



LIGHTRIDGE RESOURCES

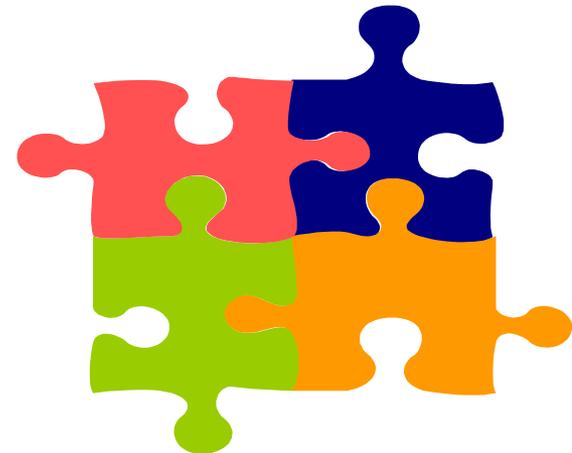
Putting All the Pieces Together

Energy Management Systems: Realizing the Potential

Dennis Spriggs, PhD.

President

LightRidge Resources, LLC



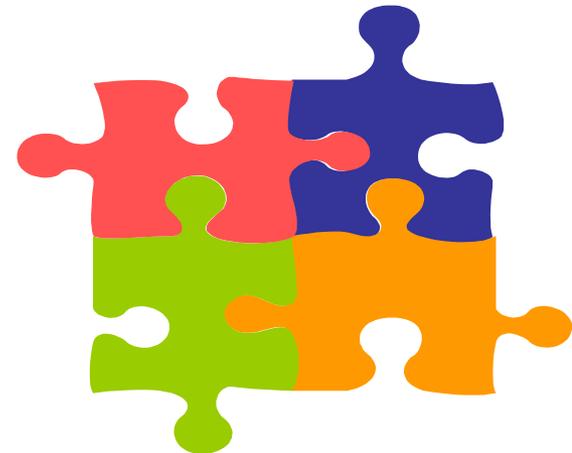
Discussion Points



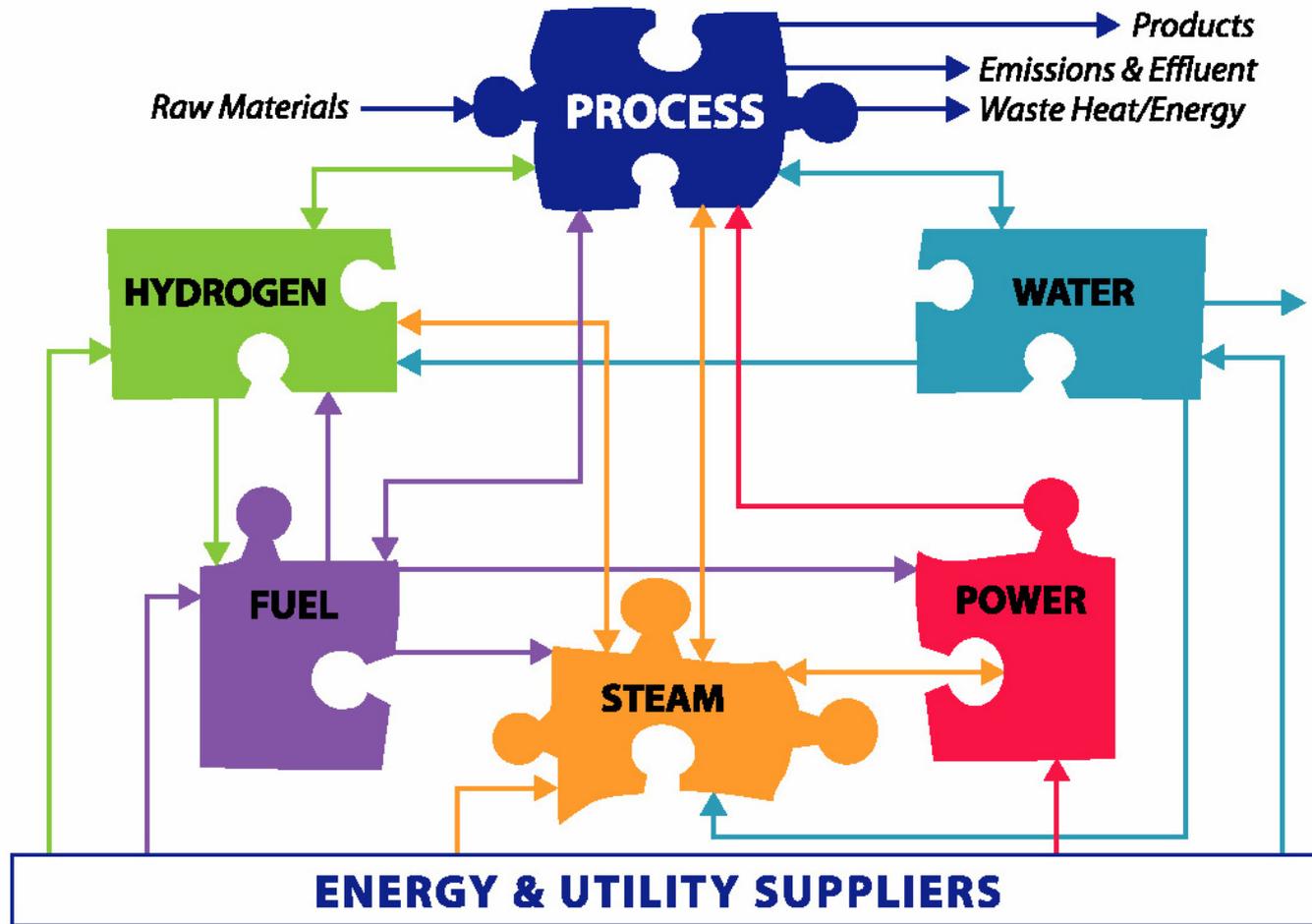
- **The Case for Energy Management**
- **The Barriers & Issues**
- **Proactive Approach**
- **The Payoff**



