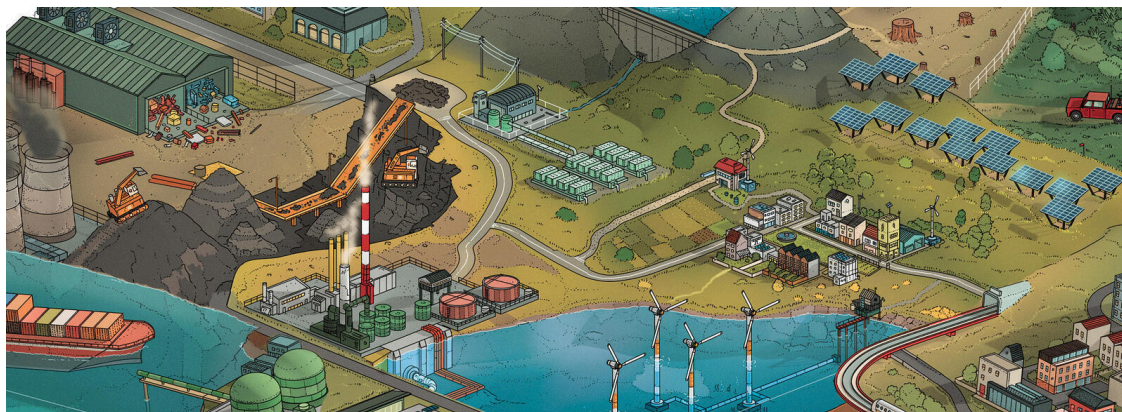


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# Combating climate change

## Humanity's window of opportunity to keep warming below the critical 1.5°C threshold is rapidly closing



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**Issue:** Fall 2023**Illustrator:** Doug John Miller

In 2008, several members of the Alliance of Small Island States (AOSIS)—a coalition of 39 island nations ranging from Barbados to Vanuatu—were already experiencing the devastating effects of global temperature increase: coral bleaching, species extinction, and more regular flooding. AOSIS commissioned a study to better understand these impacts, and the findings clearly showed that global warming of 2°C above preindustrial levels—the broadly accepted global temperature limit at the time—would be catastrophic for these small island states.

So these nations, with the support of climate change-vulnerable African countries, decided to make the case for a 1.5°C limit, setting off a seven-year fight for the lower cap.

A warming cap provides governments and businesses a needed signal to implement climate policies and investment strategies. After years of advocacy by AOSIS and other groups—and organizations such as WWF—1.5°C became the global benchmark, included in the Paris Agreement of 2015 and endorsed by the UN.

In 2018, the Intergovernmental Panel on Climate Change (IPCC), the UN's climate science body, published a comprehensive assessment of a 1.5°C limit. The report clearly set out what's at stake. In a world 2°C warmer than preindustrial levels, 2 billion people would be exposed to extreme heatwaves at least once every 20 years and over 1 billion to drought and desertification. There would also be a 170% increase in flood risk compared to today. Keeping the world under 1.5°C warmer, on the other hand, could lessen the number of people exposed to extreme heatwaves and drought by 1.3 billion and 200 million, respectively, and would mean a 70% lower risk of flooding than in the 2°C scenario.

The relative impacts are just as stark for wildlife and ecosystems. Biodiversity loss would increase from 14% in a 1.5°C world to 18% in a 2°C world. In a 1.5°C world, 70% of the world's coral reefs would be lost by 2050, but virtually all warm water corals would be lost in a world 2°C warmer.

Recently, the IPCC published the Sixth Assessment Report—the most comprehensive assessment of the state of knowledge on climate change drivers, impacts, adaptation, and mitigation solutions in a decade. The report bolstered the findings of the 1.5°C assessment, but also gave us the dire warning that we are running out of time to achieve a cap of 1.5°C—and we must act now to keep this goal within reach. There are solutions available across all sectors that can reduce emissions by over 50% by 2030, an important milestone to limit warming to 1.5°C. But it is challenging. Countries have differing capabilities to act based on their access to money and resources. Some countries and companies are still taking a "you first" attitude, and every moment of delay makes it more unlikely the world will be able to limit warming to under 1.5°C.

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Stephanie Roe, WWF's global climate and energy lead scientist, and a lead author on the IPCC's Sixth Assessment Report, says, "We have all the solutions and tools within our grasp. This decade is critical for ramping up implementation. We need to go bigger and faster to make real change happen in time." In short, we need swift, dramatic, and collaborative action in the years leading up to 2030.

