PHILANTHROPY FOR CLIMATE ACTION:

REDUCING GLOBAL EMISSIONS THROUGH HIGH IMPACT INTERVENTIONS

IKEA Foundation

RMI

SYSTEMIQ

PREFACES

Per Heggenes, CEO, IKEA Foundation

As the world gathers for COP27, we are reminded of the urgency of the climate crisis we face. Around the world, more people than ever are experiencing its impact on their lives and livelihoods. 2022 is on track to be the hottest year ever recorded. Droughts and floods are becoming more frequent and intense.

At the IKEA Foundation, we strongly believe that successfully addressing this challenge will require unprecedented collaboration, between governments, the private sector, civil society organisations and, of course, philanthropies.

In publishing this research, we are making our own contribution to encouraging this collaboration. Not only to avoid the most devastating effects of climate change but because it shows that by doing so it is also possible to improve people's livelihoods. Many of the opportunities outlined bring tangible benefits to the many people.

We are grateful to Systemiq and RMI for the expertise and experience they brought to this work, which continues to inform the IKEA Foundation's own approach to climate action. We hope this research will support other global philanthropies to join us in driving the climate agenda forward.

Jeremy Oppenheim, founder and senior partner, Systemiq

Despite the devastating impact of climate change, less than 2% of philanthropic capital is directed towards climate mitigation. This allocation needs to be scaled fast. But it is not just a volume game. It also matters *where* and *how* philanthropy uses its capital.

The methodology Systemiq developed with the IKEA Foundation and RMI is designed to help foundations prioritise high impact interventions to cut emissions at scale and speed. This report demonstrates that there are a wide array of large-scale mitigation options, meaning that almost any foundation could deploy capital in a way that is close to their strategy and expertise. The fact that IKEA Foundation has chosen to open-source this methodology demonstrates their deep commitment to urgent climate action and to the transformative potential of joined-up philanthropy.

Since its inception in 2016, Systemiq's purpose has been to accelerate the changes needed in our key economic systems to deliver a safer, more just and more humane society. We are deeply aware of the threats climate change pose to our societies and believe that this publication is a step in the right direction to further strengthen the role of philanthropy in tackling climate change.

EXECUTIVE SUMMARY

- The 2020s will be a **decisive decade for reducing global greenhouse gas (GHG) emissions** if the world is to successfully prevent devastating climate change. In 2021 the IKEA Foundation (IKF) announced an additional €1 billion in funding for climate action initiatives over the start of the decade. IKF commissioned Systemiq & RMI to develop a strategy & **portfolio of impact opportunities** to understand where this funding could best be deployed to deliver emissions reductions quickly, efficiently and at scale.
- The Systemiq/RMI research considers 5 key systems in which the consumption and production of GHG emissions needs to be transformed to limit global warming to 1.5°C. These are: Energy & Power, Food & Land Use, Industry, Transport and Buildings. In each of these five systems, **the universe of levers of change are identified** based on their potential to reduce GHG emissions. Each lever is scored based on a set of criteria: technological readiness, additionality to private & public funding and cost effectiveness. This scoring exercise results in **12 levers being prioritised** for a further deep-dive. The first part of this report outlines the 5 systems and all its potential levers of change. It also showcases the scoring exercises based on the set criteria to get to the 12 prioritised levers.
- The second part of this report maps out the **2-3 main opportunity areas for philanthropic funds for each of these prioritised levers, resulting in 36 opportunity areas**. These opportunity areas are then assessed using a new set of criteria: speed of emissions reduction (less or more than 5 years), the ability to 'crowd-in' private finance, and the direct co-benefits resulting from an intervention in this opportunity area other than GHG emissions reduction, such as biodiversity and job creation. Concrete opportunities for action are provided to help philanthropic funds to enter these areas of action.
- The IKEA Foundation is using this research to **inform the deployment of funding** dedicated to climate action initiatives. Together with Systemiq and RMI, we hope its publication will support other philanthropies to use the resources available to them to help prevent devastating climate change in the coming decades.

AUTHORS AND BACKGROUND INFORMATION

Authors: The '*Philanthropy for Climate Action*' report was commissioned by the IKEA Foundation and produced by Systemiq in partnership with RMI. The team that developed this report comprised: Veerle Haagh, Jez Alleyn, Liesbeth Huisman, Talia Smith, Mark Meldrum, Katherine Stodulka, Jeremy Oppenheim (Systemiq) and Katie Mulvaney, Adefunke Sonaike, Daniel Padilla, Lena Hansen, James Newcomb, Jules Kortenhorst (RMI). The report team is deeply grateful to numerous colleagues and experts who have generously contributed their time and expertise to inform the report.

About the IKEA Foundation: The IKEA Foundation is a strategic philanthropy that focuses its grant making efforts on tackling the two biggest threats to children's futures: poverty and climate change. It currently grants more than €200 million per year to help improve family incomes and quality of life while protecting the planet from climate change. Since 2009, the IKEA Foundation has granted more than €1.5 billion to create a better future for children and their families. In 2021 the Board of the IKEA Foundation decided to make an additional €1 billion available over the next five years to accelerate the reduction of greenhouse gas emissions.

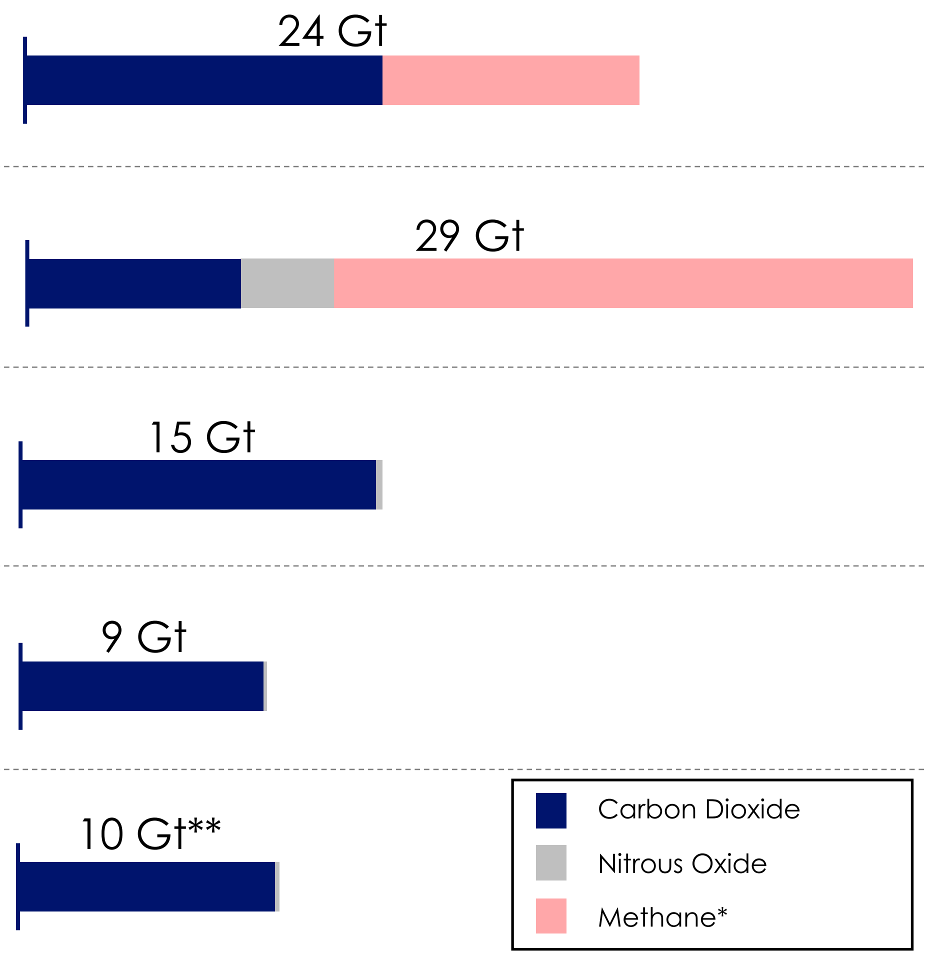
About Systemiq: Systemiq, the system change company, was founded in 2016 to drive the achievement of the Sustainable Development Goals and the Paris Agreement, by transforming markets and business models in five key systems: nature and food, materials and circularity, energy, urban areas, and sustainable finance. A certified B Corp, Systemiq combines strategic advisory with high-impact, on-the-ground work, and partners with business, finance, policy-makers and civil society to deliver system change. Systemiq's people are based in Brazil, France, Germany, Indonesia, the Netherlands and the UK. Find out more at www.systemiq.earth.

About RMI: RMI is an independent non-profit founded in 1982 that transforms global energy systems through market-driven solutions to align with a 1.5°C future and to secure a clean, prosperous, zero-carbon future for all. We work in the world's most critical geographies and engage businesses, policymakers, communities, and NGOs to identify and scale energy system interventions that will cut greenhouse gas emissions by at least 50 percent by 2030. RMI has offices in: Basalt and Boulder, Colo.; New York City; Oakland, Calif.; Washington, D.C.; and Beijing.

AGENDA

- **Introducing 5 systems and levers of change**
- Prioritised levers energy & power
- Prioritised levers food and land-use
- Prioritised levers transport
- Prioritised levers building
- Appendix

TO LIMIT GLOBAL WARMING TO 1.5°C, WE MUST REDUCE GHG EMISSIONS IN FIVE KEY SYSTEMS BY ADJUSTING PRODUCTION AND CONSUMPTION



System	2019 GHG emissions (CO2e):	1.5°C trajectory
Energy & Power	24 Gt	Replacement of fossil fuels (oil, gas, coal) by clean energy sources (mainly solar, wind) supported by increased storage capacity
Food & Land use	29 Gt	Widespread protection and restoration of land and vegetation, via a realisation of the value of nature and a reduced consumption of meat and dairy
Industry	15 Gt	Shift to low-carbon/'green' processes in the chemicals, steel, and cement sectors via electrification, green hydrogen and carbon capture and storage
Transport	9 Gt	Electrification, green hydrogen and green synthetic fuels for road vehicles, shipping, aviation and rail, coupled with accelerated rollout of required infrastructure
Buildings	10 Gt**	Improved energy efficiency of new and existing building stock, supported by behavioural change

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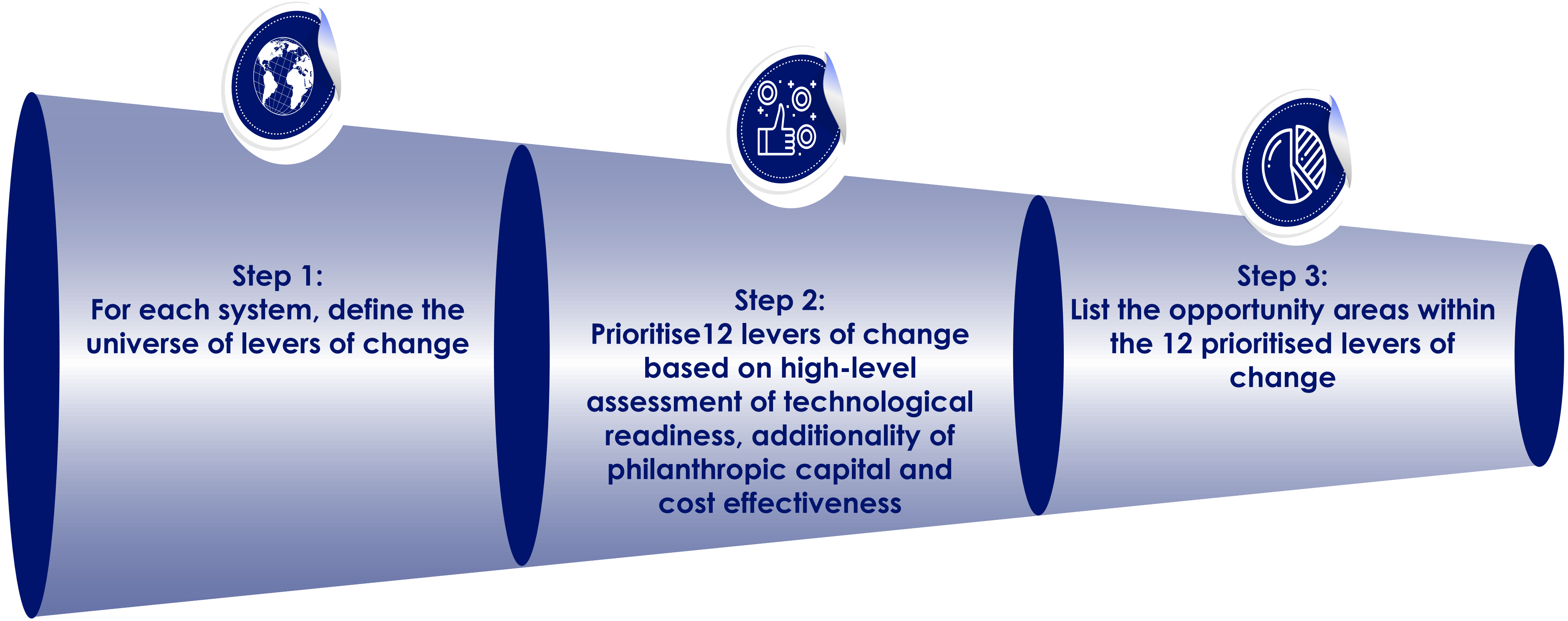
* Using the 20-year Global Warming Potential

** Hydrofluorocarbon (HFCs) contribute another 1 Gt to buildings – HFCs are man-made organic compounds and used a lot in air conditioning

Sources: IEA (2021) Net Zero by 2050 - A Roadmap for the Global Energy Sector; Roe et al. (2019) Contribution of the land sector to a 1.5C world; ETC (2021) Keeping the battle for 1.5C alive: feasible actions in the 2020s; NOAA CSL (2018) Ozone Assessment

OVERARCHING 3-STEP FRAMEWORK TO IDENTIFY OPPORTUNITIES AREAS



Step 1:
For each system, define the universe of levers of change

Step 2:
Prioritise12 levers of change based on high-level assessment of technological readiness, additionality of philanthropic capital and cost effectiveness

Step 3:
List the opportunity areas within the 12 prioritised levers of change

STEP 1: IN EACH SYSTEM, LEVERS OF CHANGE CAN BE IDENTIFIED TO REDUCE GHG EMISSIONS

System	Lever of Change	Ticket Size
		Gt CO2e, 2030, p.a.
Energy & Power	Clean electricity systems	8
	Minimise upstream methane emissions	4
	Early retirement of fossil power assets	4
	Clean electricity transmission & distribution	7
	Aggregated procurement of renewables	4
	Grid interconnections to transfer renewables	1
	Energy storage & other flexibility	1
	Connected & flexible grids (incl. microgrids)	1
	Demand-side flexibility and management	1
	Utility business models/ regulators	2
	Efficient economic (and low carbon) dispatch	2
	Bioenergy production	2
	CCS & CO2 transport & storage	0
Food & Land Use	Avoiding/ending deforestation	4
	Afforestation & reforestation	3
	Reduce methane emissions from ag & waste	5
	Peatland restoration & reduced conversion	2
	Improved agricultural practices	2
	Shift to alternative & plant-based proteins	2
	Reduce food loss & waste	2
	Enhanced soil sequestration in agriculture, biochar	1

System	Lever of Change	Ticket Size
		Gt CO2e, 2030, p.a.
Industry	Materials efficiency / circularity	1
	Energy efficiency in industry	2
	Co-locating industry with cheap renewables	1
	Use of low-temperature heat	1
	Technical CDR	1
	Clean hydrogen	-0
	Carbon capture, utilisation & storage	1
Transport	Electric vehicles - Light weight	2
	Electric vehicles- Heavy weight	1
	Reduced demand	1
	Clean, connected, shared mobility (TNCs, final mile etc.)	1
	Public transit	0
	Clean Fuels	1
Buildings	Energy efficiency in buildings - retrofit	2
	Low emissions build. materials and design-new	1
	Efficient & clean space/water heating	1
	Clean cooking	1
	Efficient & clean cooling	1

STEP 2: UNDERSTAND TECHNOLOGICAL READINESS FOR SCALE FOR EACH LEVER

☐ Consumption levers of change
○○○○○ Technology is no barrier to scale
○ Technology is a significant barrier to scale

Energy & Power	
Clean electricity systems	○○○○○
Clean electricity transmission & distribution	○○○○○
Energy storage & other flexibility	○○○○
Grid interconnections to transfer renewables	○○○○○
Efficient economic (and low carbon) dispatch – cheapest assets to grid first	○○○○○
Utility business models/regulators	○○○○○
Aggregated procurement of renewables	○○○○○
Connected & flexible grids (incl. microgrids)	○○○○
Demand-side flexibility and management	○○○
Securitization for early retirement of fossil power assets	○○○○○
Minimise upstream methane emissions	○○○○○
Bioenergy production	○○○○
CCS & CO_2 transport & storage	○○

Food & Land use	
Avoiding/ ending deforestation	○○○○○
Afforestation & reforestation	○○○○○
Improved agricultural practices	○○○○
Forest management & agroforestry	○○○○○
Peatland and coastal wetlands restoration & reduced conversion	○○○○○
Reduce food loss and waste	○○○
Shift to alternative & plant-based proteins	○○○○
Reduce emissions from waste disposal (landfill, wastewater)	○○○○○
Enhanced soil sequestration in agriculture, biochar	○○○○

Industry	
Energy efficiency in industry	○○○○○
Use of low-temperature heat	○○○○
Materials efficiency/circularity	○○○
Clean hydrogen	○○○○
Carbon capture, utilisation & storage	○○
Technical CDR	○○○○
Co-locating industry with cheap renewables	○○○○○

Buildings	
Low emissions building materials and design – new	○○○○○
Heating & cooling	○○○○○
Energy efficiency in buildings – retrofit	○○○○○
Clean cooking	○○○○○
Efficient & clean space/water heating	○○○○○
Efficient & clean cooling	○○○○○

Transport	
Hybrid & Electric vehicles – Light weight	○○○○○
Hybrid & Electric vehicles – Heavy weight	○○○○
Clean Fuels	○○○○
Clean, connected, shared mobility (TNCs, final mile etc.)	○○○○○
Aviation demand mitigation	○○○○○
Reduced demand	○○○○○
EV infra & batteries	○○○○○
Public transit	○○○○○

