Peter Beardsley, PE, Principal

- Alaska Civil PE 10934 (2003)
- Alaska Environmental PE 14147 (2014)
- Certified Energy Auditor 1603 (2011)
- Managed AHFC Projects for *NORTECH*
- Led Benchmarking Effort
- Administrative Management and Technical Quality Control for Audits

Energy Audit Rationale

- Energy use is the most significant intersection of people and the built environment
- Evaluate a building's energy use relative to:
  - Square feet
  - Productivity
  - Similar buildings
- Quantify energy use and cost
- Identify infrastructure and operational issues

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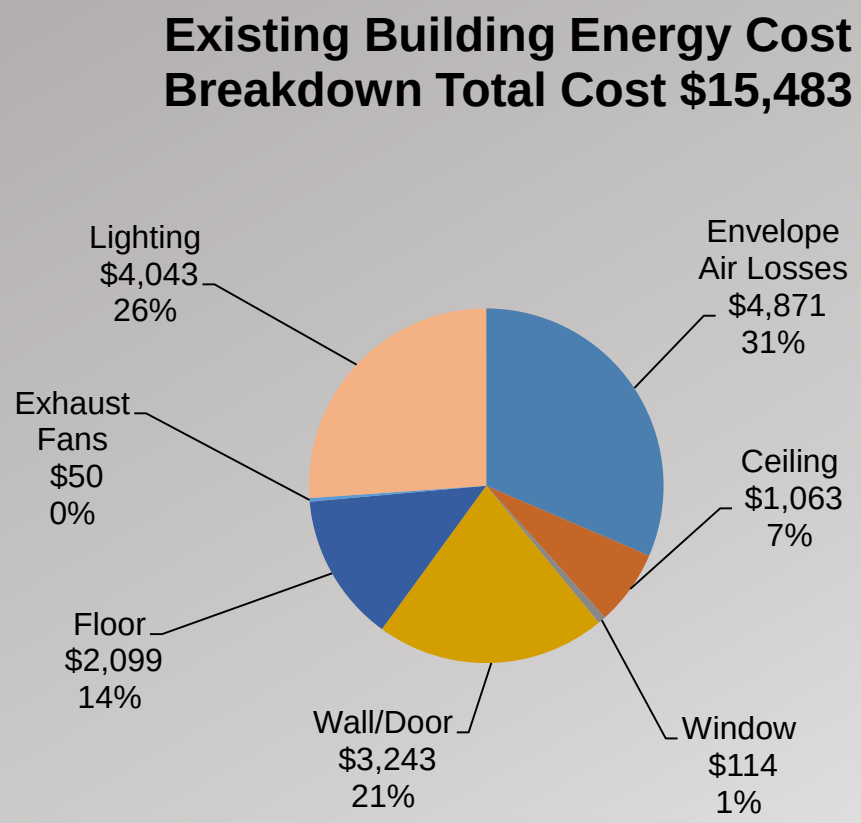
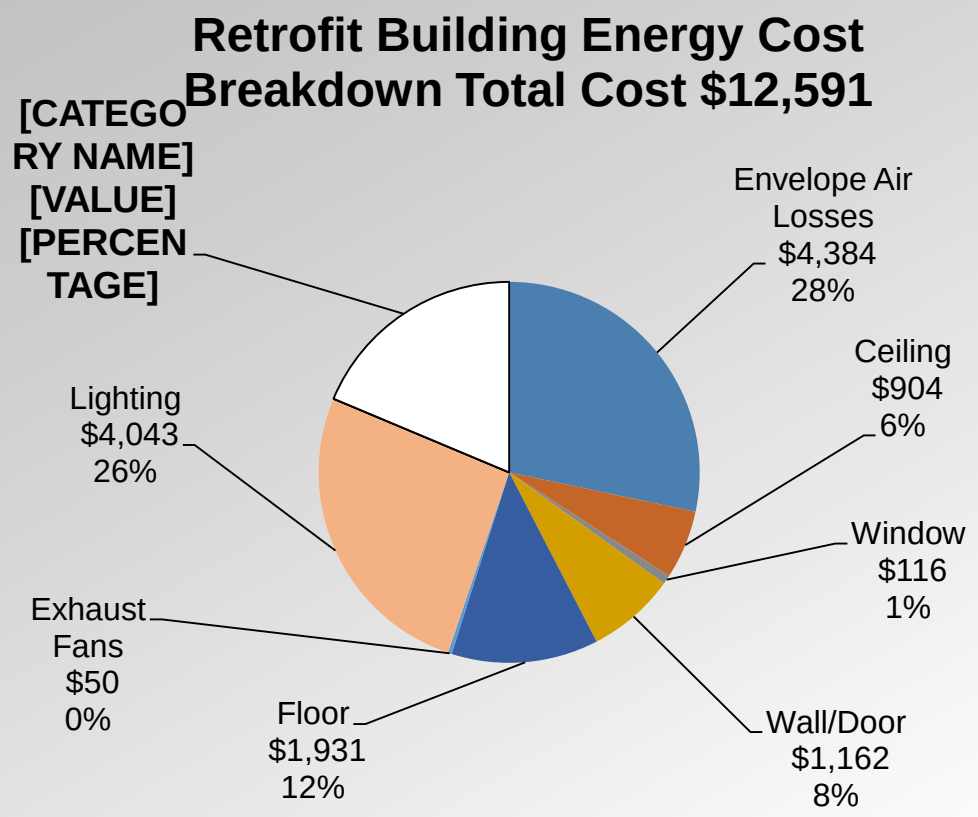
Energy Audit Goal – Save Money!





