

Proposed Solution #1: Plant-Rich Diets

Eating a plant-rich diet means eating 2 oz or less of meat and under 2250 calories a day. This solution also includes buying locally grown fruits and vegetables when you can. If 50%-75% of people on Earth ate a plant-rich diet by 2050, this solution would reduce our carbon imbalance by 25-34%.



How this solution works:

This solution would cut 1.4-2.3 gigatons of the 9 gigaton carbon imbalance per year by eating more plants and less meat. A lot of farmland is used to grow grain to feed livestock that people eat (e.g., beef, chicken, pork). If we eat less meat, we need less land to grow the grain. Also, if we can turn some of this farmland back into forest, this solution could cut up to 3.1 gigatons of the 9 gigaton imbalance. This solution can be started by anyone simply by eating more plants instead of meat at their next snack or meal.

How this solution would impact my family and community:

Meat can be expensive, so buying less meat can save some families money. Eating a plant-rich diet can also mean that more money goes to local produce farmers. People who eat plant-rich diets tend to eat less calories and weigh less. This means that eating a plant-rich diet can help make our communities healthier and reduce healthcare costs for everyone. However, there are some problems with trying to eat a plant-rich diet. Not everyone can buy fresh produce in their area. Eating a plant-rich diet may mean that supermarkets or stores would need to be built in some neighborhoods where it's hard to find fresh fruits and vegetables. Some families may also find it difficult to eat less meat because many families expect meat at each meal. Eating less meat could have a negative effect on cattle, dairy, fish, chicken, and other livestock farmers and ranchers jobs, even though it could help other farmers that grow vegetable and fruit crops.

How this solution will impact the environment:

Almost anyone can take small steps to change what is on their plates. This solution would mean less animals are killed for food. It would also protect any forest land that would have to be cleared in the future to raise livestock. Less land will also have to be used to produce grain for livestock. Clearing less land would also help maintain biodiversity.

Proposed Solution #2: Reducing Food Waste

We grow a lot of food, and roughly 30-40% of the food we grow is not eaten. This means the resources, such as the land to grow the food, the energy used to farm the food, the use of fertilizer, the human labor and the transportation of that food are being wasted. If 50-75% of food waste is reduced by 2050, this solution could reduce our carbon imbalance by 3.8%-7%.



How this solution works:

Reducing food waste could cut 0.34-0.63 gigatons of the 9 gigaton carbon imbalance per year. Food waste happens because of 2 main reasons. Some people throw out food because it goes bad before they can eat it. Other produce does not go to stores or people do not buy them because it looks strange compared to other produce. If weird shaped produce does not bother you or you could eat more fresh produce before it goes bad, this is a good solution. Anyone can reduce their food waste. To start doing this solution, some time would have to be spent by families, restaurants, and other places that serve food to better plan weekly meals so that the food is not wasted.

How this solution would impact my family and community:

Reducing food waste can save some families up to 30% off of their normal grocery bill! For some people to start making less food waste, they would need better food storage, such as a refrigerator or a cellar. People would also need to be able to access fresh food more easily, which can be difficult in some cities and small towns. There are companies that are working to reduce food waste by selling people the “ugly” produce that stores would normally throw in the trash. By buying produce from these companies, people can reduce the amount of food being produced, shipped, and wasted. This could negatively affect people who work in the shipping, growing, and packaging of those foods.

How this solution will impact the environment:

This solution could be done by almost any family, but it would make the most impact on families who throw out a lot of food on a regular basis. This solution would allow for more natural space where farmland once grew food and could help bring back wildlife into those areas.

Proposed Solution #3: Carpooling

Carpooling, or ridesharing, is when people who are heading the same direction share a ride together. Sharing rides leads to less fuel used per person. If people in cities share a ride with at least 2 other people per trip, our carbon imbalance could be reduced by 3.8%-7%.

How this solution works:

Carpooling regularly could cut 0.15-0.26 gigatons of the 9 gigaton carbon imbalance per year. Carpooling works best when a person who normally rides alone shares a vehicle with 2 or more people. Some cities have created special carpool lanes to encourage carpooling. Anyone carpooling can use these carpool lanes to get to their locations faster. Anyone almost anywhere can carpool, but carpooling makes a bigger difference in cities. Some people do not carpool because finding someone to carpool with can take a bit of time and effort. Carpooling also requires people to be reliable and on time. Some people also just prefer to ride alone.



