



› **FROM THE EU GREEN DEAL TO ACTION**
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› **WHY A EUROPEAN GREEN DEAL**

There is only one planet Earth, yet by 2050, the world will be consuming as if there were three .

As half of total greenhouse gas emissions and more than 90% of biodiversity loss and water stress come from resource extraction and processing, the European Green Deal launched a concerted strategy for a climate-neutral, resource-efficient and competitive economy.

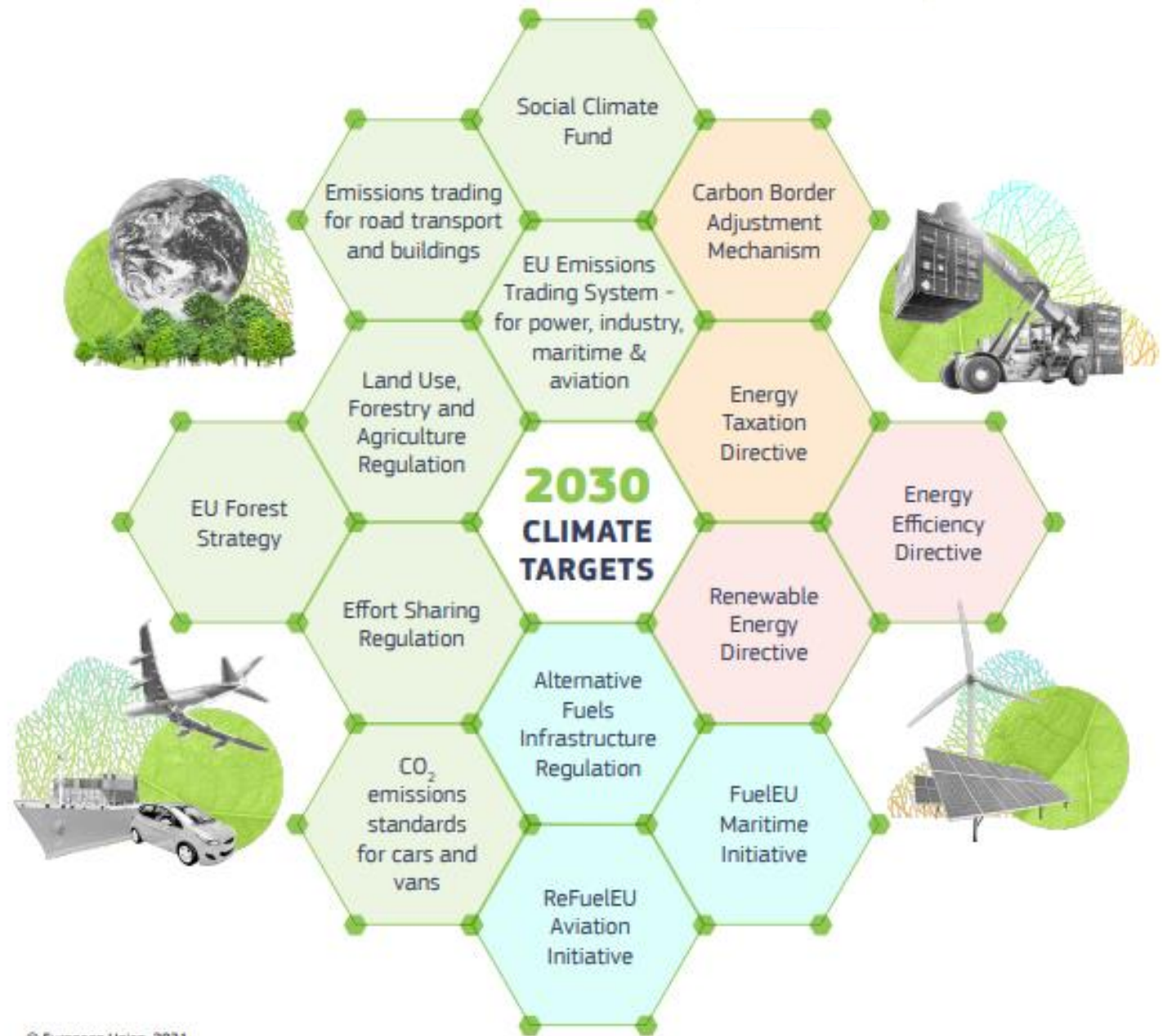
Scaling up the circular economy from front-runners to the mainstream economic players will make a decisive contribution to achieving climate neutrality by 2050 and decoupling economic growth from resource use

