van Schaik, M. Kok and A. Petersen (2009), *Adapting EU Governance for a More Sustainable Future*, PBL Report 500159002, Bilthoven/The Hague.



RECYCLING ALUMINIUM COST ONLY 5% OF
THE REFINERY OF RAW MATERIAL
WHY DON'T GOVERNMENTS ENCOURAGE THIS?

Scarcity: a Story of Linkages of Sustainability

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Essay for the Conference:

Enriching the Planet, Empowering Europe – Optimising the use of natural resources for a more sustainable economy, The Hague, 26 & 27 April 2010, cf.: <http://www.clingendael.nl/resource scarcity>

Introduction

In this essay, we explain how technological improvements and substitution have saved us from resource scarcity in the past and how the linkages between different resources will make this much harder in the not-so-distant future.

One could argue that the economic significance of resources is very limited and has decreased over time. Some of the most important resources, such as water, air and biodiversity, are often not priced at all. In developed countries, the share of the primary sector (agriculture, fishery and mining) to national GDP is between 1 and 5%.¹ Hence, 95-99% of the economic added value comes from manufactured products and services. However, this economic reality does not contradict the physical reality that the materials we produce through mining and agriculture are the foundation of our welfare. Although we are increasingly living in cyberspace, we cannot eat bits, nor can we live inside computer chips. We still have to nourish ourselves, build houses and infrastructure, and manufacture the products that make our lives comfortable. Even cyberspace only exists within material products such as servers and PCs, which are fed by a continuous and substantial supply of fossil fuels. If the supply of materials were to cease, society as we know it, including cyberspace, would come to a grinding halt.

The world economy is large not only in monetary terms but also in terms of material throughput. At this moment, the global economy annually consumes a little over 1 Gton of metals, 6 Gtons of food, 12 Gtons of fossil fuels and 4,500 Gtons of water. The amount of nitrogen fixated by humans is larger than the amount fixated in nature. Regarding more than half of the elements in the periodic table, humans mobilise more than 50% of the total (natural and anthropogenic) mobilised amount. In many cases, the scale of human activities is now comparable with or larger than the scale of natural processes. This means that we have a substantial impact on our environment, which is illustrated by the environmental problems that we face today.

Although technological development and substitution have so far saved us from worldwide resource scarcity, this does not mean that there is no scarcity in our world today. As a result of unequal distribution of wealth and resources, a large proportion of the human population is still deprived of access to clean water, food and other basic material needs. Although this unequal distribution is clearly one of the main issues that human society will have to address, we will not discuss it further in this essay. Here, we will review the historical and current debate on

resource scarcity and discuss how the linkages between different resources may aggravate individual scarcity issues.

The history of resource scarcity

Several authors have described the role of the availability of resources in the collapse of civilisations.²⁻⁴ In these historical studies, a lack of big game, forests, fertile land and water (often caused by climate change) figured among the factors that contributed to the collapse of societies. Since the industrial revolution, mineral resources joined the list of resources that are crucial for a flourishing society.

Worries about the supply of basic commodities are as old as the human race. From the extinction of large mammals for hunters and gatherers, the availability of fertile land in the time of Malthus, the availability of fuel wood at the break of the industrial revolution, the projections of the Club of Rome in the 1970s, to the concerns over peak oil and the 2003-2008 metals boom in current times, scarcity of resources has frequently been a hot topic. Time after time, human ingenuity, through technological innovation, solved the problem of scarcity, mainly by replacing natural capital by human capital. Sedentary agriculture with domesticated animals substituted game, artificial fertilisers substituted fertile land and fossil fuels substituted fuel wood and animal and human labour. These substitutions of key resources marked major transitions in the development of human society, which underlines the importance of the material basis of society.

Since the industrial revolution, resource use has exploded. If water is excluded, fossil fuels dominate resource use in terms of both mass and value, followed by bulk metals and fertilisers. Although the work of the Club of Rome in the 1970s was heavily criticised, it made clear that exponential growth in resource use is, by definition, unsustainable. The scientific and public debate after WWII focused on scarcity issues related to fossil fuels and non-fuel minerals. In 1952, a report was published by the US President's Material Policy Commission (Paley Commission), 'Resources for Freedom', in which material scarcity was addressed. The strongest scientific debate on mineral depletion between resource economists and environmentalists took place in the two decades between 1960 and 1980. Economists like Solow and Nordhaus took the position that economic principles, technological progress and substitution would prevent the depletion of resources. Others, such as Georgescu Roegen, Daly and the main environmentalists of that time Ehrlich and Meadows emphasised that exponential growth would inevitably lead to the depletion of resources.⁵

If real (inflation-corrected) prices are used as an indicator of scarcity, the view of the resource optimists is clearly supported by the empirical data. Resource prices have decreased over the last 200 years or so. Decreasing prices show that new discoveries, technological innovation and substitution have outrun increased demand and degrading ore quality. However, the fact that the optimists have so far been right does not necessarily mean that their predictions will hold in the future. Besides the economic reality of the resource economists, there is a physical reality in which we are now reaching some fundamental boundaries of the exponential growth in resource use. These boundaries can be found when looking more closely at the factors that caused resource prices to decrease over the past centuries. A second important limiting factor can be found when analysing the linkages between the different scarcity issues.

Why resource prices decreased in the past and why this trend will not continue in the future

Several factors caused real resource prices to decrease in the past, despite exponentially growing demand. Globalisation has made it possible to tap into new remote resources. Global trade in commodities and resources has been enabled by a sharp decrease in long-distance transport costs that occurred in two major waves. Before 1850, the production and consumption of commodities like food, fibres, fossil fuels and minerals was largely a national or continental affair.⁶ After 1850, the introduction of steam power facilitated the large-scale deployment of railways and steamships for bulk transport. This development made long-distance transport of bulk goods much cheaper. At the time, this caused major problems for European farmers because of imports of cheap textiles and foodstuffs. The second wave of reduction in costs of bulk transport took place between 1956 and 1970 and was triggered by the Suez crisis. In this period, specialised bulk carriers, deeper seaports and specialised harbour infrastructure were developed. The introduction of bulk carriers made it possible to transport relatively low-price commodities like coal and iron ore over extremely long distances, e.g., from Australia to Europe. This led to a crisis among European miners, again caused by cheap imports. These two waves of scaling up long-distance transport reduced bulk transport costs by 90% (in real terms) between the 1870s and the 1990s.^{1,6} The introduction of bulk carriers entailed substantial positive feedback: they made long-distance transport of crude oil cheaper, which, in turn, reduced the cost of oil-consuming transport.

A second factor that supported the downward trend of resource prices was the scale-up of mining operations.

Soon after prehistoric people started collecting minerals from the Earth's surface, subsurface mines were created to follow the mineral veins. For a long time, subsurface or underground mines were the major source of minerals. Over the last century, a shift took place from subsurface mines to large surface mines. In the US, 98% of the metals is now mined from surface mines. Mining from surface mines is more efficient than mining from subsurface mines because much larger equipment can be used and no subsurface infrastructure is needed. The scale-up of mining operations is also linked to globalisation, which has allowed the expansion of mining operations to large remote deposits.

Both globalisation and the scale-up of mining operations have thus facilitated the downward price trends and have increased the availability of commodities. However, regarding both trends, it is hard to envisage further developments in that direction. Globalisation is a one-off affair: there is only one globe and the effects seem to be decreasing. Scaling up bulk carriers much further than their current size is hard to imagine. A factor two size increase may be conceivable but a factor ten seems out of reach, not only because of the limits to construction but also due to the larger sized harbours and harbour infrastructure that would be needed.^{7,8} The scale-up of mining operations also seems to have reached its practical limits. The size of newly discovered deposits is decreasing and new deposits are often found in deeper layers which are less accessible via surface mining.⁹ The mechanisms providing us with ample cheap resources are about to become obsolete. On top of this, the linkages between different resources increase the supply constraints.

Scarcity and linkages of sustainability

Resources are linked to each other in different ways. Land, energy and water are needed to produce mineral resources, while surrounding biotic resources are being degraded through emissions, waste flows and physical destruction. Metals and land are needed to produce wind turbines and PV solar cells, while the building and installation of this equipment also affects local climate and local flora and fauna. The production of food requires fertile land, ample water supplies, mineral inputs in the form of fertilisers and diesel for agricultural machines, while biotic resources are being degraded through nutrient leaching, pesticide emissions and physical destruction, including the initial land-use transition from nature to agriculture.

In a recent publication,¹⁰ the links between different resources have been analysed and, where possible, quantified. The main conclusions of this comprehensive work are summarised below.

Mineral resources

Although direct land use by mining is limited, mining affects large land areas indirectly on account of its waste flows and emissions. One of the major challenges in the mining industry is the reduction of this impact and the practical implementation of land reclamation. Another problem is the access to land, not only for the actual mining, but also for exploration. Exploration of oil and gas can take place with relatively few seismic measurements, while non-fuel minerals can only be detected from a few hundred metres of the outer limits of the ore body. To reach new deposits, which are often deeply buried, access is required to a land area that is a factor thousand bigger than the area that will actually be mined. At the same time, large land areas are not available because they are already in use for other purposes, e.g., urban development and nature reserves.

Water and energy are essential resources in the mining of mineral resources. After the rich and easily accessible deposits are depleted, mining will continue for lower-grade ores, more fine grained deposits and less accessible, e.g., deeper deposits. This will have a substantial impact on the amount of water and energy needed per unit of resource produced. As regards oil, the difference in inputs between conventional oil from the Middle East and Canadian tar sands is a good example. For the production of one barrel of oil from tar sands, 2 barrels of water are needed (net).¹¹ In the Athabasca river basin, the extraction of water is limited by government regulations to 370 million cubic meters per year (6% of the total water flow), which is equivalent to three million barrels of oil per day (3.5% of current global production and about three times the current output in the area). Furthermore, between 6.5 (strip mining) and 26 cubic meters (*in situ*) of natural gas is used for the production of one barrel of oil from tar sands. This is equivalent to 5 to 20% of the energy content of the produced oil.¹¹

As regards non-fuel minerals, the mining and grinding of lower-quality ores also increases energy and water needs. For copper and nickel, energy demand will dramatically increase when ore grades drop below 1%. This is mainly caused by the additional waste material that must be handled and processed. Water requirements for metal production and extraction could increase by a factor of 30. More energy is also needed for the exploration and identification of future resources that will likely be found at greater depth. If the extra energy needs are extrapolated to all mineral resources, the energy required to produce metals could approach 40% of global energy supply by 2050, if current technologies are applied. When considering the constraints on energy resources, this is clearly not possible. It will become unavoidable to switch to mining technologies that are much less energy intensive

than current practice or to reduce our consumption of primary metals.

Energy resources

In order to produce fossil fuels and uranium, water and energy are needed, as described in section 4.1. Furthermore, there is a need for non-fuel minerals which are necessary to build the infrastructure and equipment required for mining, refining and transporting these fuels. Moving from conventional fossil fuels to non-conventional fuels, such as heavy oil, tar sands, shale oils, coal-bed methane and gas hydrates, will substantially increase the demand for equipment and infrastructure. It will also increase the amount of energy needed to produce fossil energy carriers. The same is true for the conversion of the more abundant fossil energy sources – coal and gas – to liquid oil-like carriers. For these conversions additional infrastructure is needed in the form of Gas-to-Liquids and Coal-to-Liquids installations, which will demand more energy inputs. This means that when a shift is made to non-conventional fossil energy sources, the total energy efficiency of the global energy system will decrease while the material intensity will increase. If carbon capture and storage is applied as an add-on to fossil-based systems to mitigate climate change, efficiency and material intensity will increase even further (20-30% of base materials¹²).

Renewable energy sources like wind and sunlight are clean, abundant and relatively evenly distributed globally. However, they are also diffuse, low-exergy energy sources. This means that relatively large amounts of high-tech equipment is needed to convert them into high-exergy energy carriers like electricity and hydrogen that can be used for transport, industry, household appliances, computers, etc. Almost all renewable energy systems that convert renewable energy into high-exergy carriers, are much more material intensive than the current fossil fuel-based systems.¹³ Besides the extra use of bulk materials like copper, iron, aluminium and concrete, specific issues arise regarding minor metals used in these renewable technologies. New-generation direct-drive wind turbines are equipped with neodymium containing permanent magnets (about 150 kg/MWe). The same is true for the electromotors in hybrid and electric cars, which also often contain dysprosium. The use of neodymium and dysprosium in permanent magnets increases the magnetic strength per unit of mass and volume, thus allowing for smaller and lighter motors and generators. In wind turbines, the additional advantage of the direct-drive design is that the gearbox, which requires substantial maintenance, is no longer needed, making direct-drive turbines the obvious choice for off-shore applications. However, current production of neodymium and dysprosium is very low (18000 and 500 ton annually, respectively) and is concentrated in China, which currently controls 95% of the

world market. The introduction of (hybrid) electric vehicles and direct-drive turbines will be strongly constrained by the supply of these rare earth metals.

At the moment, different solar cells are available. Amorphous silicon cells are cheap but have low efficiency, while crystalline silicon cells have high efficiencies but are also expensive and energy intensive to produce. Thin-film PV cells have been developed that can be produced at lower costs. The main thin-film technologies are based on cadmium telluride (CdTe) and copper indium gallium selenide (CIGS). Since these thin-film cells use a combination of less common materials, the supply of these materials can be an issue of concern. Current reserves do not allow a substantial contribution to worldwide energy demand. All these thin-film technologies are limited to a maximum of less than 2% of current global energy consumption. Some, more unconventional, thin-film PV technologies (especially FeS_2) look very promising from the perspective of material constraints and can be scaled up to the level of twice the current global energy demand.¹⁴ Considering these material constraints, it seems that the use of current thin-film cells based on rare materials will be limited. This illustrates the importance of assessing new technologies with a view to scaling them up to substantial levels. Large-scale government funding for technologies that will remain marginal is not an efficient way to tackle the energy and climate crisis.

Water resources

Drilling for water, and pumping, filtering and purification require energy and materials. Since the volume of water used is huge – 370 times the amount of fossil fuels – the amount of energy and materials required for handling is also large. At the same time, as described above, water is an essential resource in the mining of fossil fuels and non-fuel minerals. Water is also indispensable as a cooling agent in the power sector. About 70% of total water consumption is used for agriculture. World food production is to a large extent dependent on irrigation from surface water and fossil water sources. The latter are by definition not sustainable, although they are often very large. Almost all the water on this planet is seawater. In some locations, desalination is the best alternative for producing fresh water. Large-scale cheap desalination would substantially increase the potential for agricultural production. However, although technologies are developing rapidly, desalination is still a very energy-intensive process.

