ERC frontier research contribution to the European Green Deal

The European Research Council (ERC) follows a strictly bottom-up approach to funding research proposals, with excellence as the sole criterion for selection. The research that ERC grantees pursue, free of any thematic objectives, generates results that address a wide range of issues with significant socioeconomic, environmental and policy relevance. As a result, this rich and diverse portfolio of frontier research generates new knowledge and proposes concrete solutions for addressing some of the most pressing policy priorities of the European Commission. This is the case for the over 950 projects funded by the ERC, worth more than €2 billion, in the Horizon 2020 (H2020) Framework Programme (2014–2020) that are relevant for the 'European Green Deal'.

Data as of December 2021

ERC frontier research contribution to the European Green Deal

This fact sheet provides an overview of the projects relevant for the selected areas of the European Green Deal. The projects were funded under the Starting Grant (StG), Consolidator Grant (CoG), Advanced Grant (AdG) and Synergy Grant (SyG) schemes launched in the H2020 Framework Programme (2014–2020)*

Areas of interest for the European Green Deal

- Boosting climate action
- Farm to fork
- Sustainable and smart mobility
- Clean, affordable and secure energy
- Biodiversity and ecosystems
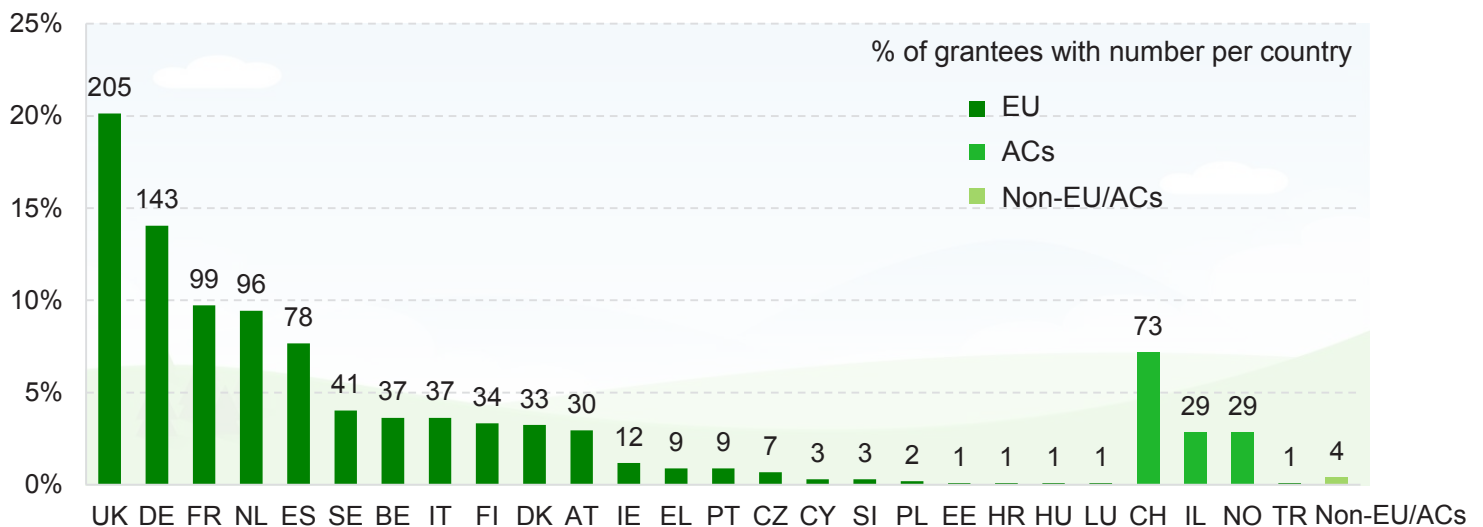
953 ERC-funded projects, worth €2039 million

Physical sciences and engineering
490 projects, €1075 million

Life sciences
252 projects, €539 million

Social sciences and humanities
211 projects, €425 million

Distribution of ERC-funded projects in H2020

1018 grantees lead 953 projects and are based in 22 EU Member States, 4 Associated Countries (ACs) and 2 non-EU/ACs

