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Energy Efficiency as an Investment:

The Value of Investing in Energy Efficiency

CenterPoint Energy

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Randy Gunn, Managing Director Navigant Consulting

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- Regulatory processes and litigation support
- Energy market modelling and economics
- Customer strategies
- Fuel services
- Resource procurement
- Operations and performance improvement
- Asset transaction support

- Energy technology and technology management
- Business planning and strategy
- Renewables
- Energy efficiency and sustainability
- Greenhouse gas/climate change
- Clean energy
- All aspects of generation and transmission

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Topics

- The case for energy efficiency…
- …but don't ignore the NEBS!
- Types of typical projects
- Comparing project economics
- Developing an on-going strategy
- Positioning for the future

Topics

Google Buys *nest* for $3.2 Billion

(It's the network, dude!)

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Numerous Opportunities to Improve Efficiency

National Energy Efficiency Potential

*McKinsey & Company Study-Unlocking Energy Efficiency in the U.S. Economy**

A $520 Billion investment in efficiency measures would yield $1.2 trillion in gross energy savings by 2020

*Lawrence Berkeley National Lab-U.S. Building-Sector Energy Efficiency Potential**

1/3 of Business as usual electric consumption can be saved at a cost of 2.7 cents per kWh

2.5 year simple payback

Savings at 3.5 times larger than the investment required

*McKinsey & Company. *Unlocking Energy Efficiency in the U.S. Economy*. July 2009
http://www.mckinsey.com/mgi/publications/Curbing_Global_Energy/executive_summary.asp

*U.S Building Sector Energy Efficiency Potential. Lawrence Berkeley National Laboratory. University of California. Berkeley, California 94720U.S. http://enduse.lbl.gov/info/LBNL-1096E.pdf

For the Environmental Protection Agency, Climate Protection Partnerships Division, Office of Air and Radiation, under U.S. Department of Energy Contract No. DE-AC02-05CH11231.

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Relative Cost and Risk of Various Strategies

Source: Practicing risk aware electricity regulation -- Ceres, April 2012

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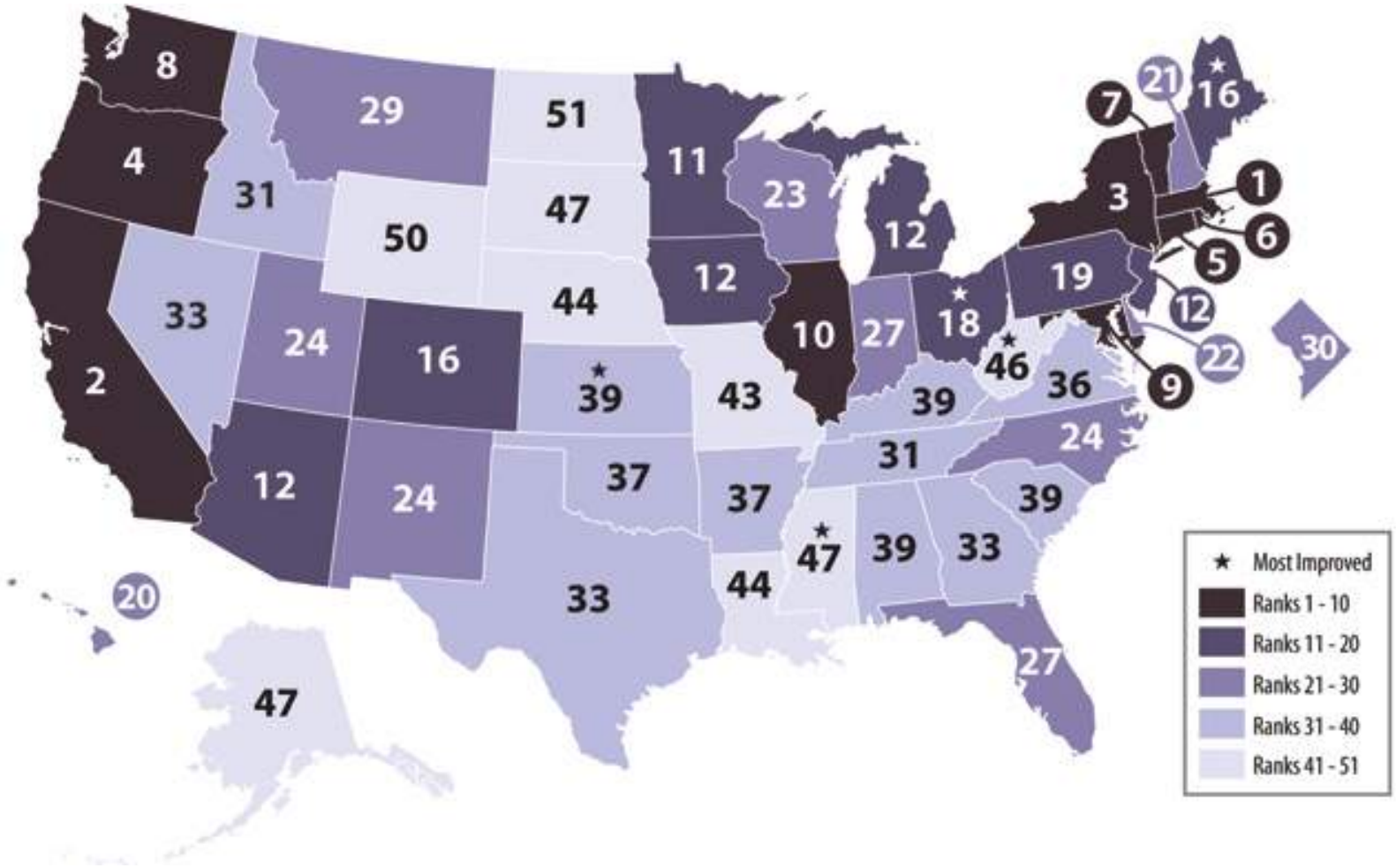
2013 Rankings by State: Energy Efficiency across the U.S.