The Case for Energy Management



The Case for Energy Management

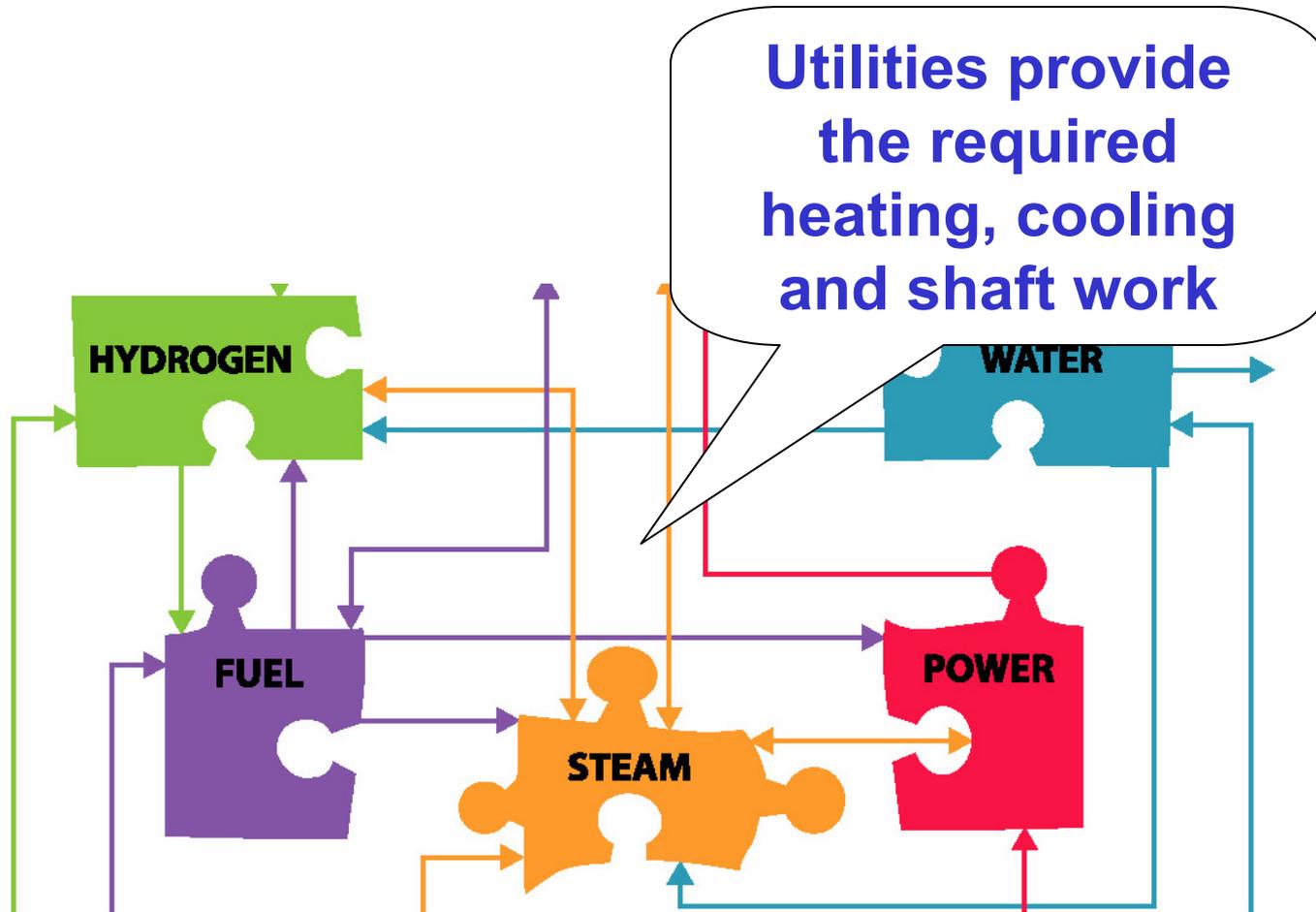


The Case for Energy Management

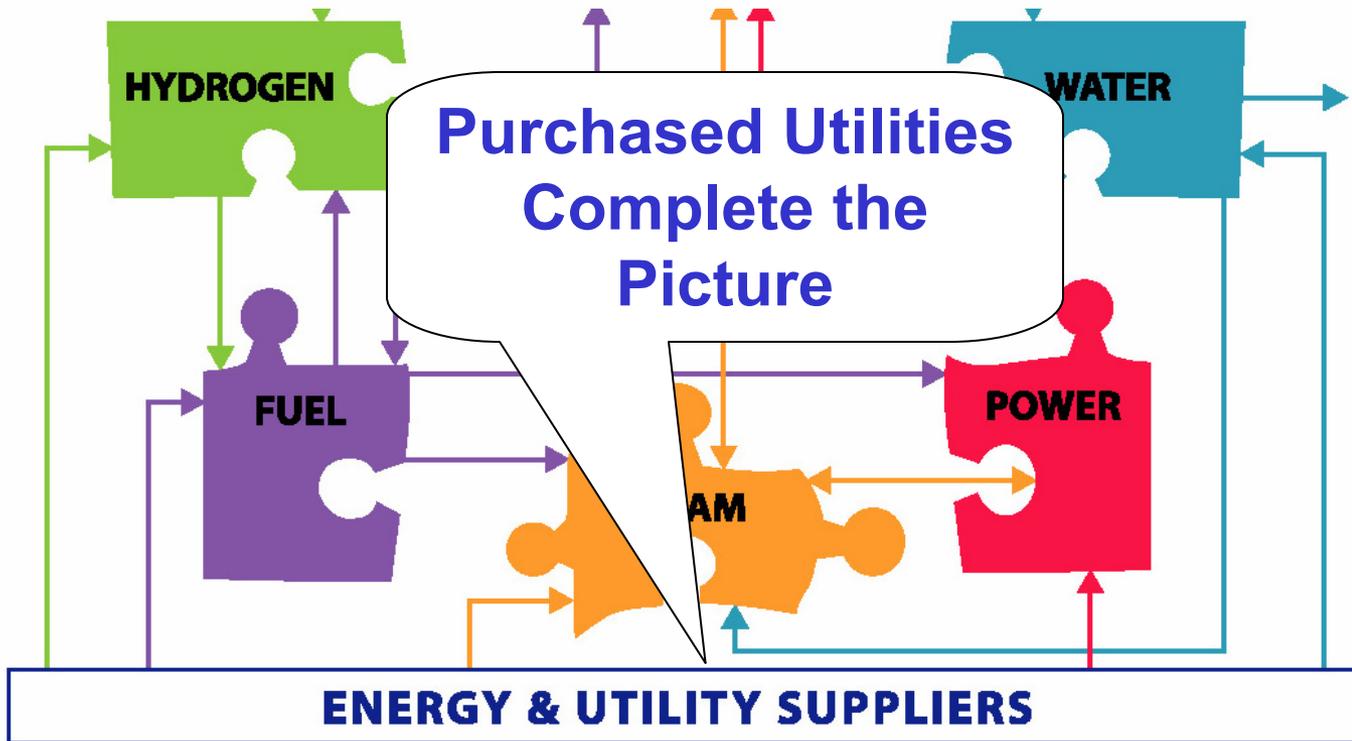


**It all starts
with process
demands**

The Case for Energy Management



