Sustainable Return on Investment: Measuring the Triple Bottom Line

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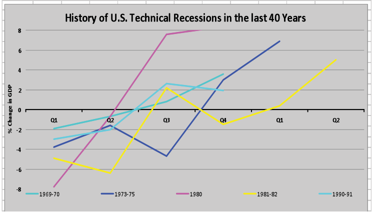
Sustainability – The Triple Bottom Line

1. **Does the Project Make Economic Sense?**



Economic Environment

2. **Does the Project Provide Social Benefit?**

Social Environment

3. **Does the Project Protect or Enhance the Environment?**

Natural Environment

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National Energy/Climate Legislation & Initiatives

Focused on Monitoring, Reducing and Reporting Sustainability Metrics

EPA Regulatory Initiatives

- EPA Mandatory GHG Reporting Rule
- EPA GHG Endangerment Finding
- EPA Tailoring Rule

Proposed Energy/Climate Legislation

- American Clean Energy & Security Act of 2009 (Waxman-Markey)
- Clean Energy Jobs and American Power Act (Kerry-Boxer)
- Clean Energy & Climate Framework (Kerry-Graham-Lieberman)
- Amendment to Offset Provisions (Stabenow)

SEC-Issued Guidance Requiring Corporate Disclosure of Material Climate Change Risks and Opportunities

Other Recent Developments: EO 13514

- Executive Order 13514: Federal Leadership in Environmental, Energy, and Economic Performance

Addresses:

- 30% reduction in vehicle fleet petroleum use by 2020;
- 26% improvement in water efficiency by 2020;
- 50% recycling and waste diversion by 2015;
- 95% of all applicable contracts will meet sustainability requiremen
- Implementation of 2030 net-zero-energy building requirement

The 35 Federal Agencies to reduce GHG emissions 28% by 2020 from 2008 levels

September 10 – Federal Agencies released integrated Strategic Sustainability Performance Plans

- Estimated Scope 1, 2 and 3 emissions
- Identified strategies to meet goals

Benefits to the Nation of EO 13514

There may be initial investment costs

Long-term benefits:

- Energy savings
- Jobs
- Innovations
- Improvements to local infrastructure

Encourages Government to 'Walk the Talk'

Regional & Local Initiatives Continue without Federal Legislation

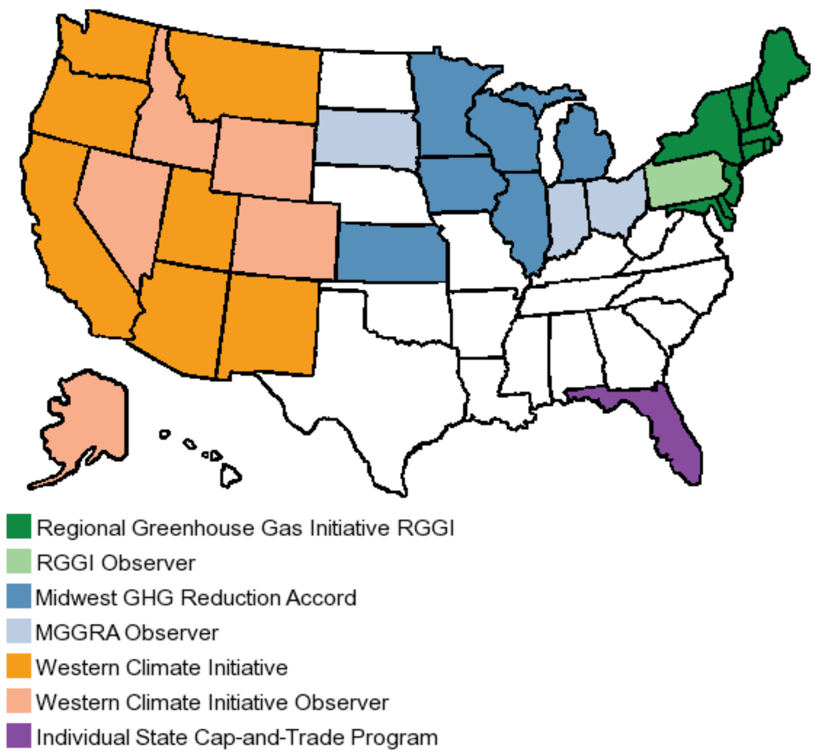
- US Mayors Climate Protection Agreement
  - Meet or beat the Kyoto Protocol targets in their own communities (7% reductions from 1990 levels by 2012)
  - 1044 mayors representing 87,619,792 people

California Cap & Trade Program

Regional Greenhouse Gas Initiative

Western Climate Initiative

– States with Varying Levels of Renewable Portfolio Standards, GHG Emission Reduction Targets, Climate Action Plans, and Mandatory Compliance

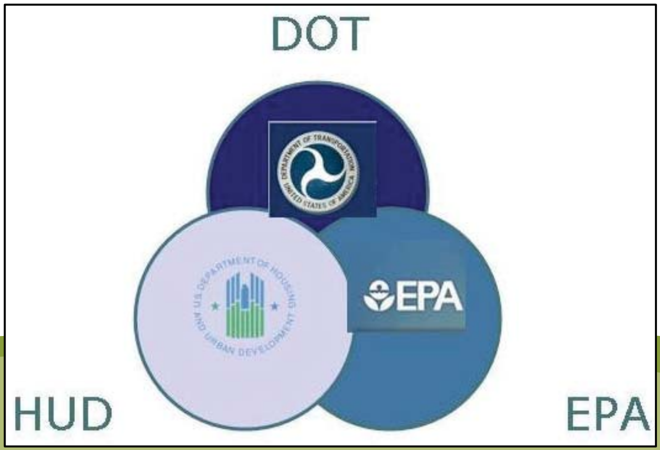


Other Key Drivers Moving us Towards a Transformation of the Economy

- Cost savings / Economics
  - Energy efficiency
  - Economic competitiveness
  - Job creation
  - Energy Security
- Social Responsibility
  - Corporate values and responsibility
  - Stakeholder expectations
- Reputation
  - Public perception
  - Risk avoidance
  - Leadership rewards
- Transparency
  - Assess benefits to society

Grants, Funding & Incentives for Sustainability, Clean Energy and Smart Growth Projects

- American Recovery and Reinvestment Act (ARRA) Examples
    - Energy Efficiency & Conservation Block Grant (EECBG) Program
    - Renewable Energy Incentives/ Tax Credits
    - Many more…
- Competitive Grants
    - TIGER I and II Grants
    - EPA Climate Community Showcase Grants
    - EPA/HUD/DOT Sustainable Communities Regional Planning Grants
    - HUD's Community Challenge Grants
    - Many more…
- Regulated and Voluntary Carbon Markets
    - $126 billion in 2008; $150+ billion in 2009
    - $1.2T by 2020



However…even though there is funding…

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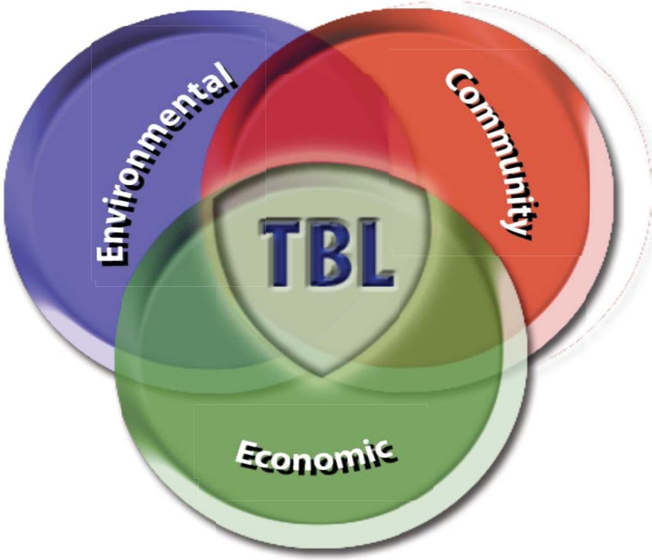
…it is a very COMPETITIVE environment, and there is limited funding for a lot of great ideas

With the Goal to Implement Local Strategies to Produce the Greatest Outcomes…

- Plan to Identify Projects with Greatest Potential
- Demonstrate Benefits to Build Support for Investments
- Identify Sources of Additional Funding
- Consider Alternative Approaches to Implementation
- Build Transparency into Planning and Implementation