STEP 2: CLARIFY ADDITIONALITY WITH REGARDS TO PUBLIC & PRIVATE SECTOR FINANCE

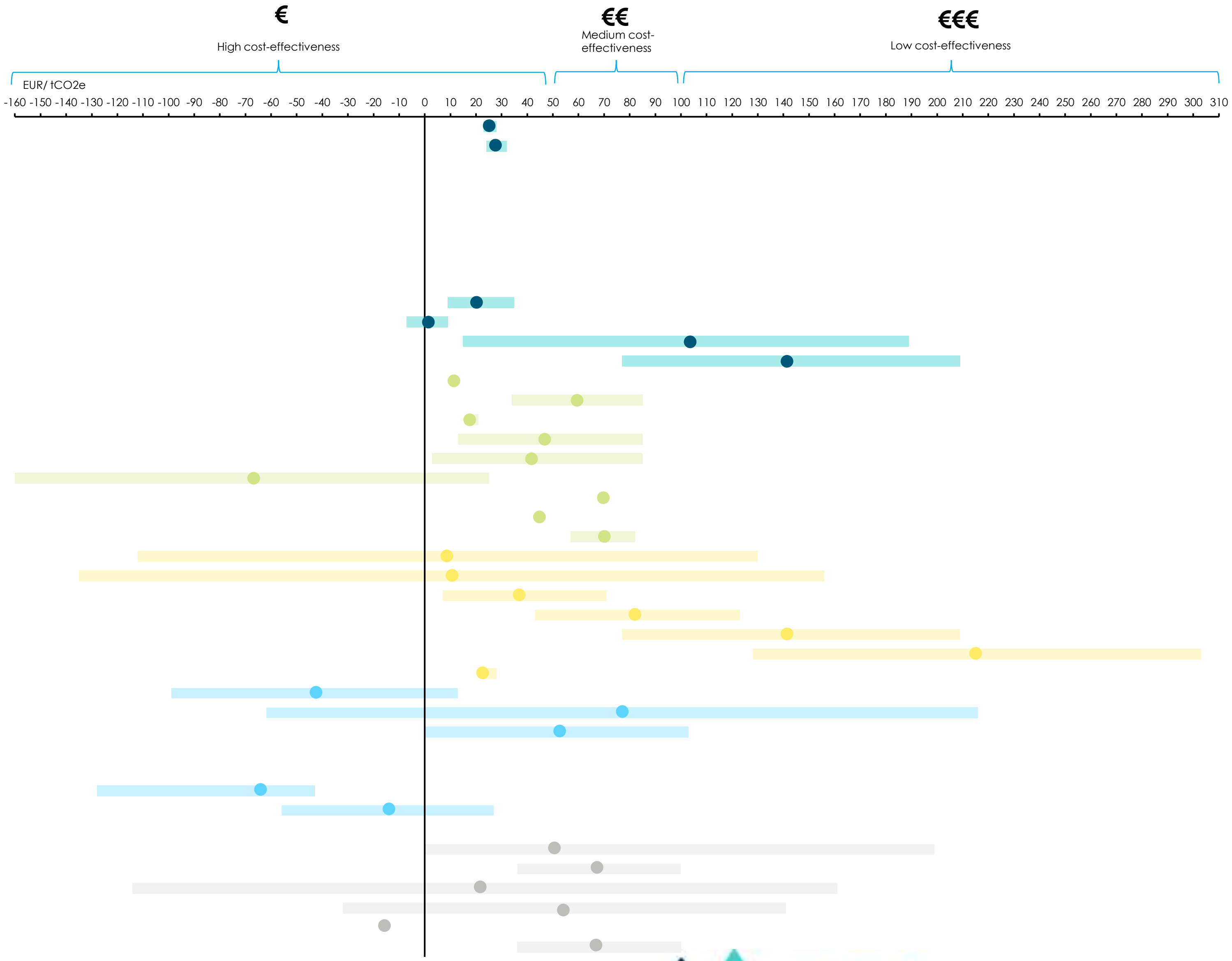
⬜ Public and private finance will (most likely) ensure that this lever will deliver on the 1.5C in this region

🟩 Public and private finance will (most likely) not ensure that this lever will deliver on the 1.5C in this region; philanthropic funding can help

System	Lever of Change	Asia Pacific	LATAM & Caribbean	Africa	Europe & Central Asia	Middle East	North America	Oceania
Energy & Power	Clean electricity systems	🟩	🟩	🟩		🟩		
	Clean electricity transmission & distribution	🟩	🟩	🟩		🟩		
	Energy storage & other flexibility	🟩	🟩	🟩		🟩		
	Grid interconnections to transfer renewables	🟩	🟩	🟩		🟩		
	Efficient economic (and low carbon) dispatch - cheapest assets to grid first	🟩	🟩	🟩		🟩		
	Utility business models/regulators	🟩	🟩	🟩		🟩		
	Procurement & installation of renewables	🟩	🟩	🟩		🟩		
	Connected & flexible grids (incl. microgrids)	🟩	🟩	🟩		🟩		
	Demand-side flexibility and management	🟩	🟩	🟩		🟩		
	Early retirement of fossil power assets	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Minimise upstream methane emissions	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Bioenergy production	🟩	🟩	🟩		🟩		
	CCS & CO2 transport & storage	🟩	🟩	🟩	🟩	🟩	🟩	🟩
Food & Land Use	Avoiding/ ending deforestation	🟩	🟩	🟩				
	Afforestation & reforestation	🟩	🟩	🟩				
	Improved agricultural practices	🟩	🟩	🟩				
	Forest management & agroforestry	🟩	🟩	🟩				
	Peatland and coastal wetlands restoration & reduced conversion	🟩	🟩	🟩				
	Reduce food loss and waste	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Shift to alternative & plant-based proteins	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Reduce emissions from waste disposal (landfill, wastewater)	🟩	🟩	🟩				
	Enhanced soil sequestration in agriculture, biochar	🟩	🟩	🟩				
Industry	**Energy efficiency in industry**	🟩	🟩	🟩		🟩		
	Use of low-temperature heat	🟩	🟩	🟩		🟩		
	Materials efficiency / circularity	🟩	🟩	🟩		🟩		
	Clean hydrogen	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Carbon capture, utilisation & storage	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Technical CDR	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Co-locating industry with cheap renewables	🟩	🟩	🟩		🟩		
Transport	Hybrid & Electric vehicles - Light weight	🟩	🟩	🟩		🟩		
	Hybrid & Electric vehicles- Heavy weight	🟩	🟩	🟩		🟩		
	Clean Fuels	🟩	🟩	🟩		🟩		
	Clean, connected, shared mobility (TNCs, final mile etc.)	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Aviation demand mitigation	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Reduced demand	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	EV infra & batteries	🟩	🟩	🟩		🟩		
	Public transit	🟩	🟩	🟩		🟩		
Buildings	Low emissions building materials and design - new	🟩	🟩	🟩		🟩	🟩	
	Heating & cooling	🟩	🟩	🟩		🟩		
	Energy efficiency in buildings - retrofit	🟩	🟩	🟩		🟩		
	Clean cooking	🟩	🟩	🟩		🟩		
	Efficient & clean space/water heating	🟩	🟩	🟩		🟩		
	Efficient & clean cooling	🟩	🟩	🟩		🟩		

STEP 2: HIGH LEVEL ESTIMATE OF THE COST EFFECTIVENESS OF EACH LEVER

System	Lever of Change
Energy & Power	Clean electricity systems
	Clean electricity transmission & distribution
	Energy storage & other flexibility
	Grid interconnections to transfer renewables
	Efficient economic (and low carbon) dispatch - cheapest assets to grid first
	Utility business models/regulators
	Procurement & installation of renewables
	Connected & flexible grids (incl. microgrids)
	Demand-side flexibility and management
	Early retirement of fossil power assets
	Minimise upstream methane emissions
	Bioenergy production
	CCS & CO2 transport & storage
Food & Land Use	Avoiding/ ending deforestation
	Afforestation & reforestation
	Improved agricultural practices
	Forest management & agroforestry
	Peatland and coastal wetlands restoration & reduced conversion
	Reduce food loss and waste
	Shift to alternative & plant-based proteins
	Reduce emissions waste disposal (landfill, wastewater)
	Enhanced soil sequestration in agriculture, biochar
Industry	Energy efficiency in industry
	Use of low-temperature heat
	Materials efficiency / circularity
	Clean hydrogen
	Carbon capture, utilisation & storage
	Technical CDR
	Co-locating industry with cheap renewables
Transport	Hybrid & Electric vehicles - Light weight
	Hybrid & Electric vehicles- Heavy weight
	Clean Fuels
	Clean, connected, shared mobility (TNCs, final mile etc.)
	Aviation demand mitigation
	Reduced demand
	EV infra & batteries
	Public transit
Buildings	Low emissions building materials and design - new
	Heating & cooling
	Energy efficiency in buildings - retrofit
	Clean cooking
	Efficient & clean space/water heating
	Efficient & clean cooling



STEP 2: 12 LEVERS ARE PRIORITISED FOR FURTHER DEEPDIVES, BASED ON TECHNOLOGICAL READINESS, ADDITIONALITY AND COST EFFECTIVENESS

Energy & Power	1. Clean electricity systems
	2. Early retirement of fossil power assets
	3. Minimise upstream methane emissions
Food & Land use	4. Avoiding/ ending deforestation
	5. Afforestation & reforestation
	6. Peatland restoration & reduced conversion
	7. Shift to alternative & plant-based proteins
	8. Reduce methane emissions from agriculture & waste
	9. Reduce food loss & waste
Transport	10. Electric vehicles –Light weight
Buildings	11. Decarbonised new buildings for developing countries
	12. Retrofit existing building stock in developed countries

Consumption / supply-side levers

STEP 3: FULL LIST OF PRIORITISED OPPORTUNITY AREAS WITHIN THE 12 LEVERS

1. Clean electricity systems **Energy & Power**

- 1.1 Cover costs for renewable energy generation
- 1.2 Create enabling policies to drive renewables in emerging markets

2. Early retirement of fossil power assets

- 2.1 Support a just transition retiring fossil power assets
- 2.2 Provide targeted financial support to retire fossil power assets
- 2.3 Build in-country capacity for the transition to a 1.5C pathway

3. Minimise upstream methane emissions

- 3.1 Create a market for minimising upstream methane emissions
- 3.2 Leverage technologies that minimise upstream methane emissions

4. Avoiding/ ending deforestation **Food & Land use**

- 4.1 Create the capacity for high-integrity carbon projects at government level (i.e., REDD+)
- 4.2 Incubate projects to supply high-integrate carbon credits at project level (i.e., REDD+)
- 4.3 Build the market for protecting the tropical forests (incl. peatlands)

5. Afforestation & reforestation

- 5.1 Fund the planting of trees
- 5.2 Enable adoption of agroforestry practices & land restoration

6. Peatland restoration & reduced conversion

- 6.1 Create the capacity for high-integrity carbon projects at government level (i.e., REDD+)
- 6.2 Incubate projects to supply high-integrate carbon credits at project level (i.e., REDD+)
- 6.3 Enhance mapping and monitoring of tropical peatlands

7. Shift to alternative & plant-based proteins

- 7.1 Fund research for policy makers on alternative plant-based diets
- 7.2 Create behaviour change campaigns promoting diet shifts

7. Shift to alternative & plant-based proteins (continued…)

- 7.3 Create the market for alternative proteins

8. Reduce methane emissions from agriculture & waste

- 8.1 Create the market & enabling environment for reducing methane emissions
- 8.2 Leverage agricultural practices to reduce methane emissions from enteric fermentation
- 8.3 Enable adoption of cost-effective measures to reduce methane emissions from rice cultivation
- 8.4 Improve collection & treatment of waste

9. Reduce food loss & waste

- 9.1 Invigorate efforts to strengthen value chains which can reduce losses
- 9.2 Support the development of national strategies and public-private partnerships to reduce FLW
- 9.3 Shift cultural norms and behaviour by raising awareness on food loss & waste

10. Electric vehicles –Light weight **Transport**

- 10.1 Enable adoption of electric vehicles by supporting charging infrastructure
- 10.2 Reduce emissions from urban freight by optimizing vehicle usage and electrifying
- 10.3 Support the market for electric 2 & 3 wheelers through operations and financing innovation

11. Decarbonised new buildings for developing countries **Buildings**

- 11.1 Aggregated procurement of efficient space cooling equipment
- 11.2 Net zero buildings demonstration projects with major developers
- 11.3 Stimulate investment in low-embodies carbon building materials
- 11.4 Build skill capacity of construction industry

12. Retrofit existing building stock in developed countries

- 12.1 Support retrofit programs and related policies
- 12.2 Fund deep energy retrofits with developers
- 12.3 Advance grid-interactive technology
- 12.4 Promote efficient technology installations

☐ Consumption / supply-side levers

IKEA Foundation

RMI

SYSTEMIQ

AGENDA

- Introducing 5 systems and levers of change
- **Prioritised levers: energy & power**
- Prioritised levers: food and land-use
- Prioritised levers: transport
- Prioritised levers: building
- Appendix

ENERGY & POWER - PRIORITISED LEVERS AND OPPORTUNITY AREAS SHARED IN THIS CHAPTER

1. Clean electricity systems
- 1.1 Cover costs for renewable energy generation
- 1.2 Create enabling policies to drive renewables in emerging markets

2. Early retirement of fossil power assets
- 2.1 Support a just transition retiring fossil power assets
- 2.2 Provide targeted financial support to retire fossil power assets
- 2.3 Build in-country capacity for the transition to a 1.5C pathway

3. Minimise upstream methane emissions
- 3.1 Create a market for minimising upstream methane emissions
- 3.2 Leverage technologies that minimise upstream methane emissions

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* Using the 20year Global Warming Potential

** Hydrofluorocarbon (HFCs) contribute another 1 Gt to buildings – HFCs are man-made organic compounds and used a lot in air conditioning

Sources: IEA (2021) Net Zero by 2050 - A Roadmap for the Global Energy Sector; Roe et al. (2019) Contribution of the land sector to a 1.5C world; ETC (2021) Keeping the battle for 1.5C alive: feasible actions in the 2020s; NOAA CSL (2018) Ozone Assessment

1. CLEAN ELECTRICITY SYSTEMS

7.8GT CO2e	Mitigation potential by 2030
€26/tC02e	Cost/effectiveness

Energy & Power

Clean electricity systems

Definition *what are clean electricity systems?*

Clean electricity systems are those within which electricity is generated via renewable/zero-emission means, and in which energy is saved via energy efficiency measures. This type of system is a stark departure from many existing electricity systems – **particularly in developing countries** – which are either entirely or predominantly reliant on the burning of fossil fuels (such as coal) for the generation of their electricity.

Problem statement *why should we create clean electricity systems?*

12.3GT CO2e

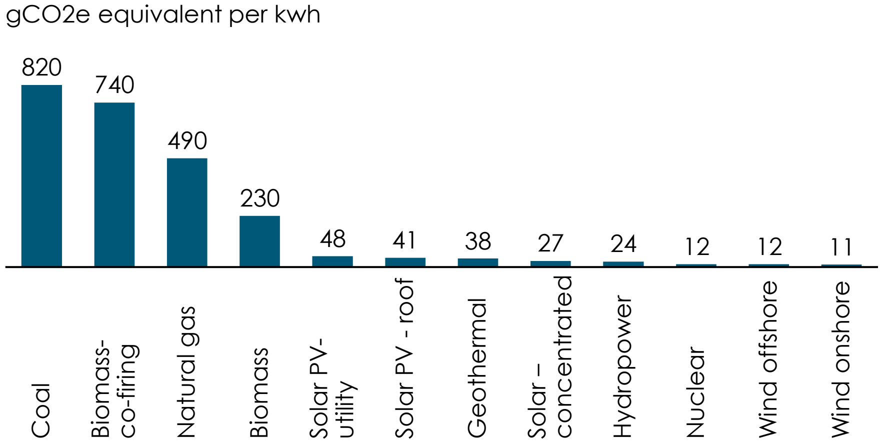
CO2e emissions from electricity generation worldwide totalled 12.3 GT in 2020, of which 9.1 GT was from coal-fired generation, 2.7 GT from gas-fired plants, and 0.6 GT from oil-fired plants.

Net zero by 2040

Low costs, widespread policy support, and maturity of an array of renewable energy technologies (i.e., solar & wind) can see global electricity systems reach net zero by 2040.

Drivers *what causes electricity systems to be non-clean?*

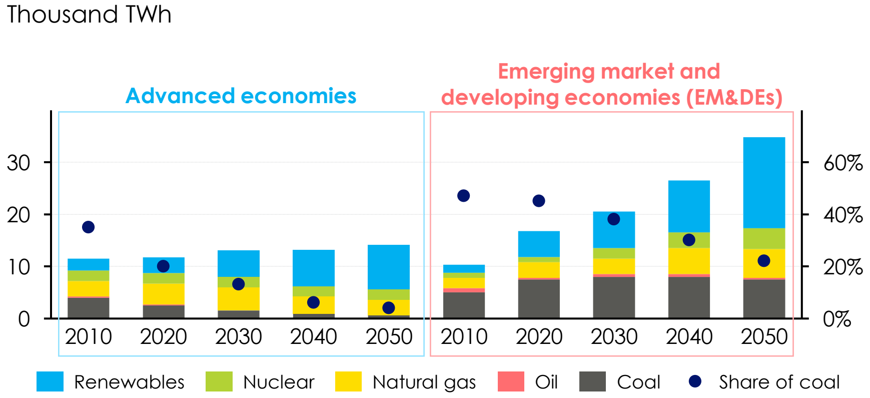
Average life-cycle CO2e emissions of electricity Sources



Electricity system emissions are mainly produced via the use of coal, biomass, and gas. The replacement of these energy sources with renewable alternatives is the key to creating clean electricity systems and driving down emissions.

Geography *where is most change needed?*

Past & projected electricity generation by fuel and share of coal



Electricity generation by fuel and share of coal in the IEA Stated Policies Scenario (STEPS - illustrates the consequences of existing and stated policies for the energy sector)

EM&DEs are currently the furthest from having clean electricity systems

IKEA Foundation

Sources: IEA (2021) Net Zero by 2050: A Roadmap for the Global Energy Sector; World Nuclear Association (2021) Carbon Dioxide Emissions From Electricity

RMI ENERGY. TRANSFORMED.

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1.1 COVER COSTS OF RENEWABLE ENERGY ENABLING ENVIRONMENT AND PROJECT DEVELOPMENT

Energy & Power

Clean electricity systems

Providing direct financing to cover the costs associated with early-stage renewable energy adoption can make RE lower-cost and more feasible in regions where these are barriers to adoption

There are numerous costs associated with creating clean energy systems. A significant portion of these costs are incurred prior to the creation of renewable energy generation sites/assets. These upfront costs are therefore a **barrier to widespread renewable energy adoption** in regions viewed as too risky by investors. As a result, philanthropy could have a direct impact on GHG reductions by providing finance to cover such costs, thereby getting increasing numbers of renewable energy projects off the ground (i.e., via **TA grants** to cover DD/legal costs/feasibility studies or via funds to be deployed as risk capital to draw in private finance where otherwise deemed too risky). **Additionality to SPX is key**, and therefore a focus on Southeast Asia, collaborating with a platform like SDG 1 Indonesia (with SMi) could be considered.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ TA facilities, fund feasibility studies, and risk capital will all help projects get off the ground faster
●———————◆—● Indirect Direct	Direct vs indirect impact	▪ Philanthropic money could have a significant impact on GHGs as an enabler if deployed here; facilitating a shift to RE by governments and helping to bridge the early-stage funding gap and subsequently drawing in more private finance
4 – 6 MtCO2e	Estimated impact when investing €100m	▪ Lower = SNV deployed €16m for 570 Kt GHGs = 3.5 Mt per €100m. Higher = SPX aiming for 1bn tCO2 with $21bn (€17.8bn) of grants & public/private money = 5.6 Mt per €100m
○ ● ○	Catalytic/tipping point impact	▪ Feasibility studies could prove the benefits of RE in certain regions, leading to a tipping point in terms of political will and start crowding in private finance, while de-risking capital could be hugely catalytic in getting RE projects off the ground
○ ● ○	Direct co-benefits	▪ Covering early-stage costs will enable RE to get off the ground in certain regions, after which energy costs for local communities would begin to fall

Possible opportunities for action

- Provide TA grants to cover sourcing/DD/legal costs associated with the creation of renewable energy generation sites
- Provide TA facility for pre-feasibility study and project development for small-mid sized RE in e.g., Southeast Asia (like Bloomberg feasibility study in Indonesia); project demonstration can then influence policymakers
- Place finance or TA into a guarantee fund to de-risk mid-to-large scale wind and solar development
- Create a fund with existing donors to provide capital to mini-grid creation in places where business models are not yet competitive
- Provide grants to purchase and create zones for renewable energy development in e.g., Africa (i.e., South Africa's REDZ concept)

1.2 CREATE ENABLING POLICIES TO DRIVE RENEWABLES IN EM&DES

Energy & Power

Clean electricity systems

Philanthropy could support Emerging Market (EM) & Developing Economy (DE) governments and regulators (directly or via existing organisations) to create policies which pave the way for rollout of renewable energy

As outlined in the IEA's Stated Policies Scenario (STEPS – see graph on slide 16), EM&DEs are on course to continue growing their reliance on fossil fuels as a source of electricity, with negative implications for global GHG emissions. In many regions, this is largely down to a lack of **policies and regulations** which allow for rapid and low-cost deployment of renewable energy generation assets. BNEF have estimated that countries with suitable policy environments attract **c. 17x more investment** into renewables than those without. Offering support to these players via direct TA grants or funding for research could therefore act as a **catalyst to lower-carbon electricity systems** in EM&DEs, which is complimentary to SPX.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ It will take time for governments and regulators to fully develop and implement new policies, and a few more years after that until new renewable energy generation sites are successfully rolled out
◆ **Indirect** **Direct**	Direct vs indirect impact	▪ Transitioning EM&DEs' electricity systems to clean generation would bring significant GHG emissions reduction. However, this policy-focused intervention is geared more at enabling a transition than enacting it, so the impact remains more indirect than direct
4 – 6 MtCO2e	Estimated impact when investing €100m	▪ Lower = SNV deployed €16m for 570 Kt GHGs = 3.5 Mt per €100m. Higher = SPX aiming for 1bn tCO2 with $21bn (€17.8bn) of grants & public/private money = 5.6 Mt per €100m
○ ○ ●	Catalytic/tipping point impact	▪ The creation of policies which streamline the rollout of renewable energy in EM&DEs would be highly catalytic, and philanthropy could trigger tipping points in numerous regions
○ ● ○	Direct co-benefits	▪ Enabling policies for renewable energy would help to drive down costs of these technologies in a certain region, in the longer term leading to lower energy costs for local communities

Possible opportunities for action

- Provide TA grants to governments to design and implement policies which enable the rollout of renewable energy (i.e., RE auctions)
- Provide TA grants to system operators to upskill them on management of systems with a higher share of renewables (i.e., implementing advanced software platforms)
- Support existing organisations helping EM&DEs with their journey to net zero (i.e., via G20 engagement)
- Support existing initiatives focused on highlighting potential for EM&DEs to grow their share of renewable energy via research (i.e., leapfrog study; i.e., transmission studies to areas of potentially high VRE)

2. EARLY RETIREMENT OF FOSSIL POWER ASSETS

3.8GT CO2e	Mitigation potential by 2030
€22/tC02e	Cost effectiveness

Energy & Power

Early retirement of fossil power assets

Definition *what is early retirement of fossil power assets*

Fossil power assets are assets that burn coal, oil and/or natural gas to generate electricity. Currently coal-fired power stations generate a third of the world's electricity and are **the biggest anthropogenic source of GHG emissions**. Fossil power assets will soon become stranded assets* in the Global North as per the commitments of nations to adhere to the Paris Agreement. Consequently, coal could phase out in 2030 in OECD countries. However, in the Global South, mainly Asia, the huge demand for coal, the profit motive, and a lack of clear policies are the main reasons the sector continues to attract investment. On top of that, in the Global South there are young coal plants (~10 years) that will operate for another ~30 years if they are not retired. Early retirement of fossil power assets entails **accelerating winding down those young plants**.