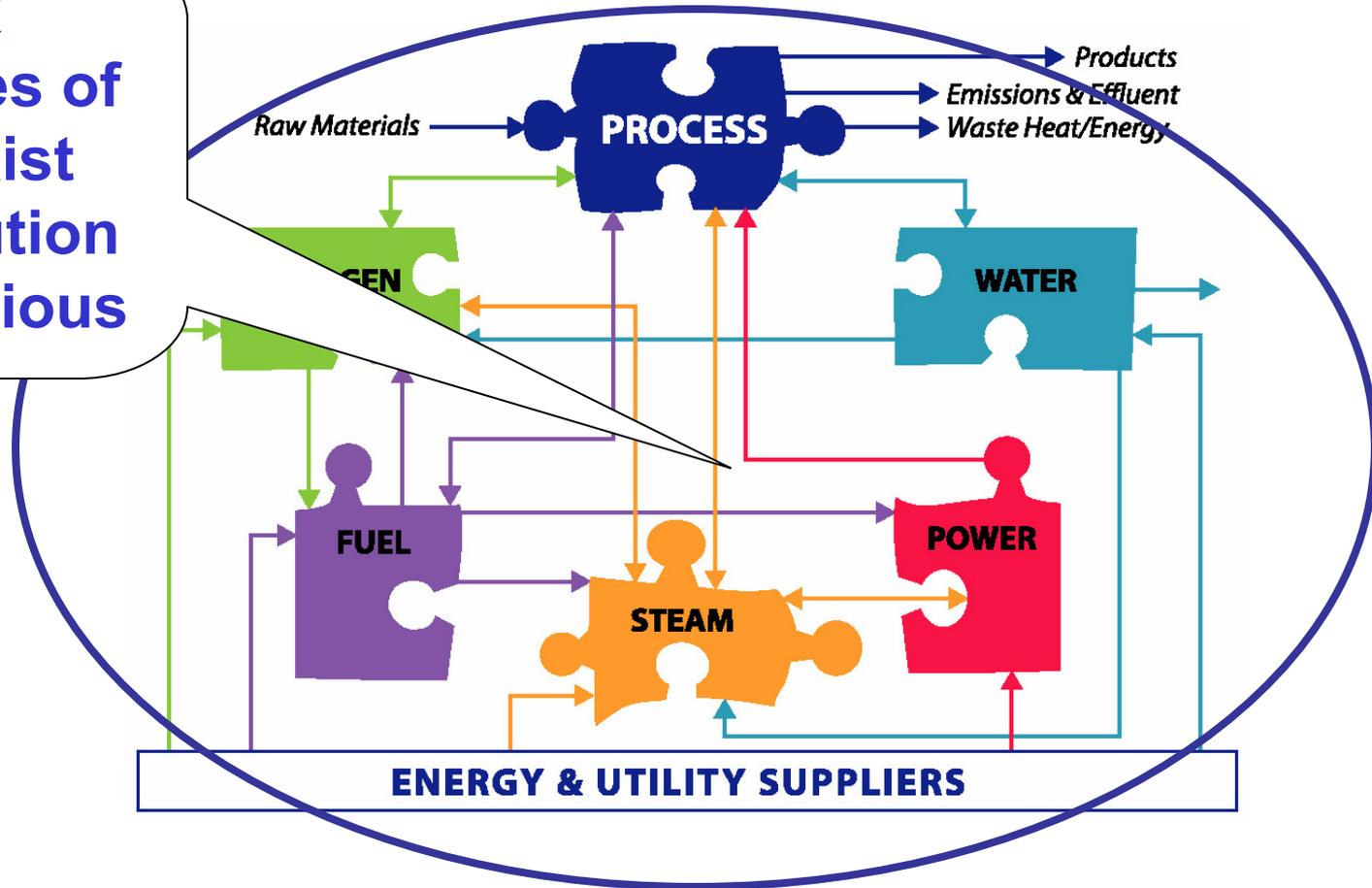
The Case for Energy Management



The Case for Energy Management



- Complex
- Many Degrees of Freedom Exist
- Optimal Solution Far From Obvious



The Case for Energy Management: Conclusion