How this solution would impact my family and community:

Ridesharing can save money. If a family of 3 that normally drives their own cars rode in the same car, they could save an average of \$2,000 on gas a year. However, as gas gets cheaper and larger cars also become cheaper, more people are choosing to drive their own cars. Some ridesharing companies make it easy to share a ride with someone else. Ridesharing would mean less fossil fuel use, which could also hurt the jobs of some people who work with fossil fuels. Some people also don't want to "pool" rides because they feel it is less safe.

How this solution will impact the environment:

People are less likely to throw trash out of their cars when others are watching. That means that carpooling can help cut down on littering. If we carpool, there are less cars on the road. This can also lead to fewer animals being hit by cars. Cities and businesses can also have more green spaces around their buildings because people would need less parking spots. This means that more animals could return to these spaces.

Proposed Solution #4: Electric Cars

Electric vehicles run on electricity instead of fossil fuels. If we increase the number of people who own electric cars by 16-23%, we could reduce our global carbon imbalance by 4.4%-5.8%.

How this solution works:

This solution would cut 0.4-0.5 gigatons of the 9 gigaton carbon imbalance per year. Right now, there are over 1 million electric vehicles being used. Some people may believe that electric cars are not better for the environment. This is because the energy used to charge them might come from fossil fuels. But, even when the electricity comes from fossil fuels, electric cars still make 50% less emissions than a gas car. If the energy to charge them comes from solar power, the electric cars cause 95% less emissions than a gas car. There can be some issues with using electric cars. While electric cars are available, some types can be hard to find. Many people cannot easily go buy a new car, making this solution harder to do for many people. It will take years or even decades for everyone to start driving electric cars. Some people also do not like the way electric vehicles look and do not want to buy an electric car.



How this solution would impact my family and community:

Electric cars generally cost more than gas cars (about 30% more expensive in the United States). Charging stations would also have to be added to homes and businesses. Electric cars don't need oil change and other services like a gas car, but the batteries cost much more than a battery for a gas car. Electric cars also generally travel shorter distances than gasoline cars. Right now, electric cars don't make as much sense to own as a gas car for anyone that drives long distances. Buying electric cars also causes problems for people who work in fossil fuels.

How this solution will impact the environment:

Electric vehicles do not generally require oil changes, spark plug replacements, or other maintenance that can lead to pollution. When compared to gas cars, electric cars are much better for the environment.

Proposed Solution #5: Onshore Wind Turbines

Wind turbines on the land can be used to replace power that was once made by fossil fuels. If land wind turbines make 19.6–29.6% of the world's electricity by 2050, this solution could reduce our global carbon imbalance by 17.4%–54.4%

How this solution works:

Onshore wind turbines could cut 1.6–4.9 gigatons of the 9 gigaton carbon imbalance per year. Wind turbines use the wind to turn large blades twice the size of semi trailers in the air. This blade turning makes power that can be used by anyone. Wind turbines are built in groups called wind farms. Wind farms already exist in many windy locations. Some people are against wind farms. Many people do not want the turbines to block their views or be in their backyards. Because some people do not like them, it can make getting a wind farm built very difficult. Wind turbines also only work well in windy areas.



How this solution would impact my family and community:

Wind turbines are expected to be the cheapest way to make energy in the next 10 years. This would mean that wind farms would be cheaper to use than fossil fuels. Wind farms also take less than a year to build. Wind turbines can cost several million dollars a piece. This means that electric companies can afford wind turbines, but they are very expensive for a regular person to own, even the smaller ones. Wind farms require special skills to take care of them. Wind turbines also need less people to take care of them than fossil fuel power plants. This means that not everyone who works at a fossil fuel power plant could find work at a wind farm. Those workers would need to find new jobs or be retrained to work on wind farms.

