Global Cooperation This info-mural describes one of three scenarios and modeling outcomes developed by the POLFREE Project. The other two scenarios are Europe Goes Ahead and Civil Society Leads. Policies by Decade to Achieve European Resource Efficiency Targets

About the POLFREE Project

The POLFREE (POLicy options For a Resource Effi-cient Economy) project worked through four key stages. The first was to address the key question – why have resources been used inefficiently? To do these, we con-structed a theoretical framework for the analysis of resource efficiency, with detailed comparison of the trends and policies at EU and Member State (MS) level, cross-country econometric analysis to derive resourcereduction cost curves, and an analysis of business ers to resource efficiency; thereby developing an en hanced understanding of the drivers of inefficient resource use.

This led to the second stage, an exploration of new con cepts and paradigms that can bring about a radical increase in resource efficiency, and a vision for a resource-efficient economy in the EU. This included suggestions for new, more resource-efficient business models for firms, and ideas for a global governan regime that can promote resource-efficient econo among the EU's trading partners and more widely. From its new vision for a resource-efficient economy in Europe, the project proposed policy mixes, business models and mechanisms of global governance through which resource-efficient economies may be promoted.

The third stage involved intensive work on creating, modeling and visualizing scenarios for the emergence of resource-efficient economies. This involved linking quantitative economic and ecological models, and simu-lating the policies and policy mixes derived in the earlier work, supplemented with appropriate Life-Cycle Assess-ment (LCA) analysis for selected products and sectors, to ensure that the policies and business models in the scenarios lead to absolute decoupling of economic activity from resource use and environmental degradation The scenarios and associated policy analysis consider ered economic, environmental and social dimension

The project was be explicitly geared to support policy efforts and initiatives on resource efficiency in the Euro-pean Commission, and involved a wide range of stake-holders from business, the policy world, and NGOs.

Context and Assumption for the Strong Cooperation Scenario

EU and Member States

Economic Model Green Growth: The OECD defines green growth as promoting economic growth while reducing pollution and greenhouse gas emissions, minimizing waste and inefficient use of natural resources, and maintaining biodiversity. Green growth also means improving health prospects for populations and strengthening energy security.

Macro-economic Objective The economy is based on the principle of green growth, resulting in a mediu to high level of GDP and high levels of competition.

Social Equality Lower than today. Social equality refers to a situation in which all people within a specific society or isolated group have the same status in cer-tain respects. Thus it includes equal rights under the law, such as security, voting rights, freedom of speech and assembly, property rights, and equal access to social goods and services.

Technology and Resource Efficiency The transition to a green and low-carbon economy is triggered by significant innovations. Incentives are in place so that the private sector invests more in research and inno vation on resource efficiency. Demand-side measures create incentives for green innovation by building mar-kets. By 2020, smart and specialized R&D efforts dramatically improved the management, reuse, recycling and substitution of resources. International requirements for technology transfer are introduced.

Lifestyles and Preferences Lifestyles and prefe ences are largely shaped by the top down structures and systems, and are largely led by external price sig nals. High levels of technological advancement in re source efficiency driven by international standards allow for more consistent standards of living and ease the pressure of resource use despite continued con-sumerism. International standards on products ensure that the price of goods reflect their cost in environment tal, humanitarian and resource terms.

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adjusted based on evaluation and learning



strong international coalitions striving forward develop new norms and practices.