Land resources and agriculture

Agriculture is by far the most important type of land use by man. About one third of the ice-free land is used for cropland ($\frac{1}{3}$) and pasture ($\frac{2}{3}$). This is equal to the surface area of all forests on the planet. Only about half a percent is used for built-up areas. Besides the 20% of land used for

pasture, 35% of all grain is fed to livestock. The efficiency of converting grain protein into meat protein depends on the meat product and is about 1:2 for chicken, 1:4 for pork and 1:10 for beef. This means that a shift from animal proteins to vegetable proteins would make it possible to feed more people with the same amount of crop production. However, current trends point in the opposite direction. Current agriculture is a highly material-, energy- and water-intensive process. The input of large amounts of mechanical labour, artificial fertilisers and pesticides saved us from a food crisis that was looming just prior to the industrial revolution. However, all these inputs require large amounts of energy and materials, which is also one of the main reasons why first-generation biofuels are not as beneficial for the environment as policy-makers hoped. Some of these inputs also include non-renewable resources like potash and phosphate. Although we still have phosphate reserves that will last for hundreds to thousands of years, the dissipative use of a mineral resource is by definition unsustainable. Recycling is hardly possible and substitution is not an option since phosphate is macro-nutrient that is essential for plant growth.

Conclusions, Discussion and Recommendations

Worldwide economic growth is still strongly coupled to increasing resource use. Emerging economies, China in particular, are responsible for the rise in resource use coupled to the construction of urban areas, infrastructure and industry. At the same time, the internal markets of these countries are growing rapidly and the demand for luxury consumer goods like cars, TVs, refrigerators and air conditioners is also increasing fast. In developed countries, where the infrastructure is in place, the demand for basic resources such as concrete, steel and other base metals has levelled off. However, because consumer products are becoming more and more high-tech, the demand for relatively scarce materials like indium for flat screens and tantalum for mobile devices is increasing rapidly. In addition, a transition in the worldwide energy system is needed to address climate change. This transition will mean that we move to an energy system that is more material intensive as well as more high-tech than the current fossil fuel-based system. Since the energy system is one of the largest subsystems of the world economy, the consequences in terms of material requirements will be substantial.

As regards all basic resources (energy, minerals, water and food), supply is struggling to keep up with the demand of the growing world economy. The fact that all these resources are needed to produce resources makes the potential scarcity problem a very complex one. Looking at

resource scarcity issues individually while disregarding the links to other resources will lead to underestimating the true scale of the problem and to problems being shifted from one resource to another. Resource use not only entails scarcity issues but also has environmental impacts: the production, use and disposal of resources is by far the most important cause of the environmental problems that we are confronted with, including the loss of biodiversity, arguably the only true non-renewable resource.

It is clear that we will have to carefully manage the way in which we use the remaining resources. The European Raw Materials Initiative is aimed at giving European enterprises fair access to raw materials on the world market, supporting the supply from European sources and improving resource efficiency and recycling rates. However, we also have to ensure that we analyse potential solutions to existing problems from a systems perspective in which the linkages between the different environmental problems, resources and other issues are fully addressed. We will also have to find strategies that will solve the scarcity issue in relation to environmental issues. Moving to a more closed-loop society seems one obvious way to both address the resource scarcity issue and reduce environmental pressure. Material accounting can help to keep track of materials from mining to manufacturing, end-use and disposal, and dynamic material models can help us understand future material requirements, including their linkages. Looking at different resources and environmental issues from a systems perspective will prevent us from focusing on partial solutions like first-generation biofuels that create other problems (i.e., competition with food production, increased water use and increased pollution).

In principle, the EU Resource Strategy takes such an integrated approach and addresses resource issues as a set of interlinked issues, from scarcity of minerals to loss of biodiversity. The challenge that lies ahead is to convert this general strategy into a set of concrete policy guidelines and policy measures. To start up the discussion, we would like to propose the following:

- Analyse all problems and proposed solutions from a systems perspective;
- Develop dynamic methods and models to this end, targeted at individual resources as well as at the linkages between them, thus making it possible to include these complex issues in scenarios for the future;
- Give incentives for increased resource efficiency in production processes;
- Give incentives to close the loop of the main materials by the collection, recycling and treatment of waste;
- Also Start discussing problems that will only occur in the distant future if there are no easy solutions and the consequences might be catastrophic (e.g., phosphate depletion).

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A Sustainable and Fair Food System in the European Union

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Introduction

Undernourishment has largely disappeared in high-income countries. Food deficiency diseases are giving way to health problems caused by overnutrition. Meanwhile in the world at large, one billion people remain undernourished. The main cause is poverty, not a lack of supply. With on average 2800 kcal per day per person, enough food is available to properly feed the whole global population.⁸² However, accessibility and nutritional quality are still problems for many.

The current situation provides no guarantee with regard to the future, when scarcity may become absolute. Further growth in world population and changing diets in emerging economies will raise the demand for food. The FAO has estimated that we need 70% more food by 2050 than we produce today.⁸³ At the same time, depletion of fossil hydrocarbons will increase the demand for biofuels and materials, which may compete with food for biomass. Food may become scarcer in the future, inducing higher prices. This is unlikely to threaten food supply in European Union countries directly. European citizens will probably remain sufficiently affluent to buy their way out of any food scarcity. However, a tripling or quadrupling of international grain prices would entail security risks in destabilising neighbouring regions and prompt a run on land and water resources. In this regard, the food riots and land grabbing that were caused by the brief food price spike in 2008 are telling.

The European Union is favourably endowed with land and water resources. The per capita availability of highly suitable agricultural land in the European Union is 0.12 hectare, against 0.07 hectare in the world at large. For moderately suitable land, the figures are 0.26 and 0.19 hectare, respectively.⁸⁴ If necessary, the European Union should be able to produce a large share of biomass for its population. This does not alter the fact that agriculture in the European Union is faced with sustainability problems and competing claims on natural resources. In addition, livestock systems may cause health risks for humans. Therefore, the question is how the EU can reduce health risks and ensure sustainable food security for itself and the world.

In this paper we will first briefly discuss the recent history of food scarcity. Subsequently, we will address the present challenges for global agriculture and conclude with policy options for the EU to cope with these issues.

Interaction of humans and natural resources

Like animals, humans extract food and other necessities from natural resources. They can increase the efficiency of their extraction through cultural (technical and institutional) evolution. In the course of time, this induced important changes in the dynamics of human food economies. In pre-industrial societies, a broad array of goods was made from farm-produced biomass. Supply growth was constrained by high transport costs, slow innovation and low soil fertility. Demographic developments and economic upswings raised agricultural prices and cheapened farm labour. These price effects encouraged a shift to more intensive farming systems – usually led by more substantial entrepreneurs who were better equipped for innovations than small farmers. This resulted in ‘agricultural revolutions’ which allowed further population growth and prompted new spurts in non-farm activity and state formation. Sooner or later, however, pre-industrial societies outgrew their slowly evolving capacity for increasing food production. At such instances, food prices skyrocketed, leading to a check on population growth.

From the 19th century, the rise of technical science and the exploitation of fossil fuels – the remains of 2 billion years of natural biomass growth – have relaxed the traditional constraints on economic growth. They brought cheap transport that enabled the tapping of reserves for agricultural intensification; cheap fertilisers and plant varieties that could transform these fertilisers into harvestable products; and substitute products for farm-based non-food products. This created a whole new potential for increasing the production of food, allowing a glutting of international markets, a squeeze on farm profits, a decline of large farms with hired labour and a shift of labour to other sectors. As a result, many farms were left to self-employed farmers, who were caught in a treadmill of increasing output based on innovation and investment, and decreasing agricultural prices.

Where supportive farm policies were implemented (mainly in Western and Asian countries), green revolutions became an engine of modern economic growth. Unlike in pre-industrial societies, this involved a progressive increase in per capita incomes, which, in turn, induced a demographic transition. In a first phase, mortality decreased, speeding up population growth, but further improvements in living standards led to decreased fertility and demographic levelling. Failure to introduce supportive farm policies led to involution and stagnation (in smallholder regions) or to socially exclusive modernisation of large farms, leading to lopsided growth. Medical and other improvements are still causing a reduction in mortality, but poverty is prevent-

⁸² FAO statistics as accessed on 3 April 2010.

⁸³ FAO (2009): Harvesting Agriculture's Multiple Benefits: Mitigation, Adaptation, Development and Food Security (Policy Brief).

⁸⁴ FAO statistics as accessed on 3 April 2010.

ing an adjustment of fertility, resulting in high population growth and continuing low incomes. This unequal development of the world's regions is now likely to drive a number of robust trends that will strongly affect our common future:

- In spite of the demographic levelling in rich countries, rapid population growth in poor countries will cause a further growth in world population, albeit a slower one than in the preceding decades. World population is expected to increase from the current 7 billion to around 9 billion over the next three decades.
- Rising incomes induce a shift to diets with more animal-based food products. In addition to cultural factors, a biologically evolved preference probably plays a role, which makes this shift a persistent tendency. Although the consumption of livestock products in rich countries is now stabilising and is likely to decrease, in developing countries with rising incomes it is increasing, so that the global demand for animal-based food products may double between now and mid-century. This will boost the demand for agricultural biomass since producing one energy unit of animal (including fish) products requires several energy units of plant biomass as feed.
- Rising incomes increase the demand for the satisfaction of what Maslow has called the 'need for self-actualisation'. In many cases, this appears to include a demand for consumption landscapes and 'natural' goods (organic foods, etc.). This demand makes itself felt through product and political markets and imposes constraints on the biomass to be extracted from natural resources.
- Rising incomes increase the demand for energy. Although the consumption of primary energy in rich countries is now stabilising, in newly industrialising countries it is increasing fast. The gradual depletion of global reserves of fossil fuels will raise extraction costs, even with improved extraction techniques. This will raise the demand for agro-fuels and agro-materials, reversing the earlier trend towards substitution. New bio-refinement techniques will have an ambivalent effect on this, moderating the demand for agricultural feedstock by improving conversion ratios, but increasing it by lowering the price of agro-based non-foods.

Present challenges

How to ensure food security

Between now and 2050, growth in world population and change in diets in emerging economies are likely to cause a 70 percent increase in food demand.⁸⁵ The new demand for bio-based fuels and materials will compete with the demand for food and other biomass products. At the same time, the sources of the rapid supply growth in the 20th century are being depleted. Global land and water reserves are dwindling. Some regions retain significant room for irrigation, but elsewhere major grain belts are running dry.⁸⁶ Vast stretches of marginal land still exist, but exploiting them would require excessive amounts of inputs. In practice, a further expansion of agricultural area will mainly be at the expense of forests, which occupy more fertile soils. Rather than from new land reclamation, further increases in farm production should come from higher output per hectare. In, for instance, Africa, there is ample room for raising crop yields by eliminating limitations due to water or nutrient shortage or to reduction of crop growth by pests, diseases and weeds. However, in the EU, the 'yield gap' between actual production and the potential yield of existing crop varieties is considerably smaller.

Although we do have options to increase biomass production, the fast development of the bio-based economy may interfere. Less than a decade ago, biofuels were widely seen as a sustainable alternative to fuels derived from fossil oil. Today, they raise much discussion about both their effectiveness and their detrimental effect on food security. For that reason, the attention has shifted from the so-called first generation of biofuels to the second one. The first generation uses food or food crops as feedstock, whereby there is a clear competition between food and fuel. The second generation is not based on edible feedstock and hence is considered as not competing with food.⁸⁷ However, most of the competition is not for feed-stock, but for scarce production resources like soil, nutrients and water. Obviously, when a farmer shifts his cultivation from an edible crop towards a non-edible biofuel crop, food production is affected. Driven by policies, subsidies or free-market prices, farmers may indeed

⁸⁵ FAO (2009): Harvesting Agriculture's Multiple Benefits: Mitigation, Adaptation, Development and Food Security (Policy Brief).

⁸⁶ N.B.J. Koning, M.K. van Ittersum, G.A. Becx, M.A.J.S. van Boekel, W.A. Brandenburg, J.A. van den Broek, J. Goudriaan, G. van Hofwegen, R.A. Jongeneel, J.B. Schiere and M. Smies, 'Long-term Global Availability of Food: Continued Abundance or New Scarcity?', *NJAS Wageningen Journal of Life Sciences*, Vol. 55, No. 3 (2008)

⁸⁷ R. Sims, M. Taylor, J. Saddler and W. Mabey (2008), From 1st- to 2nd-Generation Biofuel Technologies, OECD/IAE.

decide on a large-scale shift to dedicated biofuel crops. Much more land and other resources are needed for a substantial energy production than for food production’.

Productivity is not only limited by biophysical constraints. For one thing, producers maximise profit rather than output. For example, the depletion of global reserves of fossil fuels and phosphate rock will raise the costs of farm inputs, particularly fertilisers. In addition, producers face relatively high risks and transaction costs as well as unfavourable product-price ratios in many regions. Consequently, they may opt for technologies that give a lower output per hectare. These may be efficient in certain circumstances, as simple production systems need fewer inputs for maintenance, but the effect is that global food supply will reach an economic ceiling before the biophysical potential has been exhausted. More generally, increasing output is constrained by diminishing returns. Pushing back diminishing returns requires investment in techniques and skills for increasing the production and conversion efficiency of biomass, as well as strategies for mitigating the increase in biomass demand. This will call for adequate policies.

One possibility to increase the technical potential for biomass production is to raise the potential yield of crops. Here, a factor to be taken into account is that there is less and less room for producing higher-yielding varieties, using simple breeding techniques. Nevertheless, new techniques like F1 hybrids still allow a considerable increase in yield. A challenging option is the improvement of plant photosynthetic efficiency, a domain where the European Union could take the lead. Besides yield, quality needs to be addressed. Much of the global agricultural research has gone into producing more calories (cereals), with little attention for protein and vitamin crops like vegetables in many regions of the world. As a result, output of such improved cereals is generally higher than that of other crops, often limiting diversity in diets and thus challenging food security.

Another possibility of meeting the biomass demand is to develop new non-farm biomass production systems. Ocean farming may offer an enormous potential for marine biomass production. In particular, micro-algae are considered high potentials for energy and components. However, containment and control of nutrient flows in open water are still major challenges.

Biomass conversion can be improved by fractionating it into separate components for further processing. Such bio-refinement may allow fuller use of plants by separating high-value components for pharmaceuticals and fine chemicals from components for food and feed and residues for applications like generating energy. (gezien

de opmerking in de kantlijn, moet de zin dan niet zijn: ‘by separating high-value components from components for food and feed for pharmaceuticals and fine chemicals and from residues for applications like generating energy’?) The presence of high-tech industries, well-equipped ports and excellent logistic and scientific infrastructures makes the EU well placed to lead this development.

