

Green Competitiveness: Considerations for Romania

Digitalization, Circularity, Resilience, Transformation



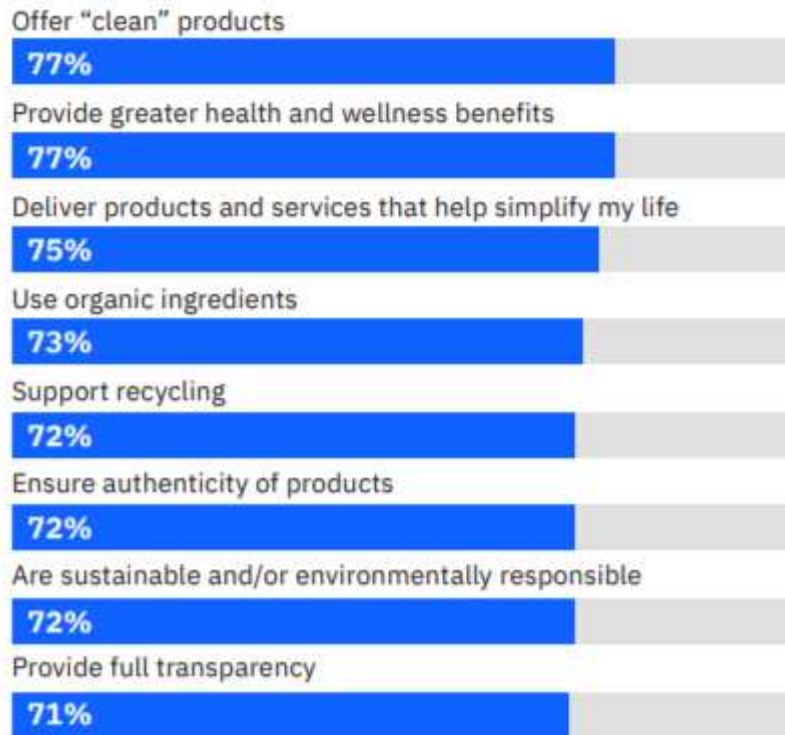
WORLD BANK GROUP

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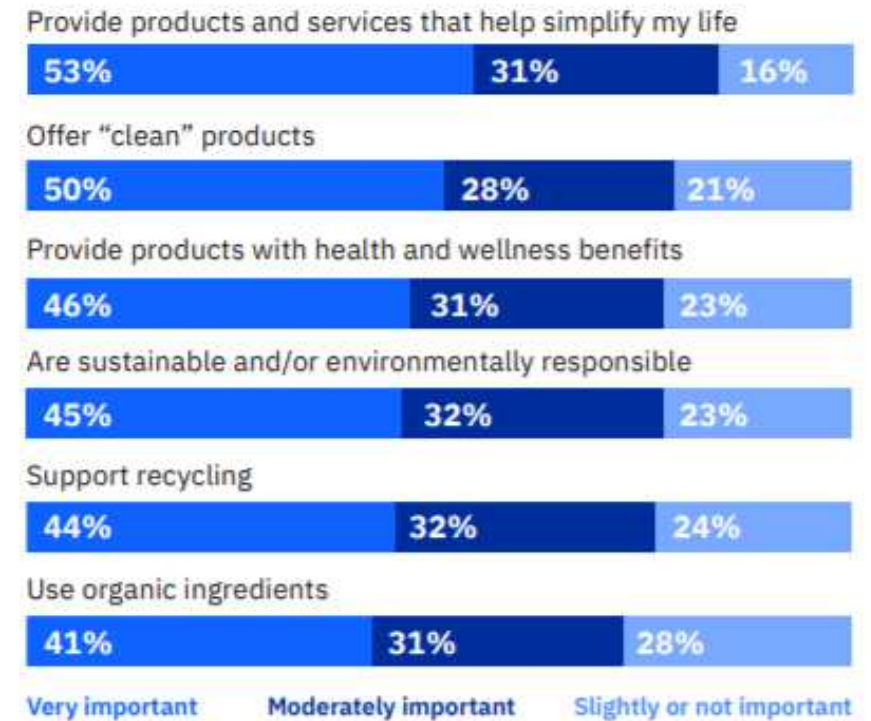
Markets & Technology Unit
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Market dynamics are changing towards green

For attributes they say are very important to them, consumers are willing to pay a premium for brands that:



Consumers are looking for brands that:

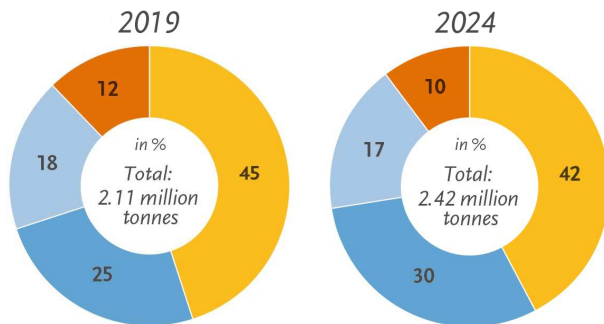


Source: National Retail Association, IBM, 2020

Companies and markets are moving towards biobased plastics

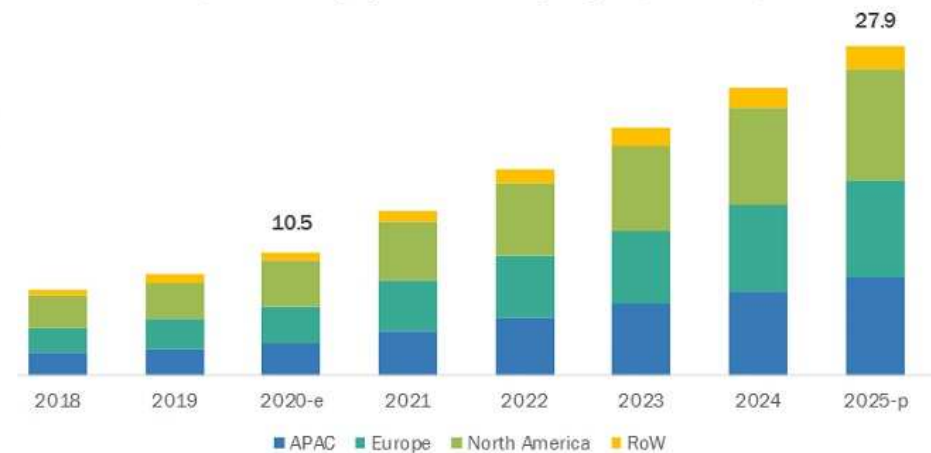
- Global Commitment unites more than 500 organizations behind concrete 2025 targets to eliminate the plastic items
- **The European bioplastic market has the largest market share.** Key drivers are favorable government regulations, widespread adoption of bioplastics in daily life by consumers, increasing fossil-fuel prices, and environmental awareness.

Global production capacities of bioplastics (by region)



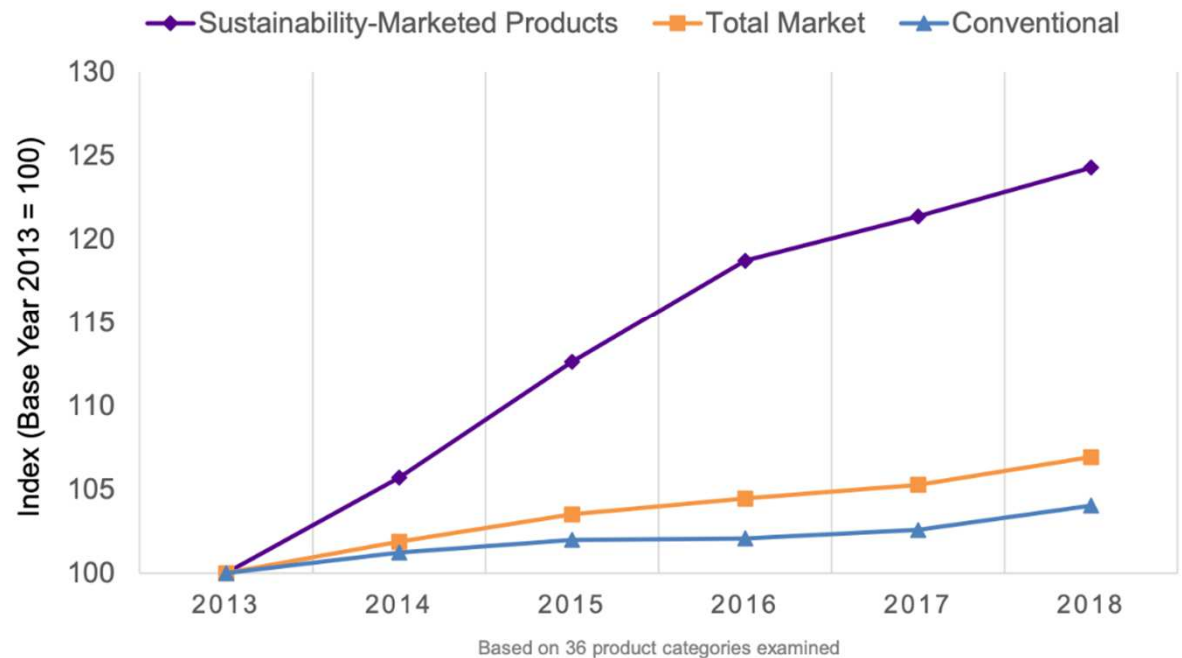
Source: European Bioplastics, nova-Institute (2019). More information: www.european-bioplastics.org/market and www.bio-based.eu/markets