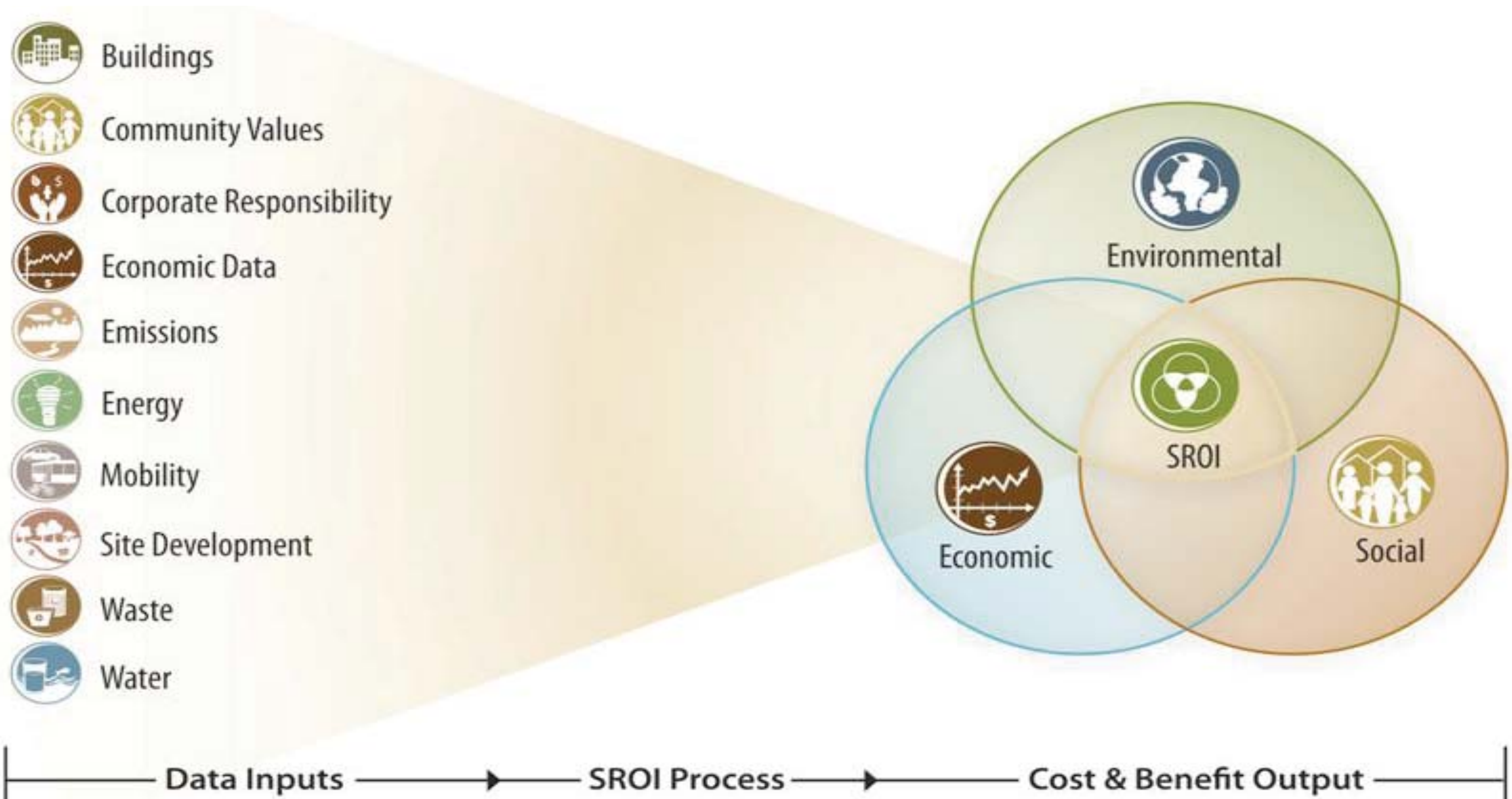
And Quantify the Economic, Environmental and Social Benefits…

- Greenhouse gas emissions
- Energy efficiency
- Economic development
- Energy security
- Job creation
- Economic diversity
- Pollution prevention
- Clean air and water
- **Resiliency**



Introducing SROI to Measure Sustainability Benefits

Evaluate Investments and Secure Funding Considering the Complete Triple Bottom Line



And…if we don't start accounting for TBL costs and benefits when making decisions…

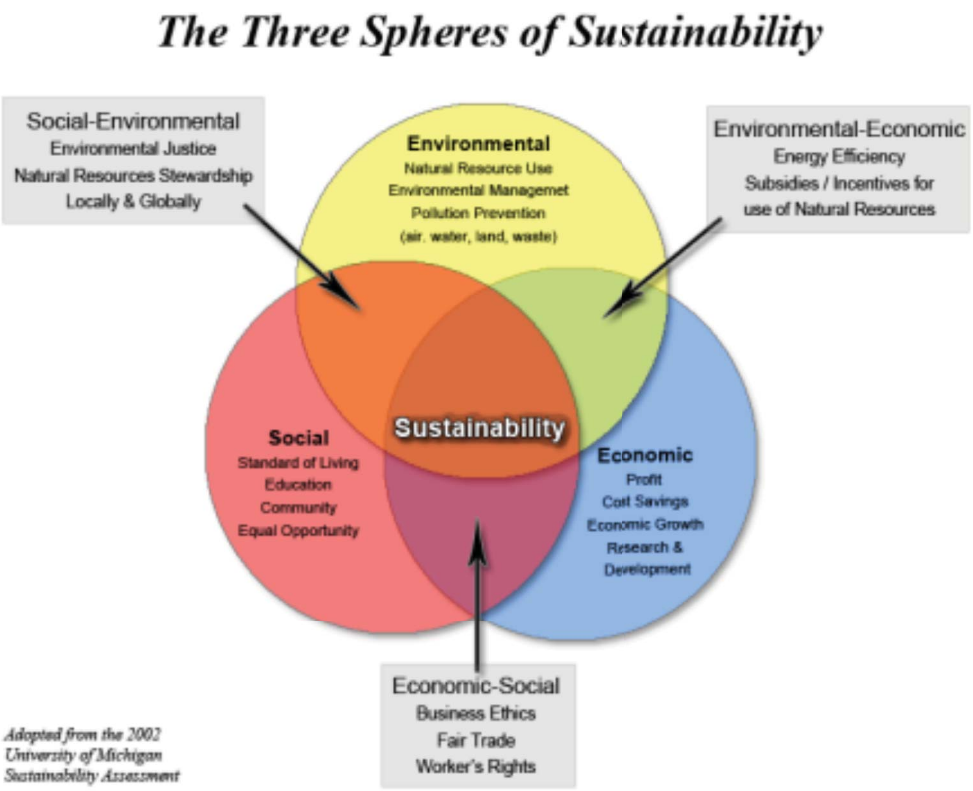
Crowds panic as flooding threatens Ireland...

We may have to resort to adaptation strategies….

Making Sustainable Decisions

Traditional models such as Life-Cycle Cost Analysis (LCCA) often fall short:

- Only consider cash impacts
- Do not account for uncertainty
- Lack transparency



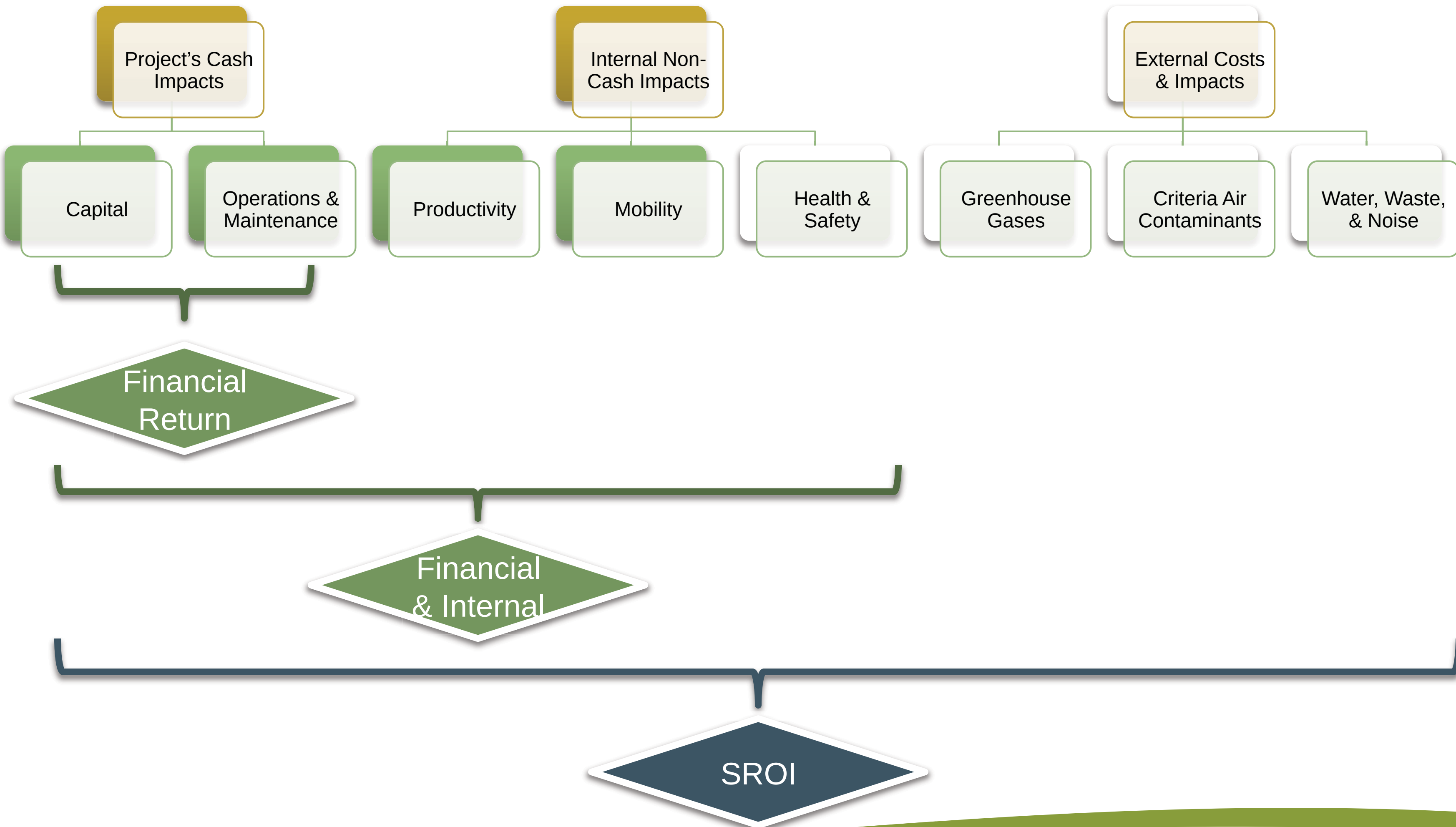
What is SROI?

