



Grant Agreement no. 308371
ENV.2012.6.3-2 - Policy Options for a Resource-Efficient Economy

- Collaborative project -

<h2>D4.6 – SWOT Analysis of Resource Efficiency Pathways</h2>

WP 4 – Synthesis of Project Results

Due date of deliverable: Month 36 (extension granted)
Submission date: 31 / 03 / 2016
Start date of project: 1st October 2012 Duration: 42 months
Lead beneficiary for this deliverable: UCL
Last editor: Paul Drummond
Contributors: Paul Drummond

<i>This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 308371.</i>		
Dissemination Level		
PU	Public	PU

History table

Version	Date	Released by	Comments
Final version	31 st March 2016	UCL	

Table of contents

HISTORY TABLE	2
TABLE OF CONTENTS	3
1. INTRODUCTION.....	4
2. GLOBAL COOPERATION SCENARIO	8
3. EU GOES AHEAD SCENARIO	9
4. CIVIL SOCIETY LEADS SCENARIO	10
REFERENCES	11
ANNEX I: POLFREE VISION FOR A RESOURCE-EFFICIENT EUROPE IN 2050.....	12

1. Introduction

Alongside exploring answers to the question of why resources are currently not used as efficiently in the European economy as well as they might, the POLFREE project developed a 'Vision' for a resource-efficient economy in the EU by 2050 (see Jäger (2014), and Annex I). Three transition pathways (or scenarios) for achieving this Vision were then produced, entitled 'Global Co-operation', 'EU Goes Ahead' and 'Civil Society Leads' (see Jäger & Schanes (2014)¹), and quantitatively assessed using two economic models of different theoretical basis (GINFORS and EXIOMOD), individually coupled to the dynamic global vegetation model LPJmL, in order to provide an holistic assessment of the dynamic economic and environmental implications of each scenario (see Meyer *et al* (2014) and Reynés & Hu (2014) for a description of the models and coupling for GINFORS and EXIOMOD, respectively). The transition scenarios in the modelling sought, in particular, to achieve the headline targets listed in Table 1.

Table 1 - POLFREE Headline Targets for a Resource-Efficient Economy in 2050²

	2050 Target	Description
Materials	5 tonnes Raw Material Consumption (RMC) per capita (global)	Returning to a global level of global raw material extraction equivalent to the year 2000 and distributing this level equally among the expected world population in 2050
	No net additions to building stock (EU)	European demand for primary resources is reduced to the point that they can be nearly all sourced within the built environment through e.g. urban mining. This also implies a reduced land take and much higher levels of renovation of the existing building stock.
Land	EU global cropland footprint reduced to 0.17-0.20 ha/capita	Low target: planetary boundary for land use change to limit effects of climate change. High target: halt the loss of biodiversity and keep land use change within the safe operating space
	No net loss of cropland (EU)	No net land take due to expansion of built-up land and no soil degradation (implies long-term maintenance of soil fertility through good agricultural practices to ensure production over the years to come). Overarching rationale is to prevent the loss of fertile cropland in the EU.
Water	EU mean global water footprint per capita reduced 30-50% below 2004 levels	The water footprint covers not only the demand consumption of water directly but also the water in imported goods.
	Water Exploitation Index (WEI) below 20% in all EU countries	At 20% a region is defined as being under "water stress".

¹ The original titles in Jäger & Schanes (2014) are 'Strong Cooperation', 'Strong Europe' and 'Strong

² Adapted from Jäger (2014, p.22)

Carbon	EU mean global carbon footprint per capita reduced 60-80% below 2004 levels	Considers the impacts of goods and services imported into the EU
	EU GHG emissions reduced by 80-95% (below 1990 levels)	To keep climate change below 2°C from pre-industrial levels

A summary of the transition pathways (along with a ‘Business-as-Usual’ scenario to allow for comparison) and the results of their application to the GINFORS/LPJmL model coupling³ are summarised below (for a more comprehensive discussion, see Drummond (2015)):

Business-as-Usual - Increased concern for the environmental sustainability of the economy fails to materialise, either with ‘top-down’ institutions (international, EU-level, national or local), or ‘bottom-up’, civil society actors. As such, associated policy measures in the EU or the rest of the world are not introduced, or for those currently in place, ambition is not increased.

