

Course Code: CE 447

Course Title: Climate change and sustainable development

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**LECTURE: 12**

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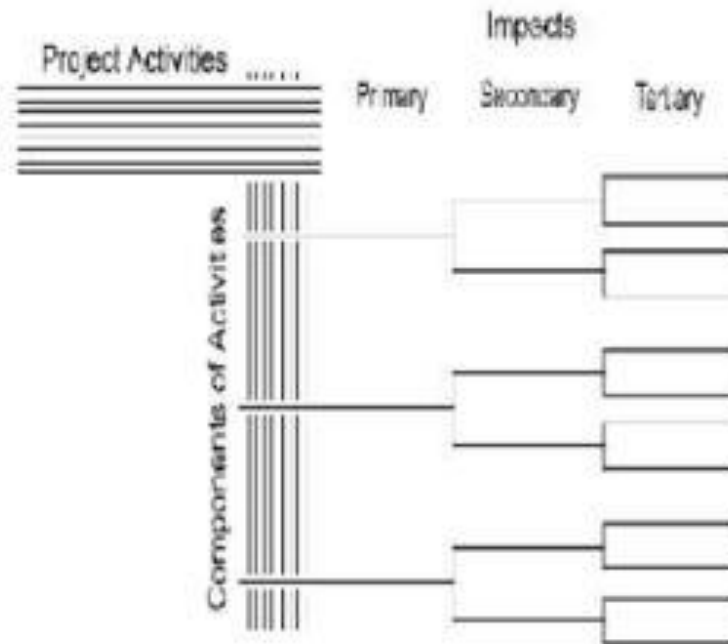
## Lecture plan

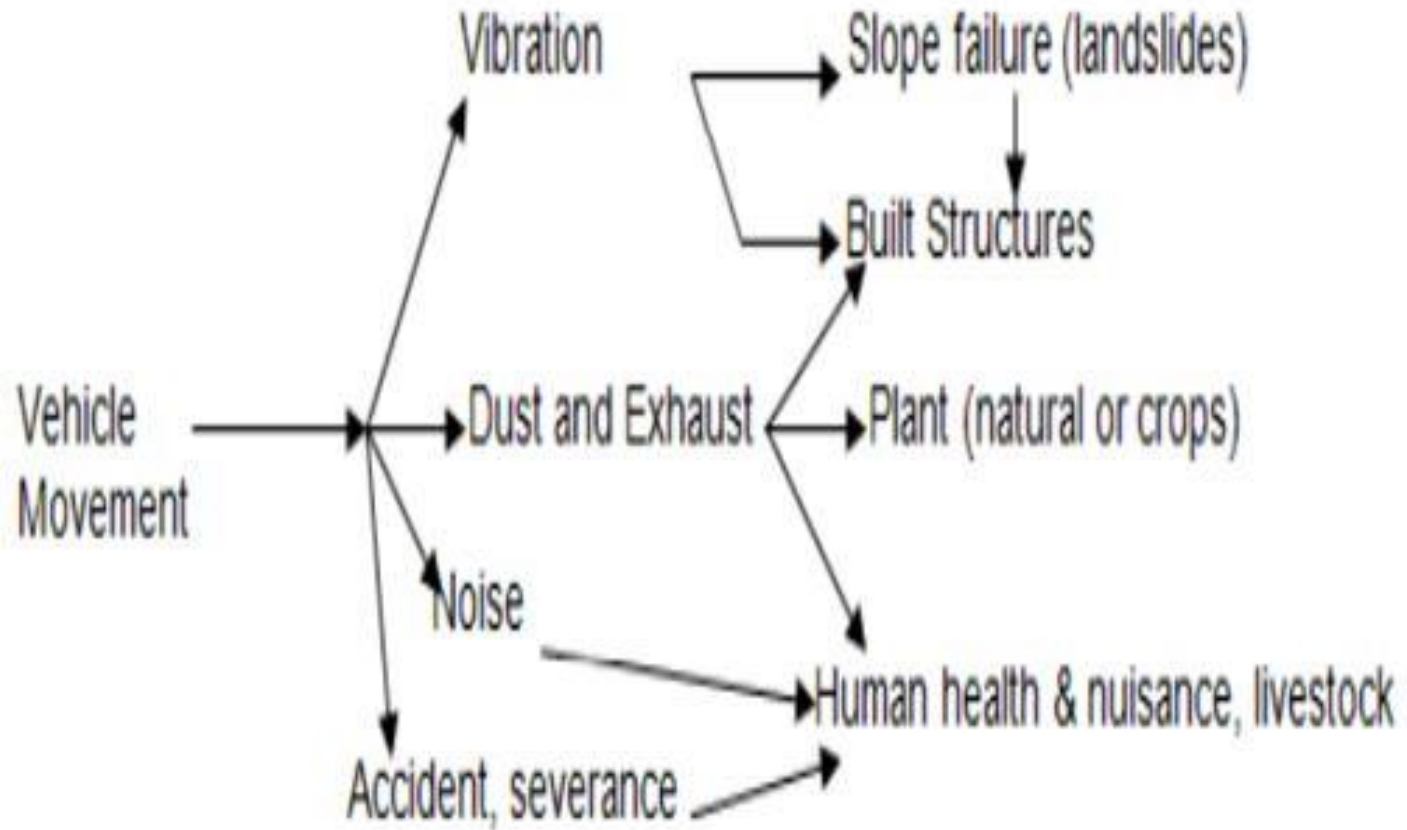
- Networks/flowcharts of EIA method
- Advantages and disadvantages of flowchart methods
- Overlays/GIS
- Carbon taxes

