

Concept of Green technology

Green technology or environment technology means using science and technology to protect the world's natural resources and mitigate the negative environmental impact of human activity.

Green tech refers to a type of technology that is considered environmentally friendly based on its production process or its supply chain. Green tech—an abbreviation of "green technology"—can also refer to clean energy production, the use of alternative fuels, and technologies that are less harmful to the environment than fossil fuels.

Although the market for green technology is relatively young, it has garnered a significant amount of investor interest due to increasing awareness about the impacts of climate change and the depletion of natural resources.

Green technology is an umbrella term that describes the use of technology and science to create products and services that are environmentally friendly. Green tech is related to cleantech, which specifically refers to products or services that improve operational performance while also reducing costs, energy consumption, waste, or negative effects on the environment.

The goal of green tech is to protect the environment, repair damage done to the environment in the past, and conserve the Earth's natural resources. Green tech has also become a burgeoning industry that has attracted enormous amounts of investment capital.

The use of green tech can be a stated goal of a business segment or a company. These goals are typically outlined in a company's environmental, social, and governance (ESG) statement, or can even be found in the mission statement of a firm. Increasingly, socially responsible investors are looking to narrow down their prospective investments to only include companies that specifically employ or produce green technologies.

Types of Green Tech

Green technology is a broad category that encompasses several forms of environmental remediation. While climate change and carbon emissions are now considered among the most pressing global issues, there are also many efforts to address local environmental hazards.

Some seek to protect specific ecosystems or endangered species. Others seek to conserve scarce natural resources by finding more sustainable alternatives.

Alternative Energy

In order to provide a viable alternative to fossil fuels, many businesses are seeking to engineer alternative sources of energy that do not generate atmospheric carbon. Solar and wind power are now among the most inexpensive sources of energy, and solar panels are affordable to U.S. homeowners at a consumer scale. Other alternatives, such as geothermal and tidal energy, have yet to be deployed at scale.

Electric Vehicles

Nearly a third of U.S. greenhouse gas emissions are released by transportation activities, according to the Environmental Protection Agency.⁴ Many manufacturers are exploring ways to reduce automotive emissions, either by designing more fuel-efficient engines or shifting to electrical power.

However, electric vehicles require a host of innovations in other spheres, such as high-capacity rechargeable batteries and charging infrastructure. In addition, the benefits of electric vehicles are limited by the fact that many power grids still rely on fossil fuels.

Sustainable Agriculture

Farming and livestock have a substantial environmental footprint, from the high costs of land and water usage to the ecological consequences of pesticides, fertilizers, and animal waste. As a result, there are many opportunities for green technology in the area of agriculture. For example, organic farming techniques can reduce the damage due to soil exhaustion, innovations in cattle feed can reduce methane emissions, and meat substitutes can reduce the consumption of livestock.

Recycling

Recycling seeks to conserve scarce resources by reusing materials or finding sustainable substitutes. While plastic, glass, paper, and metal waste are the most familiar forms of

recycling, more sophisticated operations can be used to recover expensive raw materials from e-waste or automobile parts.

Carbon Capture

Carbon capture refers to a group of experimental technologies that seek to remove and sequester greenhouse gases, either at the point of combustion or from the atmosphere. This technology has been heavily promoted by the fossil fuel industry, although it has yet to deliver on those expectations.⁵ The largest carbon capture facility can absorb 4,000 tons of carbon dioxide per year, a minuscule amount compared to annual emissions.⁶

Green technology: a few examples

There's more to **green tech** than solar panels and wind turbines. Here's a list of some popular planet-saving innovations you might not have heard of:

- **Wastewater treatment and water purification** (recycling water to make it drinkable, or clean enough for other purposes)
- **Waste management and recycling** (minimizing landfill and its impact)
- **Waste-to-energy** (burning landfill to generate electricity)
- **Electric transport** (electric cars, trucks, buses, scooters — you name it)
- **Programmable thermostats** (programming temperatures to save energy when you're not home)
- **Self-sufficient buildings** (buildings that produce enough energy to power themselves, generally through solar panels)
- **Low carbon construction** (developing energy-efficient buildings made with green materials and smaller footprints)
- **Carbon capture and storage** (capturing and removing carbon from the atmosphere)
- **LED lighting** (ultra-energy-efficient light bulbs)
- **Vertical farming** (uses less land, less water, and can be set up in cities)
- **Composting** (turning food waste into fertilizer)
- **Wave energy** (using ocean waves to generate electricity)
- **Batteries** (energy storage is crucial in the transition to renewables)

- **Green materials** (local, renewable materials like bamboo, hemp and straw)
- **Carbon tracking software** (yep, that's us — software that calculates your company's carbon emissions)

Defining Green Technology

Green technology, often referred to as cleantech or environmental technology, is the application of science and technology to create environmentally friendly products and services. The ultimate objective of green technology is not just to reduce ongoing harm to our environment but also to repair existing damage and promote regeneration. It encompasses everything done to restore our environment and leverage Earth's natural resources in a sustainable manner.

Spanning from solar panels to advanced waste management systems, green technologies aim not only to lower carbon emissions and conserve natural resources, but also to introduce more sustainable alternatives to traditional practices. Furthermore, they hold the potential to create regenerative solutions that can repair and restore our ecological balance, going beyond mere mitigation to foster a more resilient and flourishing environment.

For instance, renewable energy sources like solar and wind power help reduce dependence on fossil fuels, ultimately decreasing greenhouse gas emissions and combating the part of the triple planetary crisis relating to climate change. Similarly, innovations in sustainable agriculture, such as vertical farming and the utilization of biochar, help conserve land and water resources while increasing food production. Biochar, a charcoal-like substance produced by pyrolyzing agricultural and forestry wastes, not only minimizes contamination but also safely stores carbon, providing a further contribution to climate change mitigation. The diverse range of green technology examples showcases the versatility and potential of these environmentally friendly solutions in addressing the complex aspects of the global challenges we face.

Green Tech vs. Clean Tech vs. Environmental Tech

While the terms green tech, clean tech, and environmental tech are often used interchangeably, they have distinct focuses. Green tech encompasses any technology that is environmentally friendly or sustainable, aiming to reduce our overall impact on the environment. On the other hand, clean tech focuses on improving environmental performance, often by making production processes more efficient and eco-friendly.

Environmental tech, sometimes referred to as climate tech, is specifically geared towards addressing issues caused by human-induced climate change. This can include technologies for

reducing greenhouse gas emissions or adapting to the consequences of a changing climate, such as sea-level rise and extreme weather events.

By understanding the nuances between these terms, we can better appreciate the diverse range of solutions that green, clean, and environmental technologies offer in addressing our planet's most pressing challenges.

The Evolution of Green Technology

The history of green technology has roots deeper than one might initially suspect, stretching back to the era of the Great Depression. The Soil Conservation Act of 1935, established in the United States on April 27, 1935, formed the Soil Conservation Service. This was a response to the devastating Dust Bowl of the 1930s, when intense dust storms resulted from poor farming practices and heavy equipment use. This service was designed to control floods, prevent impairment of reservoirs, maintain the navigability of rivers and harbors, protect public health, public lands, and relieve unemployment.

While the concept of environmental protection was nascent, it became more formalized with the establishment of the Environmental Protection Agency (EPA) in 1970, following a surge in public concern for the environment after World War II. Green technology evolution was initiated when scientists began recognizing the environmental impacts of coal-burning factories in the early 1990s. Since then, the sector has continuously evolved, fueled by social movements, organizations, and government policies advocating for sustainable development. This journey highlights the adaptive and reactive nature of green technology in response to the environmental crises we face.

Modern green technology encompasses a wide range of innovative solutions, from renewable energy sources like solar and wind power to waste management and recycling systems. As public awareness of environmental issues continues to grow, the demand for green tech is also increasing. These advancements have the potential to reshape industries, create new jobs.

Green Energy

What is Green Energy?