How to Quantify the Savings?

Justify efficiency measure costs by quantifying savings!

- Preliminary Energy Audit (PEA) or Benchmarking
- Level 1 site visit / walk through
- Level 2 investigation of whole building with breakdown of specific systems
- Level 3 investigation/design of specific systems and energy efficiency measures

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PEA Relates the Money to Energy Use

- Energy costs are NOT controlled by the building owner
  - Volatile over time
  - Global commodities markets
  - Refining and delivery costs
  - Local supplier competition
- Energy use CAN BE controlled by the building owner
  - Changing infrastructure
    - More efficient lighting
    - More efficient heat system
  - Changing behavior
    - Turning off lights
    - Turning down thermostats

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PEA Identifies Potentials

- Relates energy savings to monetary savings for different energy sources
- Provides scales of potential energy use and reductions to conceptual costs/savings
- Provides pathways for documenting energy use to monitor energy and cost savings

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Easiest Potential Savings

- Facilities with high energy use/cost are immediately obvious
- Easiest cost savings is the money not used for energy
  - Demand
  - Power factor
  - Theft (heating oil or electric)
  - Loss/leaks (heating oil)
- These savings can be achieved with
  - No change in behavior
  - Minimal design/capital costs
- Operator awareness of the monthly bill may be enough

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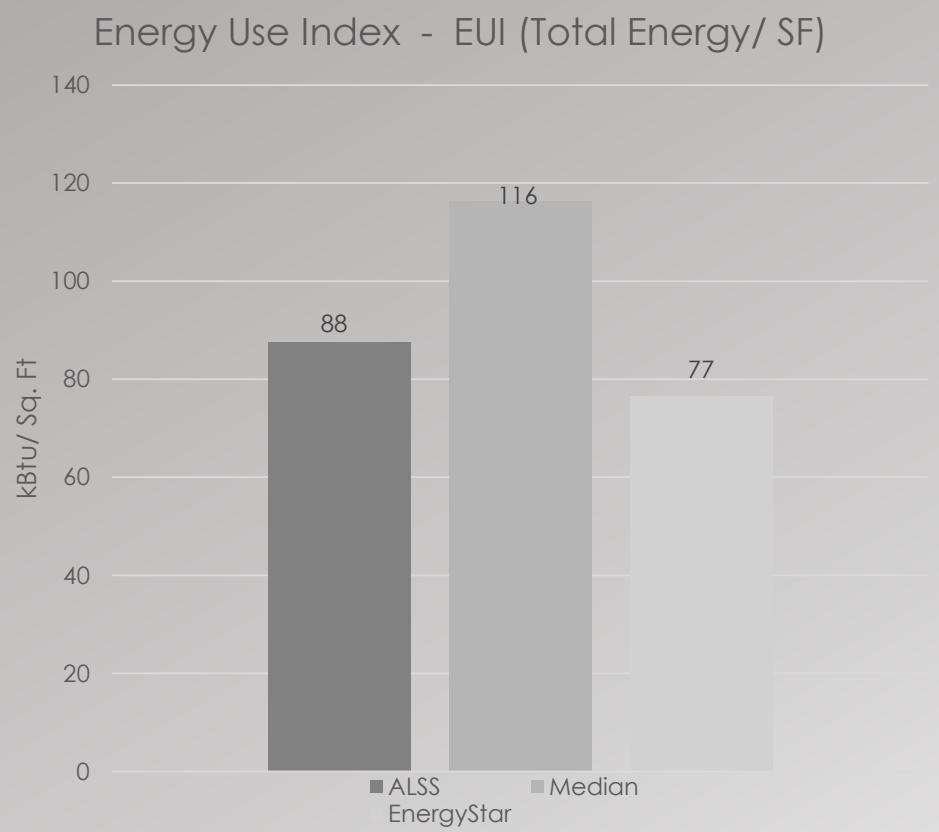
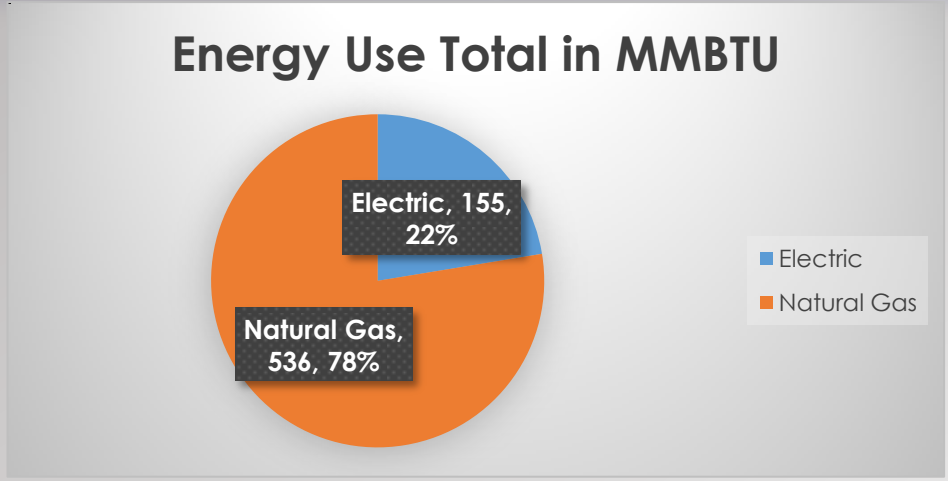
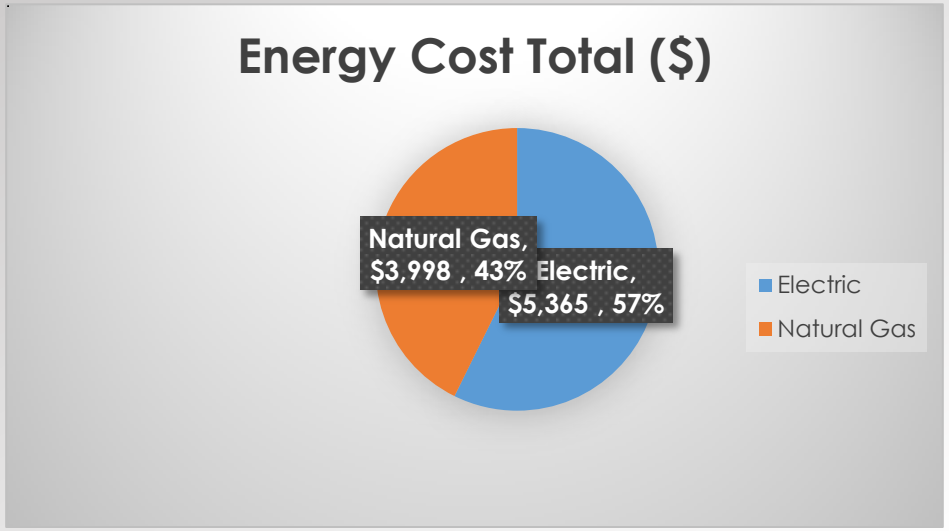
Preliminary Energy Assessment (Benchmarking)