Problem statement *why should we retire fossil power assets?*

13GT CO2e

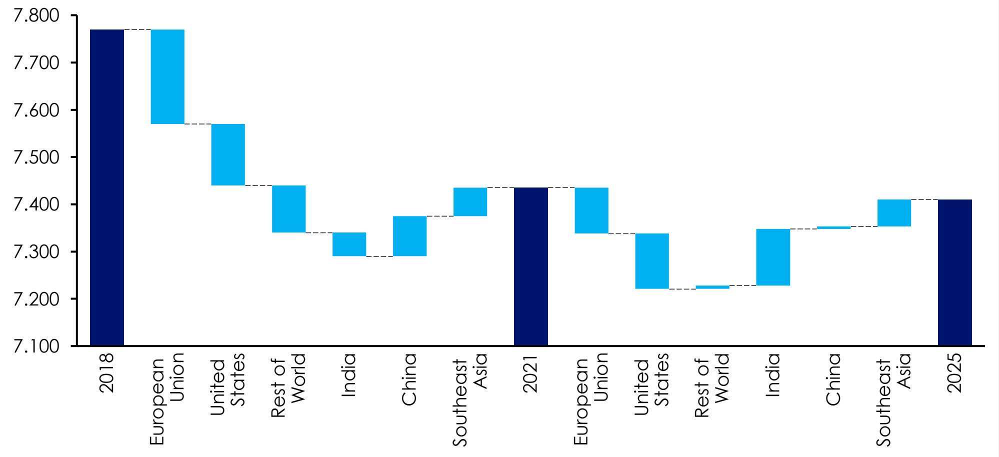
The current Energy & Power system contributes significantly to climate change with >10GT of CO2e emissions each year (13GT in 2019).

>35%

The global power mix is slowly shifting towards renewables. However, at present, one-third of the global power mix still comes from coal plants.

Drivers *what causes the existence of fossil power assets?*

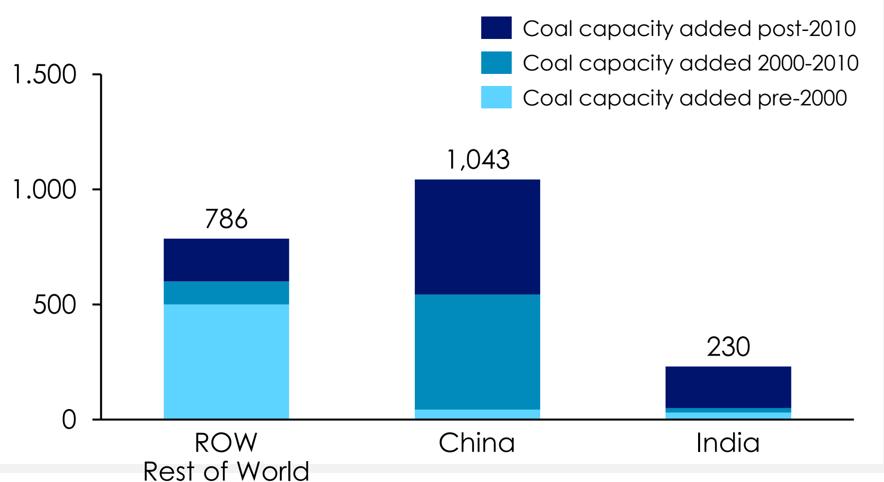
Changes in global coal consumption by region, 2018-2025, Mt



While the EU and the United States are set to reduce global coal consumption , India, China & South Asia will increase their consumption

Geography *where are the new & young fossil fuel assets?*

2030 coal fleet by age, China and India, GW



Five Asian countries* account for 80% of new coal power investment

*China, India, Indonesia, Japan and Vietnam plan to build more than 600 coal power units

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*The IEA defines stranded assets as assets that cease to earn an economic return much before the end of their economic life.

Source: IEA (2021) Data & Statistics: Year-on-year quarterly change of coal consumption by region, 2020; BloombergNEF (2020) New Energy Outlook, Global Energy Monitor Coal Plant database,

2.1 SUPPORT A JUST TRANSITION RETIRING FOSSIL POWER ASSETS

Energy & Power

Early retirement of fossil power assets

To avoid unemployment and other negative impacts on countries' economies it is essential to support the *just* transition away from fossil fuel power

The principle of **a just transition** entails that a net zero economy should co-exist with a healthy economy. The process of achieving the clean environment should be fair one that does not cost communities their health, jobs, or economic assets. A just transition in the context of retiring fossil power assets will include **retraining, job assistance, and the development of new industries in affected regions**. More concretely, training coal miners to transition to solar & wind, ideally with union protection. By doing so, the main political blocker in many countries to faster transition is mitigated. The support of a just transition would be most effective in countries where there is political willingness and traction in phasing out coal. This will go hand in hand with scaling clean energy systems. Inspiration could be taken from the EU 'Just Transition Mechanism' to help all EU regions reach climate neutrality.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ Retiring a coal plant will take more than 10 years, however there are already certain initiatives ongoing and therefore the impact could be more short term
◆ **Indirect** — **Direct**	Direct vs indirect impact	▪ The impact on reducing GHG emissions is indirect given it will enable the retirement of the fossil power assets, but not the retirement itself
c. 15 MtCO2e	Estimated impact when investing €100m	▪ Mean cost of decommissioning coal in South Africa is c. $8/tCO2e (€6.76) avoided = 14.8 Mt
🔴 ⚪ ⚪	Catalytic/tipping point impact	▪ Supporting the closure of a fossil fuel plant directly will not create a market directly. It *could* drive the uptake of renewables, but that is not for granted
⚪ ⚪ 🟢	Direct co-benefits	▪ A just transition is focused on co-benefits and aims to create jobs and increase human capital on green technologies

Possible opportunities for action

- Collaborate with existing organisations that have the capabilities to set up a program or fund to support the just transition, by providing grants to upskill and retrain workers in countries where there is political willingness & traction

- Support existing organisations that campaign and raise awareness on a just transition in phasing out fossil power assets

2.2 PROVIDE TARGETED FINANCE TO RETIRE FOSSIL POWER ASSETS

Engaging in coal retirement finance mechanisms can ensure the early retirement of fossil power assets in relevant countries

There are multiple different financial mechanisms and roles for philanthropies in physical decommissioning of fossil power assets, often referred to as coal retirement mechanisms. **Coal retirement mechanisms** are financial facilities that purchase coal-fired power plants in developing countries from existing owners and **retire plant in 10-15 years** (vs a typical 30-40 years of operations). Funds paid to current owners could be recycled into clean energy generation. Grant funding could be in the form of **de-risking capital** (i.e., guarantees), covering for certain **costs** (i.e., infrastructure costs or **compensations** towards to coal asset owners) or the support of setting up the actual fund. The latter could be effective linking into the on-going initiatives from financial institutions, e.g., Prudential.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ There are only early-stage initiatives on the way for setting up funds on retiring of coal assets. It is expected that it will take over 5 years till implementation
Indirect ——◆ Direct	Direct vs indirect impact	▪ Retiring a fossil power asset will have a direct impact on reducing GHG emissions
N/a.	Estimated impact when investing €100m	▪ –
⚪ ⚪ 🟢	Catalytic/tipping point impact	▪ This opportunity space could crowd-in private finance & have a catalytic impact. Targeted finance (i.e., providing the costs of setting up a fund), will break down barriers for financial institutions to engage
⚪ 🟡 ⚪	Direct co-benefits	▪ The co-benefits are mainly health related benefits by retiring fossil power assets, however there are also drawbacks i.e., increased unemployment of coal workers. A combination with supporting a just transition is preferred

Possible opportunities for action

- Engage with the existing coalitions or set up a new coalitions that create public-private partnerships or funds to buy out plants and wind them down within 15 years. Contribution could be either in the set up of the fund or in providing de-risking capital into the fund

- Provide grant funding to organisations or vehicles that provide de-risking capital in retiring coal plants (i.e., guarantees) or directly cover certain costs (i.e., infrastructure costs or compensations towards to coal assets owners)

2.3 BUILD IN-COUNTRY CAPACITY FOR THE TRANSITION TO A 1.5C PATHWAY

Accelerating the retirement of fossil power assets is part of a countries' transition to a 1.5C pathway; in-country capacity is needed to deliver on that transition

The energy transition refers to the global energy sector's shift from fossil-based energy production and consumption — including oil, natural gas, and coal — to renewable energy sources like wind & solar, as well as lithium-ion batteries. The transition will have consequences and side-effects across economies. The prerequisite for the energy transition to take place is 'absorptive capacity' of a certain country which involves **high levels of human capital** and is especially important for complex technologies. Capacity building for key countries in implementing their NDCs or alignment with the 1.5C trajectory by create country roadmaps is therefore crucial. For example, The Blended Finance Taskforce included in its new programme will (i) design pooled funding vehicles; (ii) build in-country capacity and investment roadmaps; and (iii) pilot/scale new financial products to help mobilise climate & transition finance for countries on a net zero journey working to get on a 1.5 degree pathway.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ Building capacity at government-level will require a significant amount of time and the impact will become clear only after human capital is build
◆ Indirect Direct	Direct vs indirect impact	▪ The impact will be at government-level and therefore not directly reducing GHG emissions
c. 15 MtCO2e	Estimated impact when investing €100m	▪ Mean cost of decommissioning coal in South Africa is c. $8/tCO2e (€6.76) avoided = 14.8 Mt
○ ○ ●	Catalytic/tipping point impact	▪ Building capacity at a country level could enable the country to implement policies & technologies that will drive markets for amongst others clean energy systems & energy efficiency
○ ○ ●	Direct co-benefits	▪ Direct co-benefits is the human capital & jobs created in-country, as well as health benefits

Possible opportunities for action

- Support existing organisations to develop country transition packages/blueprints which lay out the economic case & financing pathways for transition, strengthen institutional capacity and accelerate high-quality pipeline development

3. MINIMISE UPSTREAM METHANE EMISSIONS

4.2GT CO2e	Mitigation potential by 2030
€4/tC02e	Cost/effectiveness

Energy & Power

Minimise upstream methane emissions

Definition *what are upstream methane emissions?*

Methane is a potent greenhouse gas with roughly 28 times more climate heating potential than CO2e, on a 100-year timescale, and more than 80 times more powerful during the first 20 years after its release into the atmosphere.

Upstream methane refers to the methane emissions produced by the coal, oil & gas industries. These upstream emissions are released into the atmosphere during the extraction and transportation of these fossil fuel resources, either as a by-product of extraction, due to incomplete flaring (combustion), or via leakage from pipes.

Problem statement *why should we avoid upstream methane emissions?*

10.5GT CO2e

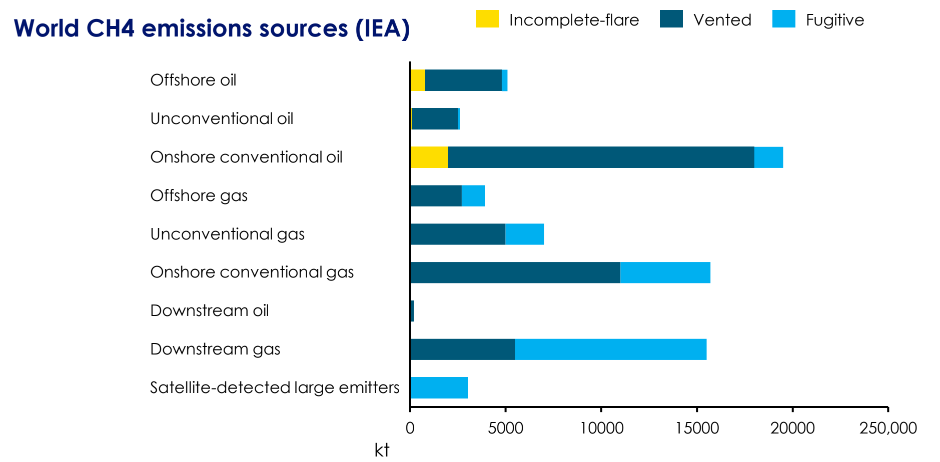
In 2020, the upstream methane emissions from the coal and oil & gas industries were around 125 MT which is 10.5GT CO2e taking 20-years timescale

13 countries

At the moment, only thirteen countries account of methane emissions in their National Determined Contribution (NDCs)

Drivers *what causes upstream methane emissions?*

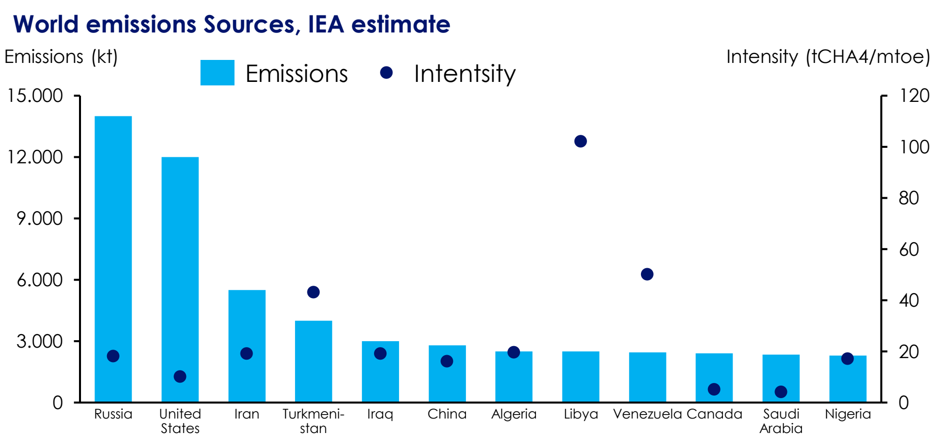
Split of 72 MT of global methane emissions from oil & gas



The largest annual contributor to upstream methane emissions is the venting (release) of CH4 by the onshore oil industry, which produces nearly 2MT of methane.

Geography *where are most upstream methane emissions produced?*

Methane emissions and intensity of production in selected oil and gas producers (2020)



Russia produced most upstream CH4, while Libya has the most CH4 intense processes

Sources: IEA (2021) Methane Tracker; IEA (2021) Total methane emissions and methane intensity of production in selected oil and gas producers in 2020

3.1 CREATE A MARKET FOR MINIMISING UPSTREAM METHANE EMISSIONS

It is imperative in the context of GHG reductions to create the international market conditions which facilitate the reduction of upstream methane emissions

Despite being such a potent GHG, methane continues to receive **insufficient attention from public and private sectors** globally, when compared to CO2e. For example, only 13 countries currently account for CH4 in their Nationally Determined Contributions (NDCs), and there is still little in the way of research or technological development targeting upstream methane emissions. Philanthropy could therefore be catalytic by creating the market for methane emissions reduction. This could entail a focus on **building governmental capacity, improving government access to data on methane**, conducting **research to inform policy**, or philanthropy could deploy grants to help **scale technologies** which target increased upstream methane emissions transparency.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ The bedding in of market conditions for upstream CH4 reduction will take time as governments and oil & gas companies shift their stances
◆ Indirect — Direct	Direct vs indirect impact	▪ This is an indirect, enabling approach, aimed at facilitating upstream methane emissions reductions in the medium term
N/a.	Estimated impact when investing €100m	
○ ○ 🟢	Catalytic/tipping point impact	▪ While governmental awareness/treatment of methane emissions is early on its S-curve, philanthropy could have a significant impact on that trajectory by creating more methane-focused market conditions
○ 🟡 ○	Direct co-benefits	▪ Co-benefits include increased efficiency of oil & gas pipelines

Possible opportunities for action

- Provide financing to help scale the technologies/ companies aimed at improving transparency of methane emissions

- Collaborate with importing nations to improve the quality of data they gather around methane
- Provide TA grants to build capacity to i.e., focus on tracking and reducing CH4 emissions, or create border adjustment mechanisms that factor in methane of imported fuel

- Fund a coalition aimed at: constructing a roadmap for reducing CH4; supporting creation of an enabling environment to implement the roadmap; scaling funding for this roadmap

3.2 LEVERAGE TECHNOLOGIES THAT MINIMISE UPSTREAM METHANE EMISSIONS

There are technologies already being deployed that could be leveraged to significantly reduce methane emissions in a cost-effective manner

Technology can be leveraged to dramatically cut methane emissions, often in a **cost-effective** way. For example, the IEA has estimated that **existing technologies** can cost-effectively reduce 70% out of the current annual 72 MT CH4 emissions from oil and gas. For upstream emissions in particular, this can be achieved via a mixture of replacing existing devices, installing new devices, and via leak detection & repair (LDAR). Philanthropy's role could be to **raise awareness** of the benefits of some of the simpler fixes, or to **cover some of the costs** of replacing devices early or with electric alternatives.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ Many of the technologies required to reduce upstream CH4 already exist and could be deployed immediately with instant effect
○———◆—○ **Indirect** **Direct**	Direct vs indirect impact	▪ Supporting the deployment of technologies at oil & gas sites would have a direct effect on GHG emissions
N/a.	Estimated impact when investing €100m	
○ 🟡 ○	Catalytic/tipping point impact	▪ Shifting oil & gas company/government behaviors would be catalytic in terms of methane emissions reductions, but covering costs to leverage technologies would not shift the market in general
🔴 ○ ○	Direct co-benefits	▪ Some indirect benefits i.e., improved air quality, increased efficiency of oil & gas pipelines; some significant risks though i.e., other interests in oil-producing regions, subsidies can accidentally extend life of fossil assets

Possible opportunities for action

- Partner with governments to create subsidies or provide de-risking capital to oil & gas companies to incentivise the uptake of tech that measures and/or limits methane emissions
- Form a platform focused on methane and share research highlighting the available technologies which can reduce CH4 emissions

AGENDA

- Introducing 5 systems and levers of change
- Prioritised levers energy & power
- **Prioritised levers food and land-use**
- Prioritised levers transport
- Prioritised levers building
- Appendix

FOOD & LAND USE - PRIORITISED LEVERS AND OPPORTUNITY AREAS SHARED IN THIS CHAPTER

4. Avoiding/ ending deforestation

- 4.1 Create the capacity for high-integrity carbon projects at government level (i.e., REDD+)
- 4.2 Incubate projects to supply high-integrate carbon credits at project level (i.e., REDD+)
- 4.3 Build the market for protecting the tropical forests (incl. peatlands)

5. Afforestation & reforestation

- 5.1 Fund the planting of trees
- 5.2 Enable adoption of agroforestry practices & land restoration

6. Peatland restoration & reduced conversion

- 6.1 Create the capacity for high-integrity carbon projects at government level (i.e., REDD+)
- 6.2 Incubate projects to supply high-integrate carbon credits at project level (i.e., REDD+)
- 6.3 Enhance mapping and monitoring of tropical peatlands

7. Shift to alternative & plant-based proteins

- 7.1 Fund research for policy makers on alternative plant-based diets
- 7.2 Create behaviour change campaigns promoting diet shifts
- 7.3 Create the market for alternative proteins

8. Reduce methane emissions from agriculture & waste

- 8.1 Create the market & enabling environment for reducing methane emissions
- 8.2 Leverage agricultural practices to reduce methane emissions from enteric fermentation
- 8.3 Enable adoption of cost-effective measures to reduce methane emissions from rice cultivation
- 8.4 Improve collection & treatment of waste

9. Reduce food loss & waste

- 9.1 Invigorate efforts to strengthen value chains which can reduce losses
- 9.2 Support the development of national strategies and public-private partnerships to reduce FLW
- 9.3 Shift cultural norms and behaviour by raising awareness on food loss & waste

4. AVOIDING / ENDING DEFORESTATION

4.0GT CO2e	Mitigation potential by 2030
€11/tC02e	Cost effectiveness

Food & Land use

Avoiding / ending deforestation

Definition *what is deforestation*

Deforestation is permanent loss of forest mainly driven by commodity-driven tree cover loss and urbanization. Defined as loss of natural forest as a result of i) conversion to agriculture or other non-forest land use; ii) conversion to a tree plantation; or iii) severe and sustained degradation.