Source: ACEEE 2013 rankings
http://www.aceee.org/state-policy/scorecard

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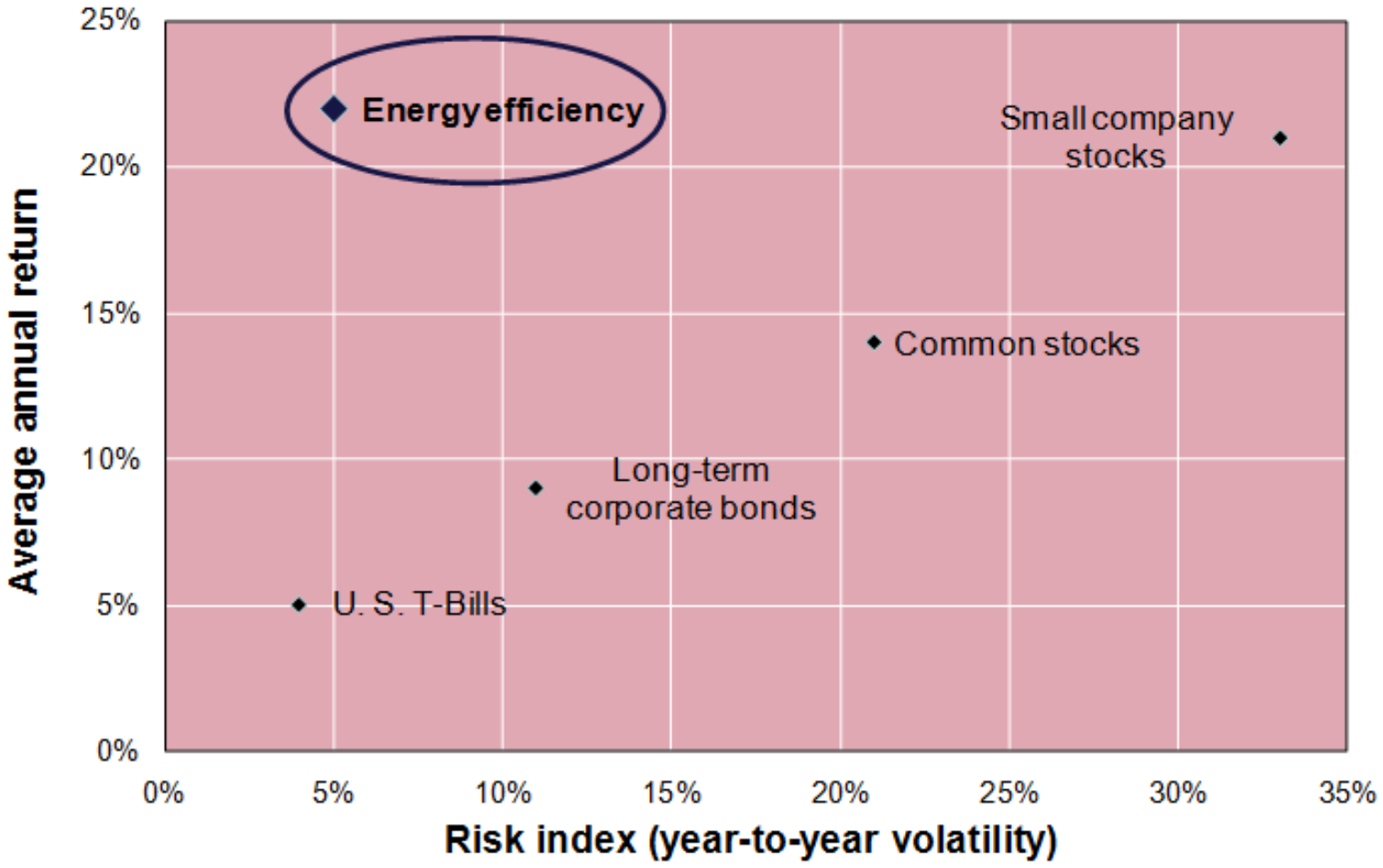
Energy Efficiency Risk vs. Return



