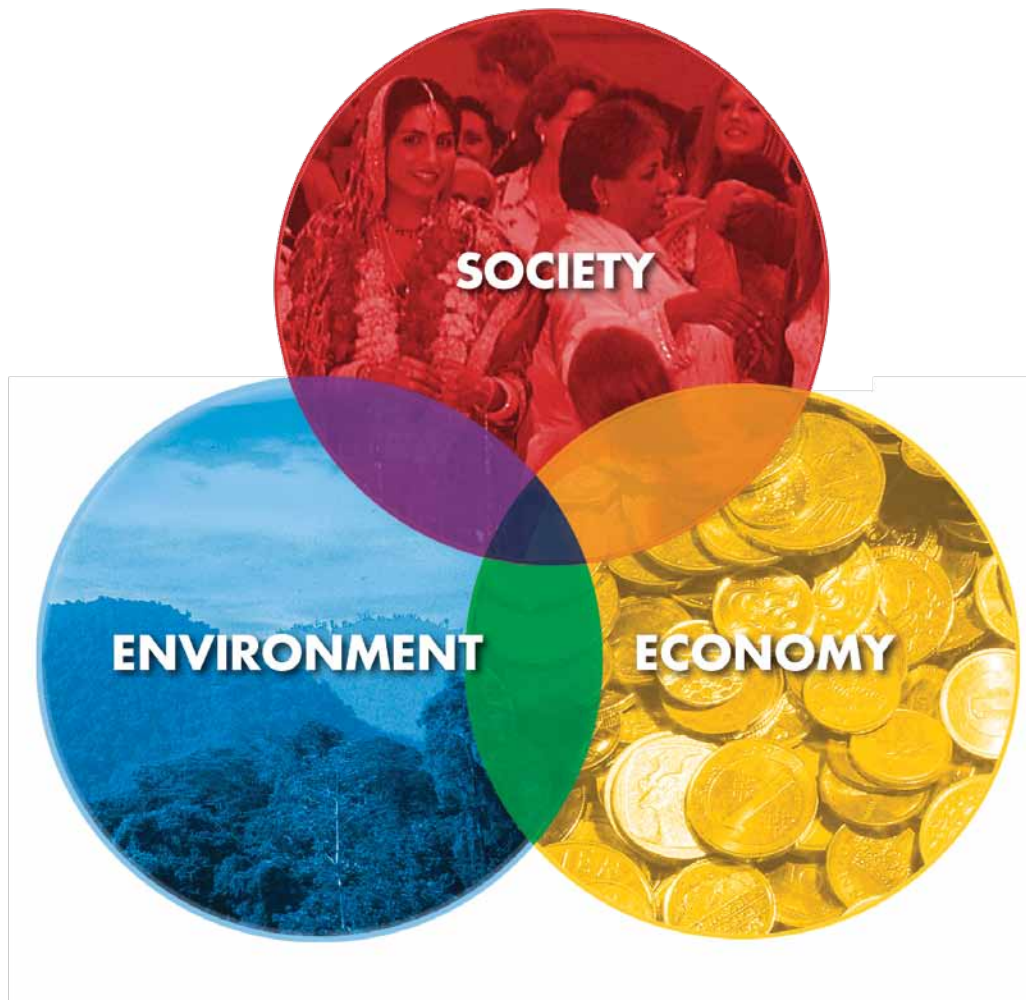


# Components of Sustainability



## Society

- How are people's lives affected?
- How are cultures affected?
- Do some people benefit at the expense of others?

## Environment

- How are living organisms affected?
- How are air, water, and soil affected?
- What is the long-term impact on the environment?

## Economy

- How are local, national, and international economies affected?
- What is the cost-benefit?
- Is there a long-term economic gain for people and communities?

