Energy Smart
Food Choices

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Individual energy consumption
Adapted from Unesco Courier

- Energy consumed in the form of food
- Domestic: Energy for cooking, heating etc.
- Services: Energy for office work, trade, teaching etc.
- Energy for industry and agriculture
- Energy for transport

Today 28% of the world's population consumes 77% of the world's energy production.

Or \( \frac{3}{4} \) of the world's population uses less than \( \frac{1}{4} \) of the energy produced.
US Food System: 7.3 Calories Expended for Each Calorie of Food Energy

- Farming, 1.6 calories
- Transport, 1.0 calorie
- Processing, 1.2 calories
- Packaging, 0.5 calories
- Food retail, 0.3 calories
- Commercial food service, 0.5 calories
- Household storage and preparation, 2.3 calories

Heller and Keoleian, 2000, University of Michigan Center for Sustainable Systems
Energy in Food (UK)
8% of total energy consumption

Farming 27%
Processing 8%
Moving 47%
Selling 18%
Energy inputs for a 455 g can of sweet corn

- Production: 450 kcal
- Processing: 316 kcal
- Packaging: 1006 kcal
- Transportation: 158 kcal
- Distribution: 340 kcal
- Shopping: 311 kcal
- Home prep.: 457 kcal

Total: 3065 kcal

Food energy in corn: 375 kcal
The “food mile” is a misleading concept: How food travels has more impact on energy use and greenhouse gas emissions than how far it travels.
# Hamburger embodied energy

<table>
<thead>
<tr>
<th></th>
<th>E (MJ)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bun</td>
<td>1-3</td>
<td>Grow/dry: 8-15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mill/bake: 45-50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Store/transport: 40-45%</td>
</tr>
<tr>
<td>Meat</td>
<td>5-10</td>
<td>Animal feed: 50-60%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Butcher/freeze: 15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Store/transport: 15-30%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fry: 10-15%</td>
</tr>
<tr>
<td>Lettuce</td>
<td>1-4</td>
<td>Growing: 40-98%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Truck/store: 2-60%</td>
</tr>
<tr>
<td>Cheese</td>
<td>0.5-0.9</td>
<td>Animal feed: 40-50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dairy process: 30-35%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Store/transport: 25%</td>
</tr>
<tr>
<td>Pickle &amp; onion</td>
<td>0.1-0.2</td>
<td>Growing: 15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Processing: 30-60%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Store/transport: 15-30%</td>
</tr>
</tbody>
</table>

359 Calories (kilocalories) in a cheeseburger with vegetables (1.5 MJ)

Low energy burger (7 MJ)

High energy burger (20 MJ)

Embodied energy (MJ/portion)

1. Local honey: 0.004 MJ/portion
2. Local apples: 0.44 MJ/portion
3. Imported oranges: 0.75 MJ/portion
4. Fresh local strawberries: 0.77 MJ/portion
5. Fresh raspberries: 0.9 MJ/portion
6. Raisins: 1.0 MJ/portion
7. New Zealand apples: 1.1 MJ/portion
8. Bananas: 1.3 MJ/portion
9. Local apple cake with margarine: 1.4 MJ/portion
10. Local ice cream: 1.4 MJ/portion
11. Imported ice cream: 1.5 MJ/portion
12. Local apple cake with butter: 1.8 MJ/portion
13. Frozen imported strawberries: 2.0 MJ/portion
14. Frozen raspberries: 2.0 MJ/portion
15. Imported chocolate: 4.4 MJ/portion
16. Fresh tropical fruit, by plane: 14.0 MJ/portion
### Two Dinner Menus
*Energy in and out, in MJ*

<table>
<thead>
<tr>
<th>Item</th>
<th>In</th>
<th>Out</th>
<th>Item</th>
<th>In</th>
<th>Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>9.4</td>
<td>0.80</td>
<td>Chicken</td>
<td>4.37</td>
<td>0.81</td>
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<tr>
<td>Rice</td>
<td>1.1</td>
<td>0.68</td>
<td>Potato</td>
<td>0.91</td>
<td>0.61</td>
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<tr>
<td>Tomato</td>
<td>4.6</td>
<td>0.06</td>
<td>Carrot</td>
<td>0.50</td>
<td>0.21</td>
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<tr>
<td>Wine</td>
<td>4.2</td>
<td>0.98</td>
<td>Water</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Oil</td>
<td></td>
<td></td>
<td>Oil</td>
<td>0.30</td>
<td>0.74</td>
</tr>
</tbody>
</table>

**Meal**

<table>
<thead>
<tr>
<th>In</th>
<th>Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>2.5</td>
</tr>
<tr>
<td>6.1</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Energy Smart Food Choices

• Less meat and seafood
  – Choose poultry and grass-fed animals
• More fruit and vegetables, in season
  – Avoid greenhouse-grown produce
• More local and organic foods
  – Avoid foods flown in
  – Avoid frequent car trips to grocery store
• Whole foods, not processed
• Less refrigeration
• More microwave and stove top; less baking