

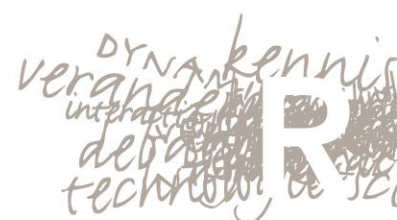
Sustainable alleviation of resource hunger

Management summary

2014

André Krom & Arnoud van Waes

Rathenau Instituut



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Sustainable alleviation of resource hunger

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Sustainable alleviation of resource hunger

In the report, *Sustainable alleviation of resource hunger* (2015), the Rathenau Instituut discusses several strategies that can accelerate the achievement of the goal of resources policy in the Netherlands and in Europe in order to sustainably secure sufficient resources for our economy.¹

The underlying reason for this report is the double role technology plays in the resources issue. On the one hand, the increasing use of technological products (electronics) results in a rising demand for materials that are 'critical' to our economy. On the other hand, technology can also offer solutions, for example when it helps us to make better use of resources without this having adverse effects on man and/or the environment. The Rathenau Instituut studies developments in science and technology, interprets their potential impact on society and policy, and fosters dialogue and debate in support of decision-making on science and technology.

In the report, two specific natural resources (indium and tantalum) serve as examples of a broader group of materials that are critical for our economy, or which are extracted in conflict areas (tantalum). These metals are used in many electronic devices, from solar cells to smartphones. The report also looks at international developments. The activities in China and Africa serve as an example of a shifting balance of power on the world stage, which offers both opportunities and challenges for resource policies in the Netherlands and Europe.

In *Sustainable alleviation of resource hunger*, these opportunities and challenges are tied to Dutch and European ambitions to create a circular economy in which resources are used efficiently and the least possible amount of waste is produced. The Rathenau Instituut hopes that this report will make a contribution to the political and societal discussion about the European plans for a transition to a circular economy and about the Dutch programme 'Van Afval Naar Grondstof (from waste to resource)' (Ministry of Infrastructure & the Environment [I&M] 2014a), the most important objective of which is to stimulate this transition.

This summary explains the recommendations that the Rathenau Instituut makes to the Dutch Ministries and the Parliamentary Standing Committees on Economic Affairs, Foreign Affairs and Infrastructure and the Environment. The recommendations are also relevant for the European Commission and the European Parliament:

- Make resources subject to minimum requirements, for *people, planet* and *profit* (p. 2-3);
- Make resource policy economically feasible, both within and outside of Europe (p. 3-8);
- In evaluating which resources are 'critical', in addition to economic criteria, also include minimum social and ecological requirements, and use these in negotiations with partner countries (p. 8-9);
- Stimulate integral resource policy in which resource extraction and use is always evaluated on the basis of economic, ecological and social sustainability (p. 10).

¹ The report is based in part on two case studies: one on indium and tantalum (Kleijn, 2015), and one on resource activities in China and Africa (Grosskurth & Konijn, 2015). The report also contains a chapter by Hees & Van der Weijden on geopolitical strategies for extracting resources. See also Appendix 2.

Resource hunger: growing demand, great challenges

We are facing a growing resource hunger worldwide. The expectation from now until 2030 is that the demand for important natural resources such as fossil fuels, food/feed, minerals, fertilisers and wood will continue to rise (Chatham House 2012). Among other factors, this rising demand is caused by an expected growth in the world population: from 7.2 billion in 2014 to 10.9 billion in 2100 (World Population Statistics 2014; UN 2013). This growth will be seen primarily in developing countries, including China and India (UN 2013). The assumption is that citizens in 'emerging economies' aspire to the prosperity and level of consumption of Western countries (EC 2011).

The global resource hunger comes with great challenges. First of all, the *security of supply* of crucial resources has come under increasing pressure. Will we also be able to secure sufficient quantities of resources in the future that are necessary to keep economies going? Physical scarcity is seldom the greatest problem here. Developments in technology often make it possible to tap into new supplies and/or make better use of old supplies. The fact that we have access to these resources is however becoming less and less self-evident. To illustrate this phenomenon, references are often made to the growing economic and political power of Brazil, Russia, India, China and South Africa, known as the BRICS countries. Using this power to gain access to crucial natural resources means greater risks to the security of supply for the Netherlands and Europe. Both are in fact dependent to a significant degree on resources from abroad. One clear example is indium, a metal that is usually used in the manufacture of electronics. The demand for electronics is only expected to increase. Over half the worldwide production of indium takes place in China. The access to much sought-after natural resources is expected to lead to growing political tension (Chatham House 2012). The resource issue has become an increasingly geopolitical one (PBL 2012; CLM 2013; HCSS & TNO 2013).