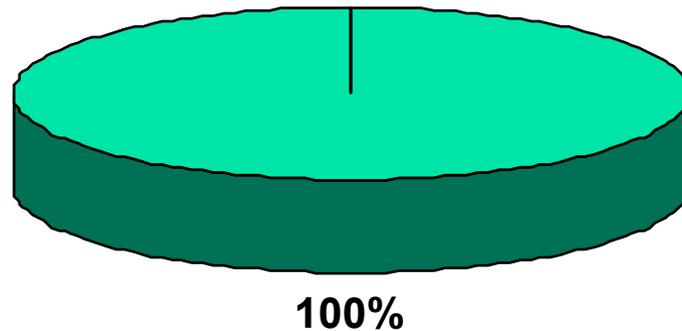
Energy management can uncover a vast store of hidden treasure



Uncovering the Hidden Treasure

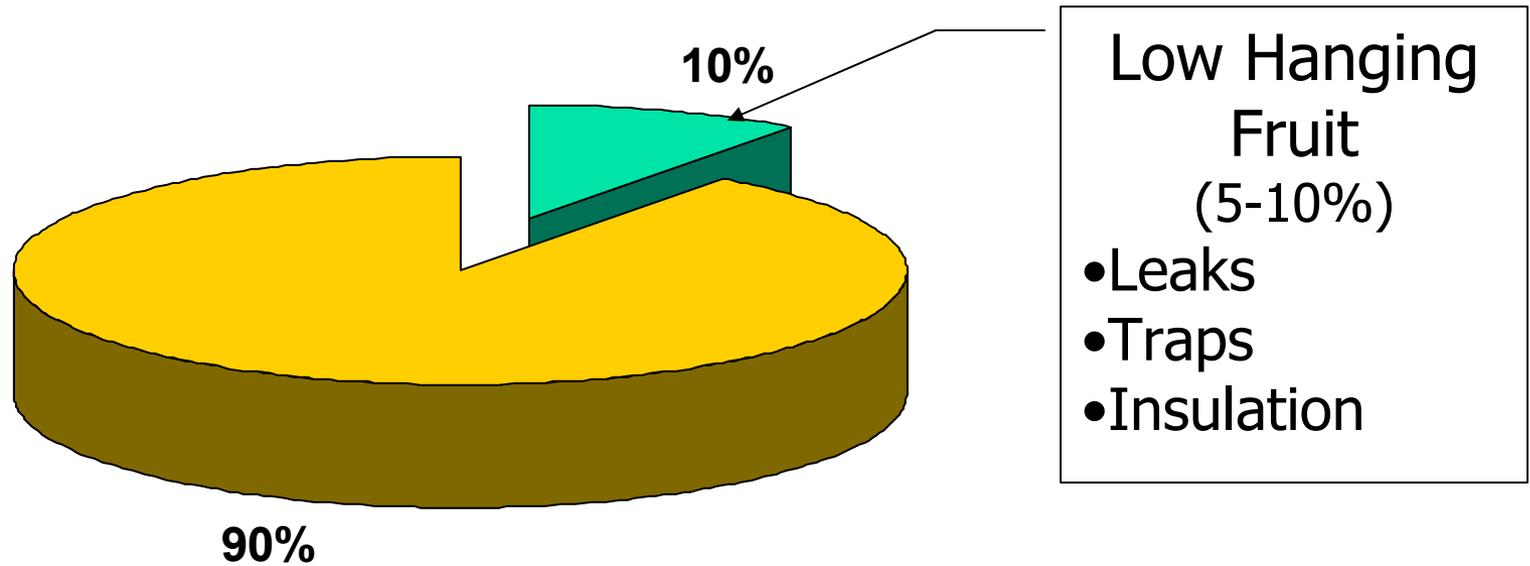


- Energy is the largest controllable cost for the process industries
- Current energy use