It's best practice in Cost-Benefit Analysis and Financial Analysis over a project's entire life-cycle, augmented by:

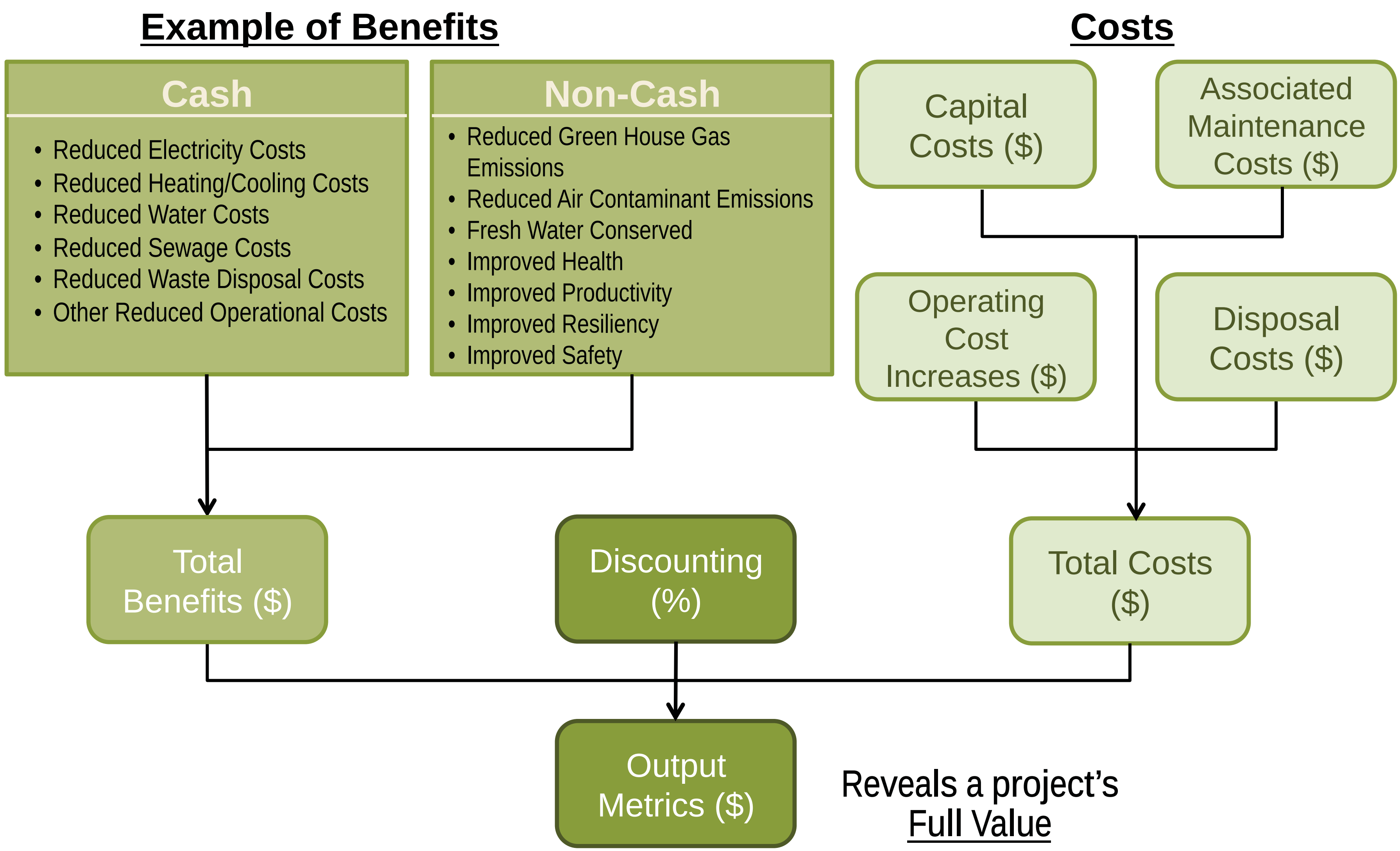
- ➢Accounting for uncertainty using state-of-the-art risk analysis techniques
- ➢Engaging stakeholders directly to generate consensus and transparency

SROI = Calculating The Triple Bottom Line

SROI adds to traditional financial analysis the monetized value of non-cash benefits and externalities

