



ENERGY MANAGEMENT

***Prepared for
Seafood Processors Workshop
GMA / FPA - Seattle
March 30, 2007***

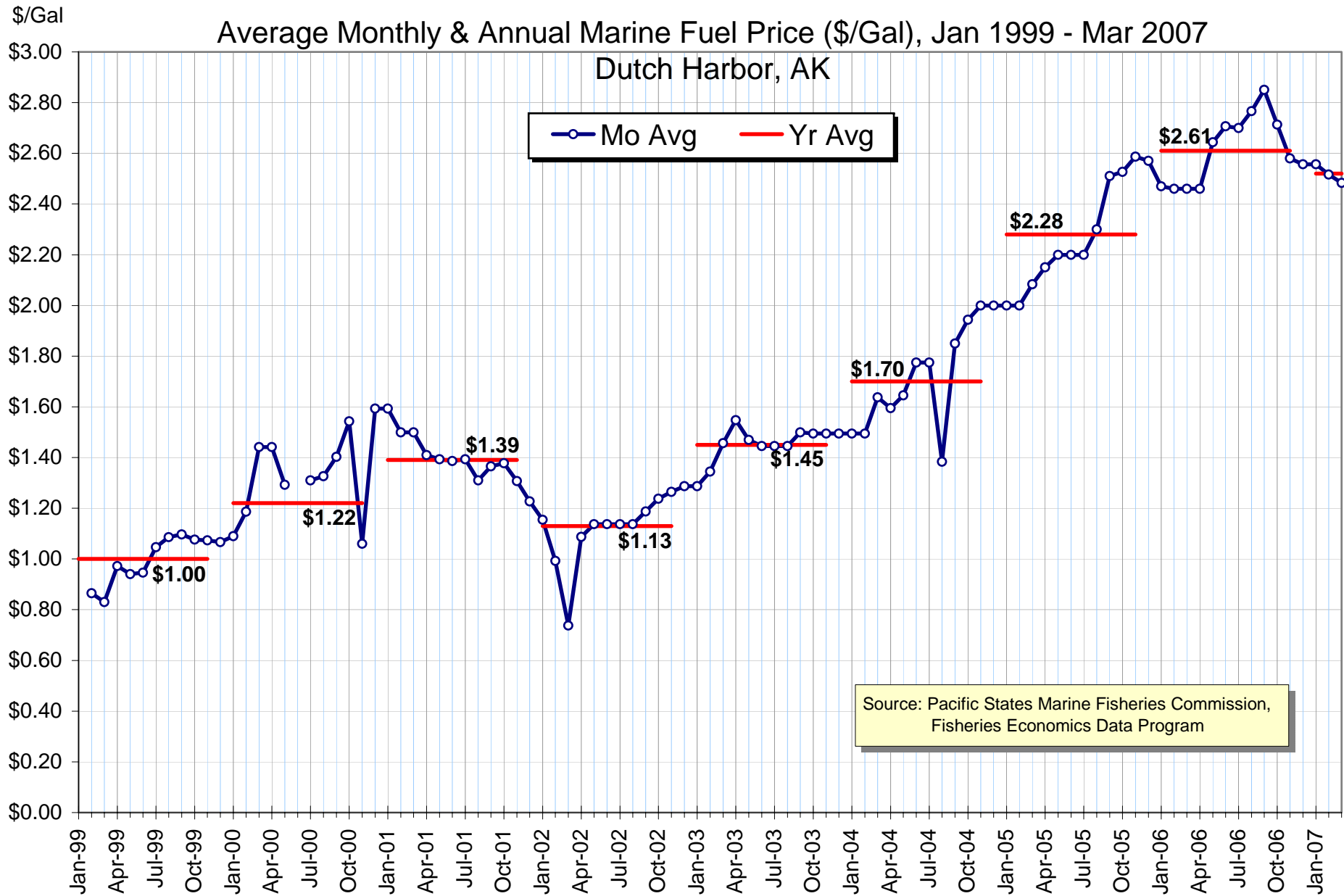
NATURAL RESOURCES CONSULTANTS, INC.