Bioplastics & Biopolymers Market, By Region (USD Billion)



Circular Economy creates new markets along traditional value chains

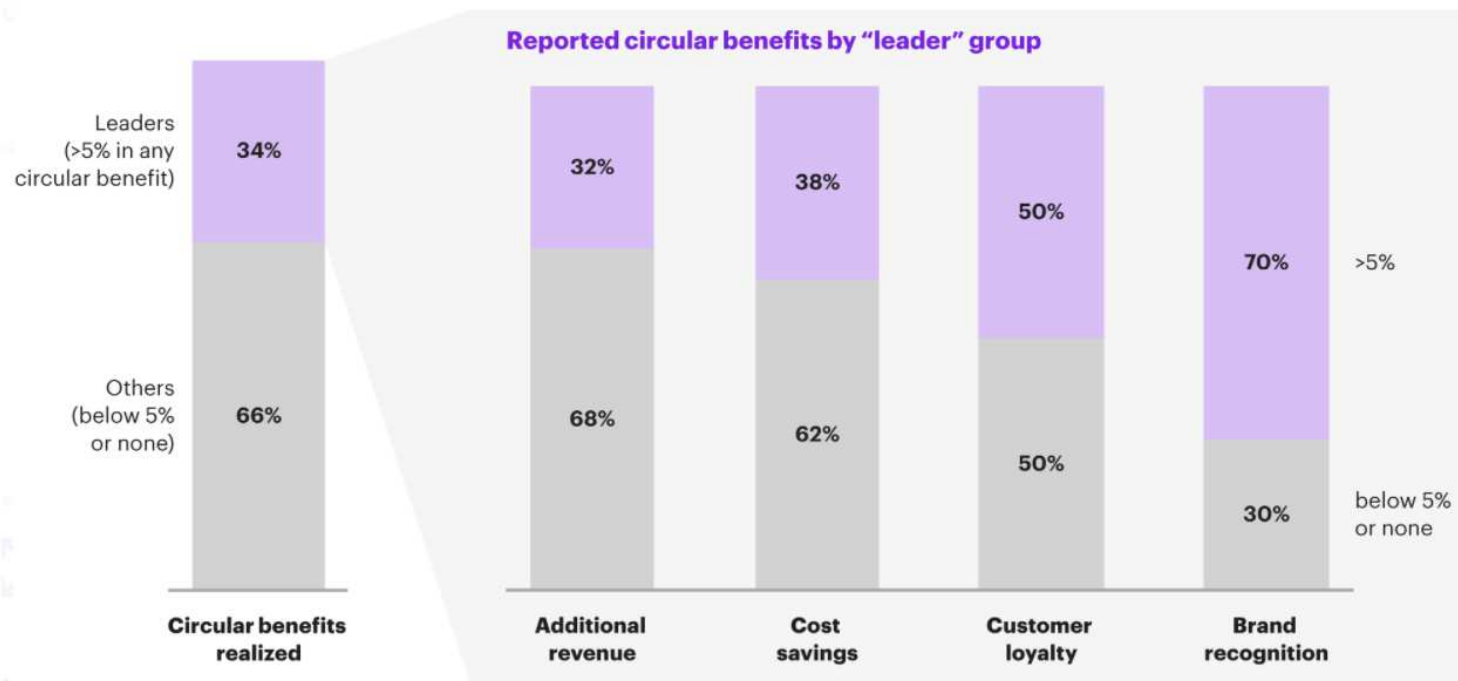
- Sustainability-marketed products grew **5.6 times faster** than conventional-products, and 3.3 times faster than the consumer product goods market (NYU Stern Center for Sustainable Business. 2019).
- Over 90% of individual product categories, the growth of Sustainability-Marketed Products outpaced the growth of their respective categories.)



Source: NYU Stern Center for Sustainable Business. Sustainable Share Index. Research on IRI Purchasing Data (2019.)

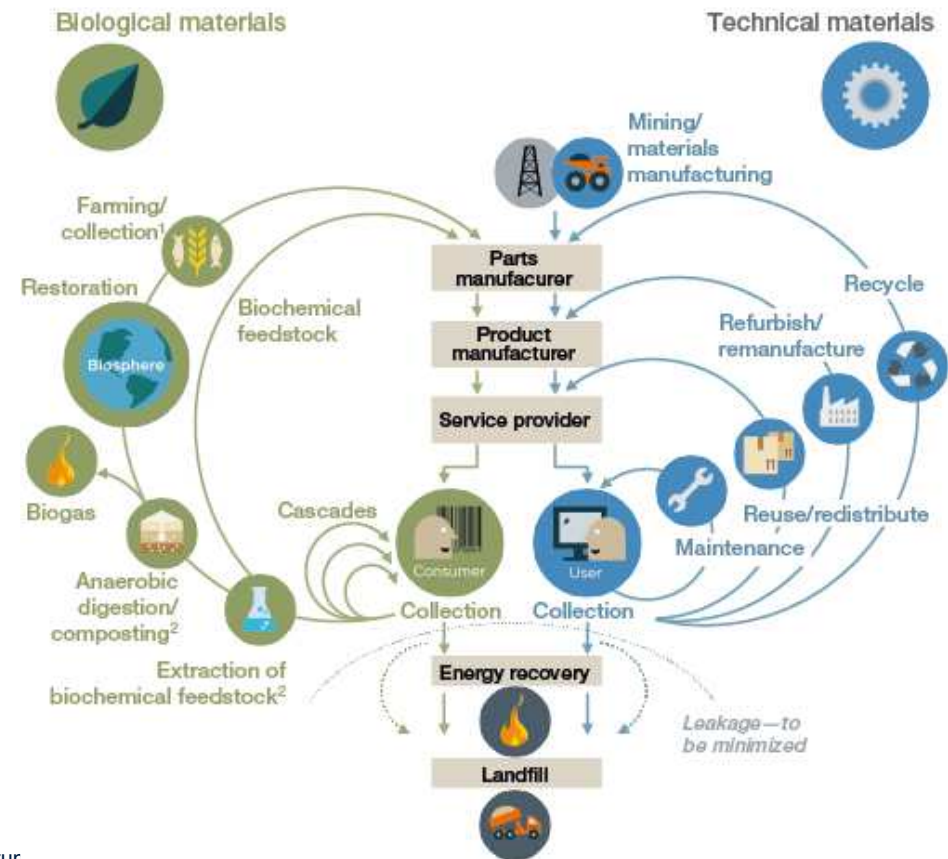
Green Competitiveness is also seen as a method to boost competitiveness and growth of companies

- In the United States, specifically, high ESG awareness drives 75 percent of the consumer purchase decisions (HSBC Global Research, 2019)
- Kearney recently surveyed companies on circularity and reported 1/3 increase in benefits for top performing companies



Circular economy approaches are seen as systemic ways to promote green competitiveness in product, process and value chains

"A circular economy describes an economic productive system that is based on business models which replace the 'end-of-life' concept with reducing, alternatively reusing, repairing, remanufacturing, recycling and recovering materials in production/ distribution and consumption processes, to return into a technical or biological cycle. The CE model operates at the **micro level** (products, companies, consumers), **meso level** (eco-industrial parks), and **macro level** (city, region, nation and beyond), with the aim to accomplish an **economic sustainability**, which implies creating economic prosperity (GDP growth, financial gain), social progress (employment generation) and environmental innovation (renewable energy, urban mining)."

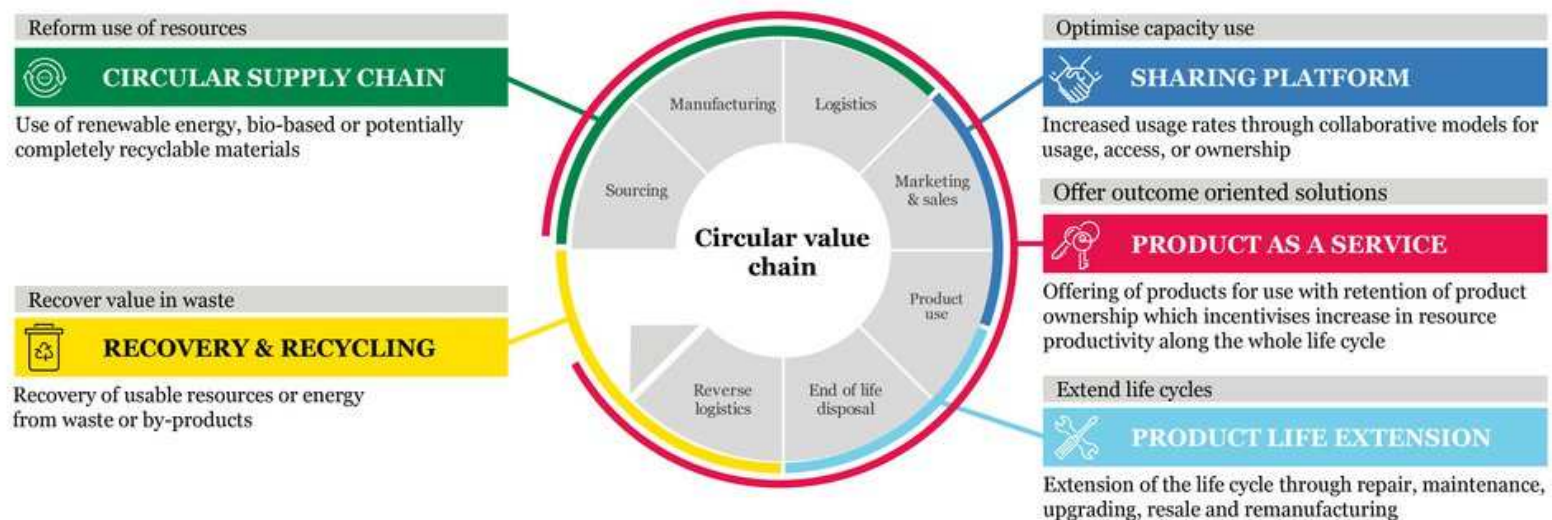


Source: Ellen MacArthur Foundation, 2015; Urbinati *et al.*, 2017; Korhonen *et al.*, 2018, World Economic Forum, 2019.