The modelling suggests that by 2050, increasing consumption of fossil fuels driven by economic and population growth leads to global CO₂ emissions more than doubling from 1990 levels, producing an increase in global average surface temperatures of between 4 and 6°C by the end of the century. Other environmental pressures also increase to 2050, such as an increase in global raw material consumption per capita (~40% from present levels), global water abstraction (~35% from 2000) and agricultural land use (~10% from present levels). Such increasing demand induces higher prices for key commodities, such as oil, ores and crops (average increase in real prices by 1.6%, 4% and 2.1% per year, respectively). Average GDP growth rates reduce over time, both globally (from around 2.6% over the last 20 years, to 2.1% from the present day to 2050), and in the EU (from around 1.5% over the last 20 years, to 0.9% from the present day to 2050). Employment reduces by around 30 million by 2050 (a reduction of around 15% from current levels). In this future, the risk of resource nationalism and conflict increases over time, along with social issues resulting from increased prices for essential commodities (e.g. crops) (Meyer *et al*, 2015). Substantial costs from the impact of climate change may also be expected, but are not considered in the simulations.

Global Cooperation - Global commitment to resource-efficiency and a sustainable economy is expressed through strong, binding targets and processes set by multilateral agreements, with all countries committed to achieving their aims (with the EU playing a strong global role). The emphasis shifts to ‘green growth’, with integrated resource markets generating a high level of trade in commodities (supported by agreements on transparency and governance). An Integrated Resource Management Agency (IRMA) is established to support global information gathering and sharing, and to co-ordinate and implement resource-related targets, instruments and processes across different policy fields. Harmonised market-based instruments predominate, with lifestyles and preferences of society driven by extrinsic motivations, and shaped by top-down structures and systems.

The modelling suggests that global CO₂ emissions peak at around 2020, and decrease to around 11% below 1990 levels by 2050. The policy mix induces strong investments in new resource-efficient technologies, reducing demand for resources, and consequently prices (including food prices), against the Business-as-Usual

³ See Drummond (2016, p.21) for discussion and justification.

scenario. All environmental targets listed in Table 1 are achieved. Social tensions arising from increasing food prices in the Business-as-Usual scenario are likely to be less prominent (if not diffused), along with the risk of resource conflicts and damage costs from climate change. Global GDP is consistently higher than in the Business-as-Usual scenario (5.2% by 2050), whilst GDP in the EU is even stronger (8.2% by 2050) - a function of the role of the EU as a consumer rather than producer of resources. Employment is also higher. Only some resource-producing industries, such as mining and quarrying, coke and refined petroleum and food and beverages, experience reduced value-added against a Business-as-Usual trajectory; all other economic sectors are 'winners' (Meyer *et al*, 2015).

EU Goes Ahead - Multilateral agreements and processes are present, but are manifest mainly through issue-focussed 'coalitions of the willing', concerned with information sharing and voluntary measures. Although a global commodity market is in place, availability of resources is commonly disrupted due to instances of 'resource nationalism'. This contributes to the decision by the EU to unilaterally pursue a resource-efficient, environmentally sustainable economy by 2050, through 'green growth'. Top down structures and market-based instruments again dominate (with mechanisms introduced to protect the international competitiveness of Industry in the EU), supported by regulations and standards, with the focus on developing and deploying new resource-efficient, low-carbon technologies, rather than wholesale changes in behaviour.

the EU is the only region in the world that rigorously improves its resource efficiency and the environmental impact of their use (meeting the targets presented in Table 1). By doing so, it insulates itself from increasing commodity prices (which increase in line with the Business-as-Usual scenario, as the reduction in EU resource consumption is relatively insignificant in the face of continually increasing global demand). It also realises a first-mover advantage through the development and deployment of new resource-efficient technologies and behaviours. As such, GDP in the EU grows at a higher rate than in the Global Cooperation scenario, to 12.4% larger than the Business-as-Usual scenario by 2050, whilst employment is increased by 3.5 million jobs (~2%) by 2050 against the Business-as-Usual scenario (Meyer *et al*, 2015).

Civil Society Leads - As with 'EU Goes Ahead', although multilateral agreements and processes are present, they are relatively weak, and disruption to the free trade in resources is relatively common. Although in this scenario the EU again pursues a transition to a resource-efficient, low-carbon economy, this is driven by intrinsic changes in the behaviour and preferences of civil society and non-governmental actors. The role of the EU and Member State governments is not so much to lead the transition, but to create the appropriate conditions for this bottom-up process to develop. Significant changes in the lifestyle of European citizens occurs, including a focus on local, seasonal food, a radical shift from personal transport to public transport, walking and cycling, and a dramatic decrease in employment in the formal economy in favour of volunteering in the local community, and increased leisure time. Progress is measured using a 'Beyond GDP' approach, which incorporates health, happiness and the 'ecological rucksack' of the individual.