Perspectives & Objectives

- **Seafood Processing is “Energy Intensive”**
- **Energy Costs Have Increased Rapidly**
- **Oregon State Team (Kelleher, Kolbe & Wheeler) Studied “Energy & Productivity” in 1999 - 2001**
- **Natural Resources Consultants, Inc. (Bill Woods & Ed Lapsley’s “Legacy Project”) Focus on “Energy Efficiency” in 2007**
- **OBJECTIVE → To Describe 3 Phase Approach Now In Use & Preliminary Results**

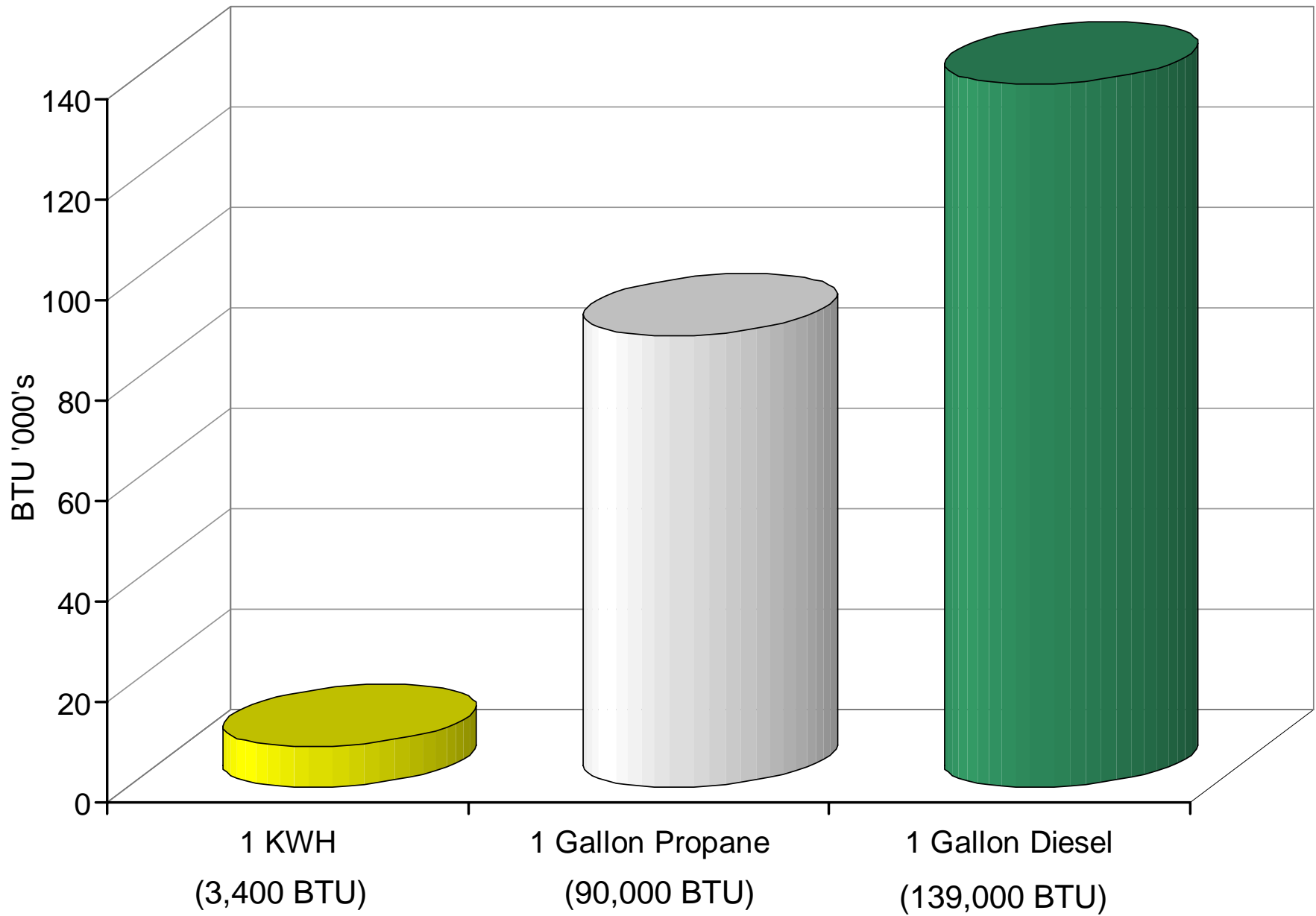
MARINE FUEL

Average Monthly & Annual Marine Fuel Price (\$/Gal), Jan 1999 - Mar 2007
Dutch Harbor, AK



