



CENTRE FOR RESEARCH INTO  
ENERGY DEMAND SOLUTIONS

# Scotland's carbon footprint and policy options

John Barrett

14 JANUARY 2020

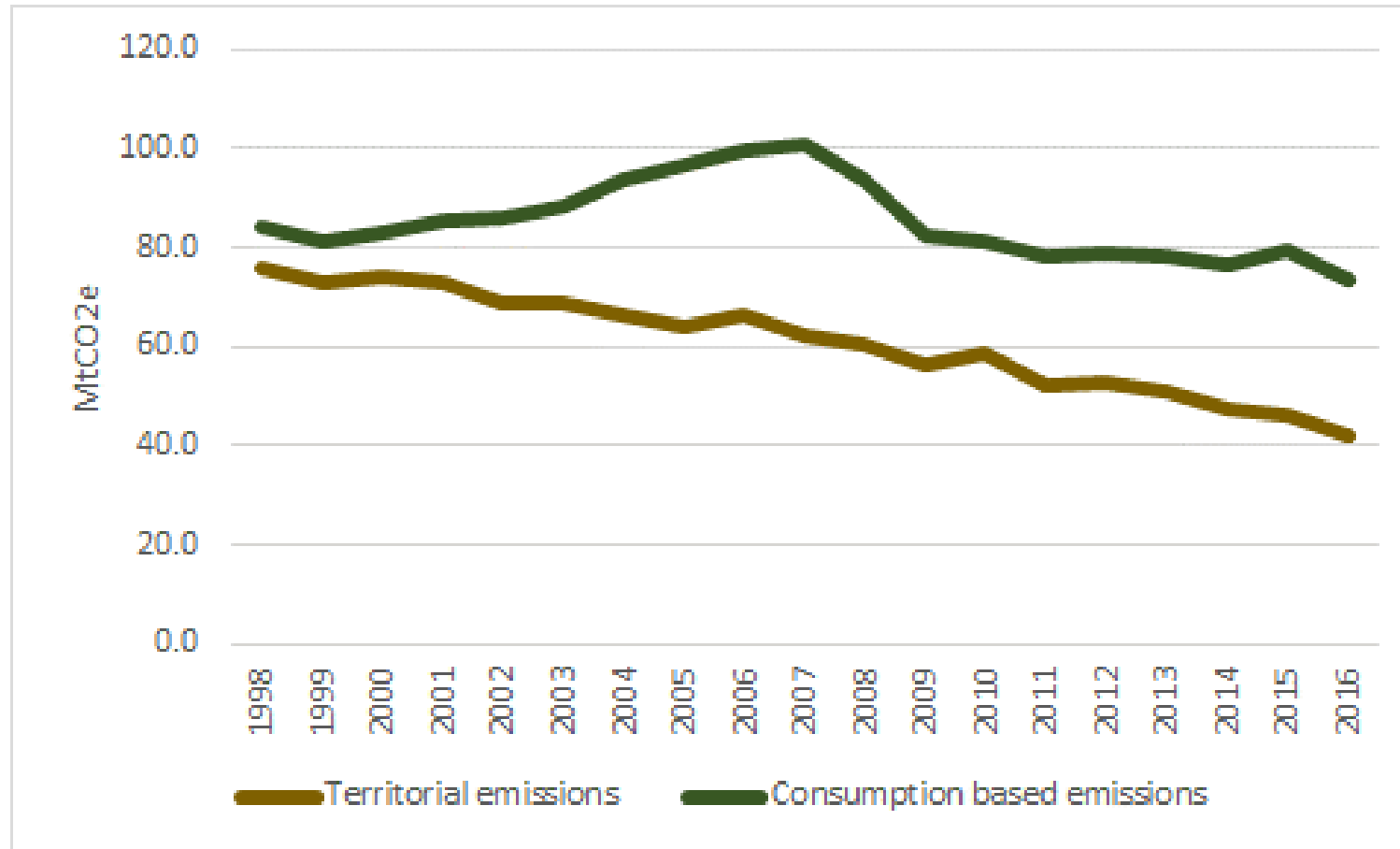


MATERIALS & PRODUCTS



[www.creds.ac.uk](http://www.creds.ac.uk)

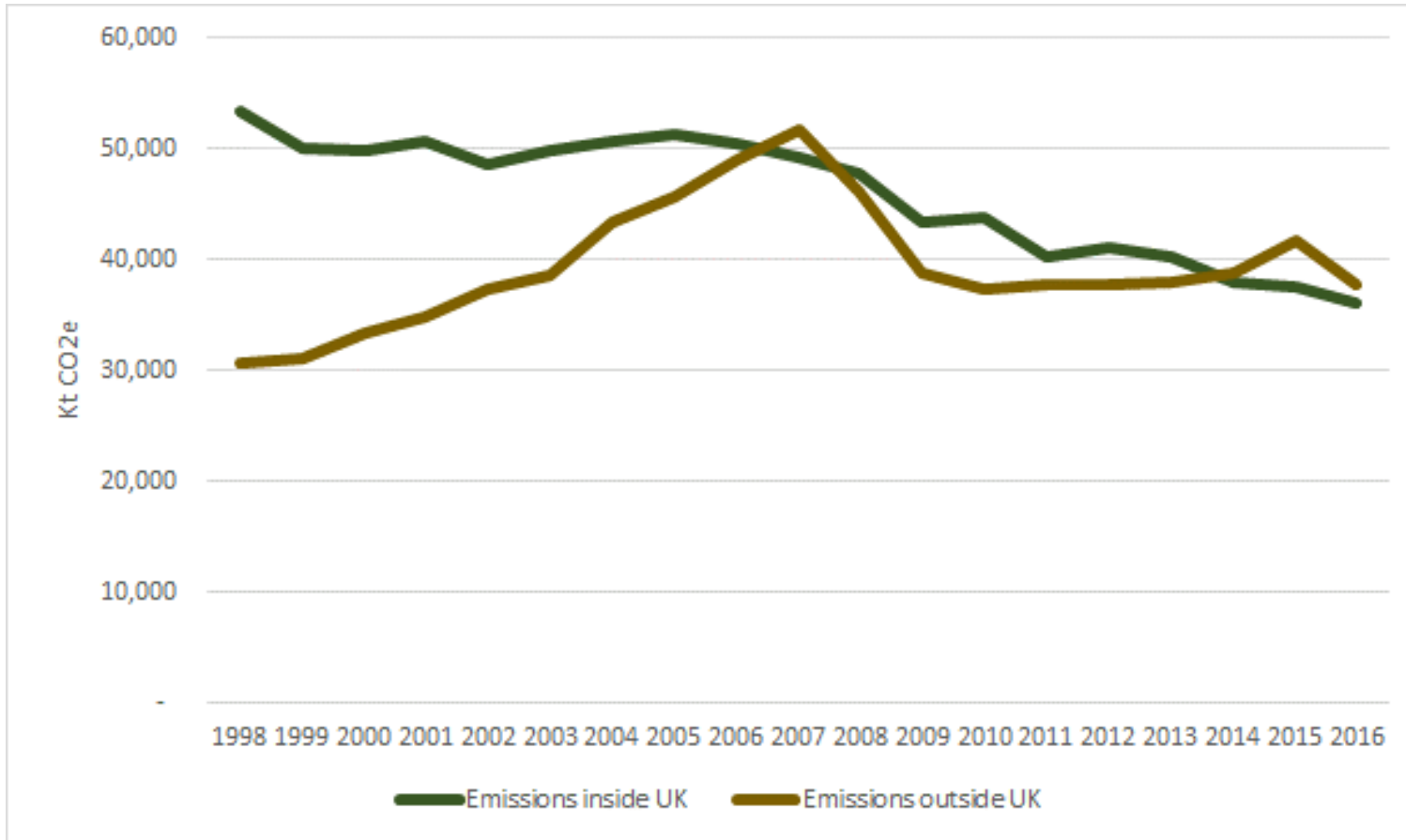
# Consumption based GHG emissions in Scotland



- Territorial emissions have reduced by 45%
- Consumption based emissions have reduced by 12%
- Net Zero by 2050 implies reductions ~ 8 – 10% annual reduction
- Annual reduction
  - Territorial – 2.4%
  - Consumption – 0.6%

Source: Consumption figures from University of Leeds for Scottish Govt. Territorial emissions from Scottish Govt.