The modelling suggests that a strong post-consumerism movement in European civil society may also drive resource efficiency, and achieve the targets presented in Table 1. Whilst international developments are similar to those under the EU Goes Ahead scenario, key differences emerge in the EU. Although the impact on employment is

positive (9% increase in the number of jobs by 2050 against Business-as-Usual), this is a result of the increase in part-time jobs and reduced working time per capita. This produces lower labour productivities and wages. Annual GDP growth reduces to zero by 2050, with the absolute size of the EU’s economy over 21% lower than Business-as-Usual by 2050. However, it is also assumed that this scenario emerges as a ‘Beyond GDP’ future in the EU, in which measures of progress are diversified beyond growth in GDP (Meyer *et al*, 2015).

The purpose of this report is to provide a high-level SWOT analysis for each of the three transition scenarios, against the objective of achieving the Vision of a resource-efficient European economy in 2050, as illustrated in Annex I (and the headline targets in Table 1). A SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis, originally developed in American (particularly Harvard) business schools in the 1960s (Hills and Westbrook, 1997), is a structured planning method that assesses both internal factors (strengths and weaknesses) and external factors (opportunities and threats) to the success of a given strategy or circumstance. The definitions of each of the four SWOT elements as used in this report are presented in Table 2.

Table 2 - Definition of the four SWOT elements

<p>A Strength is an aspect of the pathway that may be helpful in achieving the goals of the Vision from within the EU, or that would likely have a direct or indirectly positive effect on the EU’s environment, economy and society</p>	<p>A Weakness is an aspect of the pathway that may hinder the achievement of the goals of the Vision from within the EU, or that would likely have a direct or indirectly negative effect on the EU’s environment, economy and society</p>
<p>An Opportunity is an aspect of the pathway that may be helpful in achieving the goals of the Vision in the EU, or that would likely have a direct or indirectly positive effect on the EU’s environment, economy and society, but emanates from other countries/regions or international processes</p>	<p>A Threat is an aspect of the pathway that may hinder the achievement of the goals of the Vision in the EU, or that would likely have a direct or indirectly negative effect on the EU’s environment, economy and society, but emanates from other countries/regions or international processes</p>

The three sections below present the SWOT analysis for the Global Cooperation, EU Goes Ahead and Civil Society Leads scenarios, respectively. It must be noted that such an analysis is not exhaustive, but seeks to highlight the most salient points in each quadrant.

2. Global Cooperation Scenario

	Strengths	Weaknesses
Internal to the EU	<ul style="list-style-type: none"> - The EU achieves decoupling of economic growth from resource consumption - GDP growth and employment higher than Business-As-Usual - Import dependency for raw materials is decreased - The transition does not require a substantial shift in lifestyles of the general population - The EU has ability to guide the development of international policy instruments and processes in its favour - Market-based mechanisms may gain more support than regulatory approaches with Member States, the Commission and industry than regulatory approaches (Drummond, 2015). - Concerns over industrial 'leakage' are dissipated 	<ul style="list-style-type: none"> - Support by Member States to relinquish increasing governance competence to the EU, and subsequently to international institutions, may be difficult to obtain - Some Member States may resist the transition, due to the importance of extractive industries - Public support is required to enact major infrastructure changes
	Opportunities	Threats
External to the EU	<ul style="list-style-type: none"> - Global governance and cooperation produced a more secure global supply chain for the EU - As global action on climate change is taken, the cost of climate change (globally and in the EU) are minimised - It is likely that costs of the transition are minimised, whilst benefits are maximised, in a globally cooperative world, and occur at a more rapid pace (at the global scale) 	<ul style="list-style-type: none"> - Countries with large extractive industries may be resistant - Resistance to cede governance to international institutions, including the need for strict enforcement, is likely (O'Keeffe <i>et al</i>, 2014) - International processes may limit flexibility of the EU to take decisions impacting its environment, economy or society - An overarching, EU-specific strategy for the transition may not be possible - Institutions and processes may be become dominated by developing, increasingly resource-intensive countries, and shift away from the interests of the EU