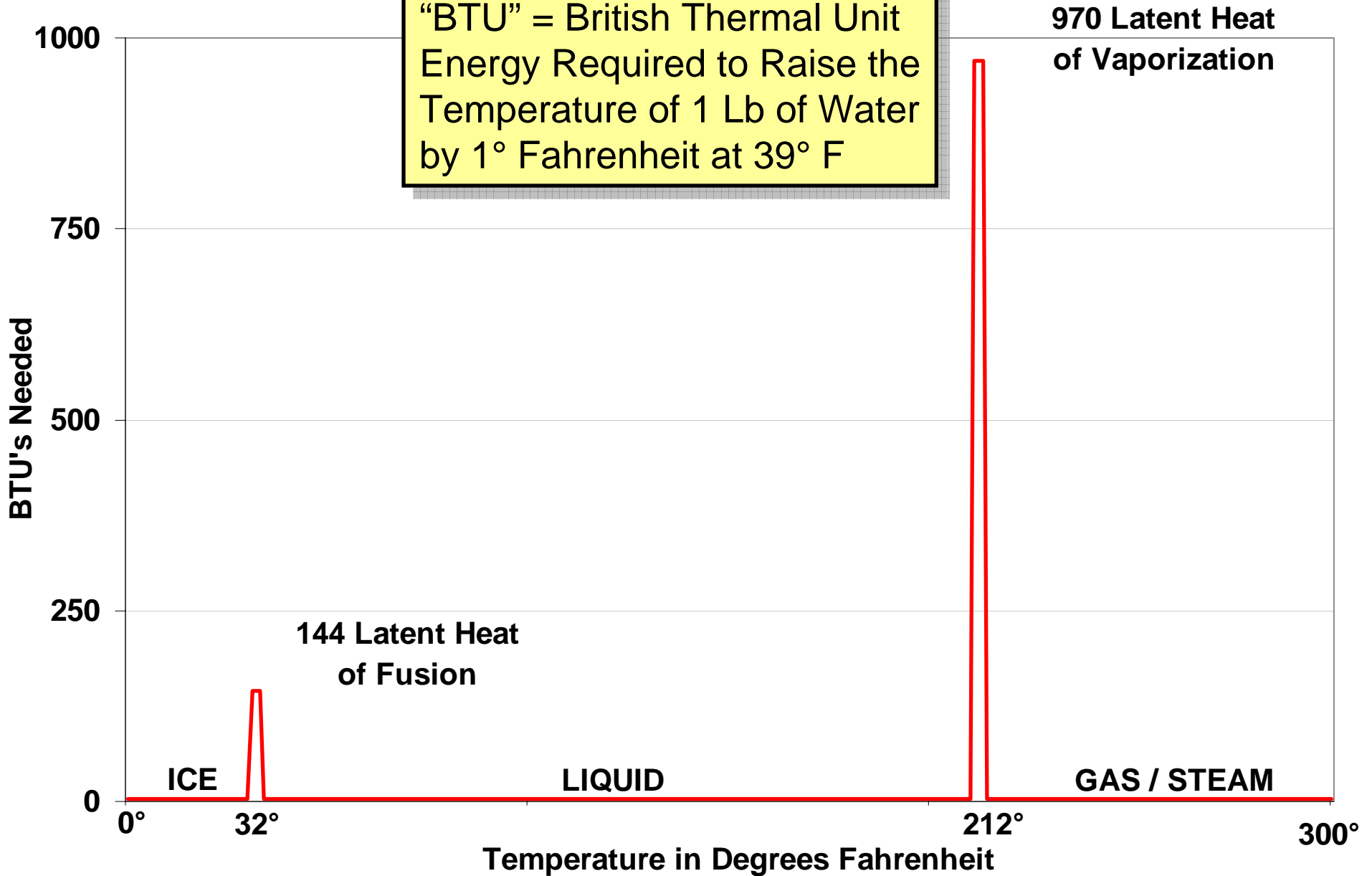
Source: Pacific States Marine Fisheries Commission, Fisheries Economics Data Program