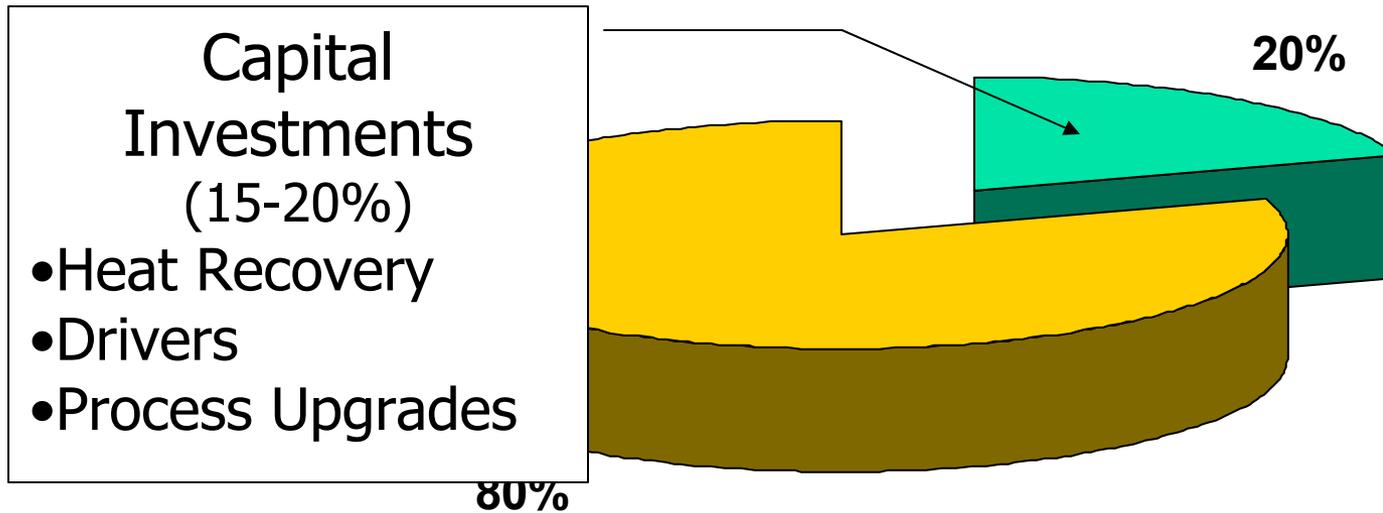


Where are the savings hidden?