# Networks

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- Network diagrams provide a means for displaying first, secondary, tertiary, and higher order impacts.
- To develop a network, a series of questions related to each project activity (such as what are the primary impact areas, the primary impacts within these areas, the secondary impact areas, the secondary impacts within these areas, and so on) must be answered.





# Networks/Flowcharts

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What are the advantages and disadvantages of flowcharts method of EIA?

- **Advantages:**

- **integrated assessment**, instead of discipline by discipline
- **inter-relations between causes and effects**, including indirect impacts
- **cumulative impact assessment** - communication (when simple).

- **Disadvantages:**

- **complexity** (especially visually complex)
- difficult to **distinguish and quantify magnitudes** (and importance) of different impacts

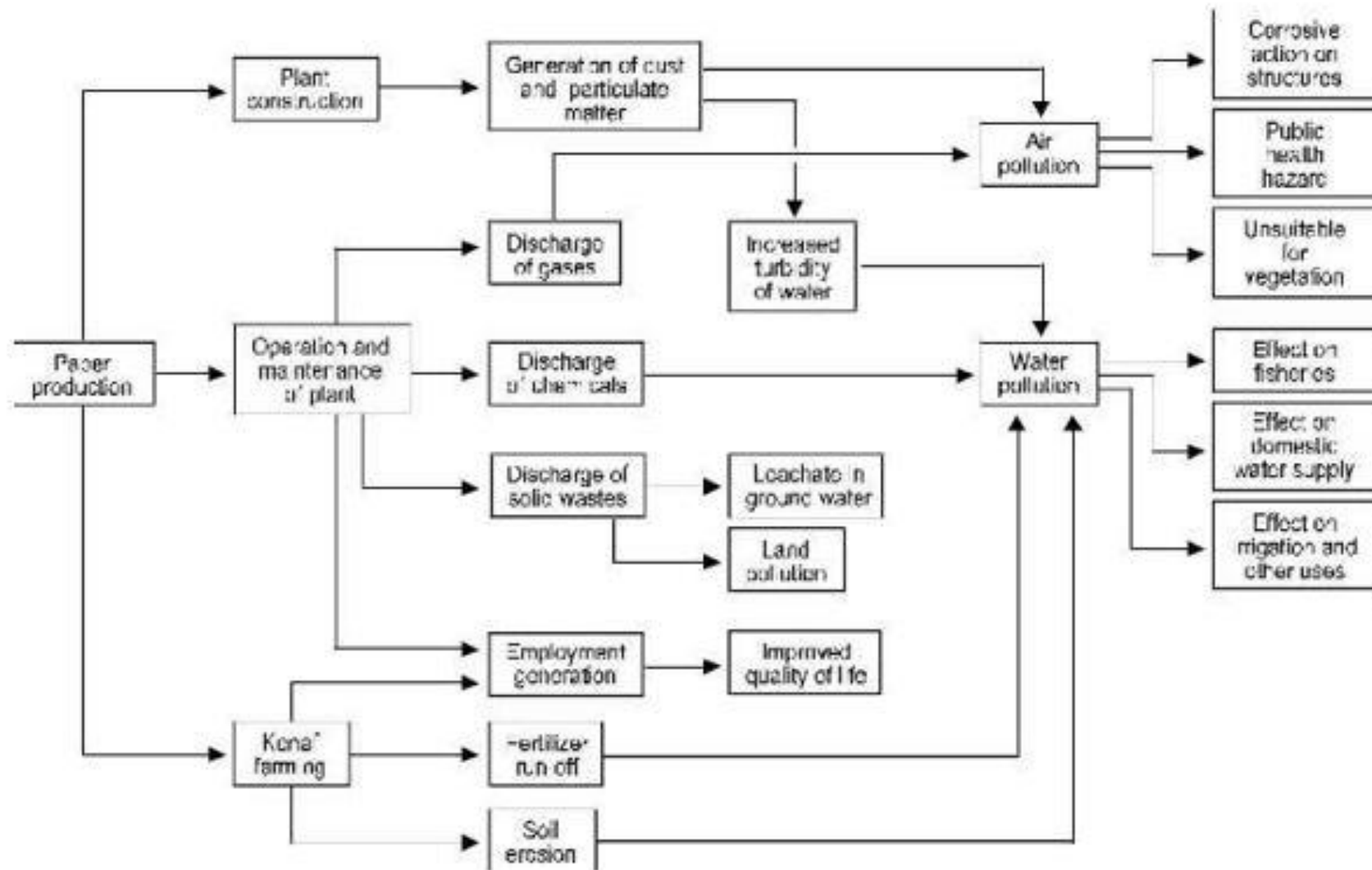


Figure 3-7: Network of pulp mill impacts (source: Lohani and Halim, 1983).

## Overlays/GIS

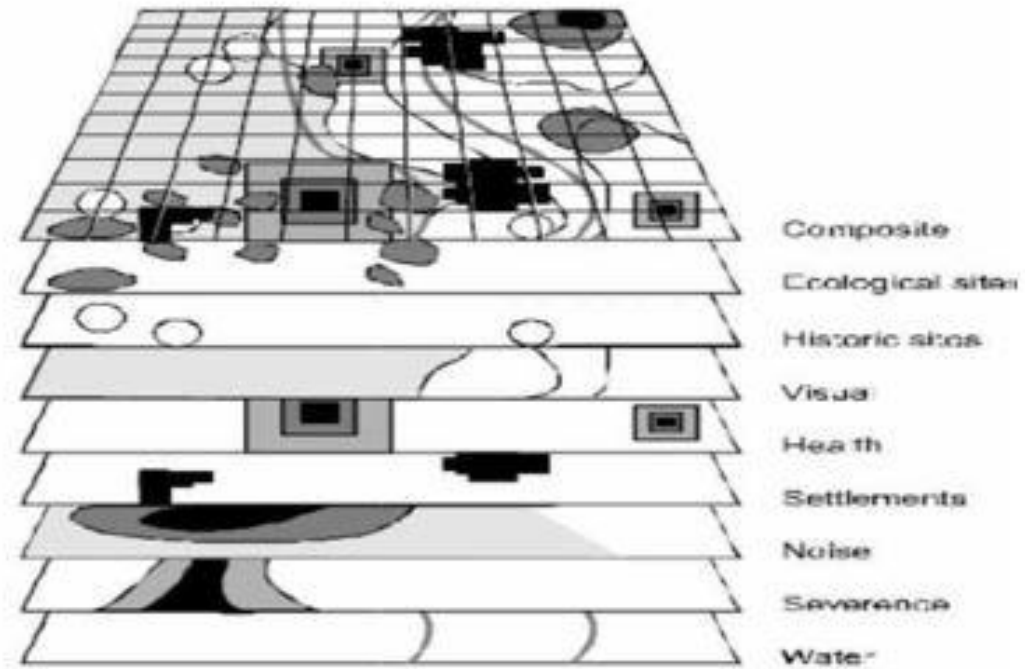
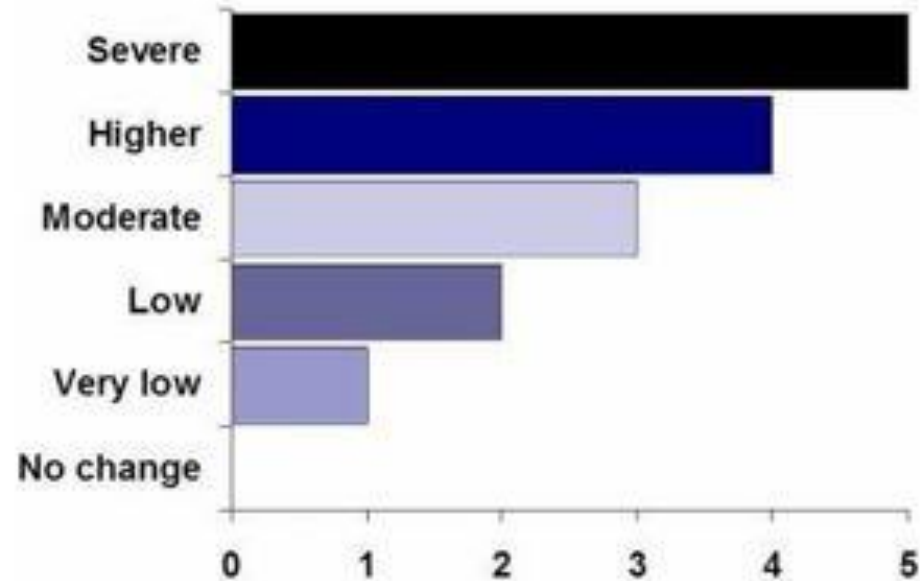