3. EU Goes Ahead Scenario

	Strengths	Weaknesses
Internal to the EU	<ul style="list-style-type: none"> - The EU achieves decoupling of economic growth from resource consumption - GDP growth and employment higher than Business-As-Usual, and higher than Global Cooperation - Import dependency for raw materials is decreased, with insulation against global raw material price shocks increased - The transition does not require a substantial shift in lifestyles of the general population - Market-based mechanisms may gain more support than regulatory approaches with Member States, the Commission and industry than regulatory approaches (Drummond, 2015). - Concerns over industrial ‘leakage’ are significantly reduced - A coherent, economy-wide strategy at the EU level can effectively guide the transition 	<ul style="list-style-type: none"> - Some Member States may resist the transition, due to the importance of extractive industries - Requires support of civil society and Member States to pursue a unilateral approach - Public support is required to enact major infrastructure changes
	Opportunities	Threats
External to the EU	<ul style="list-style-type: none"> - Through unilateral action, the EU may realise a first-mover advantage, and export technology/practices to other countries facing increasing resource scarcity and prices - Reduced reliance on international institutions and processes, which may hamper the speed of the transition in the EU 	<ul style="list-style-type: none"> - The costs of climate change are likely to be only partially avoided, as only the EU seeks to decarbonise - International resource scarcity and prices (coupled with climate change damages) may lead to mass migration to the EU - Although insulated to a degree, the EUs global supply chain remains relatively insecure - With increasing resource-efficient, low-carbon requirements for products and services put on the market, international firms may leave, as the size of the EU market reduces, and potential cost of manufacture and sale compared to elsewhere increases.

4. Civil Society Leads Scenario

	Strengths	Weaknesses
Internal to the EU	<ul style="list-style-type: none"> - The EU achieves decoupling of economic growth from resource consumption - Employment is significantly increased, even over Global Cooperation and EU Goes Ahead - Import dependency for raw materials is decreased, with insulation against global raw material price shocks increased (although in this scenario, the EU's global supply chain is minimal) - An increasingly direct focus on wellbeing and happiness, rather than economic growth as an indicator of progress ('Beyond GDP') 	<ul style="list-style-type: none"> - Requires significant change in society, and in the structure and operation of the economy, driven by bottom-up actors - EU GDP is significantly reduced against both transition and Business-as-Usual scenarios, however GDP alone is assumed to be no longer a leading indicator of progress - As a bottom-up process driven by disparate actors, a coherent long-term strategy is difficult to produce and follow, possibly leading to increased overall costs
	Opportunities	Threats
External to the EU	<ul style="list-style-type: none"> - Little reliance on international institutions and processes, which may otherwise hamper the speed of the transition in the EU 	<ul style="list-style-type: none"> - The costs of climate change are likely to be only partially avoided, as only the EU seeks to decarbonise - International resource scarcity and prices (coupled with climate change damages) may lead to mass migration to the EU - The international community may shun the apparently isolationist EU, if its new economic and social strategies, structures and preferences are not accepted, rendering co-operation and negotiation on other issues more difficult

References

Drummond, P. (2016) *Conclusions & Policy Insights*, University College London, London

Drummond, P. (2015) *Short-term improvements for an Effective, Cost-Efficient and Feasible Policy Mix*, University College London, London

Hill, T. and Westbrook, R. (1997) SWOT Analysis: It's Time for a Product Recall, *Long Range Planning*, 30(1), 46-52

Jäger, J (2014) *A Vision for a Resource Efficient Economy*, Sustainable Europe Resesarch Institute, Vienna

Jäger, J. and Schanes, K. (2014) *Report on Scenario Formulation*, Sustainable Europe Research Institute (SERI), Vienna

Meyer, B., Beringer, T., Diestelkamp, M., Hohmann, F. (2014) Report on the Linking of GINFORS and LPJmL, Gesellschaft für wirtschaftliche Strukurforschung (GWS), Osnabrück

Meyer, B., Diestelkamp, M., Beringer, T. (2015) Report about Integrated Scenario Interpretation GINFORS/LPJmL Results, Gesellschaft für wirtschaftliche Strukurforschung (GWS), Osnabrück

O'Keeffe, M., Jäger, J., Hartwig, F., Armeni, C., Bleischwitz, R. (2014) *Report on Global Governance for Resource-Efficient Economies*, University College London, London

Reynés, F., and Hu, J. (2014) *Report on the Linking of EXIOMOD and LPJmL*, TNO, The Hague

Annex I: POLFREE Vision for a Resource-Efficient Europe in 2050



Vision for a Resource-Efficient Europe in 2050