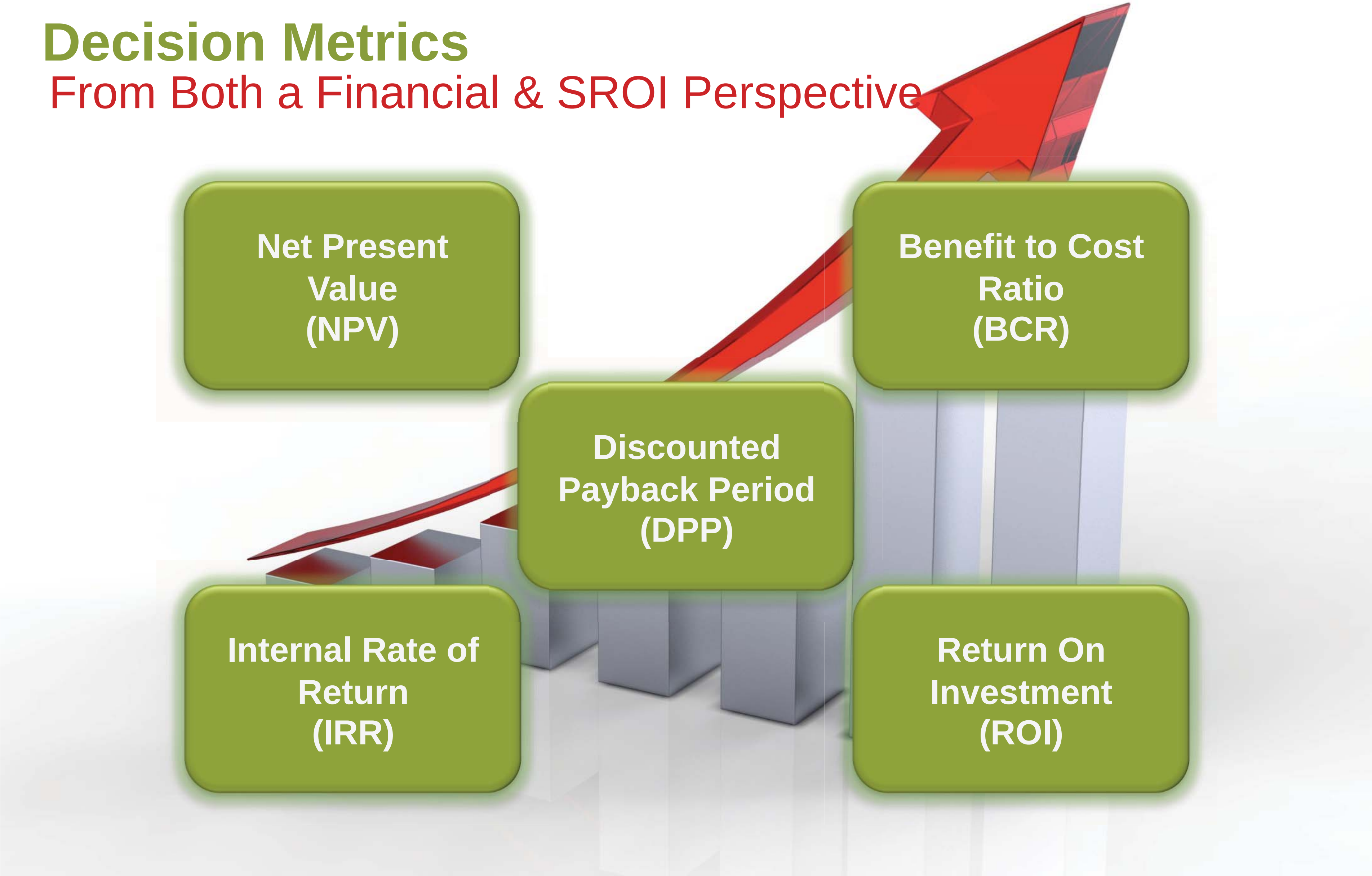


SROI Flow Diagram



Decision Metrics

From Both a Financial & SROI Perspective



Examples of Recent SROI Projects

Client	Project
US Department of Defence	SROI analysis for the Fort Belvoir Community Hospital, USAG Humphreys in Korea and Fort Bliss in Texas
BNSF & UP Railroads	Proved the public benefit of three new infrastructure projects resulting in $200M in grants from TCIF
Boston Redevelopment Authority	The city of Boston used SROI to analyze its portfolio of ARRA funding projects
City of Ottawa	Developing a framework to rank city streets for utility burial based on the triple-bottom line
Denver Metro Wastewater Reclamation District	Using SROI to make design & construction decisions on Denver's proposed new wastewater treatment facility
Johns Hopkins University	Provided SROI analysis of JHU's Campus Sustainability Initiative project in order to secure LEED certification
US National Park Service	Working with the Park Service to use SROI to help make sustainable transportation planning decisions

SROI Methodology

A Four Step Process

"SROI reveals the hidden value in projects."

David Lewis, PhD
HDR National Director, Economics & Finance

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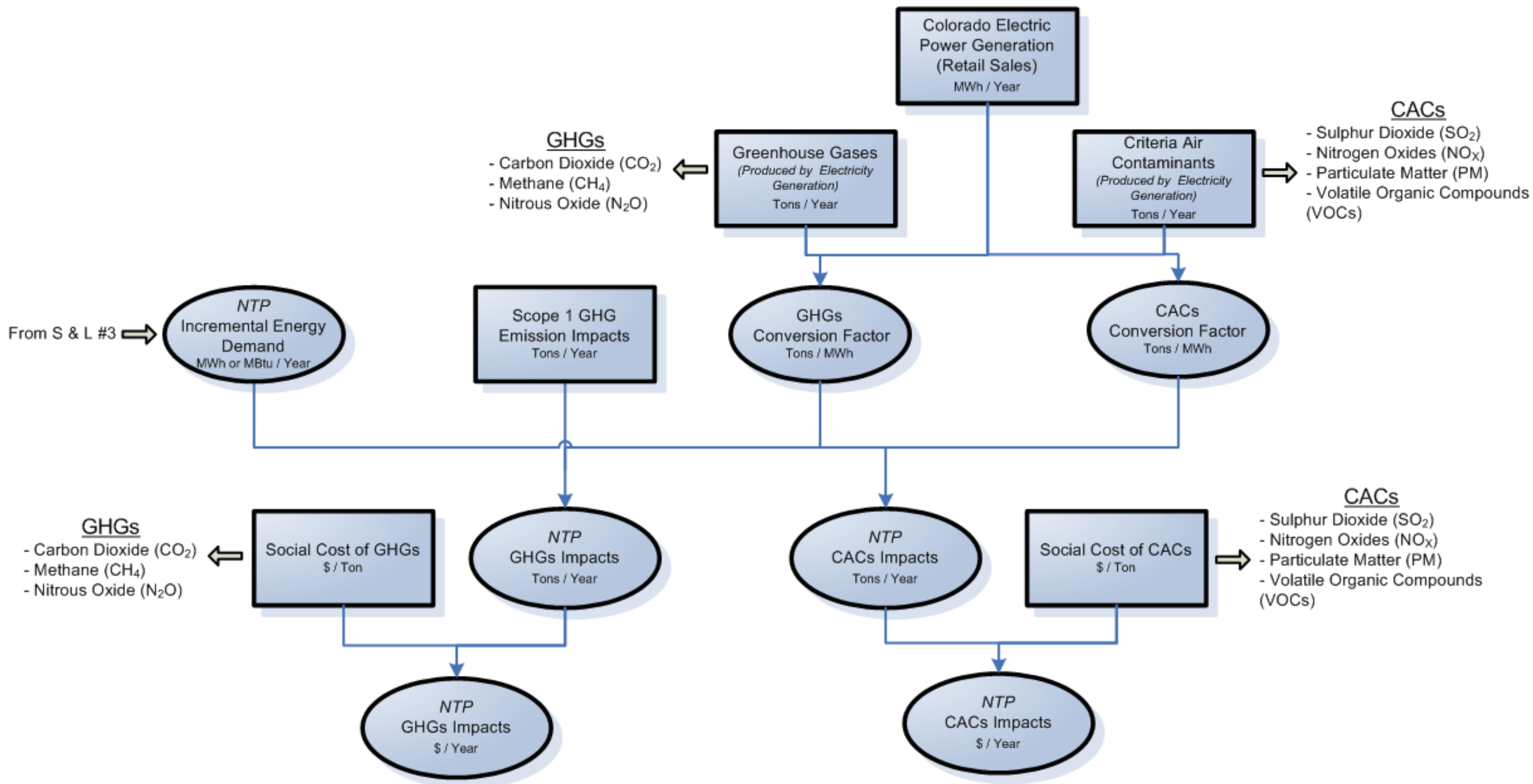
SROI Methodology – Step 1

Structure and Logic Diagrams

S&L #4: Social Value of Greenhouse Gases (GHGs) & Criteria Air Contaminants (CACs) Impacts



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SROI Methodology – Step 2

Quantify Input Data Assumptions

Quantify Input Data Distributions

Data Sources	
	• Over 8,000 Architects, Engineers, Scientists & Economists • Meta-analysis of third party research & data • Financial & insurance markets • Contingent valuation i.e. willingness to pay surveys • Bayesian analysis/expert opinion

Colorado Electric Power Generation (Year 2005) -- Total (All Plants)			
Category	**Metrics**	**Median**	**Comment**
Plant annual net generation	MWh	49,632,186	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Plant annual total nonrenewable net generation	MWh	47,528,394	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Plant annual total renewable net generation	MWh	2,103,792	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Plant annual hydro net generation	MWh	1,293,231	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Plant annual biomass net generation	MWh	34,327	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Plant annual wind net generation	MWh	776,234	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Plant annual solar net generation	MWh	0	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Plant annual geothermal net generation	MWh	0	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Total Retail Sales	MWh	48,353,236	Energy Information Administration (Year 2005)
Exported	MWh	1,198,342	Implied
Direct Use	MWh	80,608	Direct Use is commercial or industrial use of electricity that 1)
Plant annual net generation less Direct Use	MWh	49,551,578	Implied
Colorado Electric Power Generation - GHG and CAC --Total (All Plants) 2005			
Category	**Metrics**	**Median**	**Comment**
Plant annual NOx emissions	Tons	72,523	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Plant annual SO2 emissions	Tons	62,898	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Plant annual CO2 emissions	Tons	46,988,461	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Plant annual CH4 emissions	Tons	583	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Plant annual N2O emissions	Tons	726	EPA: eGRID2007 Version 1.0 Plant File (Year 2005 Data)
Plant annual PM2.5 emissions	Tons	5,441	EPA 2005 National Emissions Inventory. Tier Summaries.
Plant annual PM10 emissions	Tons	7,391	EPA 2005 National Emissions Inventory. Tier Summaries.
Plant annual VOC emissions	Tons	887	EPA 2005 National Emissions Inventory. Tier Summaries.

