



ISSUE BRIEF : Q4 2020

PROJECT DRAWDOWN

AN ACTIONABLE PLAN TO STOP CLIMATE
CHANGE QUICKLY, SAFELY, AND EQUITABLY



BUSINESSFORWARD
FOUNDATION

INTRODUCTION

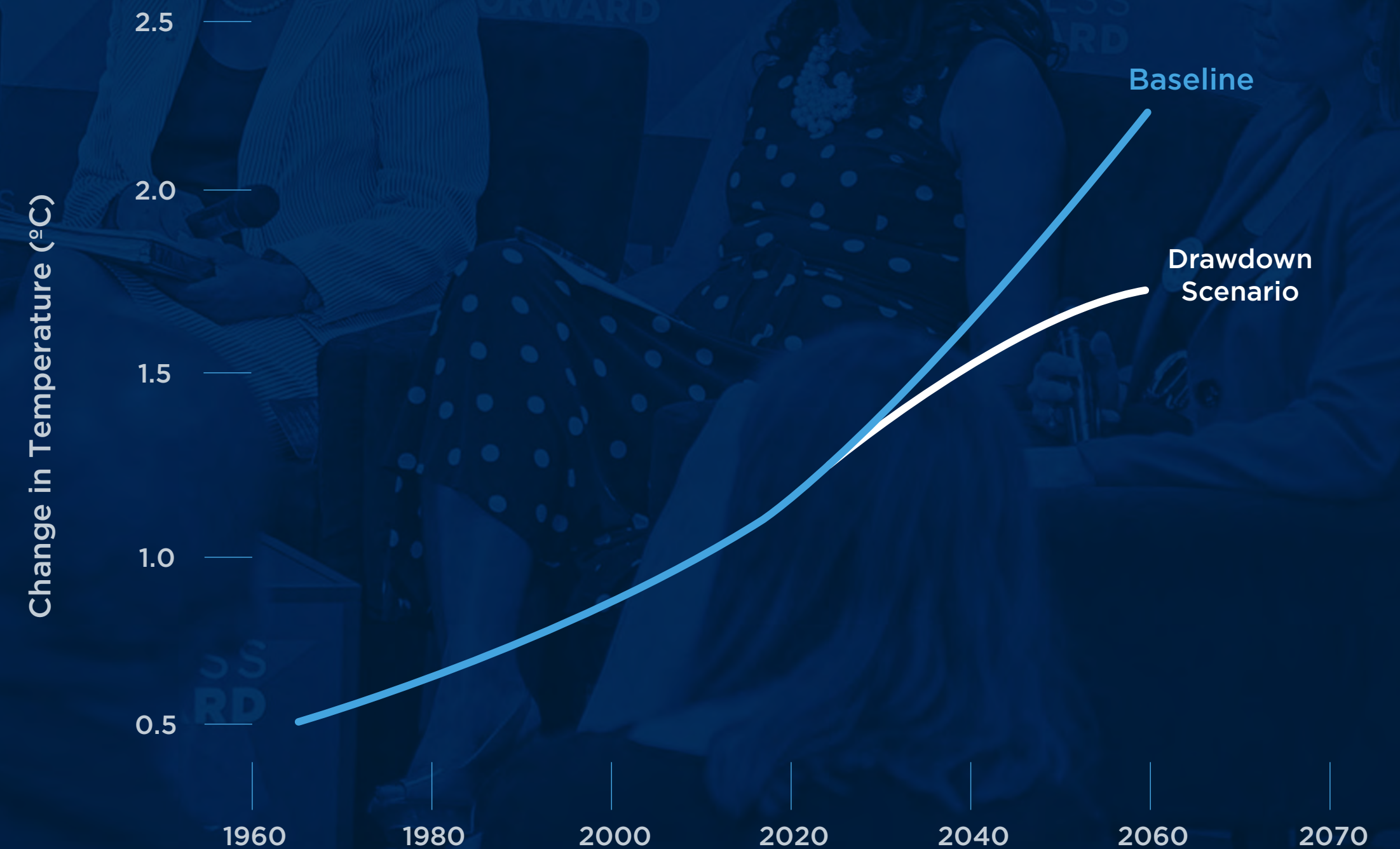
Business Forward has organized hundreds of briefings across the country on clean energy, climate change, and energy security. These briefings have included two Secretaries of Energy, two EPA Administrators, dozens of U.S. Senators and Congressmen, and hundreds of other officials. At these briefings, business leaders invariably ask, “Can we afford to fix it?”

Answering that question requires an understanding of which activities generate the most greenhouse gas pollution and how much reducing that activity might cost. We need apples-to-apples ROI comparisons of, say, electrifying our auto fleets versus reducing deforestation. If you want to understand options for stopping climate change and have time for only one book, we recommend *The Drawdown Review*, a comprehensive, accessible, and relatable look at the three-piece climate puzzle.

“Drawdown” is the future point in time when levels of greenhouse gases in the atmosphere stop climbing and start to steadily decline. To achieve this, Project Drawdown explains the individual and collective impact of hundreds of reforms to (1) reduce greenhouse gas pollution, (2) support and enhance the sinks of carbon dioxide found in nature, and (3) help society achieve broader transformations. By comparing the ROI of each of these reforms, Project Drawdown makes it easier for policymakers to achieve drawdown “quickly, safely, and equitably.”

This issue brief summarizes Project Drawdown’s findings. We encourage you to learn more at www.drawdown.org