Enhancing global food security in the future may require measures to mitigate the increase in biomass demand, as well as a radical improvement in access to food. A global social security system would moderate the growth in world population which is being stimulated by poverty. Speeding up the development of novel nuclear or solar energy techniques might help to limit the demand for bio-energy. Effective meat substitutes may limit the consumption of livestock products which require an input of plant energy of several times their own energy content. However, the human taste for livestock products makes it difficult to develop substitutes that are widely accepted by consumers. Attempts at producing attractive meat substitutes from plants have failed, but fungi might offer better prospects.

The above options involve major investments in infrastructures, research and human capital. To avoid unnecessary scarcity, such investments should be made in time. The problem is that private and public investors have short-time horizons. If current prices are high (low), they expect that this will continue to be so in the future. Such expectations generate price fluctuations (‘cobweb cycles’) in agricultural markets by alternately causing overshooting and undershooting of trend investment. Indeed, the rise in food prices after 2005 was partly caused by low prices in the 1980s-90s which resulted in reduced investment. This price rise may now prompt a rapid exploitation of the last options still available to realise a relatively cheap increase in global farm output in countries such as Brazil or Russia. Again, this might induce a new price fall after a couple of years and once again squeeze long-term investment in the world’s capacity for food production. If this were to coincide with a trend change towards increased scarcity, the result might be a period of strongly rising food prices likely to cause havoc in poor food-importing countries.

How to make food production environmentally sustainable

Any increased production must be environmentally sustainable. This does not necessarily mean a reduction of inputs. In many poor countries, unsustainability is due to too few, rather than too much inputs. Lack of nutrients and water depletes the soil, leaving it degraded and no longer suitable for agriculture. In contrast, in many developed countries, unsustainability is the result of too much inputs. Overusage of nutrients and pesticides will

decrease the biological functionality of soil and, again, degrade it. A balanced application based on ecological principles (by some referred to as ecological literacy) is needed for sustainability. Integrated Crop Management and Precision Agriculture will be powerful tools to answer these challenges.

In many countries, a large part of any yield is destroyed by pests and diseases. Controlling these problems will greatly contribute to higher productivity. To avoid overuse of pesticides, agronomic measures are needed. Genetic resistance may prove an excellent way to avoid the use of pesticides. To fully capitalise on the possibilities of breeding, we suggest that genetic modification should not be excluded *a priori*. A regulated application of this technology, avoiding monopoly power on the part of patent holders, may turn out to be more sustainable than refraining from using it.

To prevent the depletion of phosphate reserves from constraining growth in agricultural biomass production, strategies aimed at preserving and retaining phosphate may be required. Among these are more precise application (precision agriculture), increasing the nutrient-use efficiency of plants, and recycling. Phosphate is washed into the sea and sedimented, most of it in estuaries and coastal areas. Ocean farming might be a way to regain this phosphate through phyto-mining.

How to reduce health risks of food production and consumption

Agricultural production involves several risks to human health. In high-income countries the risks of pesticide use are now largely under control. However, animal production is still posing problems. The use of antibiotics in livestock farming stimulates the development of resistance to these drugs among various pathogens that can affect humans. Moreover, livestock production is a source of zoonotic diseases that may be transmitted to humans and can even become transmittable between humans, leading to pandemics. Indeed, many infectious diseases stem from the interaction of people and livestock. The case of Q fever illustrates that the risk is not limited to large-scale closed systems. A high concentration of small-scale open systems may be even more dangerous. The highest risks for the European Union come from the spread of animal diseases from Africa and Asia as a result of increased global trade and climate change that support the spread of vectors, and from semi-traditional livestock systems around Asian mega-cities, where pandemic diseases may emerge that spread to the rest of the world, including Europe.

A different health risk arises from over-consumption, especially of fats and fast carbohydrates. It stimulates disorders such as obesity, diabetes, certain forms of cancer

and cardiovascular disease. These health problems are not easy to avoid in affluent societies, because they do not simply stem from food cultures but are rooted in evolutionary discordance. Biological evolution has equipped humans with a genetic outfit that stimulates them to eat large amounts of high-energy foods ('hungry gene'). This has helped our Pleistocene ancestors to survive when faced with an erratic supply of food, but is causing problems for people who have ample access to food.

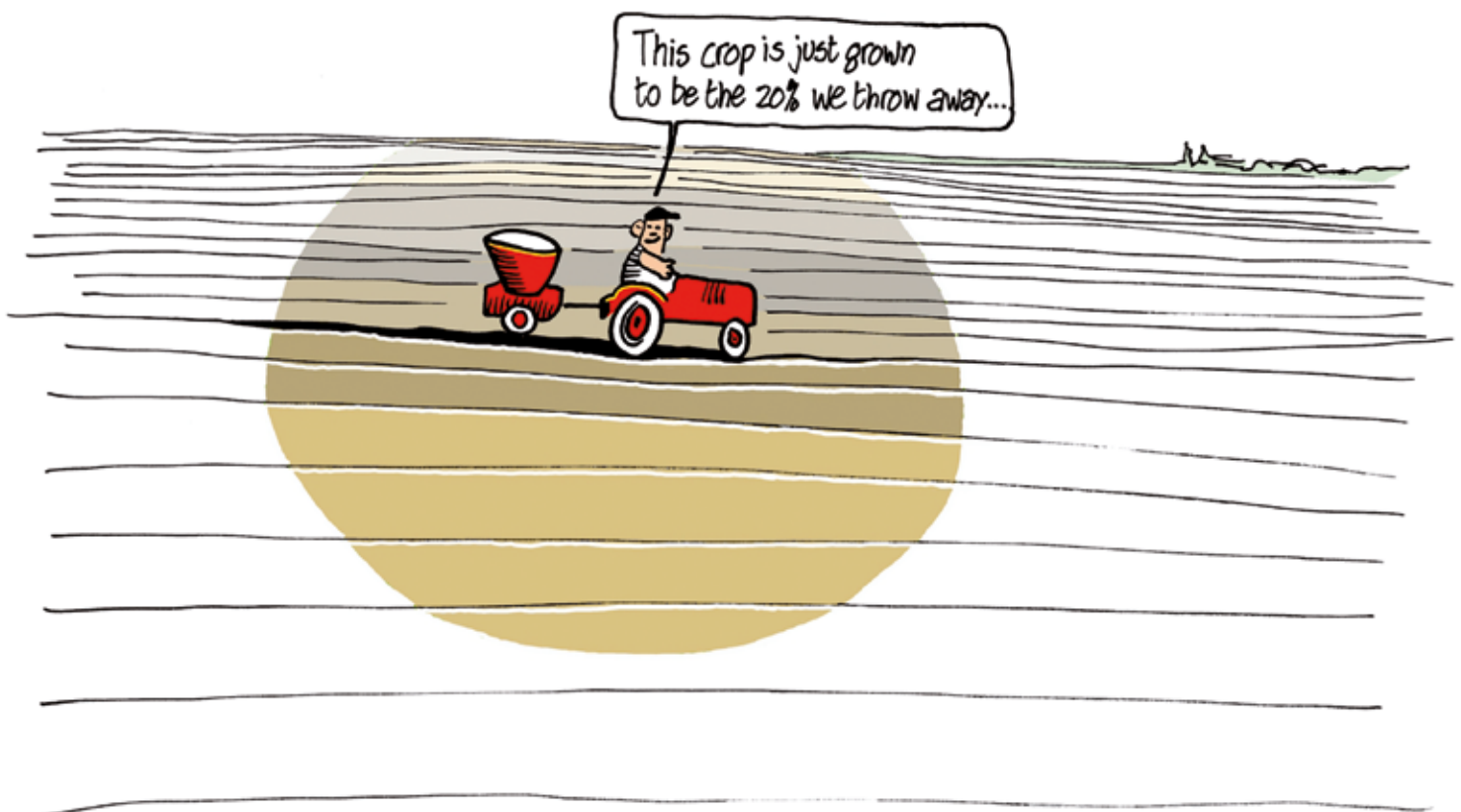
The growing awareness of the relation between nutrition and health is leading to an avalanche of slimming diets and health claims for certain foods. The latter range from natural foods (like anti-carcinogenic broccoli) to fortified foods (such as iodised salt or vitamin-enriched fruit juices) and nutraceuticals (like margarine supplemented with cholesterol-reducing phytosterols or dairy products with beneficial microorganisms). This development has led to the emergence of an industry producing special health foods and a new branch of genetic research called nutrigenomics.

Policy conclusions

The European Union can do several things to ensure a sustainable, healthy and fair food system, internally and in the world at large:

- Agriculture should be based on ecological literacy and not focus on *maximising* but rather on *optimising* production. Powerful tools are precision agriculture, integrated pest, disease and weed management, and genetic modification. To avoid problems in livestock production, concentration of production may be a better strategy than dispersing it over a large area.
- Trade may contribute to an efficient division of labour between countries, including regions that are well endowed with land and water and produce biomass for regions where these resources are scarce. Yet questions may be raised about the EU's strong dependence on imports of oilseeds and protein crops. In any case, in view of its relatively high per capita availability of suitable land and water, the EU should always retain the possibility to turn its net food deficit into a surplus should the global situation so require.
- The EU could raise its public investment in research relating to sustainable yield increases, nutrients recycling, bio-refinement, effective meat substitutes and new non-farm biomass production systems. Where possible, biodiversity conservation should be combined with agricultural production. Nature reserves and the like should be restricted to marginal lands. Organic agriculture should not be seen as a general model since it cannot feed the world and may have negative environmental effects. Governments could discourage the

- consumption of livestock products with especially unfavourable feed conversion ratios (such as feedlot beef).
- To moderate global population growth, the EU could take the lead in creating a global social security system. To reduce poverty-induced hunger and increase food production in the developing world, it could support smallholder-based agricultural development in poor countries. This requires, among other things, improved soil fertility management in regions like Sub-Saharan Africa, where lack of fertiliser produces low yields and causes widespread soil degradation. To facilitate sustainable agricultural growth, it may be necessary to stop obstructing (through European Partnership Agreements) the formation of trade blocs of poor countries that support their internal agricultural prices. The EU could render its development aid more effective by supporting agricultural research and infrastructural investment in poor countries. The latter could also be used for employment projects to compensate poor consumers for the first-round effect of import restrictions on domestic food prices.
 - Rather than stimulating the use of biofuels, the EU could invest in new nuclear and solar energy techniques. Second-generation biofuels will not end the competition with food. Even if they are not based on edible feedstock, they will still compete with food crops for scarce soil, nutrient and water resources. Nor will the use of marginal lands solve the problem. Some crops may grow on marginal lands, but they will always grow better in rich soils, and farmers are likely to choose the best soils for the economically most attractive crops. Unless biofuels are based on biomass that cannot otherwise be used, they will impact on food security.
 - The EU could reconsider the direction in which international agricultural trade reforms are heading. The current liberalisation increases the scope for endogenous price fluctuations that may discourage timely investment in opportunities for increasing biomass production. What is needed is rather a multilateral trading system that keeps agro-food prices within adequate price bands. This may require restrictions on the use of biomass for non-foods when international grain prices exceed a ceiling. As agro-food and energy systems are becoming increasingly inter-related, agro-food prices cannot be stabilised without stabilising energy prices.



The Global Challenge of Mineral Scarcity⁸⁸

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Essay for the Conference:

Enriching the Planet, Empowering Europe – Optimising the use of natural resources for a more sustainable economy,
The Hague, 26 & 27 April 2010, cf.: <http://www.clingendael.nl/resource scarcity>

⁸⁸ This essay was made possible due to contributions of the EU research project POLINARES, Policy Research On Natural Resources. The authors would like to thank Rob de Wijk, Rem Korteweg, Jan Rood and Louise van Schaik for helpful comments.

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Introduction

Over the past decade, global mineral markets have experienced the longest boom in prices since World War II as demand grew rapidly and supply struggled to keep pace. This has created fears of mineral scarcity and brought mining and metals back on the policy agenda, from which they had been notably absent for decades. Concerns in these debates have focused especially on a number of minor and specialty metals that are key to emerging high-tech applications and most notably many 'green' technologies. Material security concerns and growing fears that these 'high-tech metals' are used for resource diplomacy by mineral-rich states such as China, have recently increased the visibility of the issue.

However, do growing demand, slow supply growth and high prices for metals really matter to Europe? Europe's construction, chemicals, automotive, aerospace, machinery and equipment sectors all critically depend on metals supply. But the value of the metals used in most cases represents only a fraction of the costs of the end-products in these industries' products, and the European economy is therefore certainly able to deal with significant price increases in metal markets. Nonetheless, there are a number of reasons why policy-makers should concern themselves with the recent developments in mineral markets. This essay provides a short overview of key trends in metals demand and supply and discusses the implications of growing metal scarcity for Europe as well as the emerging European policy response.⁹¹

Rapid Growth in Demand...

As a large fraction of the world population continues to industrialise and urbanise in large developing countries with China at the helm, many analysts believe that the world economy has entered an unusually resource-intensive phase of expansion or a so-called 'super cycle'. Such a super cycle is associated with a 'prolonged (decades) long-trend rise in real commodity prices' and mineral prices in particular.⁹² In studying long-term developments of copper prices, Alan Heap of the Citigroup identified two such demand-driven super cycles since the late 19th century, one around the turn of the century driven by the industrialisation of the US and a second after WWII spurred by the industrialisation of Japan (see Figure 1).

Heap conjectured that the world stood at the beginning of a third super cycle. This result has been confirmed by a recent IMF staff study, which analysed long-term price developments for six different base metals with advanced econometric techniques, identifying three such cycles over the past century instead of two (see Figure 2).⁹³

Figure 1:
Super cycles in copper prices as identified by Heap (2005)

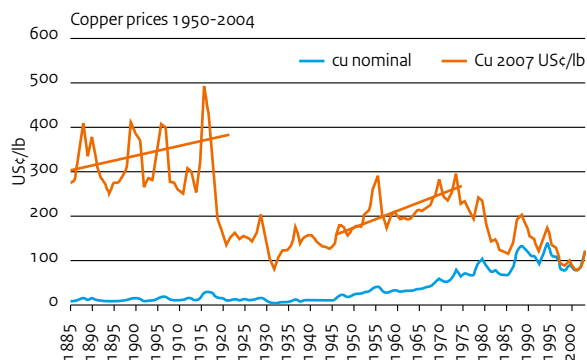
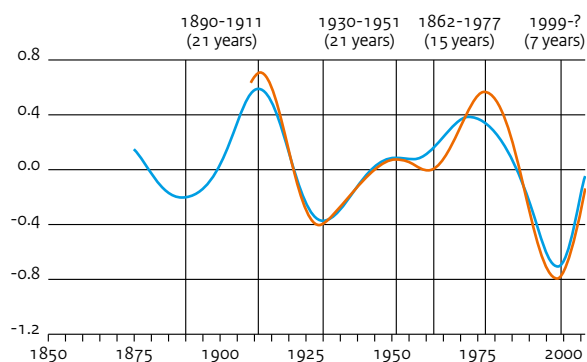


Figure 2:
Super cycles in long-term prices of six base metals, as identified by IMF staff (2008)



Super cycle theories certainly remain controversial, but there is no doubt that the increase in demand for mineral resources has put enormous pressure on global mineral markets over the past decade.⁹⁴ It is also clear that this demand growth has overwhelmingly originated from emerging economies and China in particular (see Figure 3). The extraordinarily high demand for metals in China over the past years can be explained by sustained, massive investments in infrastructure, rapid urbanisation and the relocation of a substantial fraction of global

⁹¹ Given the limited scope of this paper we focus here on base metals and minor metals. Similar, though less prominent debates have also covered industrial minerals, fossil fertilisers and precious metals such as gold.

