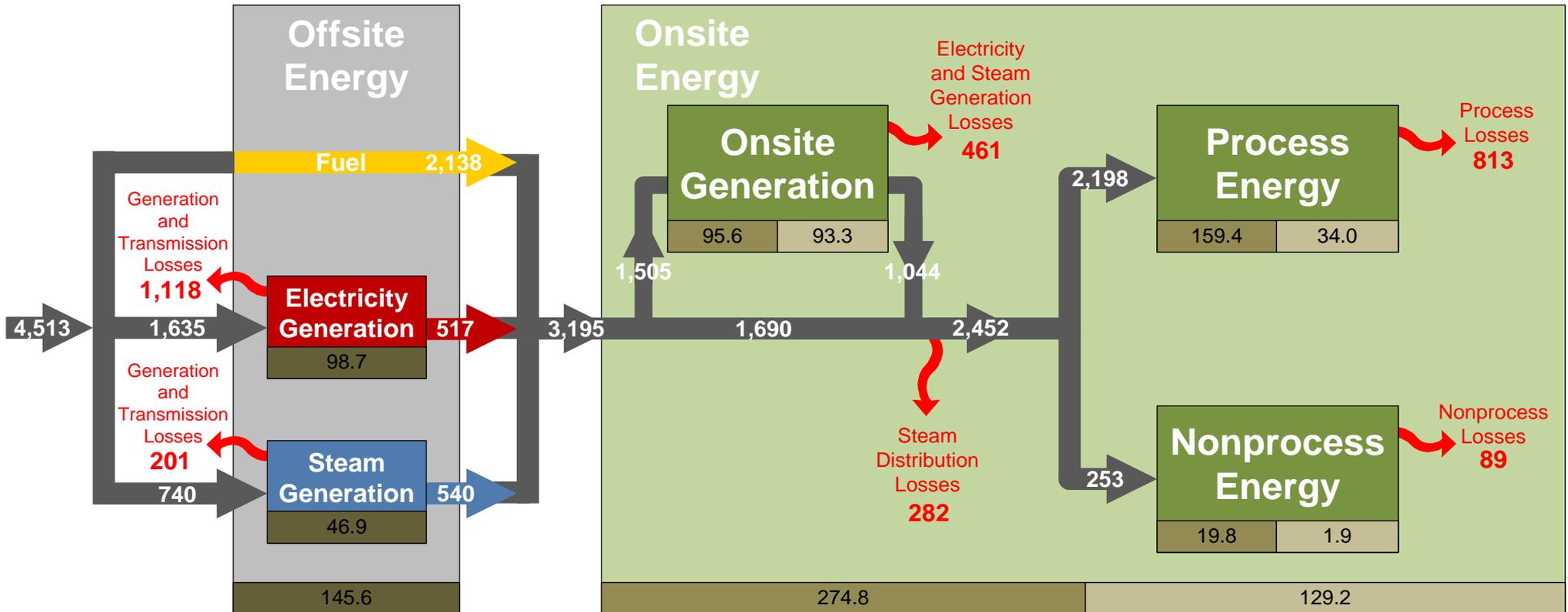# Manufacturing Energy and Carbon Footprint
Sector: Chemicals (NAICS 325)

Total Primary Energy Use: 4,513 TBtu
Total Combustion Emissions: 275 MMT CO_2e

Total Energy

Offsite Energy

Onsite Energy

Fuel — 2,138

Generation and Transmission Losses **1,118**

4,513 — 1,635

Electricity Generation — 98.7 — 517

Generation and Transmission Losses **201**

740 — **Steam Generation** — 46.9 — 540

145.6

3,195

Electricity and Steam Generation Losses **461**

Onsite Generation — 95.6 | 93.3

1,505 — 1,044

1,690

2,452

Steam Distribution Losses **282**

2,198 — **Process Energy** — 159.4 | 34.0 — Process Losses **813**

253 — **Nonprocess Energy** — 19.8 | 1.9 — Nonprocess Losses **89**

274.8 | 129.2

22 — **Electricity Export**

Legend

Energy Use
(TBtu = Trillion British Thermal Units)

- All Energy
- Fuel
- Electricity
- Steam
- Losses

Combustion Emissions
(MMT CO_2e = Million Metric Tons Carbon Dioxide Equivalent)

- Offsite
- Total | Onsite

Total Emissions = Offsite Emissions + Onsite Emissions

Manufacturing Energy and Carbon Footprint
Sector: Chemicals (NAICS 325)

Onsite Energy Use: 3,195 TBtu
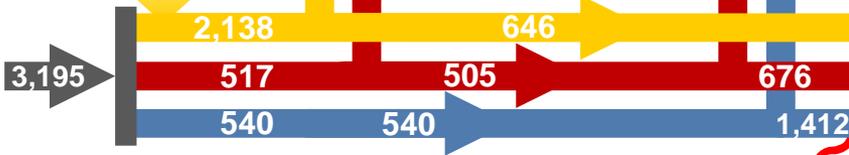**Onsite Combustion Emissions:** 129 MMT CO_2e

Onsite Energy

Onsite Generation

Steam Generation Losses **351**
Electricity Generation Losses **109**

Conventional Boilers	
34.9	32.6

541 **30** **457**

CHP/ Cogeneration	
60.5	60.5

949 **188** **416**

Other Electricity Generation*	
0.2	0.2

3 **1** **18**

95.6	93.3

Process Energy

279
Process Heating	
63.0	27.0

480 **35** **753**

37
Process Cooling and Refrigeration	
10.7	0.9

17 **56** **33**

14
Other Process Uses	
7.1	2.5

46 **6** **90**

58
Electro-Chemical	
9.4	0.0

97

141
Machine Drive	
69.3	3.7

68 **400** **117**

283

Machine-Driven Systems

Pumps	165
Fans	75
Compressed Air	176
Materials Handling	9
Materials Processing	150
Other Systems	11

159.4	34.0

Nonprocess Energy

57
Facility HVAC	
11.8	1.3

24 **42** **97**

23
Facility Lighting	
3.8	0.0

26

1
Other Facility Support	
1.6	0.1

2 **10**

2
Onsite Transportation	
0.2	0.2

3 **1**

5
Other Nonprocess	
2.3	0.3

5 **2** **41**

19.8	1.9

Fuel Types

Fuel Type	% of Total
Natural Gas	65%
Waste Gas (byproduct fuel)	21%
Coal	8%
Distillate and Residual Fuel Oils	1%
LPG and NGL	< 0.5%
Other Fuels	4%

3,195

12	2,138	646
517	505	676
540	540	1,412

282 Steam Distribution Losses

Electricity Export — **22**

Legend

Energy Use (TBtu = Trillion British Thermal Units)
- All Energy
- Fuel
- Electricity
- Steam
- Losses

Combustion Emissions (MMT CO_2e = Million Metric Tons Carbon Dioxide Equivalent)

Total	Onsite

Total Emissions = Offsite Emissions + Onsite Emissions

Notes

Energy use data source: 2006 MECS (with adjustments)

Last Revised: October 2012

Notes:
Feedstock energy not included
Energy values <0.5 TBtu shown as 0
Values represent aggregate data
Offsite generation shown on net basis

* Onsite, renewable, non-combustion generation contributes 0 TBtu

Prepared for the Advanced Manufacturing Office (AMO) by Energetics Incorporated