Primary tropical forest is old-growth forests that are typically high in carbon stock and rich in biodiversity and have not been cleared and regrown in recent history. Primary forests can be found across the globe, but it is most at risk in **tropical belt countries** given large agricultural commodities are grown there.

Problem statement *why should we avoid & end deforestation?*

8-10%

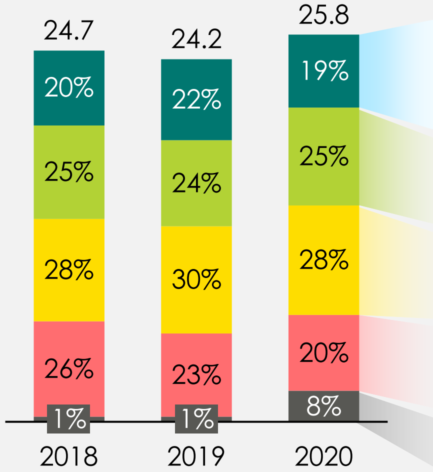
Annual anthropogenic emissions from tropical deforestation accounts for ~10% of global GHGs, making it a larger source of emissions than the European Union

900bn tCO2e

Almost 1 trillion tCO2e is contained by primary tropical forests and their soils, more than twice the world's carbon budget to restrict warming to less than 1.5C - making them some of the densest carbon stocks on the planet

Drivers *what causes deforestation?*

Global total tree cover loss* by dominant driver, million ha



Commodity-driven deforestation: Large-scale permanent deforestation linked primarily to commercial agricultural expansion, but also mining and energy infrastructure

Shifting agriculture: Temporary loss or permanent deforestation due to small- and medium-scale agriculture.

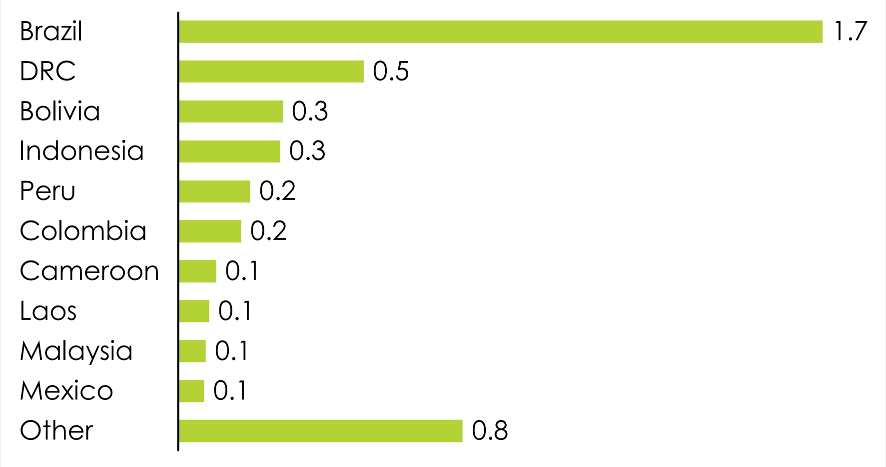
Forestry: Temporary loss from plantation and natural forest harvesting, with some deforestation of primary forests.

Wildfire: Temporary loss, does not include fire clearing for agriculture (except for potentially a small margin of error)

Other

Geography *where is most deforestation happening?*

Total primary rainforest tree cover loss 2020 by country, mln ha



~80% of primary forest loss comes from top-10 countries

* Includes both primary & secondary forests, as well as tropical and boreal forests

Source: Global Forest Watch (2020) Dashboard GLOBAL PRIMARY FOREST LOSS; Roe et al. (2019) Contribution of the land sector to a 1.5 °C world

4.1 CREATE THE CAPACITY FOR HIGH-INTEGRITY CARBON PROJECTS AT GOVERNMENT LEVEL (I.E., REDD+)

Food & Land use

Avoiding / ending deforestation

Government-level intervention to support countries to develop & certify high-integrity carbon projects and/or support readiness to develop carbon projects would be catalytic in the fight against climate change

Provide capacity to governments for undertaking actions that protect the tropical forests. This could include supporting a country to 1) **adopt highest standards for independent accreditation** and verification of forest emission reductions (for example, Architecture for REDD+ Transactions or "ART") 2) **find buyers for carbon credit** in collaboration with the LEAF coalition and; 3) support the government to then **develop & implement the carbon projects**. An effective example intervention would be collaborating with countries that are ready for ART certification and have high forest coverage and low deforestation rates at the moment, i.e., Gabon, Guyana, and Suriname.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ The carbon stock is already in tropical forests and becoming ART certified could take less than a year. Implementing projects could take 2-3 years
Indirect ◆ **Direct**	Direct vs indirect impact	▪ The impact of providing capacity building to the government is not completely direct, given it will first need to create the enabling environment in order to develop projects to avoid deforestation
9 -16 MtCO2e	Estimated impact when investing €100m	▪ UK government Mobilising Finance for Forests Program aiming for 28 Mt CO2 in 5yrs using £150m (€175m) of government money = 16 Mt per €100m. Lower bound assumes 50% achievable by 2030
○ ○ ●	Catalytic/tipping point impact	▪ Supporting a country becoming certified and prepare for implementing carbon projects could drive significant tipping points. This opportunity space will establish an enabling environment for private capital to be crowded-in
○ ○ ●	Direct co-benefits	▪ Co-benefits will be in the form of job creation as well as increased human capital. Indirectly, there will be improved biodiversity and health

Possible opportunities for action

- Set up a new coalition to support governments of relevant countries to protect their tropical forests
- Provide funding to existing organisations that support governments already or have the capacity to do so

4.2 INCUBATE PROJECTS TO SUPPLY HIGH-INTEGRATE CARBON CREDITS AT PROJECT LEVEL (I.E., REDD+)

Food & Land use

Avoiding / ending deforestation

Provide capacity-building & finance to project developers to build carbon projects that are protecting the tropical forests in key countries

The incubation of projects would include providing **capacity building** & finance to carbon developers, i.e., to establish baselines or design nesting arrangements. This could lead to the development of carbon credits, which can be linked to the **voluntary carbon market**. A set up that could be used as example is Partnerships for Forests, where the UK government granted SYSTEMIQ & Palladium to incubate projects that protect tropical forests and crowd-in private finance. REDD+ is a standard often used to guide activities in this sector, but there are others that could be used by philanthropy.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ The carbon stock is already in tropical forests and setting op a REDD+ project could take 2-3 years. Within 5-years the Partnerships for Forests programme achieved 2.2 million hectares under sustainable land management.
Indirect ——◆ **Direct**	Direct vs indirect impact	▪ The impact of developing carbon projects will directly avoid deforestation and therefore directly reduce GHG emissions.
9 -16 MtCO2e	Estimated impact when investing €100m	▪ UK government Mobilising Finance for Forests Program aiming for 28 Mt CO2 in 5yrs using £150m (€175m) of government money = 16 Mt per €100m. Lower bound assumes 50% achievable by 2030
⚪ 🟡 ⚪	Catalytic/tipping point impact	▪ There is significant momentum around carbon projects and voluntary carbon market, however the carbon projects might be fragmented.
⚪ ⚪ 🟢	Direct co-benefits	▪ The co-benefits of setting up carbon projects are plenty, i.e., biodiversity conservation, job creation, supporting indigenous communities.

Possible opportunities for action

- Directly fund existing organisations that provide readiness and preparatory support for carbon projects linked to VCMI to governments, i.e., REDD+ & VCMI

- Design a program for an existing NGO and/or professional service organisations to incubate carbon projects by providing capacity building to local carbon developers
- This could crowd-in commercial capital by de-risking investments & build pipeline (i.e., a blended finance vehicle)
- A model that could be replicated or contributed to is the partnerships between Apple, Conservation International & Goldman Sachs

Source: McKinsey (2021): A blueprint for scaling voluntary carbon markets to meet the climate challenge

Food & Land use

Avoiding / ending deforestation

4.3 BUILD THE MARKET FOR PROTECTING THE TROPICAL FORESTS (INCL. PEATLANDS)

Building the market mechanisms that are needed to value tropical forests, i.e., market for deforestation free supply chains and voluntary carbon markets, will dramatically reduce GHGs

In order to meet global goals, finance for tropical forests needs to scale >20x from current levels of $3bn/year to $65bn/year to 2030. **Filling this gap requires building new market mechanisms that don't exist today.** These include: 1) building the **market for deforestation-free commodities**, which includes transparency in the supply chains, green financial products to incentivize producers and traders to shift to a deforestation-free value chain, and raising consumer awareness; and 2) building the **voluntary carbon market**, which on the supply side includes the establishment of a market infrastructure, rules and transparency, and on the demand side create norms and incentives for buyers to purchase high-integrity credits. The annual global demand for carbon credits could reach up to 1.5 to 2.0GT of carbon dioxide (GtCO2e) by 2030, increasing by a factor of 15 from by 2030. To finance the many organisations active in this space with limited absorption capacity, philanthropy could consider setting up a TA facility for building the market with a regranting mechanism.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	- Creating the market for deforestation-free supply chains and the voluntary carbon market
◆ **Indirect** **Direct**	Direct vs indirect impact	- GHG emissions reduction from building the market for protecting the tropical forests could be significant, however this will be indirect.
9 -16 MtCO2e	Estimated impact when investing €100m	- UK government Mobilising Finance for Forests Program aiming for 28 Mt CO2 in 5yrs using £150m (€175m) of government money = 16 Mt per €100m. Lower bound assumes 50% achievable by 2030
⚪ ⚪ 🟢	Catalytic/tipping point impact	- There is momentum for both deforestation-free supply chain (i.e., Amsterdam Declaration) and voluntary carbon markets could increase by a factor of 15 by 2030. Building the market could significantly drive the tipping points.
🔴 ⚪ ⚪	Direct co-benefits	- Co-benefits for building the market would be indirect.

Possible opportunities for action

- Support existing initiatives that enable transparency in supply chains or from financial institutions and/ or raise consumer awareness
- Support the development of and/of create green financial products that incentivize deforestation-free supply chains
- Support existing initiatives that are working on the institutionalization of the voluntary carbon market
- Support existing initiatives that ensure companies are incentivized and recognized for adopting best practices and establish clear demand-side norms

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Source:: McKinsey (2021): A blueprint for scaling voluntary carbon markets to meet the climate challenge

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5. AFFORESTATION & REFORESTATION

3.0GT CO2e Mitigation potential by 2030

€46/tC02e Cost effectiveness

Food & Land use

Afforestation & reforestation

Definition *what is afforestation and reforestation*

Reforestation is the process of planting trees in a forest where the number of trees has been decreasing. **Afforestation** is when new trees are planted or seeds are sown in an area where there were no trees before, creating a new forest. Those activities are often referred to as A/R. Those practices include **agroforestry** which includes growing of both trees and agricultural crops on the same piece of land. In this context often is referred to **land restoration**, which incudes planting trees but goes beyond to restore degraded land.

Problem statement *why should we invest in reforestation?*

0.48 kgCO2e

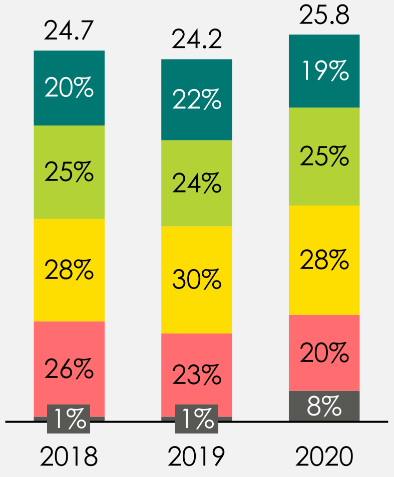
A mature tree can almost absorb half a kilogram of CO2e per year.

80%

Planting trees is not only important for absorbing CO2e – healthy forests have many co-benefits. E.g., 80% of the world's terrestrial plants and animals live in forests

Drivers *what causes afforestation & reforestation to be needed?*

Global total tree cover loss* by dominant driver, mln ha



Commodity-driven deforestation: Large-scale permanent deforestation linked primarily to commercial agricultural expansion, but also mining and energy infrastructure

Shifting agriculture: Temporary loss or permanent deforestation due to small- and medium-scale agriculture.

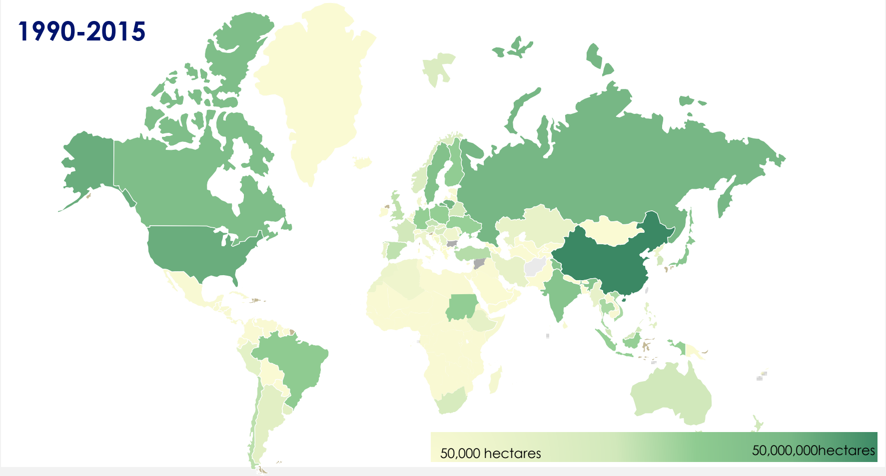
Forestry: Temporary loss from plantation and natural forest harvesting, with some deforestation of primary forests.

Wildfire: Temporary loss, does not include fire clearing for agriculture (except for potentially a small margin of error)

Other

Geography *where is most reforestation happening?*

Global planted forests from 1990-2015



Significant number of countries planted the trees over the past two decades

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* Includes both primary & secondary forests, as well as tropical and boreal forests

Source: Global Forest Watch (2020) Dashboard GLOBAL PRIMARY FOREST LOSS; Carbon Brief (2018) Mapped where afforestation is taking place around the world

5.1 FUND THE PLANTING OF TREES DIRECTLY

Food & Land use

Afforestation / Reforestation

There are several existing organisations philanthropy could support who directly plant trees in priority areas for afforestation and reforestation

Tree-planting is the process of planting tree seedlings, generally for forestry, land reclamation, or landscaping purposes. Planting trees is complex work, not only from a technical point of view – skills and resources are needed to create suitable places for small trees to germinate and grow – but also, and above all, from a strategic standpoint. Planting trees is not enough, they must be supported in their growth. This means thinking in the medium and long term, and for this you need to find the right tree for the right place and the right purpose. There are more and more organisations that have set up large tree-planting programmes to cater to these requirements and cool down the planet.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ It takes more than 5 years for a tree to start absorbing carbon and therefore the impact will be long-term
Indirect ◆ Direct	Direct vs indirect impact	▪ By planting trees GHG emission will be directly reduced given once a tree is mature
5-11 MtCO2e	Estimated impact when investing €100m	▪ WRI: 350m ha captures 1.7 Gt CO2e p/a = 4.86 t/ha p/a; 38.9 tCO2e/ha to 2030. Cost of restoration in Africa of $440/ha (€371) and $900/ha in LatAm (€760); Africa = €9.54/ tCO2e; LatAm = €19.5/tCO2e
🔴 ⚪ ⚪	Catalytic/tipping point impact	▪ Given there is no business model or market mechanism behind planting trees, this will not drive tipping points or attract private capital funding
⚪ ⚪ 🟢	Direct co-benefits	▪ Tree planting would directly create jobs and improve biodiversity

Possible opportunities for action

- Support organisations that are directly engaged in tree planting activities

5.2 ENABLE ADOPTION OF AGROFORESTRY PRACTICES & LAND RESTORATION

Food & Land use

Afforestation / Reforestation

Make the case for wide-spread adoption of agroforestry practices and land restoration, especially by smallholder farmers, which could have significant impact on climate change

Agroforestry is a collective name for land-use systems and technologies where trees are deliberately used on the same land-management units as agricultural crops. Agroforestry can also be defined as a dynamic, ecologically-based, natural resource management system that, through the integration of trees on farms and in the agricultural landscape, **diversifies and sustains production for increased social, economic and environmental benefits** for land users at all levels. In particular, agroforestry is crucial to smallholder farmers and other rural populations because it can enhance their food supply, income, and health. **Land restoration** or rehabilitation is the process of ecological restoration of a site to a natural landscape and habitat.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ There are already organisations that work in this space and philanthropy could engage with existing funds to provide technical assistance which will have a short-term impact.
Indirect ◆ Direct	Direct vs indirect impact	▪ Both agroforestry & land restoration practices will have direct impact on GHG emission reduction given it involves the planting of trees
5-11 MtCO2e	Estimated impact when investing €100m	▪ WRI: 350m ha captures 1.7 Gt CO2e p/a = 4.86 t/ha p/a; 38.9 tCO2e/ha to 2030. Cost of restoration in Africa of $440/ha (€371) and $900/ha in LatAm (€760); Africa = €9.54/ tCO2e; LatAm = €19.5/tCO2e
○ ○ ●	Catalytic/tipping point impact	▪ Agroforestry practices are a business model that could ensure additional income and therefore could drive tipping points & have a catalytic impact. It could support i.e., subsistence farmers to become small business owners
○ ○ ●	Direct co-benefits	▪ The benefits would include increased income for the farmer as well as direct impact on biodiversity

Possible opportunities for action

- Fund organisations that conduct research on agroforestry practices & land restoration

- Fund existing organisations to fund and/or provide technical assistance to implement agroforestry systems and restore degraded land. I.e., the Rebuild Facility that provides returnable grants to farmers to implement agroforestry practices or a blended finance vehicle like the Land Degradation Neutrality Fund facility

6. PEATLAND RESTORATION & REDUCED CONVERSION

2.0GT CO2e	Mitigation potential by 2030
€44/tC02e	Cost/effectiveness

Food & land use

Peatland restoration / reduced conversion

Definition *what are peatlands?*

Peatlands are a type of wetland, comprised of peat soil and the wetland habitat growing on its surface. The vast amount of plant tissues that combine over time to form peat soil act as an incredibly effective carbon store. Peatlands currently cover 3% of the global land surface but are increasingly being drained and converted into profitable croplands, with a significant negative effect on global GHG emissions.

