



Saving Water and Energy: Dow's Water Strategy

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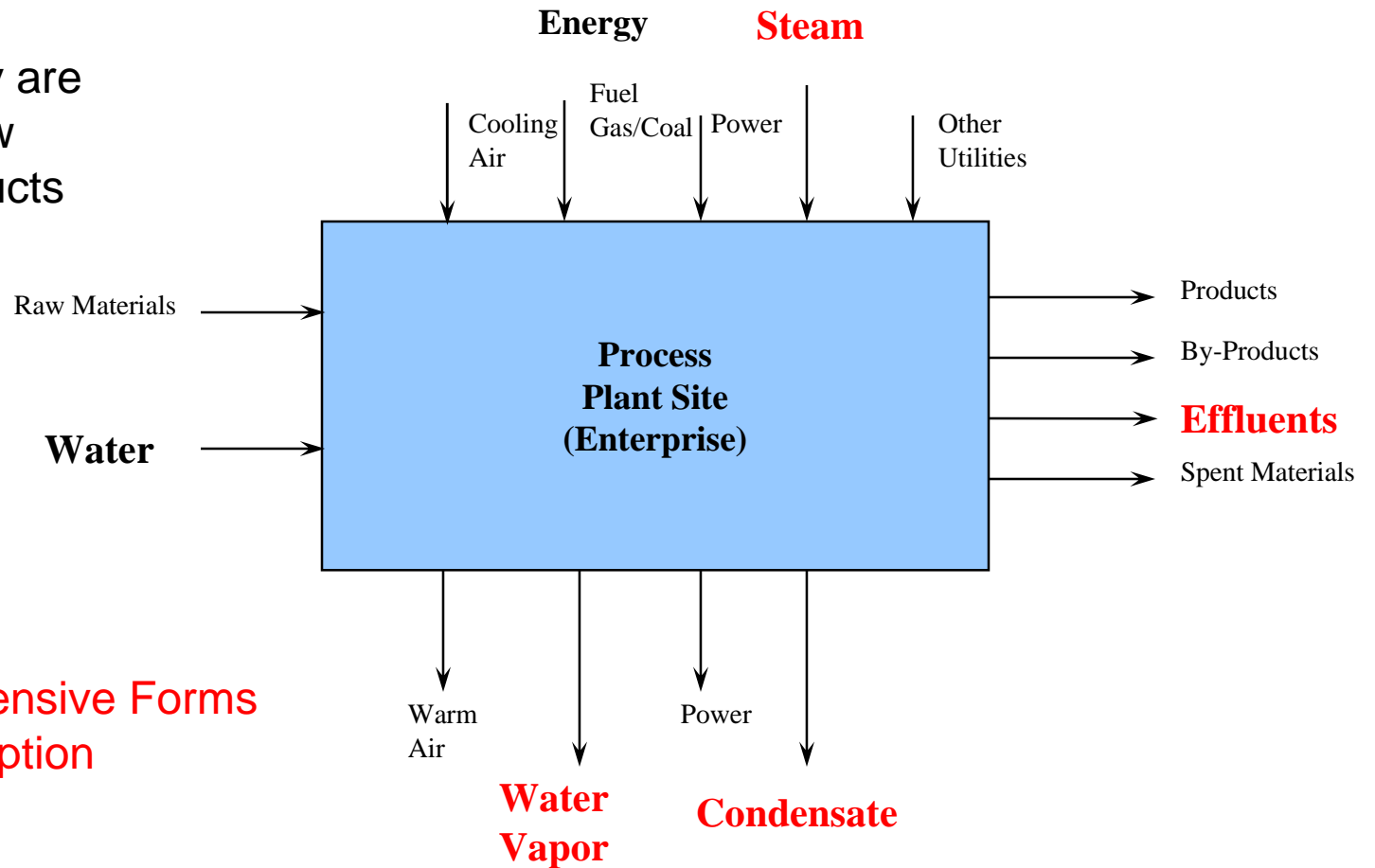
The Dow Chemical Company