A second challenge for the global resource hunger is *sustainability*. Defined in terms of People, Planet, Profit, sustainability involves the consequences that the extraction of and trade in natural resources can have for people, the environment and the economy. Sustainability is usually interpreted in an 'aspirational' sense (Meijboom & Brom 2012). The goal here is to structure economies such that economic growth goes hand-in-hand with increased welfare and better protection of the environment.

Policy response

Both challenges, the security of supply and sustainability, are high on the policy agendas of the Netherlands and Europe. In the Netherlands, these challenges are explicitly expressed in the starting points of the resource policy. The *Grondstoffennotitie* (Resource Memorandum) (BuZa, EL&I, I&M [Ministries of Foreign Affairs, Economic Affairs, Agriculture and Innovation, Infrastructure & the Environment], 2011) describes sustainability as a pre-condition for guaranteeing the security of supply in the long term. Sustainability is thereby interpreted as an aspiration, and in terms of people, planet, and profit. In concrete terms, this means that the Dutch government aims to use resources in a way that will lead to progress for man, the environment and the economy. The security of supply is viewed as being a primary responsibility of the business community; after all, this is the sector that needs the resources for its business processes (EZ 2013a). Since the government stipulates sustainability as a pre-condition for the long-term security of supply, the government must also assume at least part of this responsibility, namely for *the way in which* the availability of resources is guaranteed for the long term.

Recommendation 1:

Make resources subject to minimum requirements.

As previously mentioned, the Dutch government aims to use resources in a way that leads to progress for man, the environment and economies. When viewed this way, sustainability is not a finite goal, but instead implies that continuous improvement is possible. The sustainable use of resources does have a

clear *starting point*. In order to define the Netherlands' resource policy, several minimum sustainability requirements must be satisfied, for people, planet and profit.

In the Rathenau Instituut's *Sustainable alleviation of resource hunger*, the researchers contend that the minimum requirement for profit is that our use of resources must be profitable. Sustainability must include promising economic prospects. The minimum requirement for the planet aspect is that the approach to resources must ensure that serious damage to the environment is prevented, from extraction to end use. The infliction of serious harm on the natural environment of man and animals is not tenable in the long term. Finally, for the people aspect, the minimum requirement is that the use of natural resources may not be accompanied by human rights violations. The protection of these rights is after all enshrined in international law. If we interpret sustainability as a minimum requirement, then it is important to remedy those situations in which the use of resources is not economically profitable and/or leads to serious environmental damage or human rights violations.

Sustainability is about the *relationship* between people, planet and profit. Failing to satisfy the minimum requirement for the planet aspect, for example, makes it impossible to guarantee human welfare ('people') in the long run. By the same token, economic prosperity ('profit') may only be guaranteed for the long term if we take the earth's capacity into account. And if we respect the social boundaries to which we have made an international commitment: respecting human rights. In short, ecological and social sustainability are pre-conditions for economic sustainability. Sustainable resource policy is policy that does justice to this relationship between people, planet and profit. In order for the use of natural resources to be sustainable, the prevention of serious harm to the environment and human rights violations must first be profitable.²

**Recommendation 2:
Make sustainability economically feasible.**

The Netherlands and Europe are working hard to develop strategies to face these challenges, the security of supply and sustainability. The plans of the Netherlands and Europe view the transition to a circular economy as a way of achieving two goals at the same time with one stone: less dependency on foreign resources, and making the EU economies more sustainable. In a circular economy, the most efficient approach possible is taken to resources. The ultimate goal is to close the resource chains completely so that little to no waste is generated. In other words, waste has become a resource.

In the Netherlands, the cabinet's programme, '*Van Afval Naar Grondstof* (from waste to resource)(I&M 2014a)', serves as a guide for the transition to a circular economy. Until recently, the European counterpart was the package 'Towards a circular economy: a zero waste programme for Europe (EC 2014a)'. This package was recently withdrawn to make room for a 'broader and more ambitious waste package' that will be submitted in late 2015 (EC 2014d).