Problem statement *why should we restore and protect peatlands?*

6% of global CO2e

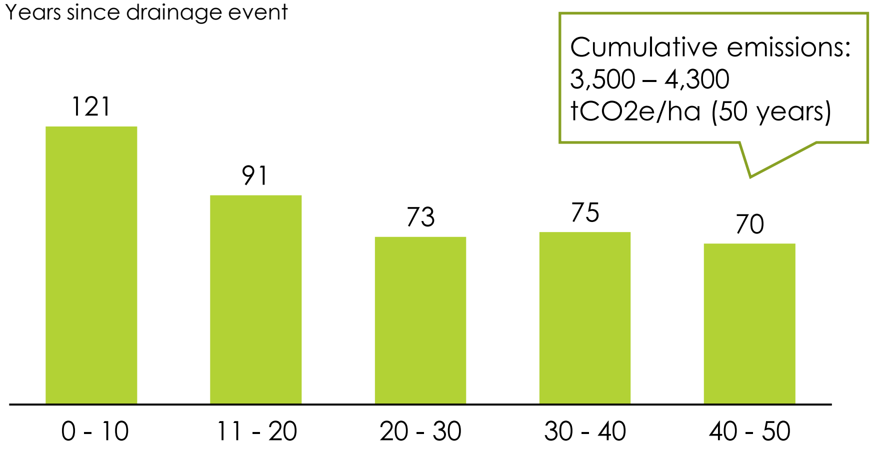
Damaged/converted peatlands are a huge source of emissions, currently responsible for almost 6% of global annual anthropogenic CO2e emissions.

0.37 Gt CO2e pa

Peatlands are the largest natural terrestrial carbon sink in the world, annually sequestering 0.37 GtCO2e (more than all other vegetation types in the world combined).

Drivers *what causes peatland degradation?*

Average annual CO2e emissions per hectare tCO2e/ha/yr

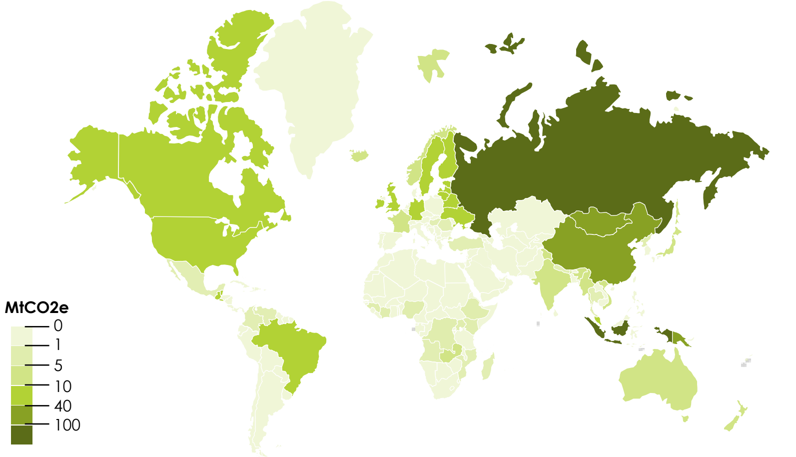


Cumulative emissions: 3,500 – 4,300 tCO2e/ha (50 years)

Peatlands are often drained to make space for profitable crops such as palm oil or pulp/paper. This act of drainage not only removes the potential of the land to act as a carbon sink, but it also makes the now-dry area **more susceptible to wildfires** (a significant Source of GHG emissions)

Geography *where is most peatland degradation happening?*

Emissions from peatland by country



Half the world's peatland emissions come from tropical peatlands in Southeast Asia

Sources: IUCN (2018) Issue Brief: Peat land & climate change; Page (2011) REVIEW OF PEAT SURFACE GREENHOUSE GAS EMISSIONS FROM OIL PALM PLANTATIONS IN SOUTHEAST ASIA; Wetlands International (2017) Briefing paper: accelerating action to Save Peat for Less Heat!

6.1 CREATE THE CAPACITY FOR HIGH-INTEGRITY CARBON PROJECTS AT GOVERNMENT LEVEL (I.E., REDD+)

Food & land use

Peatland restoration / reduced conversion

Support countries in generating wealth from peatlands which can create an environment where protection is more profitable than conversion, with significant implications for peat-related GHGs

The drainage of peatland for the pulp/paper and palm oil industries creates a host of environmental problems. Peat is a precursor to coal and is inherently flammable. When drained, peat dries and becomes more flammable. Once alight, peat fires can burn underground making them hard to extinguish. The smoke produced is high in sulphur and carbon dioxide. **Creating an economy for peatland restoration & reduced conversion involves: 1) the avoidance, reduction and sequestration of carbon emissions from peatland; and 2) the sustainable cultivation of peat-friendly crops.** Effectively, philanthropy would pay for climate change mitigation achieved through restoring and protecting peatland, stopping the cycle of degradation & fires and creating income via voluntary carbon credits.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ Especially in Indonesia, much progress already has been made on setting up the infrastructure to implement a green peatland economy, i,e., by UNEP
Indirect ◆ Direct	Direct vs indirect impact	▪ The impact will be slightly indirect given it will also include setting up the right strategy and policy frameworks for the government
10-13 MtCO2e	Estimated impact when investing €100m	▪ Riau and Kalimantan pilot projects (Indonesia) as illustrative examples: 42.6 Mt CO2e for $408m (€435m), and 27.8 Mt CO2e for $163m (€138m), respectively by 2030. Lower = 10.4 Mt. Higher = 12.5 Mt
○ ○ ●	Catalytic/tipping point impact	▪ Creating a business model for restoring and reducing conversion of peatland will drive tipping points and has the potential to significantly crowd-in private capital
○ ○ ●	Direct co-benefits	▪ Direct co-benefits will include job creation and increased human capital at government level

Possible opportunities for action

- Work with existing organisations and governments (mainly Indonesia) to implement a green peatland economy model, i.e., set up the right policy frameworks and collaborate with local project developers
- The UN recently announced the decade of eco-systems restoration in which this work could be linked in to

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6.2 INCUBATE PROJECTS TO SUPPLY HIGH-INTEGRITY CARBON CREDITS AT PROJECT LEVEL (I.E., REDD+)

Philanthropy could increase the supply of peat-generated carbon credits by setting up a peat carbon project incubator, thereby also increasing the amount of GHGs mitigated by peatlands

The incubation of peatland projects would entail providing technical assistance and finance to carbon project developers. Those projects could lead to the development of peatland carbon credits, which could be linked to the voluntary carbon markets. This work could be combined with intervention 4.2 on avoided deforestation and use a similar methodology such as REDD+. An incubator for such projects in which philanthropy would provide TA & grant financing, could crowd-in a significant amount of commercial capital. This would be especially timely and catalytic given the increased interest from private sector in nature based solutions and the fact this incubator could serve as a de-risking mechanism.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ Carbon is already stored in peatland, restoring & reducing conversion will have a short-term impact
Indirect ———◆ Direct	Direct vs indirect impact	▪ The impact of developing peatland restoration & reduced conversion projects will have a direct impact on reduced emissions
10-13 MtCO2e	Estimated impact when investing €100m	▪ Riau and Kalimantan pilot projects (Indonesia) as illustrative examples: 42.6 Mt CO2e for $408m (€435m), and 27.8 Mt CO2e for $163m (€138m), respectively by 2030. Lower = 10.4 Mt. Higher = 12.5 Mt
⚪ 🟠 ⚪	Catalytic/tipping point impact	▪ Incubating peatland projects will be at project level, projects might be fragmented and therefore will be slightly less catalytic than creating the enabling environment at government level
⚪ ⚪ 🟢	Direct co-benefits	▪ Direct co-benefits would include improved biodiversity, air quality and health

Possible opportunities for action

- Design a program for an existing NGO and/or professional service organisations to incubate carbon projects by providing capacity building & funding to local peat carbon developers
- This program could be used to crowd-in commercial capital by collaborating with financial institutions and/or setting up a blended finance vehicle

6.3 ENHANCE MAPPING AND MONITORING OF TROPICAL PEATLANDS

Food & land use

Peatland restoration / reduced conversion

Support the creation of tools which can be used to map peatlands and track their conversion could enhance transparency around peat projects, leading to a more robust market

There are a number of significant benefits to improving our ability to **map and monitor tropical peatlands**. Chief amongst these is that having a clearer picture of the scale of peatlands in a certain region allows countries to appreciate the potential impact of peatland degradation to their climate and biodiversity, and therefore encourages them to integrate nature and climate in decision making. In addition, the integration of peat carbon into voluntary carbon markets will be most effective if there is robust mapping and monitoring information backing up and quantifying claims of restoration and protection.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ The positive effects of robust mapping and monitoring on governments and carbon markets may take some time to translate into GHG reductions
◆ Indirect — Direct	Direct vs indirect impact	▪ Mapping and monitoring of peatlands will have an indirect impact on global GHG emissions, by increasing governmental focus and accountability, and providing integrity to peat carbon markets
N/a.	Estimated impact when investing €100m	▪ –
○ ● ○	Catalytic/tipping point impact	▪ Enhanced mapping could catalyse greater governmental accountability/ transparency around peatland protection, but integration of peat carbon into voluntary carbon markets relies heavily on factors outside of mapping
● ○ ○	Direct co-benefits	▪ Monitoring of peatlands could enhance governmental accountability around biodiversity conservation, and mapping could help quantify the benefits of protective projects, helping to secure livelihoods of local communities

Possible opportunities for action

- Support development of advanced peatland mapping and monitoring tools by granting to existing initiatives/ organisations to help them scale and strengthen their mapping capabilities

- Enable better transparency by creating an independent "source of truth" that monitors progress of moratorium commitments

7. SHIFT TO ALTERNATIVE & PLANT-BASED PROTEINS

2.2GT CO2e	Mitigation potential by 2030
€70/tC02e	Cost/effectiveness

Food & land use

Shift to alternative & plant-based proteins

Definition *what are alternative & plant-based proteins?*

In 2020 the world produced over 300 million metrics tonnes of meat for human consumption, and with it 14.5% of global anthropogenic GHG emissions. Realisation of the links between the meat industry and climate change – as well as various human diseases – has led to the recent growth in interest in **alternative and plant-based proteins**. These protein sources, which include pulses, nuts, insects, seaweed, fake meats, and numerous others, have not only proven to have dramatically smaller effects on the environment, but are also often easier to make in large quantities, cheaper to produce, and can be more nutritious.

Problem statement *why should we shift to alternative proteins?*

14.5% of GHGs

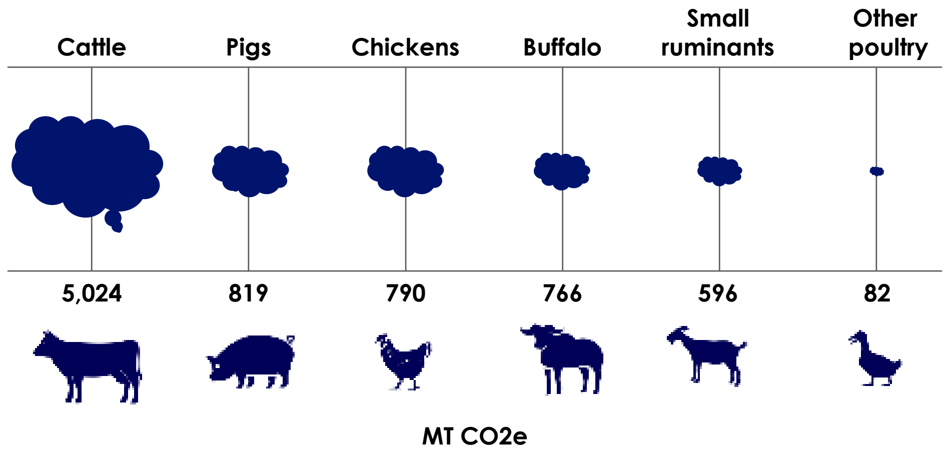
Livestock farming accounts for 14.5% of global GHG emissions annually on average, despite meat only delivering 37% of the global population's total protein.

1.8 tCO2e

Shrink That Footprint found that a meat lover has the highest carbon footprint at 3.3 tCO2e per year. A vegan diet produces only 1.5 tCO2e per year.

Drivers *what causes emissions from our current protein choices?*

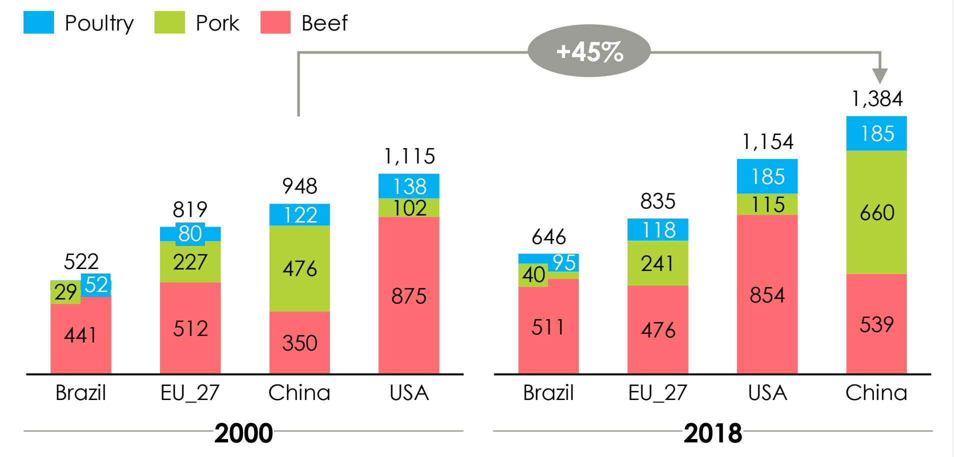
Global estimates of annual GHG emissions by livestock species



Cattle are the main contributor to the sector's emissions with about 5.0 GtCO2e, which represents about 62% of the sector's emissions

Geography *where are the largest shifts needed?*

Estimated emissions from consumption of different livestock by country, mtCO2e



China and Brazil lead the world in terms of growth of demand for meat products

Sources: McKinsey (2021) Agriculture and climate change: Reducing emissions through improved farming practices; FAO (2021): Greenhouse gas emissions: A global life cycle assessment; Food and Land Use Coalition (2021) Positive Tipping Points for Food and Land Use Systems Transformation; OECD (2021): Meat consumption

7.1 FUND RESEARCH AND ADVOCACY FOR POLICYMAKERS AROUND ALTERNATIVE DIETS

Targeted research which can be used by policymakers, and advocacy for plant-based proteins can shift diets away from meat and reduce GHGs

Given **demand for animal-based foods is expected to grow by 70% by 2050**, the importance of getting governments on-side with regard to a shift to alternative proteins should not be understated. By furnishing policymakers with compelling research which highlights the **planetary and human health benefits** of a dietary shift, philanthropy could have a significant indirect impact on GHG emissions, as those governments in question start to implement policies limiting meat production and/or consumption, and perhaps release their own campaigns to promote plant-based and alternative proteins. This impact could be even more acute if philanthropy focused its funding on research tackling the highest meat-eating nations such as **China and Brazil**.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ While the research itself could only take a few months/years, this could take longer to translate into active policies, and therefore tangible GHG reductions
◆────────── **Indirect** **Direct**	Direct vs indirect impact	▪ Funding research such as this would have a significant indirect impact on GHG emissions, provided it influenced policymakers to restrict meat production and/or consumption or strongly promote alternative proteins
N/a.	Estimated impact when investing €100m	▪ –
○ ● ○	Catalytic/tipping point impact	▪ This intervention could have catalytic impact by shifting the regulation/policy of a region away from meat, but multiple interventions are needed together to instigate a market tipping point in terms of diets
○ ○ ●	Direct co-benefits	▪ Co-benefits of such research include: healthier populations; large amounts of land being restored to nature, increasing biodiversity and carbon sinks; reduced chance of interspecies disease; reduced animal suffering

Possible opportunities for action

- Provide funding to existing research or advocacy organisations, and/or coalitions, with a focus on shifting food-related policy; Based on findings, produce policy recommendations and broader media and communications campaigns
- Country specificity would increase impact (i.e., The Good Food Institute's research into Brazilian vegetarianism)

7.2 CREATE BEHAVIOUR CHANGE CAMPAIGNS PROMOTING DIET SHIFTS

Food & land use

Shift to alternative & plant-based proteins

Fund the creation of a media campaign promoting plant-based and alternative proteins which are good for people and planet

Philanthropy could take more direct approach than funding research for policymakers, by funding the creation of a campaign targeting **behavioural shifts in consumers**. The recent documentary films such as 'Seaspiracy' and 'The Game Changers' have demonstrated the power of such media to at the very least **start widespread conversations** on the topic – the latter being more aligned with philanthropy's positive advocacy approach. Alternatively, philanthropy could fund a social media campaign to influence the younger generation, or a more traditional campaign (i.e., via adverts, posters, articles) which focuses on raising consumer awareness of the effects of their meat-heavy diet vs the benefits of eating plant-based.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ By targeting consumers directly, campaigns encouraging diet shifts could influence behaviours in the short term
◆ **Indirect** **Direct**	Direct vs indirect impact	▪ Despite the potentially rapid impact of behaviour change campaigns, they still rely on consumers for GHGs to be reduced, so this is an indirect intervention
12-15 mtCO2e	Estimated impact when investing €100m	▪ Required investment to shift to alternative proteins (10% share) by 2030 = $45-55bn (€38-47bn); livestock supply chains produce 7.1 GtCO2e p/a = 56.8 Gt to 2030, so 10% reduction in GHGs = 5.7 Gt; EUR 6.7-8.2/tCO2e
○ ● ○	Catalytic/tipping point impact	▪ This intervention could trigger a widespread shift towards alternative proteins, particularly amongst young people, but multiple interventions are needed together to instigate a market tipping point & crowd-in private capital
○ ○ ●	Direct co-benefits	▪ Co-benefits of such research include: healthier populations; large amounts of land being restored to nature, increasing biodiversity and carbon sinks; reduced chance of interspecies disease; reduced animal suffering

Possible opportunities for action

- Fund a documentary film to promote the planet & people benefits of plant-based diets (could use celebrity endorsement as in 'The Game Changers' documentary with Arnold Schwarzenegger); likely need a combination of a media platform and an NGO delivery partner like WWF that has experience

- Support social media influencers to promote positive plant-based diets to the next generation of consumers

- Support organisations like foodshift aiming to understand the regional/ cultural drivers behind meat-eating, and implement contextual/ tailored interventions

7.3 CREATE THE MARKET FOR ALTERNATIVE PROTEINS

Provide funding to accelerate R&D and the creation of an ecosystem for rapid development of priority meat-alternative proteins

One of the key barriers to widespread adoption of plant-based diets is the **perceived lack of availability** of delicious, low-cost, and nutritious alternatives to meat. To tackle this issue, philanthropy could deploy grants to fund the underpinning R&D capabilities and broader ecosystem required to enable the rapid development of priority meat-alternative proteins by the private sector. This grant funding would support the rapid deployment of innovation in plant-based proteins, and facilitate a **faster and wider route to market for plant-based meat alternatives**, thereby accelerating the speed at which these can replace meat in diets and reduce global GHGs.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ Funding R&D and the creation of plant-based protein ecosystems could allow rapid rollout of tasty, affordable meat alternatives, leading to quick GHG reductions
◆ **Indirect** **Direct**	Direct vs indirect impact	▪ This opportunity space is to create a market and could potentially drive update of alternative proteins, however this will be indirect
12-15 mtCO2e	Estimated impact when investing €100m	▪ Required investment to shift to alternative proteins (10% share) by 2030 = $45-55bn (€38-47bn); livestock supply chains produce 7.1 GtCO2e p/a = 56.8 Gt to 2030, so 10% reduction in GHGs = 5.7 Gt; EUR 6.7-8.2/tCO2e
○ ○ ●	Catalytic/tipping point impact	▪ This intervention could catalyse rapid growth on the supply side of alternative proteins
○ ○ ●	Direct co-benefits	▪ Co-benefits of such research include: healthier populations; large amounts of land being restored to nature, increasing biodiversity and carbon sinks; reduced chance of interspecies disease; reduced animal suffering

Possible opportunities for action

- Support existing organisations like to Global Food Institute focused on accelerating the scale-up of plant-based protein technologies (i.e., a Good Food Institute's Alternative Protein Development Centre or building and/or strengthening a local GFI or equivalent in high impact countries like China)

8. REDUCE METHANE EMISSIONS FROM AGRICULTURE & WASTE

5GT CO2e	Mitigation potential by 2030
€66/tC02e	Cost/effectiveness

Food & Land Use

Reduce methane from agriculture & waste

Definition *what is methane from agriculture & waste?*

Methane is a potent greenhouse gas—about 28 times more powerful than carbon dioxide at warming the Earth, on a 100-year timescale, and roughly 84 times more powerful over 20 years.

