

Quick Notes on CO2 Diagram and Energy Diagram

For the ESRP 285 Website (Spring 2008)

Carbon dioxide (CO₂) emissions are the largest source of greenhouse gas emissions, accounting for over 80% of the emissions in the USA (EIA 2003, p. 35). CO₂ emissions arise from the combustion of carbon fuels such as gasoline in vehicles and coal in power plants. Energy related carbon emissions are a global problem, and the US contributes a substantial share of the global total. In 2001, for example, the energy related carbon emissions in the US accounted for 24% of the energy related emissions in the world (EIA 2003, p. 36).

Figure 1 provides perspective by showing the nation's greenhouse gas flows and the nation's energy flows. Figure 1 depicts the greenhouse gas emissions in the year 2004 by showing sources of fuels entering on the left and the emissions associated with the use of the fuels exiting on the right. All arrows are sized to represent emissions in million metric tons of CO₂ equivalent, hereafter abbreviated as MMTCO₂. The combustion of fossil fuels in the electricity sector is depicted in the middle of the diagram. The electricity sector was responsible for 39% of energy-related emissions and 33% of the total emissions. These sizeable contributions alert us to the importance of the electricity sector to the greenhouse problem.

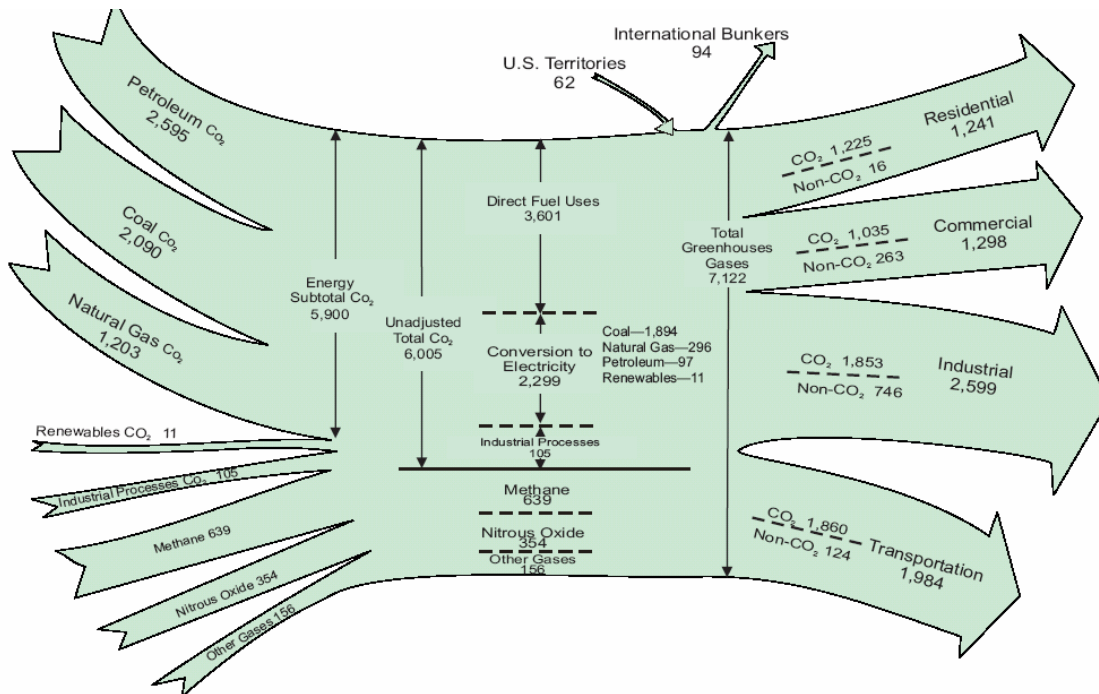


Figure 1. Greenhouse gas emissions in the USA in the year 2004, measured in MMTCO₂. Data and diagram from the EIA (2005).

Figure 2 shows the nation's energy flows in the year 2000 with sources of energy on the left and the uses of energy on the right. All arrows are sized to represent the amount of energy measured in "quads" (quadrillions BTUs). Electricity generation is depicted at the top of the diagram. Electricity generation required 40.4 quads in the year 2000, and coal provided 20.5 quads of the needed energy. The diagram shows that coal is used almost exclusively for electricity generation, and it provided over half of the energy needed in electricity generation in the year 2000.

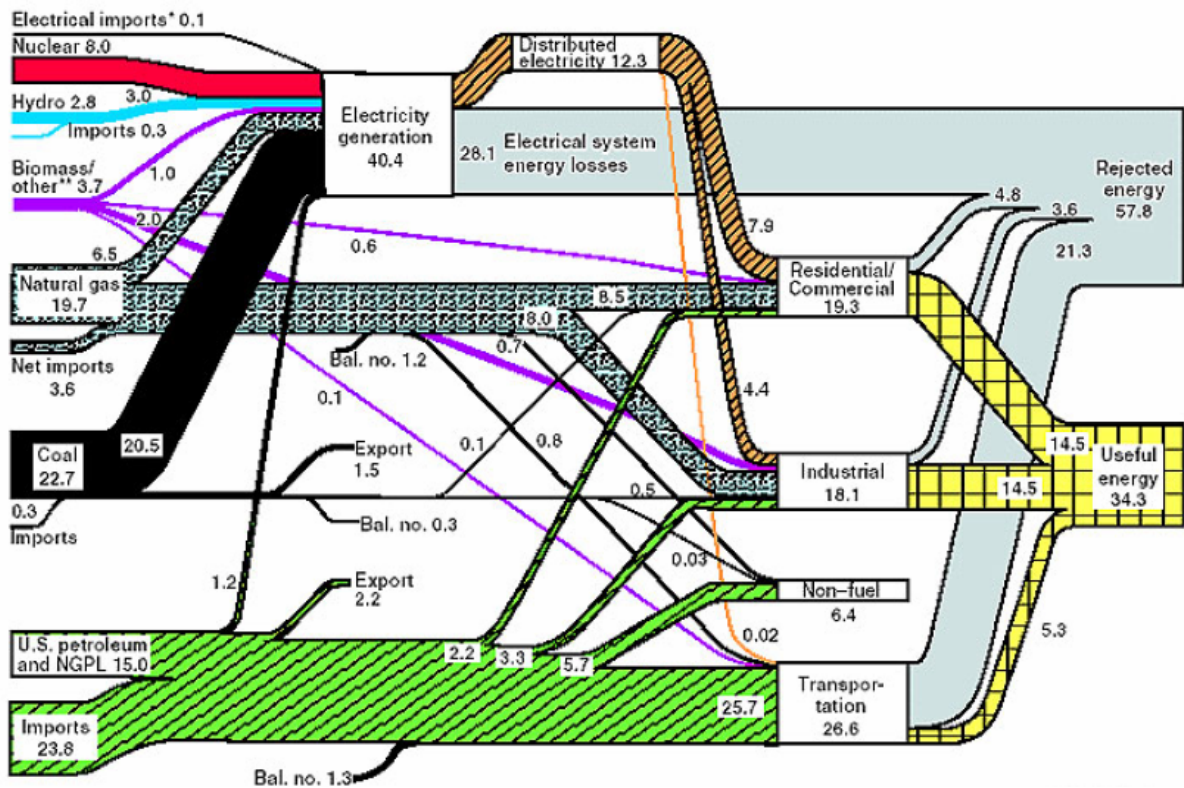


Figure 2. Annual energy flows in the USA in the year 2000, measured in Quadrillion BTUs. (Data from the EIA (2000); diagram from the Lawrence Livermore National Laboratory.)