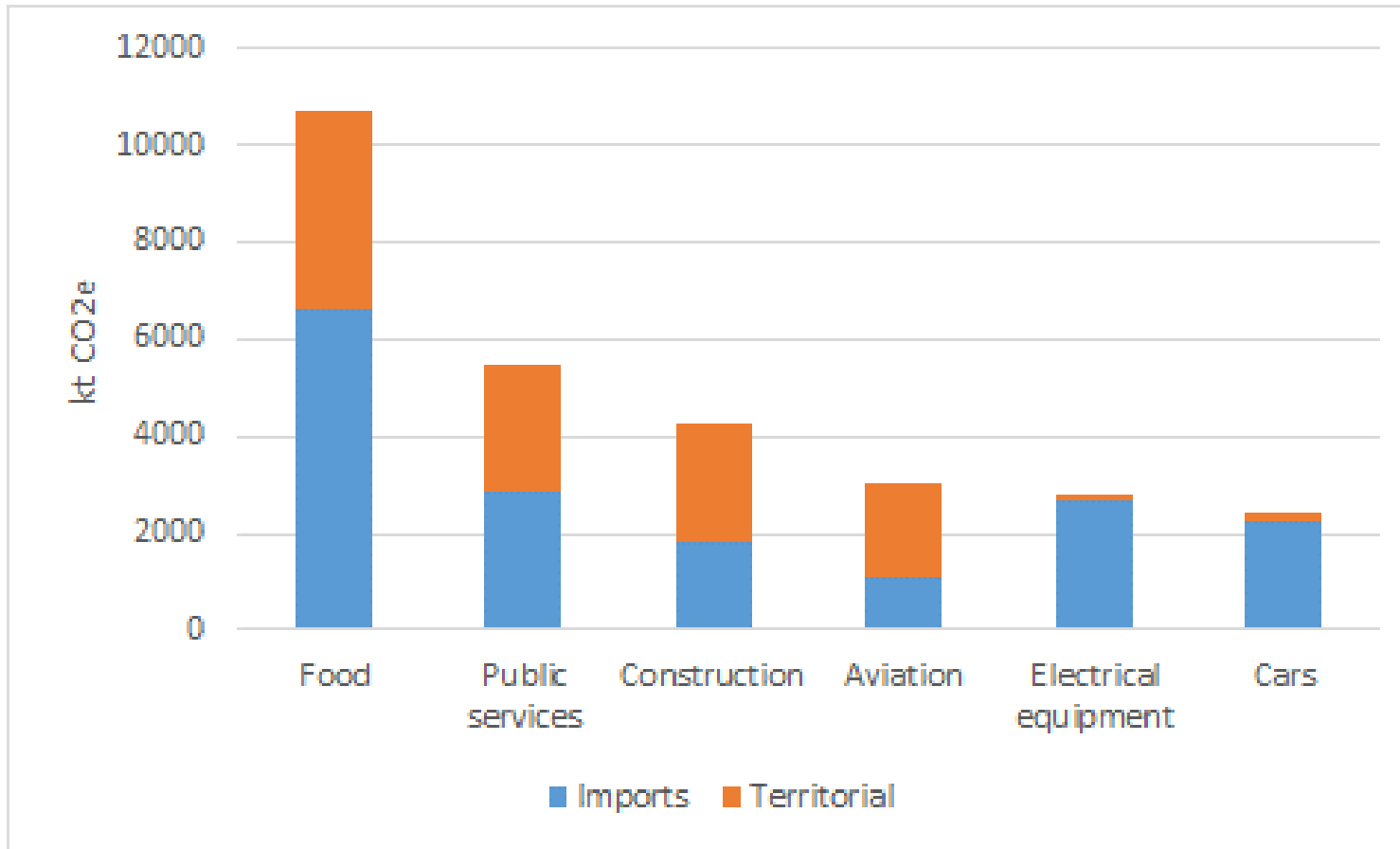
# Consumption based GHG emissions in Scotland



- Consumption emissions now greater outside Scotland
- Imported emissions have increased 23% between 1998 and 2016

Source: Consumption figures from University of Leeds for Scottish Govt.

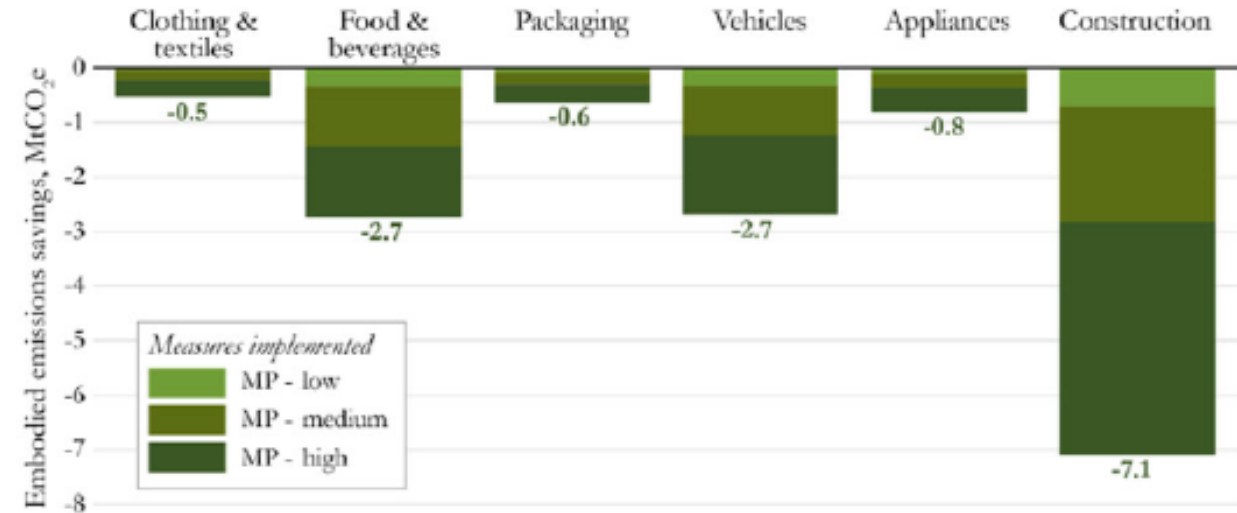
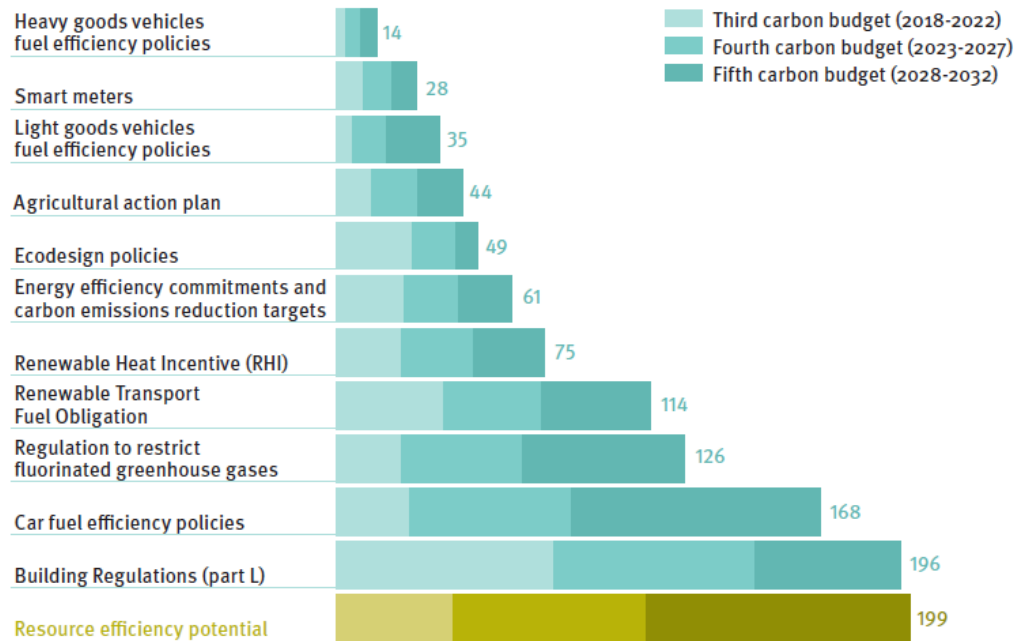
# Some key products



- 60% of food emissions occur outside Scotland
- Over 90% of car and electrical equipment emissions occur outside Scotland
- Vehicle manufacturing now about 20% of total transport emissions