Agriculture accounts for an estimated 45% of total methane (CH4) emission. The main sources of methane emissions in agriculture are enteric fermentation (livestock) and rice cultivation.

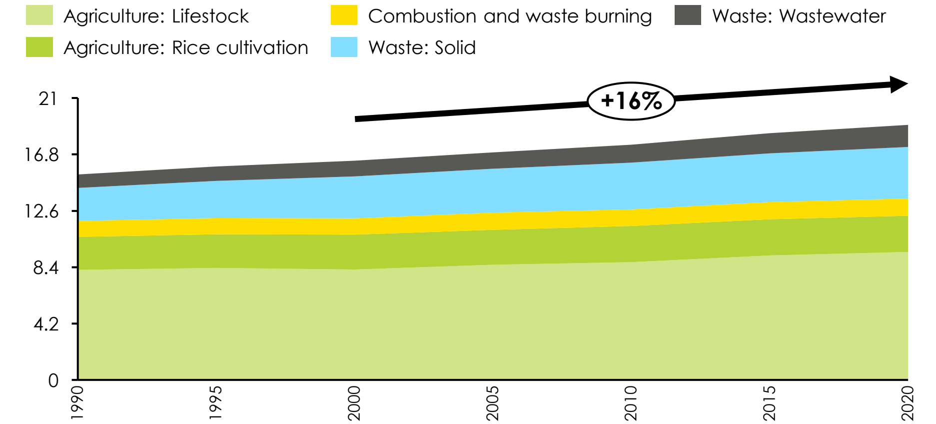
Waste emissions are from solid waste (landfills) and wastewater. Around the world, landfills are the third largest source of methane. Currently, 70% of waste is landfilled worldwide, often in an unregulated way.

Problem statement *why should we reduce methane emissions from agriculture & waste?*

8.3GT CO2e	The current annual emissions from enteric fermentation are almost 10GT (20-year GWP values- 84x carbon); almost as much as the entire global power system
43%	Almost half of all greenhouse gas emissions are coming from methane when taking the 20-year GWP values, while the focus of policy & research is almost exclusively on CO2

Drivers *what causes methane emissions?*

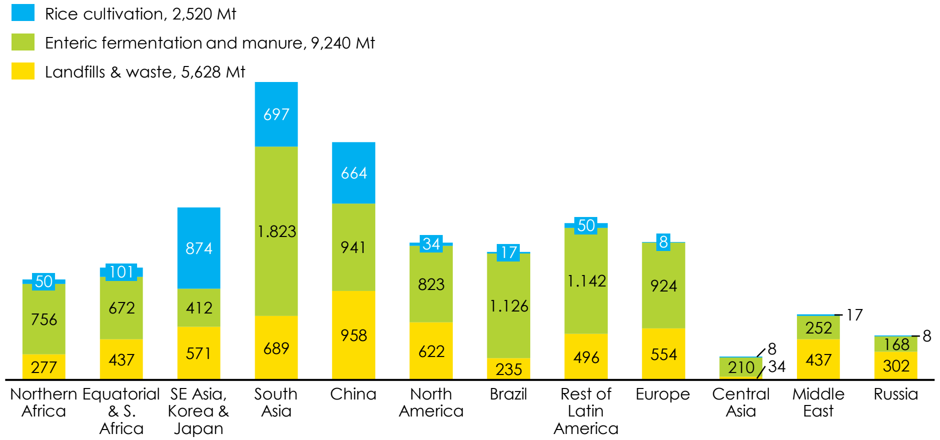
Global methane emissions (Gt CO2e)



16% growth in methane emissions from waste & agriculture in the last decade; agriculture largest contributor but waste shows biggest growth

Geography *where are methane emissions from agriculture & waste?*

Methane emissions (MT) p.a.



Methane emissions from agriculture & waste are mainly produced in Asia

Source: UN (2021) Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions

8.1 CREATE THE MARKET & ENABLING ENVIRONMENT FOR REDUCING METHANE EMISSIONS

Food & Land Use

Reduce methane from agriculture & waste

The market, or enabling environment, for reducing methane emissions is very limited – especially compared to carbon – and therefore the development of these is key to driving down CH4 emissions

For many years, methane has been overlooked in the climate conversation. But scientists and policymakers are increasingly recognizing that methane reductions are crucial. Only 13 countries account for methane emissions in their NDCs and methane is often not considered for carbon pricing. This is partly due to the fact that there are difficulties in counting methane emissions in agriculture, as well as the underestimation of the potency of methane emissions compared to carbon by using the 100 year time frame instead of 20 years. **Support is needed to create the market and enabling environment** for the world to recognise the importance of methane emissions. A concrete example could include a label for low-methane emission products, i.e. rice.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ Creating the market & enabling environment will have a long-term time horizon for the impact, especially given the market is very nascent
◆ Indirect — Direct	Direct vs indirect impact	▪ By creating the market & enabling environment the impact will be indirect
N/a.	Estimated impact when investing €100m	▪ –
○ ○ ●	Catalytic/tipping point impact	▪ Creating the market & enabling environment will drive tipping points given you it will allow for the creation of market mechanism & regulations
○ ● ○	Direct co-benefits	▪ Creating the market & enabling environment will have indirect co-benefits, i.e., improved air quality etc.

Possible opportunities for action

- Create a new coalition of existing organisations that could drive the creation of the market for methane emissions.
- Could take the form of a roundtable with all big food producers which encourages demanding low-methane products from farmers (suppliers)

- Support or set up initiatives that will improve transparency & awareness of methane emissions, i.e., labels to inform consumers, certification standards etc.
- Potentially launch a roundtable for low-methane products (similar to RSPO for palm oil)

8.2 LEVERAGE AGRICULTURAL PRACTICES TO REDUCE METHANE EMISSIONS FROM ENTERIC FERMENTATION (LIVESTOCK)

Food & Land Use

Reduce methane from agriculture & waste

There are existing agricultural practices and technologies that can significantly reduce GHG emissions from enteric fermentation which need to be leveraged

Ruminant animal protein (mostly beef and lamb) is the most greenhouse gas–intensive food to produce, largely because of **methane from enteric fermentation**. Enteric fermentation is fermentation that takes place in the digestive systems of animals. A set of proven GHG-efficient farming technologies and practices—which are already being deployed—could achieve significant emissions reductions. Those practices include, amongst others: GHG-focused breeding and genetic selection; feed-grain processing for improved digestibility; animal feed additives and animal feed mix optimization.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ Implementation of agricultural practices can rapidly reduce enteric fermentation (i.e., via changing feed additives), however this can also be a longer-term transition (i.e., via selective breeding)
Indirect ◆ **Direct**	Direct vs indirect impact	▪ The impact of implementing agricultural practices will directly reduce enteric fermentation and therefore methane emissions, however it will still depend on the farmer implementing the practices
N/a.	Estimated impact when investing €100m	▪ –
⚪ 🟠 ⚪	Catalytic/tipping point impact	▪ The agricultural practices for reducing methane emissions from enteric fermentation are already deployed and cost-effective. The funding from philanthropy in this space could drive market tipping points
⚪ ⚪ 🟢	Direct co-benefits	▪ Direct co-benefits include improved air-quality and potentially increased income for farmers given some of the practices are cost effective

Possible opportunities for action

- Support existing organisations or set up a new coalition that conduct research and create awareness on this topic

- Set up a program that (could) train (and finance) farmers on implementation of new agricultural practices & technologies (climate smart agriculture) to reduce methane emissions
- Might need to pivot towards commercial farms in USA/S. America to have impact (not easy for philanthropy to work with lots of smallholder farms in SEA)

8.3 ENABLE ADOPTION OF COST-EFFECTIVE MEASURES TO REDUCE METHANE EMISSIONS FROM RICE CULTIVATION

Food & Land Use

Reduce methane from agriculture & waste

Create the mechanisms through which low-methane, cost-effective rice cultivation practices can be proved and propagated as widely as possible

In 2020, global methane emissions from rice cultivation reached **32 MT**. McKinsey has estimated that a portion of these annual emissions can be mitigated in a cost-effective way, via: adoption of **dry direct seeding**; improved **water management** (in paddies); improved **straw management**; optimal **rice varietal selection**. Philanthropy could therefore have impact by helping to embed these operational changes as widely as possible across the rice cultivation sector. This could be done by funding direct training for rice farmers on these practices, or by supporting organisations which conduct research into/raise awareness of low-methane rice cultivation practices.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	- Most of these operational changes to rice cultivation could be embedded quickly, leading to immediate methane emissions reductions
Indirect ◆ Direct	Direct vs indirect impact	- Successful deployment of low-methane practices would directly reduce GHG emissions from agriculture. However, this intervention would still rely on rice farmers to implement the measures once philanthropy had helped re-train farmers
N/a.	Estimated impact when investing €100m	- –
○ ● ○	Catalytic/tipping point impact	- Low-methane practices relating to rice are largely cost-effective, so while there is no existing market for these, once proven to save farmers money these techniques would likely propagate widely
○ ○ ●	Direct co-benefits	- Direct co-benefits include improved air quality for regions affected, as well as potentially higher incomes for rice farmers if adoptions are cost-effective

Possible opportunities for action

- Create and/or fund a program alongside an existing organisation which helps to train rice farmers in low-methane farming practices (i.e., dry seeding; improved water management)
- Collaborate with large-scale food producers who buy/import rice, to nudge demand towards low-methane rice; perhaps via creation of a new initiative with existing business-focused organisations
- Partner with existing organisations conducting research into/raising awareness of optimal rice cultivation practices

8.4 IMPROVE COLLECTION & TREATMENT OF WASTE

Food & Land Use

Reduce methane from agriculture & waste

Increase the adoption of anaerobic digestors and gasification at waste sites would lead to a greater proportion of methane emissions being captured and turned into energy

Landfills and other solid and liquid wastes produce 5.6 Gt CO2e of methane emissions on average each year. Aside from reducing the amount of waste we produce – particularly the amount of organic matter that ends up in landfill, covered in section 9 – this methane can be reduced by improving the collection and treatment of waste. Three key ways to achieve this outcome are to: 1) **improve waste collection** and separation; 2) **recover and utilise the methane** gas from landfill sites; 3) implement **secondary and tertiary treatment of wastewater**. Philanthropy could therefore have a significant impact by convening key industry players and advocating for/supporting them in i.e. the rollout of anaerobic digestors and gasifiers at waste sites.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ National waste management systems will take time to pivot towards low-methane operations, especially if costly new equipment is required
Indirect —◆—— Direct	Direct vs indirect impact	▪ Opportunities for philanthropy to have impact here are largely indirect, focused on research and awareness
N/a.	Estimated impact when investing €100m	▪ –
○ ● ○	Catalytic/tipping point impact	▪ Philanthropic funding could help grow the market for methane capture and utilisation
○ ○ ●	Direct co-benefits	▪ Co-benefits could include increased access to energy if methane from landfill is captured, and improved sanitation in developing countries

Possible opportunities for action

- Support existing coalitions focused on increasing capacity for methane reductions (i.e., via gas recovery from landfill to be used as energy) and publishing roadmaps for improved landfill management

- Support organisations conducting research and/or advocacy for reduced food waste

9. REDUCE FOOD LOSS & WASTE

2.3 GT CO2e	Mitigation potential by 2030
€16/tC02e	Cost/effectiveness

Food & Land Use

Reduce food loss & waste

Definition *what is food loss & waste?*

Food Loss refers to food that gets spilled, spoilt or otherwise lost, or incurs reduction of quality and value through the food supply chain, before it reaches its final product stage. Food loss typically takes place at production, post-harvest, processing, and distribution stages in the food supply chain.

Food waste refers to food that reaches its final product form and is fit for consumption, but still doesn't get consumed because it is discarded, either before or after it spoils/expires. Food waste typically (but not exclusively) takes place at retail and consumption stages in the food supply chain.

Problem statement *why should we reduce food loss & waste?*

8% of GHGs

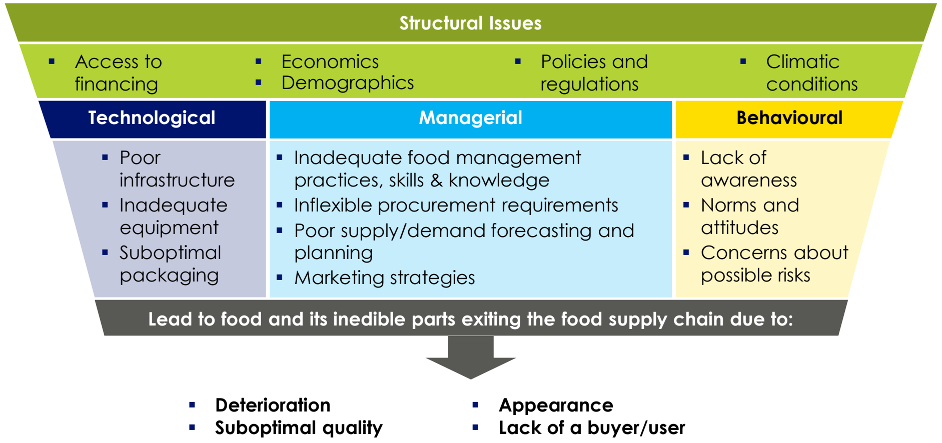
The food that is lost and wasted each year accounts for an estimated 8 percent of annual anthropogenic GHG emissions, consumes a quarter of all water used by agriculture, and requires an agricultural area the size of China.

One-third

Nearly one-third of all the food produced for human consumption in the world is never eaten. It's lost or wasted.

Drivers *what causes food loss & waste?*

Food is lost or wasted due to multiple underlying factors



Structural Issues

- Access to financing
- Economics
- Demographics
- Policies and regulations
- Climatic conditions

Technological

- Poor infrastructure
- Inadequate equipment
- Suboptimal packaging

Managerial

- Inadequate food management practices, skills & knowledge
- Inflexible procurement requirements
- Poor supply/demand forecasting and planning
- Marketing strategies

Behavioural

- Lack of awareness
- Norms and attitudes
- Concerns about possible risks

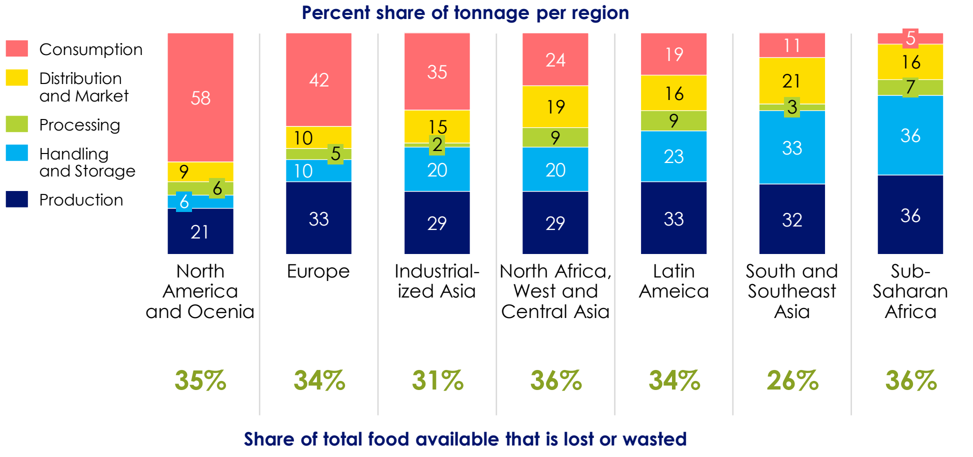
Lead to food and its inedible parts exiting the food supply chain due to:

- **Deterioration**
- **Suboptimal quality**
- **Appearance**
- **Lack of a buyer/user**

Reducing food loss & waste is complex, given the many players involved

Geography *where is most food loss & waste?*

Distribution of food loss & waste by region and stage in the food supply chain, 2007



The distribution of food loss & waste across the food supply chain varies by region of the world

Notes: values displayed are of food loss & waste as a percent of food supply, defined here as the sum of the "Food" and "Processing" columns of the FAO Food Balance Sheet. Numbers may not sum to 100 due to rounding
Source: WRI (2019) Reducing food loss & waste: Setting a Global Action Agenda;
WRI (2021) Reducing food loss & waste: Ten Interventions to Scale Impact;
Flanagan et al. (2019a); WRI analysis based on FAO (2011).