Figure 3-13: Example of overlay method (*source: Wathern, 1988*).

Essentially, the overlay method divides the study area into convenient geographical units based on uniformly spaced grid points, topographic features, or differing land uses. Field surveys, topographical land inventory maps, aerial photography, etc., are used to assemble information related to environmental and human factors within the geographical units. Factors are composed by assembling concerns that have a common basis, and regional maps are drawn for each factor. Through the use of overlays, land use possibilities and engineering feasibility are visually determined (McHarg, 1968).

# EES (Environmental Effect Study)

- Changes of environmental parameters
  - Severe (+5 or -5)
  - Higher (+4 or -4)
  - Moderate (+3 or -3)
  - Low (+2 or -2)
  - Very Low (+1 or -1)
  - No change (0)





# Impact Evaluation

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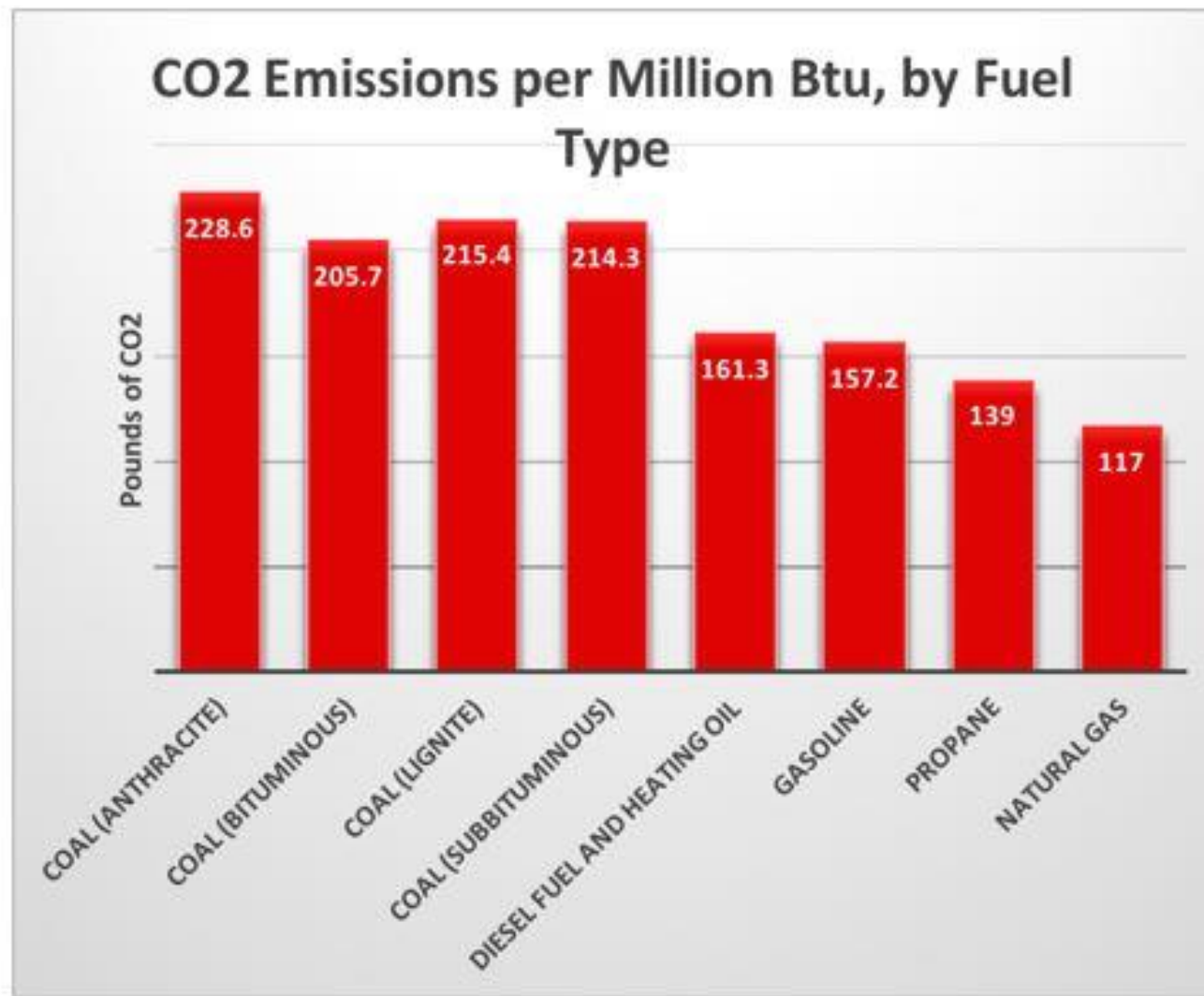
ENVIRONMENTAL PARAMETERS	Relative Importance Value	Degree of Impact	EIV
<b>I. ECOLOGICAL</b>			<b>-19</b>
Fisheries	10	-2	
Forest	5	0	
Tree Plantation	2	+1	
Wetland/Wetland Habitant	4	0	
Nuisance Plant/Eutrophication	1	-1	
<b>II. PHYSICO-CHEMICAL</b>			<b>-13</b>
