

# Decoding Carbon

#DECODINGCARBON

Backgrounder: Climate Change and Negative Externalities



## Nature of Markets: Demand, Supply and Market Equilibrium

A market is a place where buyers and sellers meet to exchange goods and services for a value. In today's world, money is the primary means of exchanging goods and services as it holds value to both parties. A market is driven by the forces of demand and supply (OpenStax Economics, 2016).

**Demand** refers to the quantity of goods and services that consumers are willing and able to purchase at different price points. Price is what a buyer pays for purchasing a unit of a given product or service.

The **quantity demanded** is the demand for a good or service at a particular price point. This is not to be confused with demand, as demand refers to the collective demand of all goods and services at all price points in a given market (OpenStax Economics, 2016).

**The law of demand** defines the relationship between demand and price in a market. A consumer's incentive is to pay less for a product or service. Therefore, when the price for a good or service increases in a market, its demand decreases. Similarly, when the price for a good or service decreases in a market, its demand increases as the consumer is able and willing to buy more. This can be demonstrated through the **demand curve**, which plots the relationship between quantity demanded

and price on a graph; see figure below for a visual representation (OpenStax Economics, 2016).

### Demand Curve of Gasoline

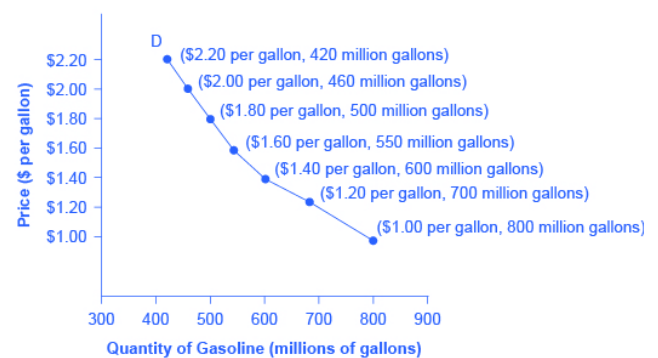


Image source: (OpenStax Economics, 2016).

**Supply** refers to the quantity of goods or services that a supplier is willing and able to supply at different price points. The amount a seller receives for selling a unit of a product or service is the price.

**Quantity supplied** is the amount of a good or service a seller is willing and able to supply at a given price point (OpenStax Economics, 2016).

**The law of supply** defines the relationship between supply and price in the market. A supplier's incentive is to sell more at a higher price. When the price of a good or service increases, its supply increases in the market. Similarly, when the price of a good or service decreases, its supply decreases in the market. A graphical representation of this positive relationship between supply and price is shown with the **supply**

## Equilibrium Point of Gasoline

**curve**, seen in the figure below (OpenStax Economics, 2016).

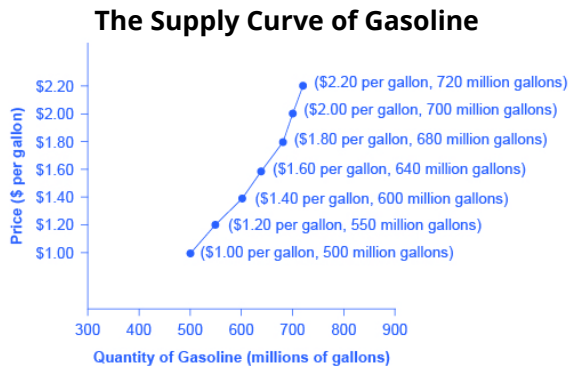
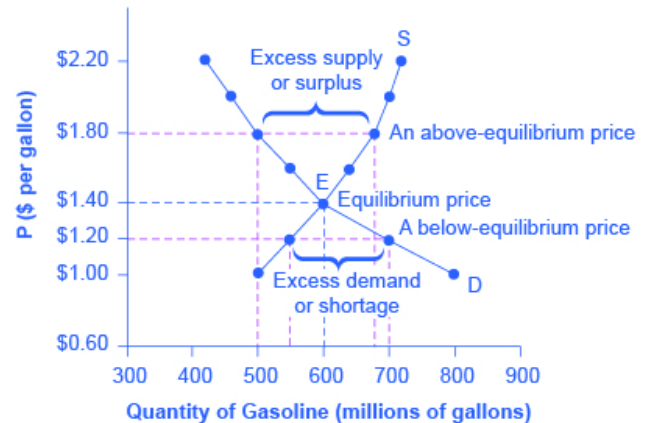


Image Source: (OpenStax Economics, 2016).

Demand and supply determine the quantity and price of goods and services that will be bought and sold in the market. The point at which supply, and demand curves meet is called the equilibrium point, at the equilibrium price and equilibrium quantity.

The equilibrium price represents the price that consumers are willing to pay, and sellers are willing to sell at, whereas the equilibrium quantity is the number of products and services that consumers are willing to purchase, and sellers are willing to sell. At equilibrium point, the market is in balance. If the market moves away from the equilibrium point, economic forces will act to move the market towards equilibrium price and quantity. The equilibrium point demonstrated through the graph below (OpenStax Economics, 2016).

Image Source: (OpenStax Economics, 2016).



Additional resources on this topic can be accessed here:

- Principles of Economics, OpenStax — Open source book on microeconomics
- It's About Supply and Demand—Resource for middle school & high school Teachers

## Negative Externalities and Climate Change

In a competitive market, an economic transaction between two parties can sometimes have indirect impacts on external parties not involved in that transaction. This results in **externalities**. When a voluntary transaction between two parties has a negative impact on an external non-party, then it is called a **negative externality**. For example, CO<sub>2</sub> emissions from driving gasoline vehicles adds to the global greenhouse gas emissions, causing climate change. A consumer willingly purchases a gasoline vehicle from a seller will not consider the negative external impacts of climate change, unless the costs associated with climate change are incorporated within the transaction (e.g., fuel carbon tax).