9.1 INVIGORATE EFFORTS TO STRENGTHEN VALUE CHAINS TO REDUCE LOSSES

Facilitating the implementation of technologies, infrastructure & practices to reduce loss in the food production chain

The UN Food and Agriculture Organization (FAO) found that **14% of the world's food is lost between production and retail**. Not only could reducing this number have an impact on GHG emissions, but it would also have significant implications for being able to produce enough food for the expanding global population. Philanthropy could therefore be deeply impactful by supporting/creating initiatives and coalitions which targeted the key causes of loss across the food production chain. This could be best achieved via support i.e., rural cold chain storage infrastructure in developing countries, or training to reduce post-harvest losses. **Especially the roll-out of cold chain storage in developing countries could have a significant impact in the short-term, given it will be key for COVID-19 vaccinations.**

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ Technologies are already existing and roll-out could be relatively short term
Indirect ◆ **Direct**	Direct vs indirect impact	▪ Training programs for farmers and implementing technologies to reduce loss in the food production chain would be direct impact
< 16 MtCO2e	Estimated impact when investing €100m	▪ FOLU: required investment to reduce FLW by 25% by 2050 is \$30bn (€25.4bn) = €7.3bn by 2030; FLW produces 3.6 GtCO2e p/a; assuming linear reductions; additional 0.89% reduction each year from 2022 = 32 Mt x 36 = 1.15 Gt; 15.8 Mt
○ ● ○	Catalytic/tipping point impact	▪ There is a clear business model and some of the technologies are cost-effective so implementing them could drive tipping points
○ ○ ●	Direct co-benefits	▪ There are direct co-benefits in terms of food security and increased farmer income. On top of that, the COVID-19 vaccine roll out in developing countries would greatly benefit from increased cold chain storage

Possible opportunities for action

- Support existing organisations or set up a new coalition that tackles key issues in the food production chain, i.e., cold chain storage and rural infrastructure
- The Clean Cooling collaborative is an initiative from the climate works foundation that works on various cooling projects

9.2 SUPPORT THE DEVELOPMENT OF NATIONAL STRATEGIES AND PUBLIC-PRIVATE PARTNERSHIPS TO REDUCE FOOD LOSS & WASTE

Food & Land Use

Reduce food loss & waste

Help to build capacity at governmental level to tackle food loss & waste, and support the creation of public-private partnerships driving research and awareness on the issue

The creation of national strategies focused on reducing food loss & waste could be catalytic. As in other sectors, facilitating the setting of **national targets** around food loss will bring with it increasingly accurate **measurement** of this issue and make it easier for governments to **identify and address root causes** of waste. This could be achieved via grants which help **build capacity** around food loss & waste in the public sector, or by supporting/creating **initiatives or coalitions** which bring together public and private players to solve the issue of food loss & waste.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ Creating national strategies tailored to a certain country would likely take time, even if once done there would likely be short-term targets for food waste reduction
Indirect ◆ **Direct**	Direct vs indirect impact	▪ Creating partnerships and funding research are more indirect routes to GHG reductions, while setting national targets would have a more direct impact
N/a.	Estimated impact when investing €100m	▪ –
○ ● ○	Catalytic/tipping point impact	▪ Philanthropic funding could be catalytic in shifting political will, but not necessarily in crowding-in private finance given the lack of a business model
○ ● ○	Direct co-benefits	▪ Direct co-benefits could include increased human capital. Indirect could more efficient (and therefore profitable) agriculture

Possible opportunities for action

- Provide grants to governmental bodies to build capacity for tackling food loss & waste
- Launch/support public-private partnerships dedicated to raising awareness of the damaging effects of food loss & waste
- Support existing organisations conducting research into food loss & waste, with a focus on providing policy advice as a result of this research

9.3 SHIFT CULTURAL NORMS AND BEHAVIOUR BY RAISING AWARENESS ON FOOD LOSS & WASTE

Food & Land Use

Reduce food loss & waste

Shifting cultural norms around consumer standards, awareness of food loss, and perceived risks of food could massively reduce food loss & waste, and with it GHG emissions

Norms and attitudes influence food production and consumption behaviours and **cause products to be removed from the food chain at various stages**. These include: what foods are considered appealing; the preferred appearance of products; attitudes about food generally (i.e., dislike of leftovers, desire for variety etc.). There is also a **general lack of awareness** of the loss these attitudes induce, and the negative impacts on the planet of these. In addition, **perceived risks of food** is also often higher than actual risk, resulting in more food loss (i.e., due to overly conservative labels and fear about liability from food donation). Philanthropy could help to shift these cultural norms by supporting awareness and other campaigns, with positive implications for GHGs and food system efficiency.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ The impact on shifting cultural norms & behaviour is a long-term play, given it will take years for people to change habits
◆ **Indirect** — **Direct**	Direct vs indirect impact	▪ The impact on shifting cultural norms and behaviour will have an indirect effect on GHG emissions reduction given still relying on people to actually reduce waste
N/a.	Estimated impact when investing €100m	▪ –
⚪ ⚪ 🟢	Catalytic/tipping point impact	▪ The shift in cultural norms and behavior change could lead to demand driven incentives for companies to also change and therefore drive tipping points
🔴 ⚪ ⚪	Direct co-benefits	▪ Co-benefits would be indirect and could include lower public health costs

Possible opportunities for action

- Support campaigns and coalitions aimed at spreading awareness of the benefits to people and planet of reducing food waste at a consumer level

- Support campaigns and organisations focused on different aspects of FLW i.e., standardising food date labelling practices, true costs of food, influencing policies

AGENDA

TRANSPORT- PRIORITISED LEVERS AND OPPORTUNITY AREAS SHARED IN THIS CHAPTER

10. Electric vehicles –Light weight

- 10.1 Enable adoption of electric vehicles by supporting charging infrastructure
- 10.2 Reduce emissions from urban freight by optimizing vehicle usage and electrifying
- 10.3 Support the market for electric 2 & 3 wheelers through operations and financing innovation

10. ELECTRIC VEHICLES – LIGHT WEIGHT

1.5GT CO2e	Mitigation potential by 2030
€43/tC02e	Cost/effectiveness

Transportation

Electric Vehicles – Light Weight

Definition

Several vehicle types are in the lightweight category, including passenger vehicles, small final-mile delivery trucks, and 2- or 3-wheelers. **Electric light weight vehicles** can be typically powered by Li-ion batteries which need to be plugged in to the electrical grid and store the energy for the vehicle, similar to a gas tank for a traditional ICE vehicle.

Problem statement *why decarbonise light-weight vehicles?*

5.5 GT CO2e

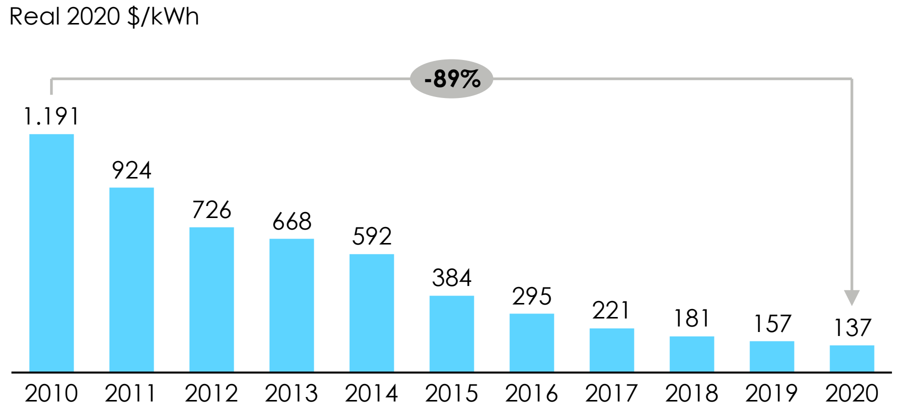
CO2e Emissions from Road Vehicles in 2020 (IEA Net Zero in 2050 Report)

80-100%

Percentage of the light weight vehicle fleet that must be electrified by 2050 in various 1.5°C scenarios (BNEF New Energy Outlook 2020, BP Net Zero 2020, IEA Net Zero in 2050)

Drivers Lithium-Ion battery pack prices

Volume-weighted average lithium-ion pack price

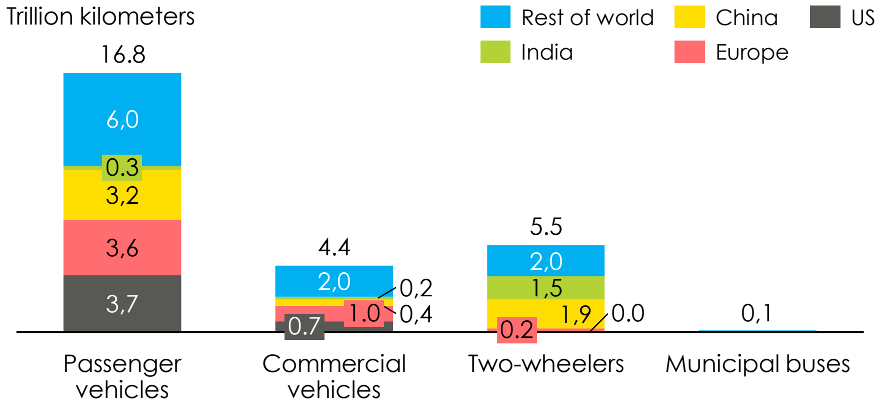


Source: BNEF

According to the Bloomberg New Energy Finance (BNEF) 2021 Electric Vehicle Outlook, battery prices are now low enough that the up-front cost of EVs may begin to compete with traditional internal combustion engine vehicles.

Geography

Total kilometres travelled by road vehicles in 2019, by region



Source: Bloomberg NEF, respective national government agencies

Globally, the US and Europe lead the world in passenger vehicle kilometers traveled with India and China rapidly catching up

10.1 ENABLE ADOPTION OF EVS BY SUPPORTING CHARGING INFRASTRUCTURE

Transportation

Electric Vehicles – Light Weight

Helping increase the adoption of EVs through the development of critical charging infrastructure

As EVs begin to scale up, a critical issue slowing down the adoption of the technology is the **lack of supporting infrastructure** to easily charge them anywhere resulting in 'range anxiety'. This issue is particularly important for individuals who don't own their own homes. Meanwhile, automakers are slow to make more EVs as there is not sufficient charging infrastructure, limiting the demand. With the deployment of EV charging from NGOs, not only will it **increase demand for electric vehicles it will also increase the supply** as issues such as range anxiety become less of a problem for OEMs and consumers alike.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ The impact of building EV chargers will have a short term (and long lasting) impact on the adoption of EVs
◆ **Indirect** **Direct**	Direct vs indirect impact	▪ Will have an indirect impact as it increases the adoption of EVs which have the impact, not the chargers themselves
2-23 MtCO2e	Estimated impact when investing €100m	▪ This metric is the same for all Transportation key opportunity areas. Upper limit is a bottom up estimate: mean cost of EV charger is €1,170; average car in UK travels 12,000km p/a emitting 1.7tCO2; Nissan Leaf travels 140km per charge; Assume 1 charger = 2 cars per day; 23.tCO2e. Lower limit is a sector-wide estimate from emissions and investment results of IEA Net Zero by 2050 report
○ ○ ●	Catalytic/tipping point impact	▪ Sufficient EV charging leads to a tipping point in adoption where the majority of automakers no longer product ICEs as EVs win the market
○ ○ ●	Direct co-benefits	▪ Aside from driving EV adoption, charging infrastructure also leads to cleaner, quieter urban areas and reduces traffic as gas delivery trucks are no longer necessary

Possible opportunities for action

- Continue to support campaigns working to hit EV tipping points by 2026
- Create a coalition of corporates and NGOs to establish a goal of offering EV charging at all locations by 2025 (
- Work with utilities and local governments to plan for and develop accessible fast charging, starting in US/Europe and then expanding to global south

10.2 REDUCE EMISSIONS FROM URBAN FREIGHT BY OPTIMIZING VEHICLE USAGE AND ELECTRIFYING

Transportation

Electric Vehicles – Light Weight

Helping reduce emissions from freight, particularly in cities

Globally, transport accounts for **14% of GHG emissions, 40% of which comes from freight**. While zero-emissions innovations in long haul trucking, shipping, and aviation are still not ready to scale, there are solutions today to help reduce emissions from freight in cities. This is primarily done in 2 ways: 1) By better **optimizing existing routes** and 2) By **electrifying the vehicles**. The co-benefits of these include less traffic, noise, and pollution in dense urban areas.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ Reductions in freight emissions can be achieved on a quick timeline, with benefits from route optimization and EVs being seen almost immediately
Indirect ◆ **Direct**	Direct vs indirect impact	▪ Will have a direct impact as emissions would be reduced as soon as changes are being made
2-23 MtCO2e	Estimated impact when investing €100m	▪ This metric is the same for all Transportation key opportunity areas. Upper limit is a bottom up estimate: mean cost of EV charger is €1,170; average car in UK travels 12,000km p/a emitting 1.7tCO2; Nissan Leaf travels 140km per charge; Assume 1 charger = 2 cars per day; 23.tCO2e. Lower limit is a sector-wide estimate from emissions and investment results of IEA Net Zero by 2050 report
○ ● ○	Catalytic/tipping point impact	▪ A tipping point on freight emissions is still far away given that there is little being done in the space and trucks tend to have long lifespans
○ ○ ●	Direct co-benefits	▪ Aside from the emissions benefits, route optimization & electrification also benefit cities through reductions in noise, pollution, and traffic

Possible opportunities for action

- Partner to create optimization tools to reduce city emissions
- Scale up Electric delivery pilots to other major cities and partner with local governments to promote adoption
- Collaborate to accelerate the towards zero-emissions freight
- Develop heavy duty EV freight corridors in global south with leading OEMs & NGOs to demonstrate viability and scale adoption

10.3 SUPPORT THE MARKET FOR ELECTRIC 2- AND 3-WHEELERS THROUGH OPERATIONS AND FINANCING INNOVATION

Transportation

Electric Vehicles – Light Weight

Helping reduce global emissions by accelerating the adoption of electric 2-and 3-wheel vehicles

2 and 3 wheelers are currently the **fastest growing mode of transportation in low- and middle-income countries** and is expected to hit **400M vehicles by 2050**. While they are significantly cheaper and smaller than cars, due to inefficient engines and poor regulations 2 stroke scooters produce more particle emissions than a standard passenger car. The most significant challenge slowing down adoption however is the high up-front cost of batteries. However, with innovations in operations and financing, these can be overcome and lead to drastic scale up of electric 2 and 3 wheelers.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ Electrifying 2 and 3 wheelers will have instant impacts, particularly in the global south on reducing emissions
Indirect ◆ **Direct**	Direct vs indirect impact	▪ Will have a direct impact as emissions would be reduced as soon as changes are being made
2-23 MtCO2e	Estimated impact when investing €100m	▪ This metric is the same for all Transportation key opportunity areas. Upper limit is a bottom up estimate: mean cost of EV charger is €1,170; average car in UK travels 12,000km p/a emitting 1.7tCO2; Nissan Leaf travels 140km per charge; Assume 1 charger = 2 cars per day; 23.tCO2e. Lower limit is a sector-wide estimate from emissions and investment results of IEA Net Zero by 2050 report
○ ○ ●	Catalytic/tipping point impact	▪ A tipping point on electrifying 2 and 3 wheelers is likely fast approaching, similar to electric passenger vehicles, however cost is an even greater barrier with low cost, light weight vehicles
○ ○ ●	Direct co-benefits	▪ Aside from the emissions benefits electrification also benefit cities through reductions in noise, pollution, and can increase mobility as well

Possible opportunities for action

- Support Electric mobility program and build coalitions to begin electrifying 2- and 3-wheelers globally
- Develop a pilot program deploy & advance 2- and 3-wheel electrification in SE Asia
- Work in partnership to reduce costs for electric 3-wheelers (e.g. 0% financing)
- Collaborate to accelerate the adoption of 2- and 3-wheel EVs by creating new financing tools to overcome high up-front costs

AGENDA

- Introducing 5 systems and levers of change
- Prioritised levers energy & power
- Prioritised levers food and land-use
- Prioritised levers transport
- **Prioritised levers building**
- Appendix

BUILDINGS – PRIORITISED LEVERS AND OPPORTUNITY AREAS SHARED IN THIS CHAPTER

11. Decarbonised new buildings for developing countries

- 11.1 Aggregated procurement of efficient space cooling equipment
- 11.2 Net zero buildings demonstration projects with major developers
- 11.3 Stimulate investment in low-embodies carbon building materials
- 11.4 Build skill capacity of construction industry

12. Retrofit existing building stock in developed countries

- 12.1 Support retrofit programs and related policies
- 12.2 Fund deep energy retrofits with developers
- 12.3 Advance grid-interactive technology
- 12.4 Promote efficient technology installations

11. DECARBONISED NEW BUILDINGS FOR DEVELOPING COUNTRIES

1GT CO2e	Mitigation potential by 2030
€51/tC02e	Cost/effectiveness

Buildings

decarbonised new buildings for developing countries

Definition *what is involved in decarbonizing new buildings?*

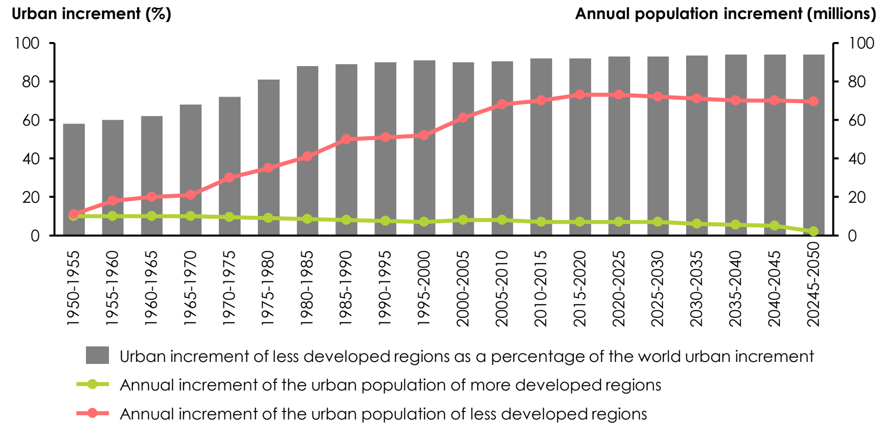
decarbonised buildings mitigate GHG emissions from both construction and operation over the life of the building. There are 5 key strategies to decarbonise our buildings including low-embodied carbon design, energy efficiency, demand flexibility, electrification and onsite renewables and storage. All are required to achieve system wide decarbonization most cost effectively. New buildings allow for greater emission reduction opportunities in both operational energy use (i.e., space cooling), and also the materials and methods used to construct the building.

Problem statement *why should new buildings be decarbonised?*

1 Gt CO2	**Difference between 2030 buildings sector CO2 emissions in the Stated Policies Scenario and Net Zero Energy (NZE) Scenario from IEA NZE in 2050 report**
11%	**Percentage of global CO2 emissions in 2018 embodied in new building construction, i.e., attributed to the production of steel, cement, and glass for buildings**

Drivers

Annual increment of the urban population of the more developed regions and the less developed regions, and urban increment of the less developed regions as a percentage of the world urban increment



By 2050, the UN projects an additional 2.5 billion people will live in cities beyond the 4.4 billion urban occupants today.

Additionally, 1 billion people currently live in slums or informal housing and will need adequate & affordable housing to achieve Sustainable Development Goal 11.

Geography *where will most new buildings be constructed?*

Projected Change in Global Cities' Population by Country, 2015-2050 (Millions)

The vast majority of urban population increase (95%) will occur in developing countries such as India, China, and Nigeria.