Source: ACEEE

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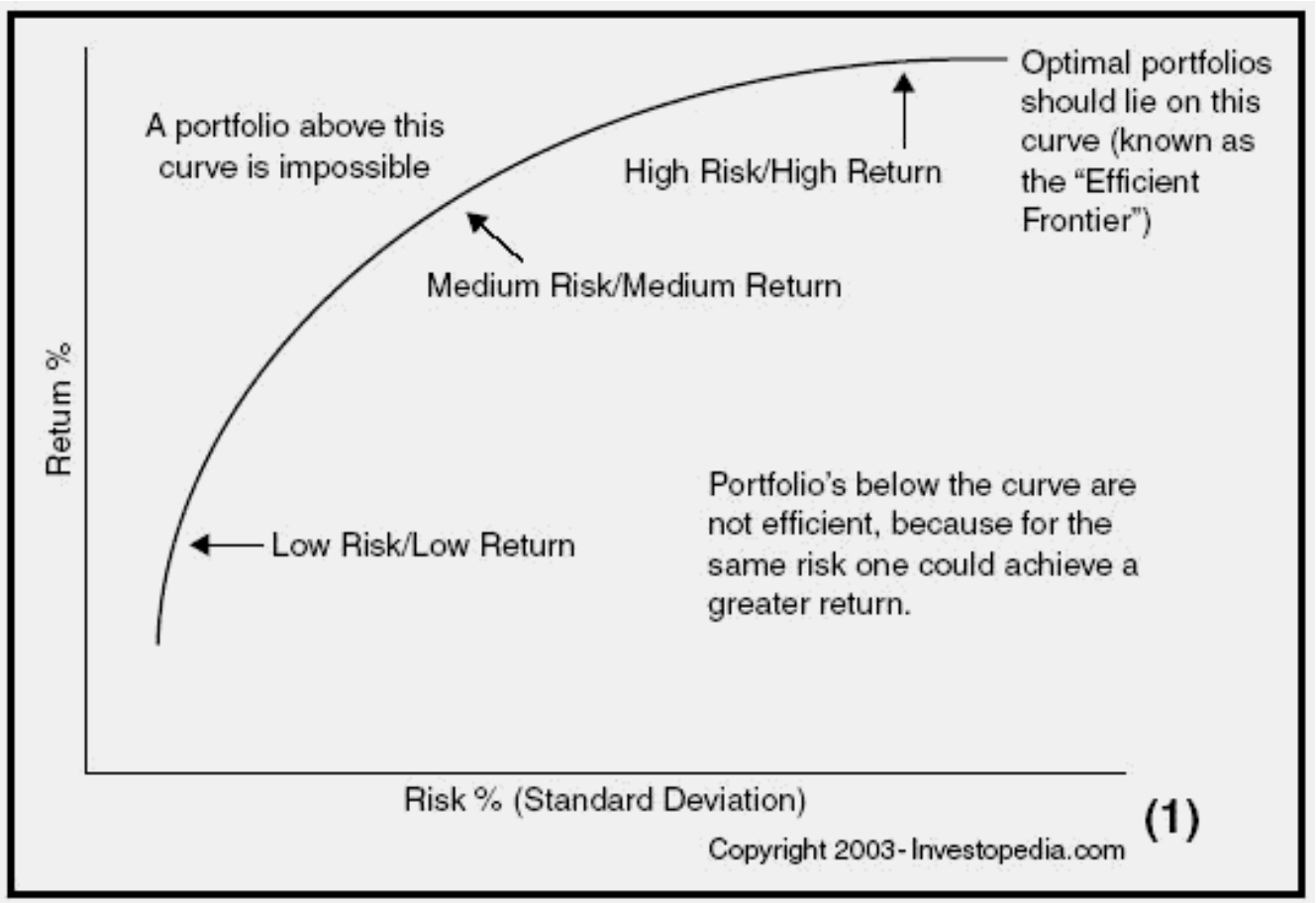
Risk vs. Return: *the Efficient Frontier*