During the 2010s	During the 2020s	Du
Additional Important Policies International agreement on breign invest- use Agreement on agreement on agreement on agreement on agreement on tural research and investments Agreement on tural research agreement on tural research tural research tural research agreement on tural research agreement on tural research tural	International climate agreeming tigte for all autors to support stepsing tation or support stepsing tation or support stepsing algement Standards for eco- sing agreeming St	
Additional Important PoliciesRequirements of the EU Fuel Quality Direc- tive tightenedEnergy labeling expanded to more energy-related and material-intensive productsLandfill ban for un- treated materials to landfillAdditional fees postruction materials to landfillJoint industry and government funded construction materials to landfillRequirements for government funded construction materials to nologiesRequirements for Green Public Procure ment (GPP) strength- enerd for all products with significant envi- ronmental impactsConcessions to energy-intensive industries removed, facili- tated by interna- tional cooperation on energy pricing	All Environmentality (EHS) removed (EHS) rem	
Additional Important Policies Significant investment in considered and sub- o neighboring state The policies Significant investment in considered and sub- o neighboring state Significant investment in considered and sub- o neighboring contribution Significant investment in significant in significant investment in significant investment in significant in significant in significant in significant in significant in significant in significant in significant in significant	Average EU CO2 intensity target for 10g CO2/KWh Renewable Energy Corrective target (27% of energy) demad supplied) wrenewables) Smart gid links between al EU Member States conpleted and fully op- entional, with links to tween on-EU regions Carbon capture and reuse successfully dem- cial deployment begins Payment system for energy services (e.g. for storage) similar or torage) similar or torage) similar or torage) similar or torage) Target for intercon- nector capacity torage tech- nologies are demonstrated New energy storage tech- nologies are demonstrated	<text><text></text></text>
Vehicle Excise Duties aligned across the EU and linked to CO ₂ intensity Vehicles marbuilties aligned across the EU and linked to CO ₂ intensity Vehicles intro- buties aligned across the EU antly expanded Vehicles intro- beyond the EU Across Congestion fransport manage- ment systems con- beyond the EU Across Modal connections	CO2 intensity standards heavy goods vehicles and heavy goods vehicles and heavy for heavy heavy goods vehicles and heavy heav	CO2 intensity standard for new cars (10gCO2/km), for new light goods vehiclesStandard fo intensity of revised base life-cycle as and applied whole fleetCO2 Intensity Standards Distandards Distandards DistandardsMaterial Intensity Standard Distandard Distandards
Additional Important Policies Additional Important Policies Additional Important Policies Smart meters for programme to to have electric water/space heating and cooking, if energy and cooking, if energy sprovided by an external supplier Additional Important Policies Smart meters for resource efficiency mance Smart meters Smart meters	Sense of the provision of	<text></text>
Additional Important Policies Institutional barriers for recycling recycling materials used in the economy Additional Important Policies Increased regu- tation and monitoring to re-use and re-cycling improved throughout the EU	Continued support for the development and use of advanced materials and production technologies Manufacturing industry establishes international value chain management Integration of mining, base metals, and construent metals, used companies as supply chains to minimize to minimim	
Awareness cam- paigns on food waste prevention and on healthy diets Funding for the establishment of urban gardens Training pro- grammes on land use planning for better integrating green spaces Regulations to restrict /eliminate elements in pro- cessed foods Regulations to require restaurants to provide small, medium and large portions	Tax based on greenhouse gas emissions related to meet production Additional Important Policies Widespread shift of forest management practices from "sustained-yield" to restry to "multiple-purpose management" Incentives to favour green spaces in cities strengthened	
Resource Efficiency are adopted for the major world play- or a one one by set in the set is adopted for the major world play- eff in the set is adopted for the major world play- eff in the set is adopted for the major world play- eff in the set is adopted for the major world play- eff in the set is adopted for the major world play- eff in the set is adopted in the intervention and consumption ing sustainable extraction rates. Resource efficiency are adopted for the major world play- eff in the set is adopted in the intervention and consumption ing sustainable extraction rates. Resource efficiency are adopted for the major world play- eff in the set is adopted in the intervention and consumption ing sustainable extraction rates. Resource efficiency are adopted for the major world play- eff in the set is adopted in the intervention and consumption ing sustainable extraction rates. Resource efficiency are adopted for the major world play- eff in the set is adopted in the intervention and consumption ing sustainable extraction rates. Resource efficiency are adopted for the major world play- ing sustainable extraction rates. Resource efficiency are adopted in the intervention and consumption ing sustainable extraction rates. Resource efficiency are adopted in the intervention and consumption ing sustainable extraction rates. Resource efficiency are adopted in the intervention and intervention and intervention and intervention and consumption ing sustainable extraction rates. Resource efficiency are adopted in the intervention and intervention and intervention and intervention and consumption Resource efficiency are adopted in the intervention and intervent		