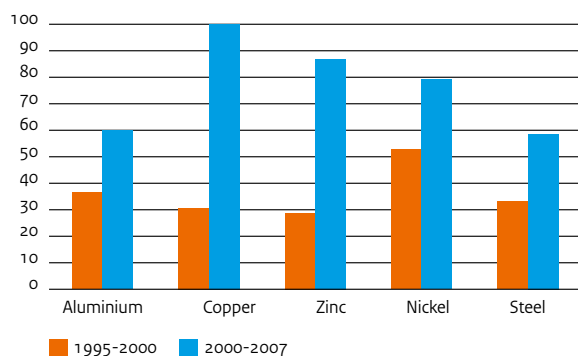
⁹² Heap (2005), *China – The Engine of a Commodities Super Cycle*, Citigroup Smith Barney.

⁹³ Cuddington & Jerret (2008), *Super Cycles in Real Metal Prices*, IMF Staff Papers 55(4), pp. 514-565.

⁹⁴ Humphreys (2009), *The Great Metals Boom: A Retrospective*, Resources Policy 35, pp. 1-13.

manufacturing capacity to China. As high GDP growth rates, rapid urbanisation and large infrastructure investments are likely to continue not only in China but also in several other large emerging economies over the coming years, experts expect sustained high demand growth for a number of base metals.

Figure 3:
China's share in global demand growth for base metals
1995-2007⁹⁵



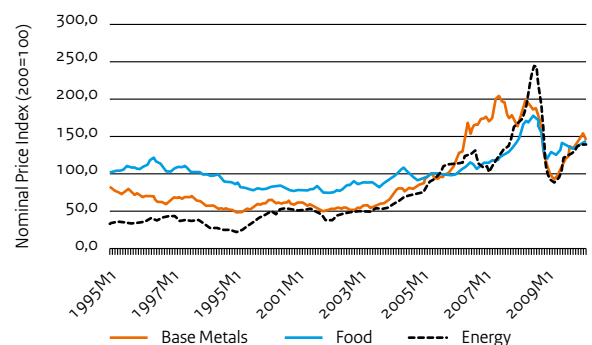
However, not only the demand for base metals will keep growing rapidly. Many key emerging technologies require growing amounts of a large number of more 'exotic' specialty and minor metals, such as Rare Earth Elements (REEs), Lithium, Tungsten, Tantalum, Indium, or the Platinum Group Metals (PGM). These elements have become an indispensable part of high-tech applications such as mobile phones, flat screens or hybrid cars as well as a long list of other applications in aerospace, automobile, defence, optical, semiconductor and advanced chemical industries, as well as in many emission-reduction technologies.

While such 'high-tech metals' are often used in only very small quantities in individual products, demand has been growing very quickly as new applications appear almost daily. Future demand for individual elements is very difficult to forecast as it depends critically on new technological innovations and the rate of diffusion of specific emergent technologies, such as hybrid cars or specific types of wind turbines for example.⁹⁶ Nonetheless, there is little doubt that demand for these high-tech metals in general will keep growing precipitously over the coming years and that they will continue to play a critical role in the high-tech industries of the future.

... and Struggling Supply

While demand kept growing rapidly over the past decade, suppliers struggled to keep pace and often missed their production targets.⁹⁷ This led to a sharp tightening of mineral markets and a volatile rally in prices. Over a decade, prices for base metals quadrupled in nominal terms from their lows during the Asian Crisis and in real terms reached levels not seen since the commodity shocks of the 1970s (see Figure 4). For high-tech metals, the ride has been even rockier. Temporary bottlenecks in supply or precipitously increasing demand due to a new technical application have caused severe price shocks for several of these metals over the past decade. A good example is that of Indium, for which the price jumped more than 800% between 2002 and 2005, mainly due to its usage in ever-more popular flat screen displays and TV panels.⁹⁸

Figure 4:
Nominal price developments for primary resources
(1995-2005)⁹⁹



The price boom for metals came to a sudden end in March 2008, when the onset of the financial crisis lowered demand projections considerably. In less than a year, base metal prices lost more than half of their value, leading to widespread pain in the mining industry. Analysts quickly began to decry the 'super cycle' as a commodity price bubble that was inflated by profit-hungry speculators.¹⁰⁰ However, the crisis in metal markets turned out to be short-lived and base metal prices have again been on a firm upward trajectory since February 2009. Up until today, metal prices have regained roughly half of the loss they sustained during the crisis, an impressive performance given a world economy that has been busy trying to recover from its worst crisis in decades. If global demand keeps recovering as analysts expect, supply is likely to

⁹⁵ From Farooki (2009), *China's Structural Demand and the Commodity Super Cycle: Implications for Africa*, paper prepared for the Leeds University Research Workshop 'China Africa Development'.

⁹⁶ Oakdene Hollins Research & Consulting (2010), *Lanthanide Resources and Alternatives*, Report for the UK Department for Transport and the UK Department for Business, Innovation and Skills.

⁹⁷ Humphreys (2009), *The Great Metals Boom: A Retrospective*, Resources Policy 35, pp. 1-13.

⁹⁸ USGS Mineral Commodities Summaries 2007, p. 78.

⁹⁹ HCSS, based on monthly price indices from the IMF Commodity Prices Database.

¹⁰⁰ Humphreys (2009), *The Great Metals Boom: A Retrospective*, Resources Policy 35, pp. 1-13.

come under renewed pressure, possibly leading to a return of record prices.

The massive price rally in minerals has created fears of shortages and debates on the threat of ‘mineral scarcity’ among policy-makers and in the media. These discussions have mainly focused on worries that an ever-growing world population and global economy might quickly be reaching the ecological limits of the planet and that non-renewable resources will soon be ‘running out’.

In contrast to this, careful analysis shows that the reasons for the sputtering growth in the supply of natural resources are much more complex.¹⁰¹ The cyclical nature of the mining industry, long lead times for setting up new mines and a sore lack of investments are at least as much to blame for relatively slow supply growth as the exhaustion of available resources. In fact, there is plenty more to be found on our planet, even if these resources are not so easy to find, convenient to access and easy to extract as the resources we have been consuming in the past.¹⁰²

However, at least for base metals with a long history of extraction, there is no denying that the exhaustion of many existing mines and the shrinking size, increasing remoteness, greater depth and lower ore grade of new mineable deposits pose a significant challenge to expanding global supplies.¹⁰³ Mining and refining of base metals has become technically more difficult and increasingly energy intense, as the ‘low hanging fruit’ has been picked. These factors are threatening to considerably drive up production costs in conventional mining and create worries that future production may not keep pace with the voracious growth of demand.

For many high-tech metals, producers have also experienced difficulties to expand supplies at the pace of demand. However, it is key to understand that for most of these minor and specialty metals, the lion share of world production comes from only a handful of mines around the world and supply growth is constrained by different factors than in the base metal case. After all, most of these elements are not necessarily less abundant in the earth’s crust than base metals, but their mining has typically started much later in history, and annual production volumes are only a fraction of those for base metals. Geological constraints to increasing supply thus play a limited role here. Instead, investments in high-tech metals mining have been insufficient despite high prices and projections for growing demand. Figure 5 provides an overview of the most salient reasons that are causing under-investments in high-tech metals production.

Figure 5:

Concerns for large-scale investors in high-tech metals mining¹⁰⁴

Factor	Constraints
Competition	Opaque cost curves of competitors.
	Concentrated asset ownership among suppliers, non-competitive market structure.
Prices	Ability to hedge against price depression is limited.
	Forward curve visibility is poor.
Marketing	Lack of transparent markets with large amounts of buyers creates risks beyond the mine gate.
Substitutability	Potential of substitution in key applications creates risks of a sudden collapse in demand.
Scale	Investments relatively small in comparison to base metal mining, creating unfavourable balance towards overhead in terms of market research, R&D.

Does Mineral Scarcity Matter to Europe and the World?

In most end-products, the value of the metals contained represents only a fraction of the costs for the European consumer and the European economy is certainly able to weather significant price increases for raw materials. Nonetheless, there is cause for concern. Europe produces only 3% of the global supply of metals and is therefore to a very large extent dependent on imports from the rest of the world (see Figure 6).¹⁰⁵ A steep increase in real prices of metals implies therefore that wealth is transferred from import-dependent European countries to commodity suppliers. More importantly, however, resource-rich countries are able to provide their industries an unfair advantage over their European competitors, a strategy that several emerging economies have recently engaged in. Especially in the high-tech sector, where new technologies critically depend on minor or specialty metals, unequal access can be cause for concern.

Faced with the prospect of increasing demand and tightening supply of minerals used in critical applications, access to scarce minerals and stockpiles are also increas-

¹⁰¹ HCSS (2009), *Scarcity of Minerals: A Strategic Security Issue*, Report available for download at www.hcss.nl.

¹⁰² Tilton (2003), *On Borrowed Time? Assessing the Threat of Mineral Depletion*, Washington, DC: Resources for the Future.

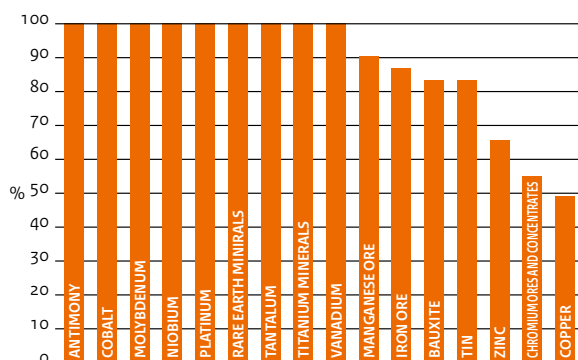
¹⁰³ Diederer (2009), *Metal Mineral Scarcity: A Call for Managed Austerity and the Elements of Hope*, TNO Defence, Security and Safety.

¹⁰⁴ HCSS, based on Barclays Natural Resource Investments, (2010) *An Investor’s Perspective on Exotic and Specialty Metals Sector*, presentation at Rare Earths, Speciality & Minor Metals Investment Summit, 18 March 2010, London.

¹⁰⁵ EU Commission (2008), Communication from the Commission to the European Parliament and the Council: The Raw Materials Initiative – Meeting our critical needs for growth and jobs in Europe, Brussels.

ingly framed as issues of vital interest or national security. China, the US and Japan, for example, are all aggressively pursuing strategies that guarantee their high-tech industries' access to specific metals such as Rare Earth Elements (REEs), a development that may come at the detriment of European interests.¹⁰⁶ Due to import dependence and concentrated supplies, European industries are vulnerable to sudden supply shocks, e.g. because of changes in the industrial policy of key suppliers or trade and political disputes.

Figure 6:
EU net imports of metals as percentage of apparent consumption¹⁰⁷



A particularly serious issue in this context is the dependence of many emerging 'green technologies' on a number of high-tech metals and especially large quantities of REEs.¹⁰⁸ The limited supply of these materials has the potential to develop into a serious drag on the transition to more sustainable energy generation and use. Today, China controls the supply of REEs and has been moving aggressively to curb supplies to the rest of the world as its domestic demand increases and it seeks to move up the value chain. While large viable reserves exist outside of China, new mining projects have been advancing very slowly, mainly because of profitability concerns and lack of investments.¹⁰⁹

Increasing resource scarcity could also intensify both intra- and inter-state conflict. The role of diamonds in fuelling violent conflicts in Sub-Saharan Africa has been well documented. But conflicts can also thrive on other mining

products, especially where artisanal mining is involved. Tantalum (or 'Coltan', after the mineral that contains this crucial high-tech metal) mining in Congo is a case in point. High prices can make such business much more profitable. As the recent Western concerns over Chinese policy on REE exports and its investments in the African mining sector show, tight markets can also work to exacerbate trade and investment disputes, making the world as a whole a more dangerous and less stable place to live in.¹¹⁰

Meeting the Challenge of Mineral Scarcity

Well-designed policies can help Europe and its industries to adapt to increasing mineral scarcity and to mitigate negative consequences of mineral scarcity. With regard to Europe's policy towards minerals, three goals are important: to decrease dependency on metal supplies from the rest of the world, to support global mining industries in increasing output and to ensure fair and secure access to minerals.

Decreasing dependency on foreign supplies means both to become 'metals-lean', i.e., to reduce waste and make consumption of metals in industries more efficient, and to increase European supplies of metals. In some cases, this may mean opening new mines in Europe. Much more importantly, however, it means turning to recycling as a key source of future material supply for industries. Recycling industries are still far from having realised their full potential, especially when it comes to high-tech metals, and could become very profitable businesses in the future. In order to support the expansion of the global supply of minerals over the coming years, European countries could work to increase investments in the conventional mining sector and invest systematically in R&D for the resource extraction technologies of the future. In a highly cyclical industry with long lead times which often operates in countries with limited infrastructure and weak institutional frameworks, investments by the private sector are often suboptimal. This is particularly the case for high-tech metals. Public support for ensuring adequate levels of investment in the production of metals of strategic importance to European industries is therefore crucial. Such investment support could take place for example through, public-private partnerships in FDI or loan guarantees. As large, easily accessible deposits of high ore grades are being exhausted, there is also no denying that expanding supplies of minerals throughout the 21st century will demand orientation towards new resource frontiers. Examples of such frontiers are ultra-deep mining or deep-sea mining, but also advanced refining technologies that allow processing of lower ore grades. Europe could contribute to such cutting-edge technologies.

¹⁰⁶ HCSS (2009), *Scarcity of Minerals: A Strategic Security Issue*. Report available for download at www.hcss.nl.