How this solution will impact the environment:

Wind farms need to be built in wide, open, windy spaces. Wind turbines take up less space than a fossil fuel plant, and the land around them can still be used for farming or other purposes. Wind farms also do not emit carbon like fossil fuel plants. Wind turbines also cause less noise pollution. These machines do not cause cancer or other harm to humans. It is also rare that birds are hurt by the blades. Wind farms are much more friendly to the environment than fossil fuel plants.

Proposed Solution #6: Silvopasture

A silvopasture is a pasture used for raising animals that also has trees. These pastures with trees capture 5-10 times more carbon dioxide than a wide open field. If 40-50% of ranchers turn their land into silvopasture by 2050, this solution could reduce our global carbon imbalance by 9.8-15.6%.



How this solution works:

Turning grazing land into silvopasture could cut roughly 1.1 gigatons of the 9 gigaton carbon imbalance per year. Silvopasture is not a new idea.

People have used forests and other areas for animals to graze for centuries. Silvopasture is easy to do if your land already has trees where animals can graze. However, growing young trees into adult trees in now-open fields would take years.

How this solution would impact my family and community:

If you do not already have silvopasture land, it can be expensive to create. First, the animals on the land would have to be moved so trees could be planted. Newly planted trees have to grow to a height where livestock would not eat and kill the trees. After the trees have grown, the animals could use the land again. Waiting for trees to grow can mean less farmland to grow the animals. This means that ranchers would have to raise less animals while the silvopasture trees were growing. This could temporarily make them less money. Once the trees are grown, livestock can use the pasture again. The rancher could also sell any food made by the trees. This means that after the trees are adults, the farmer would make more money from his land than by just selling livestock. Silvopasture can increase the profits of the rancher in the long run. Converting land to silvopasture would also not have any large impacts on jobs.

How this solution will impact the environment:

Silvopasture can only be added to fields in more moist areas. Places like some grasslands in the midwest may be too rocky. They might also lack the soil, humidity, or water needed for trees to grow. By adding back native trees to a field, silvopasture can also help increase biodiversity. Tree shade, reduced runoff, and root uptake also help reduce the effects of flooding and droughts.

Proposed Solution #7: LED Lighting at Home

LED light bulbs are much more energy efficient than incandescent light bulbs (i.e., regular light bulbs). If we can change 90-95% of the world's household light bulbs to LED by 2050, we could reduce our global carbon imbalance by 3.8-4%.



How this solution works:

Using LEDs would cut 0.3-0.35 gigatons of the 9 gigaton carbon imbalance per year. In the past, incandescent bulbs have gotten very hot and converted a lot of electricity into heat. LED light bulbs use about 90% less energy than an incandescent bulb and use most of their energy to make light instead of heat. Many people already use LED lighting in their homes. This solution would require people to change their bulbs to LED lighting. Some families may want to wait for their current bulbs to burn out before replacing them, while others may replace them all at once.

How this solution would impact my family and community:

LEDs can cost up to 6 times more than incandescent bulbs but they last 10 times longer. This means it will cost less to use LED bulbs over time. Using LED light bulbs would have only a small impact on jobs. These LED light bulbs may look different than incandescent bulbs, but when they are turned on, most people hardly notice the difference. Some states are even asking people to use more efficient light bulbs and require that stores only sell LEDs.

How this solution will impact the environment:

LED light bulbs can be used almost anywhere. By using these bulbs in schools, businesses, and other places, we can reduce our carbon emissions even more. Throwing out these bulbs may have an impact on the environment if they are put in the regular trash. Check to see how to get rid of your LEDs when they have stopped working. Some LEDs cannot be thrown out with regular trash and have to be disposed of like computers and other appliances.

Proposed Solution #8: Rooftop Solar Panels

Right now, roughly 0.5% of the world's power comes from solar panels that can be found on the roofs of homes and businesses. If we can generate 13.5-14.2% of the world's energy from rooftop solar panels by 2050, we could reduce our global carbon imbalance by 10.4-25.4%.



How this solution works:

Rooftop solar panels could cut 0.9-2.3 gigatons of the 9 gigaton carbon imbalance per year. These solar panels convert sunlight into electricity. The energy is either stored by batteries or sold to the local electric company. This solution has been around for over a decade. Anyone who wants to install solar panels can use them. The rooftop solar panels work well in very sunny locations. If the weather is cloudy or dark, the solar panels may not make enough power for the home. In that case, electricity would be used from a power plant. It can take up to 4 months for solar panels to be added to rooftops. This is because the city and power company need to approve the solar panel plan and then the panels have to be installed.