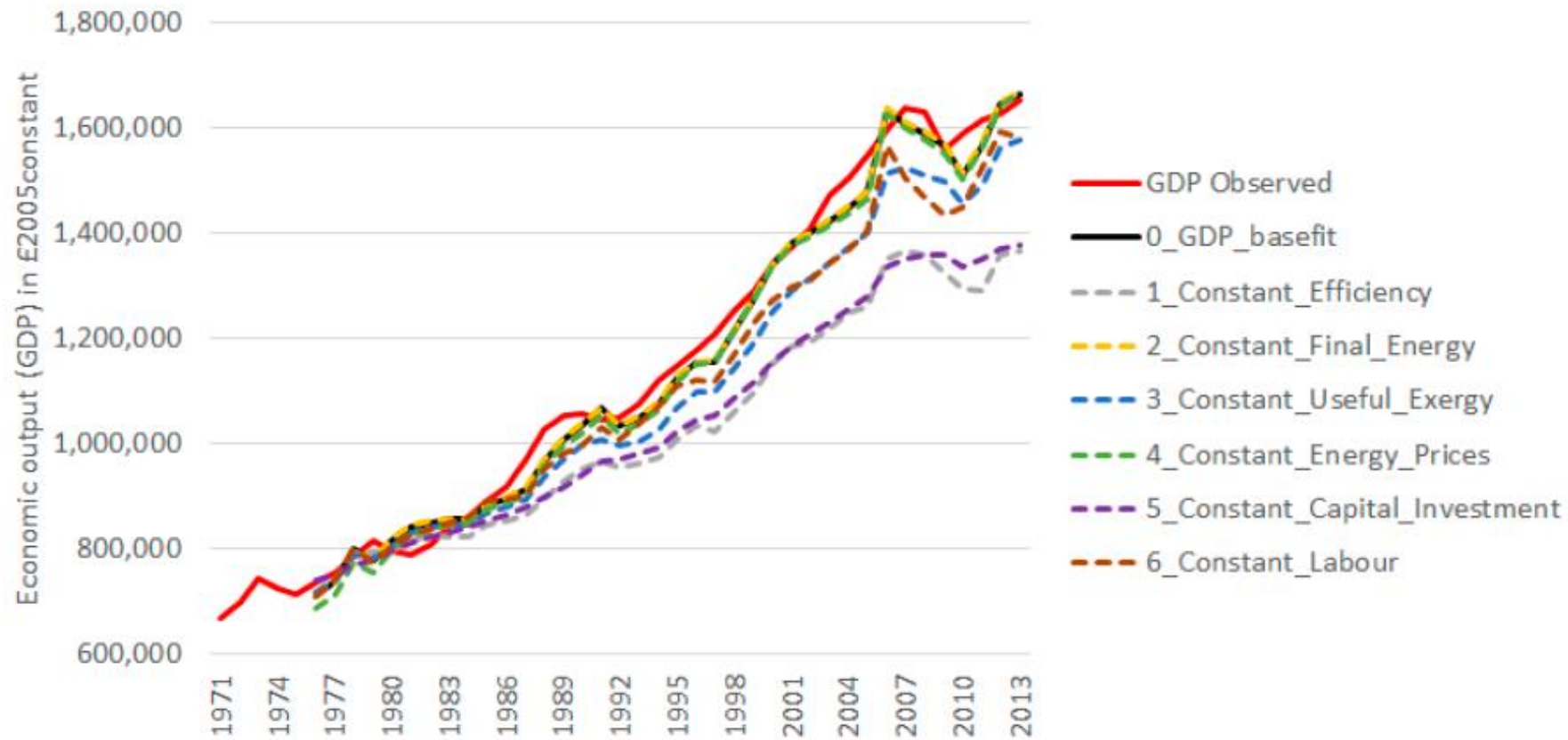
Source: Consumption figures from University of Leeds for Scottish Govt.

# Resource consumption options



Source: Scott et al (2019)

# Relationship between energy efficiency and energy demand



Source: Sakai et al, 2019



# Key findings

- Recycling and circularity of resources is important but is not enough to reduce the impact of current levels of consumption
- Efficiency improvements will not outpace increases in consumption over the long-term
- A comprehensive energy demand strategy is required that concentrates of absolute reductions in materials and energy not intensity improvements
- Short-term reductions are more important than long-term unproven technologies

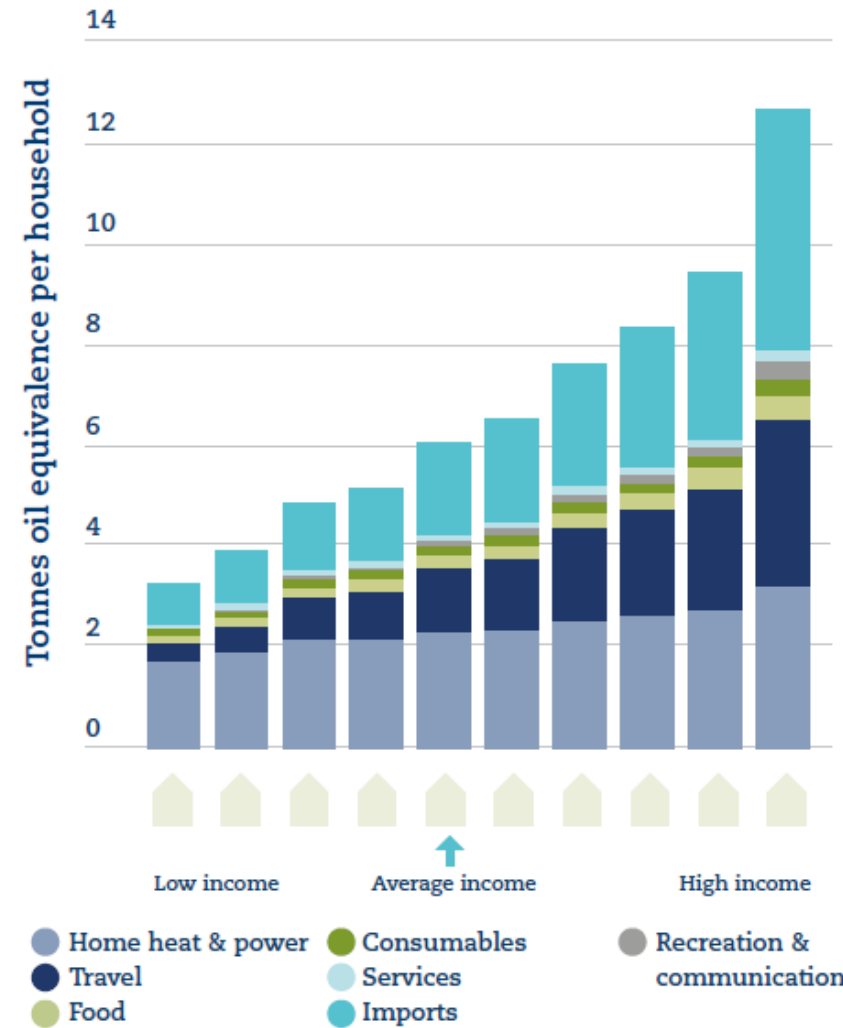
# Broadening the scope of material and energy demand – Shift, Avoid, Improve

Energy Service	Description	Metrics		
		Avoid	Shift	Improve
Mobility	Includes private transport categorised by car, bus, rail, 2 wheel, aviation	Total Passenger kms per capita	Modal shift (passenger kms per mode)	Vehicle efficiency (EJ/vehicle km)
Shelter	Includes household direct and electricity demand for heating, lighting and appliances	Total demand for heat, lightening and electrical appliances (total kWh per capita)	Shift to less energy intensive appliances (Time per appliance)	Appliance energy efficiency (Kwh / appliance)
Nutrition	Includes all household food	Calorific intake (kcal per capita)	Shift to less energy intensive foods (kg per food type)	Agricultural efficiency (E / kg of different food types)
Goods and services	Includes all industry and services energy demand including the movement of goods	Level of demand for materials and products by households	Purchasing of less energy intensive materials and products	Industrial and service sector process and energy efficiency