ENERGY SOURCES



ENERGY PHYSICS

“BTU” = British Thermal Unit
Energy Required to Raise the
Temperature of 1 Lb of Water
by 1° Fahrenheit at 39° F



NRC – OSU Comparison

- **OSU Study Broader than NRC**
- **OSU in 1999 - 2001**
 - **Productivity & Energy Efficiency**
 - **Seafood Shore Plants in WA / OR / AK**
 - **One Year at 10 Plants**
 - **Public Academic Document, Grant Funded**
- **NRC in 2007**
 - **Energy Efficiency Only**
 - **Seafood Shore Plants in AK Only**
 - **3 Years / 36 Month at 6 Plants (So Far)**
 - **Confidential Contract Paid by Processors**

Criteria for Both NRC & OSU Work

ENERGY USAGE AS:

- **Cost per Pound of Finished Product (\$/Lb)**
- **Cost as % of Finished Product Market Value**
- **Used per Pound of Finished Product (BTU/Lb)**

Energy Management Program

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graph TD; A[Energy Management Program] --> B[Phase 1 Energy Audit]; A --> C[Phase 2 Energy Needs Survey]; A --> D[Phase 3 Energy Mgt Plan];
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Phase 1 Energy Audit

- Energy Use & Cost Trends
- Production Trends
- Energy Use per Finished Product
- Benchmark Energy Use
- Utility Energy Rate Analysis

Phase 2 Energy Needs Survey

- Identify Energy Needs in Pre Field Survey
- Verify Equipment, Inventory & Usage During Onsite Survey
- Identify Potential Improvements for Energy Efficiency

Phase 3 Energy Mgt Plan

- Install Monitoring Devices Identified in Needs Survey
- Implement Operating Procedure Changes
- Implement Program for Training Key Personnel
- Analyze & Prioritize Investment Opportunities
- Design, Bid & Award Capital Improvements
- Monitor Results

Phase 1 - Energy Audit

Energy Used

- Record Energy Supplied by Outside Vendors (Units & Costs)
- Convert to Common Units (BTU)
- Audit Monthly Billing from Vendors Using Published Rates

Finished Product

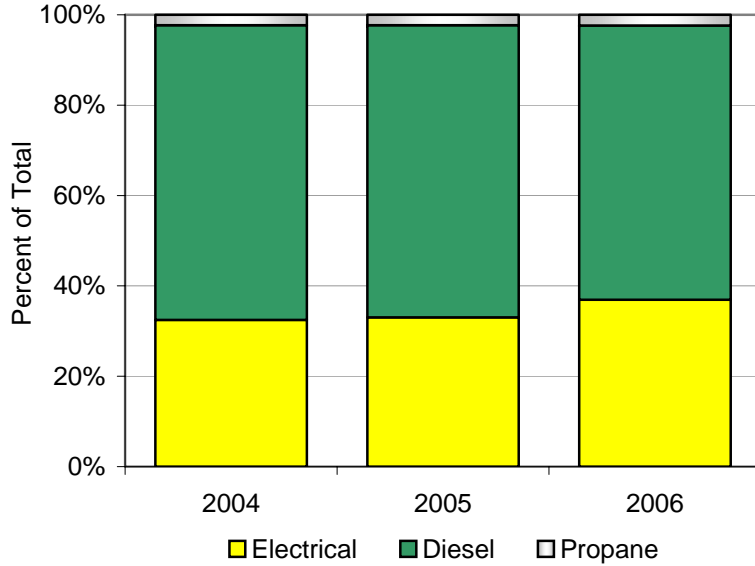
- Record FRESH Product Processed in Pounds(Unit)
- Record FROZEN Product Processed in Pounds(Unit)
- Record CAN / MEAL / OIL Product Processed in Pounds(Unit)

