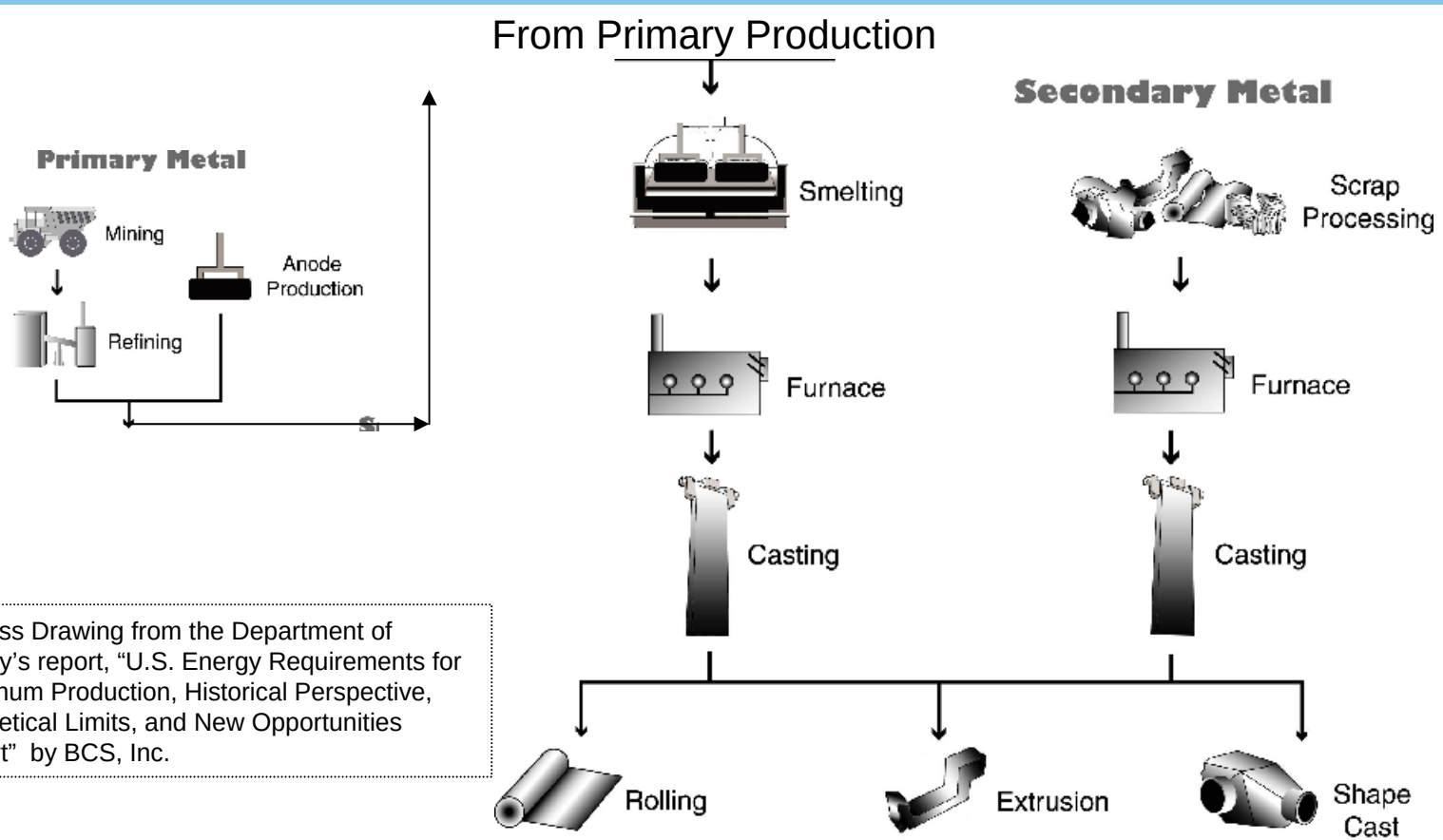
Energy Saving Opportunities in the Aluminum Industry

Areas of Energy Usage
&
Identification of Potential Energy Savings

Our thanks to the U.S. Department of Energy – EERE and E3M, Inc. for their contributions.

Energy Intensive Production Processes for the Aluminum Industry



Process Drawing from the Department of Energy's report, "U.S. Energy Requirements for Aluminum Production, Historical Perspective, Theoretical Limits, and New Opportunities Report" by BCS, Inc.

Energy Costs

Photos provided with permission from Wise Alloys.