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Typical Natural Gas Energy Efficiency Initiatives

- HVAC
- Water Heating
- Cooking
- Process Steam and Steam Traps
- Behaviour –oriented programs
- Retro-commissioning
- Strategic Energy Management

Energy Efficiency as an Investment

Replacement existing equipment	With new energy-efficient equipment	Annual Energy Savings
Faucet aerator	Low flow faucet aerator	$4 per aerator
Showerhead	Low flow showerhead	$11 per showerhead
Furnace	Condensing furnace	$100 (residential)
Boiler	Boiler with economizer	~$1,500 per MBH process boiler size
Failed steam trap	New steam trap	Between $250 (comm.) - $1200 (process)
Water heater	High-efficiency tankless water heater	Between $50 (residential) - $700 (process)

Source: CenterPoint Energy

Many Options, but Limited Investment Capital

- Simple Payback
- Cash Flow Analysis
- Net Present Value
- Internal Rate of Return
- Return on Investment

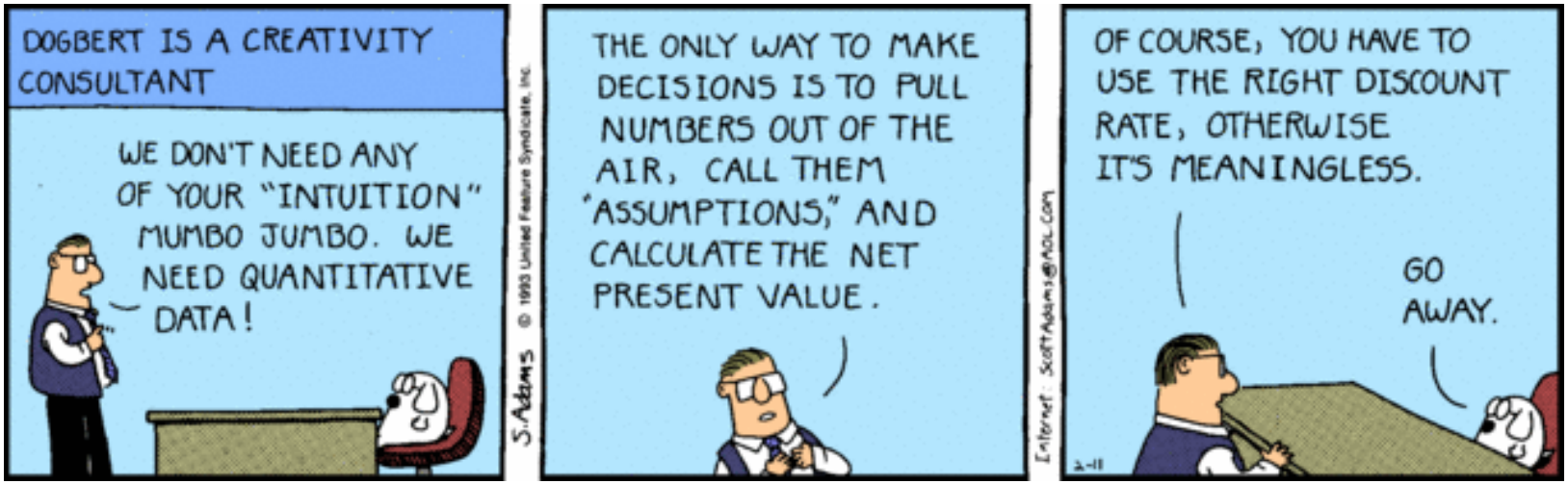
Simple Payback

- How long to recover my expenditure?
- Cost / Savings = payback (years or months)
- Well understood and widely used - but very simple
- Does not address time value of money or profitability

Net Present Value (NPV)

- More comprehensive than payback analysis
- More input data required- but time investment rewarded
- Considers lifecycle costs and timing of cashflows
- Considers maintenance, profitability, inflation, etc.
- Considers the "cost of waiting"

Net Present Value (NPV)



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Internal Rate of Return (IRR)

- More comprehensive than payback analysis
- More input data required- but time investment rewarded
- Provides a measure of *investment efficacy*, in %
- Textbook definition: discount rate to return NPV = 0