Recycling plays an important role in the circular economy. In fact, without large-scale recycling, a circular economy is inconceivable. By making resource chains circular, it is possible to limit the risks to the availability of materials crucial to the economy. However, the large-scale recycling of resources is not always profitable. One reason why recycling is relatively expensive is that it is fairly laborious to extract what are often small quantities of resources from products. This applies in particular to materials that are vital to the economy in the Netherlands, such as indium and tantalum, materials that are frequently used

² To be perfectly clear: human rights violations and serious environmental damage must *always* be prevented. If this can be handled in such a manner that ensures our treatment of resources is also profitable, then this will mean a minimum sustainable situation.

in electronics.³ For the Netherlands, a country that has made recycling a minimum standard for processing electronic waste (I&M 2014b), this is a major problem. This is mainly the case because electronic waste (e-waste) is one of the fastest-growing waste categories in Europe (EC 2014c). Since the circular economy demands recycling on a large scale, and recycling of crucial materials such as indium and tantalum is not profitable yet, the circular economy itself is not economically profitable today. For this reason, the minimum sustainability requirement for *profit* is currently not being satisfied in the Netherlands and Europe.

One current debate that touches on this area is the proposal to adjust taxes for this purpose (EC 2011, among others); namely by imposing lower taxes on labour and higher taxes on the use of resources. This lowers the burden on the environment and makes it more interesting economically to recycle resources. Because the use of resources is subject to higher taxes, the recovered resources therefore generate more money.

This would mean progress for profit (the circular economy is made economically feasible) and planet (the burden on the environment decreases). The *social* effects of a shift in taxes from labour to resources are however still unclear for the time being. One major question is whether or not *social security* can be maintained if the tax on labour is lowered.⁴

Recommendation 2a:

Examine whether or not recycling can be made profitable in Europe by shifting taxes from labour to resources, whilst retaining social security.

We also face challenges outside of Europe when it comes to sustainable guarantees for the security of the supply of resources. In a circular economy, the Netherlands and Europe also actually depend on important resources from abroad. In 2010, the EU depended on imports for 77% of the availability of economically important resources (EC 2010). Risks associated with the availability of these materials are therefore a substantial economic problem. In order to solve this problem in a sustainable manner, our resource policies outside of Europe must also offer promising economic prospects.

In the report *Sustainable alleviation of resource hunger*, the Rathenau Instituut pays special attention to the Chinese resource activities in African countries. These activities are an example of the shifting balance of power on the world stage, one that offers both challenges and opportunities for the Netherlands and Europe in terms of their ability to guarantee the security of the supply of resources in a sustainable manner. China is one of the BRICS countries that is becoming increasingly more powerful economically and politically, and that is also using this power to secure important resources. As a resource-rich continent, Africa offers great opportunities for the global resource hunger. By determining which strategies China uses in Africa for acquiring resources, Research has been done to see what the Netherlands and Europe could learn from these strategies on the one hand, and on the other, to explore the possibilities for partnerships between the Netherlands and China, and in a European context.

The Chinese resource activities in African countries focus on obtaining crucial minerals, energy carriers (including oil), and biotic resources (including wood). The most important strategies that China applies in Africa to obtain these resources are: increasing its market power (for example, by acquiring companies); setting up *Special Economic Zones* (SEZs) in which tax regulations are adapted to make investments

³ See box 2, p. 7.

⁴ Other important questions are: What is the relationship between a tax shift from labour to resources and national and international regulations? And what is the impact of this on the national and international markets?

more appealing; building infrastructure in exchange for resources, and the buying/leasing of African arable land.

As much variation as there may be between these Chinese strategies, there are also a number of important similarities. It is mainly Chinese state companies that are active in these areas. Most of the contracts concluded are long-term agreements. These contracts are usually bilateral and not very transparent. These projects involve enormous amounts of money (Grosskurth & Konijn, to be published).

As previously mentioned, the Dutch government aims to use resources in a way that leads to progress for man, the environment and the economy. From this point of view, what can we learn from the Special Economic Zones that China is setting up in Africa? To start with, the fact that an SEZ can be economically interesting for both parties. The SEZs offer tax benefits for China, even when exports to Europe are involved. By producing products in the SEZs, Chinese companies can label these 'Made in Nigeria', for example, and thus export them at lower tax rates. The SEZs also offer advantages for Africa, particularly economic growth and the shoring up of the infrastructure. An SEZ can help to make the securing of resources economically profitable (the minimum requirement for profit).