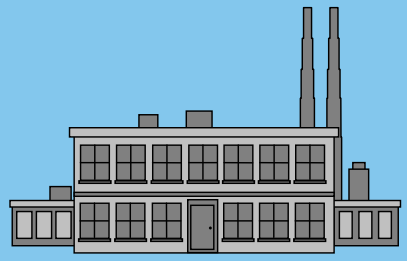
- Energy cost represents 7% to 10% of the cost of production for a producer of aluminum sheets that utilize scrap materials as a significant portion of their input.
- Energy cost is easily controllable in the short term through assessment, analysis and cost-effective energy conservation measures.
- Energy cost is expected to rise at a much higher rate than any other cost for the plant.

SECAT

Major Energy Saving Opportunities

in aluminum industry plants

Typical Energy Consumption Rates



* *Other ancillary energy usages such as lighting represent less than 2% of energy consumption.*

Click on photos for energy savings details.

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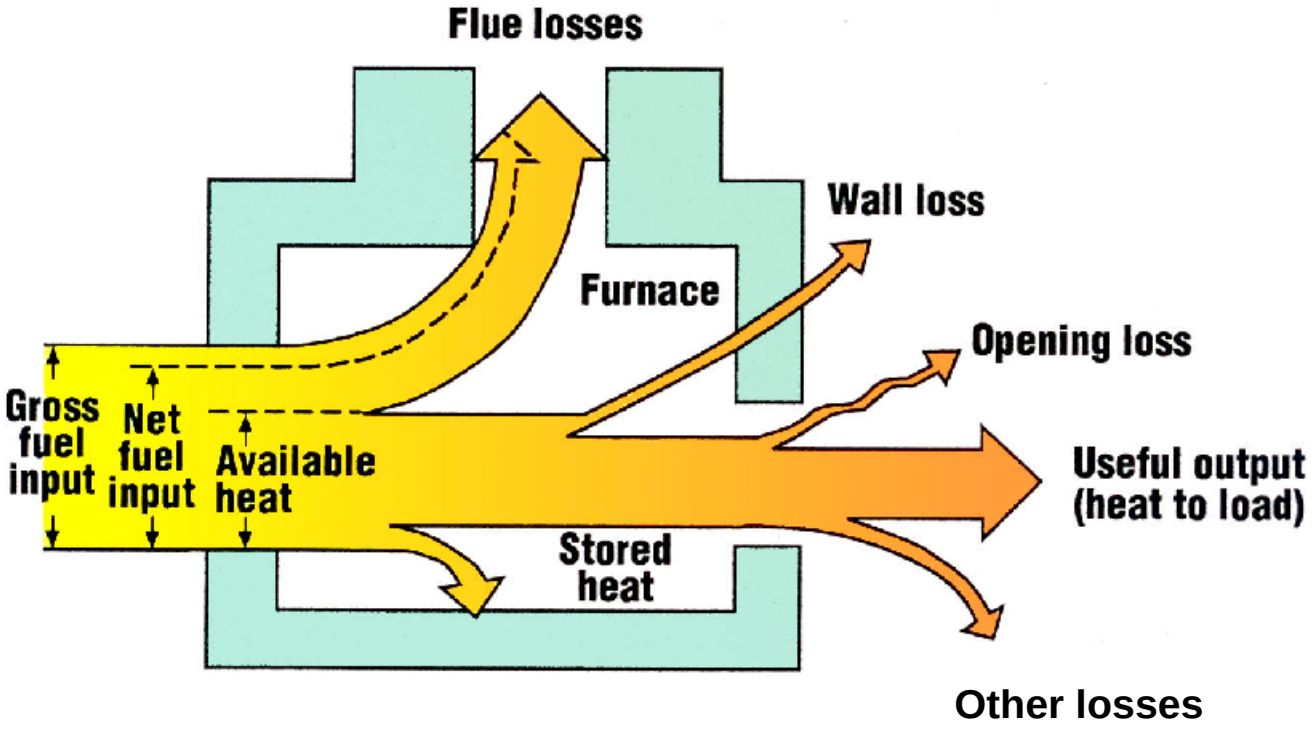
Process Heating/
Burners

How are your furnaces and melters losing heat?

- Flue gases from stack or leaks
- Furnace walls and openings
- Heat in fixtures, conveyors, load support etc.
- Heat stored in furnace wall insulation – refractories