¹⁰⁷ HCSS, based on EU Commission (2008), Commission Staff Working Document Accompanying the Raw Materials Initiative, Brussels.

¹⁰⁸ Jacobson & Delucchi (2009), *Evaluating the Feasibility of a Large-Scale Wind, Water, and Sun Energy Infrastructure*, University of Stanford Working Paper.

¹⁰⁹ Oakdene Hollins Research & Consulting (2010), *Lanthanide Resources and Alternatives*, Report for the UK Department for Transport and the UK Department for Business, Innovation and Skills.

¹¹⁰ UNEP (2009), *From Conflict to Peacebuilding – The Role of Natural Resources and the Environment*.

Finally, Europe could also do more to ensure that global markets provide continuity and reliable access to critical mineral supplies at fair and transparent prices. In our view, a firm and united European position on these issues should be actively promoted in multilateral fora like the WTO, OECD or G-20, and issues of access and supply should be treated in multilateral settings rather than bilaterally. Pursuing transparency in pricing and the encouragement of a stable and predictable regulatory environment in key producer countries, most notably China, are also needed.

Until now, the European Union's policy response to this issue has been relatively slow and hesitant. The UK, Germany and France have made some steps towards defining critical mineral resources for their industries and some Nordic countries have sought to harmonise their development policy with mining interests.¹¹¹ Mineral scarcity has also been addressed in some policy documents on natural resource scarcity, e.g., in the UK and the Netherlands.¹¹² But in general, the issue has been low on the European and most Member States' policy agendas. A notable exception to this has been the Raw Materials Initiative of the European Commission that has sought to bring to the fore the issue of critical raw materials and is particularly focused on high-tech metals.¹¹³ Figure 7 summarises the comprehensive policy recommendations of the Raw Materials Initiative for the European Commission, individual Member States and the European industries, which overlap considerably with the recommendations made above. The EU has also recently launched a multi-year research project on natural resource scarcity under its Seventh Framework programme. In this so-called POLINARES project, 12 European knowledge institutions cooperate in developing guidelines for a European Policy on Natural Resources.¹¹⁴

¹¹¹ For Germany, see M. Frondel, G. Angerer, et al. (2007), *Trends der Angebots- und Nachfragesituation bei mineralischen Rohstoffen*, RWI Essen, ISI, BGR; for France, see C. Hocquard (2008), 'Les nouveaux matériaux stratégiques, métaux high tech, métaux verts, vers une convergence', *Mag'Mat*, 26; Oakdene Hollins (2008), *Material Security. Ensuring Resource Availability for the UK Economy*. Chester: C-Tech Innovation Ltd; for Nordic initiatives on mining and development, see Global Uttmaning, Raw Materials Group (2009), *Mining for Development a Preparatory Study*.

¹¹² For the Netherlands, see Projectgroep Schaarste en Transitie (2009), *Schaarste en Transitie: Kennisvragen voor Toekomstig Beleid*, Dutch Ministry of Foreign Affairs and Dutch Ministry of Housing, Spatial Planning and the Environment. For the UK, see HM Treasury (2008), *Global Commodities: A Long-Term Vision for Stable Secure and Sustainable Global Markets*, London: Crown.

¹¹³ EU Commission (2008), Communication from the Commission to the European Parliament and the Council: The Raw Materials Initiative – Meeting our critical needs for growth and jobs in Europe, Brussels.

¹¹⁴ More information on POLINARES can be found at the project website: www.polinares.eu.

Figure 7:
The EU Commission's Raw Materials Initiative¹¹⁵

Pillar	Policy Recommendations	Level of Response
First: Undistorted Access to Raw Materials	Identify/define critical raw materials.	European Commission (EC), Member States (MS), Industry
	Include provisions on access to raw materials in bi/multilateral trade agreements.	EC, MS
	Launch EU raw material diplomacy with resource-rich countries.	EC, MS
	Identify & challenge trade distortion measures taken by third countries.	EC, MS, Industry
	Issue yearly progress reports on the implementation of trade aspects.	EC, MS, Industry
	Promote sustainable access to raw materials in development policy.	EC, MS
Second: Regulatory Framework Conditions	Exchange best practices in land use planning and administration of exploration/extraction.	MS
	Develop guidelines on reconciliation of extraction activities in environmentally protected areas.	EC
	Promote skills and focused research on innovative exploration & extraction technologies.	EC, MS, Industry
	Encourage better networking between national geological surveys.	MS
Third: Resource Efficiency & Reduction of EU Primary Raw Material Consumption	Foster substitution of raw materials.	EC, MS, Industry
	Promote recycling.	EC, MS, Industry
	Facilitate the use of secondary raw materials.	EC, MS, Industry

¹¹⁵ HCSS, based on EU Commission (2008), Communication from the Commission to the European Parliament and the Council: The Raw Materials Initiative – Meeting our critical needs for growth and jobs in Europe, Brussels.

In our view, the European Union and Member States' governments should seek to move swiftly to address this issue and create more situational awareness amongst policy-makers, business leaders and the public. Mineral markets, especially those for high-tech metals, must be more closely monitored and no-regret policy options, such as moving towards increased recycling, should be vigorously pursued. Creating a more cohesive joint European position on the issue of mineral scarcity and coordinating national policy responses at the European level should be made an urgent priority. The EU Raw Materials Initiative provides an excellent forum and numerous concrete recommendations on how to address mineral scarcity.

The Scarcity Issue: Energy, Raw Materials & the EU

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Essay for the Conference:

Enriching the Planet, Empowering Europe – Optimising the use of natural resources for a more sustainable economy,
The Hague, 26 & 27 April 2010, cf.: <http://www.clingendael.nl/resource scarcity>

Issues of energy scarcity and other raw materials demand large-scale policy attention. Scarcities emerge when it is impossible to enlarge production, when there are no alternatives, and when there is price inelasticity or a sharply rising level of consumer demand. Yet the world is not facing emerging individual scarcities, but a spectrum of interconnected global shortages. These increasing, interacting scarcities have been receiving public attention.¹¹⁶ Most significant are the interactions between the commodities of energy, food and water. Energy scarcity is considered to influence food scarcity through, for example, the usage of land for the production of biofuels, and likewise, food scarcity has an effect on the availability of energy. The same line of reasoning holds for the relation between food and water and energy and water. In dealing with scarcities, causalities should be balanced. The question is which dimensions – geopolitical, economic, etc. – are most relevant for the well-being of our societies and how governments and business can deal with the issue of scarcity. This essay will elaborate on energy scarcity, but the ideas provided may be relevant for other natural resources as well. The dilemmas surrounding the uncertainty of energy supply and the possibilities for policies regarding international cooperation, and specifically regarding the EU, are reviewed and suggestions are made.

Scarcity of energy

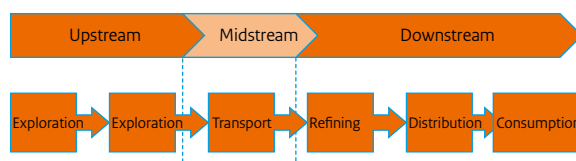
Global energy demand is expected to continue to grow, though in 2009 demand slowed down compared to previous years. In the nearby future, population growth and economic development in China, India and the Middle East are likely to cause rising energy prices. Moreover, when the global economy recovers, energy demand will revive with it. To satisfy renewed economic growth, huge investments are necessary to discover, develop, process and transport energy services and deliver them to consumers. According to recent estimates,¹¹⁷ the world will need to invest some \$26 trillion to meet the projected global demand by 2030, nearly \$1.1 trillion per year, about 25% of which must go to the oil and gas sector alone.¹¹⁸ Most disturbing is that a large proportion of those investments will be needed to compensate for the natural decline in existing oil and gas fields. Oil and gas are projected to remain the dominant energy sources, with some 60% in the EU fuel mix for the

2030 period.¹¹⁹ From a scarcity perspective, these figures are alarming. As oil is still the dominant energy source, and thereby the most complex factor in any energy policy, the difficulties surrounding fossil fuels are illustrated by the following example.

An illustration: oil

With regard to the most prominent source of energy – oil – anxiety over scarcity has existed since the 70s. Based on the recent *BP Statistical Review of World Energy*, however, global oil reserves amount to about 1200 billion barrels, potentially delivering some 40 years of continuous world production at present levels (85 mbd).¹²⁰ This picture is too simple, though. Several factors cast a shadow of uncertainty over oil production. Because of the volatility of oil prices and the insecurities surrounding the supply of oil and its supply routes, oil has to be approached strategically. Other issues affecting the production of oil are lack of investments in the existing value chains in the past and future risks influencing the investment climate.¹²¹

Figure 1:
Oil supply chains up to 2020



Energy **supply chains**, such as for oil as shown in Figure 1, increasingly cover a number of jurisdictions and more than one continent. In the case of oil, the average OECD country is confronted with upstream sections in a decreasing number of oil-exporting countries. And as about 70% of all oil resources is located in a more or less concentrated ‘strategic ellipse’ (as can be seen in Figure 2), investment risks in the upstream sections are increasing as they become more and more dependent on the role of a limited number of governments in relatively volatile and politically sensitive areas.

¹¹⁶ E. van der Voet and T.E. Graedel (2009), ‘The Emerging Importance of Linkages’, in: *Linkages and Sustainability*, Strüngmann Forum Reports, November 2009; J. Beddington (2009), ‘Food Energy, Water, and the Climate: A Perfect Storm of Global Events?’, Government Office for Science, March 2009.

¹¹⁷ IEA World Energy Outlook 2009.

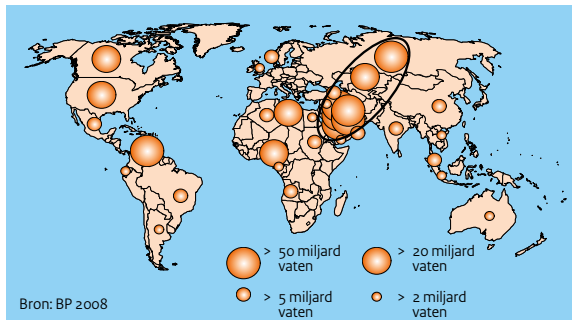
¹¹⁸ IEA World Energy Outlook 2009.

¹¹⁹ EU Energy in Figures, DG TREN 2009.

¹²⁰ *BP Statistical Review of World Energy* 2009, BP (London 2009).

¹²¹ Based on analyses carried out by CIEP in the context of the ‘Defensieverkenningen 2010’ and the ‘Scarcity & Transition’ project itself.

Figure 2:
Some 70% of global world oil resources is found in a strategic ellipse

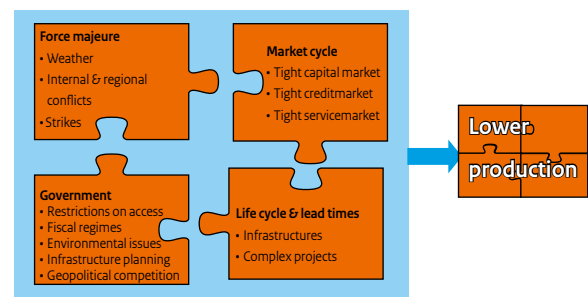


Public and private **investments** in developing supply capacities and infrastructures in the energy chains are facing ‘above ground risks’ that are highly interdependent. These interdependencies exist in all sections of international energy markets and impact on medium and longer-term production levels, thus influencing supply and demand balances. For instance, these interdependencies played a significant role in the tight international oil markets during 2004 and 2005, when every small and local supply interruption had wider impacts on international oil prices.¹²² Resolving tightness in the oil market requires that the overall investment climate be considered as well, as is shown in Figure 3. Factors such as force majeure, international market cycles, life cycles within market sectors and – in particular – government policies all affect the investment climate. Combinations of these factors have led to a doubling of project development costs and an average delay of some 12–15 months in the realisation of additional production capacities for the world market.¹²³

Bringing resources above ground is one thing, but bringing them to world markets is another. This requires **infrastructures** for transport and further **refining** to meet market specifications. Because of the enormous costs and security guarantees regarding transportation, governments have a vital role in transporting energy. They directly determine, via their planning and other decision-making procedures, the timing and further economics of the projects involved.

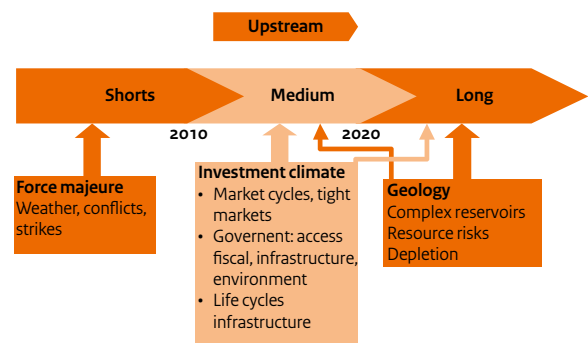
Another factor to be mentioned is the **geopolitical competition** between consuming and importing countries, between producing and exporting countries, and, at even more complicated levels, between producing/exporting and importing/consuming countries. The market models in place determine the levels of this geopolitical competition. It makes a difference whether these markets are of a more ‘business-to-business’ nature or whether they are dominated by, as can now be seen more often, especially in oil and gas, ‘government-to-government’ models.

Figure 3:
Interdependencies between above ground risks in energy production



Time is a crucial factor as the development of new resources and their supply chains usually have long time frames, especially when these new resources are located in more remote and environmentally difficult areas. As a consequence, short-term political considerations with impacts on above ground risks might have effects over time. Inconsistent short-term policies thus have long-term impacts, not only on the energy production of the country concerned but also on global markets. Figure 4 gives an indication of these relations.

Figure 4:
Interdependencies in underground and above ground factors in the upstream sector in the supply chain¹²⁴



¹²² ‘Turmoil on the International Oil Markets: Getting Used to Production Capacity Constraints’, in: *Challenges in a Changing World: Clingendael Views on Global and Regional Issues*, Den Haag, Instituut Clingendael, p. 208.

¹²³ *Medium Term Oil Market Outlook*, Clingendael Energy Lecture 2009, Noburo Tanaka (IEA).

¹²⁴ CIEP analysis.

These rather pessimistic observations, in this case specified for oil, are also generally applicable to a number of energy and other natural resources.¹²⁵ In its 2009 World Energy Outlook, the IEA indicates that although the financial crisis and the falling demand for oil and gas will somewhat relieve short-term supply constraints, in the medium to longer term uncertainties due to falling energy investments will continue to entail serious risks for energy supplies. As regards oil, the IEA concludes¹²⁶ that:

'even if investment recovers strongly and quickly with economic recovery and higher oil prices, gross-oil production capacity additions would taper off after 2011, as the impact of extending project completions takes effect and because relatively few major projects have been sanctioned during the last two to three years.'