Energy Efficiency as an Investment

#	COMPLETION	PROJECT	EST. COST	REBATE	ANNUAL SAVINGS	SIMPLE PAYBACK (YR)	ROI
1	Nov-01	Installed approx. 1750 Wattstopper surge protectors with motion sensors, East & West Towers	$104,750	$78,750	$65,520	0.4	252%
2	Nov-01	Re-lamped 6343 lamps with lower wattage lamps throughout East & West Towers	$22,176	$0	$24,625	0.9	111%
3	Jun-02	Implemented mixed recycling and kitchen composting. All towers	$100	$0	$137,380	Immediate	137380%
4	Aug-02	Reduced run time for garage exhaust fans from 8760 hours to 2236 hours, All towers	$100	$0	$48,204	Immediate	48204%
5	May-03	Optimized Boiler Control Function Programming and run times. All towers	$600	$0	$59,606	Immediate	9934%
6	Nov-03	Installed AFD (adjustable frequency drive) on chiller. West Tower	$65,000	$41,207	$38,719	0.6	163%
7	Apr-05	Reduced run time for garage Exhaust Fans, East & West Towers. From 2236 hours annually to 871 hours annually. East & West Towers	$100	$0	$50,614	0.4	249%

Adobe

Randy H. Knox III Senior Director
Global Workplace Solutions

SUSTAINABILITY ROUNDTABLE
Best Practices For More Sustainable Facilities

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Attractiveness May Depend on Evaluation Method

Table 3 — NPV and Profitability

Analysis Factors	Non-Comprehensive Project	Comprehensive Project
Investment	$100,000	$400,000
Savings	$40,000/yr.	$100,000/yr.
Simple Payback	2.5 years	4 years
IRR (10 yrs.)	38%	21%
NPV (10 yrs. @ 12%)	$126,040	$165,100

Source: U.S. Department of Energy

Energy Efficiency as an Investment

INVESTMENT ANALYSIS:
Boiler Upgrade

- $1,500,000 cost
- $200,000 rebate (YR1)
- Cost of capital = 8%
- 25 YR economic life
- 1.5%/yr energy price escalation
- $0.50/therm natural gas
- $0.09/kWh electricity
- $30,000 O&M saving/yr

SIMPLE PAYBACK = 4.6 years.

	BEFORE	AFTER
ELEC kWh	5,260,000	4,734,000
GAS therm	2,700,000	2,294,680
Annual O&M	$72,000	$42,000

>>> But, NPV = $2.1 M, and IRR = 23%!

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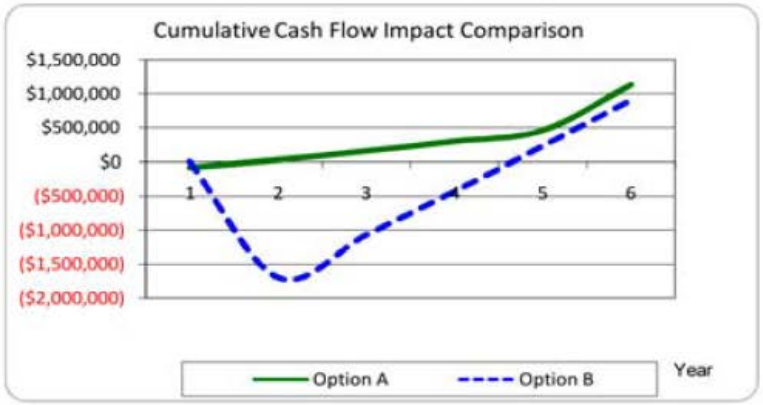
Waiting Can Be Costly

ENERGY STAR

HELP SAMPLE VALUES

COST OF DELAY and CASH FLOW ANALYSIS

Project cost	2,052,900	$
Simple payback	3	years
	8	month(s)
Interest rate	8.00	%
Financing term	5	years
Year(s) postponed	1	years
Project cost increase due to postponement	5.00	%
Estimated energy cost increases after Year 2	10.00	%
Annual increase in energy costs after year 2	2.50	%
Estimated energy savings in first year (Year 1)	75.00	%



THESE CASH FLOW CALCULATIONS ARE ON A PRETAX BASIS.

Net Present Value of Option A	$754,748	Net Present Value of Option B	Text Box:	$384,826
For purposes of this calculation, all cash flows are being discounted at the interest rate indicated in cell G7 - financing paid monthly in arrears.		Fast track financing generates	96%	more cash than waiting!