As far as the other aspects of sustainability are concerned (people and planet), it must be said that setting up Special Economic Zones in Africa does not affect the fact that there are still major problems in Africa involving the extraction of resources. This includes serious, adverse effects on the environment and human rights violations. Oil extraction in the Niger Delta for example leads to substantial environmental damage (Reuters 2013). We are familiar with these problems; after all, Dutch companies are also active in these regions. The extraction of several different resources in the Congo is also associated with armed conflict in which human rights are violated. This applies to tantalum for example, an important element used in electronic products such as smartphones and tablets.

The Rathenau Instituut advocates creating a stronger connection between the resource policies in the Netherlands and the EU and the economic growth abroad. This is both a major need and a key challenge. Through a pilot for its own *Sustainable Economic Zone* abroad, Europe could demonstrate that economic growth can go hand-in-hand with social and environmental progress (people, planet, profit).

Recommendation 2b:

Experiment with a Sustainable Economic Zone outside of Europe. Apply the experience gained from the conflict-free tin supply chain and the Special Envoy Natural Resources as a basis for collective European policy.

The Chinese Special Economic Zones in Africa can serve as inspiration for setting up a Sustainable Economic Zone outside of Europe. Both cases involve economic zones in which the regulations are adapted to attract foreign investment. The important difference however is whereas the structure of Special Economic Zones can put economic growth on shaky ground with environmental requirements and social guarantees, a Sustainable Economic Zone can serve as an example for a way of dealing with resources that leads to progress for man, the environment and the economy.⁵ In order to define the Dutch resource policy, the minimum requirements for people, planet and profit should be the starting point in the negotiations with resource-rich countries from which we also obtain our resources.

⁵ Ideas on sustainable economic zones are actually nothing new. See Appendix 1 for a few examples.

Setting up a Sustainable Economic Zone demands an intensive and constructive dialogue with Chinese and African leaders. The Rathenau Instituut has observed that there appears to be a **geopolitical momentum** driving these discussions. The concept of sustainability is starting to register in China and Africa, and in the relationship between the two. There are a few developments that are bringing a guarantee of the security of supply subject to sustainability closer (see box 1).

Box 1: Fertile ground for making international resource chains more sustainable

Recent developments in China and Africa, and in the relationship between the two appear, to offer fertile ground for a dialogue on setting up a Sustainable Economic Zone in Africa. Chinese state-owned companies are starting to take the environmental effects of their activities abroad more and more into account (driven by developments in national politics). The official Chinese foreign policy is based on non-intervention, and emphasises the importance of complying with local regulations. China is a country with a systematic and long-term resource strategy in which the security of supply is a central focus (Grosskurth & Konijn, to be published). Moreover, thinking in terms of sustainability is on the rise.

There are also positive developments in Africa in this regard. An awareness of sustainability issues appears to be growing among the population. There have also been several instances in which the local population has stopped accepting serious environmental damage. Among some African state agencies, there is an increasing willingness to do something about it. For example, Chad recently imposed a large fine on the Chinese state-owned company Chinese National Petroleum Corporation (Nako 2014). And recently in Ghana, Chinese gold miners were arrested for causing serious damage to the environment (Kaiman 2013).

Finally, there is movement in the relationship between China and Africa. During the recent *Forum on China and Africa Cooperation*, environmental aspects were explicitly cited as being relevant to the cooperation (FOCAC 2012).

The Netherlands is already doing a great deal to stimulate efforts to ensure that our use of resources satisfies the minimum requirements for people, planet and profit: economic growth in which, at a minimum, human rights violations and serious environmental damage are prevented. Two examples of these efforts: tin originating from Congo has been removed from the sphere of armed conflict, thanks in part to the (former) Special Envoy Natural Resources. The Special Envoy has played a connecting role in making an important contribution to making the tin supply chain, for example, more sustainable in Congo. There have also been cooperative talks with China on the environmental problems involved in extracting rare earth metals in the mining sector (EZ 2013b).