Circular Economy creates new markets along traditional value chains

CE can accelerate economic growth by creating new markets for products and services; promote competitive business models; create more value-added jobs.

e.g., Adoption of circular economy models (e.g., sharing platform, recovery and recycling) is estimated to be a business opportunity worth [\\$4.5 trillion](#) globally by 2030, increase GDP by as much as [7pp](#) in Europe, [0.8- 1.4%](#) additional GDP growth in Denmark, savings up to [16% of GDP](#) for businesses and household in China

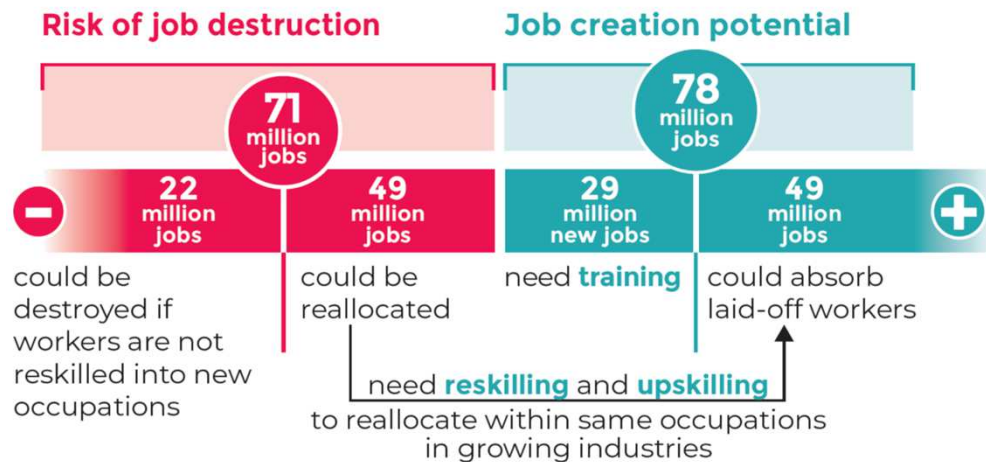


Circular economy and labor

- A CE can create better jobs: in maintenance and repair, cleaning and reuse, (dis)assembly and remanufacturing, sorting and recycling. Such new sources of employment avoid trade-offs between development targets and simultaneously promote SDGs
- Decent circular jobs require that countries **develop frameworks for quality of work** in the CE and **strengthen the legal basis and social dialogue in sectors** that will be affected by CE policies.

Global Circular Scenario 2030

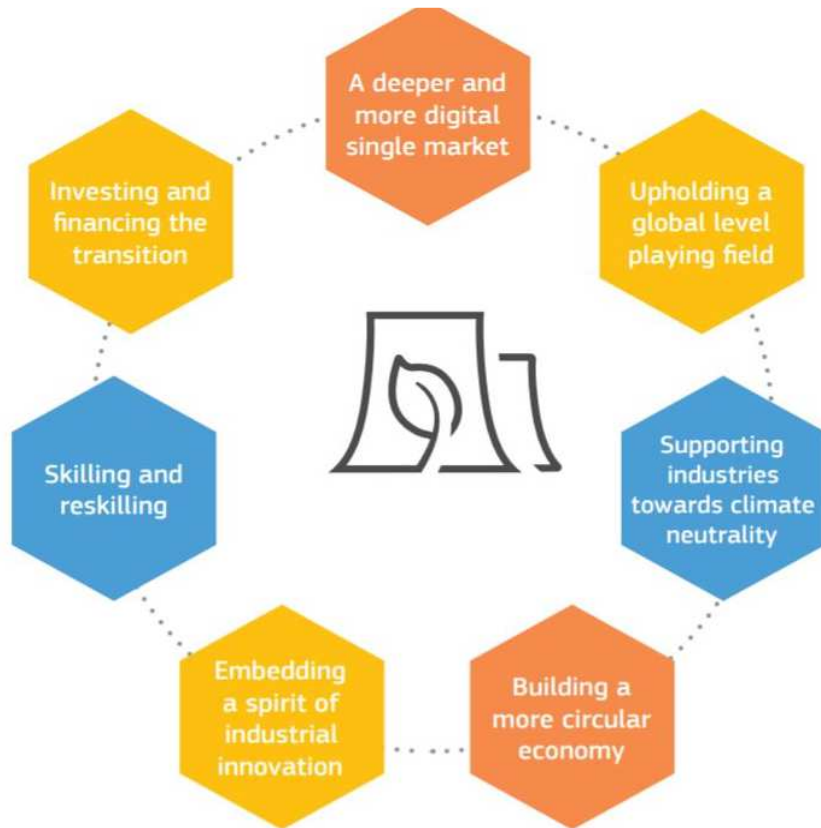
Potential job growth



Potential skill needs by circular economy activity

Activity	Low skilled	Skilled	Professional
Closed loop recycling	4 icons	4 icons	1 icon
Open loop recycling	4 icons	2 icons	1 icon
Servitisation	3 icons	3 icons	3 icons
Remanufacturing	2 icons	5 icons	2 icons
Reuse	4 icons	2 icons	1 icon
Biorefining	1 icon	4 icons	4 icons

Green competitiveness can drive digitalization



(Source: [EU Industrial Strategy, Factsheet \(EU\), 2020](#))

- The EU's new growth strategy is transforming industry to become **greener**, more **circular** and more **digital** while remaining competitive on the global stage.
- **Digital technologies** are changing the face of industry and the way we do business. They allow economic players to be more proactive, provide workers with new skills and support the decarbonisation of our economy.
- New technologies will require an enhanced **enabling environment** and **investment climate** to create new products, services, markets and business models. They will shape new types of **jobs**, which need reskilling and upskilling. And they will entail a shift from linear production to a circular economy.
- The EU must also enhance its industrial capacity in critical **digital infrastructure**. The successful roll-out of highly secured and state-of-the-art 5G network will be a major enabler for future digital services and be at the heart of the industrial data wave.

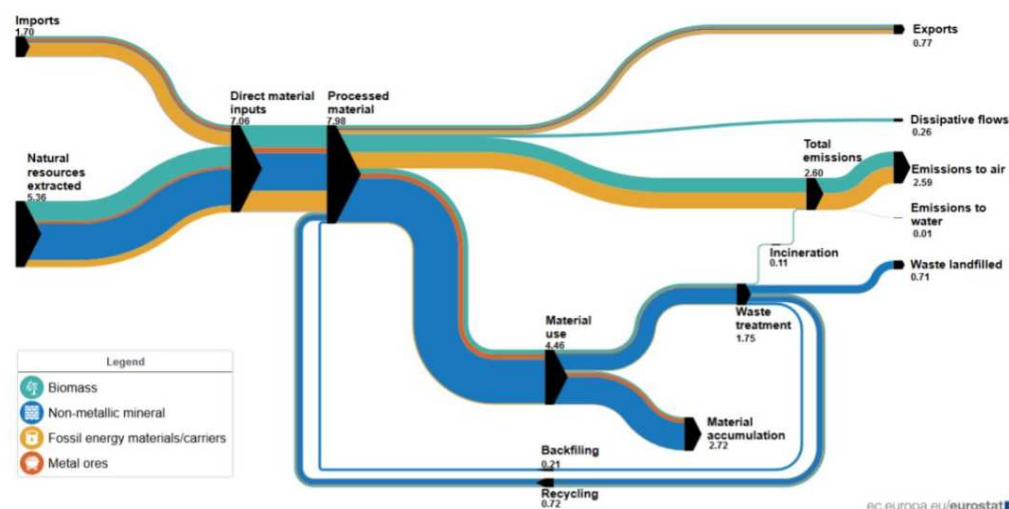
EU High-level initiatives promoting the green and digital transition

- **European Green Digital Coalition**: 26 CEOs of tech companies have signed an agreement to **invest** in the development and deployment of greener digital technologies & services that are more energy and material efficient; to **develop** methods and tools to measure the net impact of green digital technologies on the environment and climate by joining forces with NGOs and relevant expert organisations.