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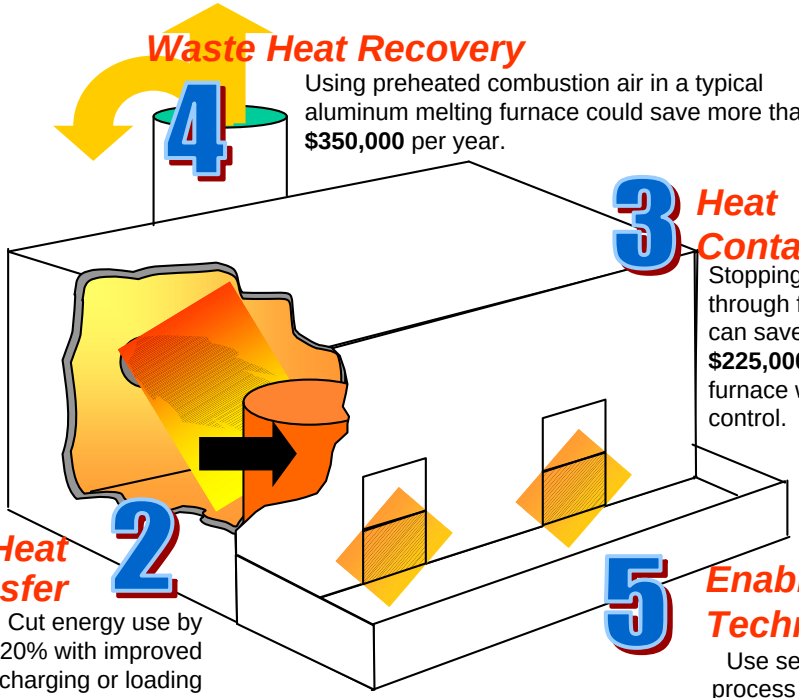
Process Heating/ Burners

- Lower energy costs
- Improve productivity
- Reduce melt losses
- Lower emissions of carbon monoxide, nitrogen oxides, and unburned hydrocarbons

- Production rate: 15,000 lbs./hr.
- Energy use: 2,000 Btu/lb. 30 million (MM) Btu/hr.
- Combustion air temperature - ambient
- Operating temperature: 1,900° F.
- Operating hours: 24 hours/day, 7 days/week, 52 weeks/year with 95% availability
- Fuel cost: $5.00 per MM Btu (natural gas)

Find your route to more efficient Process Heating

Potential Energy Savings: 10-30% of process heating energy use



4 Waste Heat Recovery

Using preheated combustion air in a typical aluminum melting furnace could save more than **$350,000** per year.

1 Heat Generation

Reduce excess air and control the air-fuel ratio in a typical aluminum melting furnace* to save up to **$170,000** per year.

3 Heat Containment

Stopping air leakage through furnace openings can save as much as **$225,000** per year in a furnace without pressure control.

2 Heat Transfer

Cut energy use by 5-20% with improved charging or loading practices and through enhanced heat transfer.

5 Enabling Technologies

Use sensors & controls, process control methods, advanced materials, and design models and tools to optimize the four process areas.

Additional Benefit: Emissions Reductions

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Find your route to more efficient Electric Motor System

Electric Motor Consumption: **10-25% of total usage**

Electric motors used for rolling, extruding operations, fans and blowers, material handling and other operations

Potential Energy Savings: 5-20% of electric motor energy cost

By selection of proper motors and by improving operations

Electric Motor Systems

Steps to Improving Electric Motor System Efficiency

1. Use Adjustable Speed Drives (ASDs) or two-speed motors where appropriate.
2. Consider load shedding. Use controls to turn off idling motors.
3. Consider replacing existing V-belts with cogged belts.
4. Choose energy-efficient motors for new applications. Consider replacement vs. repair for older, inefficient motors.
5. Match motor operating speeds, and size motors for overall system efficiency.

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Find your route to more efficient Pumping System

Pumping Systems

Pumping Systems Consumption: 5 - 10% of total energy usage.

Potential Energy Savings: 10-20% of the pumping system energy cost

Steps to Improving Pumping System Efficiency

1. Use adjustable speed drives or parallel pumps to meet variable flow requirements.
2. Trim impellers, use slower speed motors and/or gear reducers or replace it with a properly sized pump where pumps are dramatically oversized.
3. Use automatic start control or manually turn off a pump that is used intermittently or occasionally.
4. Clean pipe systems to reduce frictional losses when pressure drop becomes excessive.
5. Repair or replace pumps when performance degrades.

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Find your route to more efficient Compressed Air system

Compressed air systems: **2 - 5% of total energy usage.**

Potential Energy Savings: **5 - 15% of the compressed air system energy cost**

Compressed Air Systems

Steps to Improving Compressed Air System Efficiency

1. Check, identify and repair air leaks.
2. Review air pressure requirements for the processes and consider use of lower pressure blowers where lower pressure air is used.
3. Ascertain compressor type, its control and the effect on your compressor. Turn off unneeded compressors.
4. Proper maintenance of moisture control system to eliminate excessive moisture and contaminants in compressed air.
5. Add adequate and dedicated storage for high-volume intermittent air requirements.

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Secat Services:
Your Energy Saving Guide

- Plant-wide assessments
- Plant energy profile development
- Energy systems assessments, including best practices for process heating, electric motors, compressed air, pumping systems, and steam systems.
- Detail heating process assessments, including melting and thermal processing
- Specialized assessments for specific processes

Contact Secat for additional information

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