### What contributes to global warming and how do we mitigate the effects?

Here are the five main sectors emitting greenhouse gases and a few of the various solutions needed to limit global warming to 1.5°C.

# Global GHG\* Emissions



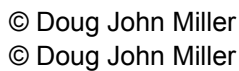
#### Contributing sectors

- **Energy** 34%
- **Industry** 24%
- **Land Use** 22%
- **Transportation** 15%
- **Buildings** 5%

\*greenhouse gas

**Energy 34% of global GHG emissions**

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- E**

**Over 70% of energy systems emissions come from the power sector, which produces electricity and heat.** The remaining 30% come from fugitive emissions due to intentional flaring or venting and unintentional leaks from defective equipment or seal joints in oil, gas, and coal mining; petroleum refining; and biomass energy systems. Despite several international agreements and treaties, the energy sector remains the world's biggest emitter, and its emissions continue to increase.

**F**

1

2

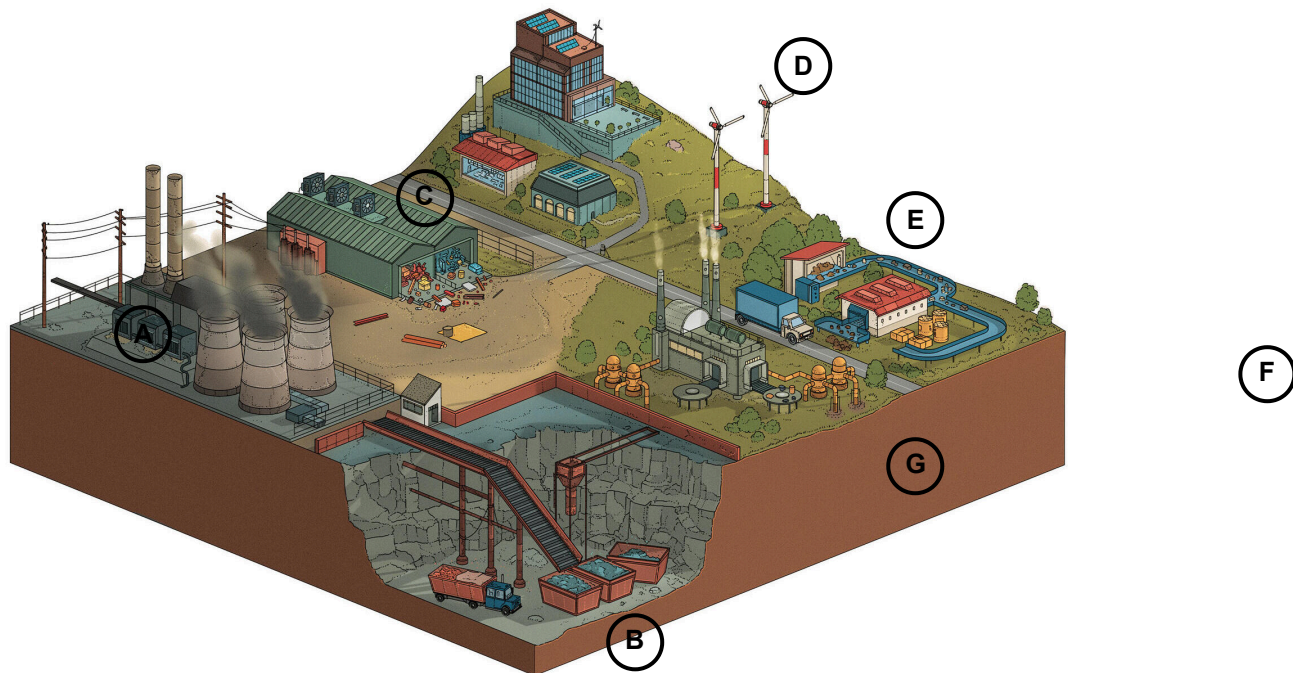
At any moment, 173,000 terawatts of solar energy are hitting the Earth, more than 10,000 times the energy needed to power the planet. Not only does solar energy have the biggest potential to reduce energy emissions, but the industry also employs over a third of the global renewable workforce. Similar to wind, solar energy costs have dropped by over 60% from 2015 to 2020, making it cheaper than fossil fuel-generated electricity.