[Shaping Europe's Digital Future](#), (Source: EU, April 2021)

- The European Commission's (EC) **Raw Materials Initiative (RMI) 2.0** objectives is (a) to support European Union (EU) policy with tailor-made applications like the periodical Raw Material **Scoreboard** (Vidal-Legaz et al., 2016) and Criticality assessments, and (b) to help coordinate other EU-level **data and information** on raw materials (EUKBRM).



Material flows in Europe, 2017, billion tonnes per year (Gt/year) (Source: Eurostat, 2020)

EU MS examples promoting the green and digital transition

Countries in Europe are increasingly recognising the role that **digitalisation** can play to boost **eco-innovation** and a sustainable, **circular economy**.

Examples of digitalisation as a key component of national strategies for eco-innovation and/CE	Examples of digitalisation applied as a policy tool/instrument towards achieving specific eco-innovation/CE
<ul style="list-style-type: none">• Circular Economy Strategy (Denmark): supporting the circular economy through data and digitalization features is one of the six thematic priorities• Low Carbon Development Strategy (Malta): aims at the decarbonization of the country through low-carbon investments in selected sectors. Information and communication technologies (ICT) are earmarked as enablers of resource efficiency, with applications in the building sector, water management, energy and smart grids, as well as mobility.• National Strategy for Technological Innovation and Digitalization (Italy): the strategy promotes, among others, the use of alternative energy sources and contributes to reducing energy consumption through the development of digital infrastructure and data centers.• Smart Specialization Strategy (Slovenia): identified three priority pillars for its implementation in the country, namely digitalization, circularity, and industry 4.0. The first two pillars indicate a growing integration of the circular economy and digital agendas in the fields of research, development and innovation.• National Strategy for the Development of Scientific Research (Bulgaria): ICT is identified as a priority research area for the eco-innovation field	<ul style="list-style-type: none">• Roadmap for the Circular Economy (France)<p>The roadmap includes several measures on digitization and digital technologies, as these represent an opportunity for the transition to a circular economy, especially by enabling networking, access to information and data for citizens, support to decision-making and the production of new services. Digital technology is regarded at the service of the circular economy in order to achieve the objectives to reduce natural resource use, the amount of non-hazardous waste, greenhouse gas emissions and others. Source: <i>Anti-Waste and Circular Economy Act (2020)</i>: https://www.legifrance.gouv.fr/eli/loi/2020/2/10/TREP1902395L/jo/texte</p>• Digital Policy Agenda for the Environment (Germany)<p>This Agenda is the first strategy in Europe that consistently combines digitization and environmental protection. The 2020 Environmental Digital Agenda is a strategic package of 70 measures aiming to organize the digital transformation climate-friendly, use it for prosperity and competitiveness, social justice and support an intact environment. Source: Website: https://www.bmu.de/digitalagenda/</p>

And leverage Industry 4.0 - technologies' potential green dividend



Big data

- Industry 4.0 developments, advances in robotics and smart tech are going to speed up the [circular economy](#) (CE) transition and support the [European Green Deal](#) –from waste recovery to social innovation, as well as in the context of COVID-19 recovery.



Blockchain

- Governments everywhere are urging not only **industry** but also **consumers** on a circular raw materials. And Europe is banking on **innovation** as a driving force in achieving its so-called twin (green and digital) transition to a zero carbon, zero waste economy that leaves no person or place behind.



Robotics

- The most effective transition to a circular economy will therefore not only use digital technologies for increasing the circularity of 'traditional' sectors **but also circularise the technology sector itself.**



IoT+ AI

- The traditional waste industry might struggle to justify investing today in advanced '**green**' **technologies**. The capital costs (CAPEX) need to be offset by gains in efficiency which reduce typical operational costs (OPEX) such as labour ([Digital Waste Management, 2021](#)).



- Finland's **ZenRobotics**

- [Machine learning and robotics](#) as “fast becoming a new industrial standard”. Its AI-powered recovery facility sorts valuable materials from the waste stream and intensifies recycling rates.
- The robots create a more structured and predictable sorting environment which helps to mitigate the health and safety risks associated with manual sorting”



- **ReCircE project** wants to improve plastic waste-sorting using **artificial intelligence (AI)** and then issuing a Digital Product Passport to build transparency into the recycled materials chain (e.g., electric kettles and toys)

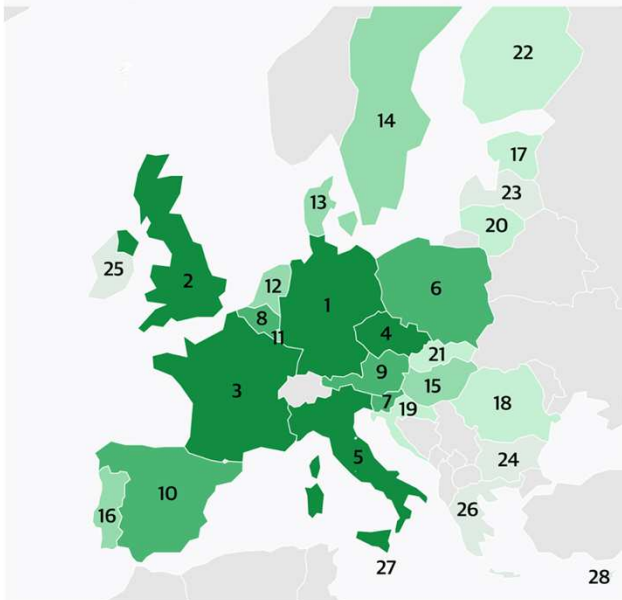
- Norway's **TOMRA Recycling** is an early AI adopter using mathematical models, based on information gathered from large-scale material sampling.

Considerable opportunities exist in Romania to drive towards a greener growth model

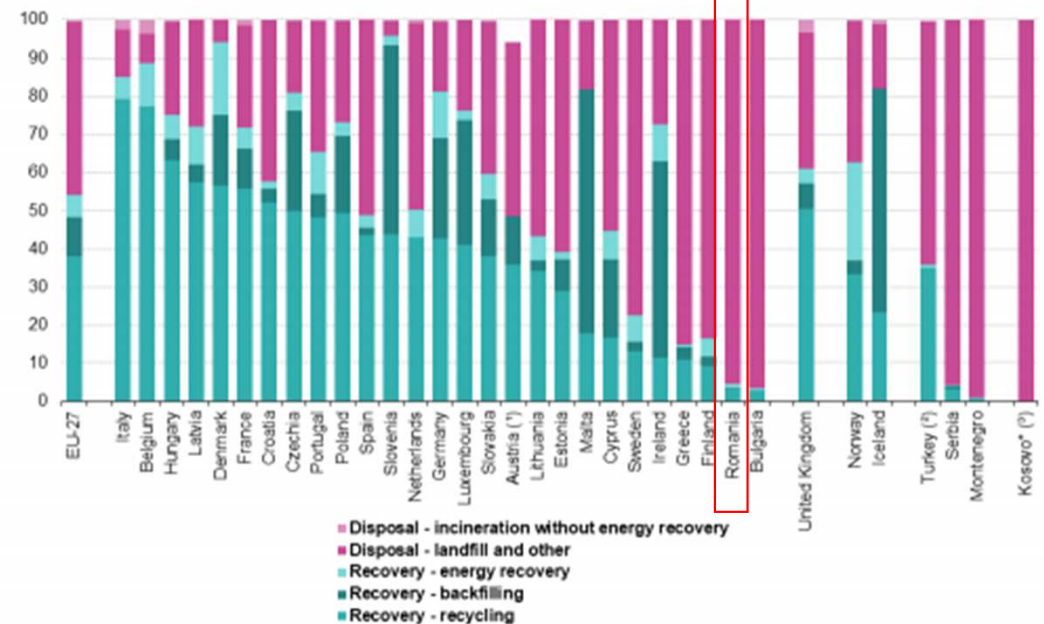
Politico data on circular economy ranking

WHICH COUNTRY HAS THE MOST CIRCULAR ECONOMY?

Hover over a country to see how it ranks in POLITICO's analysis of seven categories the European Commission will use to monitor progress on its goal of reducing waste, boosting recycling and encouraging reuse.



Waste treatment by type of recovery and disposal, 2018
(% of total treatment)



(*) No data available for energy recovery and incineration without energy recovery.

(*) No data available for incineration without energy recovery.

(*) 2016.

* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

Source: Eurostat (online data code: env_wastrt)

Initial indication is on gap in performance along key indicators

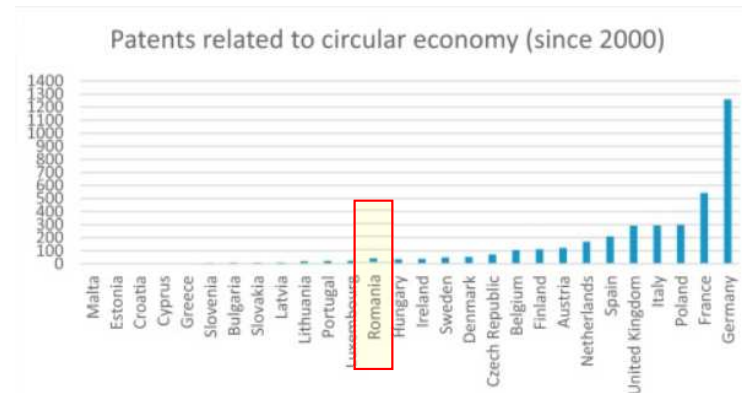
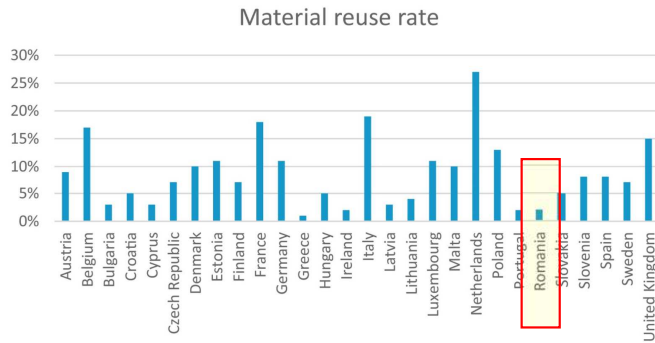


Figure 3. Recycling rate of the municipal waste in EU countries. Source: based on processed data provided by Eurostat (2017).

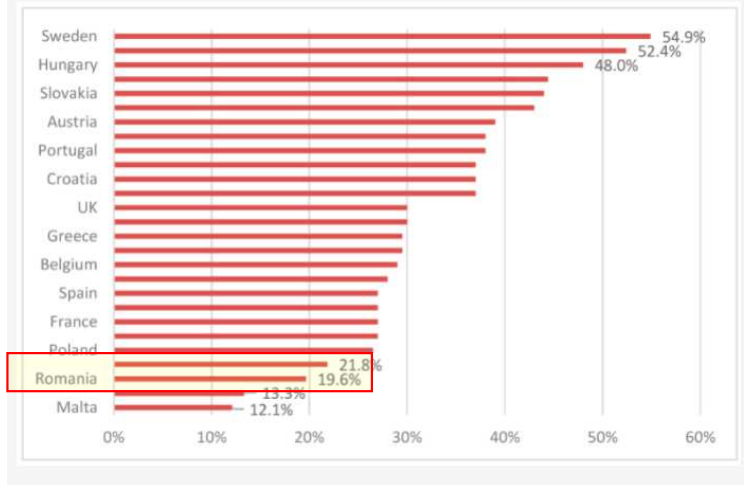
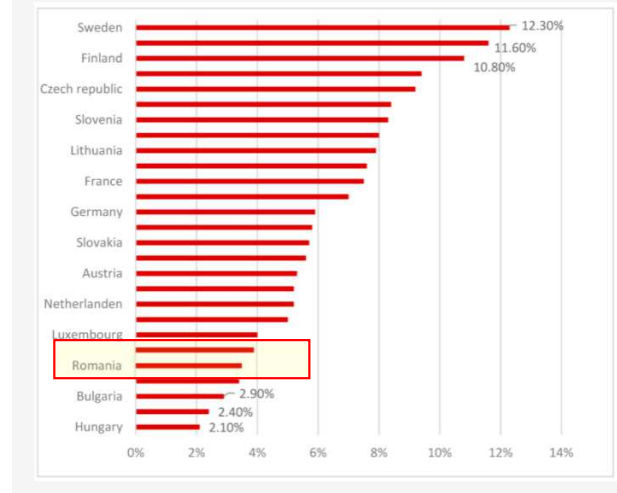
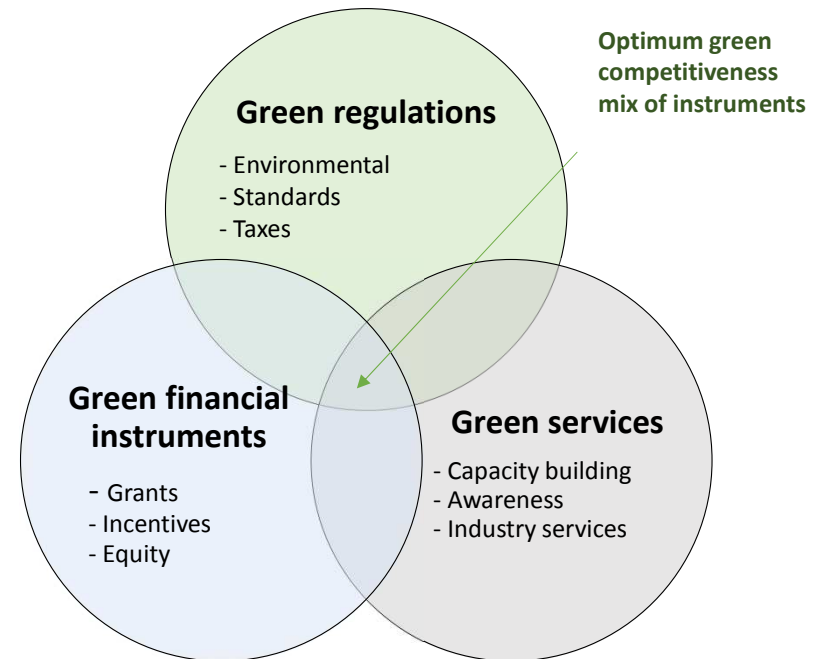
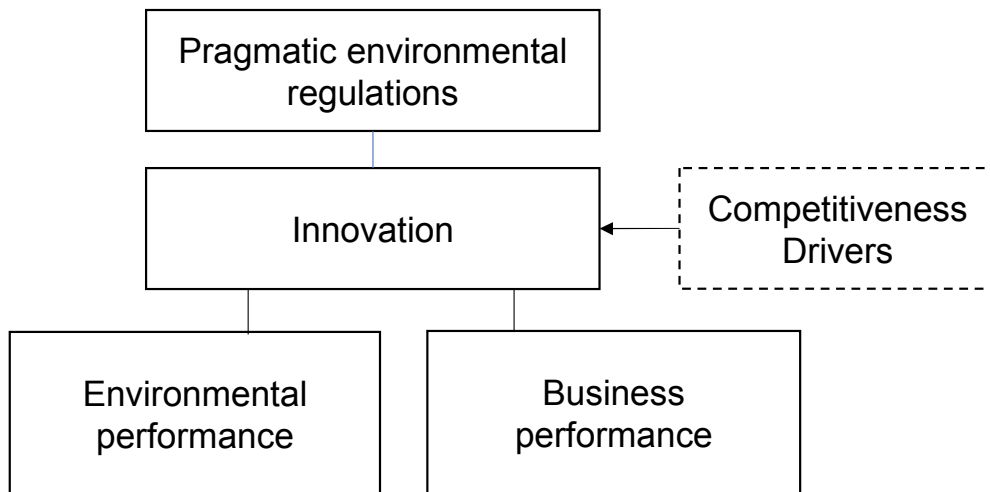


Figure 2. The labor force employed in the production of goods for environmental protection in EU countries in 2017. Source: based on processed data provided by Eurostat (2017).



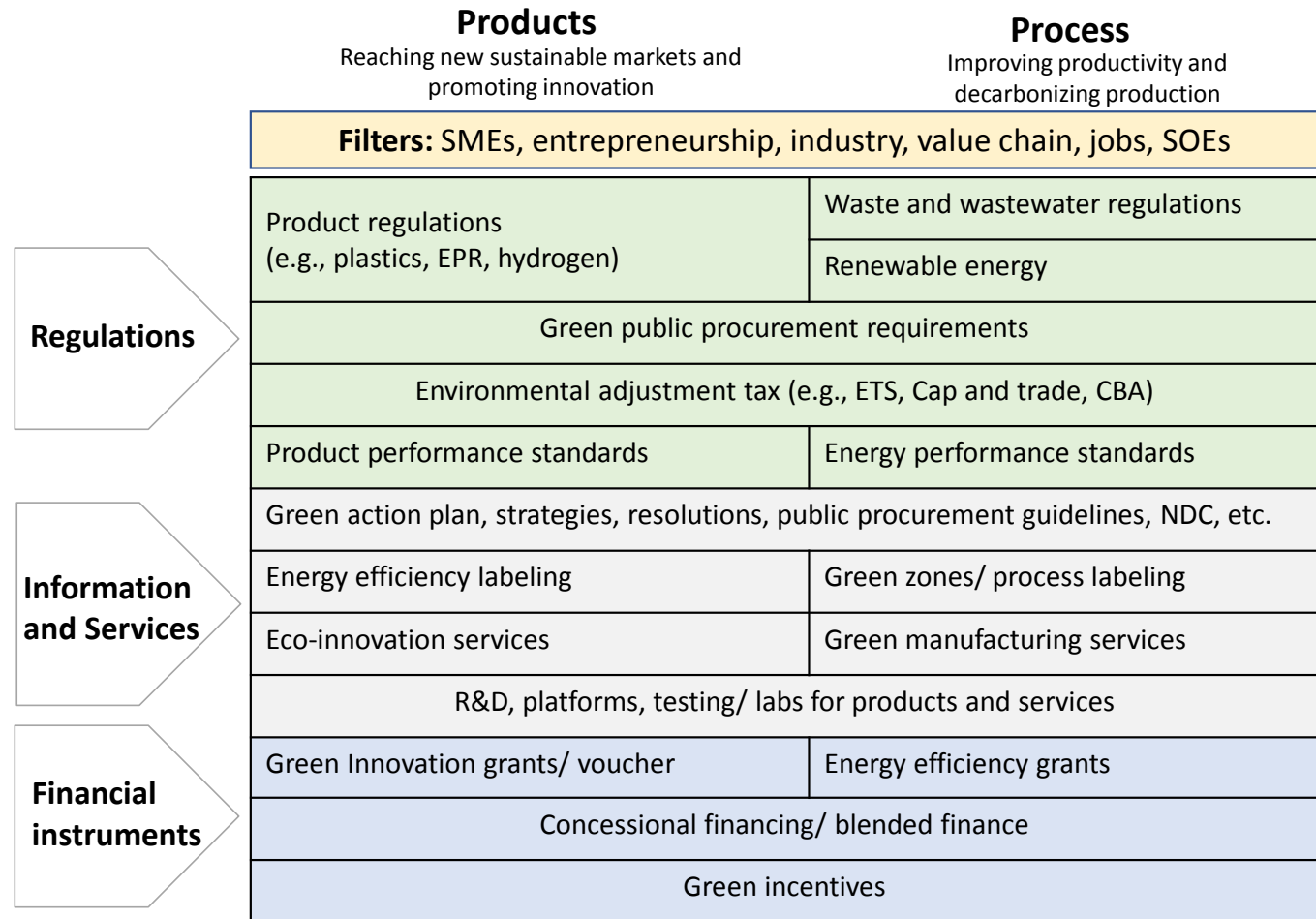
Policies will need to focus on climate, sustainability and a true cost of environmental degradation