Erosion and Siltation	2	-1	
Regional Hydrology/Flooding	6	-1	
Drainage Congestion/Water logging	5	-1	
Obstruction to Waste Water Flow	3	0	
Dust Pollution/Noise Pollution	2	0	

# Impact Evaluation

ENVIRONMENTAL PARAMETERS	Relative Importance Value	Degree of Impact	EIV
III. HUMAN INTEREST			<b>+27</b>
Loss of Agricultural Lands	8	+3	
Employment Opportunities	8	+4	
Navigation/Boat Communication	3	-3	
Commercial and Service Facilities	6	+3	
Industrial Activities	3	+2	
Irrigation Facilities	2	+3	
Landscape	2	-1	
<b>Total Environmental Impact Value</b>			<b>-5</b>

## What's a carbon tax?

- A carbon tax is a fee imposed on the burning of carbon-based fuels (coal, oil, gas). More to the point: **a carbon tax is the core policy for reducing and eventually eliminating the use of fossil fuels whose combustion is destabilizing and destroying our climate.**
- A carbon tax is a way — the only way, really — to have users of carbon fuels pay for the climate damage caused by releasing carbon dioxide into the atmosphere. If set high enough, it becomes a powerful monetary disincentive that motivates switches to clean energy across the economy, simply by making it more economically rewarding to move to non-carbon fuels and energy efficiency.