Source: Based on Creutzig et al, 2018 CREDS, unpublished

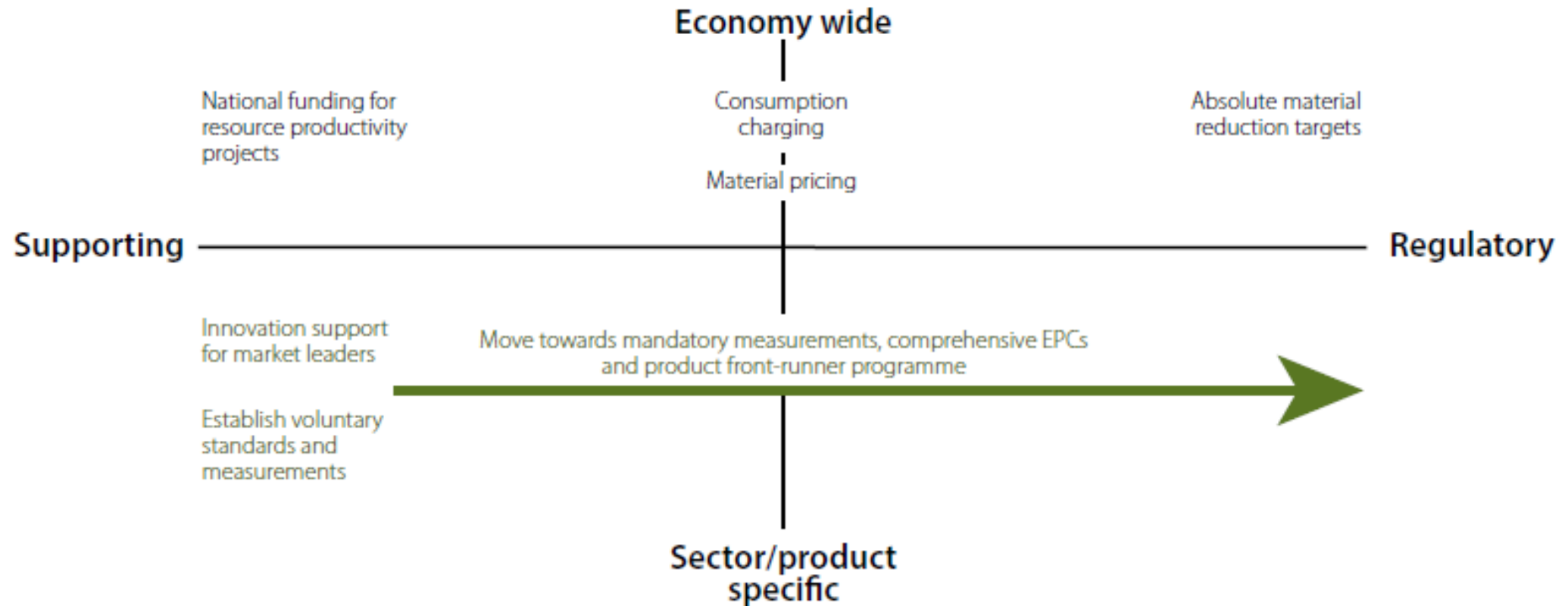


# Distribution of embodied energy emissions



Source: Barrett et al, 2018

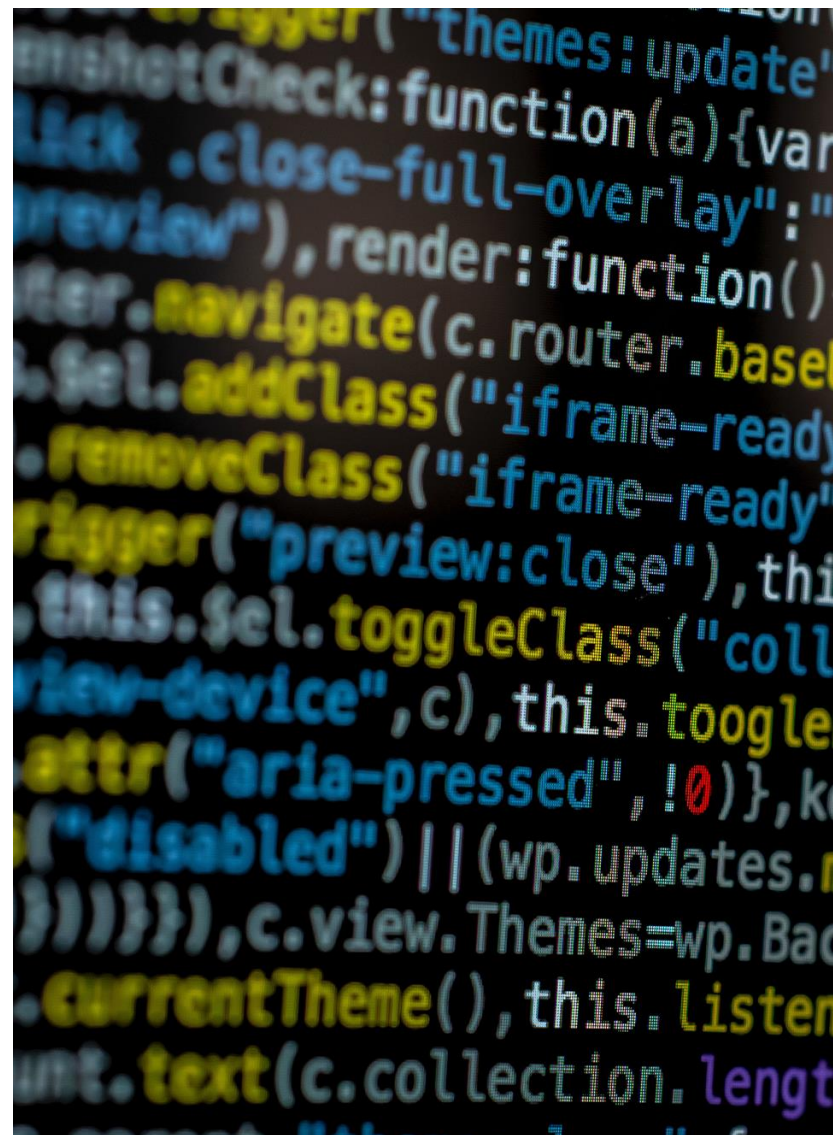
# Policy approaches





# See what we're doing

- [www.creds.ac.uk](http://www.creds.ac.uk) – regular updates with news, blogs and project information
- Twitter: @CREDS\_UK
- Quarterly newsletter





# Useful references

- Barrett J and Owen A. (2018) Funding a low carbon energy system, UKERC Briefing Note, available from: <http://www.ukerc.ac.uk/publications/funding-a-low-carbon-energy-system.html>
- Committee on Climate Change (2019) Net zero – The UK’s contribution to stopping global warming, available from: <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>
- Creutzig, F, Roy, J, Lamb, WF et al. (17 more authors) (2018) Towards demand-side solutions for mitigating climate change. Nature Climate Change, 8 (4). pp. 268-271. ISSN 1758-678X,
- Defra / University of Leeds (2018) The UK’s Carbon footprint, available from: <https://www.gov.uk/government/statistics/uks-carbon-footprint>
- Hardt L., Owen A., Brockway P., Heun M., Barrett J., Taylor P., Foxon T. (2018) Untangling the drivers of energy reduction in the UK productive sectors: Efficiency or offshoring? Applied Energy 223 (2018) 124-133.
- Intergovernmental on Climate Change (2018) Special Report – Global Warming of 1.5 degrees, available from: <https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/>
- Sakai M. Brockway P., Barrett J., Taylor P. (2019) Thermodynamic efficiency gains and their role as a key driver of economic growth, Energies, 2019, 12, 110; doi:10.3390/en12010110
- Scott, K., Gieseckam, J., Barrett, J. & Owen, A. (2019) Bridging the climate mitigation gap with economy-wide material productivity. Journal of Industrial Ecology doi: 10.1111/jiec.12831.





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# **Why a Circular Economy Bill needs Footprint Reduction Targets**

Dr Richard Dixon



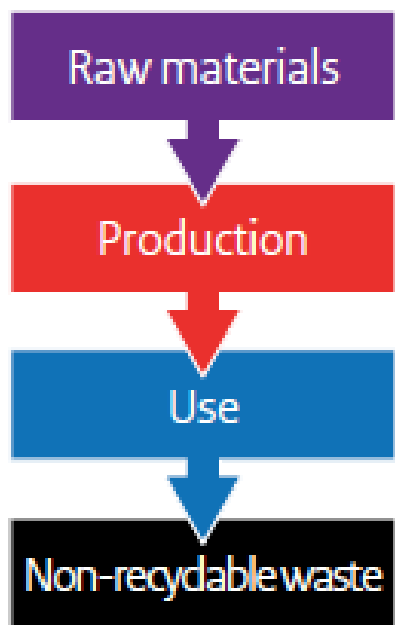
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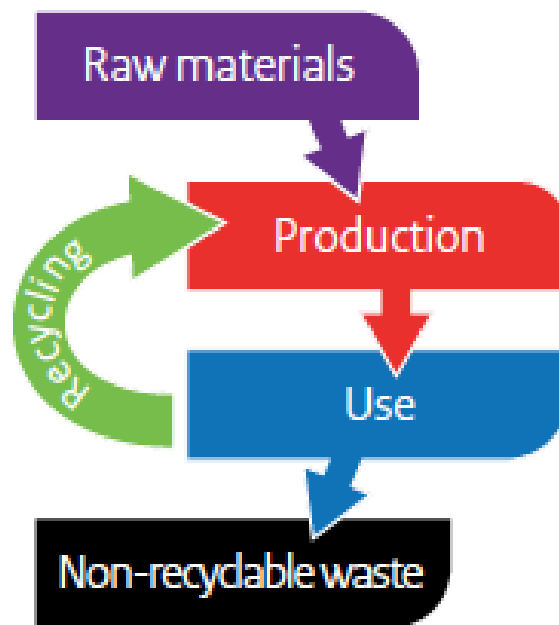
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# From a linear to a circular economy