PROJECT DRAWDOWN®

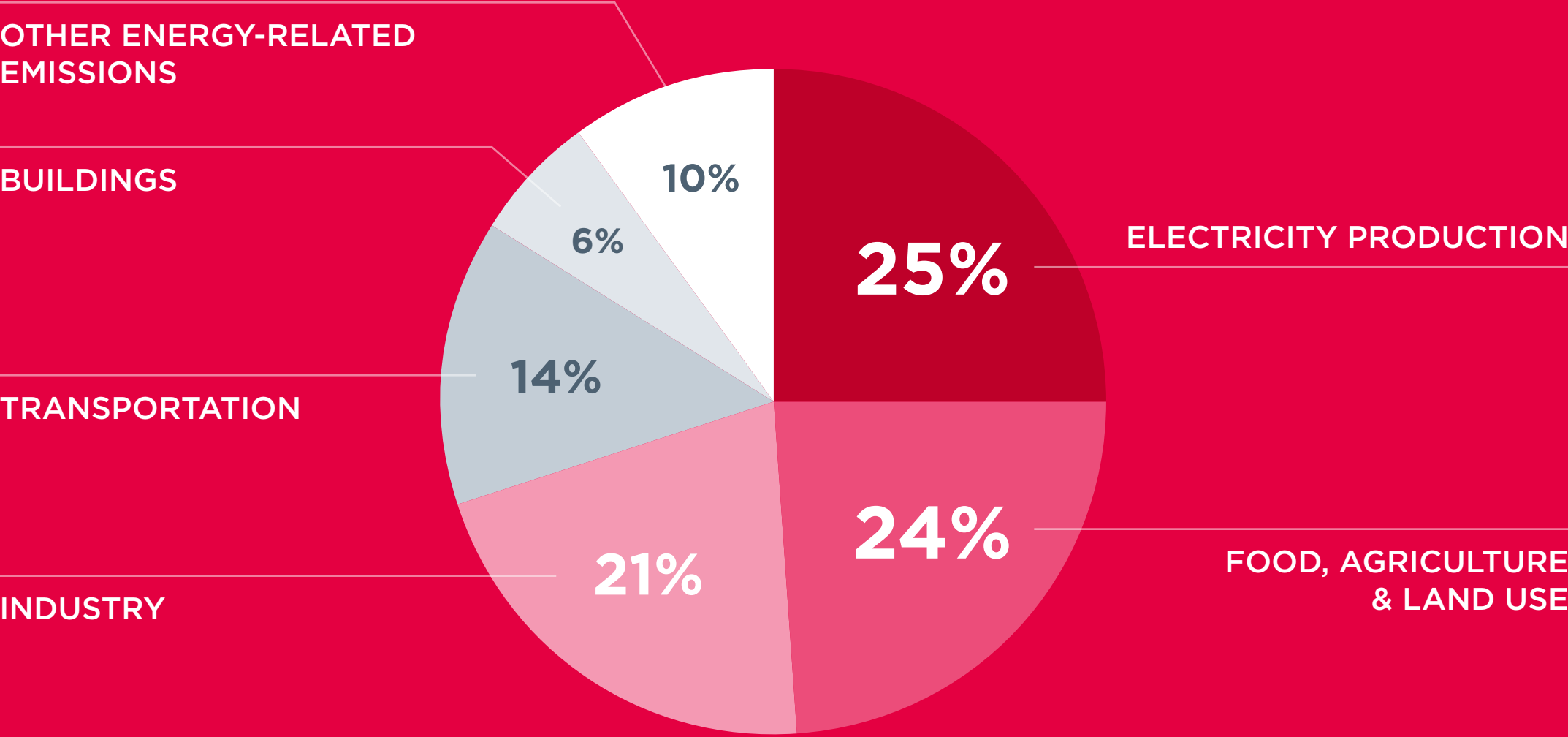


10 KEY INSIGHTS

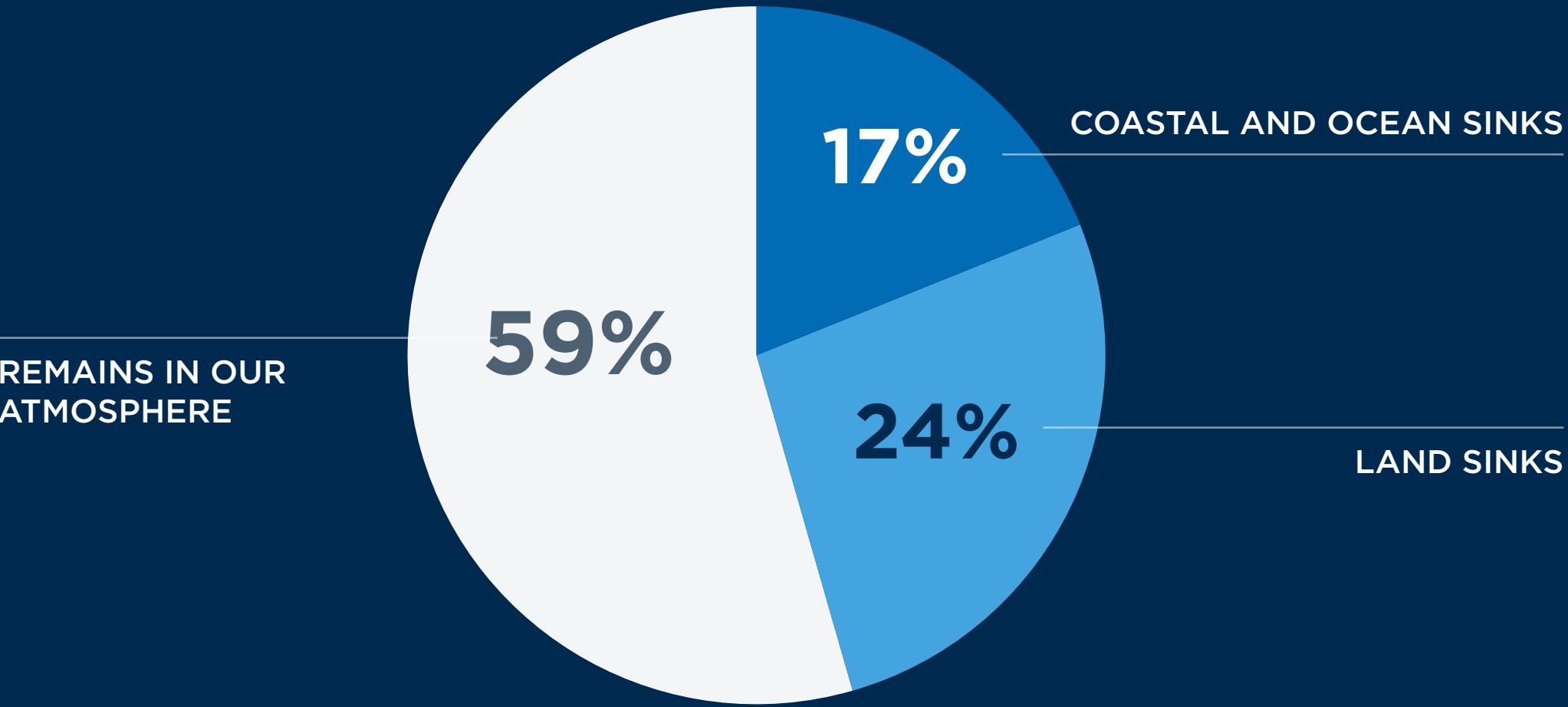
1. We can reach Drawdown by mid-century if we scale the climate solutions already in hand.
2. Climate solutions are interconnected as a system, and we need all of them.
3. Beyond addressing greenhouse gases, climate solutions can have “co-benefits” that contribute to a better, more equitable world.
4. The financial case for climate solutions is crystal clear, as savings significantly outweigh costs.
5. The majority of climate solutions reduce or replace the use of fossil fuels. We must accelerate these solutions, while actively stopping the use of coal, oil, and gas.
6. We cannot reach Drawdown without simultaneously reducing emissions toward zero and supporting nature’s carbon sinks.
7. Some of the most powerful climate solutions receive comparably little attention, reminding us to widen our lens.
8. Accelerators are critical to move solutions forward at the scale, speed, and scope required.
9. Footholds of agency exist at every level, for all individuals and institutions to participate in advancing climate solutions.
10. Immense commitment, collaboration, and ingenuity will be necessary to depart the perilous path we are on and realize the path that’s possible. But the mission is clear: make possibility reality.

CHALLENGE

Understanding the sources of greenhouse gases allows us to find solutions for climate change.
Most greenhouse gas emissions come from six sectors.



Our planet has natural carbon “sinks” that absorb emissions. Carbon sinks include both ocean sinks and land sinks - like forests, grasslands, and soil.

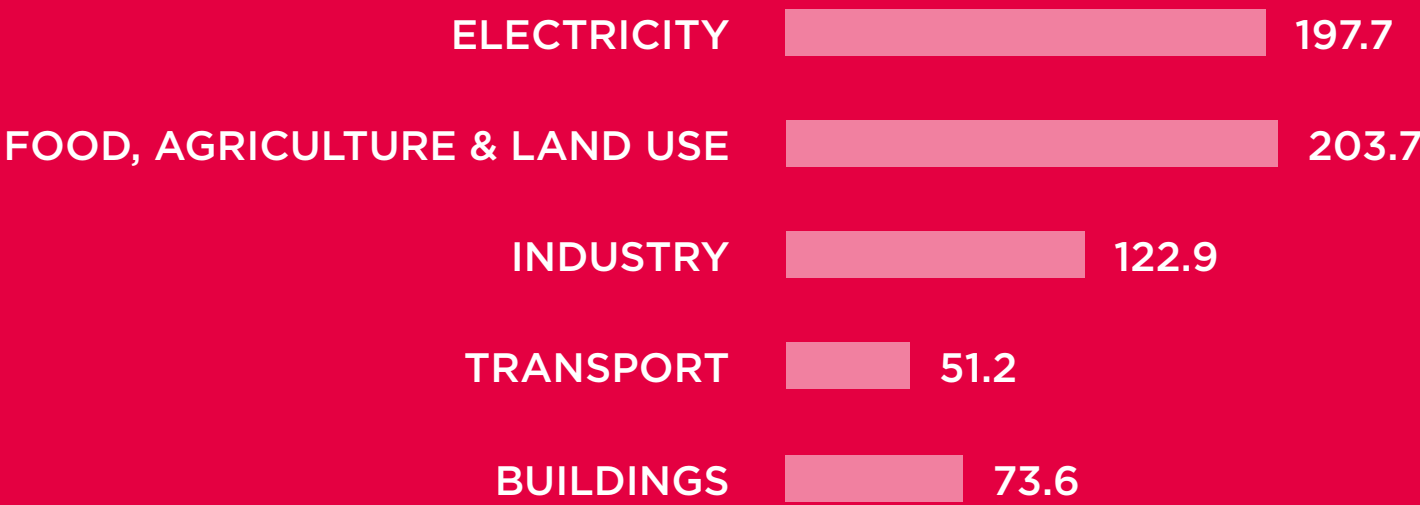


SOLUTIONS

The estimates of carbon reduction/sequestration are calculated assuming that all the following solutions and technologies are adopted and employed together. Many solutions complement the other solutions. For example, designing more efficient buildings makes renewable energy more viable.