Energy Audit

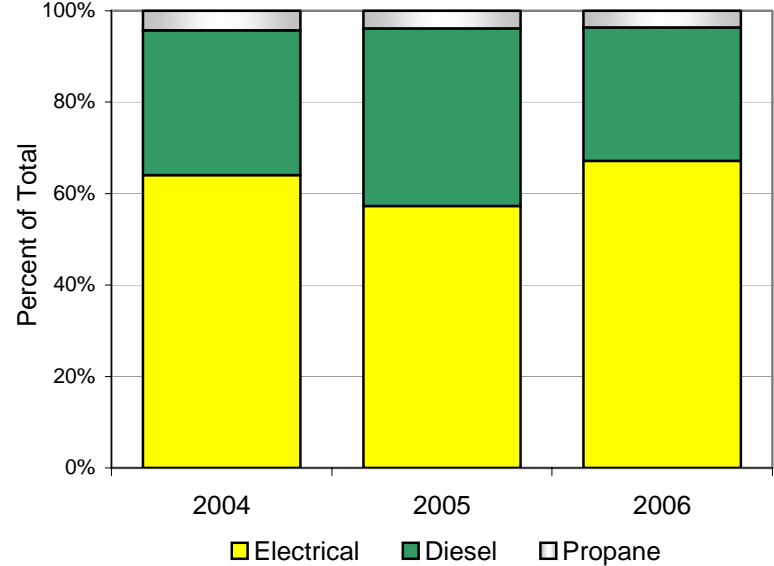
- Divide Total Energy Units & Costs by Finished Goods
- Analyze Trends Over 36 Months
- Establish Baseline Data for Future Analysis