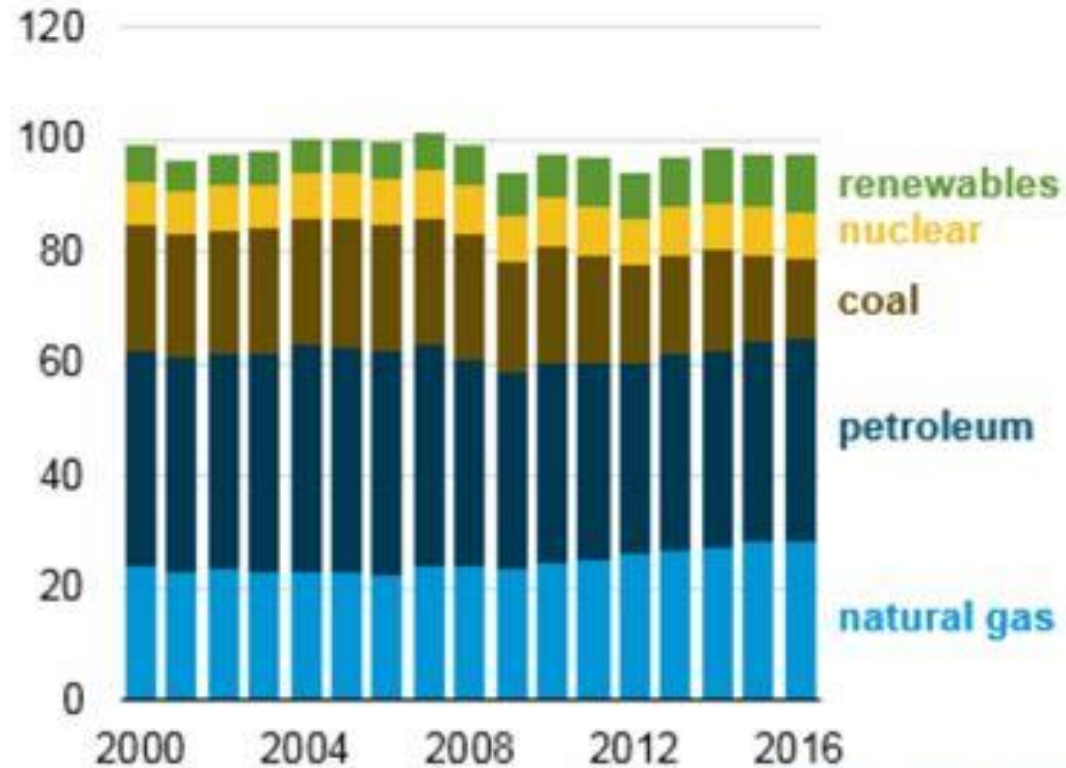
Source: U.S. Energy Information Administration. Coal releases the most CO<sub>2</sub>, natural gas the least.

- Carbon chemistry is potent but also simple. The amount of CO<sub>2</sub> released in burning any fossil fuel is strictly proportional to the fuel's carbon content. This allows the carbon tax to be levied “upstream” on the fuel itself when it is extracted from the ground or imported into the U.S., which vastly simplifies its administration.
- The energy essence of every fossil fuel is its carbon and hydrogen atoms. Oxidizing (combusting) those atoms releases their heat energy but also converts carbon to carbon dioxide. Natural gas, with a high ratio of hydrogen to carbon, is the least carbon-intensive fuel, while coal is the most. The CO<sub>2</sub> released from burning these fuels rises into the upper atmosphere and remains resident there — typically for around a century — trapping heat re-radiated from Earth's surface and causing global warming and other harmful climate change.
- The carbon content of every fossil fuel, from anthracite or lignite coal to heating oil and natural gas, is precisely known. A carbon tax obeys these proportions, taxing coal more heavily than petroleum products, and much more than natural gas. This makes a carbon tax simple to document and measure.

## How is a carbon tax implemented?

- Utilizing existing tax collection mechanisms, a carbon tax is paid “upstream,” i.e., at the point where fuels are extracted from the Earth and put into the stream of commerce, or imported into the U.S. Fuel suppliers and processors are free to pass along the cost of the tax to the extent that market conditions allow. Placing a tax on carbon gives consumers and producers a monetary incentive to reduce their carbon dioxide emissions.

### United States total energy consumption (2000-2016) quadrillion British thermal units



Source: U.S. Energy Information Administration, *Monthly Energy Review*

Perhaps the most striking feature here is that U.S. energy use has stayed largely flat since 2000.

- Carbon that is chemically bound into manufactured products such as plastics but is not burned will not be taxed. Similarly, any CO<sub>2</sub> from energy production that is permanently sequestered rather than released into the atmosphere won't be taxed (or will receive an offsetting tax credit). Additionally, some carbon tax proposals include exemptions for export-dependent businesses to help them remain competitive in global markets.