European Commission

EUROPEAN GREEN DEAL THE DECISIVE DECADE

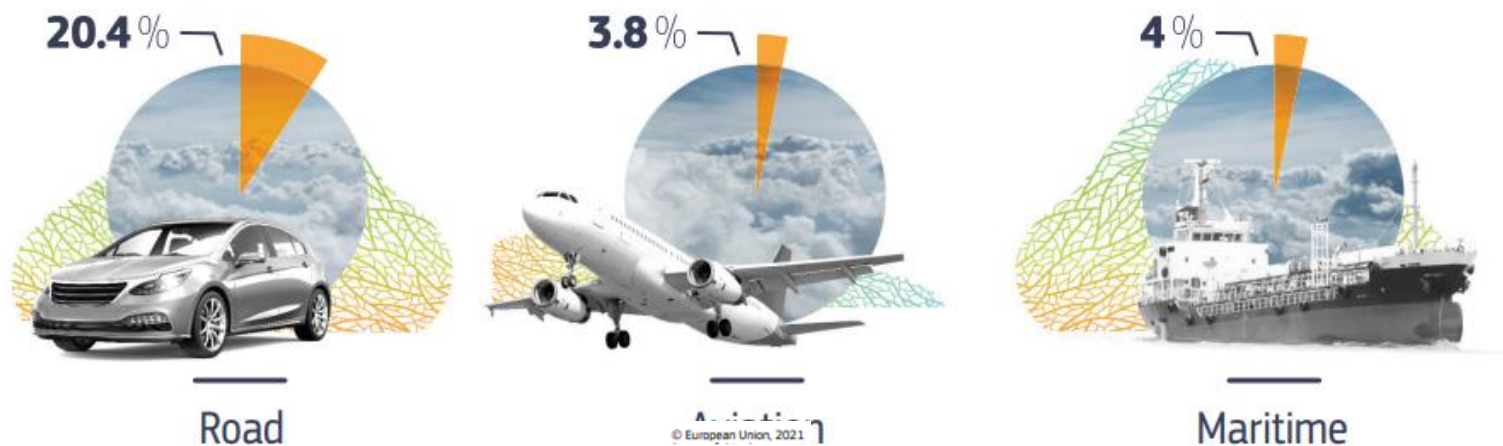
The EU will reduce its net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels, as agreed in the EU Climate Law.

On 14 July 2021, the Commission presented proposals to deliver these targets and make the European Green Deal a reality



TRANSPORT NEEDS TO CUT EMISSIONS BY 90% BY 2050

Share of total EU Greenhouse Gas (GHG) emissions, per mode



TRANSPORT AND THE EMISSIONS TRADING SYSTEM (ETS): PUTTING A PRICE ON CARBON

Road

- Extension of the ETS to road transport and building fuels from 2026;
- Focus on upstream fuel suppliers (rather than households and car drivers);
- Revenues to be channelled to support vulnerable households and investments in cleaner mobility.

Aviation

- Tighter cap on the number of allowances for intra-EU flights, starting from current levels and reduced by 4.2% annually;
- Full phase-out of free allowances by 2026;
- Extra-European flights to be subject to offsetting under the international CORSIA scheme.

Maritime

- Gradual extension of the ETS to maritime starting in 2023, with a 3-year phase in period;
- Focus on large ships (above 5000 gross tonnage) accounting for 90% of CO₂ emissions;
- Intra-EU traffic and 50% of extra-EU voyages covered by the scheme.