AHFC PEA/Benchmarking Phase

- Develop census/inventory public buildings
  - More than 1,200 buildings identified during benchmarking
  - More than >25,000,000 square feet statewide
- Evaluate interest in auditing program
- Develop Alaska-specific benchmarks

Data Received

- Most useful - monthly utility bills
  - Urban gas and electric
  - Rural electric
- Useful – periodic utility bills
  - Urban heating oil (usually on autofill)
- A little useful – accounting billing summaries
  - Urban and rural electric
  - Usually periodic, energy use back-calculated from utility rates
- Barely useful – annual delivery records
  - Rural heating oil

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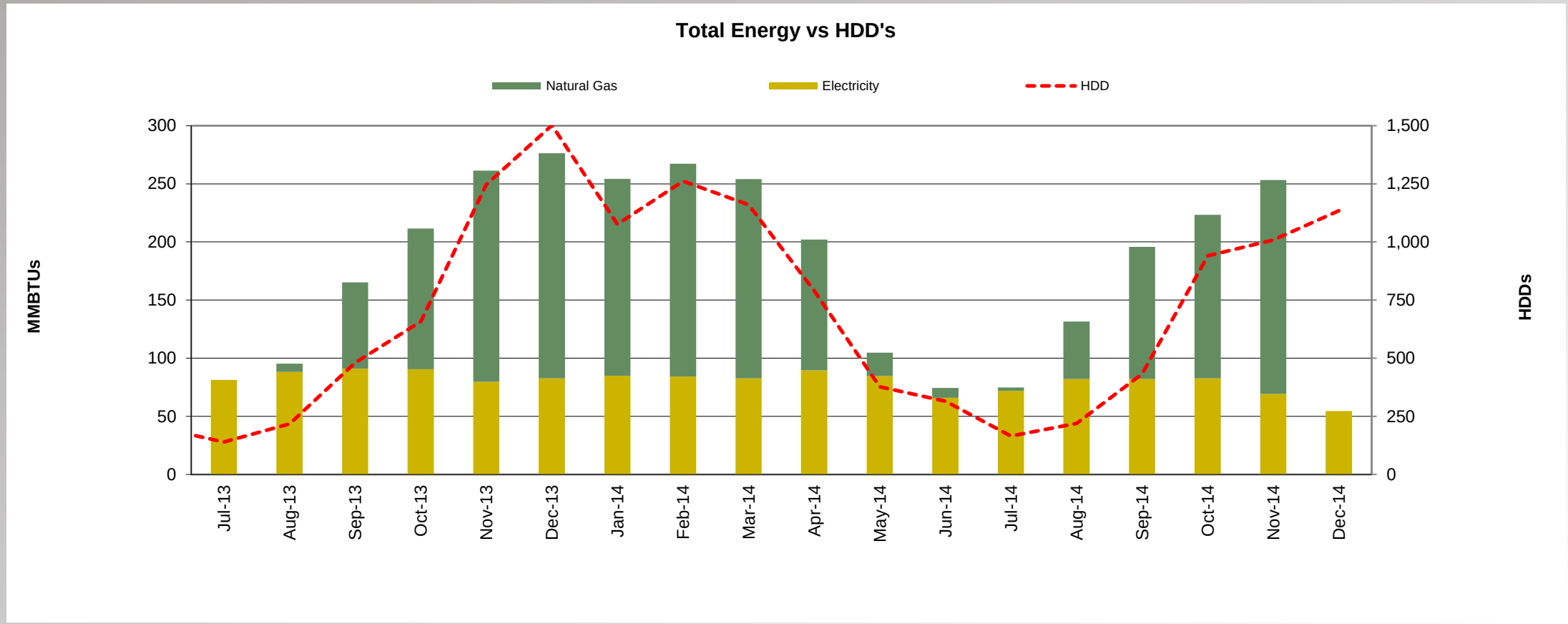
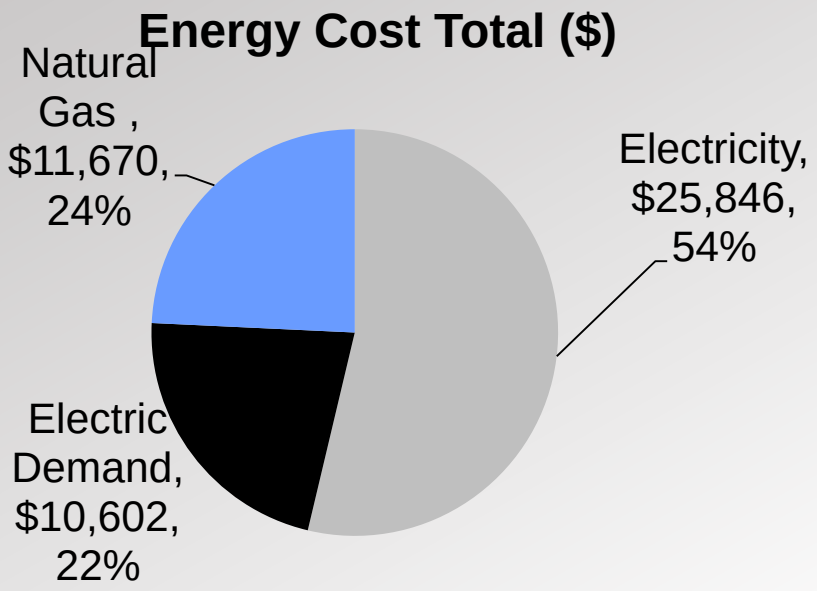
Nearly Ideal PEA Data