% of grantees with number per country
- EU
- ACs
- Non-EU/ACs

Country	Number
UK	205
DE	143
FR	99
NL	96
ES	78
SE	41
BE	37
IT	37
FI	34
DK	33
AT	30
IE	12
EL	9
PT	9
CZ	7
CY	3
SI	3
PL	2
EE	1
HR	1
HU	1
LU	1
CH	73
IL	29
NO	29
TR	1
Non-EU/ACs	4

Host institutions with ≥16 funded projects

Institution	Number of projects
National Centre for Scientific Research (FR)	62
University of Cambridge (UK)	32
Swiss Federal Institute of Technology Zurich (CH)	25
Helmholtz Association of German Research Centres (DE)	23
Delft University of Technology (NL)	20
Max Planck Society (DE)	20
Utrecht University (NL)	20
University of Oxford (UK)	18
Imperial College (UK)	16

Number of projects

Country of origin of grantees other than EU or ACs (≤4 grouped together)

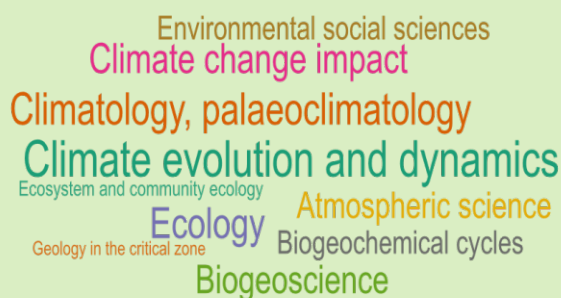| Country	Number of grantees
Russia	5
Australia	7
India	7
China	8
Canada	14
13 other non-EU/ACs	21
United States	40

Number of grantees

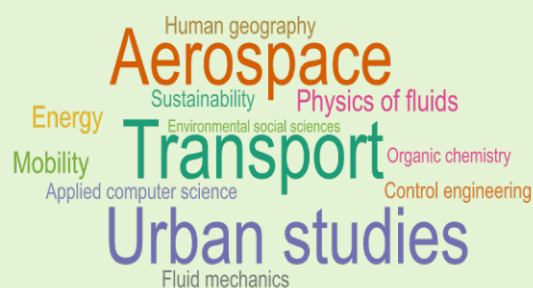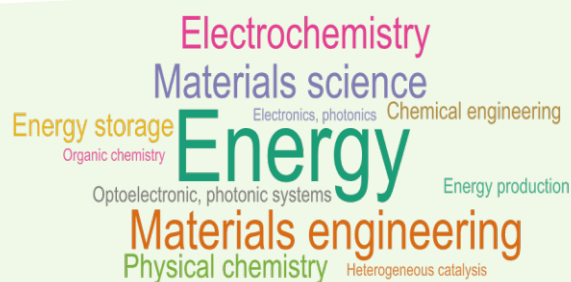# The scientific landscape of frontier research projects contributing to the selected European Green Deal areas

Environmental social sciences
Applied plant sciences
Applied life sciences
Plant physiology
Genetics
Microbiology
Ecology
Biotechnology
Ecosystem and community ecology
Agriculture
Species interactions
Evolutionary biology
Cell biology
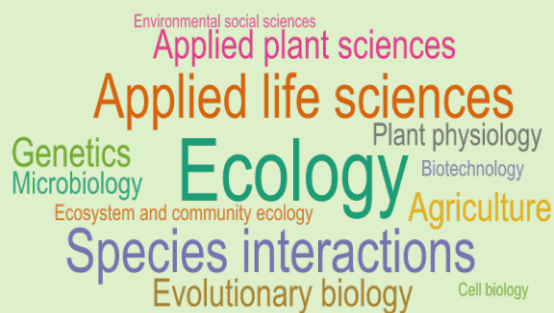
Farm to fork

270 projects, €587 million

Landscape ecology
Sustainability
Evolutionary biology
Environmental social sciences
Biodiversity, conservation
Palaeobiology and palaeoecology
Ecosystem and community ecology
Climate change impact
Ecology
Species interactions
Marine biology