During the 2030s and 2040s Modeling Process and Outcon Additional Important Policies s presented in each of the three POLFREE so 2030 Agreement reached on the diffusion of technology and capacity building for non-conventional water-resource development (urban sewage wastes and desalination). ilobal GDP +6.3% EU Number of Jobs +1.8% EU Outcomes erence against "Business-as-Usual" (Refe As developed in the o projections for 2030 and 2050 Ave. annual increase in resource productivity [G onmental tax – share of total tax revenues Resource 2030 arbon Price (€2010/tCO2 rals covered by recyclates by h proportion of demand covered b easing international markets for als (e.g. metals, electrical and electroni equipment, vehicles, plastics, paper) 2030 -34.8% nary materials by 2050. POWER Final energy demand across EU supplied by renewables CO2 intensity of electricity Additional Important Policies eneration (gCO2/kWh) Directive target Target for inter-
connector capac-
ity is increased
to 25% of total
domestic elec-
tricity generationProgramme of electricity
(and gas) interconnec-
tion to non-EU states
(e.g. Southeast Europe
and North Africa) contin-
ues Share of electricity in total **Reduced water abstraction** 2030 final energy demand -35.4% -9.3% 2030 METALS & MATERIALS Reduction in CO2 emissions from land transport from 1990 levels Additional Important Policies material EU high-speed rail of vehicles work fully operational, All convention- Electric All urban areas Hydrogen refillally fuelled cars vehicle charg- have seamless ing infrastruc-are banned ing infrastruc- intermodal ture in place in from 1990 levels 5 tonnes of raw materials 2030 ; intermodal ture in place in from all urban ture expanded transport by all urban areas 31.0% to all areas in 2035 for both areas by 2050 the EU and goods and (for all hydroalve the use of conventionally Share of electricity in total neighboring countries passengers in gen vehicles) uelled cars in cities by 2030 by 2040 in the from 2010 levels. No conver neighboring countries boring couno net additions to built-**BUILDINGS** Reduction of CO2 emissions from residential buildings from 1990 levels Reduction in primary Raw Material Input (RMI) into con-struction (Change against Additional Important Policies Facilities to recaptur nutrients from waste water are installed by Increased recycling rate of Water abstraction for public water supply (Change against construction minerals 2030 2050 INDUSTRY Reduce CO2 emissions from Industry (Change against Additional Important Policies 🗨 terial Input (RMI) ... (Change against 1995) 2030 New polymers based or carbon re-use and othe -38.8% -57.7% -77.9% 15.7% -4.6% Average annual loss o new materials and resource-efficient solu Reduce energy intensity of _ Keep water use within sustions during the 2030 and 2040s industry (Change against 1995) tainable levels Modelled values 2030 2050 -46.6% Reduced meat demand per Avoidable food waste is capita (change against 1995) halved by 2030 and elimi nated by 2050 Investmen Payment -7.1% -22.5% FOOD, AGRICULTURE, FORE Mean water footprint per Keep water use within Loss of biodiversity due to Subsidy "Support" sustainable levels land-use change is halted by capita reduced 30-5[/] 2004 levels) CO2 emissions (change Primary abiotic raw material use Regulation (in tons per capita) against 1990) DEVELOPMENTS 2010 45.6% 2030 63.5% 2050 -11.3% 2010 7.5 2030 7.3 2050 4.1 Water Exploitation Index below 20% in all EU Coun Price Agricultural land use (in mio. Water abstraction (in mio. cbm per day)

Essentia Policies

2016

2050

-82.0%

-0.03%