3 continue to store users

Declining energy demand and land-sea site navigation, efficiency are clear winning solutions for addressing climate change as the rising costs of energy measures that reduce demand in industry, buildings, and land transport along with active control of electricity consumption have the potential to reduce energy-related emissions by about 70%. In 2022, energy efficiency increased by 2%; however, we need it to increase by 4% every year to achieve net-zero emissions in 2050.



## Industry 24% of global GHG emissions



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- A. Iron ore plant
- B. Mining for metals
- C. Factory for goods
- D. Materials innovation center
- E. Onsite wind power
- F. Recycling center
- G. Carbon capture with utilization and storage

The **Renewable Thermal Collaborative**, founded by WWF and partners, aims to cut US industrial thermal emissions by 30% by 2030.

**Producing metals, chemicals, cement, plastics, fertilizers, pulp and paper, textiles, and other commodities—**and the incineration and disposal of waste—generates a massive amount of emissions. The production of cement and iron, steel, and other metals for construction is responsible for almost 10% of global emissions.

### Solutions

1

#### FUEL SWITCHING

Smart fuel-switching policies, like transitioning from coal to renewable energy, can provide up to 40% of the carbon emission cuts needed to reach the 1.5°C goal and can reduce maintenance costs for businesses and factories.

2

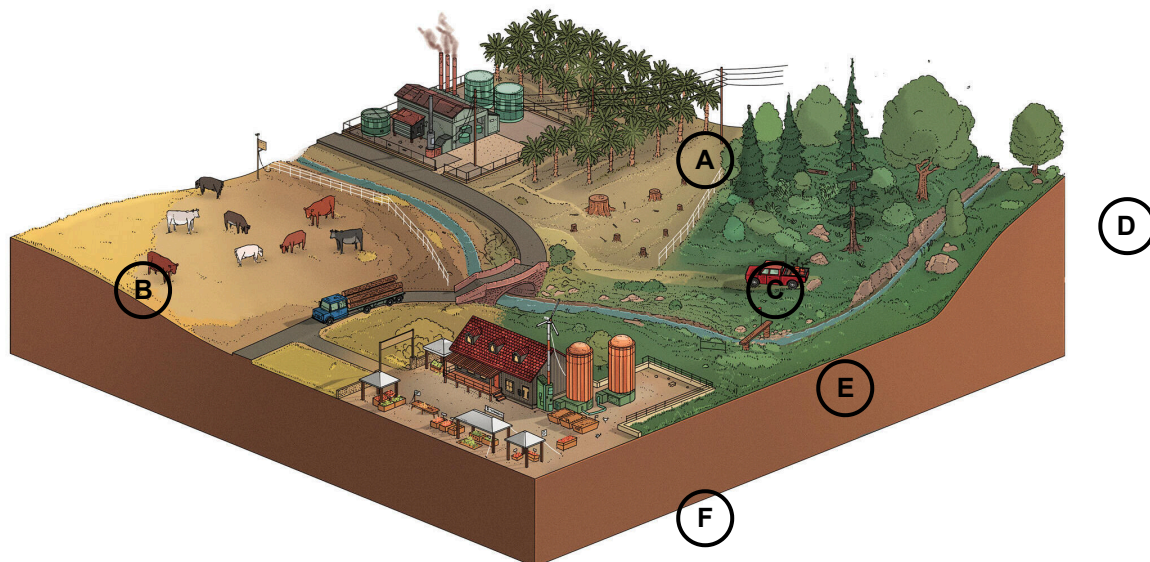
#### TRANSFORMING PRODUCTION PROCESSES

While many technologies exist to take all industry sectors to very low or zero emissions, it will take five to 15 years of intensive innovation, commercialization, and policy change to ensure adoption. If around 40% of mills turn to less-polluting electric arc furnaces, emissions from the world's steel sector could fall by 30% by 2050. The substitution of ground limestone or calcined clay building materials for cement could reduce CO<sub>2</sub>

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emissions by 24% to 50%. And using hydrogen, biogenic, or air-capture carbon and plastic waste as primary raw material for production could greatly reduce total emissions.

## Agriculture | Forestry | Other land use 22% of global GHG emissions



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- A. Palm oil plantation and refinery
- B. Pastureland and livestock
- C. Deforested area
- D. Forest restoration area
- E. Grassland restoration area
- F. Farm with seasonal products

WWF has a long history of combating deforestation and conversion in commodity supply chains, including our **Deforestation- and Conversion-Free initiative** in the Cerrado.