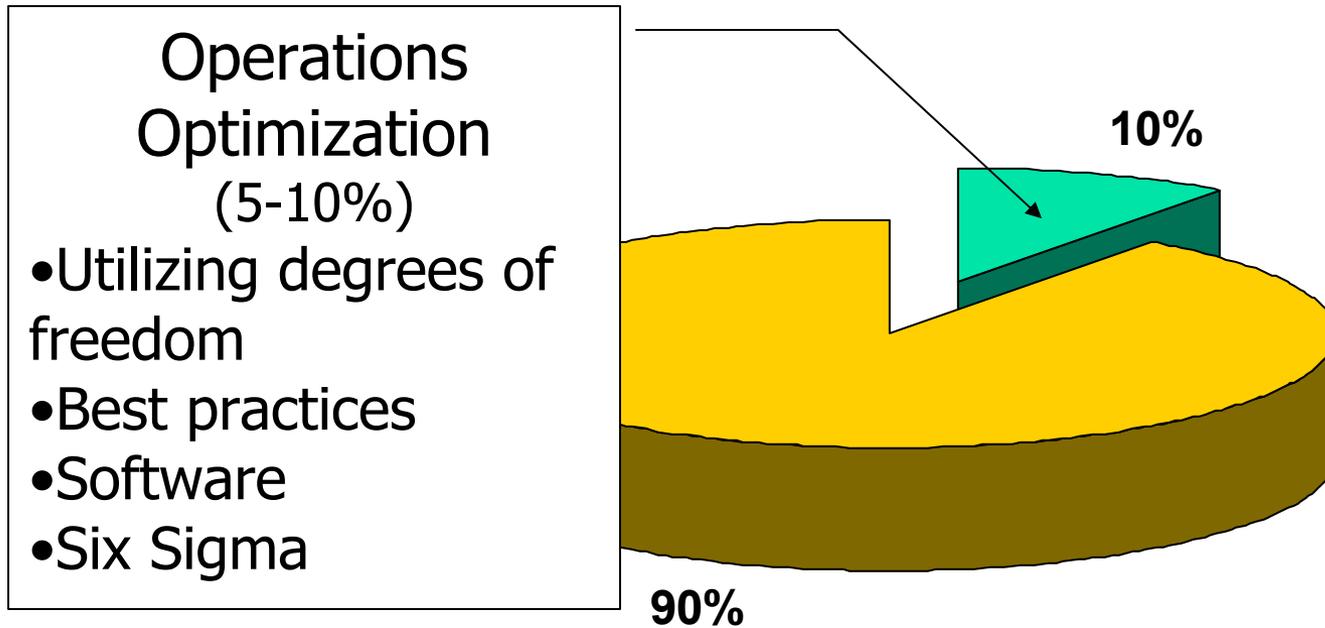
Uncovering the Hidden Treasure



Uncovering the Hidden Treasure



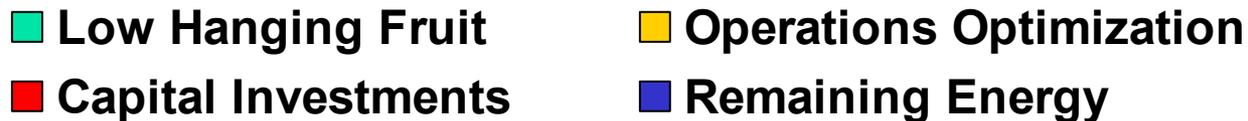
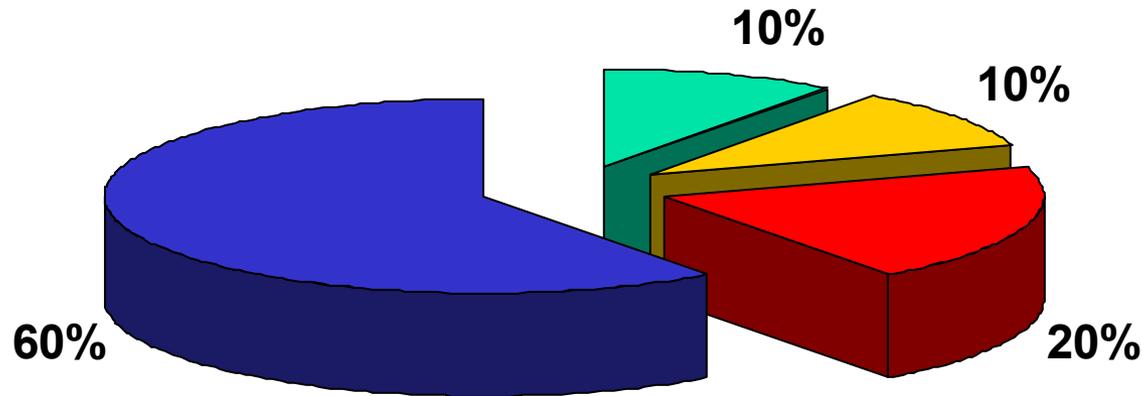
Uncovering the Hidden Treasure



Uncovering the Hidden Treasure

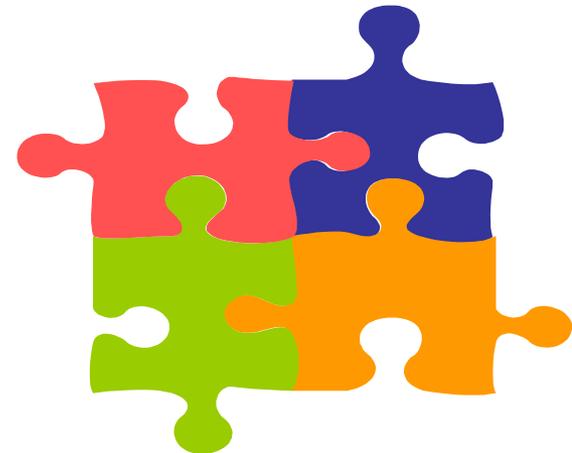


Putting it all together: A Comprehensive Energy Management Program Can Reduce Energy Spend by as Much as 25 - 40%