CLEANER ROAD TRANSPORT

More ambitious CO₂ emissions standards for new cars and vans to help grow the number of zero- and low-emission vehicles on European roads.

Binding requirements for the rollout of public charging and hydrogen refuelling stations for cars, vans and trucks



Public charging and hydrogen refuelling stations will be widely available, interoperable and easy to use, including at fixed intervals along Europe's major transport corridors

National fleet based targets for charging stations for cars and vans – those could lead to approximately*:



*according to Commission Impact Assessment of vehicle uptake following the 'Fit for 55' proposals and assuming an average power output of approx. 15kW per recharging station

We aim to **contribute to the transition towards a fully circular society and to the reduction of emissions of gases** that harm the environment, climate and human health.

We aim to design a circular economy which at the same time requires a thorough understanding of the impacts of value chains and society on climate, health and biodiversity in order to be able to provide the optimal action perspective.

We accelerate the transition **by providing guidance in design and development of the circular economy and by co-development of concrete solutions and technologies.**

- We quantify and model the impact of circular and sustainable technologies, strategies & policies.
- We focus on circular design of products, value chains and societies; quantitative environmental, economic and social indicators; and the development of disruptive technical solutions. Our special focus is on Circular Plastics value chains including microplastics
- We provide **deeper understanding and quantification of the reduction of emissions of gases** through innovative detection, characterization and predictive climate and environmental models and **logistics systems.**

Doing so, we strive **to be a European thought leader** in this domain.



CIRCULARITY AND ENERGY TRANSITION IN INDUSTRY

MAIN DRIVERS AND CHALLENGES

DRIVER: EU GREEN DEAL

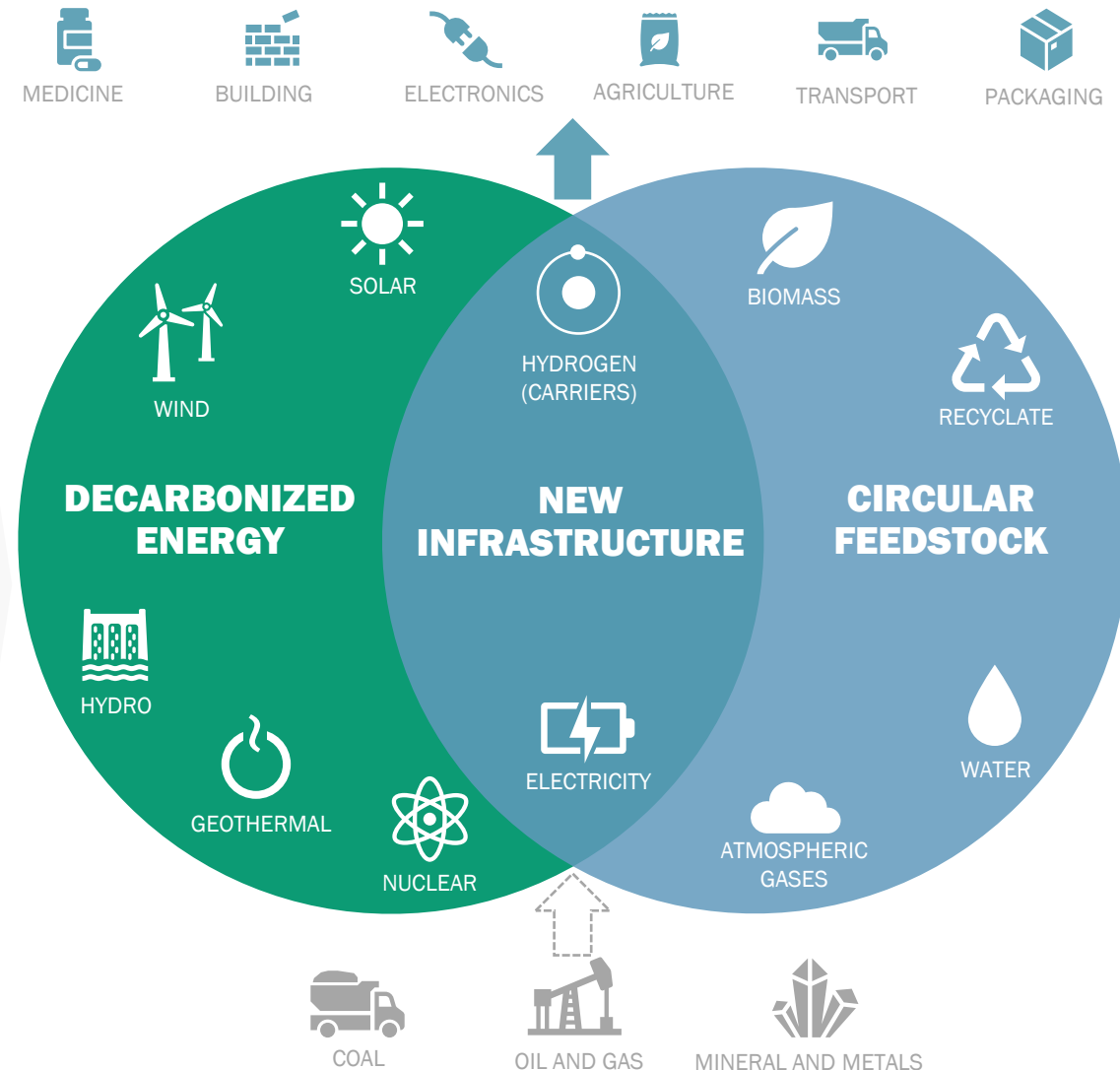
- Fit for 55 Package
- Chemicals Strategy for Sustainability (CSS)
- Circular economy
- Zero pollution