A **positive externality** arises when a voluntary transaction between two parties has a positive impact on an external non-party. In both cases, the price determined by the market for the transaction does not reflect the impact of externalities because there is no mechanism for the external non-party to incorporate their experience to this transaction. For

example, if John gets immunized for seasonal flu by getting a flu shot, the benefit of his immunization is received by other people around him (i.e., external non-parties), as all they will not get sick. This will save money spent by the health care system on treating people with the seasonal flu.

In the example of the negative externality, there is an **external cost** borne by the external non-party, whereas the positive externality results in an **external benefit** received by the external non-party. If the impacts caused by these externalities are accounted for, then it would show the true cost and benefit of the two transactions.

Externalities are a form of **market failures**—a situation where individuals acting out of self-interest as if the characteristic of a free market results in an inefficient distribution of goods and services in a market, resulting in less than optimal or inefficient outcomes, such as causing externalities. In the event of a market failure, government intervention is required to ensure an optimal outcome for when parties are interacting in that market.

Climate change is a negative externality because climate change is caused due to consumption and production of various products and services that emit GHG emissions to the atmosphere; however, the cost associated with the negative impacts from climate change are not taken into consideration during the production and consumption of these products and services. For instance, in a market that does not account for the negative externality that is climate change, a consumer will not pay for the cost of emissions caused from driving a gasoline vehicle when filling up the fuel tank. Consequently, consumers in this market will continue to purchase gasoline vehicles without paying for the cost of the negative impacts of climate change, such as poor air quality, melting glaciers, increase in extreme weather events and so on. This market assumes there is no cost associated with the negative externality, which is not the reality as there is a price associated with fixing poor air quality or making cities resilient to

prepare for extreme weather events. Therefore, this scenario leads to a market failure—a less than optimal and inefficient outcome as it does not incorporate the real cost of consuming gasoline.

More resources can be found here:

- <https://www.econlib.org/library/Enc/Externalities.html>
- <https://vimeo.com/299948695>

## Market Failures and Government Intervention: Need for Climate Policy

Climate change is a **negative externality** resulting from **greenhouse gas (GHG) emissions** released into the atmosphere. This in turn has led to many negative impacts across the globe, and many more impacts predicted to cause severe negative harm to Earth. In the event that a market activity causes negative externalities, **government intervention** is required to ensure the overall optimal outcome of that market activity. Government intervention for regulating climate change can take many forms, but ultimately it is dictated by the climate policy set by the government. As such, the **climate policy** will outline the overall goals of the government in regard to tackling climate change. Consequently, this policy drives the creation of various laws and regulations that enforces certain behaviour across various markets.

Examples of government intervention in the context of climate change include various options, such as putting a price on pollution from greenhouse gas emissions through carbon tax or a cap-and-trade system, putting in place performance standards, investing in research and innovation for developing clean technology, supporting energy efficiency standards and so on. These climate policy options are explored in detail under the Climate Policy Options topic below.

## Impact Assessments

Considering climate change is a negative externality, should the costs associated with the onset of climate change be taken into consideration when planning a new project? The answer is yes, through a process called impact assessment.

The discipline of **impact assessment** has been around for decades, which includes studying all possible impacts of undertaking a project, including economic, social, human-health and environmental impacts. The answer is yes, they are through a process called impact assessment.

When planning a project, it is important to assess all impacts of implementing that project. This analysis is typically conducted as part of an impact assessment exercise, legally required in most jurisdictions, including Canada. The *Impact Assessment Act* sets the legal requirements for conducting impact assessments of proposed projects, including environmental, social, health and gender impacts. Energy projects are no different and require going through impact assessments prior to receiving approval for implementation.

The *Impact Assessment Act* created the *Impact Assessment Agency of Canada* which is responsible for leading and managing the impact assessment process for all projects that require it. This is a holistic and thorough process, including an in-depth review of positive and negative environmental, economic, social and health impacts of projects proposed by various proponents. The input received from the agency serves as an important determinant in the eventual decision making of whether the project should proceed, in support of sustainable development (Impact Assessment Agency of Canada, 2020).

## Internalizing Externalities

The reason why an impact assessment is legally mandated in most jurisdictions is because of the underlying principle of internalizing externalities. When a voluntary transaction between two parties in a competitive market has a negative impact on an external non-party, then it is called a negative externality. As such, the price at which the transaction took place does not reflect the true costs of that transaction—in the case of an energy infrastructure project such a coal-fired power plant, the impact assessment would include economic as well as environmental and social costs such as

climate change. If left to the market, there will never be a mechanism to incorporate the negative externalities into the transaction to reflect the true cost or benefit of a transaction. Therefore, in certain markets government intervention through setting policies, laws and regulations is required to ensure overall fairness in the market.

More resources can be found here:

- Canada's impact assessment process: <https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/impact-assessment-process-overview.html>
- Internalizing externalities: <https://www.coursera.org/lecture/economic-growth-part-1/1-8-internalizing-externalities-BBkxM>

## ***Bibliography***

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OpenStax Economics. (2016, May 18). *Principles of Economics*. Retrieved from OpenStax CNX:  
<http://cnx.org/contents/69619d2b-68f0-44b0-b074-a9b2bf90b2c6>