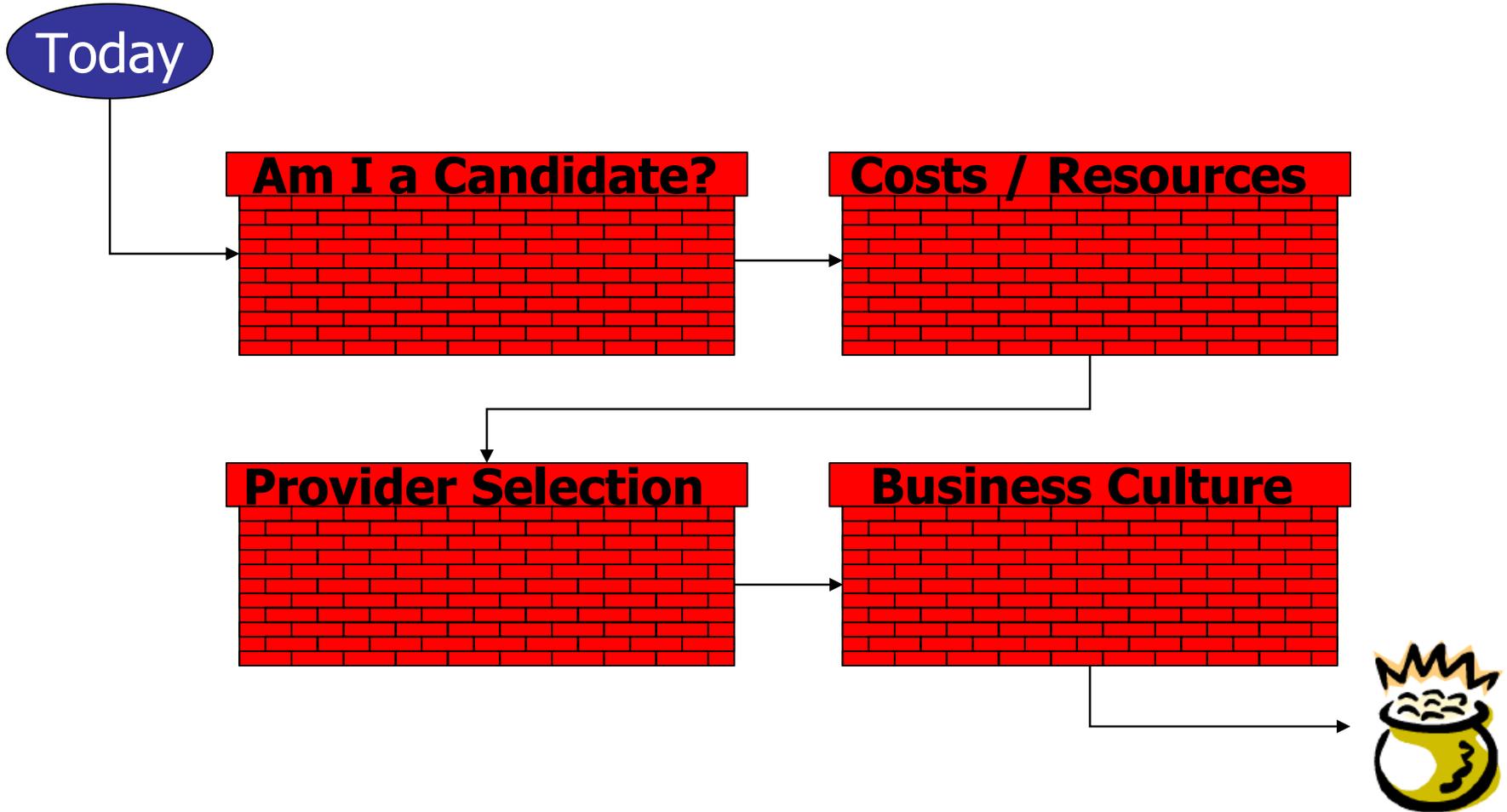




The Barriers & Issues



Barriers & Issues



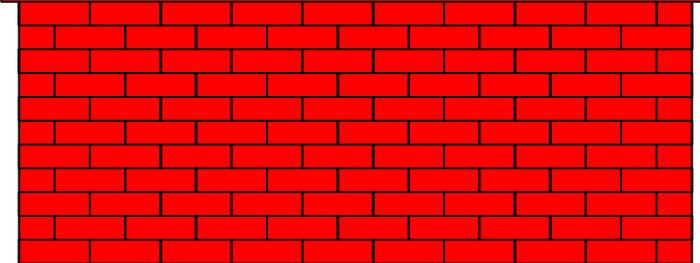
Barriers & Issues:

Am I a Candidate



- **Facility Complexity**
- **Metering**
- **Central DCS System**
- **Data Historian**
- **Energy Spend**

Am I a Candidate?

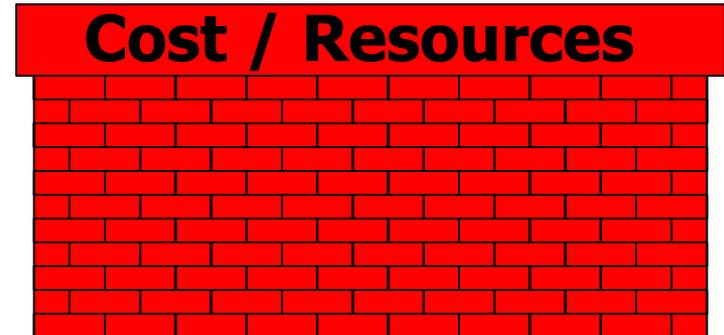


Barriers & Issues:

Cost / Resources



- **Perceived High Cost**
- **Budget Constraints**
- **Staffing Constraints**
- **Other Priorities**
- **Short Term Focus**



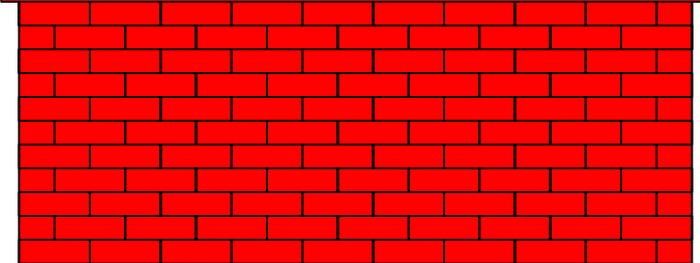
Barriers & Issues:

Provider Selection



- **Alternative Approaches**
- **Provider**
 - Expertise
 - Reliability
 - Commercial Flexibility
- **Products / Services Capabilities**

Provider Selection



Barriers & Issues:

Business Culture



- **Proof of Concept**
- **Another Passing Fad**
- **Long Term Commitment**
- **Risk Aversion**
- **Legacy Systems**
- **Change is Required**





Proactive Approach



Smooth Sailing to Payoff



Dealing With Barriers & Issues

Am I a Candidate?



Costs / Resources

Provider Selection



Business Culture

Almost Certainly – YES!



- **Facility Complexity –**
 - Chemical / Petrochemical
 - Refineries
 - Food and Beverage
 - Pulp & Paper
 - Universities
 - Institutions / Manufacturing
- **Metering & DCS –**
 - Use what you have
 - Infer missing points through modeling
- **Data Historian –**
 - Many options
- **Energy Spend –**
 - Payback < 1 year: Operations Optimization
 - Payback < 1-2 year: Low Hanging Fruit
 - Payback < 2-3 years: Capital Investments

Am I a Candidate?



Managing Costs



- **Leverage resources of others**
- **Examine alternatives to basic fee for service**
- **Align provider's interests with that of your company**
- **Evaluate value versus cost**
- **Plan for "Pay As You Go"**
 - Appropriate detail
 - Basic start
 - Add sophistication later

Costs / Resources



Who Do I Choose?