How this solution would impact my family and community:

Home solar panels can cost between \$15,000-\$25,000. People can get about 20% of their money back in some states when they do their taxes. Solar panels seem expensive, but they can reduce or get rid of the need for electricity made by power plants. In very sunny places, some power plants end up paying homeowners for their extra electricity! Since most solar panels are installed by professionals, they also have to be maintained by professionals. Solar panels can last 25-30 years. Using more solar power would mean that we would need less fossil fuels. This means that those who work in the fossil fuel industry would have to find new jobs. Some people also think that solar panels do not look good on houses and do not want to add them to their roofs.

How this solution will impact the environment:

Making a solar panel takes a lot of energy. This energy is made mainly from fossil fuels. Solar panels are also made with chemicals that can be dangerous for the environment if they are not thrown away correctly. Solar panels can also be difficult to recycle. While solar panels may overall be better than fossil fuels, they require a lot of energy and resources to produce.

Proposed Solution #9: Recycling

Recycling involves turning already-used items into items that can be used again. If all families were to recycle 68% of the products that can be recycled, we could reduce our global carbon imbalance by up to 2.6%.

How this solution works:

Recycling 68-70% of recyclable items could cut up to 0.24 gigatons of the 9 gigaton carbon imbalance per year. Recycling works by taking items that can be recycled and sending them to a location where they are broken down to be reused. Recycling is already happening in many communities, schools, and homes. Almost anyone can recycle. To start recycling, families first need to figure out if their community has a recycling program. If the community does recycle, then the family would have to pick out the materials to be recycled and get them to the right location.



How this solution would impact my family and community:

In some communities it can cost extra money to have recycling collected by the trash companies. In other cities recycling is free. Recycling creates more jobs than the jobs it takes to get rid of the trash at the landfill. Recycling also reduces waste in landfills. Many people like this because they do not like the look or smell of landfills. Recycling can help keep areas clean, but some people do not like the look of a recycling bin in their homes. There are also some communities that do not have ways for people to recycle. This means that there is nowhere to take the recycling, so people cannot recycle. While recycling is good to do, recycling facilities can be expensive to maintain, and not everything can be recycled.

How this solution will impact the environment:

Recycling can help the environment by reducing water pollution. Recycling can also reduce the amount of fossil fuels needed to make new plastics and other materials. Some people believe that recycling fills up to $\frac{1}{3}$ of landfill space. If less space is used in the future for landfills, that leaves more space for plants and animals. Recycling can also help to keep pollution out of the oceans.

Proposed Solution # 10: Tropical Forest Reforestation

Tropical forest reforestation is when land that has been cleared is turned back into tropical forests. If 622,000 to 892,000 square miles of land is turned back into tropical forests, we could reduce our global carbon imbalance by 20.1-31.5%.



How this solution works:

Turning at least 56% of cleared land back into tropical forests could reduce up to 1.82-2.84 gigatons of the 9 gigaton carbon imbalance per year. This would involve planting new tropical forest plants and trees on land that has been cleared for logging and other industries. There is already a global push to start reforesting areas that were once tropical forests, but this solution only happens in tropical regions. Tropical reforestation can take time to get back the land from those who are using it for other purposes. It also takes time for the trees to grow and start pulling large amounts of carbon out of the atmosphere.

How this solution would impact my family and community:

Goods and products that were once produced on the reforested land may increase in price. Time and money would have to be spent protecting the forest areas from people who want to use the land. Many people who live in these areas rely on the wood and cleared land for their jobs. To help with these people, some countries are paying them for their land and helping them find new jobs. Costa Rica is a great example of this. The country turned their reforested areas into a place for tourists to visit. Nowadays many people who once worked the cleared land can make money off of tourists.

How this solution will impact the environment:

While this solution can only be used in tropical forest locations, many groups take donations to plant trees in the tropical forests. Tropical reforestation allows for biodiversity to return in some areas, reduces erosion, and can help reduce the effects of floods and droughts.