- Low-carbon transition and transformation through new circular business models in industries, industrial parks, SMEs and value chains. Ensuring industries are prepared for natural disasters and can build back better (e.g., tourism).



Green competitiveness operates in a complex policy environment

- Green competitiveness covers green markets and processes.
- Top-down analysis of green competitiveness policy interventions
 - Regulations
 - Information/services
 - Financial instruments
- Analysis identifies core competitiveness policies that need to supplement “green” policies.



Mix of policies that govern environment and competitiveness drivers is key










Critical role of green innovation institutions and services

• The EU Ecolabel Product Catalogue

- It covers a wide range of product groups, from major areas of manufacturing to tourist accommodation services. Access the EU Ecolabel Product Catalogue to find out more information about environmentally friendly high-quality products and where you can find them

Or use the [Criteria for your Product Group](#) below for comprehensive search results:

Cleaning Up	Clothing and textiles
Dishwasher Detergents 	Coverings
Hand Dishwashing Detergents 	Do-It-Yourself
Hard Surface Cleaning Products 	Electronic Equipment
Indoor Cleaning Services 	Furniture
Industrial and Institutional Automatic Dishwasher Detergents 	Gardening
Industrial and Institutional Laundry Detergents 	Lubricants
Laundry Detergents 	Other Household Items
	Paper Products
	Personal care products

• The European Resource Efficiency Knowledge Centre (EREK)

- It supports companies, especially SMEs, save energy, material and water costs. We provide tools, information and business opportunities that show you new and better ways to be resource efficient and benefit from circular economy business models which turn waste into an asset:



- Information to better control of energy, water and material costs and become less dependent on suppliers
- **Compliance checks** for upcoming regulations



- Access to top international **knowledge**, technical expertise and practices on resource efficiency, and available technologies
- **Capacity-building** workshops and networking events
- Online **training** opportunities to learn from resource efficiency experts



- Information on **funding** sources and technology providers
- Help building a green image which enables the targeting of new customer **segments**
- Tools and instruments for businesses to assess their **saving** potentials
- Demonstrate return on **investment** when adopting resource efficient measures

Shifting an economy to green competitiveness requires a data driven and intersectoral approach

- More and better data is needed to improve knowledge of how to adapt to climate change, [according to the European Commission's new adaptation strategy](#). For instance, **data-rich artificial intelligence** will boost the CE transition by informing efforts to design out waste and pollution, optimising business models, and streamlining the infrastructure needed to keep products and materials in use (Ellen McArthur Foundation).
- AI-fed systems can process large volumes of data ('big data') to go deeper into the planet's natural processes and better understand what is happening at the ecosystem level, from our use of resources to changing meteorological patterns and the role of human behaviour in all of this. An [Intel study](#) found that **74%** of tech leaders believe artificial intelligence can help solve long-standing environmental challenges; and **92%** think predictive analytics will help organisations detect issues and develop new solutions, providing cost and regulatory hurdles can be overcome. In another [study by Microsoft](#) on AI in Europe, **89%** of companies surveyed expect it to generate business benefits by optimising their operations and boosting resource efficiency ([EU Eco-innovation](#)).



Energy networks



Precision farming



Mobility and transport



Smart buildings



Green data spaces

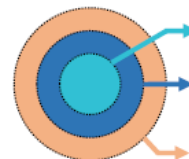
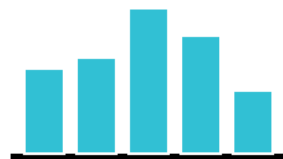
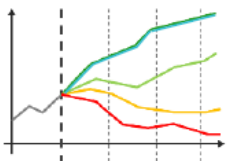


The power of data

[Shaping Europe's Digital Future, Supporting the Green Transition](#)

Designing green competitiveness intervention requires phased approach: WBG example for Thailand

Four stage approach

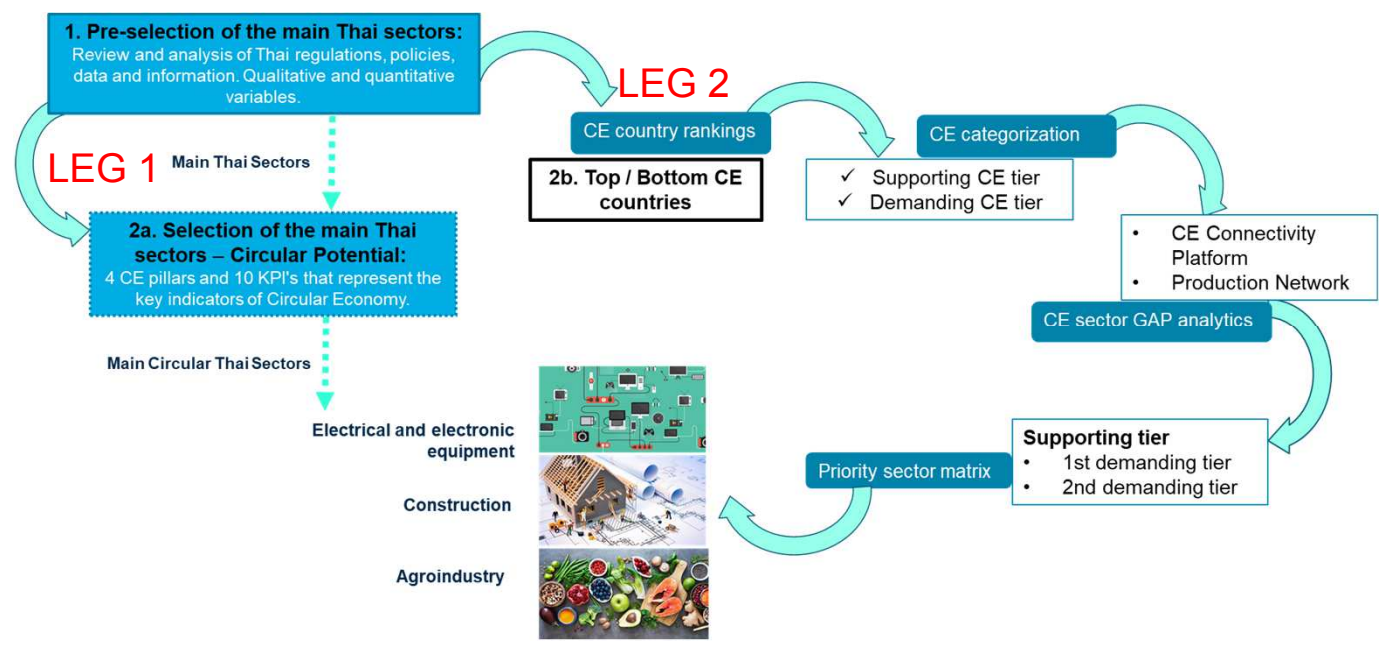


Thailand STEP 1: Prioritization of the Sectors

The prioritization of the sector is based on a two-leg approach:

LEG 1. Identification of sectors based on role in the Thai economy and CE potential

LEG 2. Identifications of the sectors based on the connectivity among value chains



Thailand LEG 1: Focus Sector Selection Based on the Two Dimension Analysis

Several sub dimensions will be used to shape a semi-quantitative scoring matrix. Each potential sector will be scored against those criteria. This will allow the assessment to rank the economic sectors by economic importance and circular potential. This scoring matrix will allow to present the results of this pre-selection exercise in a graph.