**About half of what is known as land sector emissions comes from agriculture, and the other half comes from land-use change, which includes deforestation, ecosystem conversion and degradation, wetland drainage, and the commercial harvesting of wood.** All of these land-use change examples release carbon emissions. In contrast, agriculture—which includes raising livestock, applying manure and fertilizers, flooding rice paddies, and burning organic materials that come from plants and animals—emits mainly methane and nitrous oxide. The land sector is unique in that it's not just a source of emissions but also an important carbon sink: Currently, the Earth's forests and soil absorb over 30% of all human-made carbon dioxide emissions from the atmosphere.

### Solutions

1

#### REDUCE GHG EMISSIONS AND SEQUESTER CARBON IN AGRICULTURE

Some of the mitigation activities that can reduce greenhouse gas emissions and sequester carbon in agriculture are managing livestock, including reducing methane emissions from cows; using anaerobic digesters to manage manure; improving water management in rice paddies; using perennial crops and plants bred to grow longer roots; rotating crops; increasing the quality of soil cover; and minimizing soil disturbance.

2

#### REDUCE CONVERSION OF NATURAL ECOSYSTEMS

Protecting natural habitats such as carbon-rich forests, wetlands, and grasslands from conversion has the potential to reduce emissions per year by a quantity equal to the annual GHG emissions of the US. In addition to delivering big for the climate, the effective conservation of 30%–50% of Earth's terrestrial,

freshwater, and ocean ecosystems is needed to maintain critical ecosystem services like buffering us from climate impacts (heatwaves, floods, storm surges) and providing us with clean water, biodiversity, and fertile soils.

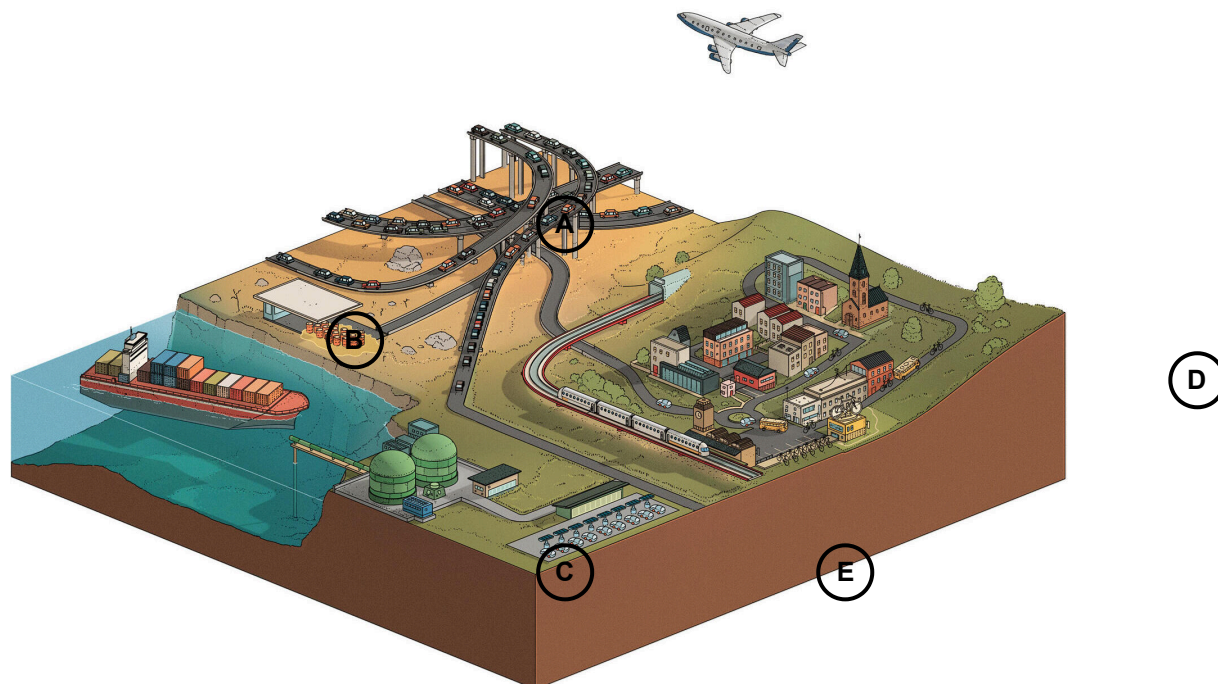
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#### SHIFT TO SUSTAINABLE, HEALTHY DIETS

With science-informed food systems solutions, the world can feed 10 billion people—with lower emissions and without destroying our vulnerable ecosystems. A global transition to eating more fruits and vegetables

and less meat, particularly red meat, has the potential to reduce emissions and improve public health by reducing malnutrition and cardiovascular disease.