* xxx

11.1 AGGREGATED PROCUREMENT OF EFFICIENT SPACE COOLING EQUIPMENT

Helping governments or developers to buy in bulk can help stimulate demand for best available technology air conditioners, creating a virtuous circle of cost decline

The final steps in fully commercializing a technology can present challenges as manufacturers scale up production and delivery to consumers, especially if demand for a new technology is initially low. However, learning-by-doing, which involves a variety of improvements such as **economies of scale, changes in the price of materials, and efficiency improvements**, can occur during the final stage of innovation and help lower the cost of a technology in order to bring it to market. **India's Energy Efficiency Services Limited (EESL)** helped to stimulate these learning effects in the case of LED light bulbs. EESL's UJALA program has purchased and distributed over 360 million LEDs to consumers across India, providing economies of scale to industry and contributing to a price reduction in the technology. IKEA could help facilitate a similar phenomenon for efficient room air conditioning units.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ Efficient air conditioning unit technologies already exist. RMI recently sponsored the Global Cooling Prize competition, which motivated participants to develop room air conditioning units with 5x lower impact than existing units
○———◆—○ **Indirect** **Direct**	Direct vs indirect impact	▪ Supporting procurement of air conditioners gets efficient cooling solutions into the market directly, to either replace old, inefficient units or provide cooling where there previously was none
1-3 MtCO2e	Estimated impact when investing €100m	▪ This metric is the same for all new buildings key opportunity areas. It takes into account IEA's Net Zero by 2050 Report results for investment and emissions reduction and a report from the National Action Plan for Energy Efficiency.
⚪ 🟡 ⚪	Catalytic/tipping point impact	▪ Aggregated procurement drives a tipping point for air conditioners, a subset of the issues involved in new buildings in developing countries
⚪ ⚪ 🟢	Direct co-benefits	▪ Beyond just providing thermal comfort, more efficient space cooling solutions will contribute to improved health impacts in developing countries that could be hit hardest by extreme heat

Possible opportunities for action

- SEforAll recently published an analysis of gaps in deploying finance for cooling solutions. They say that philanthropic grants could be especially valuable to help boost "commercial strategies such as bulk procurement".
- Existing examples to aid these efforts include
  - Grant to the Atlantic Council and Resilient Cities Network,
  - Institute for Governance and Sustainable Development and BMCE Bank of Africa support of Moroccan government air conditioners buyers club

11.2 ZERO CARBON BUILDINGS DEMONSTRATION PROJECTS WITH MAJOR DEVELOPERS

Support projects that demonstrate the proof-of-concept for zero carbon buildings in a local context

Building design and construction is an **inherently local process**. While many lessons learned can apply across geographies, demonstration projects are useful to help **work through issues** in a more regional context from codes and standards to design for different climate zones and building operations. This opportunity area also has the **potential to involve others included in this lever** such as stimulating investment in low carbon impact and building capacity. Teaming up with developers and local governments can help to build construction and design skills, while also building capacity to implement net zero energy building policies in the future.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ APEC's Nearly/Net Zero Energy Building program took 5 years (2013-2018) to get from initiation to pilot project analysis and roadmap development
◆ **Indirect** **Direct**	Direct vs indirect impact	▪ While demonstration projects are helpful to initiate scaled change, on their own they don't typically lead to major change
1-3 MtCO2e	Estimated impact when investing €100m	▪ This metric is the same for all new buildings key opportunity areas. It takes into account IEA's Net Zero by 2050 Report results for investment and emissions reduction and a report from the National Action Plan for Energy Efficiency.
○ ● ○	Catalytic/tipping point impact	▪ If lessons learned are utilized successfully, demonstration projects could seed large-scale change for the building sector in developing countries
○ ● ○	Direct co-benefits	▪ Net zero energy buildings also tend to be healthier buildings (i.e., would utilize clean cooking solutions that reduce indoor air pollution), though demonstration projects have a small direct impact

Possible opportunities for action

- RMI has assisted India's largest real estate firm, Lodha Group, with energy master plans and a net zero roadmap
- The UN Habitat Participatory Slum Upgrading Program initiated a project in Jamaica to help mitigate climate change-related extreme weather risks in informal settlements. A zero carbon building demonstration project could be salient to PSUP's work.
- APEC initiated the Nearly/Net Zero Energy Building Program in 2013. They analyzed 100 pilot projects to better understand technical solutions in countries that include China.
- Help create a biannual conference and resource hub on net zero energy and carbon neutral buildings for developing countries

11.3 STIMULATE INVESTMENT IN LOW-EMBODIED CARBON BUILDING MATERIALS

Low-embodied carbon materials can catalyze change across several sectors, starting with buildings

In 2018, **11% of global CO2 emissions were attributed to building construction**, including that embodied in building materials like cement and steel. Embodied carbon could be a crucial avenue for change not just in the buildings, but also in other sectors that use and produce these materials. Important first steps needed to help stimulate investment in low embodied carbon materials involve data collection and verification.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ The technology needed to identify, track, and verify low-embodied carbon already exists, including blockchain, existing emissions standards, and satellite imagery
◆ **Indirect** **Direct**	Direct vs indirect impact	▪ The initiatives suggested here take first steps toward a market for low-embodied carbon materials and are therefore indirect
1-3 MtCO2e	Estimated impact when investing €100m	▪ This metric is the same for all new buildings key opportunity areas. It takes into account IEA's Net Zero by 2050 Report results for investment and emissions reduction and a report from the National Action Plan for Energy Efficiency.
⚪ ⚪ 🟢	Catalytic/tipping point impact	▪ Embodied carbon initiatives could be highly catalytic, impacting buildings as well as many other sectors
🔴 ⚪ ⚪	Direct co-benefits	▪ The impacts of these efforts on low-embodied carbon sit squarely in the energy and climate space, although some health benefits could be realized down the line in communities close to material production plants

Possible opportunities for action

- UNEP DTU, a partnership between UN Environment Programme and the Technical University of Denmark, is working to create life cycle processes for the global building supply chain, including CO2 emissions per material unit
- Invest in embodied carbon, expand geographically to India and China
- The Coalition on Materials Emissions Transparency (COMET), launched by RMI, MIT, and Colorado School of Mines, seeks to help make emissions accounting for materials more transparent, to help differentiate low-carbon materials.

11.4 SUPPORT TURNKEY DECARBONIZATION DELIVERY MODELS AND INCREASE CAPACITY OF CONSTRUCTION INDUSTRY

Buildings

decarbonised new buildings for developing countries

Bundling solutions for new zero carbon buildings

Turnkey decarbonization delivery models involve modular construction-- pre-fabricating elements of a building offsite and then assembling them at the construction site. Modular construction can help **save time and money**. Decarbonization delivery models can also **facilitate policy change and help to speed the process of construction industry capacity building** by bundling solutions together (e.g., inclusion of building envelope energy efficiency measures alongside efficient appliances and electrified cooking solutions).

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ Change in this space could take some time, as this involves changing many aspects of the building construction process
◆ **Indirect** **Direct**	Direct vs indirect impact	▪ Modular design and delivery as well as skill capacity supports more direct means of reducing emissions from new buildings
1-3 MtCO2e	Estimated impact when investing €100m	▪ This metric is the same for all new buildings key opportunity areas. It takes into account IEA's Net Zero by 2050 Report results for investment and emissions reduction and a report from the National Action Plan for Energy Efficiency.
○ ● ○	Catalytic/tipping point impact	▪ This could help speed construction of new, zero carbon buildings, but may not spill over into other industries
○ ● ○	Direct co-benefits	▪ Turnkey delivery models could help reduce the cost of housing

Possible opportunities for action

- The Zero Carbon Buildings for All Initiative, launched in 2019 and endorsed by the UN Secretary General, seeks to mobilize $1 trillion USD in public and private building investment for developing countries by 2030, as well as provide support to governments to develop policy roadmaps and action plans.
- The Building Decarbonization Coalition focuses on buildings in California, USA, and provides resources for design professionals.

12. RETROFIT BUILDING STOCK IN DEVELOPED COUNTRIES

2XGT CO2e	Mitigation potential by 2030
€23/tC02e	Cost/effectiveness

Buildings

decarbonised retrofits for developed countries

Definition *what is involved in retrofitting existing buildings?*

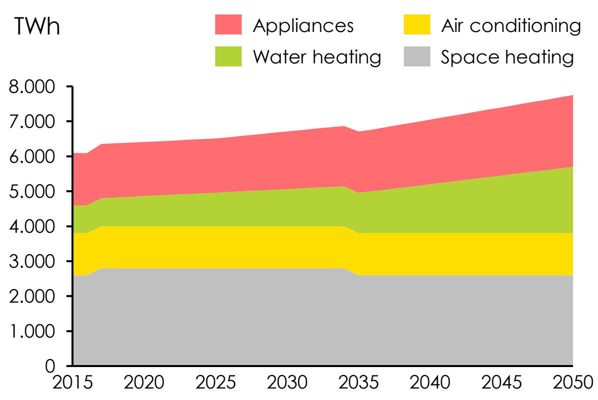
Deep Energy Retrofit is the process of completely renovating a building to substantially cut energy usage through efficiency, demand flexibility, and renewables.
The upfront capital costs of deep energy retrofits is the main barrier in wide-spread adoption. A homeowner, on average, will spend XX on a retrofit, and save that same amount on energy after XX years. A phased retrofit approach can make these costs more manageable, though efficiency measures must be prioritised, followed by equipment and on-site renewable installations.

Problem statement *why retrofit existing buildings?*

2.8 GT CO2e	Direct CO2e emissions from buildings in 2020, NOT accounting for associated electricity emissions (IEA Net Zero by 2050 report)
52%	Percent of electricity demand used by buildings in 2020 (IEA Net Zero by 2050 report)

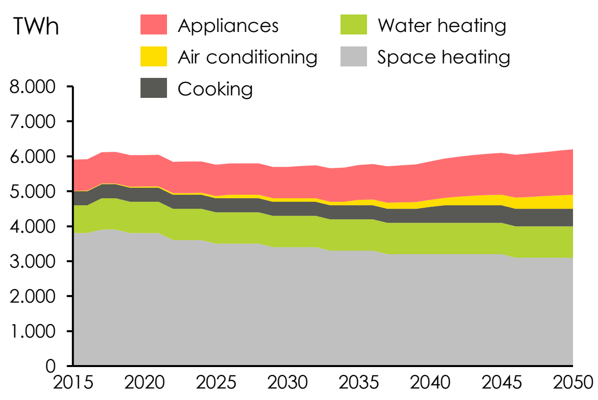
Drivers *how do existing buildings use energy?*

Energy demand by end-use US and Canada, 2015-2050



Source: Bloomberg NEF

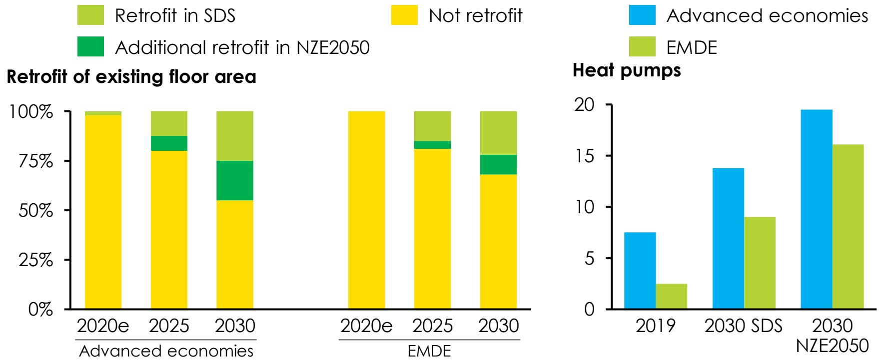
Energy demand by end-use, Europe, 2015-2020



Source: Bloomberg NEF, Odyssee

Geography *where are most retrofits needed?*

Retrofit of existing floor area (left) **and share of heat pumps to meet space heating energy needs** (right)



Retrofits are significantly accelerated and deepened in the NZE2050; heat pumps are also much more widely deployed across all regions

Note: 2020e = estimated values for 2020; EMDE = emerging market and developing economies

Most retrofits and efficient technology installations needed to decarbonise the building sector will occur in advanced economies.

IEA estimates that every month 2 million homes in advanced economies will need to be retrofitted by 2030.

*BloombergNEF
IEA World Energy Outlook 2020

12.1 SUPPORT RETROFIT PROGRAMS AND RELATED POLICIES

Contributing to local retrofit programs or advocating for policies locally

More policies that limit the energy efficiency and total energy used by existing buildings will be needed in the global north to reduce energy demand and increase utilization of efficient technology. **Building performance policies** have started in major cities, which serve as blueprints for overcoming barriers such as stakeholder dissent, financing, equity, etc. After policies are passed retrofitting programs need to be financially supported to help building owners meet mandated reductions.

Support may take the form of direct financial contributions to city green banks or grants, funding proof of concept pilot programs.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ Regulations on existing buildings is a first step in the process of retrofitting local building stocks. The anticipated emissions reductions will not be realised until the program is mature.
Indirect ◆ **Direct**	Direct vs indirect impact	▪ Policies and programs directly mandate the reduction of energy use and emissions from buildings, provided they are implemented correctly and enforced.
~3 MtCO2e	Estimated impact when investing €100m	▪ Approx. 3 Mt CO2 / €100m based on study of costs and abated emissions from U.S. energy efficiency programs in 2009
○ ○ ●	Catalytic/tipping point impact	▪ Many cities have provided blueprints for these policies and programs. Widespread adoption is the next step.
○ ● ○	Direct co-benefits	▪ Fines provide revenue for governments ▪ Efficiency of the entire building stock improves

Possible opportunities for action

- The Energy Leap project completed retrofits in 10 properties to demonstrate the feasibility and understand the barriers for retrofits in London

- IMT advocates for building energy policies and programs. Contributions to these organisations accelerates regulations. That lead to retrofits

- Coalition of business, government, environmental, and consumer groups that advocate for federal policy for energy efficiency
- Opportunities to join or start coalitions

12.2 FUND DEEP ENERGY RETROFITS

Work with developers, groups of homeowners, or organisations to finance whole or partial building retrofits for those who cannot afford to do so.

Due to the **high upfront capital costs of deep energy retrofits**, there are few that can afford such projects. Grants, low-interest loans, and technical support can help low-income homeowners, community centers, hospitals, shelters, schools, and other groups reach retrofitting mandates and goals set by governments.

Score	Criteria	Rationale
1-5yrs	Time horizon of impact	▪ Depending on the structure of the initiative, the time period is largely dependent on the time that it take to complete a retrofit.
Indirect ○────◆ **Direct**	Direct vs indirect impact	▪ Reducing the cost of a retrofit (ideally to $0), removes the main barrier to retrofitting for many building owners, accelerating the rate of emissions reductions.
~ 6 MtCO2e	Estimated impact when investing €100m	▪ Based on total investment needed to retrofit U.S. building stock
○ ○ ●	Catalytic/tipping point impact	▪ The building energy programs that exist will mandate some buildings to reduce their emissions footprint although they have limited funding.
○ ○ ●	Direct co-benefits	▪ There are many community benefits associated with reducing the energy burden and retrofit costs for these groups

Possible opportunities for action

- The CPC Green Initiative established a partnership between financial institu-tions and philanthropic foundations to provide loans for retrofits for low to moderate income housing in NYC ($150-200 million)
- Jessie Ball DuPont Fund provided grants for energy efficiency programs on university campuses. Universities were also supported with a shared energy manager.
- UK Aid and Shell Foundation provided funding to Odyssey Energy Solutions to run a pilot program to fully electrify hospitals in Sub-Saharan Africa

12.3 ADVANCE TECHNOLOGY FOR GRID-INTERACTIVE EFFICIENT BUILDINGS

Contributing to the advancement of grid-interactive efficient buildings, which will provide benefits for the electricity and transportation sectors.

Grid-interactive efficient buildings (GEBs) communicate with each other and utilities to expand grid reliability and flexibility. Buildings essentially act as batteries and electricity providers for the grid, which utility operators can utilize during periods of peak demand or low supply. In addition, smart metering and fixtures in GEBs allows for savings in real-time energy usage. There are technology barriers preventing GEB uptake, ranging from technology development to utilization. Primarily, more work is needed to connect and manage individual efficient building technology.

Building efficiency, energy cost savings, and grid benefits from GEBs have been modelled in analyses, but few pilots exist to scale to the market level.

Score	Criteria	Rationale
5-10yrs	Time horizon of impact	▪ Due to the technology and infrastructure barriers of GEBs, the emissions reductions from demand flexibility and efficiency will take some time
●—◆———————● **Indirect** **Direct**	Direct vs indirect impact	▪ Under the right operations management, there are direct savings to the grid.
N/a.	Estimated impact when investing €100m	▪ Upfront investment costs are uncertain, as pilots are still underway
⚪ 🟡 ⚪	Catalytic/tipping point impact	▪ More development is needed on the technology side.
⚪ ⚪ 🟢	Direct co-benefits	▪ Increases grid flexibility, resilience, and reliance ▪ Allows electric vehicles to provide energy to grid

Possible opportunities for action

- Lead or contribute to pilot projects, removing the operational and technology barriers of GEBs
- Involves working with governments and utilities

- Invest in companies (especially start-ups) directly or through incubators and/or accelerators
- Advance hardware and software technology

- Contribute to non-profits that host utility workshop and working groups
- Fund nonprofit/ independent studies for GEB
- Involves working with governments and utilities

12.4 PROMOTE EFFICIENT TECHNOLOGY INSTALLATIONS

Increase the efficiency of buildings by replacing inefficient technology, helping building owners complete the first step of a deep energy retrofit.

Focusing on efficient **technology installations** reduces the energy load of buildings, lowering the total capacity needs of on-site generation and grids. Once these technologies are installed, mechanical equipment and renewable installations can then be added for a complete retrofit. These technology replacements typically occur at the end of life of older, less efficient technology.

In this context, efficient technology includes **appliances, fixtures, smart metering, window replacements, and insulation**.

Score	Criteria	Rationale
1-5 yrs	Time horizon of impact	▪ Provided installations can occur on demand, time horizon is quick.
Indirect ◆ **Direct**	Direct vs indirect impact	▪ Efficient technology installations have a direct effect on energy use, although a full deep retrofit is needed for full savings.
~1 MtCO2e	Estimated impact when investing €100m	▪ Lower range based on projected saved emissions from solar rooftop installations in Hawaii
○ ○ ●	Catalytic/tipping point impact	▪ Technology is available and ready to deploy widely.
○ ○ ●	Direct co-benefits	▪ Directly impacts the energy load from the buildings sector, benefiting the grid and reducing energy cost burdens

Possible opportunities for action

- A utility donated energy star efficient air conditioning units to seniors, physically disabled, and low-income families

- Tin shed ventures (by patagonia) invested in a fund with banking partners that provided 1,000 rooftop solar units and installations to residences in Hawaii
- A project focused on renewable installations in buildings should first focus on efficiency measures

AGENDA

- Introducing 5 systems and levers of change
- Prioritised levers energy & power
- Prioritised levers food and land-use
- Prioritised levers transport
- Prioritised levers building
- **Appendix**

FULL LIST OF PRIORITISED OPPORTUNITY AREAS WITHIN THE 12 LEVERS

Energy & Power

1. Clean electricity systems
- 1.1 Cover costs for renewable energy generation
- 1.2 Create enabling policies to drive renewables in emerging markets

2. Early retirement of fossil power assets
- 2.1 Support a just transition retiring fossil power assets
- 2.2 Provide targeted financial support to retire fossil power assets
- 2.3 Build in-country capacity for the transition to a 1.5C pathway

3. Minimise upstream methane emissions
- 3.1 Create a market for minimising upstream methane emissions
- 3.2 Leverage technologies that minimise upstream methane emissions

Food & Land use

4. Avoiding/ ending deforestation
- 4.1 Create the capacity for high-integrity carbon projects at government level (i.e., REDD+)
- 4.2 Incubate projects to supply high-integrate carbon credits at project level (i.e., REDD+)
- 4.3 Build the market for protecting the tropical forests (incl. peatlands)

5. Afforestation & reforestation
- 5.1 Fund the planting of trees
- 5.2 Enable adoption of agroforestry practices & land restoration

6. Peatland restoration & reduced conversion
- 6.1 Create the capacity for high-integrity carbon projects at government level (i.e., REDD+)
- 6.2 Incubate projects to supply high-integrate carbon credits at project level (i.e., REDD+)
- 6.3 Enhance mapping and monitoring of tropical peatlands

7. Shift to alternative & plant-based proteins
- 7.1 Fund research for policy makers on alternative plant-based diets
- 7.2 Create behaviour change campaigns promoting diet shifts

7. Shift to alternative & plant-based proteins (continued…)
- 7.3 Create the market for alternative proteins

8. Reduce methane emissions from agriculture & waste
- 8.1 Create the market & enabling environment for reducing methane emissions
- 8.2 Leverage agricultural practices to reduce methane emissions from enteric fermentation
- 8.3 Enable adoption of cost-effective measures to reduce methane emissions from rice cultivation
- 8.4 Improve collection & treatment of waste

9. Reduce food loss & waste
- 9.1 Invigorate efforts to strengthen value chains which can reduce losses
- 9.2 Support the development of national strategies and public-private partnerships to reduce FLW
- 9.3 Shift cultural norms and behaviour by raising awareness on food loss & waste

Transport

10. Electric vehicles –Light weight
- 10.1 Enable adoption of electric vehicles by supporting charging infrastructure
- 10.2 Reduce emissions from urban freight by optimizing vehicle usage and electrifying
- 10.3 Support the market for electric 2 & 3 wheelers through operations and financing innovation

Buildings

11. Decarbonised new buildings for developing countries
- 11.1 Aggregated procurement of efficient space cooling equipment
- 11.2 Net zero buildings demonstration projects with major developers
- 11.3 Stimulate investment in low-embodies carbon building materials
- 11.4 Build skill capacity of construction industry

12. Retrofit existing building stock in developed countries
- 12.1 Support retrofit programs and related policies
- 12.2 Fund deep energy retrofits with developers
- 12.3 Advance grid-interactive technology
- 12.4 Promote efficient technology installations

☐ Consumption / supply-side levers

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SYSTEMIQ

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