

# Impacts of Energy

Electricity is an important part of our everyday lives. But where does it come from, and what impact does it have on our environment?



## Human-generated

**Method:** Converts human mechanical energy into electricity using devices such as treadmills, stationary bikes, or hand-crank generators.

**Impact:** Negligible emissions or waste. The main environmental footprint comes from the manufacturing and disposal of equipment.

## Microbial Fuel Cells

**Method:** Uses microbes to break down organic matter, producing electricity in the process.

**Impact:** This can be a clean process with minimal waste. It may even help in treating wastewater when integrated into wastewater treatment facilities.

## Wind

**Method:** Harnesses wind energy using large turbines.

**Impact:** No emissions during operation. However, manufacturing, transportation, and installation carry some environmental costs. There's also potential harm to bird and bat populations if not properly sited.

## Solar

**Method:** Converts sunlight into electricity, either directly using photovoltaic cells or indirectly using concentrated solar power systems.

**Impact:** No emissions during energy production. The primary environmental costs are from material mining, manufacturing, and panel disposal. Solar farms require land, potentially impacting local ecosystems.



## Tidal

**Method:** Extracts energy from the movement of tides, using turbines placed in tidal streams or barrages across tidal estuaries.

**Impact:** Renewable and emission-free during operation. However, there can be impacts on marine ecosystems and local tidal flow patterns.



## Geothermal

**Method:** Taps into the Earth's internal heat, using steam or hot water from below the surface to drive turbines.

**Impact:** Releases negligible greenhouse gases compared to fossil fuels. Some trace harmful gases might be emitted, and used water can contain minerals and heavy metals.

## Nuclear

**Method:** Uses nuclear reactions, usually fission of uranium or plutonium, to produce heat, which in turn produces steam to drive turbines.

**Impact:** No greenhouse gas emissions during operation. However, there are environmental costs associated with uranium mining, plant construction, and waste management. Potential for catastrophic accidents and long-term waste storage concerns.



## Hydroelectricity

**Method:** Converts the energy from falling or flowing water into electricity using turbines.

**Impact:** While there are no direct emissions, reservoirs can emit methane from decomposing organic matter. Large dams impact river ecosystems, fish migration, and can displace local communities.



## Biofuel/Biomass

**Method:** Burns or biologically processes organic materials such as wood, agricultural residues, or dedicated energy crops.

**Impact:** While considered renewable, burning biofuels releases carbon dioxide. Cultivation can lead to deforestation, biodiversity loss, and compete with food crops.

## Natural Gas

**Method:** Burns natural gas to produce steam that drives turbines or utilizes combustion turbines.

**Impact:** Burns cleaner than coal and oil, producing fewer greenhouse gas emissions and pollutants. However, methane leaks during extraction and transportation are a concern.

## Oil

**Method:** Burns oil to produce steam that drives turbines.

**Impact:** Releases more CO<sub>2</sub> than natural gas but less than coal. Oil extraction can lead to spills, harming marine and terrestrial environments. Refining and transportation also have environmental impacts.

## Coal

**Method:** Burns coal to produce steam that drives turbines.

**Impact:** Significant greenhouse gas emissions and pollutants like sulfur dioxide. Mining practices, especially mountaintop removal, have large ecological impacts.