The Rathenau Instituut recommends further expansion of this policy on an international level. This may be accomplished by experimenting with a Sustainable Economic Zone outside of Europe. The experiences with the conflict-free tin supply chain and the Special Envoy have shown us that it is possible to combine economic growth with benefits for people and the environment. For this reason, the researchers recommend applying this experience as a basis for European policy, in maintaining the minimum requirements for sustainability as a starting point in the partnerships with resource-rich countries. The Special Envoy's function could be embedded in the European Resources Agency, an organisation that has been advocated by various parties recently (VNO-NCW 2013, among others).

For the cooperation with China, the adherence to minimum sustainability requirements would, for example, mean that the meeting agenda would have to be broadened in three ways: by not only talking about rare earth elements, but about all resources; by not only discussing environmental problems, but also covering social sustainability aspects (such as human rights); and by not only discussing the extraction of resources in the Chinese interior, but also about China's extraction of resources in other countries (such as those in Africa).

Moving toward a broader understanding of what makes resources 'critical'

As previously mentioned, in a circular economy, the Netherlands and Europe will also depend on the availability of important resources from abroad. If there is a risk that resources crucial to our economy cannot be secured, these will be labelled 'critical'. Fourteen (groups) of elements are in fact critical to the European economy (EC 2010; 2014b). Indium and tantalum are two examples of resources that are critical for the Dutch economy (CBS 2010; TNO 2014). These metals are used primarily in high-tech sectors for the production of screens for mobile telephones, laptops and tablets, solar cells, medical equipment and coatings, products that are also consumed on a massive scale in the Netherlands (see box 2).

Box 2: Indium and tantalum are critical for the Dutch economy

Indium and tantalum are two examples of resources that are 'critical' for the Dutch economy (CBS 2010; TNO 2014). Indium is a metal that is used on a large scale, albeit in small quantities, in electronic equipment with a screen, such as mobile telephones, laptops and tablets. Tantalum is also used in electronic products such as capacitors. One important property of tantalum is that it doesn't react to bodily fluids. This makes it suitable for use in medical devices such as hearing aids and pacemakers (Kleijn, to be published).

Both materials present a major geopolitical challenge: the security of supply is at risk here. For imports of indium, Europe depends on China for 81% of its supply (EC 2013), a country which in fact needs increasingly higher quantities for its own manufacturing activities. By comparison, tantalum is less geographically concentrated (Papp 2013). The extraction of this resource occurs primarily in equatorial regions and in the Southern hemisphere, and in Canada, Brazil, Australia, and the African countries Rwanda, Mozambique, Congo, Nigeria, Ethiopia, Namibia and Zimbabwe.

Not only is the security of the supply of indium and tantalum at stake, there are also considerable challenges for both elements when it comes to guaranteeing the security of supply in a *sustainable* manner. In theory, the geopolitical problem with indium is less severe than it is for tantalum since indium may in principle be substituted in important product groups by less scarce materials (for example by carbon nanotubes). However, this is currently not profitable. It is difficult to use substitutes for tantalum without losing important product properties. One challenge for both elements is that the recycling of electronic waste (e-waste) is still in its infancy, and is not yet a cost-effective activity.

The risks for the security of supply of resources all hinge on sustainability, interpreted as people, planet, profit. This applies in particular to resources that are critical for our economy. After all, these resources carry the risk that we will not satisfy the minimum requirement for profit: using the resources must be economically profitable. If the resources we need to keep our economy going cannot be obtained, this is a problem for *economic* sustainability.

These days, resources are mainly seen as 'critical' when they do not satisfy the minimum requirement for profit. However, as we have seen, there are also social and ecological minimum requirements which must be satisfied in order for us to refer to our use of resources as sustainable: the prevention of serious environmental damage and human rights violations, no matter where our resources originate from.

The object of the Dutch resource policy is to be able to guarantee the security of supply for the most crucial resources in a sustainable manner. This not only involves economic sustainability, but also ecological and social sustainability. Moreover, ecological and social sustainability are pre-conditions for economic sustainability. This is why it is obvious not only to view resources as critical if there is a problem with economic sustainability, but also when the securing of these resources leads to serious environmental damage or human rights violations. For a minimum fulfilment of Dutch policy, these minimum requirements should also be incorporated in negotiations with resource-rich partner countries.

Recommendation 3:

In assessing which resources are 'critical', in addition to economic criteria, also include minimum social and ecological requirements, and use these in negotiations with partner countries.