ENERGY USE COMPARISONS

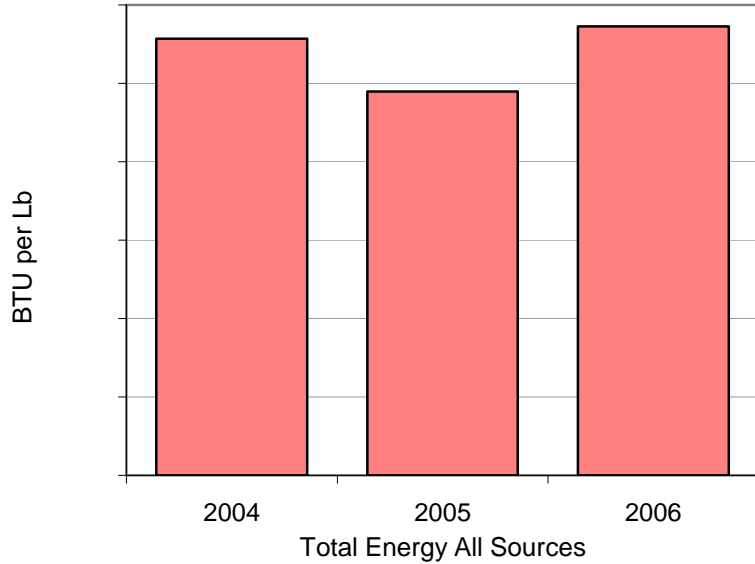
Percent of Total Energy by Type



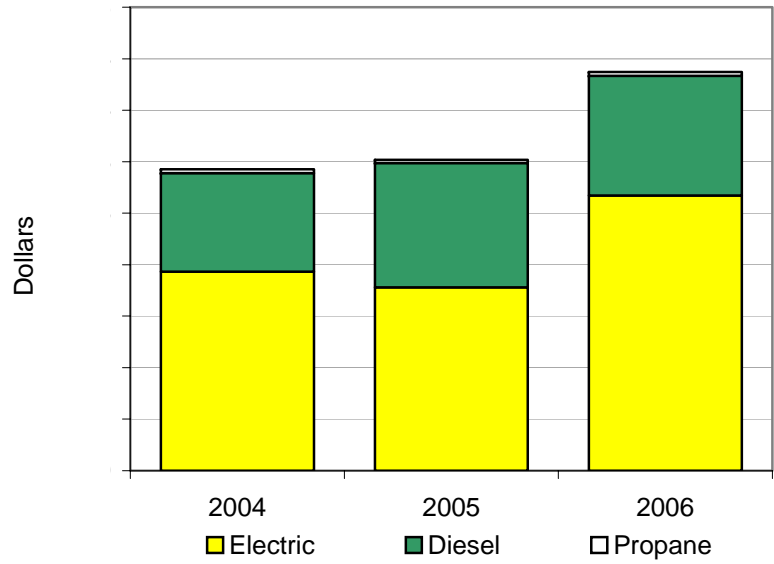
Percent of Total Cost by Type



BTU per Lb of Finished Product

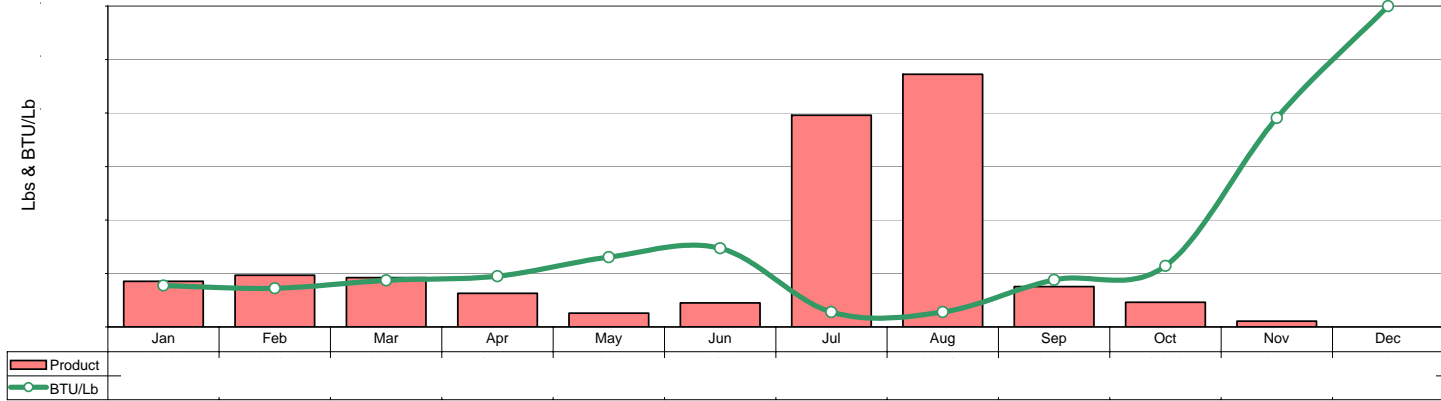


Energy Cost per Lb of Product

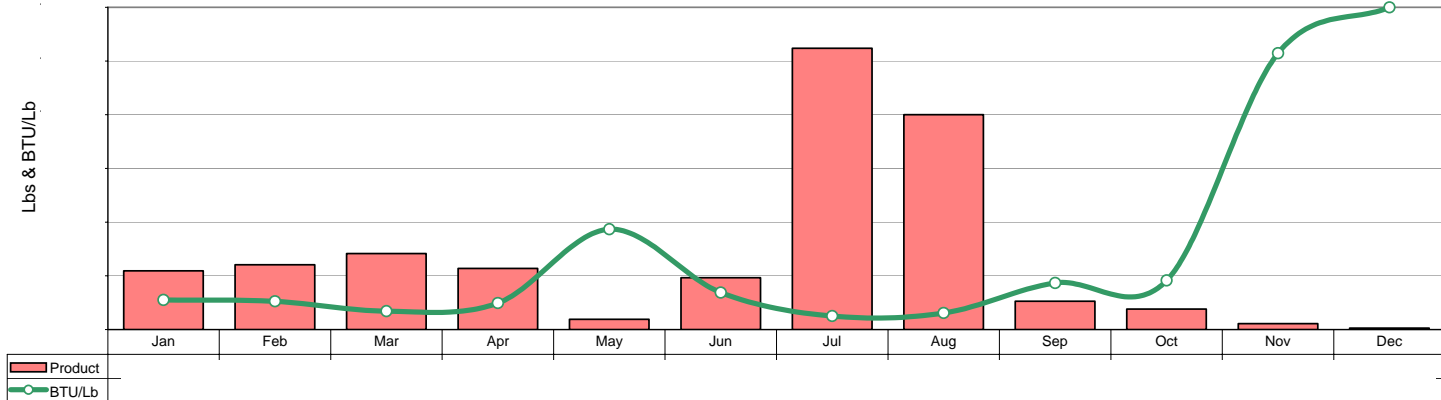


PRODUCTION v. ENERGY CONSUMPTION

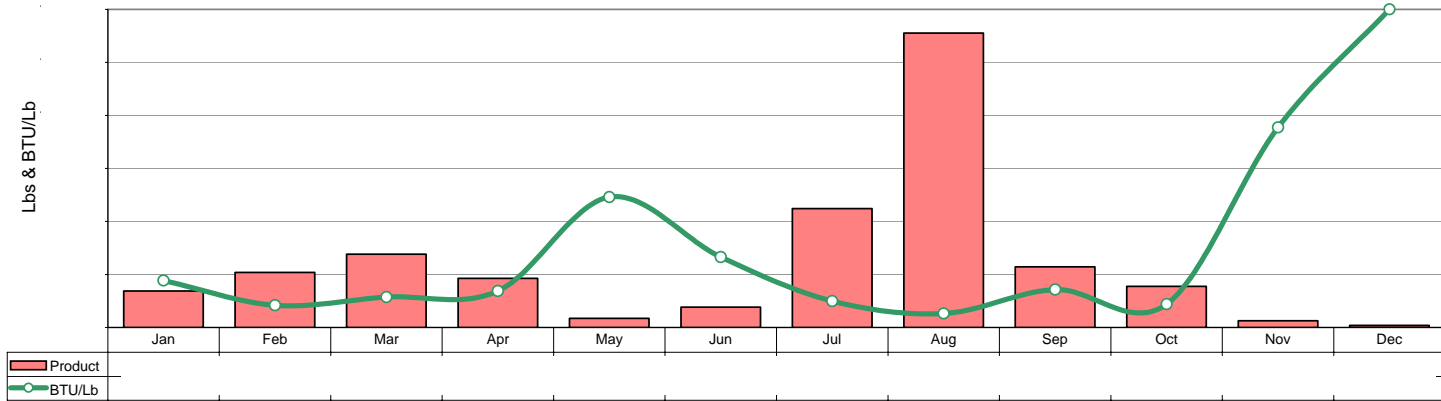
2004



2005



2006



Preliminary Results of NRC Phase 1

- Average “Energy Efficiency” (BTU/lb) Nearly the Same in Both 1999 & 2007
- Energy Cost per Finished Pound Up About 37% in Last Three Years
- Energy Cost as % of Product Value Up About 18% in Last Three Years

Preliminary Results of NRC Phase 1

- **For Useful “Apples to Apples” Benchmarking, there are 3 Distinct Groups of Seafood Plants in Alaska in Terms of “Energy Intensity”**
 - 1) Buy Electricity, No Meal Plant
 - 2) Self Generate Electricity, No Meal Plant
 - 3) Self Generate Electricity, With Meal Plant
- **It’s a Very Good Idea to Audit Your Utility Bills Annually & Check Out Any Variance from Expected Cost / KWH Each Month**

Phase 2 - Energy Needs Survey

Pre Field Survey

- Gather & Evaluate Drawings / Equipment Data
- Operating Profiles
- Develop One Line Energy Flow Diagrams
- Develop Estimated Energy Use Data

Field Survey

- Survey All Energy Systems
(Structures, Processing, Boilers, Generators, Controls, Power, Lighting & Motors, Refrigeration)
- Develop Priority List of Energy Efficiency Projects w/ Survey Team