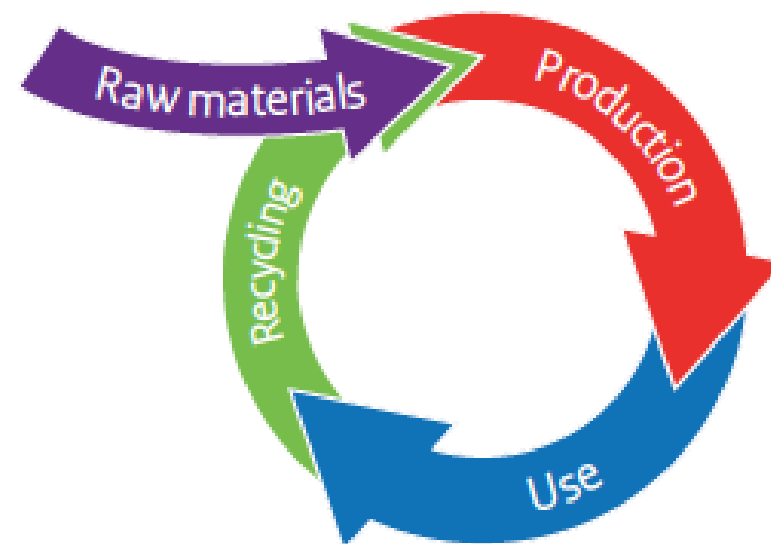
Linear economy



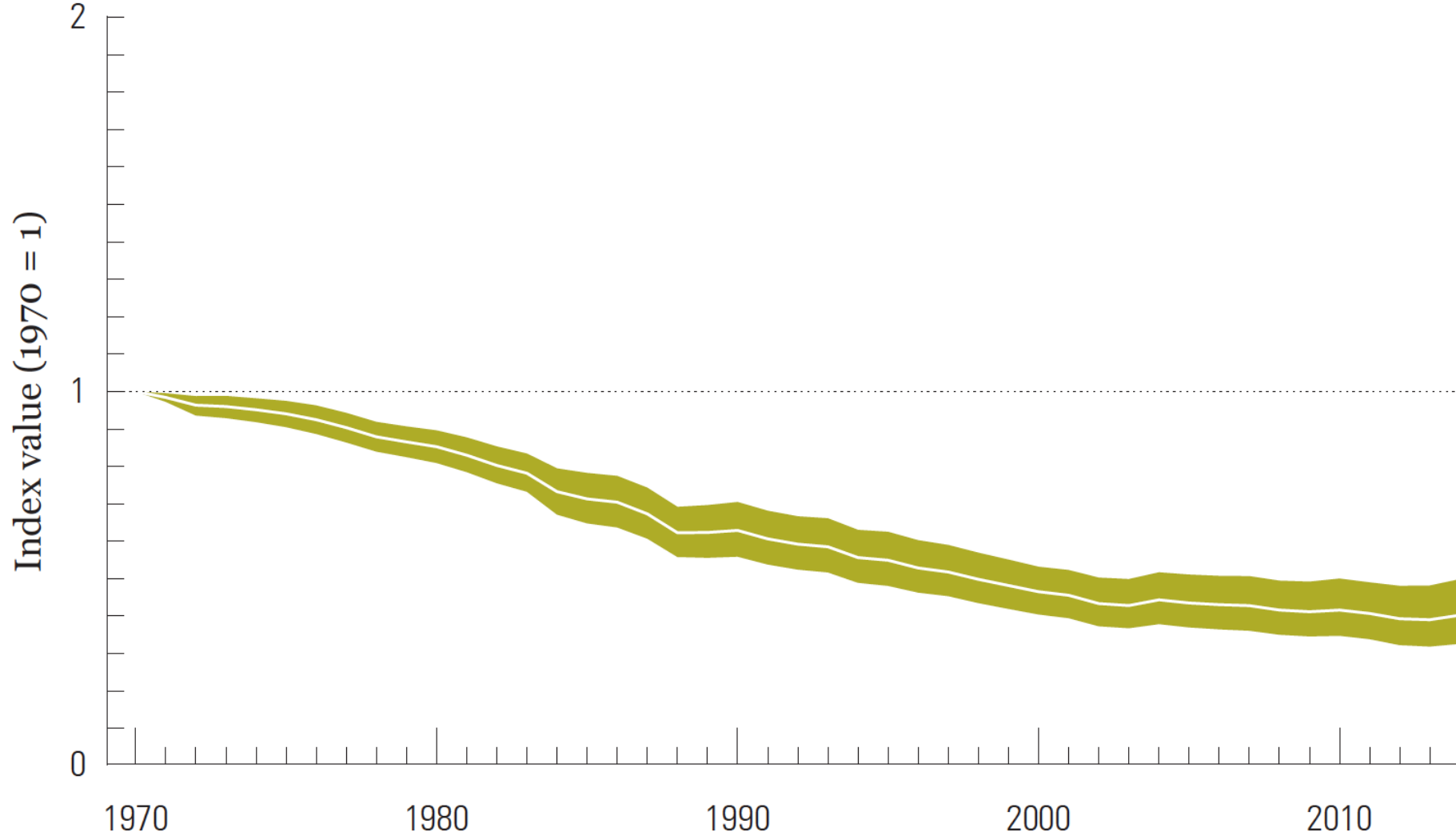
Reuse economy



Circular economy





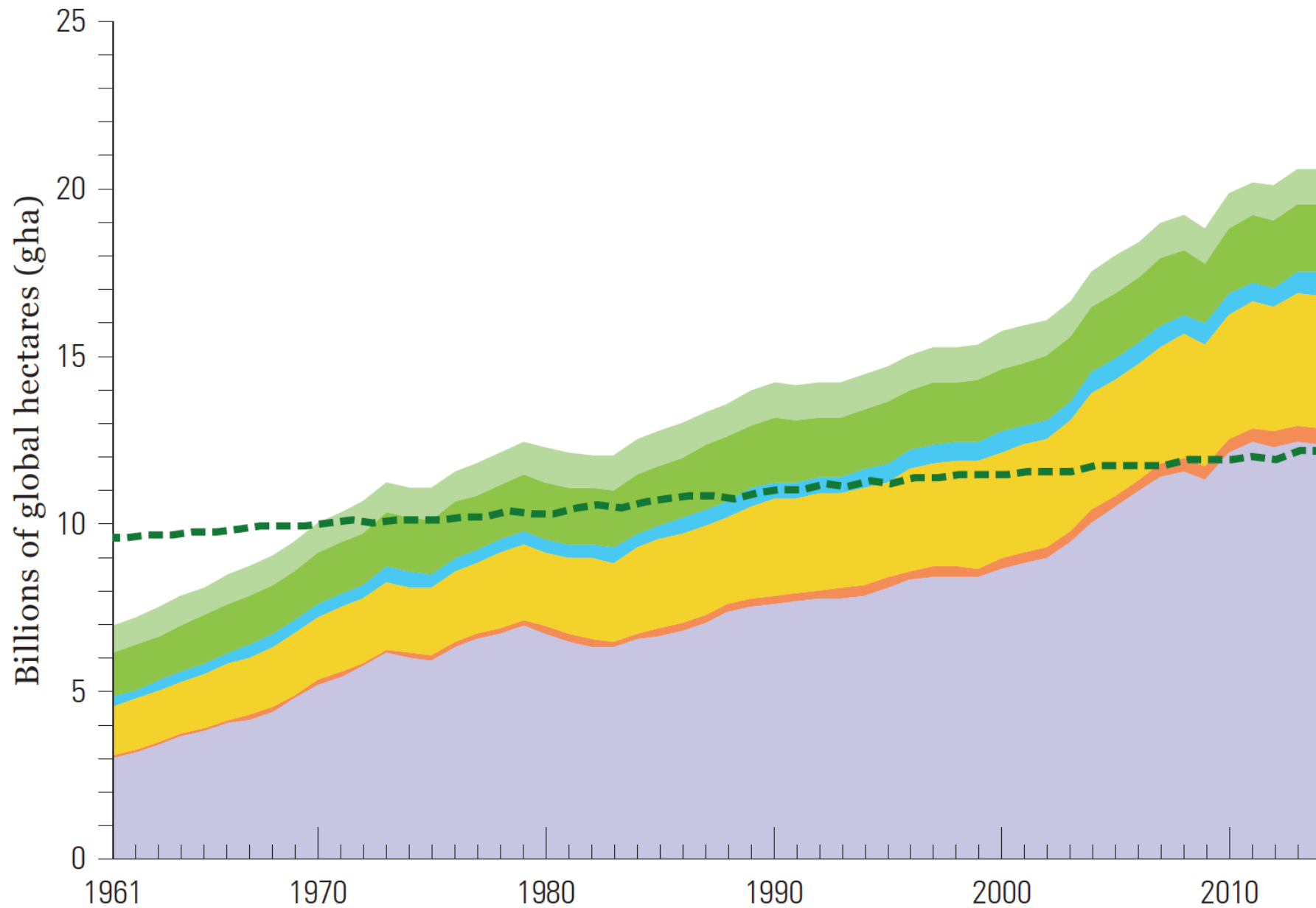
Government-wide Programme for a Circular Economy, Netherlands, 2016



**Figure 20: The Global Living Planet Index: 1970 to 2014**  
*Average abundance of 16,704 populations representing 4,005 species monitored across the globe declined by 60%. The white line shows the index values and the shaded areas represent the statistical certainty surrounding the trend (range: -50% to -67%)<sup>1</sup>.*