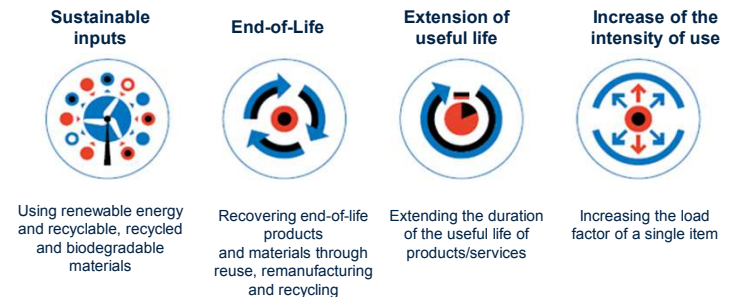
The economic focus sectors will be shortlisted according to two fundamental dimensions, in order to assess market potential: the sector's role in the national economy and its circular potential

- **Dimension 1 - role in national economy:** major economic sectors in the country will be selected, according to their size and growth potential, measured by share of GVA (gross value added), contribution to employment, international competitiveness, etc. Targeting major sectors ensures that the analysis privileges mature enough industries /sectors and enables to leverage the full economic impact of circular economy investments.

- **Dimension 2 - circular potential:** the second aspect for the sector selection process will be to assess the sector's resource profile, as this is closely linked to the sector's circular potential. For this, a number of subtopics may be assessed such as sectoral material and energy intensity, volume of waste generated, share of waste landfilled/incinerated, high level estimates/assessment of the sectoral scope for improved circularity. For the purposes of screening and in order to narrow down the scope the analysis will firstly consider the primary and secondary production sectors as they usually have a large, direct raw material footprint.

No.	Main sectors
1	Electrical & Electronic Equipment (Medical and Wellness, machinery and instruments, Electronics, transport vehicles).
2	Construction (cement, concrete production, Chemicals and plastics, stone, glass and ceramics, metals, minerals, fuels, ores and salts).
3	Agroindustry (food and beverage; agriculture; vegetables, animals, wood and paper)

Circular Economy Scoreboard



Thailand LEG 2: Focus Sector Selection Based on Thai sector connectivity

- 1 Top and Bottom Circular Economy countries are identified

The analysis considers CE base indicators from performance indicators within the categories of sustainable inputs, end-of-life, extension of useful life, and increase of intensity use. As well as, zero waste, recycling, R&D related to the CE, and sustainability indicators.
- 2 Economic sectors in Thailand are pre-selected after comparison with Top and Bottom CE countries

The analysis allows for the priority sectors that support a local green economy and sectors that have been considered as pivots in CE action plans on the move forward to a cleaner and more competitive markets.
- 3 Thailand pre-selected sectors are examined on their connectivity

The analysis considers existing relationships between sectors in Thailand and narrow the set of pre-selected sectors by prioritizing them as they become interdependent sources for CE growth.
- 4 CE convergence

The analysis considers Phase 1 outcomes and uses it to do further scanning and iterations on the pre-selection of sectors in previous step.
- 5 Thailand CE selection

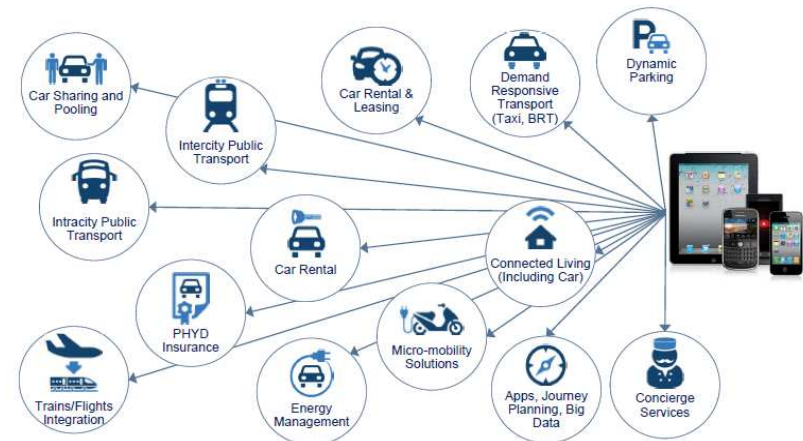
Sector priority based on CE growth.

Croatia Example: From “Auto Parts” to “Intelligent Urban Mobility Solutions”

Individual Parts with Limited Value



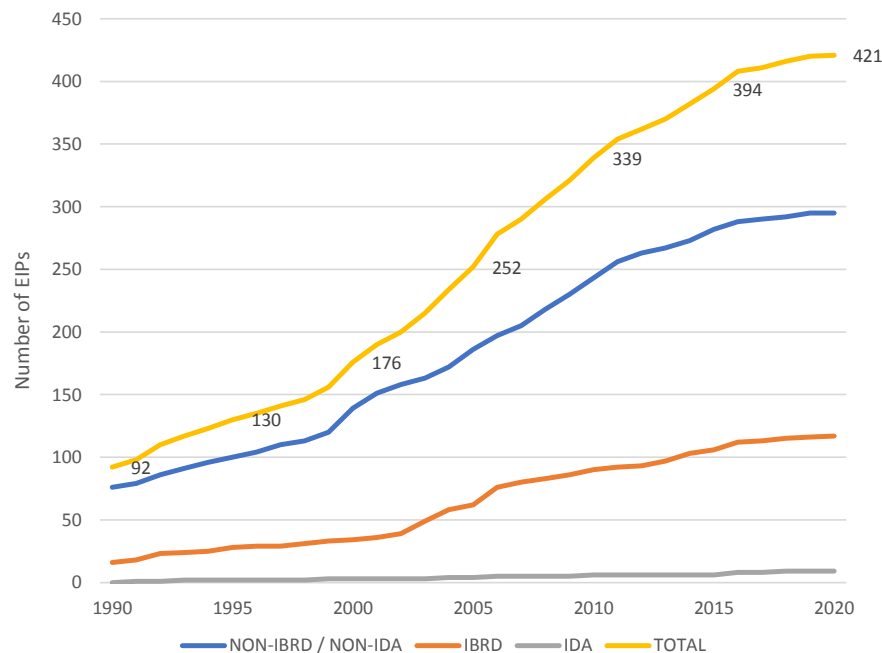
Integrated Urban Mobility Solutions



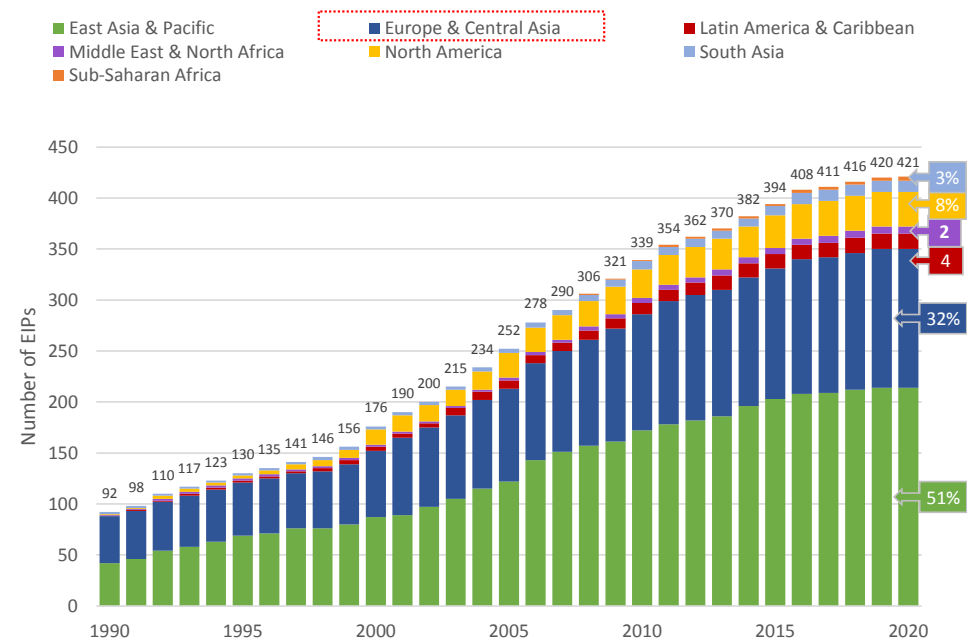
The key to strategic segmentation analysis is to identify future segments, based on the structural trends (in this case climate change and urban congestion) and new technologies (5G and big data), and find the market failures that impede the development of these