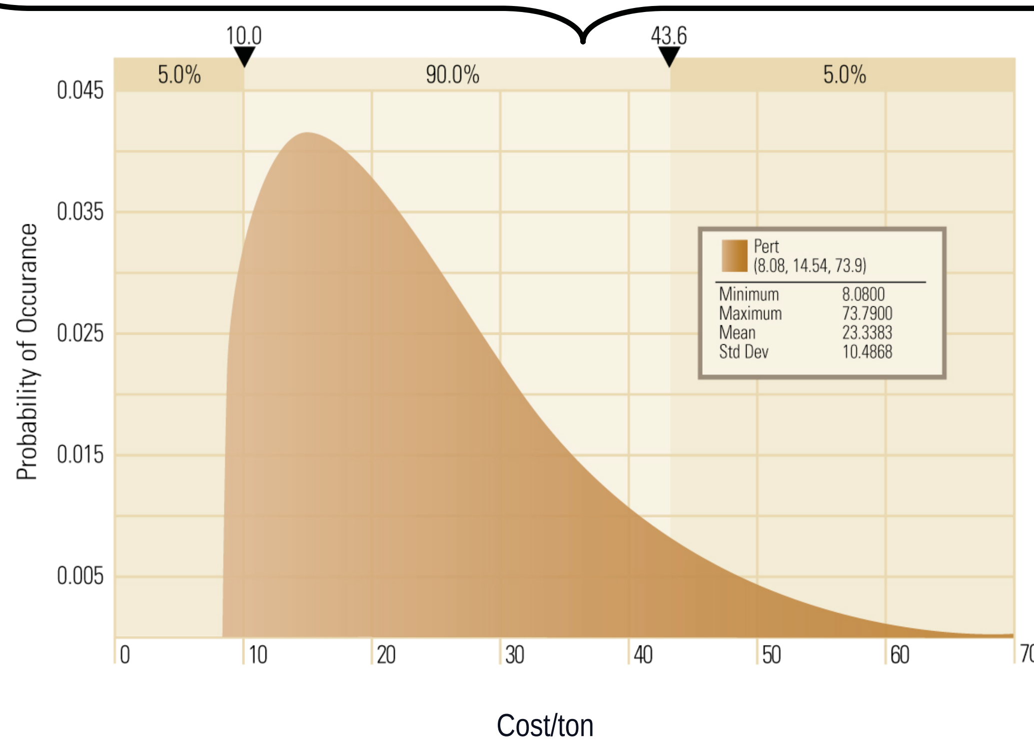
SROI Methodology – Step 2

Quantify Input Data Assumptions

Quantify Input Data Distributions

Example: Cost of CO_2 per Ton ($)

Median	Lower Limit	Upper Limit
$19.86	$8.08	$73.79



SROI Methodology – Step 2

Quantify Input Data Assumptions

Quantify Input Data Distributions

Example: Range of Values for CO2

- Median Value: We used the current market price as quoted on the European Climate Exchange based on the Cap and Trade system they have in place in Europe.
  - **As 17 Apr 2009 = $18.94 USD/ton**

- Low Value: We used **$8.08** USD/ton as calculated by William Nordhaus in his book A Question of Balance: Weighing the Options on Global Warming Policies, 2008

- High Value: We used **$73.79** USD/ton as calculated by Nicholas Stern in his book The Economics of Climate Change: The Stern Review, 2006

SROI Methodology – Step 3

Risk Analysis Process (RAP) Session

<u>Sample Participants</u>

- Client:
  - Project team
  - Technical specialists
  - Financial experts
- HDR:
  - Facilitator
  - Economists
  - Technical specialists
- Outside Experts:
  - Costing Experts
  - Energy Modelers
  - Architects & Engineers
- Public Agencies & Officials

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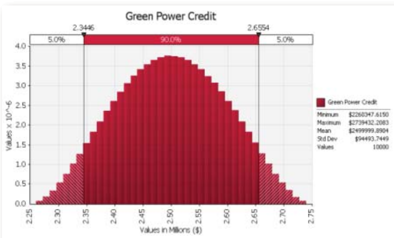
SROI Methodology – Step 4

Run the Model and Produce Results



Green Power Credit

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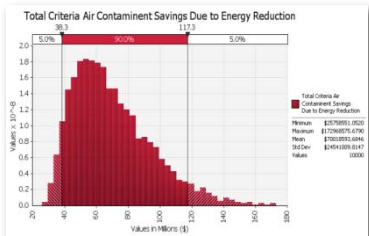
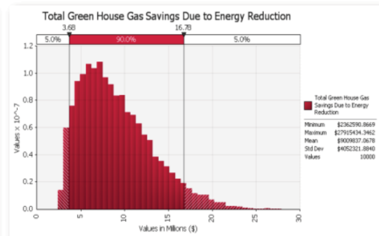


Emissions Savings



GHG Savings

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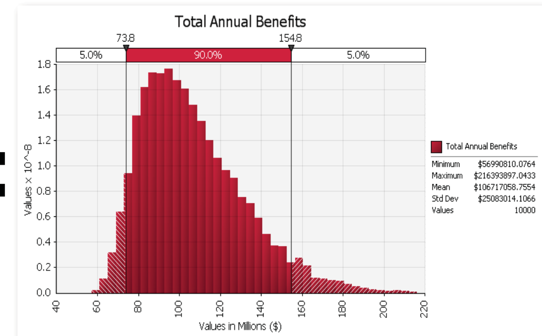
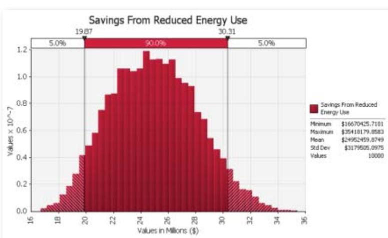
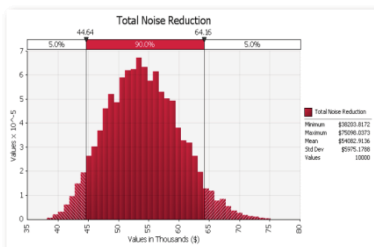


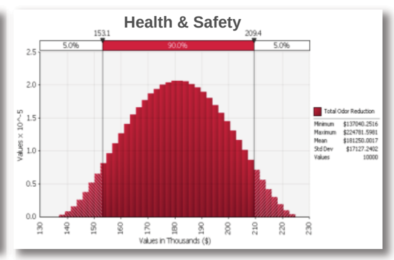
Total Benefits



Reduced Energy Costs



Noise Reduction



Health & Safety

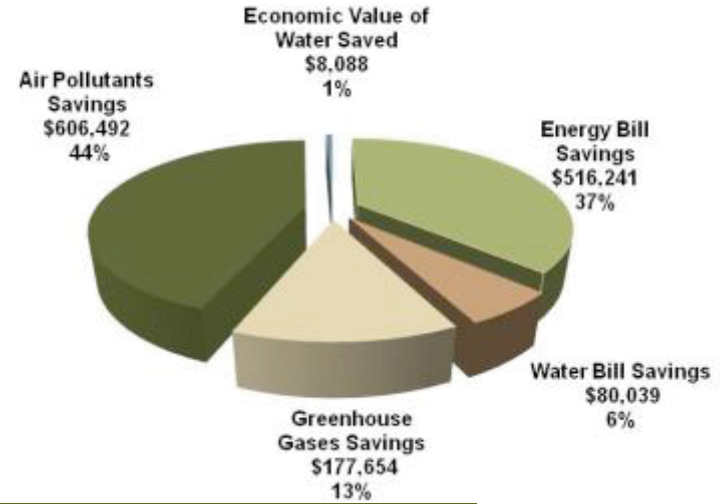
Cash Benefits

Non-Cash Benefits

SROI Results

Fort Belvoir Community Hospital

Metrics in ($000 USD)



SROI	Current Design	Alternative	Notes
Annual Value of Benefits	$1,284,097	$1,388,514	The total value of the benefits in one year
Energy Reduction	*$474,470*	*$516,241*	Cash benefit
Water Reduction	*$80,039*	*$80,039*	Cash benefit
Greenhouse Gases Savings	*$163,461*	*$177,654*	Non-cash benefit
Air Pollutants Savings	*$558,039*	*$606,492*	Non-cash benefit
Savings From Reduced Water Use	*$8,088*	*$8,088*	Non-cash benefit
Net Present Value	$15,773,620	$13,798,340	PV Benefits / PV All Costs
Return on Investment	39.3%	18.0%	Average Rate of Return on Capital Investment
Discounted Payback Period	4.6	7.7	Time in years + discounted cash flow
Internal Rate of Return (%)	31.0%	18.1%	Discount rate making NPV = 0
Benefit to Cost Ratio	4.7	2.8	PV Benefits / PV Costs

FROI	Current Design	Alternative	Notes
Annual Value of Benefits	$554,870	$596,193	The total value of the benefits in first year
Net Present Value	$4,353,935	$1,391,047	PV Benefits / PV All Costs
Return on Investment	15.9%	5.5%	Average Rate of Return on Capital Investment
Discounted Payback Period	12.9	25.0	Time in years to + positive discounted cash flow
Internal Rate of Return (%)	14.2%	6.8%	Discount rate making NPV = 0
Benefit to Cost Ratio	2.0	1.2	PV Benefits / PV Costs

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SROI Results

Military Hospital

Summary of Preliminary Results ($2010)

