

## Follow the Flow

THE TRAIL OF U.S. ENERGY—WHAT WE USE, AND HOW WE WASTE IT

If you tried to get an all-embracing view of energy use in the United States, it wouldn't take long for your eyes to go blurry. The Energy Information Administration and other sources release reams of data almost constantly. That's good if you want to look at minute detail, but not so good if you want the big picture.

Based on a version originally created by researcher David Bassett for the Woodrow Wilson Center, this energy flow map reveals the energy sources we draw from, the ways we use that energy, and the ways we waste it. Two elements are perhaps most striking: at bottom left, the relatively paltry contribution of renewables; and at far right, the staggering amount of energy lost as heat. On its own, this lost energy could satisfy the total demands of an industrialized nation like Japan or Germany.

Bassett created his first map of this kind in December 1990, while working in the pollution prevention division of the U.S. Environmental Protection Agency. When asked to update it to illuminate the current debate over energy policy, he jumped at the chance—but was dismayed when he compared the results with what he'd found two decades ago. "Aside from an increase in scale, they look much the same," he said. "It's sobering to realize how little we've been able to do to put this lost heat to use." —Matt Mahoney

### FUEL SUPPLY

Fossil fuels continue to satisfy nearly all of the United States' energy demands. The potential for renewables to replace those fuels is still mostly unrealized.

#### 84.8% FOSSIL FUELS

39.2% Petroleum

23.3% Natural gas

22.4% Coal

#### 8.3% NUCLEAR

#### 6.7% RENEWABLES

#### 0.1% IMPORTED ELECTRICITY

TYPE	CURRENT SUPPLY
Biomass	3.3%
Hydroelectric	2.7
Geothermal	0.4
Wind	0.3
Solar	0.1
Industrial waste	0.01

### SECTOR DEMAND AND END USES

Nearly half of the nation's primary fuel supply is used to generate electricity. The rest is used to power vehicles and heat buildings, and as feedstocks for the chemical industry.

#### 28.6% TRANSPORT

28.5% Primary fuels

0.1% Electricity (secondary fuel)

#### 31.4% INDUSTRIAL

20.9% Primary fuels

3.4% Electricity

7.2% Allocated waste heat from electricity generation\*

#### 17.8% COMMERCIAL

3.6%

4.5%

9.6%\*

#### 21.3% RESIDENTIAL

6.7%

4.7%

9.9%\*

#### 1.3% POWER DELIVERY

Transmission and delivery losses

### WINS AND LOSSES

Most heat loss occurs during electricity generation, but a lot is also lost in internal-combustion engines. Thermoelectric devices could eventually be used to convert some of that waste heat into electricity.

#### 44.6% WASTE HEAT

17.9% Lost in conversion from chemical to mechanical energy

26.7% Lost in conversion from chemical to electrical energy

#### 55.5% UTILIZED

41.6% Used directly as fuel for vehicles, feedstocks for industrial products, and heat sources for residential and commercial buildings

13.9% Output as electricity from power plants

\*Proportion of waste heat attributed to the generation of electricity for each economic sector.

Notes: Data for 2007. Percentages based on quadrillion BTU equivalents. Because of rounding and discrepancies between sources, figures do not total 100%.

Sources: DOE Energy Information Administration. Based on chart prepared by David Bassett for the Woodrow Wilson International Center for Scholars and the Environmental Law Institute.

Information graphic by TOMMY MCCALL and DAVID BASSETT