## Group A: Crude Oil

I am a **MARINE BIOLOGIST**. I study organisms that live in the oceans. Crude oil drilling like the kind that happens off the coast of Texas and Louisiana worries me. Oil rigs that house the machinery used to drill for petroleum in the ocean floor can be damaged by hurricanes, causing crude oil to spill into ocean waters. There is also a risk of spills when oil is transported by ship from one place to another. When oil enters a marine ecosystem, it can be disastrous. Aquatic birds, mammals, and fish can all become covered in the thick oil leading to death in some cases. Even when crude oil is extracted safely, its use has been linked to climate change, which also impacts our oceans. Climate change causes oceans to become warmer and more acidic, endangering sensitive species like coral.

I am an **OIL COMPANY SPOKESPERSON**. I believe that crude oil is the most efficient fuel source for our nation's transportation needs. We already have the technology and infrastructure in place to use crude oil for creating diesel, gasoline, and jet fuel. By drilling off the coast of the United States, we reduce our need for foreign oil. This is much safer than relying on oil from countries that may have unstable governments. Very few accidents have occurred in recent years, demonstrating the safety of the oil drilling industry. Plus, it provides many jobs in the United States.

I am a **ROUGHNECK ON AN OIL RIG**. It's a tough job, but it pays well. You have to be in good shape to work on an oil rig, that's for sure! I help to set up and carry out the drilling. I'm responsible for maintaining the pipes that carry the oil; I constantly check to make sure there are no leaks. I also help with mechanical maintenance, like making sure the engine is working right. Our rig runs all the time, so I work long hours. My family wishes I spent more time at home. Every once in a while I hear about an accident where a rig blew up or about a storm that sank a rig into the ocean. Those accidents can be fatal for the crew on the rig. I hope I can keep working on the oil rig, though, because it offers good wages for people who don't have college degrees or specialized training. All of the factory jobs in my hometown have been moved overseas, so this job is even more important now.

I am an **ALTERNATIVE FUELS INVESTOR**. I fund research on alternative fuels so that we can do all the things we love to do without relying on crude oil. While most people think the only way we can move our cars is with gasoline that comes from crude oil, I have found that there are quite a few other options that could be affordable and profitable. Creating biofuels from biomass is one option. Though biofuels create air pollution like gasoline does, their feedstocks absorb carbon dioxide from the atmosphere when they are regrown. This helps to offset the carbon dioxide emitted into the air and could help fight climate change. Or, perhaps electric cars could be the wave of the future, especially in places where electricity is provided by renewable fuel sources like wind power. All you need to do to power an electric car is to recharge its batteries after use. Another possibility is hydrogen fuel cells. These amazing devices convert hydrogen and oxygen into water, producing electricity in the process.

### Group B: Sugarcane

I am an **INDIGENOUS PERSON** whose family has lived in the same forest in Brazil for hundreds of years. We use the land to grow cassava, corn, beans, and squash. In recent years, different groups have wanted to use our land to grow sugarcane instead. Sugarcane farmers and landowners have occupied our land and cut down our forests, forcing many of us off the land. This has had a major impact on our way of life and driven many indigenous families into poverty. Without other options, some of us are forced to work on sugarcane plantations for low wages. This exhausting manual labor involves cutting down sugarcane with a machete for up to 12 hours a day.<sup>4</sup> The forests where we live provide indigenous people with the resources to support ourselves and maintain our culture. We must protect our land.

I'm a **CAR OWNER** from Brazil. Just a few years ago, my government introduced flex fuel vehicles and I purchased a car. These flex fuel vehicles run on either gasoline blends or pure ethanol made from sugarcane. I can now choose the type of fuel I want at the gas station. Like most of my friends and family, I choose sugarcane ethanol because it's affordable and I've read research on how it's also good for the environment. Because of demand from consumers like me, approximately 90% of cars made in Brazil today are flex fuel vehicles.<sup>5</sup>