	Option A (Fast Track Financing)				Option B (Waiting for Cash)			
Year	Savings	Project Cost including financing	Annual Cash Flow	Cumulative Cash Flow	Savings	Project Cost	Annual Cash Flow	Cumulative Cash Flow
1	$416,250	($499,505)	($83,255)	($83,255)	$0	$0	$0	$0
2	$610,500	($499,505)	$110,995	$27,740	$457,875	($2,155,545)	($1,697,670)	($1,697,670)
3	$625,763	($499,505)	$126,258	$153,998	$625,763	$0	$625,763	($1,071,908)
4	$641,407	($499,505)	$141,902	$295,899	$641,407	$0	$641,407	($430,501)
5	$657,442	($499,505)	$157,937	$453,836	$657,442	$0	$657,442	$226,941
6	$673,878	$0	$673,878	$1,127,714	$673,878	$0	$673,878	$900,819

Important Notice

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Energy Efficiency Investments vs. Perceived Risk

Figure 1 - Perceived "Riskiness" of Energy Efficiency compared to Core Business Projects

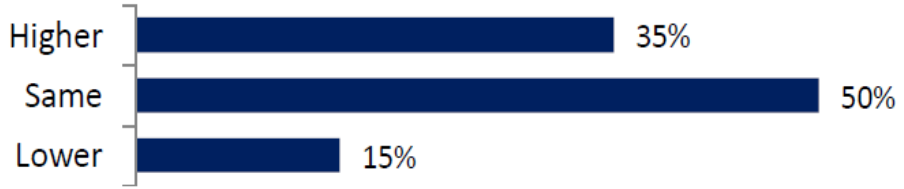

Figure 3 - Hurdle Rates demanded of Energy Efficiency compared to Core Business Investments

Source: Imperial College London Energy Futures Lab

Drivers for Energy Efficiency Investment

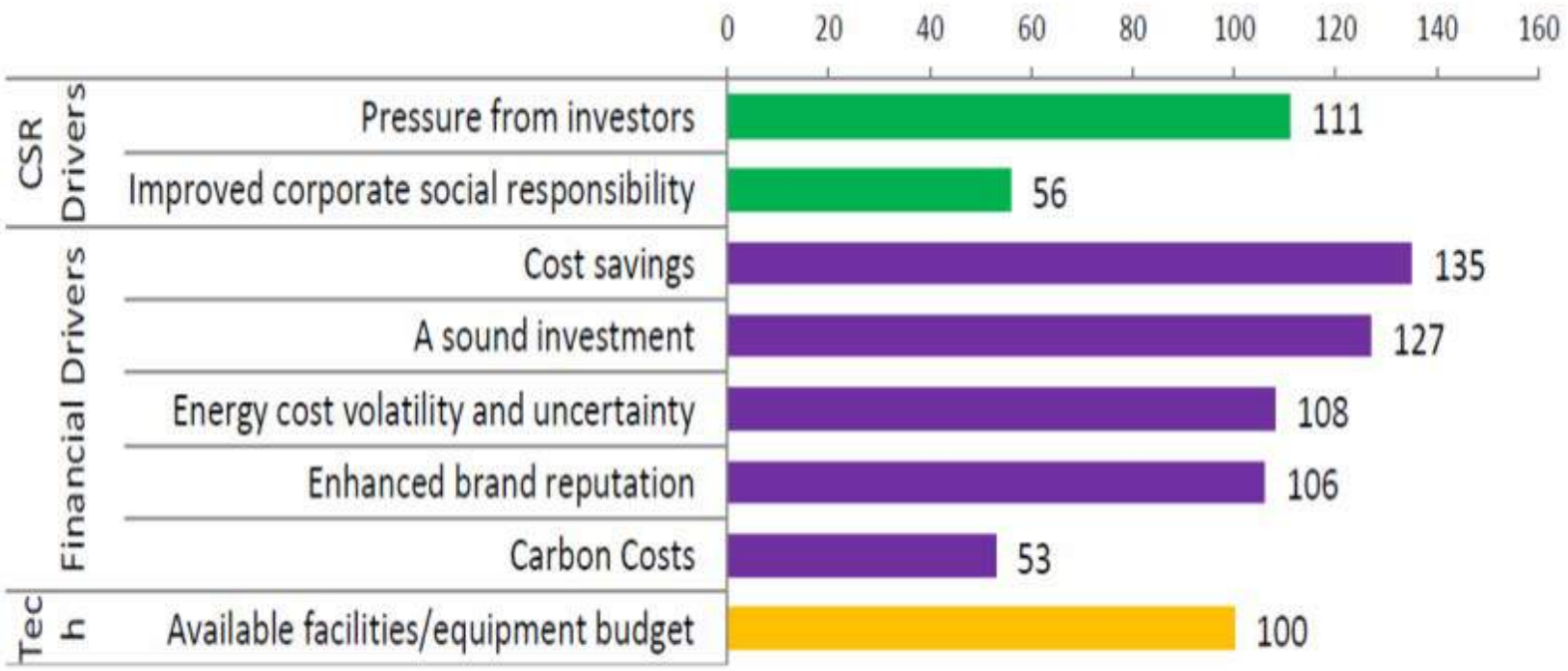

Figure 6 - Energy Efficiency Project Drivers (Scored Out of 160)