Why Auditors Need to See Bills

- Utility costs are more than just the cost of energy
  - Meter fees
  - Demand charges
  - Power factor charges
  - Delivery fees
  - Cost-of-fuel surcharges
  - Regulatory fees
  - Taxes



Anecdotes From Reviewing Bills

- Electric meters with no use (only connection fees)
- Electric meters on wrong structure/owner
- Rate structure errors
- Demand charge is significant % of annual total
- Power factor charge is significant % of annual total
- Steam/hot water charged by the square foot *every* month

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PEA Prioritize Audit Funding

		ENERGY		MONEY	
Building Name	Gross SF	2010 kBTU	2010 EUI kBTU/SF	2010 Tot. Cost	2010 ECI $/SF
School 1	41,066	3,425,361	83	$ 96,574.11	$ 2.35
District Office	3,200	165,565	52	$ 6,483.56	$ 2.03
School 2	17,141	1,626,868	95	$ 47,815.22	$ 2.79
School 3	*50,966*	*8,614,372*	*169*	*$ 248,203.76*	*$ 4.87*
Total		**13,832,166**		**$399,076.65**	

- 10% of district energy budget is $40,000
- School 3 at School 2 ECI would save ~$100,000/year
- District office has limited savings potential
- Possibly School 1 and School 2 not operating correctly

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PEA Level Estimate of Savings

District Wide 10% Cost Reduction	
Current Operating Costs	$400,000
Energy Reduction	10%
Target Annual Savings	**$40,000**

School 3 at ECI of School 2	
Current Operating Costs	$250,000
Energy Reduction	40%
Target Annual Savings	**$100,000**

Capital Investment Budget	
5 Year Payback	$200,000
10 Year Payback	**$400,000**
20 Year Payback	$800,000

Capital Investment Budget	
5 Year Payback	$500,000
10 Year Payback	**$1,000,000**
20 Year Payback	$2,000,000

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Next Steps

- Develop realistic expectations for future work
- Evaluate cost-effective strategy for auditing field work
  - Level 1 walk through for most buildings
  - Level 2/3 for less efficient buildings
  - Be prepared and flexible to deal with each building
- Increase energy use awareness
  - Awareness of energy use results in change
  - Reduce consumption by 5% in more than 75% of buildings
  - Reduce consumption by 10% in more than 40% of buildings
  - Develop organization-wide goals

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PEA/Benchmarking Summary

- Professional analysis of utility bills is a key FIRST step in the energy assessment and management process

- The PEA/Benchmarking data should be used to set expectations, prioritize needs, and allocate funding

- What is the most important next step?
  - Finding someone that cares!
  - Developing an Energy Management Plan!

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