The idea of including ecological and social aspects in the determination of whether or not a resource is critical for the Dutch economy is not new. Those in policy circles are also giving thought to this concept, and various indicators are being proposed to give it more substance (TNO 2014). To determine the ecological sustainability of our use of resources, several indicators have been proposed: the Environmental Performance Index (EPI) and the Ecological Footprint. The EPI indicates the ecological performance of the source countries. This index looks at the vitality of an ecosystem (including water, agriculture, forests, fisheries, biodiversity, climate) and the impact this has on our health (including public health, air quality, and water supply). The Ecological Footprint indicates how much nature we need to support a certain lifestyle, including our use of resources.

To define the social aspect of sustainable resources policy, the Human Development Index (HDI) of the United Nations (UN) was recently mentioned as being a potential candidate (TNO 2014). The HDI covers issues such as the opportunities people have of living long and healthy lives, access to education and a decent standard of living. This is a good fit for the focus on development that is embedded in Dutch resource policy.

The Rathenau Instituut advocates a broader vision on what makes resources critical, and joins in with those endorsing the use of these indicators in order to obtain a better picture of the social and ecological aspects of our use of resources.⁶ In *Sustainable alleviation of resource hunger*, the researchers also comment on these indicators. First of all, indicators offer insight into how countries score in these areas yet do not say anything about which minimum requirements countries must satisfy in order to be able to claim they engage in a sustainable use of resources. That would require setting a minimum EPI score.

Recommendation 3a:

Make the prevention of serious environmental damage a minimum requirement for ecological sustainability. To do this, use the Environmental Performance Index and the Ecological Footprint.

The second area of special attention is the Human Development Index. Although the HDI provides information on important social aspects such as life expectancy and education, it doesn't offer any on violations of fundamental rights of freedom in the extraction of or trade in resources. The HDI therefore does not address that which is important from the standpoint of a minimum fulfilment of the social aspect of sustainable resource policy. The Human Rights Indicators (UN 2012) which, like the HDI, benefit from a broad support base are a good supplement.

Recommendation 3b:

Make the prevention of human rights violations a minimum requirement for social sustainability. To do this, use the Human Rights Indicators in addition to the Human Development Index.

Tantalum is an example of a resource that is extracted from conflict areas, such as the Democratic Republic of Congo. These extraction activities are accompanied by violations of fundamental rights of

⁶ Cf. Buijs & Sievers (2011) who, from a perspective aimed at identifying major future risks, are critical towards broadening the concept of critical materials.

freedom. For this reason, tantalum is labelled as a 'conflict resource'. Although opportunities appear to be presenting themselves to extract tantalum from non-conflict zones (including Greenland), in all likelihood, the market for conflict resources will probably remain. This demands that we determine our attitude with regard to conflict resources.

A discussion on conflict resources is currently underway between the European Parliament and the European Commission. The EC is proposing a system of voluntary self-certification, in which companies that do not wish to use conflict resources can create their own certificate announcing this commitment. These are companies involved in the extraction of resources. The European Parliament is a proponent of mandatory certification, and advocates a regulation that encompasses the entire resource chain, from extraction to end user (companies or consumers).

The Dutch cabinet prefers to invest in the development of conflict zones rather than avoiding these areas (Ministry of Foreign Affairs 2014). In this regard, it follows the line pursued by the European Commission (voluntary self-certification). The cabinet expects mandatory certification to be less effective, and believes that it comes with the risk that companies will avoid conflict zones entirely. The cabinet is however considering opting for mandatory certification after a period of two years if voluntary self-certification proves to be insufficiently effective in reducing the use of conflict resources.

The Dutch Parliament has not yet adopted a standpoint on this issue. It would be advisable to use the established Dutch policy to evaluate the debate between the European Commission and the European Parliament. Also significant is that transparency is a primary condition for eradicating the use of conflict resources. The question is whether or not voluntary self-certification will result in the necessary transparency. Amongst other things, this depends on the question whether or not the companies active in these areas can be encouraged to participate in the voluntary self-certification system.