Proposed Solution # 11: Reducing Plastic Use

Making plastics adds 1.8 gigatons of carbon dioxide to the atmosphere each year. It is believed that people will want to increase plastic use in the future, making this number even higher than 1.8 gigatons. If everyone would reduce their plastic usage by 20% we could reduce our global carbon imbalance by 4%.



How this solution works:

Reducing plastic use by 68-70% could cut up to 0.36 gigatons of the 9 gigaton carbon imbalance per year. Most plastics are made from fossil fuels. Plastics also take energy made from fossil fuels to make. This means that fossil fuels are used in many steps of the plastic-making process. Replacing or buying less plastic products can be done by anyone.

How this solution would impact my family and community:

Plastics are cheap to make and easy for companies to use. Most of the things we use are made of plastics. The world uses more and more plastic each year. Some estimates say that we will use 4 times the amount of plastic by 2050. Ending plastic use for most people is unrealistic. Plastics are in almost every part of our lives. Reducing the amount of plastic we use would potentially mean that some people would lose their jobs. But, if single use plastics are reduced and more plastic is recycled, the recycling process would create more jobs. Replacing plastic use by doing things like using glass containers instead of plastic containers, using reusable bags instead of plastic baggies, and bringing your own shopping bags, can mean more work for the consumer. Some people do not want to reduce their plastic use because plastics are easy to use. Reducing plastic use also can mean making the decision to buy items in packaging that might cost more at the store.

How this solution will impact the environment:

Anyone anywhere can reduce their plastic use. They just have to plan ahead and pay attention to what they are buying and how it is packaged. Plastics contribute to pollution and are bad for the environment. By reducing plastic use, there would be less waste ending up in our oceans and landfills, and less land mined for natural resources.

Proposed Solution # 12: Artificial Trees

Artificial trees (i.e., machines that act like trees) will be able to pull carbon dioxide out of the atmosphere. By building 10 million artificial trees, this could reduce our global carbon imbalance by 12%.

How this solution works:

Building 10 million artificial trees could cut up to 1.1 gigatons of the 9 gigaton carbon imbalance per year. Artificial trees pull carbon dioxide out of the air 1,000 times faster than a living tree. One tree design has panels about the size of a car on top of poles. The panels hold a special kind of material that traps carbon dioxide. Another tree design has pools of electrified water and other chemicals that pull carbon dioxide from the air. As the water catches the carbon dioxide, it would also release oxygen.

Currently, these trees only exist in labs and are not available for use in the real world. We also do not know how long it will take to build them or the cost. However, the world makes 80 million vehicles a year, so they could be made quickly if making artificial trees was a top priority.



How this solution would impact my family and community:

This solution is expected to be one of the most expensive solutions to our carbon imbalance. The trees will probably have to be taken care of by professionals. This, in turn, could create jobs by teaching people how to build and maintain these artificial trees. Another concern about artificial trees is that they are not as nice looking as real trees. Some people may not want the artificial trees in their neighborhood because of how they look. The large panels might also block some people's views.

How this solution will impact the environment:

Some people have suggested building the trees in deserts and other areas where trees do not normally grow. Other people have suggested putting them on roadsides to capture emissions from vehicles. We do not know what impact these trees will have on the environment. The trees will probably take fossil fuels to build and make. Mining and other resources will probably be needed to build the parts of the trees. The use of these trees, however, would offset any fossil fuel use needed to produce the trees. We do not know how the trees would affect wildlife, but they could be comparable to solar panels or wind turbines.

Proposed Solution #13: Alternative Cement

The main ingredient in regular cement is “clinker” made from limestone. Making clinker for cement causes 5-6% of greenhouse gas emissions. By changing the main ingredient from clinker to something else, carbon emissions could be reduced by 2.9-5.9%.



How this solution works:

If we reduce the amount clinker in cement, we could reduce 0.27-0.53 gigatons of the 9 gigaton carbon imbalance per year. Normal cement is made when limestone is heated and turned into clinker. This process releases carbon dioxide. Carbon dioxide is also created by the burning of fossil fuels to get energy to make cement. Some cement companies are trying to use less clinker and more of other cement-making materials. The most promising solution is using the carbon dioxide emitted from power plants to make other materials to use instead of clinker. If we could collect emissions from power plants and reuse them in concrete, this would get us a 90% reduction in emissions. Some companies are using materials other than clinker, but it is not widely available yet. To use this clinker alternative, building regulations for cement would have to be updated. Using this alternative to make cement is not accepted yet by most building regulations.