- **Significant Investment, Ensure a Long Term Fit**
- **Expertise**
 - Good software capabilities, certainly
 - Energy management skills, equally important
- **Product Sophistication**
 - Approach
 - Features
- **Commercial Terms**
- **Scope of Capabilities**
 - Software, training, best practices
 - Consulting and strategy development
 - Implementation

Provider Selection



Integrate Energy Management System Into Company Culture



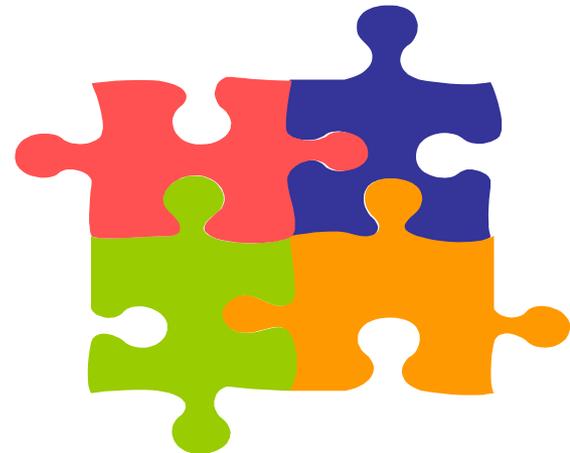
- **Past performance is a good indicator of future performance**
 - No change, no improvement
- **Pay-off is significant enough to warrant serious planning and commitment**
- **Total package required**
 - Tools and software
 - Training
 - Work processes
 - Best practices
- **Measurement and Verification**
 - Prove and report savings

Business Culture





Putting It All Together



Comprehensive Energy Management



- **Commitment**
- **Planning**
- **Resources**
- **Energy Management System Tools**
 - Software
 - Training
 - Best Practices
- **Execution**

The Role The EMS System Can Play



- **Capital Project Identification and development**
- **Facility Planning**
 - Turnarounds
 - Expansions
 - Improvements
- **Operations Optimization**
- **Maintenance Planning**
- **Equipment Monitoring**
- **Project Performance Verification**



Products and Services



Products and Services



*LightRidge Resources
Develops and
Implements
Comprehensive
Energy/Utility Strategies*

Using:

- **Consulting**
- **Software**
- **Implementation**

Software Products



- **PE-Advisor™ - Optimize overall utility interactions beginning with the core process**
- **PE-Hydrogen™ - Hydrogen system management**
- **PE-Water™ - Water system management**
- **PE-Best Practices™ - Provides tools and training to improve company practices**

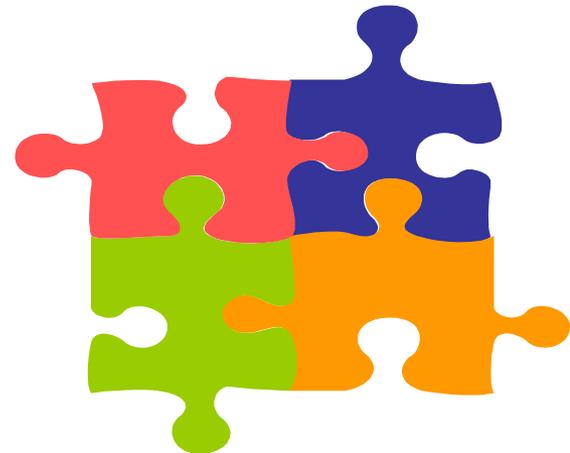
LightRidge Resources' Philosophy



- **Open Excel based environment**
- **Systems approach**
- **Appropriate detail**
- **Site wide optimization vs. unit optimization of the utility system**
- **Customized approach**
- **Clear advice to assist operators in taking corrective actions**



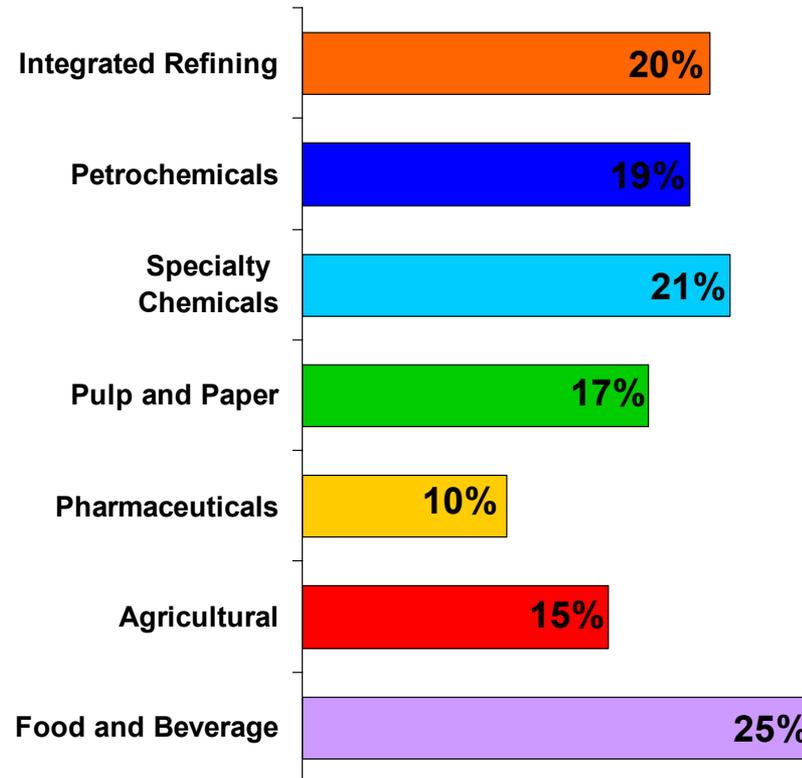
The Payoff



LightRidge Resources Experience



Average Reduction of Energy/Utility Spend



Figures do not include operational savings