Source: Imperial College London Energy Futures Lab

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Barriers to Energy Efficiency Investment

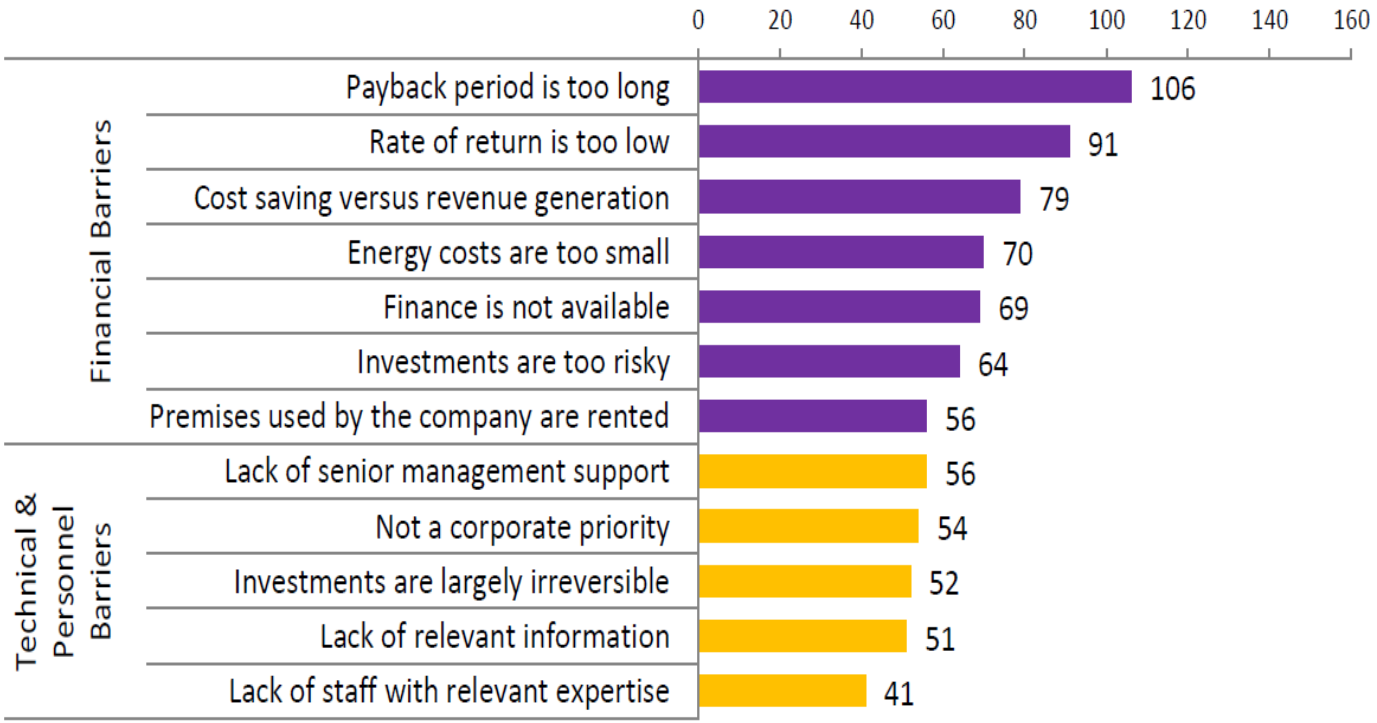

Figure 7 - Energy Efficiency Project Barriers (Scored out of 160)

Source: Imperial College London Energy Futures Lab

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All $ Are *Not* Created Equal!

Industry	Net Margin	Revenue Equivalent of $1 in Energy Savings
Advertising	3.52%	$28
Automotive	3.45%	$29
Building Materials	0.82%	$122
Drug	18.4%	$5
Food Processing	3.02%	$33
Medical Services	4.66%	$21
Restaurant	11.04%	$9
Retail Store	3.33%	$30
Trucking	2.79%	$36
Total Market	7.84%	$13

1$ saved is not the same as a 1$ earned…

Source: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/margin.html

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And What About the NEBS?