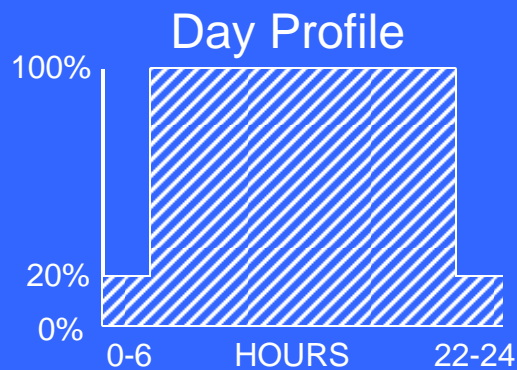
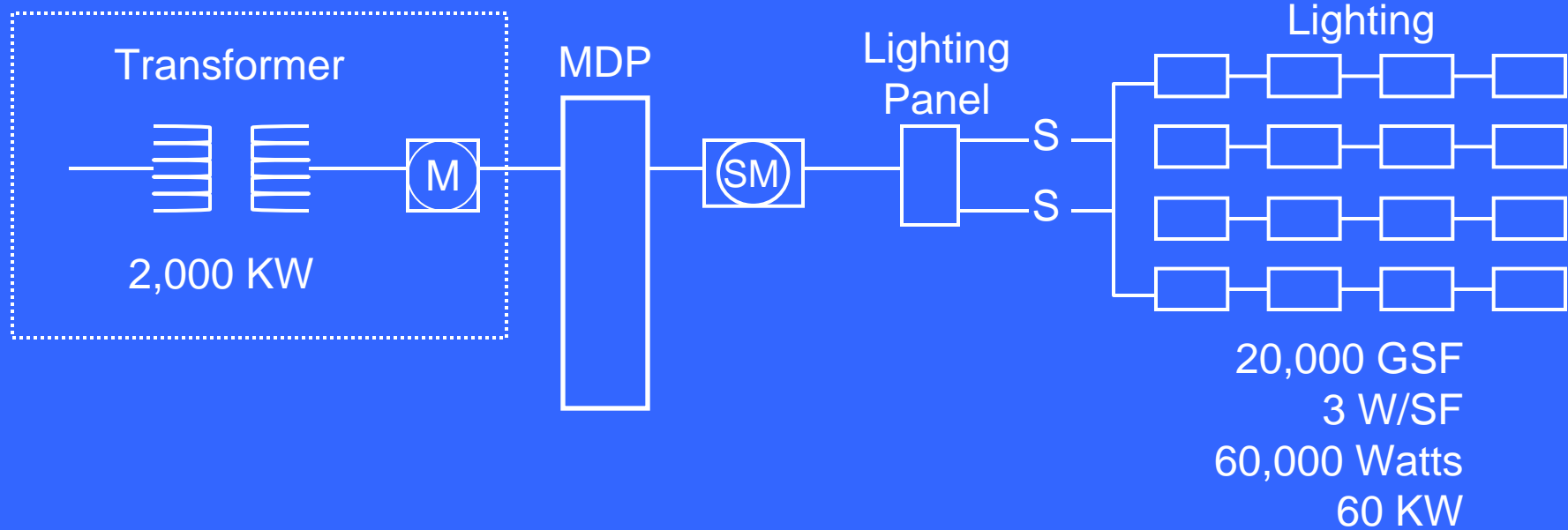
Report

- Analyze Findings from Field Survey
- Recommendations – Write Report

Training Workshop

- Develop Workshop Program
- Provide Training Workshop

Phase 2 - Energy Needs Survey - Energy Stream



%	KW	Hrs	KWH
20	60	8	96
100	60	16	960

1,056

$$1,056 \times 30 = 31,680 \text{ KWH}$$

$$\quad \times 3,412$$

$$= 108,092,160 \text{ BTU}$$

$$\text{or } 108,092 \text{ MBH}$$

$$108,092 \text{ MBH/Month}$$

$$3,603 \text{ MBH/Day}$$

$$150 \text{ MBH/Hour}$$

Phase 3 - Energy Management Plan

- **Install Monitoring Devices as Identified in Phase 2**
- **Implement Operating Procedure Changes**
- **Implement Training for Key Personnel**
- **Analyze & Prioritize Investment Opportunities**
- **Solicit Proposals from Equipment Suppliers to Implement Opportunities**
- **Award Contracts**
- **Continue Monitoring & Improve Efficiencies**



Expectations & Contacts

“That Which Gets Measured Gets Done”

Other Industries Typically Find 10 – 15 % Reduction in Energy Usage When Starting an Energy Management Program with “Low Hanging Fruit” Changes to Procedure / Training Without New Investment



Expectations & Contacts

“That Which Gets Measured Gets Done”

Involving Your Own Crew in the Energy Management Program Early Will Keep Costs Down & Increase Rate of Change and Sustainability

Expectations & Contacts

“That Which Gets Measured Gets Done”

Alaska Seafood Processors Have Not Had Much Access to Government Support Programs (DOE, USDA, AK Energy Admin & Local Utility), But That Can Change. Phases 2 and 3 of NRC Program are MUCH More Expensive than Phase 1. Do Your Homework (Energy Audits & Needs Survey) Before Bringing in the Expensive Experts

Expectations & Contacts

For Copy of the OSU Report:

<http://seagrant.oregonstate.edu/sgpubs/onlinepubs/t01004.pdf>

**For Info on Northwest Food Processors
Energy Training Program & Seminars:**

<http://www.nwfpa.org/eweb/StartPage.aspx?site=energy>

For Info on NRC Energy Management Program

CONTACTS:



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