MAIN TECHNICAL CHALLENGES

- **Energy transition:** access to low-emission electricity and direct electrification
- **Feedstock transition:** access to circular carbon and minerals/metals
- **New feedstock induced products:** oxygenated products from CO2 and biomass
- **Infrastructure for transport & storage:** energy, hydrogen, biomass, waste and CO2

OTHER CHALLENGES

- **Communication and Societal acceptance:** regain trust
- **Human capital:** education and training
- **Financing:** funding the transformation
- **Digitization and AI:** facilitate and accelerate the transformation



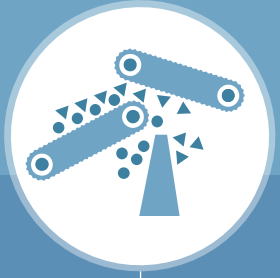
CIRCULAR PLASTICS AT TNO



1 SYSTEM INTEGRATION
VALUE CHAIN DESIGN AND
LIFE CYCLE ASSESSMENT



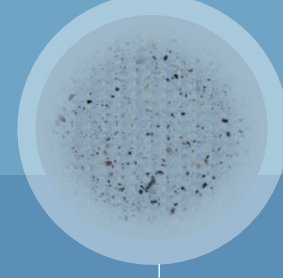
2 DESIGN
FOR / FROM
RECYCLING



3 PRETREATMENT



4 RECYCLING

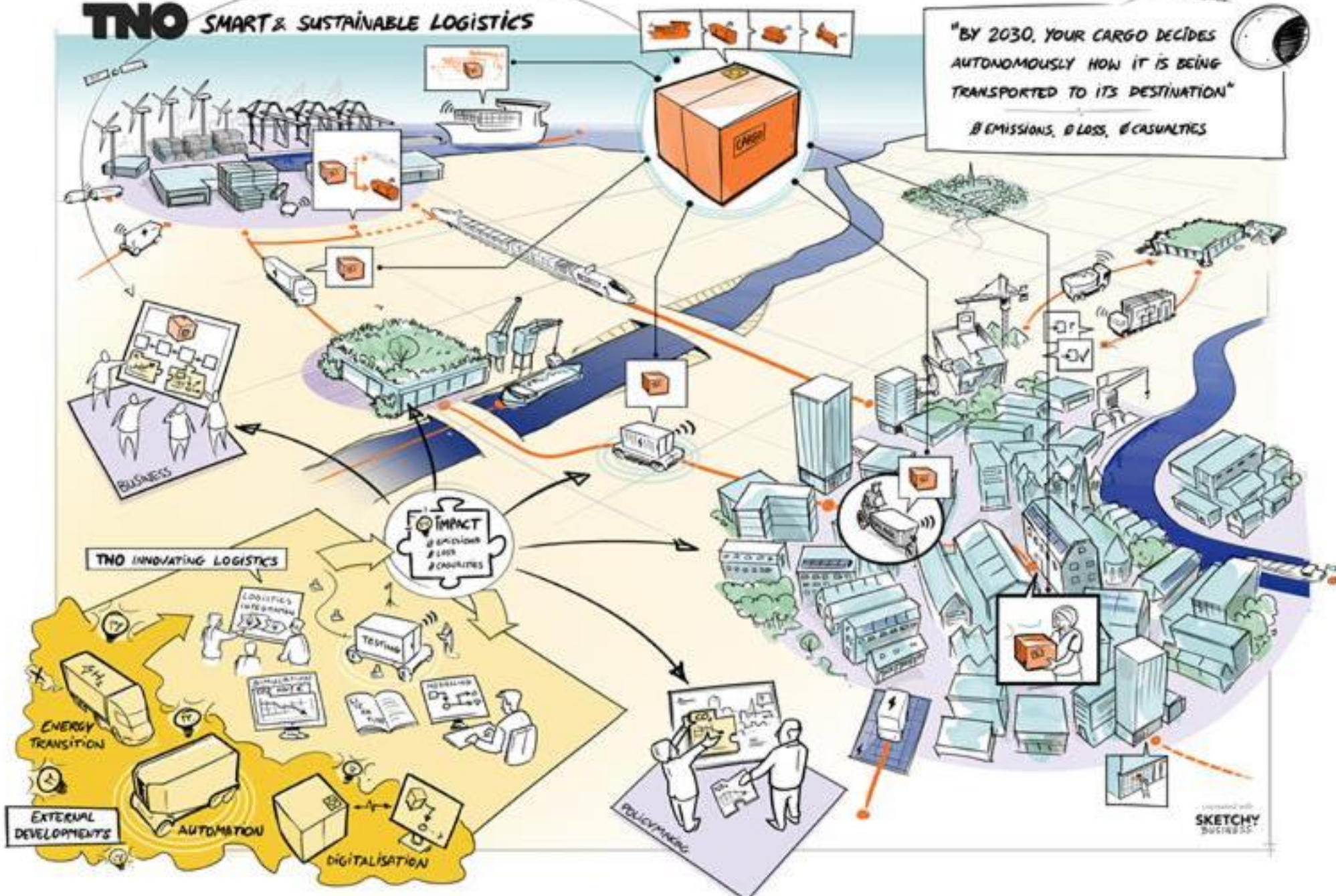


5 MICROPLASTICS



OTHER VALUE
CHAINS

TNO SMART & SUSTAINABLE LOGISTICS



"BY 2030, YOUR CARGO DECIDES AUTONOMOUSLY HOW IT IS BEING TRANSPORTED TO ITS DESTINATION"
EMISSIONS, # LOSS, # CASUALTIES