## Transportation 15% of global GHG emissions



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- A. Vehicles relying on fossil fuels
- B. Gas station
- C. Container ship and refueling
- D. Town with e-vehicles, mass transit, and bikes
- E. Electric vehicle charging station

The **Sustainable Shipping Initiative** and WWF are working together to find alternative fuels to make possible zero-emission shipping vessels that would eliminate emissions and protect marine animals.

**Globally, 73% of transportation emissions come from fuel used by road vehicles, 11% from planes, 10% from shipping, and 1% from trains.** Due to a global dependence on fossil fuels for transportation, between 1990 and 2021 this type of emissions increased by an average of nearly 1.7% every year. After a brief fall early in the COVID-19 pandemic, transportation emissions returned with a vengeance, increasing by 8% by the end of 2021. In the US, burning gasoline and diesel to power vehicles makes transportation the number one emitter of greenhouse gases.

## Solutions

1

### ELECTRIC VEHICLES

Electric vehicles powered by low-emissions electricity have significant potential to reduce emissions over the course of a vehicle's life. To limit warming to 1.5°C, global sales of electric vehicles must increase from around 5% today to more than 60% by 2030. These chargeable vehicles can have zero tailpipe emissions and the battery parts are recyclable, leading to lower emissions at the end of their life.

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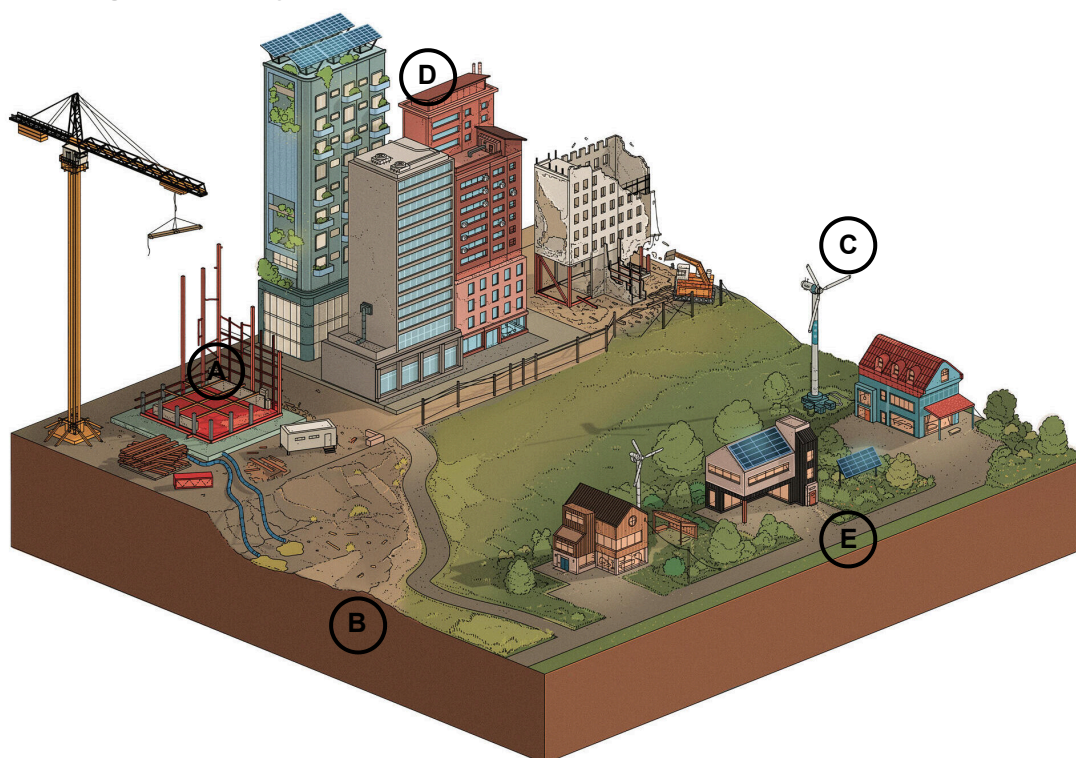
Maritime Organization has committed to cutting emissions by 50% by 2050 and is pushing for renewable fuels, optimized shipping routes, and additional zero-emissions targets.