I'm the **CEO OF A BIOFUEL COMPANY** based in Brazil. Sugarcane ethanol is the most environmentally safe fuel source for our country's transportation needs. In 1975, the National Ethanol Program helped to increase the use of ethanol in Brazil.<sup>6</sup> These days, my company collaborates with aviation and automotive companies, crop technology developers, biofuel producers, government representatives, and environmental agencies to create more efficient biofuels. Biofuels have had a positive impact on Brazil's economy. Sugar and ethanol production represent 3% of the gross domestic product. There are significantly more jobs available than there were when Brazil produced oil.<sup>7</sup>

I am a **FARMER** in Brazil. In the past, farmers like me used to provide corn, beans, and coffee to local markets. However, in the past three decades, things have changed dramatically. During the 1970s, a sugarcane mill came to our community to create biofuels that could replace oil. In theory, this was a great way to limit our dependency on oil; however, I've seen the impacts on my community and the environment. Sugarcane production has almost entirely replaced food production. Forests were cut down in order to plant large areas with this monocrop. This area was once rich in fauna and flora, but now it is barren. Less and less land is available for farming and food prices have increased significantly. The sugarcane mills use heavy machinery to prepare land, causing soil erosion.<sup>8</sup> Sugarcane mills surrounding our community spread pesticides by airplane and we have seen health impacts like asthma, lung disease, and cancer. Environmentalists have also shared how we are losing carbon stocks when the forests are cut down.

## Group C: Corn

I am an **ETHANOL PLANT WORKER** in Minnesota. A few years ago, hundreds of ethanol plants were created in states that grew lots of corn. This was an exciting time because these plants offered jobs to so many people. Small towns that had suffered economically in the past were finally starting to do well. Overall the ethanol industry employs approximately 200,000 people. Because of biofuels like ethanol the United States also saves \$2 billion a year due to reduced oil imports.<sup>9</sup> In the last couple of years, I've been concerned about my job security. Droughts throughout the Midwest have meant smaller corn harvests. I've heard that a few ethanol plants have started to shut down. Hopefully my job won't be threatened, but the excitement around ethanol production has certainly decreased in recent times.

I am a **FARMER** in Iowa. Because I grow corn, in recent years I've benefitted from government incentives to promote biofuels. As part of the Farm Bill passed in 2002, the government provides subsidies for growing corn. In other words, the government pays farmers to grow corn—\$20 billion each year, in fact. The government subsidizes corn in large part because it is used to make biofuels. Within a short time, it looks like 50% of all corn crops will be needed to create biofuels.<sup>10</sup> Other government policies, like the Energy Policy Act of 2005, also help support more corn production. The Act states that billions of gallons of ethanol must be blended in vehicle fuel each year.<sup>11</sup> Biofuel producers in the United States who buy my corn also get extra support from the government. There is a tariff on the import of biofuels from other countries, making it difficult for foreign companies to enter the U.S. market.<sup>12</sup>

I am an **ECONOMIST** from the World Bank who studies international poverty and development. I have analyzed trends in biofuel production in recent years. United States produced approximately 13.7 billion gallons of ethanol recently which is almost nine times the amount it produced in 2000.<sup>13</sup> By 2010, 6% of global grain consumption went to U.S. biofuel production and 40% of corn grown in the United States was used for ethanol. Because of increasing demand for biofuels, there has been greater competition for land to grow biofuel crops in place of food crops. Food prices have started to go up, resulting in more hunger around the world. My recommendation is that the United States uses the parts of corn that are not needed for food. Biofuels can also be created from corn stalks to produce cellulosic ethanol which can save food parts for human consumption. However, this is a more complex process that is not yet as economical as using corn starch.<sup>14</sup>

I work for the **U.S. DEPARTMENT OF ENERGY**. We are working to reduce the U.S. dependence on oil imported from other countries. If these countries were to stop producing oil then we would be in a tough place. We want to make sure that the United States has strong energy security, meaning the country has a constant and reliable supply to meet our energy needs. One way to do this is to create our own biofuels from crops like corn. By investing in biofuels within the United States, we can increase the domestic production of transportation fuels, help build rural economies by creating more jobs, and decrease the environmental impacts of the energy we use. In partnership with the U.S. Department of Agriculture, we have decided to invest \$41 million in projects to help grow the biofuels industry.<sup>15</sup>