REDUCE SOURCES

There is no “silver bullet” when it comes to addressing climate change. We must reduce production of GHGs across a variety of sectors. This requires a coordinated effort to shift from fossil fuels to renewables, to increase efficiency across systems, and to decrease food waste, among the tens of other major actions outlined in this report.



NOTE: UNITS ARE METRIC GIGATONS OF CARBON DIOXIDE EQUIVALENT GASES

SUPPORT SINKS

Ecosystems play a vital role in absorbing carbon. Whether it’s through the photosynthesis of plants or the decomposition of organisms in soil, our natural environment facilitates the capture and storage of carbon. That is why protection and restoration of ecosystems must be part of a comprehensive climate solution.



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IMPROVE SOCIETY

Increasing the quality and accessibility of health care and education can have significant effects on our economy. For example, when levels of education rise and access to reproductive health care improves, fertility falls. Lower population growth is a means of reducing consumption and production - both of which can be energy-intensive and polluting.

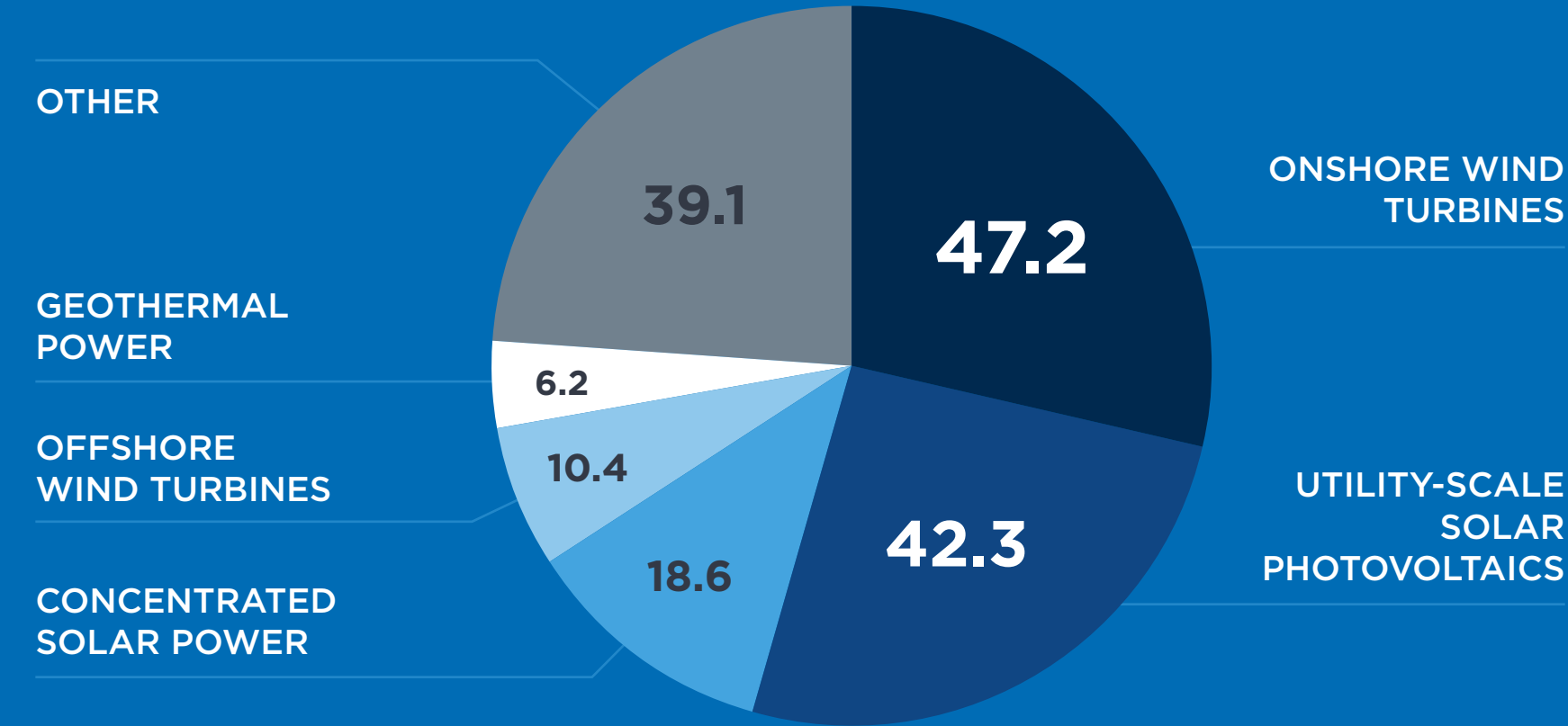


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NOTES ABOUT DRAWDOWN SCENARIO 1: THIS SOLUTION PROSCRIBES CO2-EQUIVALENT REDUCTION/SEQUESTRATION TARGETS OVER THE PERIOD OF TIME FROM 2020-2050. UNDER THIS SCENARIO, WHICH IS THE BASIS FOR THE DATA WE USE IN THIS REPORT, CO2-EQ CONCENTRATIONS WOULD RISE TO ~540PPM IN 2050. THE RESULTING GLOBAL MEAN TEMPERATURE WOULD BE 1.74°C ABOVE PRE-INDUSTRIAL LEVELS IN 2050 AND RISE TO 1.85°C IN 2060—ON A PATH TO WARM BY 2°C BY CENTURY’S END. THESE TARGETS ALIGN WITH THE PARIS AGREEMENT, DRAFTED IN LATE 2015 AND ADOPTED IN 2016, WHICH SET A GLOBAL ASPIRATION TO KEEP WARMING WELL BELOW 2°C AND TO PURSUE EFFORTS TO LIMIT IT TO 1.5°C.