Item	Sustainable Technology / Design Element	Impact	Net Present Value (8.8% nominal discount rate)		Net Present Value (4.8% nominal discount rate)	
			SROI	FROI	SROI	FROI
1	Thermal Storage	Load shifting to reduce electricity cost. It saves water consumption	($2,277,950)	($2,768,156)	($1,423,265)	($2,446,650)
2	Co-Generation Option #1 (Full Load	Load Shifting of the full electricity load from the electric utility to natural gas (Full Load)	($7,519,001)	($29,128,501)	$11,115,030	($34,064,372)
3	Co-Generation Option #2 (Peak Shaving)	Load Shifting of the Peak electricity load from the electric utility to natural gas (Peak Shaving)	($9,960,971)	($14,754,989)	($11,599,363)	($21,409,068)
4	Heat Recovery Chiller	Produces electricity and reduces natural gas and water consumption	$9,451,008	$5,373,148	$20,496,349	$11,402,984
5	Energy Recovery Ventilator	Reduces electrical and natural gas consumption	$758,508	($492,549)	$2,627,693	($66,722)
6	Ground Source Heat Pump	Reduces electrical and natural gas consumption	$2,531,891	$532,460	$7,480,615	$3,314,412
7	Solar Hot Water	Reduces electrical consumption however increases water consumption	($130,196)	($297,640)	$158,474	($215,818)
8	Solar Photovoltaics	Produces electricity however increases water consumption	($2,658,852)	($3,240,496)	($2,531,472)	($3,776,996)
9	Geothermal Direct Heating	Reduces natural gas consumption however increases electrical consumption	($1,375,199)	($1,936,041)	($228,491)	($1,512,578)
.10	HVAC Exhaust Energy Recovery Wind Turbines	Produces electricity	($1,015,939)	($1,573,125)	($658,058)	($1,857,096)
11	On-Site Greywater and Wastewater Reclamation, Treatment, and Re-Use	Reduces water consumption however increases electrical consumption	($768,573)	($3,116,302)	$1,323,187	($3,554,027)
12	Dishwasher Water Recovery and Re-Use	Reduces water consumption however increases electrical consumption	($59,432)	($82,115)	($94,223)	($141,415)
13	Recycling Station On-Site	Diverts waste from Landfill however increases electrical consumption	$1,199,726	$929,241	$2,916,764	$2,354,488
14	HEPA Filtration at all Air Handling Units in Patient-Care areas	Reduces hospital acquired infections however increases electrical consumption	$38,151,331	$73,577	$79,618,918	$276,584
15	Hydrogen Peroxide Vapor Cleaning	Reduces hospital acquired infections however increases electrical consumption	$121,065,684	$1,966,018	$253,166,523	$4,999,118

Examples of SROI Results

Tehachapi Trade Corridor, California – BNSF Railroad

Impacts of the TTC Project Once Capacity is Reached in 2029 (California Only)

Impact #	Impact Name	Impact Metric Per Year			Average from 2014 to 2038
		Mean	Probability of Exceeding		
			90%	10%	
1	Number of Truck Ton-Miles Diverted	3.7 Billion	3.0 Billion	4.5 Billion	2.6 Billion
2	Number of Truck Miles Diverted	192 Million	142 Million	249 Million	132 Million
3	Number of Trucks Taken Off the Road (This many fewer trucks on the road each day of the year)	4,465	3,308	5,785	3,071
4	Passenger Car Equivalent Miles Saved	480 Million	357 Million	622 Million	330 Million
5	Gallons of Fuel Saved	22 Million	18 Million	26 Million	15 Million
6	Tons of CO2 Emissions Avoided	246 Thousand	199 Thousand	294 Thousand	170 Thousand
7	Tons of NOx Emissions Avoided	83	-40	205	116
8	Tons of VOC Emissions Avoided	-64	-96	-32	-42
9	Tons of PM Emissions Avoided	4.7	1.1	8.4	3.4
10	Number of Injuries Avoided	116	86	151	80

Note: This is the annual impact once the new capacity has been reached. Impacts will ramp-up gradually between 2014 and 2029.

Examples of SROI Results

Tehachapi Trade Corridor, California – BNSF Railroad

Discounted Value of Net Benefits – Through 2038 (California Only)

Net Benefit #	Net Benefit Name	Net Benefit Category	Total Discounted Value (2007 US$ M)		
			Mean	Probability of Exceeding	
				90%	10%
1	Reduced Cost of Train Delay at Current Capacity	Transportation System Savings	$11	$7.2	$14.7
2	Reduced Transportation Costs from Displacing Heavy Truck Travel	Transportation System Savings	$580	$324	$847
3	Change in Inventory Costs from Displacing Heavy Truck Travel	Transportation System Savings	-$48	-$65	-$33
4	Change in Inventory Costs from Reduced Train Delay	Transportation System Savings	$6.6	$4.2	$9.4
5	Savings From Reduced Highway Congestion	Transportation System Savings	$16.4	$12.1	$21.0
6	Reduction in Maintenance Costs from Displacing Heavy Truck Travel	Transportation System Maintenance	$85	$47	$127
7	Environmental Savings from Displacing Heavy Truck Travel	Environmental Improvements	$31	$16	$48
8	Environmental Savings from Reduced Train Delay (Idling)	Environmental Improvements	$.2	$0.1	$0.4
9	Reduced Accident Costs from Displacing Heavy Truck Travel	Transportation Safety	$96	$63	$130
10	Aid in Case of Massive Natural Disaster Relief / Terrorist Attack	Emergency Relief	$4.1	$1.0	$8.1
Total Discounted Value of Net Benefits (Note: Separate calculations, may not add)			**$782**	**$507**	**$1,071**