**Key**

-  Global Living Planet Index
-  Confidence limits

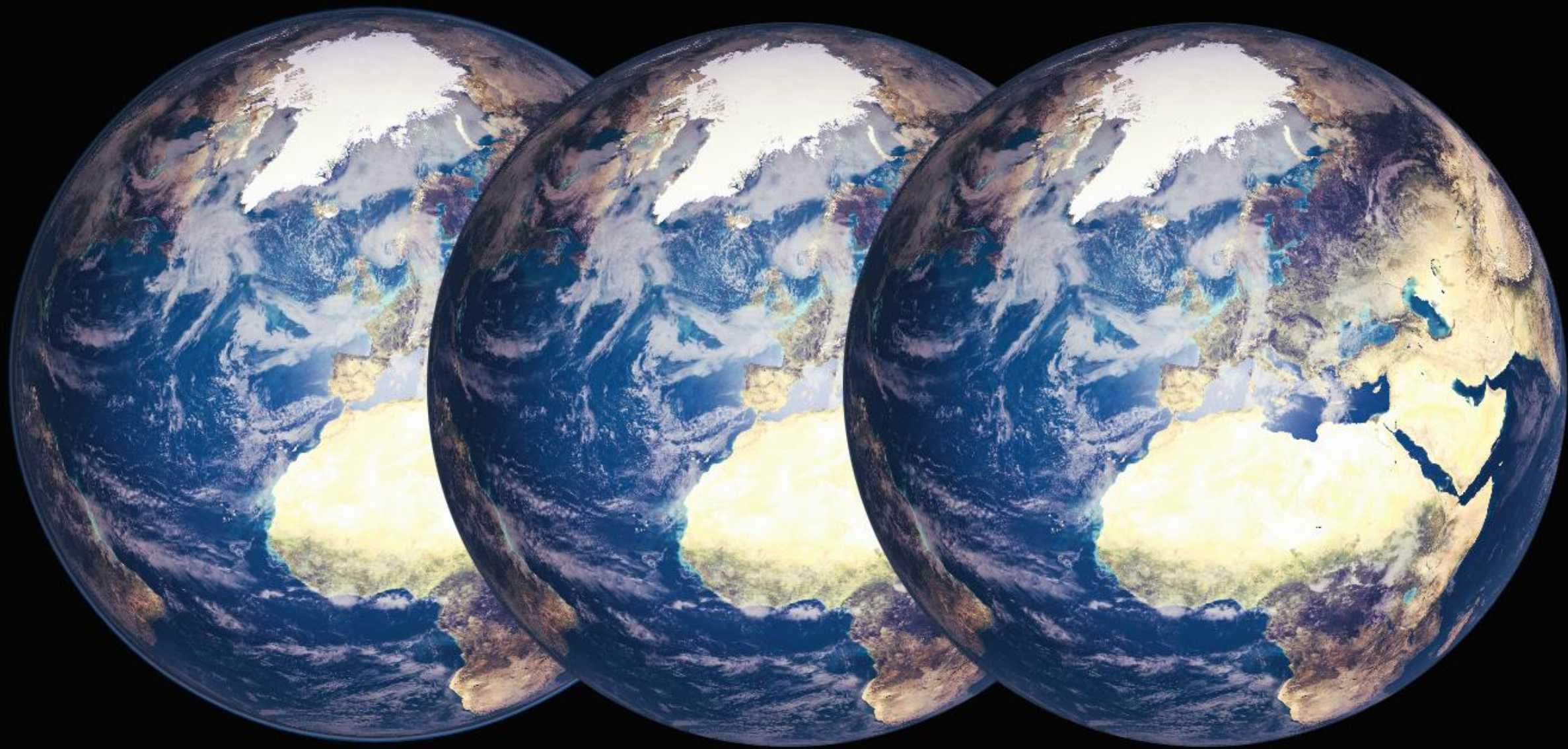


**Figure 5:**  
*World Ecological Footprint of consumption by area type in global hectares, 1961-2014. The largest contribution to the Ecological Footprint is carbon emissions from fossil fuel burning (60%)<sup>3</sup>.*

**Key**

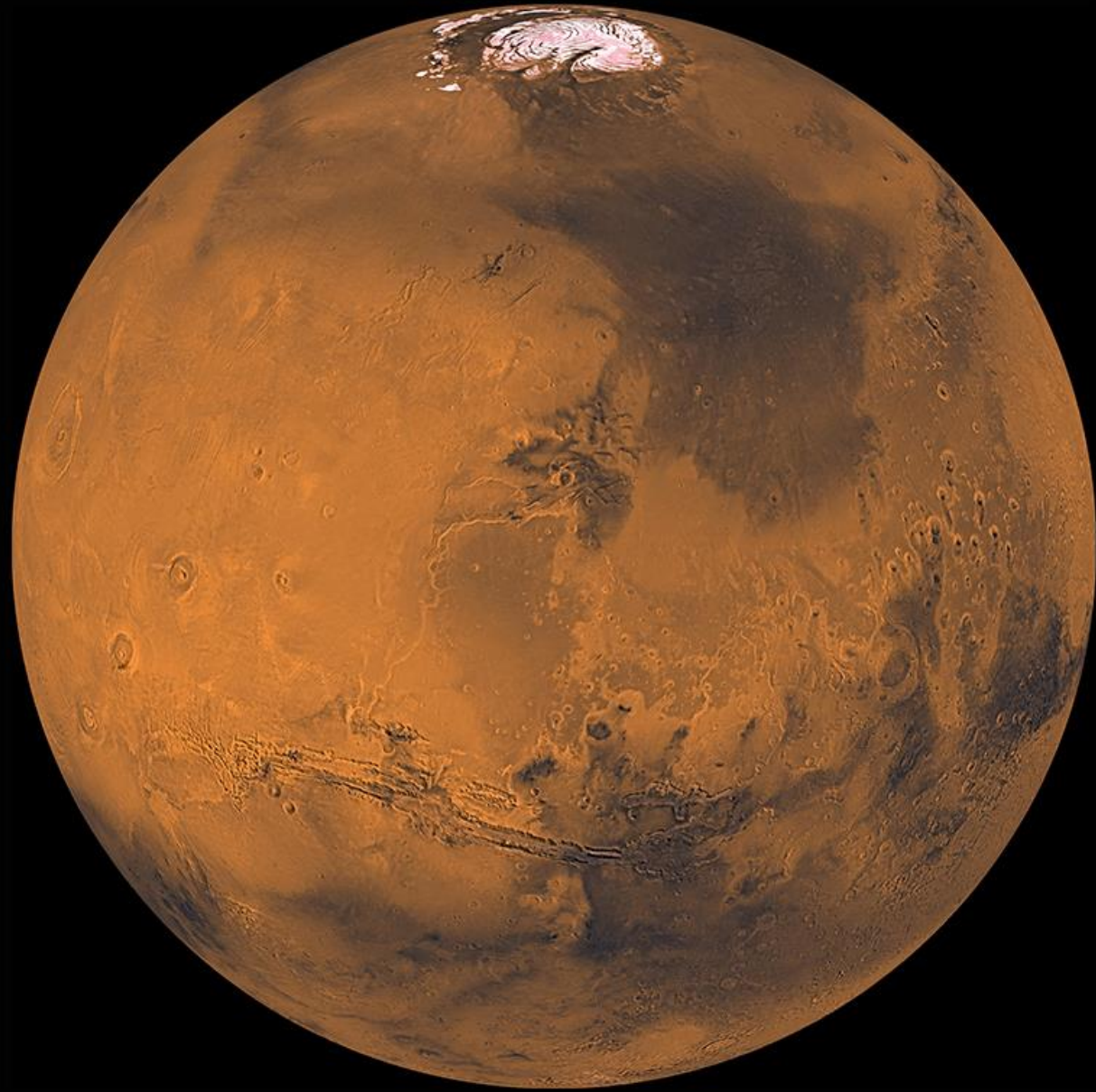
- Grazing land
- Forest products
- Fishing grounds
- Cropland
- Built-up land
- Carbon
- World biocapacity

















# Towards a Sustainable Scotland

A discussion paper

Published as part of the sustainable Europe campaign

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OF THE  
EARTH  
SCOTLAND

Towards a low footprint Scotland

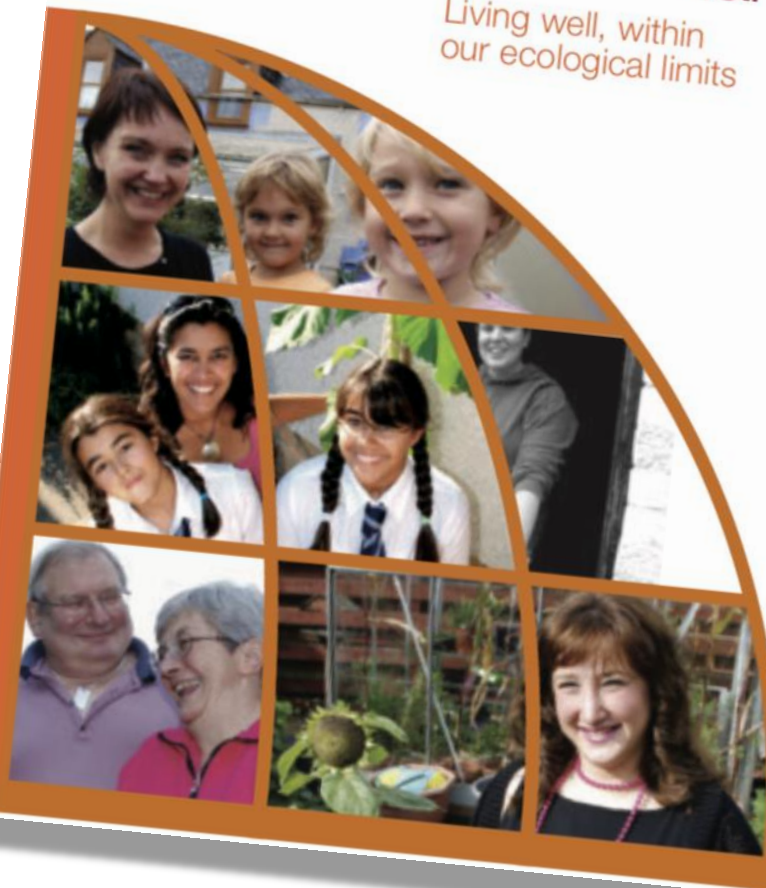
A report to  
Scotland's Global  
Footprint project

John Barrett, Jan Minx,  
Alistair Paul and Sibylle Frey  
Stockholm Environment Institute  
March 2007