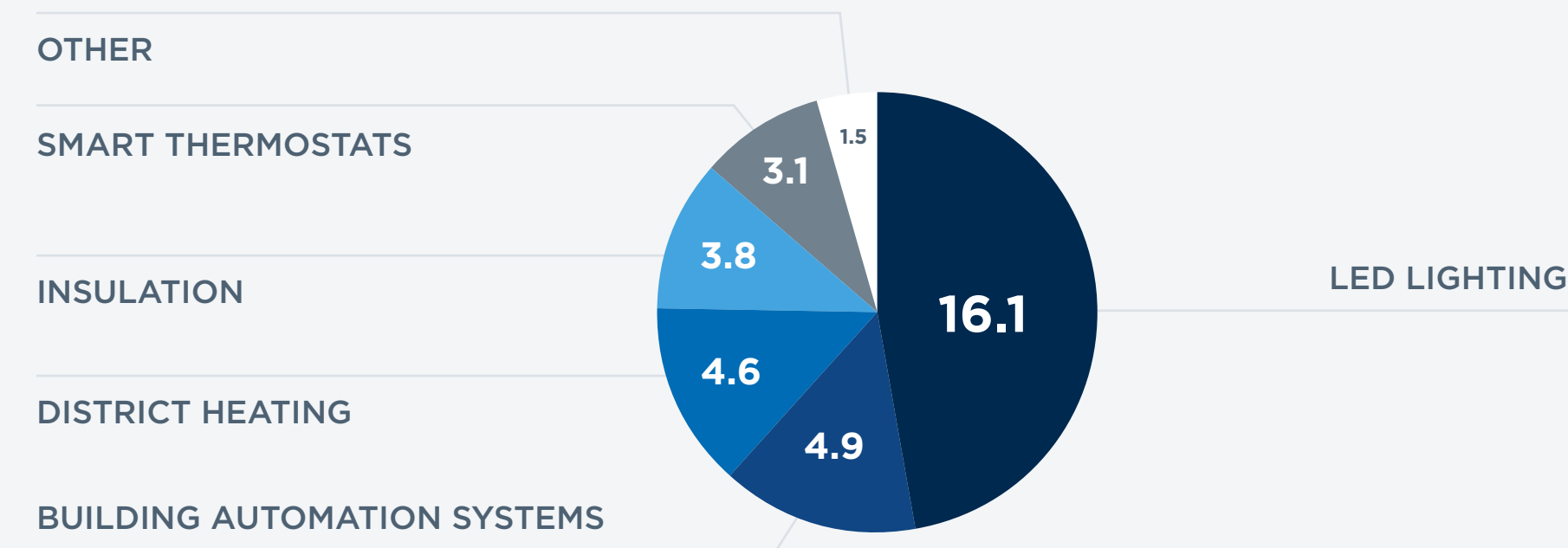
ELECTRICITY REDUCTION

SHIFTING PRODUCTION
(163.8 CO2-EQ (GT) TOTAL)



To decrease emissions, we must shift from relying on fossil fuels for energy production to harnessing wind, solar, or other kinetic energy sources that exist in nature and are emission-free.

EFFICIENCY
(34 CO2-EQ TOTAL)

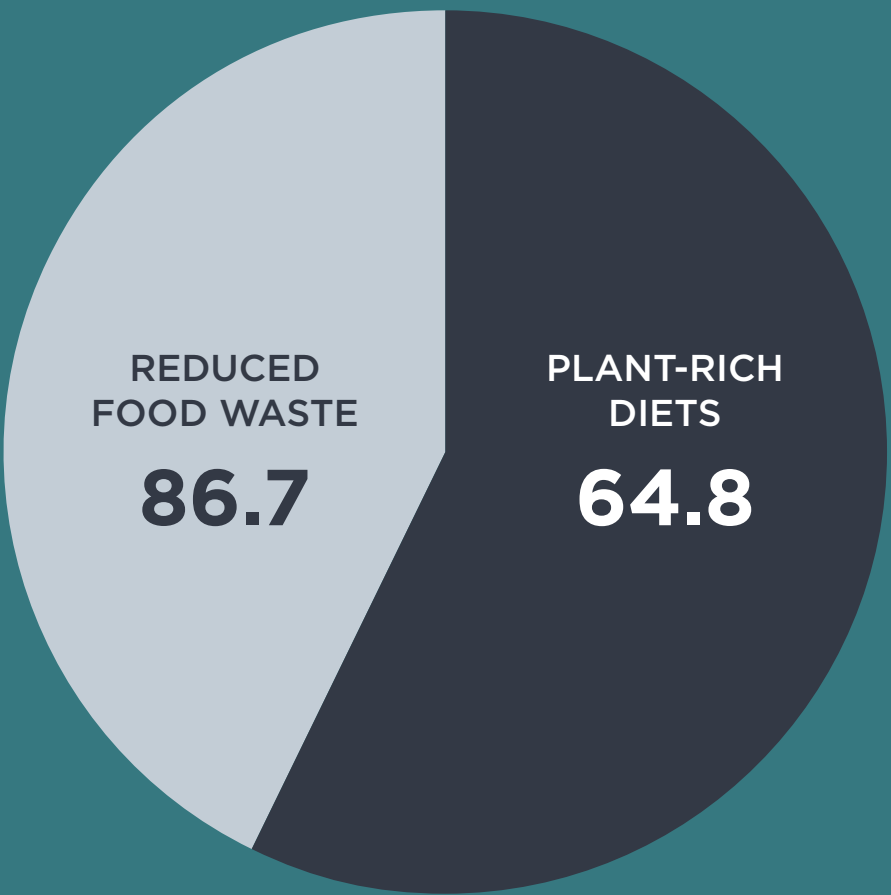


Enhancing efficiency decreases the total demand for energy, and thus the emissions associated with energy production. Buildings and industry are the two biggest end-users of energy.

THE ELECTRICITY GRID NEEDS MUST BE UPGRADED TO ALLOW FOR GREATER FLEXIBILITY AND MORE ENERGY STORAGE. FLEXIBLE GRIDS ARE MORE AMENABLE TO RENEWABLE ENERGY, THE PRODUCTION OF WHICH IS MORE VARIABLE. THESE IMPROVEMENTS WILL ALLOW US TO MEET REDUCTION TARGETS OUTLINED IN ENERGY PRODUCTION.

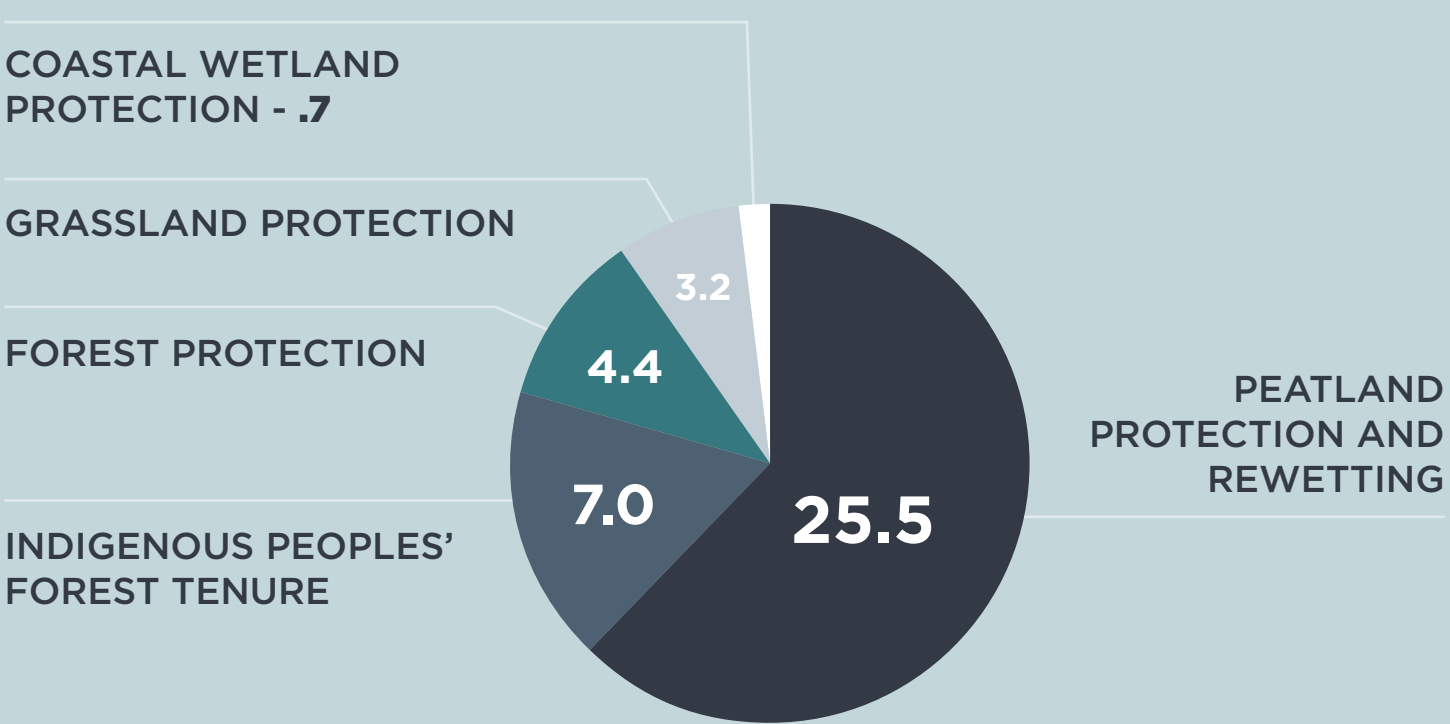
FOOD, AGRICULTURE & LAND USE

ADDRESS FOOD WASTE & DIETS (151.5 CO2-EQ TOTAL)