IMPACT
EMISSIONS
LOSS
CASUALTIES

TNO INNOVATING LOGISTICS

ENERGY TRANSITION
EXTERNAL DEVELOPMENTS
AUTOMATION
DIGITALISATION

POLICY MAKING

SKETCHY BUSINESS

THE CIRCULAR CONSTRUCTION HUB

Primaire stromen

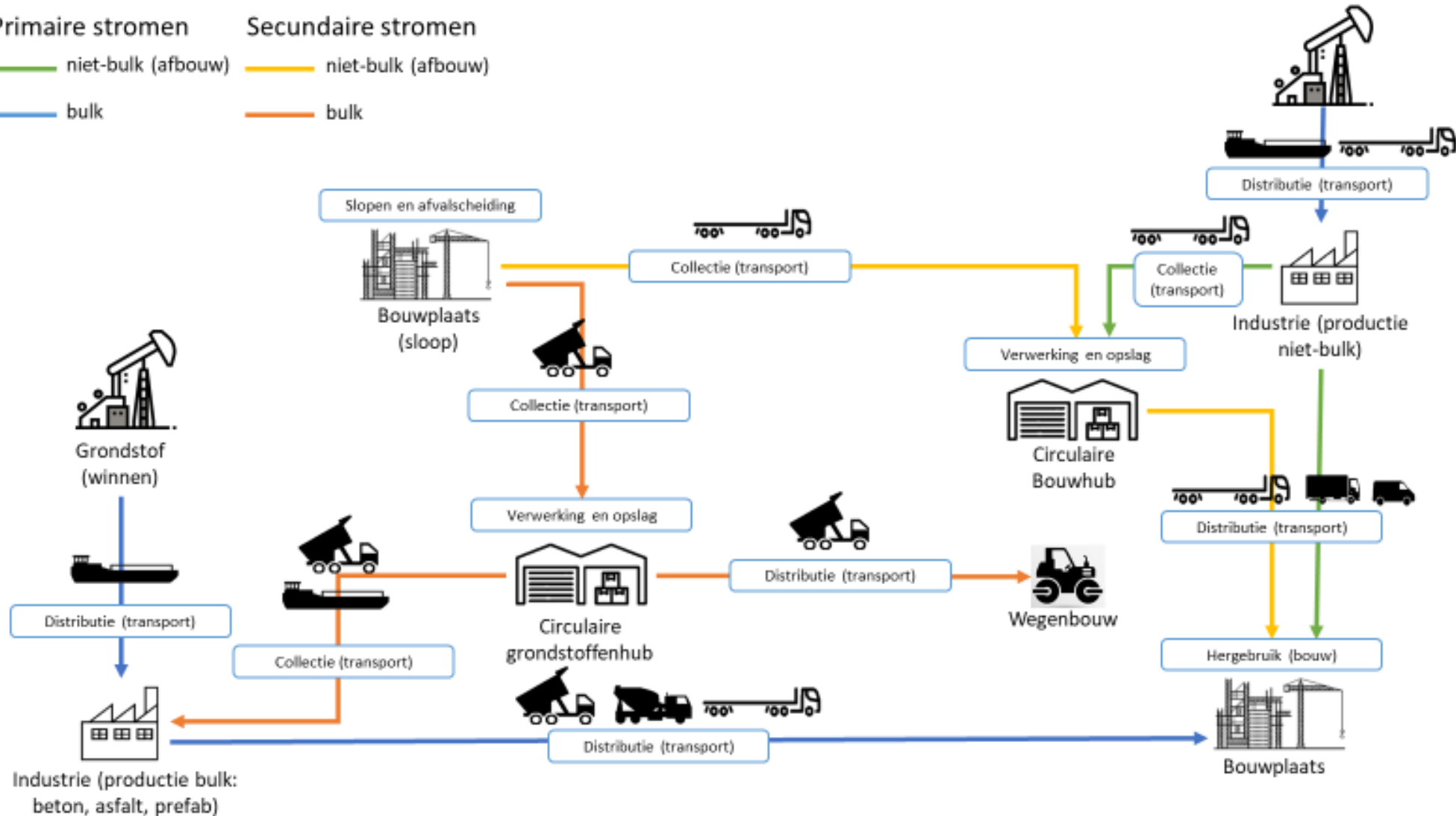
— niet-bulk (afbouw)

— bulk

Secundaire stromen

— niet-bulk (afbouw)

— bulk



› GREEN DEAL INNOVATIE PROJECTS TNO

› COLLABORATION





› **BEDANKT VOOR
UW AANDACHT**

TNO innovation
for life