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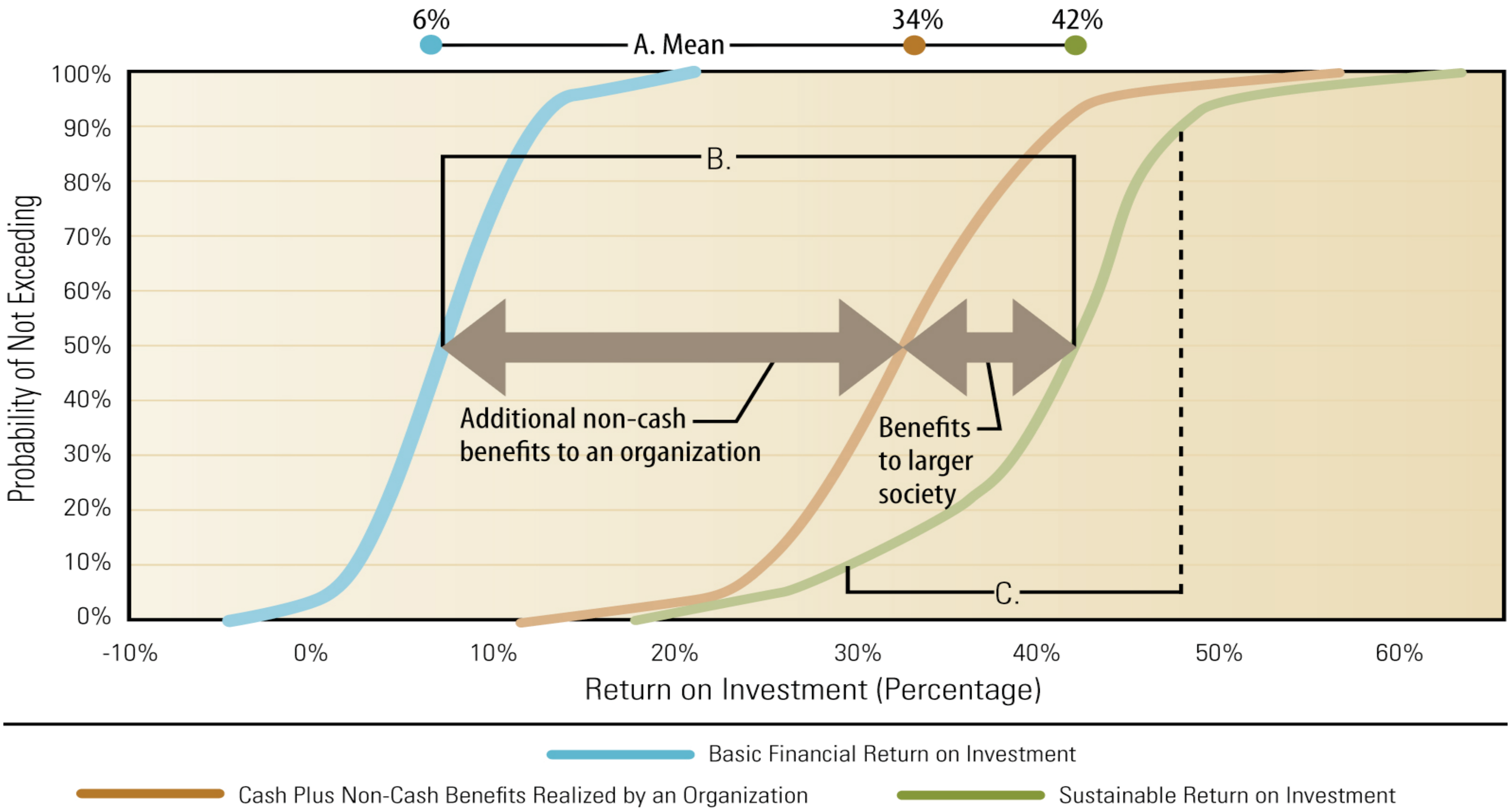
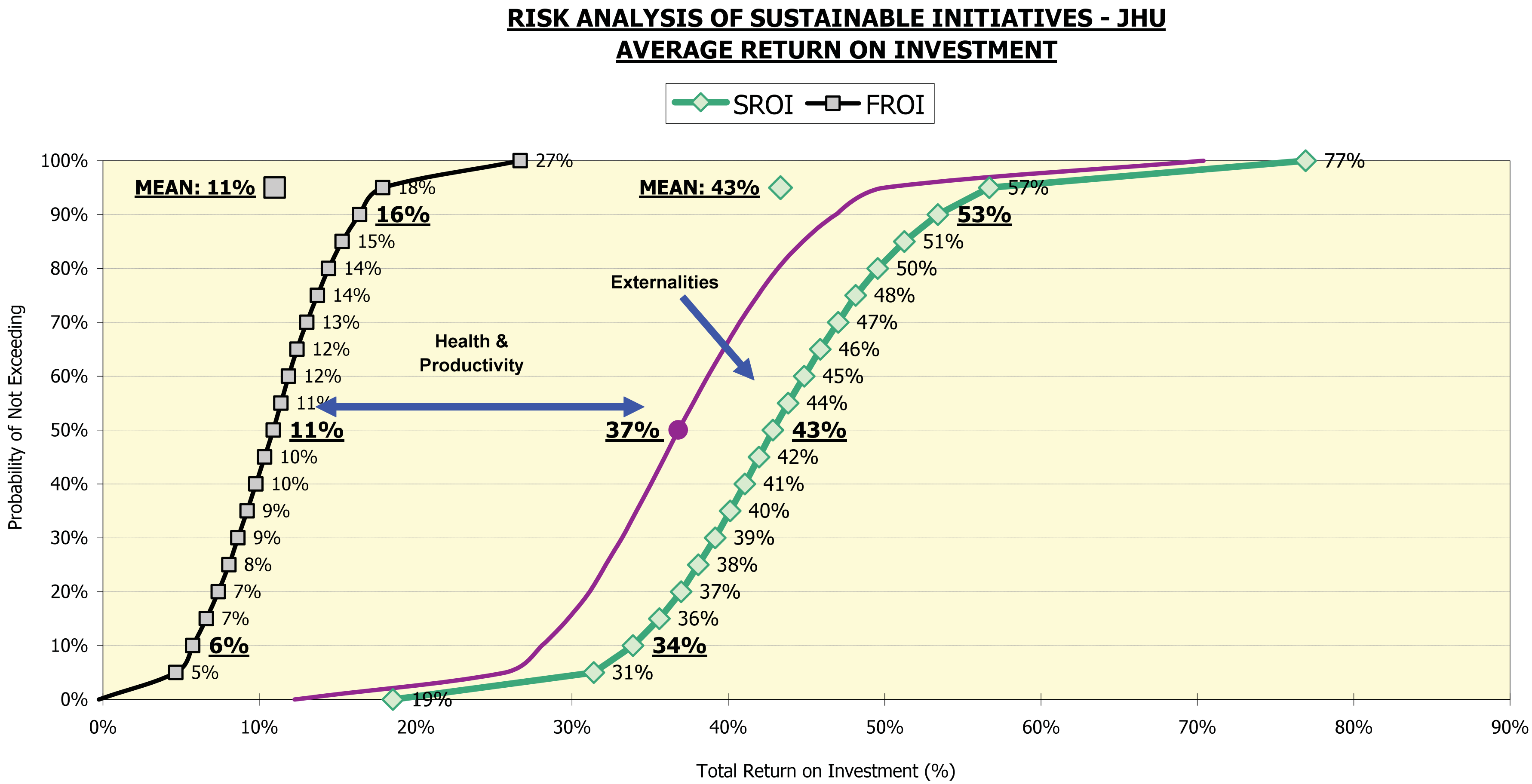
S-Curve Diagram