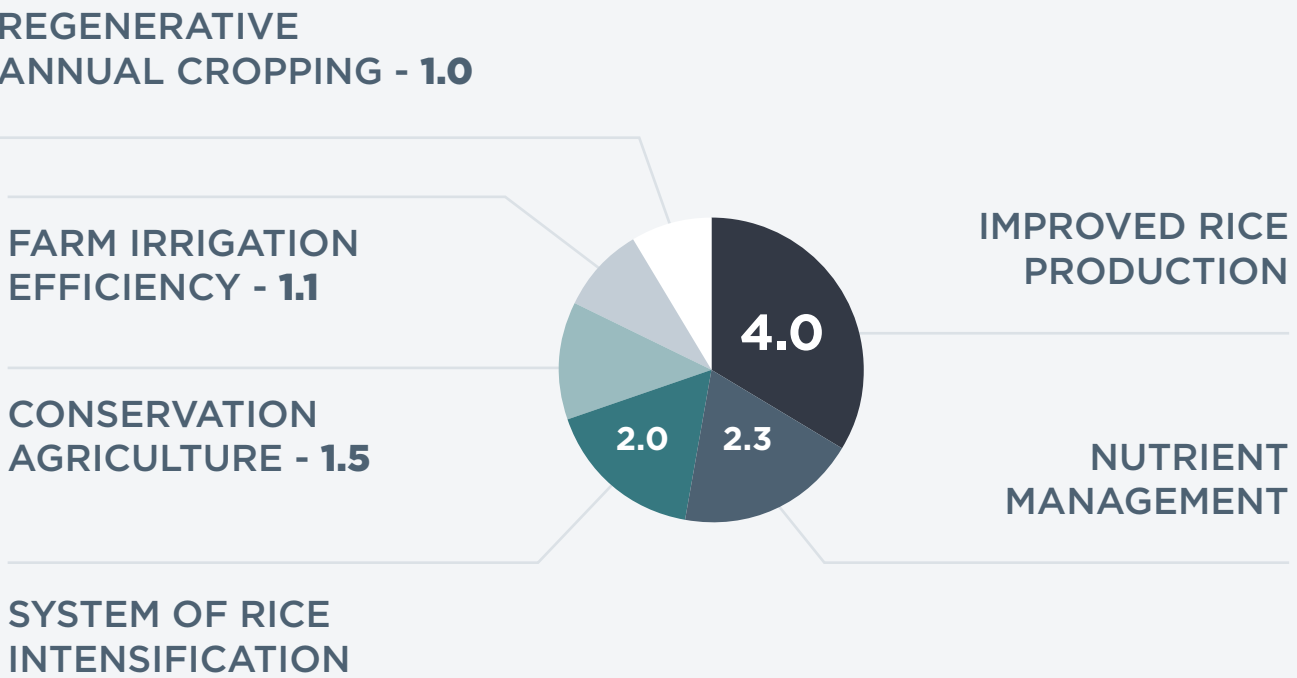
Reducing emissions starts with reducing our food demand. One way to reduce demand without reducing actual consumption is to waste less. Another way to reduce demand is to eat lower on the food chain, opting for plant-based diets.

PROTECT ECOSYSTEMS (40.8 CO2-EQ TOTAL)



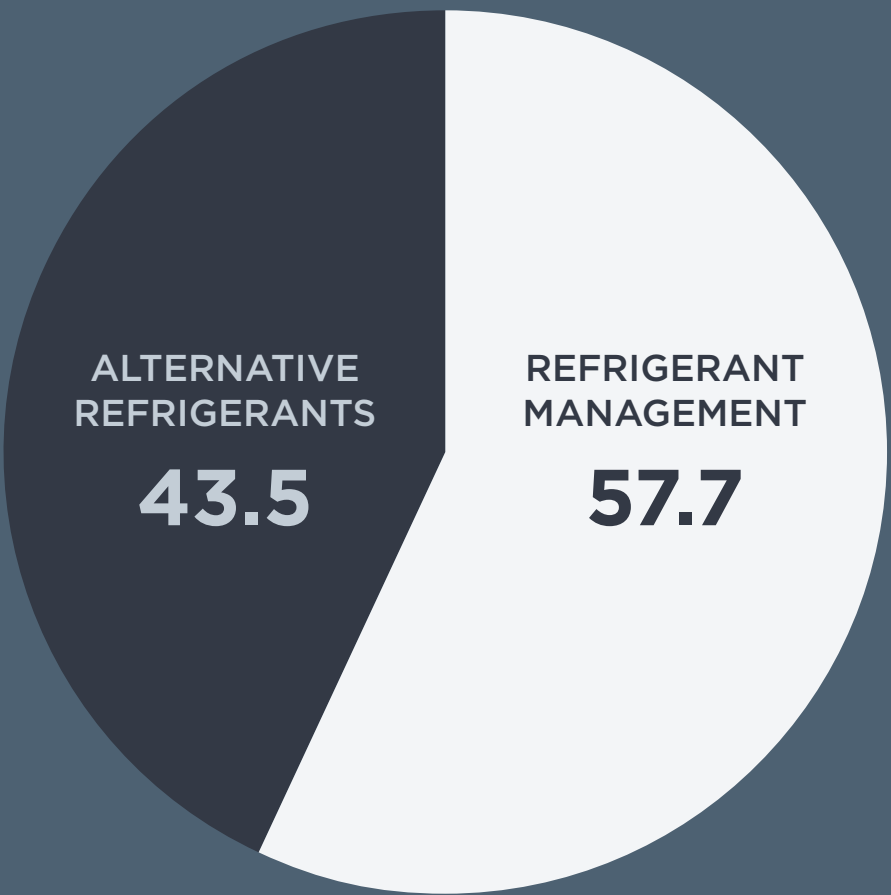
Ecosystems, from grasslands to forests, serve as natural carbon storehouses. Protecting these ecosystems prevents them from being developed or converted to farmland.

SHIFT AGRICULTURAL PRACTICES (11.9 CO2-EQ TOTAL)



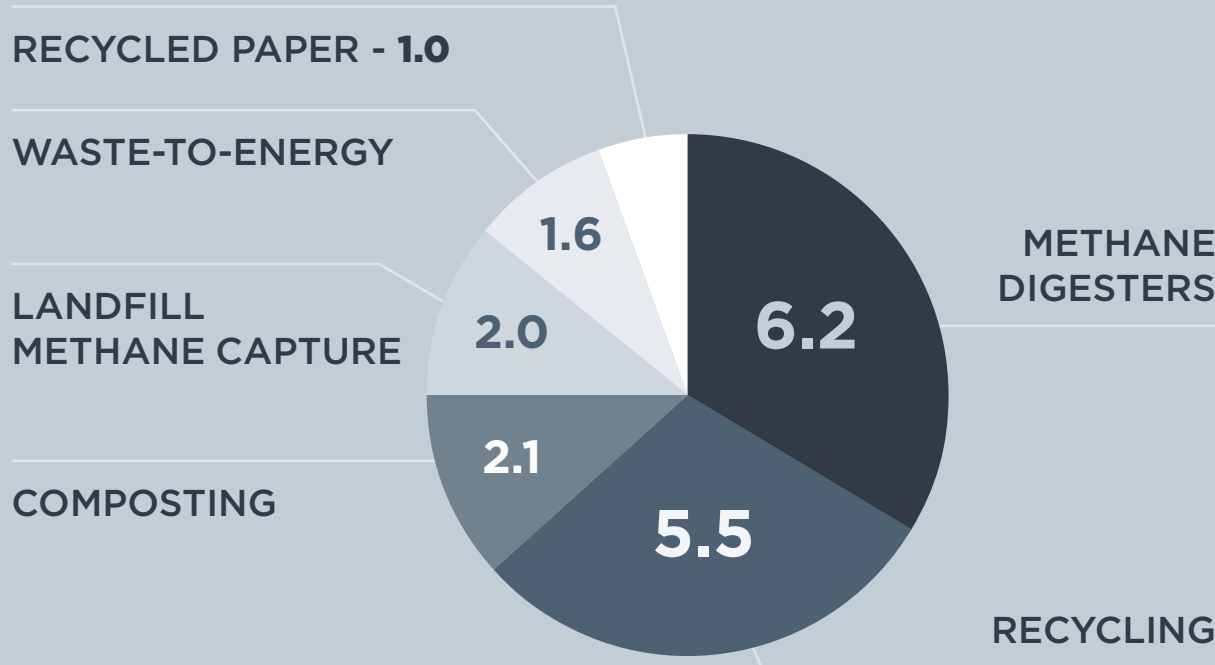
Sustainable agricultural practices - ones that minimize energy and resource usage, and prevent the degradation of soil carbon sinks - can reduce farming's overall GHG emissions.