Typical Manufacturing Process Plant



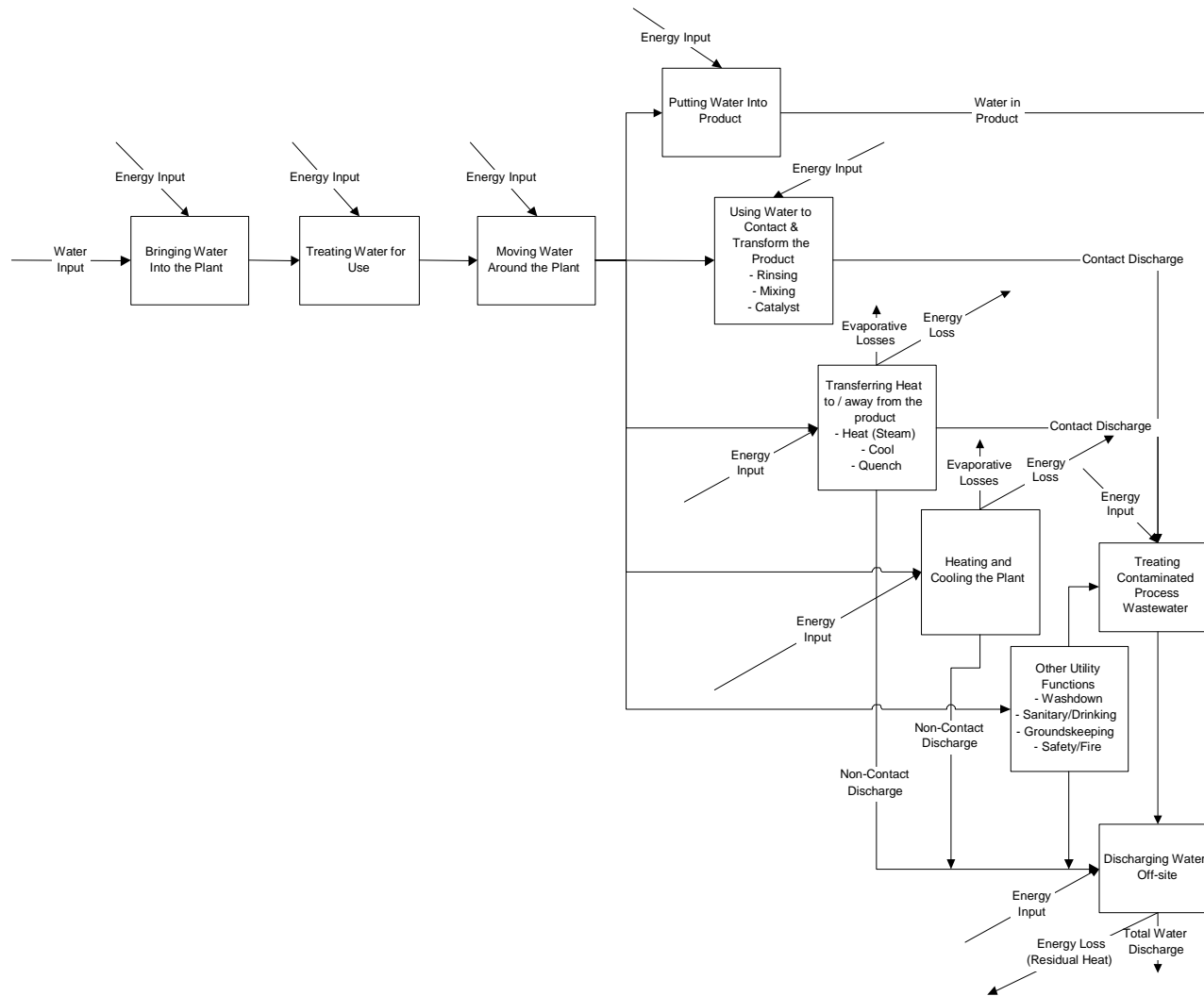
Water and energy are used to convert raw materials to products

Mass

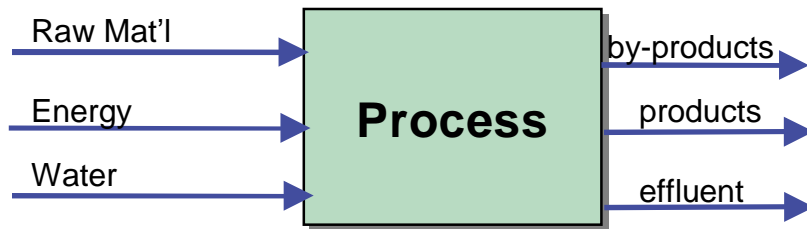


Red = Energy Intensive Forms of Water Consumption

Relationship of Water to Energy – A Visual Perspective



Water and Energy Conservation Opportunities



- Modify Processes
- Heat Recovery Cross Exchangers
- Steam Leak Elimination Programs
- Steam Trap Maintenance Programs
- High Quality Effluent Streams Reuse
- Water Metering and Accountability
- Heat Recovery Boilers
- Condensate Recovery Systems
- Use of Alternative Cooling Approaches
- Thermal Pinch/Water Pinch
- More Efficient Water Treatment
- More Efficient WW Treatment
- Fuel Gas Optimization
- Organics Waste Recovery Projects
- Cooling Tower Chemistry & Cycles Optimization

The Multiplying Benefits of Water Conservation



- **Value – triple impact potential**

- » Water → \$2.00 – 6.00/Mgal
- » Energy → \$4.00 – 10.00/MMBTU
- » Waste Treatment Cost → \$2.00 – 20.00/Mgal to Treat

- **Value of eliminating 1000 gallons of evaporative cooling demand?**

Answer → **\$64.72/mgal**

@ \$2.00/Mgal and \$8.00 MMBTU Fuel Gas

- \$2.00/mgal savings for water
- \$62.72/mgal savings in energy

- **Value of eliminating 1000 lbs of steam leaks/losses?**

Answer: → **\$10.10/Mlbs**

@250 psi steam @ \$4.00/Mgal water and \$8.00 MMBTU Fuel Gas

- **Value of eliminating 1000 lbs of condensate leaks/losses?**

Answer: → **\$1.60/Mlbs**

@ \$4.00/Mgal water and \$8.00 MMBTU Fuel Gas

- **Value of eliminating 1000 gallons of wastewater ?**

Answer: → **\$6.00/MGal**

@ 2.00/Mgal Water and \$4.00/Mgal WW Treating Costs

Success through better water management



Dow's total water impact translates to energy savings of more than 2 million kilowatts of energy.

Water projects have helped avoid more than \$35 million in capital spending.

Conclusion



- Apply Methodical Approach to Understand System
 - » Develop And Utilize A Process Map
 - Useful to Capture Both Water And Energy Input
 - Useful to Capture Approximate Water Quality Data
 - » Except Varying Data Quality
 - » Identify Areas With Highest Value Potential
 - » Drill Down In Highest Value Areas
- Metering and Accountability Programs Enable
- Thermal Pinch and Water Pinch Can Refine Optimization