3

### SHIFT TO LOW-EMISSION MODES OF TRANSPORTATION

Different types of low-emission mobility solutions are necessary for a 1.5°C world. Shifting to walking, biking, public transportation, and electric vehicles could provide up to 67% of the mitigation potential for the sector. We must ensure people have access to high-quality, safe alternatives to passenger cars—options such as high-speed rail or well-designed local bus systems.

## Buildings 5% of global GHG emissions



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- A. Construction site
- B. Waste materials impact
- C. Building demolition
- D. Climate smart building
- E. Sustainably-built homes powered by renewable energy

Through **America Is All In**, a WWF-led coalition, we're promoting the adoption of green building codes and practices across the US.

**Greenhouse gas emissions produced in buildings largely come from energy produced onsite for heating and cooling (gas and coal boilers) and for lighting and cooking (using gas, kerosene, biomass, or other fuels).**

Residential buildings contribute about two-thirds of those emissions, and nonresidential buildings one-third. Increasing population, greater wealth, and lifestyle changes are leading to larger residential floor spaces and higher energy use in buildings—changes that are projected to triple related emissions by 2060.

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**1 EFFICIENT LIGHTING, APPLIANCES, AND EQUIPMENT** Switching to energy-efficient lighting, household appliances, and other devices can make a huge difference in emissions. For instance, using recycled metals like steel or copper in such products takes 60%–90% less energy.

energy than using ores. According to the International Energy Agency, a focus on efficiency in these products could reduce annual energy-related emissions worldwide by 12%.

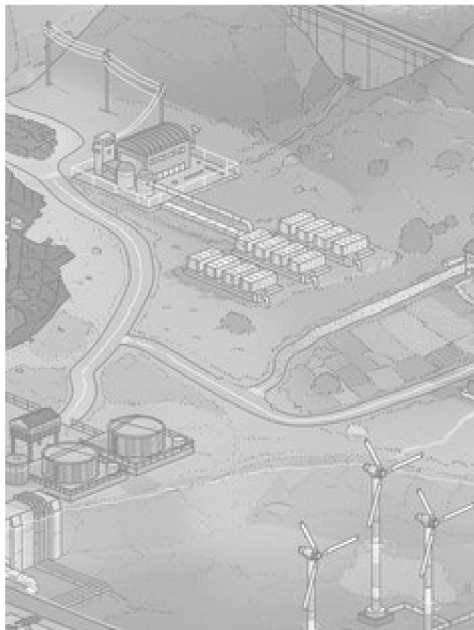
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## CONSTRUCTION AND RETROFIT OF BUILDINGS FOR ENERGY EFFICIENCY

To reach a 1.5°C world, all new construction and building retrofits need to have full electrification powered by low-emission energy sources. Energy efficient solutions like bioclimatic design; robust insulation; high-efficiency heating, cooling, lighting, and appliances; and use of lower-emission or recycled materials are also necessary.

*Source for all sectoral estimates/definitions: Working Group III, IPCC Sixth Assessment Report.*

**Explore more of this issue's coverage of WWF's fight against climate change:**



**Combating climate change**



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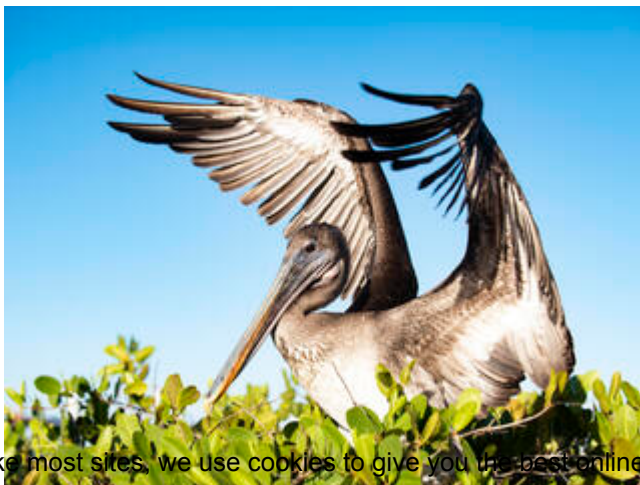
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