"Non-Energy Benefits are nothing new, but are rarely given their due." ***<u>They can and will trump economic or quantitative analysis.</u>***

- Lighting quality and/or increased productivity
- Reduced water consumption
- Fewer oil tank car derailments and explosions
- Reduced volume of asthma cases
- Reduced maintenance labor cost

Develop a Strategy

» Do your research utilizing experts and online tools

"watch out for vendors with a magnet & an oil additive"

» Compare the alternatives including all incentives

» Implement the project – follow the plan

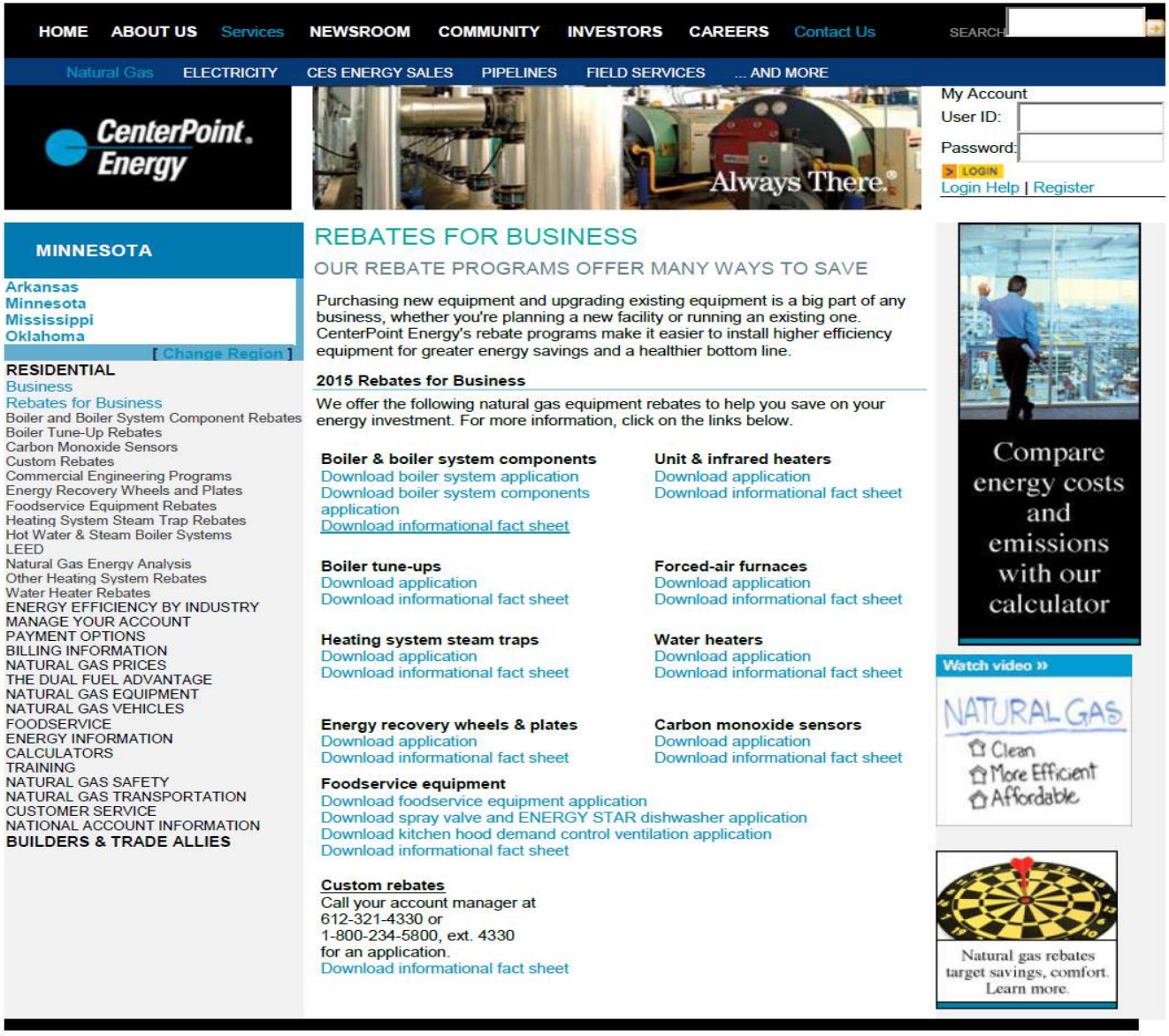
» Track and monitor savings

"what gets measured gets managed"

» Invest in training and continuous improvement

"don't just fuhgeddaboudit!"

Resources



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Key Influencing Factors for the Future

- Uncertain Economic Conditions
- Natural Gas Supply Outlook and Pricing
- Oil Supply/Demand Relationship
- China's & India's Energy Policies
- Regulatory Reaction to Grid Disruption
- Climate Change Strategy





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Key CONTACTS

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Randy Gunn| Managing Director
Randy.gunn@navigant.com
312.583.5714

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