SEI STOCKHOLM  
ENVIRONMENT  
INSTITUTE

# Towards a low footprint Scotland

Living well, within  
our ecological limits

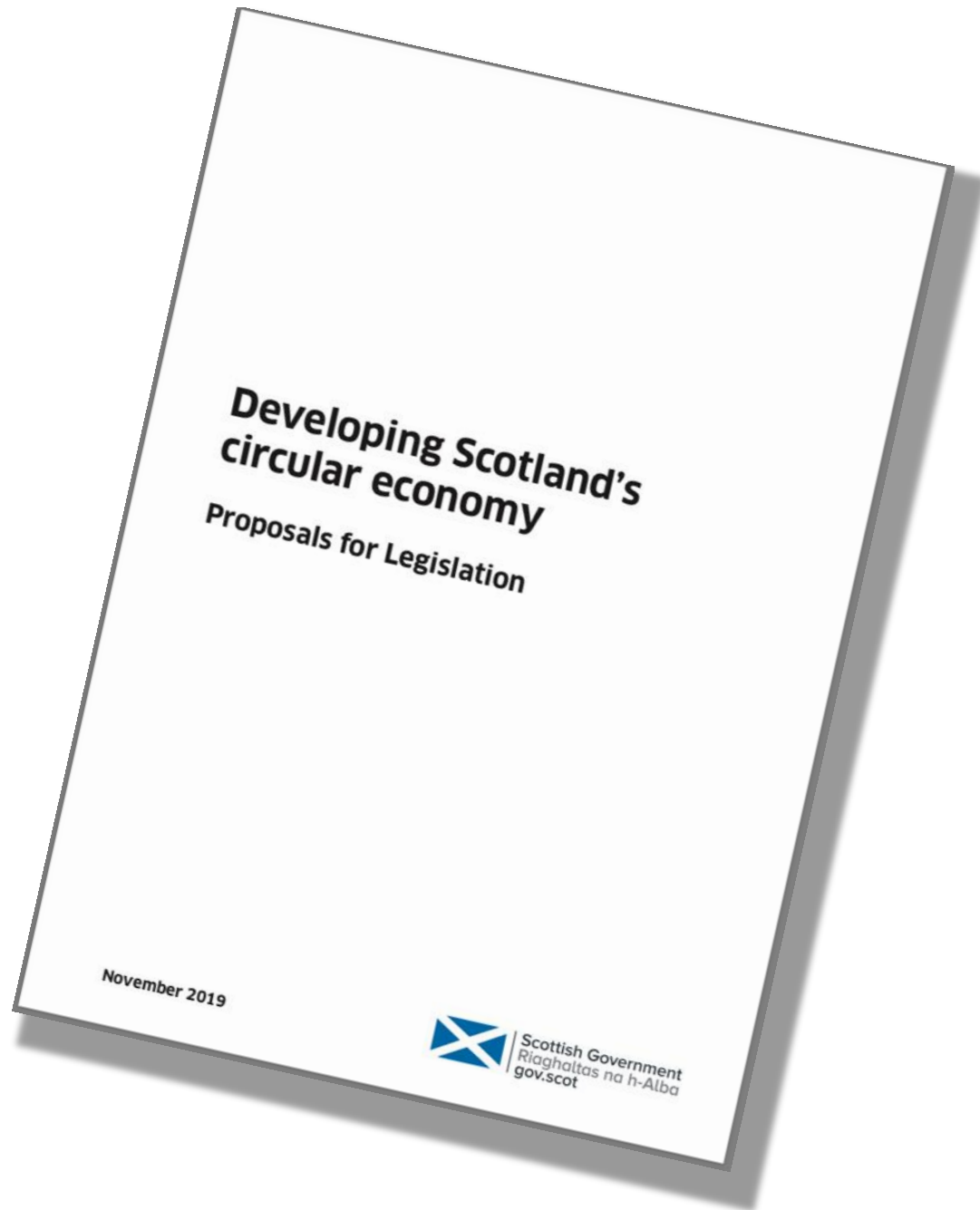




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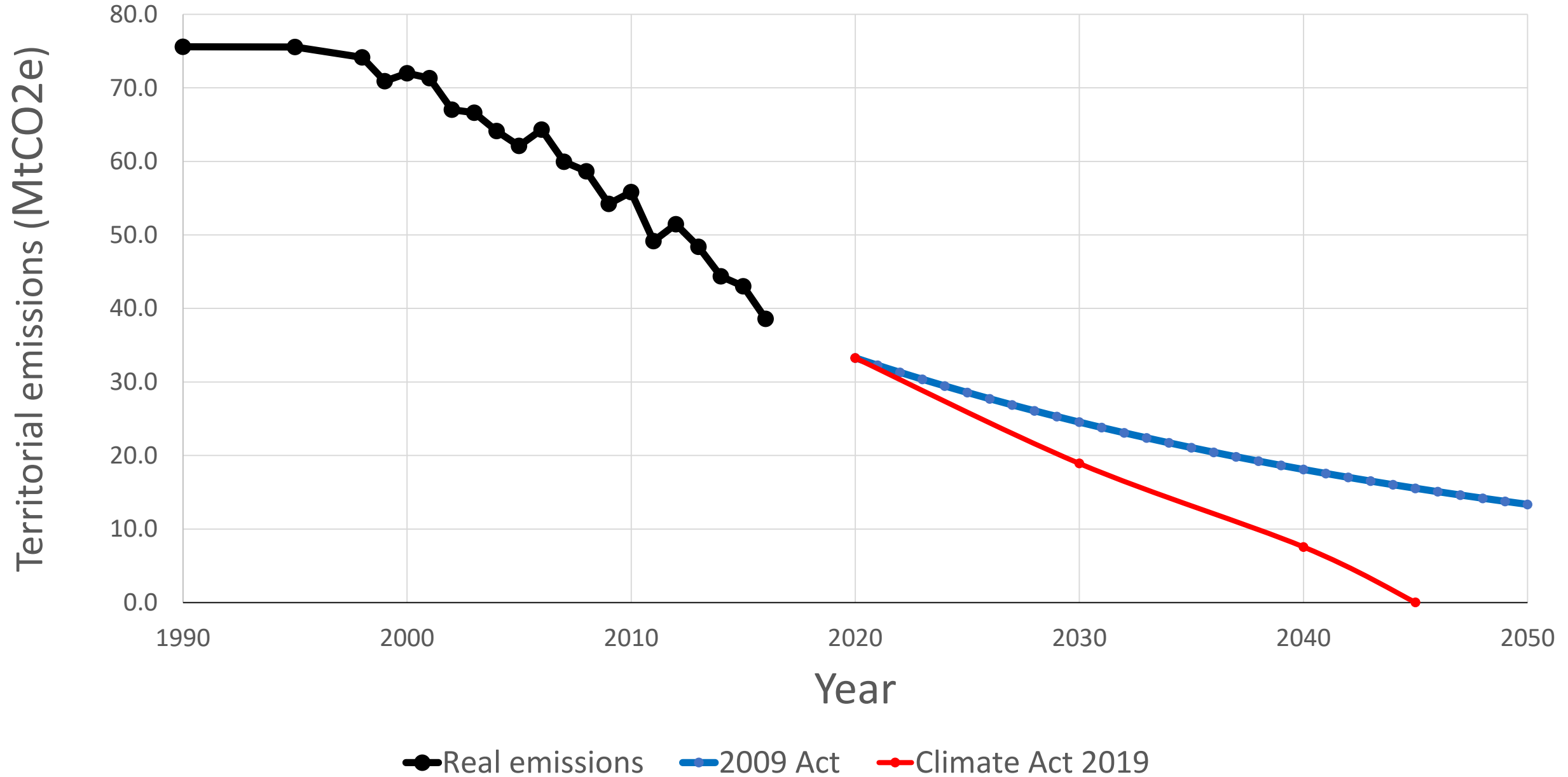


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# Netherlands Footprint Targets

- a fully circular economy by 2050
  - a 50% reduction by 2030
- 
- 72-page plan with 3 strategic goals
    1. Raw materials in existing supply chains are utilised in a high-quality manner.
    2. In cases in which new raw materials are needed, fossil-based, critical and non-sustainably produced raw materials are replaced by sustainably produced, renewable, and generally available raw materials.
    3. We develop new production methods, design new products and organise areas differently. We also promote new ways of consumption.