For gas, the situation is more complex as falling gas demand and the completion of a number of LNG trains have somewhat eased the pressure on international gas markets. Although the overall gas resource basis is large enough to cover any reasonable rate of increase in demand up to 2030 and beyond, analysis indicates that more than half of the world's existing production capacity needs to be replaced by 2030.¹²⁷ These replacements again require huge upstream and timely investments in a limited number of countries that are all located within the strategic ellipse shown in Figure 2.

The main conclusion is that an increasing role of governments is needed in determining the rules of the resource game.

Conditions of access to exploration, exploitation and production have become more politicised and hence insecure, the more so when state-owned entities are involved in the game and governments include geopolitical considerations and objectives in their strategies. These risks regarding the development of production and transport infrastructures are highly likely to increase tension and conflict. Therefore, the international system should be ready and capable to react.

International cooperation to meet conflict and tension

In human history there has always been tension and conflict over natural resources and energy. For centuries, nations and communities have fought wars to gain or defend access to those resources, which are seen as important to their survival or success. As regards oil, gas and minerals, economic globalisation has led to a progressive enlargement of the potential scope for tension and conflict. As the value chains of these resources produce high economic rents and typically stretch across national borders, governments do not just play a regulatory role but are more involved in these sectors. They often act as economic rent collector as well, through either taxation or ownership, and thus define their stakes. In recent years, tensions have been growing because governments and business fear an absolute, long-term decline in the availability of natural resources and hence in their stakes. Together with the changing international political and economic system, collaboration between nations is becoming increasingly important. The bipolar system of the Cold War period, which ended in 1989, was replaced by a short period of unipolarity in which the US was the sole super power. Action by the US and perceptions by others could be regarded as a 'proof of principle'. It is in particular noteworthy to highlight the role of oil markets in this context, with steeply rising and declining oil prices since 2003 and major impacts on global financial imbalances.¹²⁸ Especially the increasing role of emerging economies, particularly China, is seen as a herald of change in today's world system. Discussions also focus on the question of whether these changes are to be regarded as shifts in the structure of the system or as a modification of the system as such.

Regarding energy, a further strengthening of 'government-to-government' transactions is expected. States will pursue more leadership in securing energy supplies as these are perceived to become more relevant in securing vital economic and security interests. The rise of nationalistic approaches, with aggressive competition, are further affecting upstream investment climates and medium-term production opportunities. Concerns over climate change and environmental degradation are also factors in this new game. However, transition processes towards a sustainable low-carbon energy economy are highly complicated and require longer time frames to adapt. Therefore,

¹²⁵ It should be noted here that these analyses could also be carried out from the downstream perspective, which would show that the prevailing market models do not always provide the appropriate incentives for investments into new production capacities and hence influence secure supplies.

¹²⁶ IEA World Energy Outlook 2009, p. 151.

¹²⁷ Ibid., p. 49.

¹²⁸ It is useful to note that these events have led to further reflections on how oil markets and financial markets interact, resulting in new approaches to global oil and financial market governance and even regulation. The recent IEF Ministerial Meeting in Cancun (March 2010) is an example in this respect, leading to further potential system changes.

additional uncertainties for producers and consumers alike about the role of fossil energy will influence the timing of new investments. In addition, the global energy market is facing a situation of increasing perceptions of rising resource scarcities and policy approaches away from these resources. In this context, the EU needs to reconsider its role and positions, and assess its perceptions of other major players, notably the US and China.

The EU, consequences, actions?

For the first time since its inception, the EU considers access to oil, gas and minerals as a high priority. Although in the beginning the European project included energy,¹²⁹ a comprehensive integrated EU energy policy did not emerge. Concerns over the supply of energy were either not perceived, or dealt with at another international level.¹³⁰ Though the 1980s and 1990s saw concerns within the EU declining due to relatively abundant supplies, since the beginning of this century the awareness of the urgency to secure energy supplies is back on EU policy agendas. Although earlier energy policy documents tended to focus on the internal energy market, energy efficiency and clean energy, the Green Papers of 2000 and 2006¹³¹ explicitly identified security of supply as one of three main cornerstones of EU energy policy.¹³²

Energy security was further highlighted in the 2008 Strategic Energy Review (SER),¹³³ which warned against continuing energy import dependencies, which amount to around 55% today to 65% by 2020. Although the SER aims at better internal supply security and solidarity, it does not include an external EU energy policy. The 2008 Green Energy Package,¹³⁴ which sets out ambitious goals for 2020, provides concrete measures. However, the main focus of the Package is not on managing energy import dependencies. With regard to the functioning of the internal market, the EU has embarked on a major and relatively successful process of energy market liberalisation,¹³⁵ but again, it does not address long-term energy security concerns.

The three agreed Policy Packages (the Market Package, the Green Package and the Strategic Energy Review) are, however, failing when it comes to consistent and coherent implementation. This is a reflection of the major differences between the Member States regarding resources, policies and interests. These discrepancies between Member State interests influence in particular the formation of an external energy policy. In a recent report of the Research Institute 'Notre Europe' this is formulated as follows:

*'European energy policy is essentially an internal market policy flanked by measures adopted in the context of the Community's environmental policy, and without concrete real foreign policy dimensions.'*¹³⁶

The European Reform Treaty may bring new momentum, making energy policy, including external supply security, a shared competence of the Union and its Member States. However, securing external energy supplies involves such a complex, powerful mixture of interests, including the vital security aspects that are usually monopolised by states themselves, that it remains debatable whether the EU will be politically allowed to develop a strong and unified voice in forthcoming dialogues with other major players.

If the EU gets the green light to use such competence, it should have practical options regarding what kind of external strategy it could effectively establish. Difficulties lie ahead in seeking a balance between the roles and interests of national states and in defining the communality of energy supply. Globally, the external policy will have to deal with an increasingly complex world in terms of power. The EU should think about the role it wants to play and about the effect a unified voice would have on other players, such as the US, China and Brazil. Hence, the EU and its Member States should reflect on a new strategy and agree on effective instrumentation. The Barroso II Commission is expected to come up with a new, integrated energy policy approach in the coming year. To this end, fresh ideas have been raised by the think-tank community.¹³⁷

¹²⁹ The 1952 ECSC Treaty on coal, expired and not renewed in 2002; the 1958 Euratom Treaty on Nuclear Energy, still in place but used selectively.

¹³⁰ The IEA allocation mechanism in case of an oil emergency.

¹³¹ COM(2000) 769 final and COM(2006) 105.

¹³² Ibid.

¹³³ SEC(2008) 2794 and 2795.

¹³⁴ COM(2008) 30.

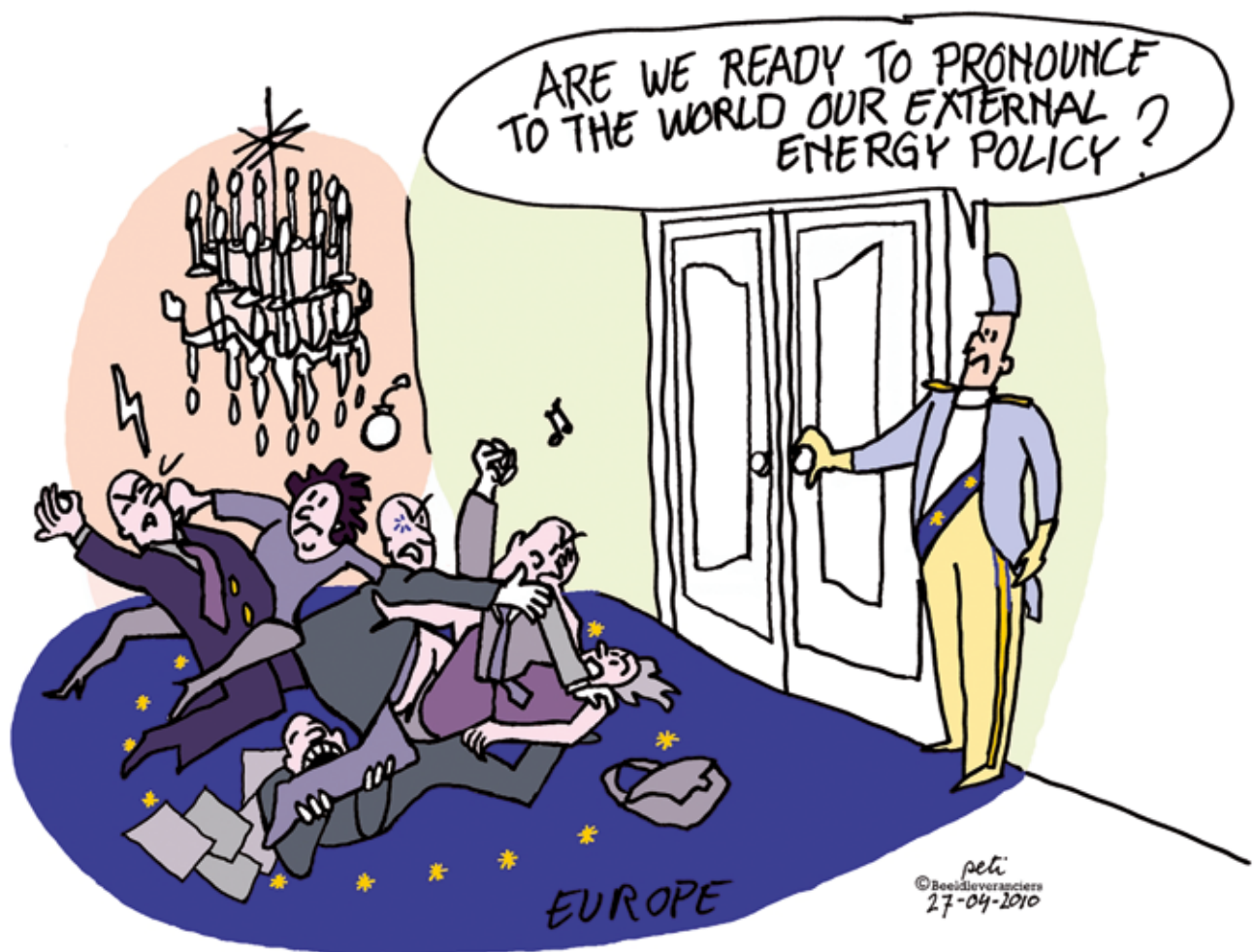
¹³⁵ A new, wide set of directives and regulations (the 3rd Energy Market Package) should enter into force in March 2011 (OJ L 211, 14 August 2009).

¹³⁶ *Towards a European Energy Community: A Policy Proposal*, April 2010.

¹³⁷ Reference is made to the Roadmap 2050 of the European Climate Foundation (www.roadmap2050.eu), the study mentioned in footnote 19 and the Smart EU Energy Policy Project of CIEP in cooperation with the Loyola de Palacio Chair at the EU University Institute, the Fondazione ENI Enrico Mattei and Wilton Park Conferences (April 2010, www.clingendael.nl/ciep).

Concluding reflections for discussion

- The world at large is facing huge challenges in meeting the demand for energy and other natural resources, and in fairly distributing them. New emerging global players are setting the scene in a variety of ways, demanding effective responses at EU levels. Present EU energy policies are useful but not sufficient as they focus on the internal market and environmental policies and are unable to meet the EU's external energy supply concerns and needs.
- The EU lacks a coherent strategy for its external position, for securing its future energy and for meeting other resource needs. Such a strategy should focus on the EU's clear needs in relation to its external energy supplies and the ways and means to effectively pursue them.
- Speaking with 'one voice' on external energy issues may as yet be a bridge too far. Sharing information on an ex ante basis, in combination with applying the external trade rule (the EU is responsible for trade policy, the capitals for trade promotion) might be an appropriate way forward.
- The EU could be more ambitious and pick its winners from among foreign partners, in line with its own strategic long-term external energy needs, using innovative mechanisms for securing effective future supplies. It would be a challenge to consider such an approach.



4 Conference Programme

Enriching the Planet – Empowering Europe

Optimising the use of natural resources for a more sustainable economy

Venue:

Oude Raadzaal, Javastraat 26, The Hague
26-27 April

A transition to an economy in which energy, food, water and mineral resources are used in a sustainable way so as to protect ecosystems and to combat climate change and loss of biodiversity is perhaps the biggest challenge of our time. The EU has traditionally been at the forefront in the debate on sustainable management of natural resources. It has a Raw Materials Strategy and Strategy on Natural Resources and the issue at hand is related to the discussions on inter alia the EU 2020 Strategy, Sustainable Development Strategy, Energy Policy, the European Security Strategy and Reform of the Common Agricultural Policy. This high level conference will focus on causes and consequences of scarcity and will discuss what can be done at the EU level to catalyse the transition towards a more sustainable economy. It will look at what the EU could do internally, how it could energize its sustainability agenda internationally, and how it could respond to global developments regarding scarcity of natural resources to contribute to shaping global solutions.

Participants in the conference will be about 60 senior policy-makers from selected countries, international organisations and the European Commission, as well as outstanding experts from research institutes. Where possible, they will be brought together in smaller roundtable settings to debate some of the core issues related to resource scarcity and transition. The objective is to test and connect newest research findings and ideas with ongoing policy developments within the EU, such as the revisions of key policy strategies and the implementation of the Lisbon Treaty. Ahead of the conference, input will be provided through background papers and a number of short essays on the core issues. The conference will take place under Chatham House Rule, aiming at a free and open discussion.