Green energy is any energy type that is generated from natural resources, such as sunlight, wind or water. It often comes from renewable energy sources although there are some differences between renewable and green energy

Green energy plays a key role in the energy transition due to its low environmental impact. It offers an alternative to non-renewable energy and helps fight global warming by not producing greenhouse gases or increasing carbon emissions.

As a source of energy, green energy often comes from renewable energy technologies such as solar energy, wind power, geothermal energy, biomass and hydroelectric power. Each of these technologies works in different ways, whether that is by taking power from the sun, as with solar panels, or using wind turbines or the flow of water to generate energy.

In order to be deemed green energy, a resource cannot produce pollution, such as is found with fossil fuels. This means that not all sources used by the renewable energy industry are green. For example, power generation that burns organic material from sustainable forests may be renewable, but it is not necessarily green, due to the CO₂ produced by the burning process itself.

Green energy sources are usually naturally replenished, as opposed to fossil fuel sources like natural gas or coal, which can take millions of years to develop. Green sources also often avoid mining or drilling operations that can be damaging to eco-systems.

Types

The main sources are wind energy, solar power and hydroelectric power (including tidal energy, which uses ocean energy from the tides in the sea). Solar and wind power are able to be produced on a small scale at people's homes or alternatively, they can be generated on a larger, industrial scale.

The six most common forms are as follows:

1. Solar Power

This common type of renewable energy is usually produced using photovoltaic cells that capture sunlight and turn it into electricity. Solar power is also used to heat buildings and for hot water as well as for cooking and lighting. Solar power has now become affordable enough to be used for domestic purposes including garden lighting, although it is also used on a larger scale to power entire neighbourhoods.

2. Wind Power

Particularly suited to offshore and higher altitude sites, wind energy uses the power of the flow of air around the world to push turbines that then generate electricity.

3. Hydropower

Also known as hydroelectric power, this type of green energy uses the flow of water in rivers, streams, dams or elsewhere to produce electricity. Hydropower can even work on a small scale using the flow of water through pipes in the home or can come from evaporation, rainfall or the tides in the oceans.

4. Geothermal Energy

This type of green power uses thermal energy that has been stored just under the earth's crust. While this resource requires drilling to access, thereby calling the environmental impact into question, it is a huge resource once tapped into. Geothermal energy has been used for bathing in hot springs for thousands of years and this same resource can be used for steam to turn turbines and generate electricity.

5. Biomass

This renewable resource also needs to be carefully managed in order to be truly labelled as a 'green energy' source. Biomass power plants use wood waste, sawdust and combustible organic

agricultural waste to create energy. While the burning of these materials releases greenhouse gas these emissions are still far lower than those from petroleum-based fuels.

6. Biofuels

Rather than burning biomass as mentioned above, these organic materials can be transformed into fuel such as ethanol and biodiesel.

Green Energy	Source	Technology	Use
Solar energy	Sun	Photovoltaic, thermosolar	Electricity, heating, cooling
Wind power	Wind	Wind turbines	Electricity
Hydroelectric energy	Water	Hydroelectric plants	Electricity
Geothermal energy	The Earth	Surface geothermal systems and heat pumps	Electricity, heating and cooling
Bioenergy	Biomass	Biomass combustion, biogas plants, biofuels	Electricity, heating and cooling, transportation

What is the difference between renewable energy and clean energy?

Renewable energy comes from resources provided by nature - the wind and sun being the most obvious examples. Clean energy is energy that produces little or no pollution. It includes renewables, but it also includes nuclear energy and the carbon-neutralising impact of technologies like carbon capture and sequestration (CCS).

For example, nuclear energy is clean because it is decarbonized and does not emit greenhouse gases into the atmosphere. However, this energy is not renewable because uranium, its fuel, is a limited resource.

Advantages of green energy

Green energy has many advantages including:

- Clean energy;
- Inexhaustible energy source;
- No carbon emissions of greenhouse gases;

- Energy independence;
- Self-sufficient;
- Sustainability;
- Environmentally-friendly and slows down climate change.