## Group D: Woody Biomass

I am **LOGGER** in Washington state. I make my living by harvesting trees. In the past, these trees were used for all sorts of things everyone needs, like furniture, construction materials, magazines, tissues, and toilet paper. Lately, there has been an increased demand to use the biomass from forests, wood process industries, and recycled wood products for the purpose of creating biofuels. This has increased job opportunities for people in my community. Loggers believe it is important to maintain a healthy forest industry. Forests are home to 90% of the biodiversity on land.<sup>16</sup>

I am a member of a **TRIBAL GROUP** that has lived near the same Pacific Northwest forest for hundreds of years. The forest provides us with food, shelter, and medicines. Trees are one of our most valuable natural resources and have great cultural significance. When we make decisions regarding how we share this natural resource, we consider many factors: our economic needs, our society and culture, and the impact on the environment. Our tribe manages approximately 255,000 acres of forestland. We take great pride in being stewards of the land. We are working with a number of different groups to consider how the waste wood found throughout our forests could be used as a viable option for the biofuel industry. If more of our fuels came from woody biomass, it could help to greatly support employment for our tribes.<sup>17</sup>

I am a representative of the **AVIATION INDUSTRY** in the northwestern United States. We are working with different groups like the Navy, Air Force, and university researchers to help develop sustainable biofuels. One of the universities we work with has been given a \$40 million grant to focus on creating sustainably grown wood energy crops for transportation fuels.<sup>18</sup> Our hope is that the creation of alternative biofuels would give us a choice about fuel. Right now, the only option we have is petroleum-based jet fuel. Woody biomass is abundant in the Pacific Northwest region and this resource provides an opportunity for us to create sustainable biofuels. We believe that transitioning to the use of biofuels will help to support local economies by creating jobs and meeting a growing consumer demand.

I am an **ENVIRONMENTAL SCIENTIST**. I study the impacts of increased woody biomass use for biofuels. Using woody biomass residues for energy is using biomass that would have typically been burned or decomposed. Using them for biofuels avoids uncontrolled air pollutant emissions from open burning. However, this does raise a concern about the sustainability of removing residues from the forest. If residues become this valuable and profitable, will too many be removed therefore impacting forest soil health? Bioenergy producers say they will rely only on residues and not on entire trees, but rising prices could mean a shift in forest practices to shorter more intensive harvest rotations if whole trees are used. This could have impacts on carbon storage, wildlife habitat, and water quality.

# Is It Sustainable?



**Group Members:** \_\_\_\_\_

**Feedstock:** \_\_\_\_\_

1. What are the environmental impacts of extracting this resource?

\_\_\_\_\_  
\_\_\_\_\_

2. Overall, is this feedstock **environmentally** sustainable?

a. Why, or why not? \_\_\_\_\_

\_\_\_\_\_

b. How could it be made more sustainable? \_\_\_\_\_

\_\_\_\_\_

3. How does the use of this feedstock affect local and national economies?

\_\_\_\_\_  
\_\_\_\_\_

4. Overall, is this feedstock **economically** sustainable?

a. Why, or why not? \_\_\_\_\_

\_\_\_\_\_

b. How could it be made more sustainable? \_\_\_\_\_

\_\_\_\_\_

5. How does the use of this feedstock impact people and communities?

\_\_\_\_\_  
\_\_\_\_\_

6. Overall, is this feedstock **socially** sustainable?

a. Why, or why not? \_\_\_\_\_

\_\_\_\_\_

b. How could it be made more sustainable? \_\_\_\_\_

\_\_\_\_\_

7. On a scale of 1-5, where 1 is not sustainable at all and 5 is completely sustainable, rate the overall sustainability of this feedstock.

**NOT  
SUSTAINABLE**

1

2

3

4

**COMPLETELY  
SUSTAINABLE**

5