# Scotland's emissions trajectories





# Experiences from France

Penelope Vincent-Sweet, FNE

With Thibault Turchet, ZeroWaste France



## Regional federations

# Work in progress!



# What is the EEB?

# EEB: the environmental voice of European citizens

**We stand for  
environmental justice,  
sustainable development  
and participatory  
democracy.**

**Our aim is to ensure the EU secures a healthy environment and rich biodiversity for all.**



[www.eeb.org](http://www.eeb.org)



Work of persuasion

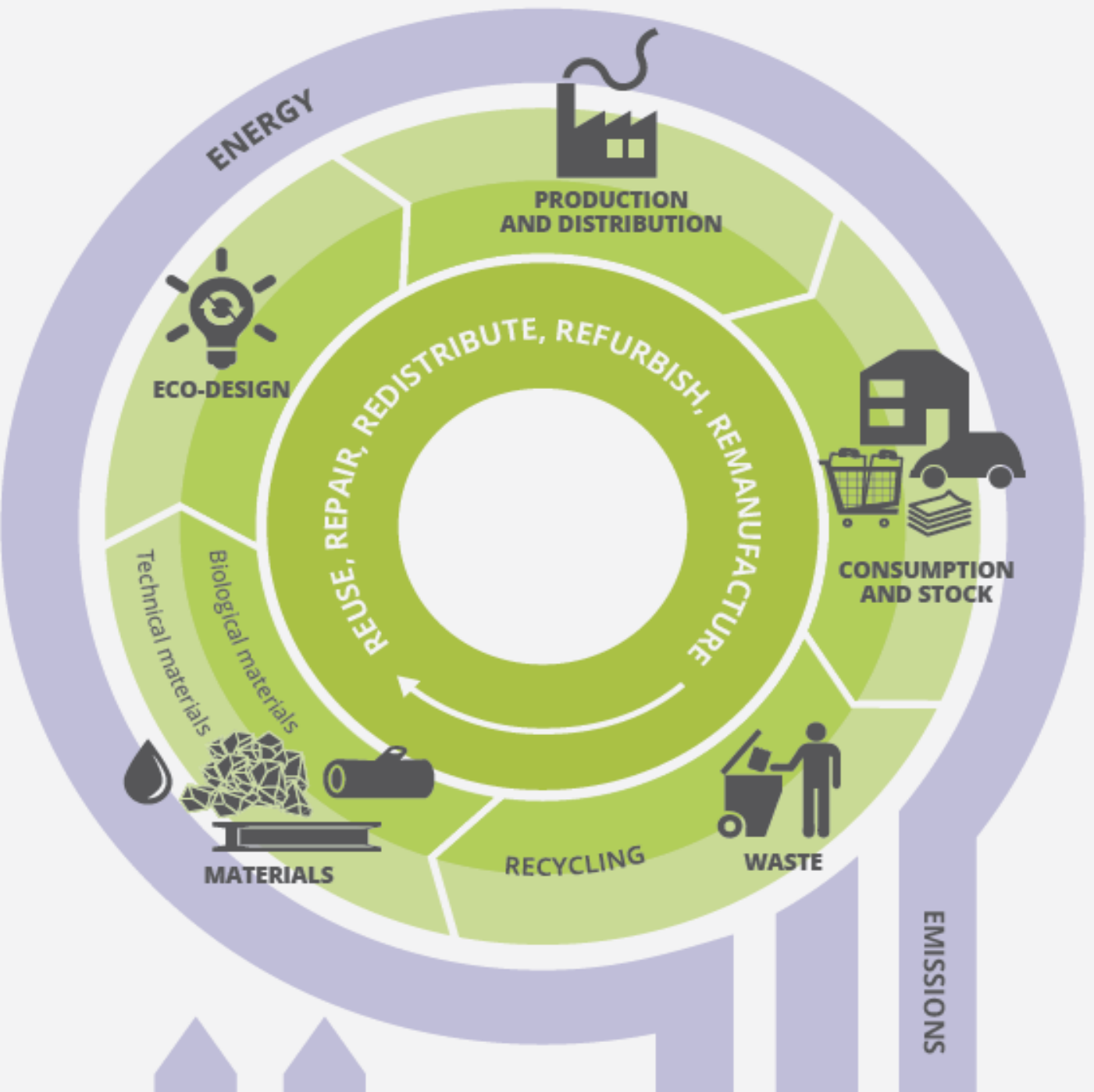
What is the Circular Economy?

Many misleading versions which are not circular!

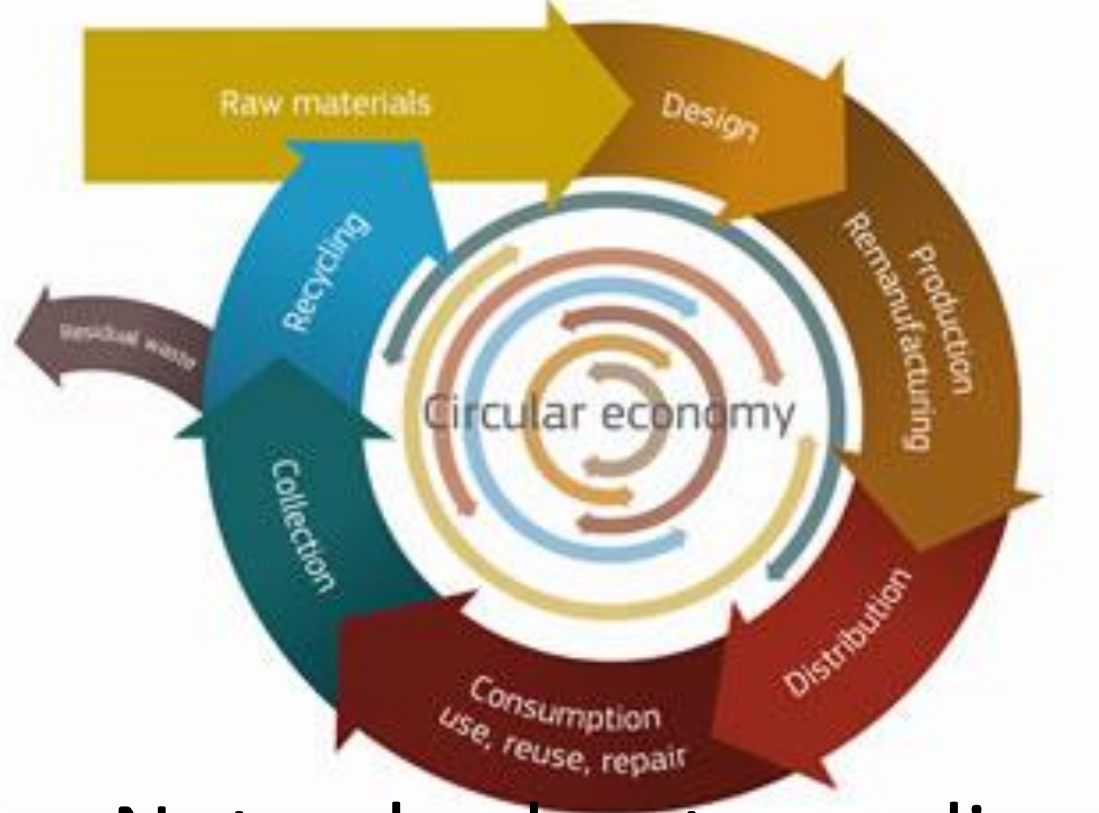


## THE CIRCULAR ECONOMY

Source: EEA 2019







Not only about recycling!

To fit the wider system, circular economy solutions must be filtered by those principles:

1. Slow  
(long life of products)
2. Small  
(no superfluous waste)
3. Local  
(territorial hierarchy)
4. Clean  
(no toxic substances)
5. Sustainable  
feedstocks
6. Perpetual  
(downcycling avoided)



## *French environmental legislation*

- Grenelle, LTECV, Circular Economy law
- Waste prevention plans and programmes
- Waste management plans:
  - national, regional, sometimes local
- EPR (since 1992)
  
- Circular economy law: based on the circular economy roadmap which was discussed intensively 2 years ago.



## ***Influences in France***

- Enormous influence of big waste management groups (Véolia, SITA)
  - push incineration
  - less enthusiasm for preventing waste and reducing municipal restwaste
- Local authorities also influential, but not all in the same direction.
- Commercial and industrial waste = an unknown quantity, despite the rules.  
Difficulty ensuring rules are respected.



# Targets

- Targets need
  - Means and motivation
  - Sticks and/or carrots
- French attitude to targets:
  - careful not to do better than targets
  - if you miss a target, never mind, the target date will be extended

## Extended Producer Responsibility

- Almost 20 schemes now (started with packaging)
- Generate 1.2 billion € per year
  - Much money -> local authorities for collections
- Balance of power difficult to maintain
- Ecodesign beginning to be integrated: bonus/malus
- Find a balance between EPR and regulations

# What makes us hopeful

## In the new Circular Economy bill

- Ban on single-use crockery/cutlery for eating on-site (2023)
- Restrictions on plastic bottles for water
- Public buildings must have drinking fountains (2022)
- The end of plastic films wrapping fruit & veg (2021)
- Fewer exemptions for biodegradable plastics
- Articles on labelling, reparability labelling, spare parts
- More substantial sanctions and fines



# What makes us hopeful - 2

## In the new Circular Economy bill

### EPR Schemes

- More focus on ecodesign
  - substantial bonus and malus allowed (up to 20% of price)
- Wider responsibility, not just end of life
- Part of the EPR money will go to repair and reuse



# What we would have liked to see

## In the new Circular Economy bill

- More ambitious green procurement obligations
  - Banning single-use plastics in public services
- Stronger restrictions on advertising
  - No prospectuses in mailboxes unless expressly agreed
- More substantial support of the repair and reuse sector
- No building incinerators until all other measures in place
- More ambitious and realistic targets (before 2040!)
- Deposit scheme for refill
- Action on toxic components:
  - reduction and traceability: towards a “product passport”



NB many laws require decrees to be applied

Concrete measures and means are often lacking

A sea-change needed in society: how we relate to consumption

In France: “Sobriété heureuse” (Pierre Rabhi)  
= “Joy in simplicity”



**Thank you!**

fne.asso.fr

zerowastefrance.org