Biodiversity and ecosystems

95 projects, €202 million

Environmental social sciences
Climate change impact
Climatology, palaeoclimatology
Climate evolution and dynamics
Ecosystem and community ecology
Atmospheric science
Geology in the critical zone
Ecology
Biogeochemical cycles
Biogeoscience

Boosting climate action

574 projects, €1273 million

Clean, affordable and secure energy

277 projects, €586 million

Electrochemistry
Materials science
Electronics, photonics
Chemical engineering
Energy storage
Organic chemistry
Energy
Optoelectronic, photonic systems
Energy production
Materials engineering
Physical chemistry
Heterogeneous catalysis

Human geography
Aerospace
Energy
Sustainability
Physics of fluids
Environmental social sciences
Mobility
Transport
Organic chemistry
Applied computer science
Control engineering
Urban studies
Fluid mechanics

Sustainable and smart mobility

66 projects, €132 million

The word clouds represent the most prevalent scientific fields in the pool of ERC projects identified as relevant for each of the selected areas of the European Green Deal. The total number of projects under each area as well as the budget are indicated.
29% of the 953 projects contribute to two or more of these areas.

Scientific synergies and methodological developments in the selected European Green Deal areas

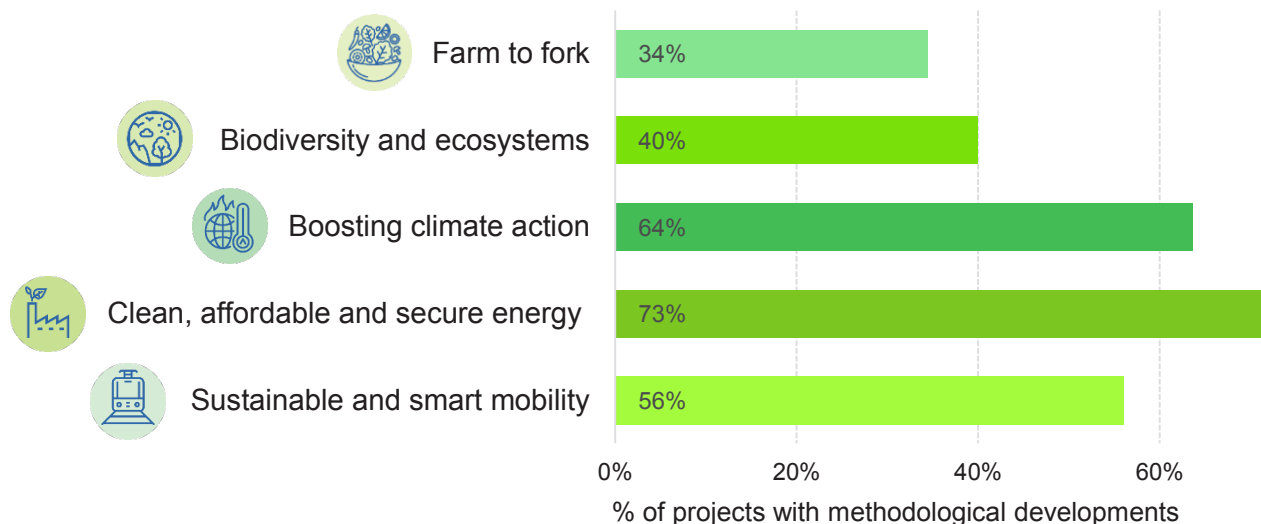## Scientific synergies among European Green Deal areas