Day 1 conference

Arrival of the participants

18.30

Informal drinks

19.00

Conference dinner with invited participants

Special words of welcome by:

- *Jaap de Zwaan*, Director Clingendael Institute
- *Tineke Huizinga*, Minister of the Environment and Spatial Planning

Keynote address on the EU's objectives for greening the economy

Janez Potočnik, Commissioner for Environment

The agenda of the forthcoming Belgian EU Presidency on the issue of resource scarcity

Joke Schauvliege, Flemish Minister of Environment, Agriculture and Culture,

- open to diner invitees only -

Day 2 conference

09.00

Registration

09.15

Opening of the Conference

Tineke Huizinga, Minister of the Environment and Spatial Planning

09.25

Introduction by the Chair of the Seminar:

Laurens Jan Brinkhorst, Professor of International and European Law at the University of Leiden; former Minister of Agriculture, and of Economic Affairs

09.30

Resource scarcity: the public good character of food and energy and how to deal with their expected shortages in the future

Alex Evans, Centre on International Cooperation, New York University

09.50	<p>The global quest for a more sustainable use of resources <i>Ernst Ulrich von Weizsäcker, Chair of the UNEP panel on the sustainable use of resources</i></p>
10.10	Discussion
10.45	Coffee break
11.15	<p>Geopolitical views on the management and protection of natural resources</p> <ul style="list-style-type: none"> • <i>Bernice Lee</i>, Research Director of Energy, Environment and Resource Governance, Chatham House, United Kingdom • <i>Michael Klare</i>, Professor Peace and World Security Studies, Hampshire College, United States
11.45	Discussion
12.30	Lunch
13.30	<p>Workshops on Scarce resources: energy, food and minerals</p> <p>Workshop 1 – Securing a sustainable and affordable energy supply in Europe</p> <ul style="list-style-type: none"> • A review of the EU's energy policy • A transition to renewable energy sources: economic and societal barriers • Energy and foreign policy integration at the EU level <p>Chaired by: <i>Jacques de Jong</i>, Senior Research Fellow, Clingendael International Energy Programme</p> <p>Brief presentations by:</p> <ul style="list-style-type: none"> • <i>Helen Donoghue</i>, Unit Strategy & Programming, DG Energy and Transport, European Commission • <i>Dominique Finon</i>, Senior Fellow, French National Center of Scientific Research (CNRS), and affiliated with CIRED, EHESS (Paris) and IEPE (Grenoble University) • <i>Marcel Viëtor</i>, Deutsche Gesellschaft für Auswärtige Politik, Germany <p>Workshop 2 –Towards a sustainable and fair food system in the EU</p> <ul style="list-style-type: none"> • Access to food and the functioning and governance of food markets • Food security within the EU: still a relevant issue? • Safeguarding fish stocks or promoting it as alternative to meat? • External impacts of the CAP and the EU's trade agenda • Strategic importance of natural resources for agricultural production <p>Chaired by: <i>Gerrit Meester</i>, Chair of the OECD Committee for Agriculture</p> <p>Brief presentations by:</p> <ul style="list-style-type: none"> • <i>Carlo Trojan</i>, former Secretary General of the European Commission, former EU permanent representative to the WTO and Chairman International Food & Trade Policy Council • <i>Anders Klum</i>, Director for Economic Analysis, Swedish Ministry of Agriculture <p>Workshop 3- Precious minerals for the production of goods and food</p> <ul style="list-style-type: none"> • Increasing resource extraction within the EU or stepping up raw materials diplomacy? • Safeguarding natural resources: a question of access, recycling, efficiency or substitution? • Phosphate; is there enough to keep up world food production? • Towards a ten-year framework for sustainable production and consumption <p>Chaired by: <i>Renée Bergkamp</i>, Director-General of Enterprise & Innovation, Ministry of Economic Affairs of the Netherlands</p>

	Brief presentations by: <ul style="list-style-type: none"> • <i>Gwenole Cozigou</i>, Director for Chemicals, Metals, Forest-based and Textile Industries, DG Enterprise, European Commission. • <i>Günter Tiess</i>, Department of Mineral Resources and Petroleum engineering, Montan University of Leoben, Austria
14.30	Short break
14.45	Positioning Europe: Setting an Agenda for Action <p>Sustainable growth within Europe in 2020</p> <ul style="list-style-type: none"> • Integrating the economic and ecological aspects of the EU's natural resources strategy • CAP reform: how use Europe's competitive advantage in food with a sustainable land-use and economic development of rural areas? • Renewable energy sources: fashion or necessity? • Towards a European research agenda on scarcity and transition <p>Keynote address by: <i>Pierre Dechamps</i>, Advisor Energy, Climate and the Environment, Bureau of European Policy Advisors, European Commission</p> <p>Food scarcity and the future of sustainable agriculture in Europe: <i>Gerda Verburg</i>, Minister of Agriculture, Nature and Food Quality</p> <p>Invited comments by:</p> <ul style="list-style-type: none"> • <i>Joris Relaes</i>, Head of Cabinet for Agriculture of the Flemish Prime-Minister, on behalf of the forthcoming Belgian presidency of the EU • <i>David Baldock</i>, Director of the Institute for European Environmental Policy, United Kingdom
15.15	Discussion
15.45	Short break
16.00	The role of EU: reacting to global developments in the field of scarcity or co-shaping the framework for a sustainable planet? <ul style="list-style-type: none"> • Cooperation on natural resources management as a way to peace? • Sustainable resource management; a priority area for the European External Action Service? • Using aid and trade instruments to safeguard access to scarce resources? • Capacity to responding to conflicts over energy, water, minerals, and other natural resources • Safeguarding strategic sectors within the EU from foreign take-overs <p>Keynote address by: <i>Elina Bardram</i>, Policy coordinator for Sustainable Development and Climate Change, Directorate General for External Relations, European Commission</p> <p>Invited comments by:</p> <ul style="list-style-type: none"> • <i>Susanne Dröge</i>, Head of Research Division on Global Issues, Stiftung Wissenschaft und Politik (SWP), Germany • <i>Jan Lundqvist</i>, Senior Scientific Adviser of the Stockholm International Water Institute, Sweden
17.15	Summary and conclusions (if possible) by the Chair of the conference <p>- Press briefing -</p>
17.30	Drinks

5 Conference Speeches

Resource efficiency as a driver for greening the economy
Janez Potočnik, EU Commissioner for the Environment

Contribution for the Conference: Enriching the Planet, Empowering Europe - Optimising the use of natural resources for a more sustainable economy, The Hague, 26 & 27 April 2010, cf:
<http://www.clingendael.nl/resourcecascity>

Good evening ladies and gentlemen.

I am glad that I get to speak to you before the main course...not because what I have to say is likely to give you indigestion...but because I want to give you some food for thought. If you had already eaten you might not be so receptive!

Actually, I know that you as an audience are already receptive to the kinds of ideas I want to put to you. The title of the conference tells me that we already share the same appetite for enriching and empowering our planet. And on tonight's menu, we have a special *plat du jour* – resource efficiency.

Resource efficiency isn't perhaps the most obvious of concepts to explain, but perhaps I might start by asking you a question:

Who came to work on a bike today and who came by car? I know that I'm speaking in Holland, so there might be an obvious answer...but it is a simple illustration of an everyday 'lifestyle' choice, which potentially has a real impact on the environment. We could take it further and think about Europe as a developed economy... there is much we have to 'weigh up' if we care about our environment. And these days there is plenty of evidence to show that we do care more than ever.

This is great, but it is simply not enough for our action to stop at the level of the individual.

And that is why we have legislation to limit damaging behaviour, and to sanction those who do the damage. We also have great new technologies, which have given us safer chemicals to replace hazardous ones or which are helping us recycle and re-use waste.

But even this is not enough. Why? Because there are just too many of us. Some 500 million Europeans are putting unprecedented pressure on our environment.

Part of the answer lies in changing our behaviour, as consumers and as producers. And that means using our markets to work in ways which put the proper value on the resources we use. This is one important part of building a resource efficient economy.

But what do we really mean by resource efficiency? The thrifty Dutch, just like some compatriots from my home region, have a history of doing this: using less of what we have to achieve the same, or even more.

It is all about managing our resources sustainably, throughout their life cycle, to reduce the environmental impact of their use. It is a means to help us live, produce and consume within our planet's natural limits. It's not rocket science, in fact it is nothing more than a common sense revolution.

It's not only about energy either. Energy is only one of the natural resources we are using on this Earth. Both our material resources and our natural systems and biodiversity have to be cherished and used carefully.

Some think that resource efficiency is just a way of promoting growth in the eco-innovation sector. This is not true. Sure resource efficiency needs eco-innovation, but we need to look further...to green the whole economy. Think of the waste issue. We can find ways to avoid producing more waste than is absolutely inevitable – but a resource efficient outlook would mean looking at new practices and new business models, which could make the best use of and recover value from the waste we can't avoid producing. It is about recovering re-usable products, materials and energy while minimizing the amount of final disposal.

So yes to eco-innovation...but also yes to a broader meaning of eco-innovation which would mean cleaner industry in general, rather than just cleaning-up industries.

As Oscar Wilde might have said..."We want to be the unstoppable in pursuit of the re-usable..."

And so, Ladies and Gentlemen, we must make resource efficiency a central priority. We made this more concrete through EU2020, which focuses on "Sustainable growth: promoting a more resource efficient, greener and more competitive economy" ...

EU2020 also has Resource efficiency is one of its seven flagship initiatives. Its stated objective is to "*decouple economic growth from the use of resources, support the shift towards a low carbon economy, increase the use of renewable energy sources, modernise our transport sector and promote energy efficiency.*"

This decoupling idea is at the core of resource efficiency... continued economic growth alongside the sustainable management of our resources. And it makes sense at every level...environmentally, economically, commercially and geo-politically.

But it won't happen on its own.

We need everyone who can to help bend our collective European will towards **making it happen**. And this will mean drawing in a lot of different people, because resource efficiency is a truly cross-cutting affair.

If you need an image... think of it as an umbrella, reaching across and over existing policies.

I will have to work closely with colleagues at European level – particularly those Commissioners responsible for energy, transport, industry, trade, agriculture, fisheries, regional policy and research. We have a decent track record so far with many good initiatives at European level – the Sustainable Production and Consumption and Sustainable Industrial Policy Action Plan, the Raw Materials Initiative, the Resource and Recycling Strategies, the Energy and Climate Package...

We will need the Member States to buy-into the concept too as well as the regions and municipalities. And of course we will need the private sector – who understand

better than most the need to get “less in – more out”, which is what resource efficiency really means. And we will need to change the behaviour of European consumers. To work on people’s awareness, and to influence their habits.

But the arguments are changing and becoming more difficult to ignore. The recent report on the Economics of Ecosystems and Biodiversity (TEEB) tells us that ignoring biodiversity loss would be an expensive mistake – and could cost us 7 % of global GDP by 2050.

We need to take the heat off our natural resources. To do this we must change relative prices of different inputs in the economy to reflect the real value of those resources. The only other alternative is more regulation...but even policies need to be resource efficient. Having said that we have a duty to ensure that remaining legislation adopted during recent years – on air, waste, chemicals – is properly and effectively implemented. We know we have much work to do in this area and we will continue to prevent breaches where we can, and build a state of trust with regard to implementation and compliance with Member States.

But to return to the issue of pricing; if we don’t make the changes in relative prices, innovation on its own will not deliver the changes we need in the balance of economic inputs. Take for example energy efficiency. Innovation can help, but as our energy output becomes more efficient demand for it increases...causing what is known as the “rebound effect”. Looked at economy-wide, this effect can mean energy use remains more or less the same, even if we are more energy efficient. The story holds for other resources. If you get better at making something...it is likely that more people will want it!

The changes – which will need true 21st Century economic tools – have to be made at the heart of our fiscal policies, which may have to shift their aims beyond raising revenue. And we will be looking closely at the expertise that the Member States can contribute in this respect.

Subsidies will also figure. Inefficient technologies and business structures are sometimes ‘protected’ by subsidies, which can cause more harm than good to the environment. We need to unlock this cycle.

The flip side of this is the demand side. We want to encourage greener public procurement, which accounts for 16% of GDP. Consider this...if all public authorities across the EU were to opt for water efficient toilets and taps in public buildings, their water consumption would be reduced by 200 million cubic meters¹³⁸ – that’s the same volume as China’s annual timber demand.

I said at the beginning that we have to think further than how much we care as individuals. While this is still true, individuals are so important. And the cycling vs. driving question I asked at the beginning shows just how much we all have to balance in our daily decision-making, and how much we need to use relative pricing to change behaviour. Here’s another example...one that is coming to a table near you...and it’s about food. Recent research findings from a Dutch project¹³⁹ show us we are moving quickly to a future where we do not have enough land to provide the animal proteins – the meat and cheese that have been for centuries the basis of our diets – that 9 billion people would need.

If this isn’t a wake-up call about changing present consumption habits – where we waste about a third of the food we produce – then I don’t know what is....

Ladies and Gentlemen

I said earlier that today’s plat du jour was resource efficiency. I hope I have been able, not just to give you a clear description of what is on the menu, but also an idea of the ingredients which make it up.

I hope you can see that I believe in changing behaviour through enterprise, markets and prices, rather than through environmental legislation and sanctions, even if we need both.

And as policy makers – we must use the legislative power we have to engage and guide the wider society, as it is only by changing our collective behaviour that we will achieve sustainable growth.

After all that, I hope you still have an appetite. As a final word, I would like to say I am looking forward to hearing from Minister Schauvliege, who will be speaking after you have eaten, and to the good cooperation I am sure we will achieve with the upcoming Belgian Presidency.

Bon appétit!

¹³⁸ RELIEF European Research Project.

¹³⁹ Netherlands Environmental Assessment Agency (PBL), 2009. Getting into the Right Lane for 2050.

**Joke Schauvliege,
Minister of Environment, Nature and Culture, Flanders,
incoming Belgian EU Presidency**

Conferentie 26-27 april 2010, Den Haag
'Enriching the Planet – Empowering Europe. Optimising the use
of natural resources for a more sustainable economy'

**CHALLENGES OF THE UPCOMING BELGIAN EU PRESIDENCY ON THE ISSUE OF SUSTAINABLE MATERIALS
AND RESOURCES MANAGEMENT**

Ladies and gentlemen,

I would like to thank the Dutch government for organising this conference meant to gather ideas on how to use resources in a sustainable way, so as to protect ecosystems, combat climate change and enhance Europe's competitiveness. It is my privilege to briefly present to you the initiatives the upcoming Belgian EU Presidency will undertake to help accomplish this much-needed transition towards a more sustainable European economy.

Home to only 7.7 percent of the world population, the European Union is responsible for 16 percent of the global ecological footprint. The current pattern of production, consumption and use of materials endangers the availability of the resources on which our well being is based. In addition, today's materials use has a negative impact on the quality of air, water and soil, on human health, on climate change and on biodiversity.

This environmental degradation occurs both within and outside the EU. Therefore, Europe urgently needs to manage materials more sustainably and work towards a decoupling of environmental impact from rise in well being. The longer the EU lingers, the more expensive the investment required will be and the greater the risk that critical ecosystems and resources will be eroded beyond the point at which they can easily recover.

Belgium, therefore, welcomes the fact that the Commission Communication on the EU 2020 Strategy aims at the delivery of smart, sustainable and inclusive growth and stresses the need for a resource efficient Europe. We fully support Commissioner Potočnik's firm intention to enhance resource efficiency and decouple economic growth from the use of resources in the years to come.

The EU already addresses many of the environmental challenges related to resources and materials use. A further strengthening and better implementation of existing EU waste rules can undoubtedly contribute to limit the degradation of ecosystems due to the use of materials and to conserve resources.

We believe a resource efficient, green and competitive European economy is one in which we overcome the traditional divisions between environmental, energy, economic, competitiveness and innovation policies. It is an economy in which we move beyond the recovery of waste to the management of material cycles in such a way that they deliver the services we need without depleting our natural resources.