ADDRESS REFRIGERANTS
(101.2 CO2-EQ TOTAL)



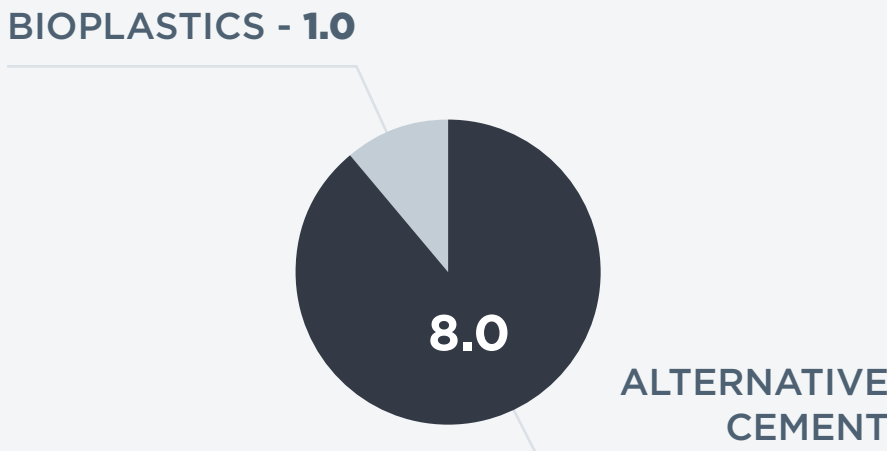
The chemicals used in refrigerators can leak during their use or after their disposal. To reduce this risk, we need to dispose of them safely and ultimately find alternatives to refrigerants.

USE WASTE
(18.4 CO2-EQ TOTAL)



When we repurpose waste, we reduce the use of energy and raw materials.

IMPROVE MATERIALS
(9.0 CO2-EQ TOTAL)

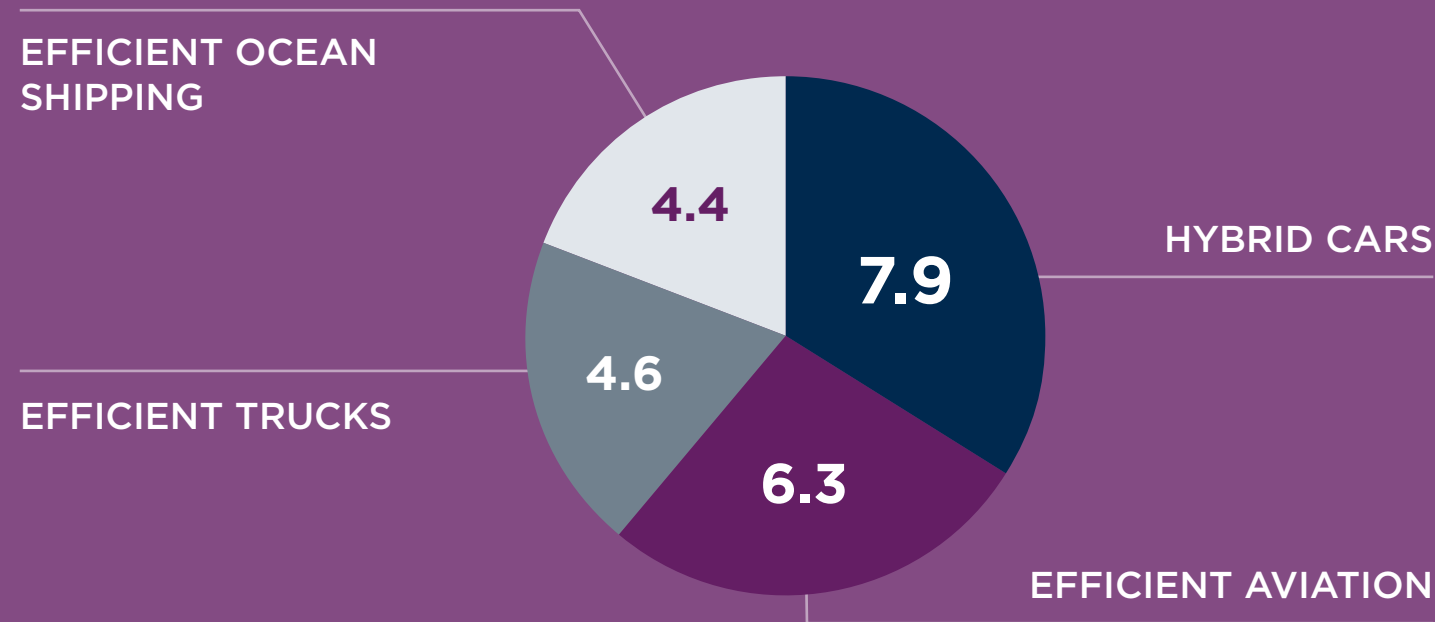


We must replace plastics and metals, created through carbon-intensive processes, with better alternatives.

INDUSTRIES CAN IMPROVE THEIR MANUFACTURING PROCESSES BY ENHANCING PRODUCTION EFFICIENCY AND USING RENEWABLE ENERGY SOURCES TO POWER PLANTS.

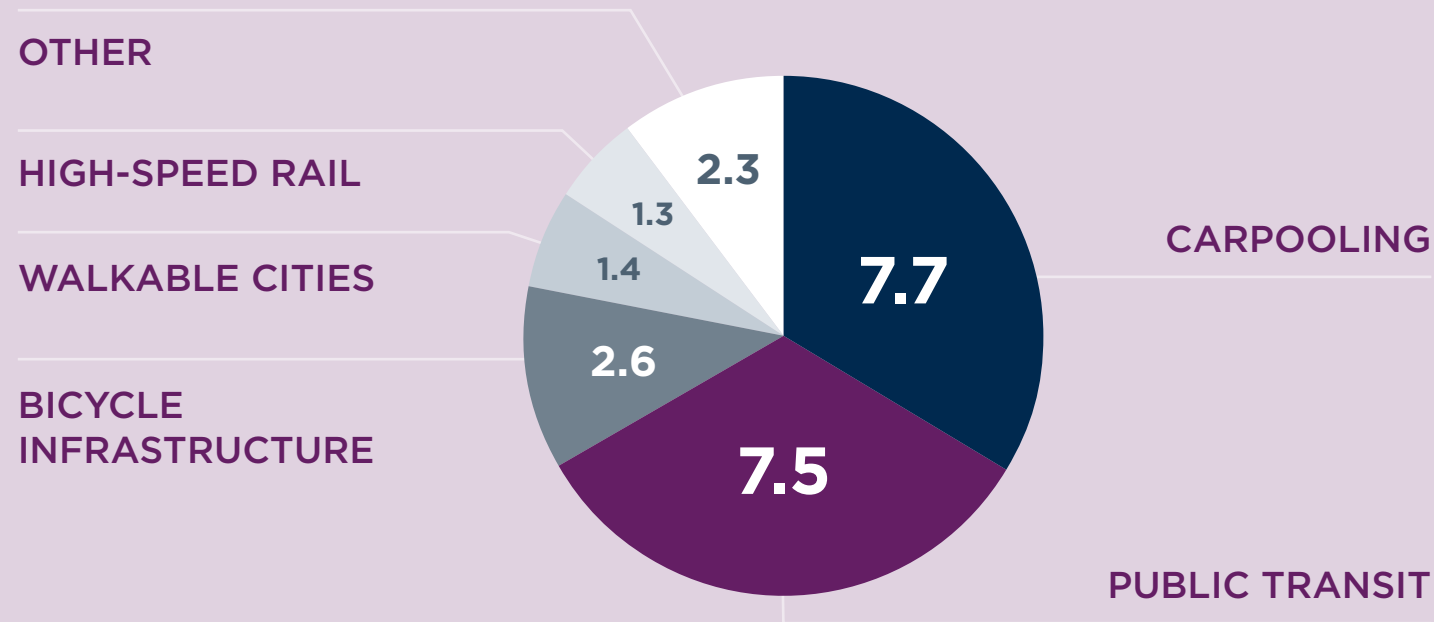
TRANSPORTATION

ENHANCE EFFICIENCY (23.2 CO2-EQ TOTAL)



