The Evolving Energy System
Facilities: 29.5% of rejected energy


All values $\times 10^{15}$ Btu (2.12 $\times 10^{15}$ Btu = 10$^6$ bbl/day oil)

Total energy consumption = 67.5 $\times 10^{15}$ Btu

Source: https://flowcharts.llnl.gov

Ever-Green Energy  
ever-greenenergy.com
Facilities accounted for 15.6% of rejected energy

Source: https://flowcharts.llnl.gov
US Energy Usage and System Efficiency
1950 - 2011

Efficiency = Rejected Energy/(Energy Services + Rejected Energy)

Source: Data from Lawrence Livermore National Laboratory Energy Flow Diagrams
https://flowcharts.llnl.gov/index.html
“Some 60% of primary energy is lost as waste heat....”

Energy Efficiency, p. 9
Global Comparison

Comparison of Energy System Efficiency (%)

Source: Based on data from Lawrence Livermore National Laboratory Energy Flow Diagrams
https://flowcharts.llnl.gov/index.html
Minnesota’s Energy Profile

- Over 1,800 Trillion BTU’s of primary energy used annually
  - $21 billion spent on energy in 2010
- Minnesota is essentially dependent on energy imported from other states and countries
  - 100% of coal and uranium
  - 100% of oil & petroleum products
  - 100% of natural gas
- Using energy efficiently benefits Minnesota’s residents, economy and environment
Estimated Minnesota Energy Use In 2008
~1816.5 Trillion BTU

Source: https://flowcharts.llnl.gov, Issued January 2011
MN 2008 Rejected/Lost Energy
1,047.2 Trillion BTU

- Transportation: 41%
- Electricity Generation: 37%
- Commercial: 9%
- Residential: 7%
- Industrial: 6%

Source: Data from Lawrence Livermore National Laboratory Energy Flow Diagrams - https://flowcharts.llnl.gov/index.html
Waste Heat Recovery Legislation

"Waste heat recovered and used as thermal energy" means capturing heat energy that would otherwise be exhausted or dissipated to the environment from machinery, buildings, or industrial processes and productively using such recovered thermal energy where it was captured or distributing it as thermal energy to other locations where it is used to reduce demand side consumption of natural gas, electric energy, or both.

Demand side natural gas or electric energy displaced by use of waste heat recovered and used as thermal energy, including the recovered thermal energy from a cogeneration or combined heat and power facility, is eligible to be counted towards a utility's natural gas or electric energy savings goals, subject to department approval.