Consequences for practical application

This broader view of a 'critical' resource can lead to lists of critical resources other than those which have already been drawn up for the Netherlands (and other countries) and Europe (see EC 2014b; TNO 2014). Resources may end up appearing on these lists that are not critical for the Dutch economy in the traditional sense, yet which are crucial in a social and/or ecological context. One example of a resource that is critical in a social context is coal that is extracted from certain mines in Colombia where these activities have been accompanied by human rights violations, the product of which is referred to as 'blood coal'. This coal is used in Dutch energy plants for the generation of electricity (Pax 2014). And finally, palm oil is an example of a resource that is considered critical in an ecological sense. In order to produce sufficient quantities of palm oil, large swathes of rainforest must be destroyed in Indonesia for example, which leads to serious environmental damage and other adverse effects.

Moving toward an integral resource policy

A sustainable resource policy in the Netherlands requires, at the very least, subjecting the resources that we use to a minimum set of requirements for economic, social and ecological sustainability. Our approach to resources should, at a minimum, be economically feasible, and should exclude serious environmental damage and human rights violations. In order to gain insight into this, policy is necessary in which the aspects of people, planet and profit area always assessed in our approach to these resources. In other words, sustainable resource policy should be an integral policy.

Recommendation 4:

Stimulate integral resource policy in which resource extraction and use is always evaluated on the basis of economic, ecological and social sustainability

The Dutch cabinet aims to develop an integral resource policy (BuZa & EL&I 2011; EZ 2013b). In its report *Sustainable alleviation of resource hunger*, the Rathenau Instituut proposes elements that can offer further support for the development of integral resource policy:

- Make resources subject to minimum requirements, for people, planet and profit;
- Put sustainable resource policy within the context of an economic perspective, both within and outside of Europe;
- In evaluating which resources are 'critical', in addition to economic criteria, also include minimum social and ecological requirements, and use these in negotiations with partner countries.

References:

Buijs, B. & H. Sievers (2011). CIEP-BGR Briefing Paper: Critical Thinking about Critical Minerals. http://www.nachhaltigwirtschaften.at/e2050/e2050_pdf/reports/20111111_critical_thinking_about_critical_minerals.pdf

Chatham House & E3G (2008). *Low Carbon Zones. A transformational agenda for China and Europe.*

Chatham House (2012). *Resource Futures. A Chatham House Report.*

European Commission (EC)(2010). *Critical raw materials for the EU. Report of the Ad-hoc Working Group on defining critical raw materials.*

European Commission (EC)(2011). *A resource-efficient Europe – Flagship under the Europe 2020 Strategy.*

European Commission (EC)(2014a). *Towards a circular economy: a zero waste programme for Europe.*

European Commission (EC)(2014b). *Report on critical raw materials for the EU. Report of the Ad hoc Working Group on defining critical raw materials.*

European Commission (EC)(2014c). *Waste Electrical & Electronic Equipment (WEEE).*

FOCAC (2012). *The fifth ministerial conference of the forum on China-Africa cooperation. Beijing action plan (2013-2015).*

Grosskurth J. & P. Konijn (2015). *China, Afrika en grondstoffen: feiten en lessen.* Den Haag: Rathenau

Instituut. Kaiman, J. (2013). Ghana arrests 124 Chinese citizens for illegal gold mining. <http://www.theguardian.com/world/2013/jun/06/ghana-arrest-chinese-illegal-gold-mining> 6 juni 2013.

Ketola, T. (2011). *Developing Tibet into a special sustainability zone of China?* Turku: University of Turku, Finland.

Kleijn, R. (2015). *Een analyse van twee kritische grondstoffen: indium en tantaal.* Den Haag: Rathenau Instituut.

Ministerie van Economische Zaken (BuZa) (2014). Fiches werkgroep Beoordeling Nieuwe Commissievoorstellen (BNC). Verordening conflictmaterialen. Den Haag: Ministerie van Buitenlandse Zaken.

Ministerie van Economische Zaken (EZ) (2013a). Brief aan de voorzitter van de Tweede Kamer. Betreft: Beantwoording vragen over grondstoffenvoorzieningszekerheid. Den Haag: Ministerie van Economische Zaken, 20 september 2013.

Ministerie van Economische Zaken (EZ) (2013b). Brief aan de voorzitter van de Tweede Kamer. Voortgangsrapportage Grondstoffennotitie. Den Haag: Ministerie van Economische Zaken, 4 juli 2013.

Ministerie van Infrastructuur & Milieu (I&M) (2014a). Van Afval naar Grondstof. Uitwerking van acht operationele doelstellingen.