In other words, the EU institutions and the Member States should move towards the development of a strong sustainable materials management policy. Rather than focus on isolated aspects of material chains, we need to manage complete chains. Sustainable materials management elevates the focus of governments, industry and consumers from individual material, product or process attributes, to the entire system of material flows and associated life-cycle impacts.

Sustainable materials management can help combat climate change, halt biodiversity loss, prevent pollution and protect human health. Moreover, it contributes to the creation of jobs, boosts competitiveness, fosters innovation and reduces Europe's dependence on primary resources. In short, a sustainable materials management policy can help reduce Europe's demand on nature while maintaining or improving its competitiveness.

The upcoming Belgian Presidency wants to support the European Commission and help to create the necessary momentum to further strengthen the integrated material chain approach at the EU level. To this end, **Belgium will devote the informal environment Council organised on the 12 and 13th of July 2010 to the theme of sustainable materials management.** In short, the Belgian presidency wants to enable the EU ministers to exchange views on the following question: How can materials be deployed as efficiently and environmentally friendly as possible?

Ministers will be invited to think about how EU policy can further encourage waste prevention and recycling. EU policy makers should take measures aiming at resource efficiency improvements. In addition to technological innovation, genuine systems innovation is required to achieve the sustainable management of materials. New business models, new management techniques, new logistics, new consumption models and innovative ways of cooperation between the different actors have to be developed. We need to ask ourselves how the EU can stimulate this type of systems innovation.

Finally, the informal Council will deal with what needs to be done to move towards an ambitious European materials policy, in terms of the strengthening of existing EU initiatives.

During its Presidency, **Belgium will also host the OECD Global Forum on Sustainable Materials Management from the 25th to the 27th of October 2010.** On the basis of an extensive examination of good examples of sustainable materials management from the private and the public sector, the aim of the Forum is to present clear policy recommendations to implement a sustainable materials management policy.

The debates at the informal Council and the OECD Forum on Sustainable Materials Management should pave the way for the adoption of formal Council

Conclusions on the sustainable use of resources and materials at the December 2010 environment Council. These Council Conclusions will give direction to the work to be done by the European Commission and the Member States.

I would like to summarise the way forward to promote sustainable materials management as follows: integration, innovation and measuring.

Ladies and gentlemen,
To conclude, please allow me to rephrase a passage that I 've read in an English newspaper lately: "Never underestimate the importance of psychology when it comes to seeking to create a more sustainable world. Because our beliefs about change largely influence our ability to make a difference. Or to put it another way: what we think, is what we create."
Thank you.

Joke Schauvliege
Flemish minister for Environment, Nature and Culture

**Tineke Huizinga,
Minister of the Environment and Spatial Planning,
the Netherlands**

Contribution for the Conference:

Enriching the Planet, Empowering Europe - Optimising the use of natural resources for a more sustainable economy,
The Hague, 26 & 27 April 2010, cf: <http://www.clingendael.nl/resource scarcity>.

Ladies and gentlemen,

The power of nature and the fragility of man were once again made clear with the eruption of the volcano on Iceland and the closure of Europe's airspace.

It reminded us of man's modest place in the scheme of things.

It confronted us with our vulnerability.

In short, ladies and gentlemen: the planet can do without us, we cannot do without our planet and its resources.

Obviously we cannot control the whims of mother nature, we can however influence our own impact on the environment.

Climate change, the loss of biodiversity and the scarcity of resources are all challenges we can tackle.

On a national level, The Netherlands has developed the so-called Delta programme:

An extensive number of projects that will make our country 2050-proof, so to speak.

We have set up a special Delta fund to finance these projects.

We need to protect our country against rising waters, reduce our energy consumption and transform our economy from fossil fuel based to sustainable.

The Netherlands shares its know-how with other delta nations such as Vietnam, Bangladesh, Egypt, Indonesia and Mozambique.

Sharing know-how and experience is of paramount importance in meeting the challenges we face.

In 40 years' time nine billion people will inhabit our planet. Nine billion people demanding clean water, energy and land to grow crops for food.

Although there are uncertainties, of one thing we are certain: the demand for energy and water will explode. Conservative estimates predict that in 2050 we shall need the current total global amount of energy we consume just to meet the demand for rare metals.

And we shall need the total current global amount of water we consume for water treatment alone.

Future claims on resources demand a paradigm shift. We need to take action at the national, European and global level.

We need to innovate.

We need to cooperate.

We need the courage to make tough decisions.

Not only in The Netherlands and Europe but elsewhere, people are aware we need to make this transition.

But we need to speed things up.

Time is our scarcest commodity.

If we are to make the 2050 deadline, we need to start today. The changes we need to make take time.

The European Union is vulnerable because of its dependence on others for a lot of resources.

Oil, gas, neodymium for electric motors, phosphates for fertilisers are just a few examples of important fossil fuels and minerals we are dependant on from others.

In addition to this our current transitional technology increases pressure on rare metals and minerals.

This is a fragile state of affairs.

Thanks to our prosperity, our single market, our technological know-how and our ability to innovate, the European Union can meet the challenges of climate change and loss of biodiversity.

Now the matter of our dwindling resources requires an answer.

The Dutch government is therefore very pleased to be hosting this conference.

As the coordinating minister for sustainable development in The Netherlands I am grateful to you for coming here today.

It is inspiring to see so many senior experts, scientists and policymakers under one roof, ready to share their knowledge.

Yesterday I spoke to European Commissioner Janez Potočnik.

He too is anxious to hear the results of this conference and is committed to doing everything he can.

Commissioner Potočnik will join forces with EU member states to achieve the 2020 strategy on natural resources.

Ladies and gentlemen,

If necessity is the mother of invention then let scarcity be the mother of innovation.

It is essential that we share our technologies and experience as we shape our world so it can sustain nine billion people.

Let's start today.

You will hear many prominent speakers at this conference.

I know you will enjoy today's speeches and discussions.

I hope they will fill you with inspiration.

Thank you.

**Gerda Verburg,
Minister of Agriculture, Nature and Food Quality,
the Netherlands**

At the conference 'Enriching the planet, empowering Europe, april 27th, The Hague.

Ladies and gentlemen,

On one of those rare sunny days in the Netherlands, the views of its lowlands can be wide. You can see mills and cities, harbours and roads, canals and farm fields. And dunes and dikes. They provide protection from rivers and the North Sea, that ever-present force that inspires and humbles us in a country where 25 per cent of the land is below sea level. It is human resourcefulness that makes the most of the space available, combining agriculture, infrastructure and water management with regard for nature's resilience and even climate changes.

Combining has become essential for the Dutch to survive. It might be the reason we have chosen 'coherence' to be the theme of today's conference. Minister Huizinga and I are very pleased to welcome you here today. Together we will look at the issues that present such challenges, including food, water, energy, the climate and biodiversity. You have come here today because you are willing to look further. Further than the Danube, the Alps and the Strait of Gibraltar. Further than the northern lights. We won't disappoint. Taking the wide view is not easy, but please don't let that deter you.

Alex Evans listed for you this morning the challenges. These challenges are also discussed at the highest political levels in the UN Commission on Sustainable Development. The Commission has inspired commitment and has formulated possible solutions. These include initiating and maintaining a global dialogue between East, West, North and South, and between governments and NGOs around the world.

I think we all noticed during the past year that the financial crisis has confronted us with unforeseen developments. In terms of food consumption, for instance, the crisis has become a determining factor in people's decisions when to buy food, and why. Moreover, the economic crisis of the Western world contrasts with the increasing population and standard of living in other parts of the world. Growing competition for land, water, energy, and overexploitation of fisheries will affect our ability to produce food, as will the urgent requirement to reduce the impact of the food system on the environment.

And then there was the shocking TEEB report published earlier this year. The report states that if we do not act, ecosystems, the very fuel of our existence, will disappear at an alarming rate.

On top of that, the FAO estimates that we must produce 70% more food by 2050 to be able to feed the world population of 9 billion people. That's only forty years away. So we keep a close eye in Brussels what they eat in Beijing tomorrow and what they grow in Brazil. Farmers in Europe

and the US are anticipating on what the people of Delhi want to eat.

Never before have we had to feed so many people. Never before were one billion people obese, and one billion people starving. Never before have our food production and our economies been global. And never before have we had to acknowledge that our natural resources are nearly depleted.

Amidst the complexity of these challenges it is good to know where our strength lies. After all, there is so much we can do, in so many fields ...

It starts with us all recognising the similarities among these challenges and their coherence. Food, water, sustainable energy, climate and biodiversity – these issues are all intertwined. To find suitable solutions, we must turn to sustainability and innovation.

Also important is that we recognise that agriculture, food production and rural development are in fact part of the solution. We must develop a concrete agenda, where new technology and sustainability go hand in hand.

- Together we can reduce our relatively large environmental footprint, for instance by reducing the amount of land outside the EU dedicated to the production of feed, and by making EU farm production more sustainable.
- And yes, we can increase food production at the same time. We can make sure that the links in the food supply chain become more efficient and equitable. We can make sure that our farmers, our knowledge capital and our subsidies are harmonised. This may sound complicated but it doesn't have to be. I have seen farmers in Ethiopia who increased their production fourfold, simply by cooperating and introducing a few agricultural modernisations. That, too, is innovation!
- We can help individuals and families take responsibility for their food consumption. We can support consumers in their wish to increase awareness about how they live. We can stimulate businesses to economise on water use. To explore energy alternatives. And not to waste food. Did you know that households throw away almost half of all the food they buy? And to produce this food, CO₂ was emitted and fresh water used, or rather, wasted, as Mr Jan Lundqvist from the Stockholm International Water Institute can confirm?
- We can share our expertise and experience in renewable production and show the world the strength of our agriculture.

This is not just my personal objective, but, I hope, our shared objective, complementing each other wherever we can. But do we have the means, the desire and the multi-level networks to play a role of importance in sustainably feeding the 9 billion?

The answer is yes.

There are a number of ways to do this, some of which you will have heard already. I have three trump cards I'd like to play:

The card of knowledge and technology,

The card of ambition,

And the card of cooperation.

If we play our three cards right in Europe, the rest can follow. Let me explain.

1. First, the knowledge and technology card. This entails more sustainable production, respecting the environment, stepping up scientific and practical research, but also: innovation and unorthodox cooperation between farmers and parties in the food production chain. European countries can help each other, for instance via the joint research agenda. The Dutch University of Wageningen has extensive experience and a sound academic reputation. I believe that joint research presents an important political challenge. I agree with Mr Potocnik that it does not yet feature prominently on the EU agenda. There are plenty of opportunities for Joint Programming or another Scarcity & Transition programme. I would like to develop initiatives with other EU countries.
2. Second, the ambitions card. Having national ambitions to produce and consume in a sustainable manner. In our drive to produce more sustainably, I would like to share our ambitions with you. Not to tell you how to act, but to inspire you. Our aim is to share our vision of food with both consumers and producers. My toolkit contains a public information campaign, an educational programme, subsidies for innovations, certifications, and information on the Sustainable Food Programme, which represents the food production and retail chains. In May we will be organising a European conference on sustainable production and consumption.
3. Third, the card of cooperation. To create coherence, we must have international and development cooperation. Take the outcome of the Round Table on Responsible Soy. Businesses, scientists and NGOs have all committed to making the international soy supply chain more sustainable. Other supply chains such as timber, fish, and palm oil, will follow.

We are also working with FAO, through the UN Commission on Sustainable Development. And together with the Ministry of Development Cooperation, we work to encourage sustainable agriculture in developing countries.

Playing these trump cards of knowledge, ambition and cooperation will affect not only our global economy, but other aspects of our lives, our morality and behaviour as well. It is this interaction between economy, behaviour and morality that I will emphasise during the seminar on the Future of Food, which will be held in London tomorrow.

After all, if the world around us changes, the spirit of the times will change too. Consumers want to be able to choose what they consume. It is not a hype or a trend, but a heart-felt drive. Awareness is also growing amongst businesses to make production more sustainable. So let us not forget to involve our citizens, consumers and businesses in our aim to find green and sustainable solutions. Public-private partnerships can be key.

The economic position of European agriculture is relatively stable and strong. It is reason for us to update and continue CAP after 2013. It allows us to explore new horizons. How inspiring and exciting to be part of that process, to contribute ideas to dealing with our strong position.

Ladies and gentlemen,

I see opportunities to meet these challenges. Both for the EU itself and in a global context. Knowledge, ambition, and cooperation in the field of sustainability are all we need. It will make the most of both our strong economic position and the spirit of the times. We can make progress by working together. It will help our own generation and future generations to live their lives on this planet, without depleting its resources. In my view this is an economic as well as a moral obligation. These are basic human requirements – being healthy and safe and able to build a life for yourself. Agriculture in Europe can and must demonstrate its huge strength and value for the future.

I would therefore like to ask you to continue, to be careful in your analyses,
Honest in your dilemmas,
Brave in your challenges,
Brilliant in your solutions,
And decisive in implementing solutions.

I wish you every success in achieving these objectives.
Thank you.

6 Participants list

Conference Enriching the Planet – Empowering Europe

27 April 2010, The Hague, The Netherlands

List of Participants

Name	Position	Organisation	Country
Asbeek Brusse, Wendy	Director	Scientific Council for Government Policy	The Netherlands
Bachmann, Günther	Director	German Council for Sustainable Development	Germany
Baldock, David	Executive Director	Institute for European Environmental Policy	United Kingdom
Bardram, Elina	Policy coordinator for Sustainable Development and Climate Change	DG External Relations, European Commission	European Union
Bastein, Ton	Program Manager	TNO	The Netherlands
Benschop, Dick	Vice President Strategy and Profolio	Shell International B.V.	The Netherlands
Bentum, Patricia, van	Agricultural counsellor	Permanent Representation of the Netherlands to the OECD	The Netherlands
Bergkamp, Renée	Director-General for Enterprise & Innovation	Ministry of Economic Affairs	The Netherlands
Bosmans, Werner	Policy Officer	European Commission	European Union
Boucke, Raoul	Deputy Head Environment & Nature	Permanent Representation to the EU	The Netherlands
Brandt, Patrick	Head, Development Cooperation Section	Ministry of Foreign Affairs	The Netherlands
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Dechamps, Pierre	Advisor Energy, Climate and the Environment	European Commission	European Union
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Name	Position	Organisation	Country
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Le Pellec-Dairon, Marie	Agricultural Engineer	Ministry for the Environment	France

Name	Position	Organisation	Country
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Potocnik, Janez	Commissioner	European Commissioner for Environment	European Union
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Name	Position	Organisation	Country
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