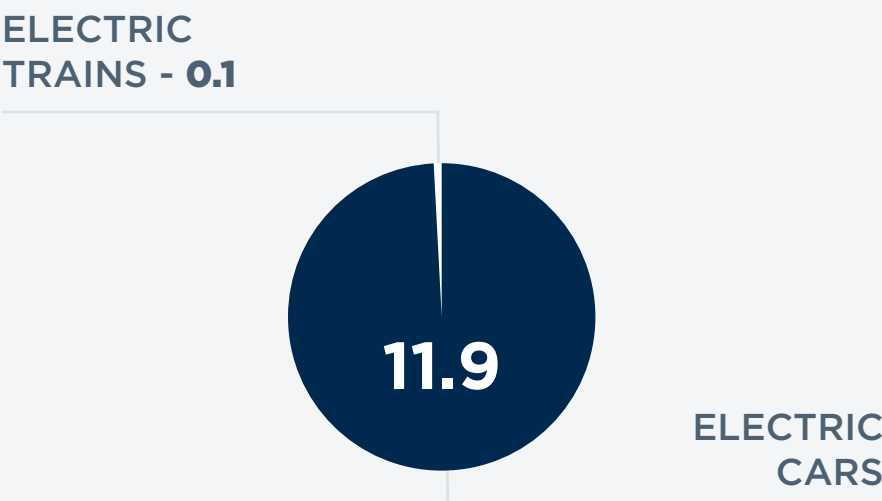
Better design and mechanical improvements can lead to increased fuel-efficiency.

SHIFT TO ALTERNATIVES (22.8 CO2-EQ TOTAL)



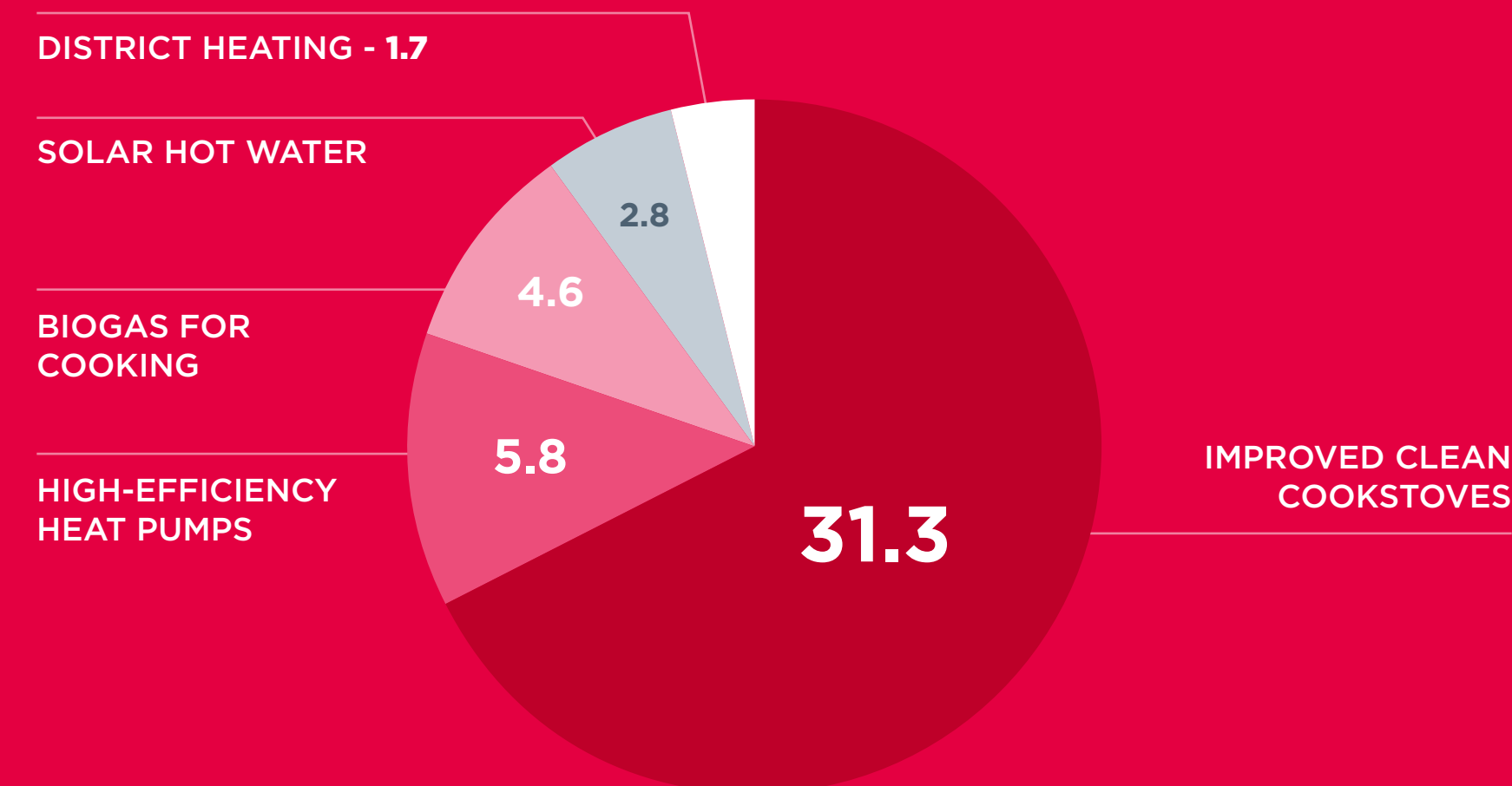
Encouraging public and “pooled” transit, walking, and biking as modes of transport reduces the demand for fossil-fuels.

ELECTRIFY VEHICLES (12.0 CO2-EQ TOTAL)