Ministerie van Infrastructuur & Milieu (I&M) (2014b). Landelijk afvalbeheerplan. 2009 – 2021. Tweede wijziging. Inspraaknotitie. Deel 3: voorgenomen wijzigingen in de bijlagen.

Ministerie van Buitenlandse Zaken (BuZa), Ministerie van Economische Zaken, Landbouw & Infrastructuur (EL&I) (2011). Grondstoffennotitie. Den Haag

TNO (2014). *Materialen in de Nederlandse Economie. Een beoordeling van de kwetsbaarheid.*

CLM (2013). *Voedsel, grondstoffen en geopolitiek. Rapportage aan het Platform Landbouw, Innovatie & Samenleving.* http://www.clm.nl/uploads/pdf/838-Voedsel_grondstoffen_geopolitiek-web.pdf.pdf

HCSS & TNO (2013). *Resources for our future. Key issues and best practices in resource efficiency.*

PAX (2014). *The Dark Side of Coal. Paramilitary Violence in the Mining of Region of Cesar, Colombia.*

PBL (2012). 'Schaarse grondstoffen opnieuw op de agenda'. <http://themasites.pbl.nl/balansvandeleeftomgeving/2012/bevindingen/de-grote-opgaven-voor-het-leeftomgevingsbeleid/grondstoffen-schaarste>

Reuters (2013). Shell says it's containing oil spill in Nigeria's Delta. <http://www.reuters.com/article/2013/08/23/shell-nigeria-spill-idUSL6N0GO2E420130823> 3 augustus 2013.

Nako, M. (2014). Chad fines China's CNPC unit \$1.2 billion for environmental damage. <http://www.reuters.com/article/2014/03/21/us-chad-cnpc-fine-idUSBREA2K1NB20140321> 21 maart 2014.

VNO-NCW (2013). Gouden bergen afval in Nederland? http://www.vno-ncw.nl/Publicaties/Forum/Pages/Gouden_bergen_afval_in_Nederland_18557.aspx#.VDZdjmd_tmd

United Nations (VN) (2012). Human rights indicators - A Guide to Measurement and Implementation. The Office of the United Nations High Commissioner for Human Rights.

Appendix 1:

The Low Carbon Zone & Special Sustainability Zone

Following on from the success of the Special Economic Zones in China, a consortium of European and Chinese research institutes has developed the Low Carbon Zone (LCZ) concept. The goal of an LCZ is to stimulate investments in large-scale innovative projects, and to enter into international partnerships that contribute to the reduction of CO₂ emissions (Chatham House 2008). Since 2008, experiments involving the integration of economic and ecological sustainability have been conducted in Jilin, a Chinese district the size of Belgium where an LCZ has been set up. A similar concept is the Special Sustainability Zone (SSZ), where, in addition to economic and ecological aspects, attention is also placed on social (and cultural) elements of sustainability (Ketola 2011).

Appendix 2:

The project team

A extensive project team has contributed to the creation of the report, *Sustainable alleviation of resource hunger*.

Members of this team from the Rathenau Instituut were: André Krom & Arnoud van Waes (authors/researchers), Rinie van Est (Coordinator Technology Assessment), and Frans Brom (Head of Department Technology Assessment). In previous stages, Monique Riphagen and Lotte Asveld (researchers) also made a contribution to the project.

Acting as external authors, Eric Hees and Wouter Van der Weijden contributed a chapter on geopolitical strategies for extracting resources. Eric Hees is an adviser at CLM Onderzoek en Advies BV (CLM Research and Advice) in Culemborg. Wouter van der Weijden is the director of Stichting Centrum Landbouw en Milieu (The Centre for Agriculture and Environment Foundation [CLM Foundation]).

The report is based in part on two case studies, each of which will be published separately as a background study. Rene Kleijn is responsible for a case study on indium and tantalum, two metals that are crucial for the Dutch economy. Kleijn works as assistant professor and as educational director of the master's degree programme Industrial Ecology at the Centrum voor Milieuwetenschappen Leiden (Institute of Environmental Sciences or CML).

Jasper Grosskurth and Peter Konijn wrote a background study on China's resource activities in Africa. Jasper Grosskurth is a fellow member at the African Studies Centre (Leiden) and Director of Research and Strategy at Research Solutions Africa Ltd in Nairobi. Peter Konijn is the head of the Monitoring & Evaluation department at UTZ Certified in Amsterdam.