The nodes represent the selected areas of the European Green Deal and their size is proportional to the number of projects. These areas are interconnected and the strength of this connection is represented by the thickness of the arc, which is proportional to the number of shared scientific fields. The most representative scientific fields for the main connections, highlighted with letters, are listed.
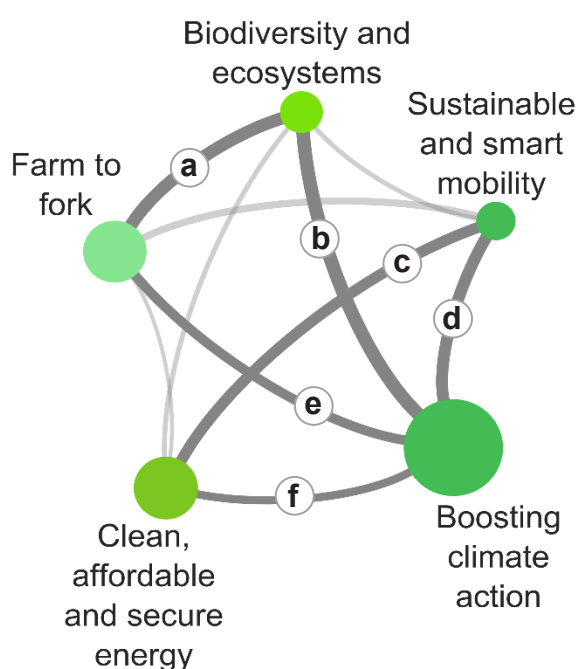
a Ecology; Evolutionary biology; Environmental social sciences; Biogeoscience

b Ecology; Evolutionary biology; Environmental social sciences; Palaeobiology and palaeoecology; Biogeoscience

c Energy; Aerospace; Physics of fluids; Environmental social sciences; Human geography

d Energy; Urban studies; Human geography; Environmental social sciences; Physics of fluids; Aerospace

e Ecology; Evolutionary biology; Environmental social sciences; Marine biology; Microbiology

f Energy; Materials engineering; Chemical engineering; Organic chemistry; Physical chemistry

Methodological developments in projects contributing to the selected European Green Deal areas

The main methodological development in the projects relevant for the selected European Green Deal areas is in the field of *Computational modelling, simulations* with the earth system, carbon cycle and sea level being the focus. Other prominent methodological developments are *Experimental methods* with a focus on climate change monitoring and CO_2 emissions, and *Synthetic methods* with a focus on renewable energy and new materials.

Farm to fork	34%
Biodiversity and ecosystems	40%
Boosting climate action	64%
Clean, affordable and secure energy	73%
Sustainable and smart mobility	56%

% of projects with methodological developments

Award winning project SHARECITY explores urban food sharing initiatives, and how they can become a real transformative mechanism for sustainable cities.

Food historian Dulce Freire examines the history of seeds in Europe in the project ReSEED, which is an effort to rediscover ancient varieties that could help modern agriculture to become more sustainable.

BIODESERT at the Dryland Ecology and Global Change Lab is led by renowned climate change expert Fernando Maestre and includes the first global field survey focussing on how aridity and grazing pressure changes affect dryland ecosystems.

LEGALARCHITECTURES looks into how policy makers can design environmental governance laws to maximise compliance and involvement non-State actors in environmental governance.

BIGSEA produced the first global fishery model with interactive, dynamic management and used it to provide the first-ever assessment of global fishery dynamics following an abrupt climate shock.

Project urbisphere looks at cities to explore how urbanization, human behaviour and technology impact climate change, and how urban populations are affected and adapt.

Examples of ERC-funded projects contributing to the selected European Green Deal areas

CC-TOP explores the Arctic Ocean to study the potential impact of methane release from thawing permafrost to the atmosphere. The results have major relevance for future global warming predictions.

COFLeaf focusses on new photocatalytic systems that efficiently harvest and convert light into chemical energy such as hydrogen, opening the new research field 'soft photocatalysis'.

NOVCARBFIX managed to engineer bacteria to use CO2 as the sole source to produce all its biomass carbon, with important implications for agricultural productivity and renewable energy storage.

SOLENALGAE and its proof of concept **ASTAOMEGA** successfully improved photosynthetic efficiency of microalgae, bringing a 30 percent increase in biomass. Besides potential applications as sustainable biofuels, an innovative and commercially competitive production platform for high value products as omega-3 and antioxidants was developed.

Scale-FreeBack aims to improve the management of large-scale road traffic networks, and resulted in the Grenoble Traffic Lab, an experimental public platform for testing traffic estimation, forecasting and control algorithms with real-time data.

2D4D brings together two important topics, decarbonisation and disruptive digitalisation, to ensure that the digital revolution becomes a decarbonisation enabler and not a barrier.