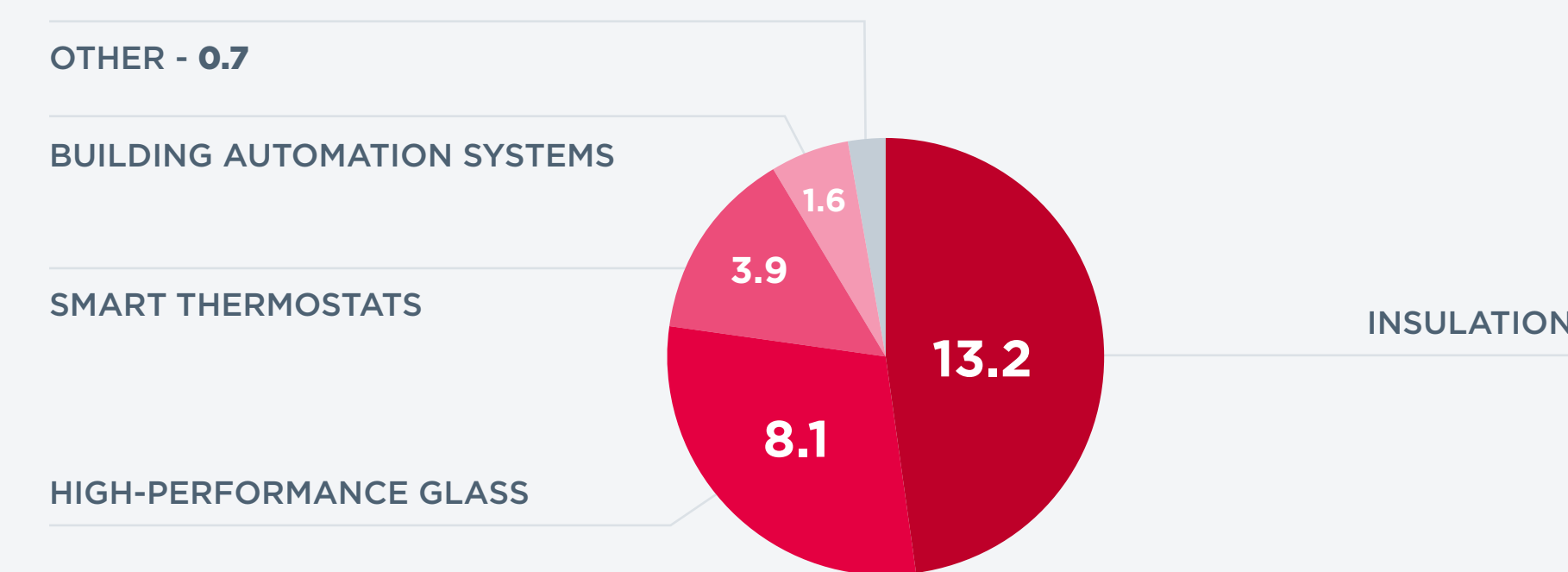
Replacing petroleum with electricity can greatly reduce carbon emissions - especially if the electricity comes from renewable sources.

SHIFT ENERGY SOURCES
(46.2 CO2-EQ TOTAL)



Replacing electricity generated from fossil fuels to electricity generated from renewables can help decrease the emissions associated with heating buildings and water, preparing meals, etc.

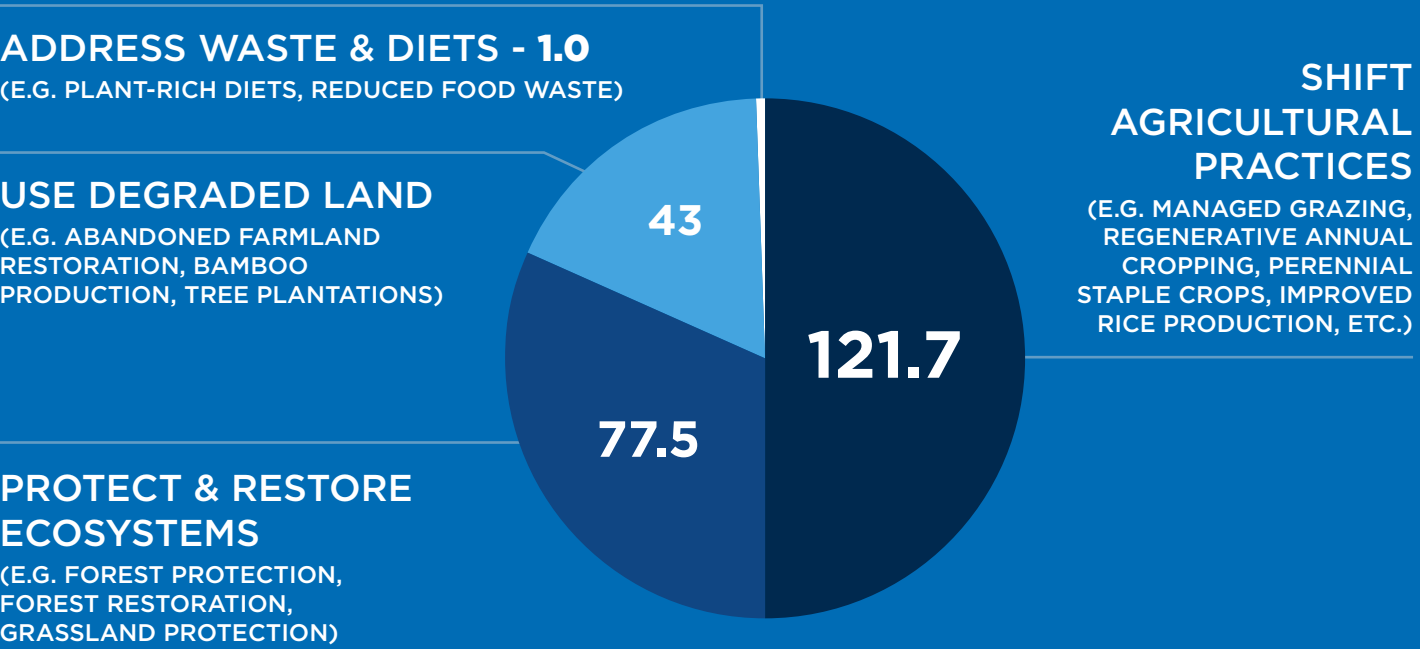
ENHANCE EFFICIENCY
(27.5 CO2-EQ TOTAL)



Enhancing efficiency decreases the total demand for energy, and thus the emissions associated with energy production. Buildings and industry are the two biggest end-users of energy.

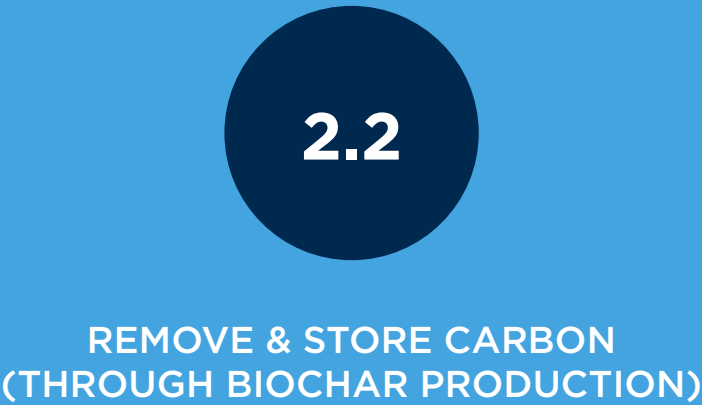
SOME OF THE INTERVENTIONS THAT REDUCE THE SOURCES OF EMISSIONS ALSO WORK TOWARDS CARBON SEQUESTRATION. FOR EXAMPLE, ADDRESSING FOOD WASTE DECREASES DEMAND FOR FOOD, AND AS A RESULT ENERGY, BUT IT ALSO PREVENTS THE DESTRUCTION OF FORESTS THAT ARE NATURAL CARBON SINKS.

LAND SINKS
(243.2 CO2-EQ TOTAL)



Reducing food waste spares farmland from deforestation. Protecting and restoring peatlands and grasslands helps preserve these natural carbon sinks. Regenerative agriculture maintains the quality of soil that sequesters carbon.

ENGINEERED SINKS
(2.2 CO2-EQ TOTAL)



Soil, forests, and oceans are natural carbon sinks. But humans are capable of engineering carbon sinks that can be buried, stored, carbon through innovation. One example is baking biomass into biochar, which can be buried or used to enrich soil.

COASTAL AND OCEAN SINKS
(1.1 CO2-EQ TOTAL)



Protecting and restoring coastal and ocean sinks such as mangroves, salt marshes, and seagrass meadows supports carbon sequestration.

10 MOST EFFECTIVE INDIVIDUAL SOLUTIONS TO REDUCE EMISSIONS

OVERALL RANKING	SOLUTION	TOTAL CO2-EQ (GT) REDUCED/SEQUESTERED (2020-2050)
1	Reduced Food Waste	87.4
2	Health & Education	85.4
3	Plant-Rich Diets	65.0
4	Refrigerant Management	57.7
5	Tropical Forest Restoration	54.5
6	Onshore Wind Turbines	47.2
7	Alternative Refrigerants	43.5
8	Utility-Scale Solar Photovoltaics	42.3
9	Improved Clean Cookstoves	31.3
10	Distributed Solar Photovoltaics	28.0

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