How this solution would impact my family and community:

Using cement with the clinker substitute appears to be cheaper than normal cement. It appears to be just as easy to use as regular cement, so families and companies would not have to pay extra to use this special cement. Switching to the special cement would reduce the need for people who work to make clinker, but would make jobs for turning emissions into the special cement. The special cement is also whiter and brighter than normal cement, and some people like the look of the whiter special cement.

How this solution will impact the environment:

Right now, cement made with the clinker substitute isn't allowed for large construction projects in a lot of cities and countries. People need to do more to figure out if the new cement will work just as good as the old way of making cement. By using the new special cement, less limestone would need to be mined, making this solution more environmentally friendly.

Proposed Solution #14: Planting Trees

A fully grown tree can pull roughly 48 lbs of carbon dioxide out of the atmosphere a year. That is twice what a car will emit on average a year. If every person on the planet planted one tree, we could reduce carbon dioxide emissions by 2-6%.

How this solution works:

Planting one tree a person (for 7.5 billion people on the planet) could offset our emissions by 0.16-0.54 gigatons per year. The space for the trees would fill 72,000 square miles—roughly the size of North Dakota.

Right now, there is an effort called the “One trillion trees initiative” meant to conserve and restore 1 trillion trees by 2030. So far, several countries, including the United States, are working on meeting this goal. Even after these trees have been planted, trees take a long time to grow. A tree planted today may not take a lot of carbon out of the atmosphere until 2030 or 2040.



How this solution would impact my family and community:

Planting a tree from a seed can cost around \$0.10. To plant an older tree can cost \$50-100, but it can also trap carbon dioxide faster than a seedling. If local, state, or national governments buy and grow large amounts of trees at once the cost is much lower. Planting trees is easy, and planting trees helps create jobs. Some companies have even started to plant trees in areas where planting trees would pull carbon out of the air faster, like in the rainforests. Many people like trees in yards and parks, and most people enjoy having trees around their communities.

How this solution will impact the environment:

Tree planting can be done anywhere that trees can grow roots in soil. Most people assume that planting trees of any kind is good for the environment. This is not always true. Planting trees that are non-native can reduce biodiversity in some places. If you plant a tree, the tree should be a tree that normally grows in your area. Planting trees normal for your area might slow the capture of carbon dioxide, but it is better for the plants and animals in our area.

Proposed Solution #15: Smart Thermostats

Smart thermostats learn the behaviors of their owners and adjust the temperatures to be as energy efficient as possible. If 58-63% of households use smart thermostats, this could reduce our global carbon imbalance by 2.6-2.7%.

How this solution works:

Using smart thermostats could cut up to 0.23-0.25 gigatons of the 9 gigaton carbon imbalance per year. When a person is away from home, the smart thermostat will adjust to save energy and money. Before the person comes home, the thermostat will automatically switch to a comfortable temperature. Smart thermostats can also be controlled by smartphone apps, so temperatures can be adjusted when people are away from home. Smart thermostats can be bought online and at most home stores, and most people can install a smart thermostat themselves.



How this solution would impact my family and community:

Smart thermostats range anywhere from \$100-\$500 but can save the average household around \$130 a year on utility costs. Currently, 3% of people globally use a smart thermostat. Smart thermostats require an internet connection to control, and many people around the world do not have internet or central heat and air. Many homes are still heated by fire (fireplaces or wood stoves) or other methods. For more people to use a smart thermostat, more homes around the world would need to have internet and different heating and cooling methods. Smart thermostats are mostly made outside of the United States, so not many jobs would be directly made or lost by making smart thermostats. Since it helps families use less energy, this may eventually have small impacts on those who work in the fossil fuel industry. Many people like the modern look and convenience of smart thermostats.

How this solution will impact the environment:

Smart thermostats have no direct impacts on wildlife.