Countries are also pushing green competitiveness through targeted policies

Increase in the number of eco-industrial parks



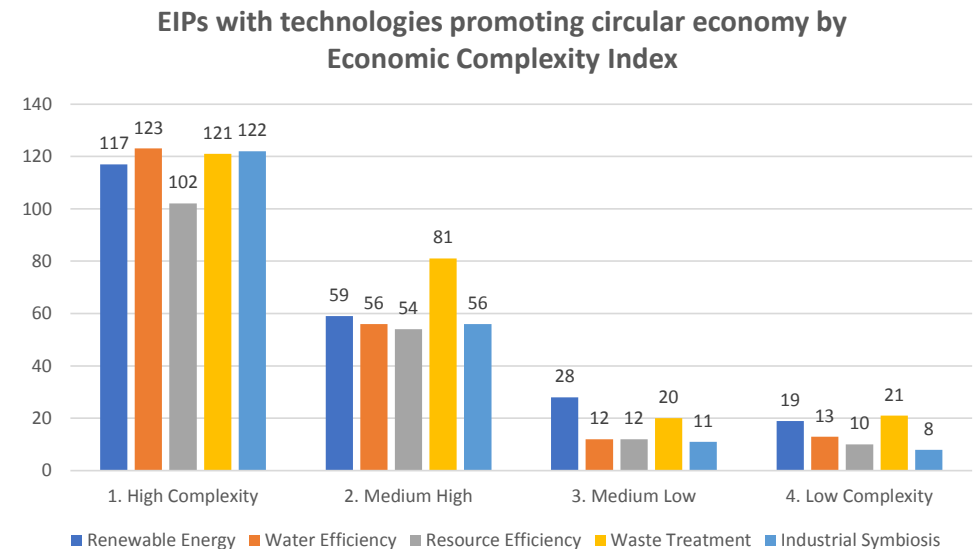
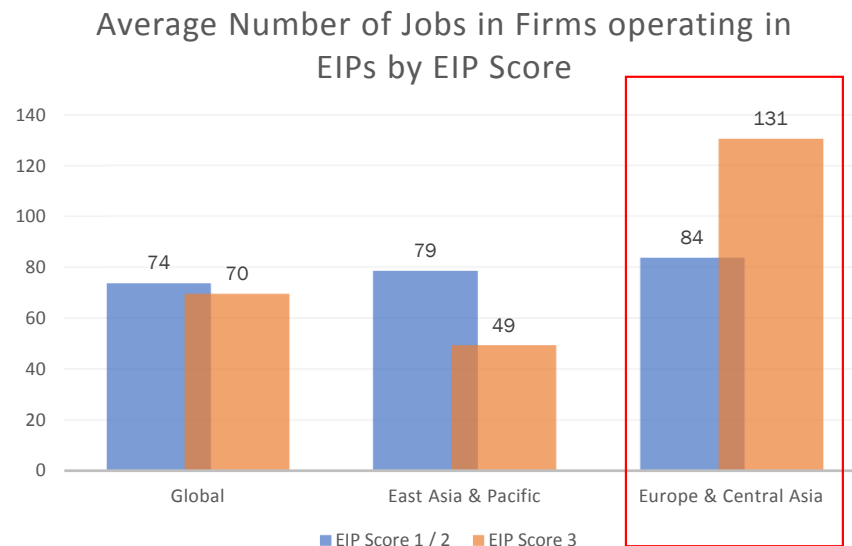
Increase in the number of EIPs by region



Note: Seventeen EIPs in the World Bank's database did not include information on their starting year of operations, and were therefore not included in this analysis. EIP = eco-industrial park; IBRD = International Bank for Reconstruction and Development; IDA= International Development Association.

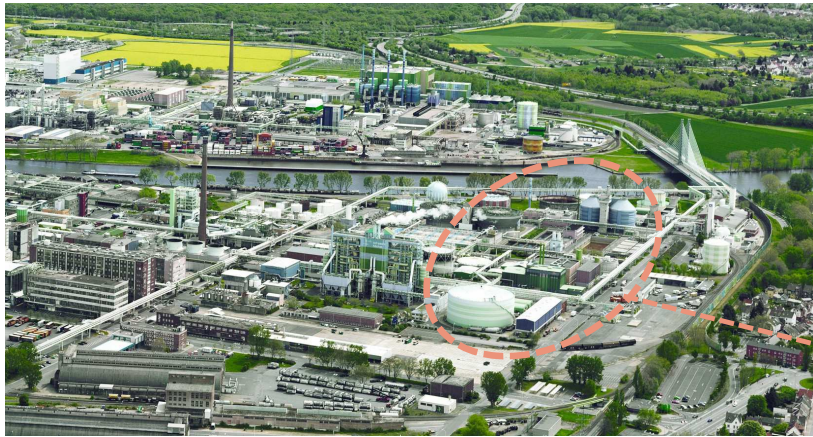
EIPs are an effective way to pilot and advance green competitiveness policies

EIPs with high EIP scores are associated with high number of jobs per firm.



Note: "EIP score 3" = EIPs with more than 3 EIP technologies
EIP technologies = renewable energy, resource efficiency, industrial symbiosis, water efficiency, waste treatment.

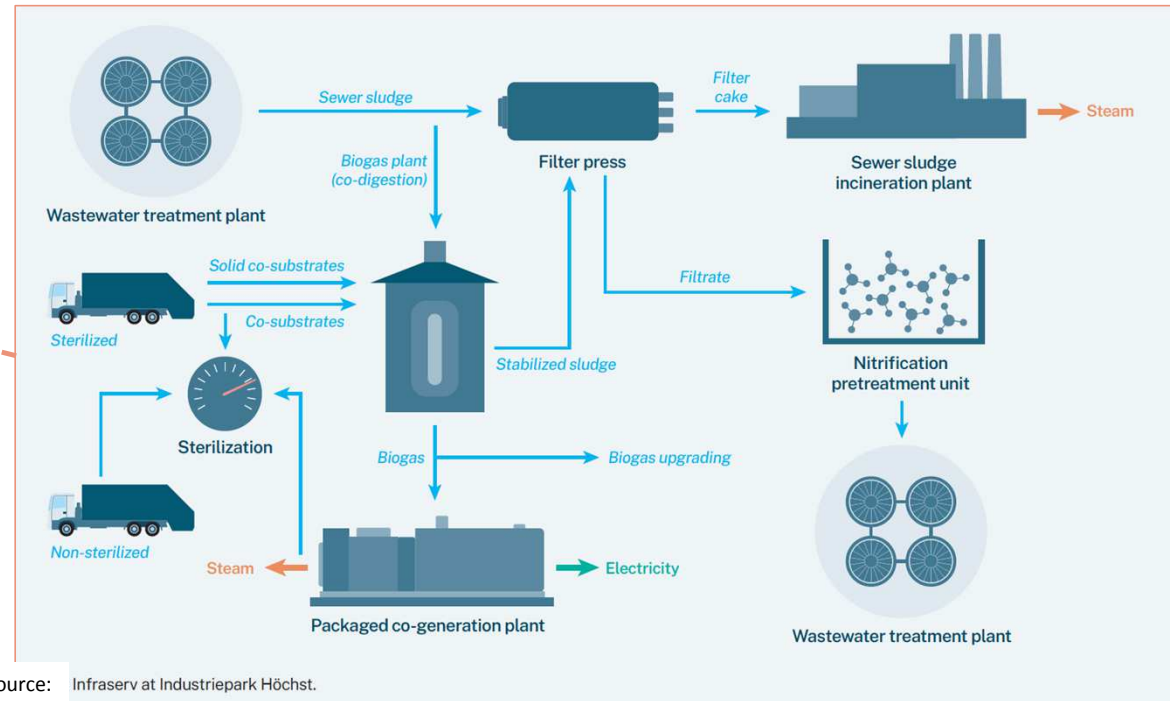
Höchst Industrial Park, Germany



Size: 460 hectares (50 hectares available for new construction)

- Provides additional revenue-generating opportunity for the park operator by becoming an EIP.

Schematic diagram of biogas generation system in Höchst Industrial Park



Source: Infraserv at Industriepark Höchst.

In Germany, **Höchst Industrial Park**, **over 500,000 metric tons CO2 emissions are mitigated every year**. **Biogas production** is enabled by recovering 310,000 tons per annum (tpa) sewage sludge from wastewater treatment plant. The park **generated 6.65 bln Euro worth of investment and 22,000 jobs**.

Turkey: Green Organized Industrial Zones

Objective. IPF to increase the efficiency and sustainability of select organized industrial zones (OIZs) and enhance the competitiveness of firms in beneficiary OIZs in Turkey.

Program overview:

The project has been originated by a collaboration between IFC and IBRD, working on both technical and policy level. The technical diagnostics have identified \$1.1 billion investments in resource efficiency, industrial symbiosis and green infrastructure across the 18 OIZs. The results from diagnostics scaled the IBRD loan at an amount of \$325M to be provided to Ministry of Treasury and Finance. Treasury will channel the IBRD loan to Ministry of Industry and Technology's available credit line. The loan will be disbursed to OIZs for their green industrial zone investments through a public bank where the bank acts as a conduit for budget resources rather than a commercial lender.

Expected Results: 42,874 MWh/year in energy saving, 14,160 metric tons GHG reduction annually. Regulatory amendments and Green OIZ certification system is underway. Climate Co-Benefits US\$ 133.76 million (44.58% of project financing).



Eskisehir Organized Industrial Park is one of the main counterparts looking to adopt the EIP approach



New Eco-Industrial Park standard designed in order to guide lending operation.

Romania can leverage ongoing best practice examples

- World Bank, with UNIDO and GIZ, has developed global framework for eco-industrial parks; including handbook.
- World Bank recently published detailed data and analysis of EIPs globally