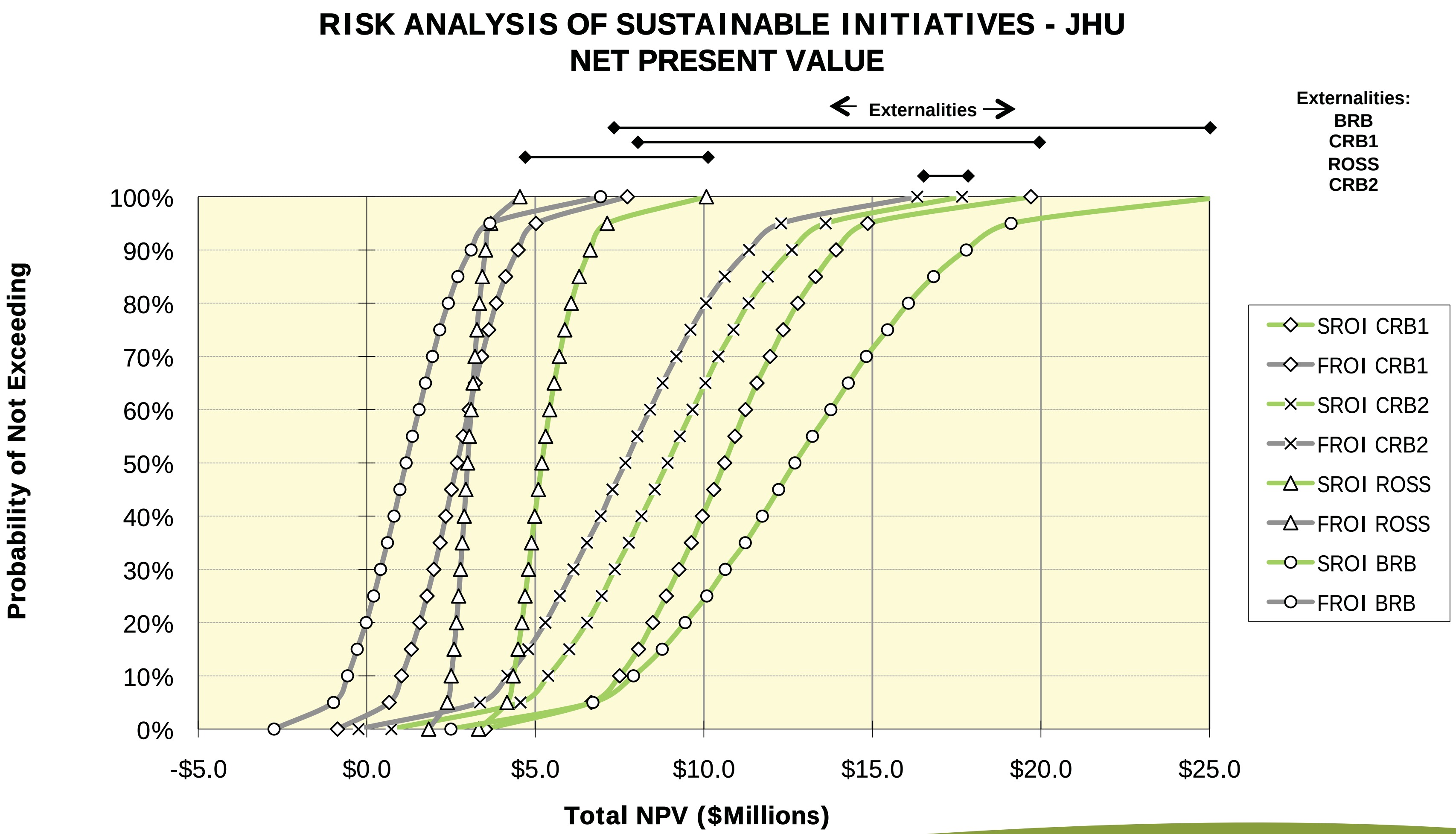
Examples of SROI Results

John Hopkins University, Baltimore Maryland

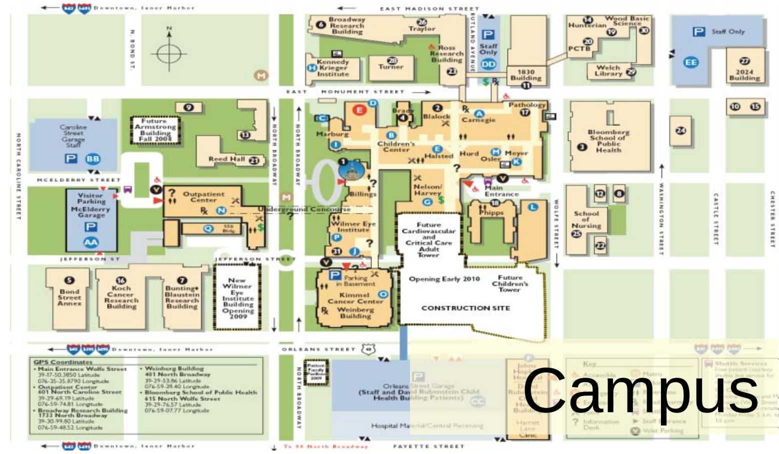


Examples of SROI Results

Johns Hopkins University - Portfolio Assessment with Risk



Scale of Application



Prioritizing Projects

Projects on Radar Screen	Project Name	Project Description	Profitability SROI: IRR	Project Rank	Capital Required ($M)	Cumulative Capital ($M)	Project Grouping
	Foxtrot	Solar Caps	25%	1	$ 58	$ 58	Projects that should be implemented
	Delta	Landfill Gas Collection	21%	2	$ 321	$ 379	
	Victor	WTE 1	20%	3	$ 72	$ 451	
	Mike	Long Haul Rail Option	19%	4	$ 95	$ 546	
	Juliet	MRF refurbishment	17%	5	$ 150	$ 696	
Capital Budget Line	Sierra	Anaerobic digestion of organics	17%	6	$ 265	$ 961	
Max Annual Capital $1B	Quebec	Autoclave	15%	7	$ 250	$ 1,211	Good projects that lack funding
	Lima	Waste Park	14%	8	$ 170	$ 1,381	
	Alpha	Road haul Option	14%	9	$ 60	$ 1,441	
	Whiskey	WTE 2	13%	10	$ 143	$ 1,584	
	November	Additional MRF 1	12%	11	$ 86	$ 1,670	
	Uniform	Standardized Garbage Bins	12%	12	$ 77	$ 1,747	
	Zulu	Additional MRF 2	11%	13	$ 99	$ 1,846	
	Golf	Landfill 1	10%	14	$ 112	$ 1,958	
	Tango	Natural Gas Trucks	9%	15	$ 41	$ 1,999	
	Charlie	Solar Panels on HQ	8%	16	$ 250	$ 2,249	
NPV Break-Even Line	India	Wind Turbines on capped L/F	7%	17	$ 14	$ 2,263	
Hurdle Rate 7% IRR	Bravo	Hybrid Trucks	6%	18	$ 87	$ 2,350	Projects that aren't worth pursuing
	X-ray	Landfill 2	5%	19	$ 300	$ 2,650	
	Oscar	Plasma Gasification	5%	20	$ 12	$ 2,662	
	Hotel	Wind Turbine for HQ	2%	21	$ 357	$ 3,019	
	Romeo	3 R's Education Program	1%	22	$ 37	$ 3,056	

HDR

Client Case Study

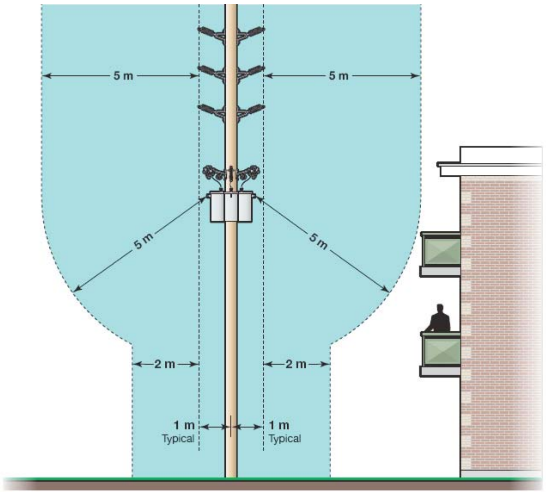
City of Ottawa
Utility Undergrounding Analysis

Ottawa Underground Wiring Context

- Overhead wires commonplace, but often viewed as relic of 20^{th} Century
- **Electrical servicing in new residential areas are underground, but still overhead within most right-of-ways**
- **Lack of clear policy = inconsistent decision making**
- **Need for clear policy**

Why bury overhead wires?

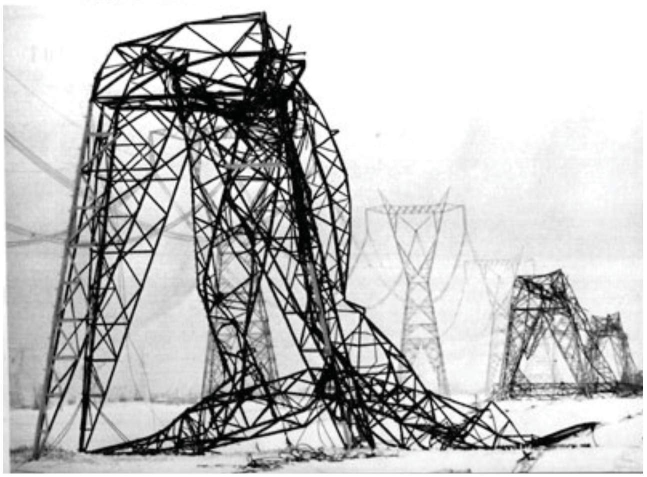
Requests to bury overhead wires typically relate to:



- streetscape aesthetics

- power line proximity

and…
- reliability



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Undergrounding Complexity

Planning / Technical	Financial
• Seen as barrier to Official Plan objectives (e.g. intensification and Smart Growth)	• Significant cost of burial (+$3M per mile) - 4X to 10X more than rebuilding
• Limited space within the right-of-way	• Additional costs beyond hydro costs (e.g. property owner, other utilities)
• Timing relative to infrastructure renewal programs	• Current sources limited to Property Owners, Utility Providers, or City Funding
• Uniqueness of each street	• No formal funding mechanism

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Undergrounding 'Benefit' and 'Cost' Variables

Benefits	Costs
• Reduction in tree trimming costs (F)	• Initial capital costs (F)
• Reduction in number of outages (S)	• Additional O&M costs (F)
• Intensification of development (S)	• Additional easement and rental costs (F)
• Improved streetscape aesthetics (S)	• Other related installation costs (F)
• Reduction in service restoration costs (S)	• Installation of dedicated street lights (F)
	• Additional mapping and graphics (F)
	• Travel time disruption costs (S)

(F) = financial (S) = sustainable

Selection of Sample Streets

Analysis of sample streets considered to be representative of various street types in Ottawa:

- Central Area
- **Traditional Main Street (2 streets)**
- **Arterial Main Street**
- Mixed Use
- Town Centre
- Suburban Arterial
- **Rural Village**

Modeling Results

Table 5: Cost-Benefit Analysis Outcomes, Projects with Combination with Other Work

Evaluation Metrics	Central Area	Traditional Main Streets		Arterial Main Streets	Mixed Use/ Town Centre/ Suburban Arterial			Rural Village
	Metcalfe	Elgin	Bank @Glebe	Bank St. B	St. Joseph	Strandherd	Eagelson	Perth
Undergrounding with Other Work - FINANCIAL ROI								
Total Net Present Value, NPV, $M	-$6.15	-$5.10	-$9.83	-$32.19	-$1.00	-$3.84	-$18.22	-$2.46
Net Present Value per km, NPV per km, $M	-$6.47	-$5.60	-$5.55	-$4.86	-$2.85	-$3.28	-$2.99	-$1.72
Rate of Return over Project Life, %	-99.8%	-99.9%	-100.0%	-99.9%	-99.9%	-99.5%	-99.9%	-99.8%
Average Annual Rate of Return, Post-Construction, %	0.0%	0.0%	0.1%	0.3%	0.2%	0.2%	0.2%	0.3%
Internal Rate of Return, %	NA	NA	NA	NA	NA	NA	NA	NA
Benefit-Cost Ratio	0.002	0.001	0.000	0.001	0.001	0.005	0.001	0.002
Discounted Payback Period, Years	NA	NA	NA	NA	NA	NA	NA	NA
Undergrounding with Other Work - SUSTAINABLE ROI								
Total Net Present Value, NPV, $M	$1.42	**$7.47**	**$9.75**	$20.26	$3.72	$0.47	$1.57	$0.56
Net Present Value per km, NPV per km, $M	$1.50	**$8.20**	**$5.51**	$3.06	$10.64	$0.40	$0.26	$0.39
Rate of Return over Project Life, %	22.9%	**143.0%**	**97.0%**	58.4%	325.5%	12.0%	8.4%	19.9%
Average Annual Rate of Return, Post-Construction, %	6.6%	**12.0%**	**9.7%**	9.1%	18.5%	5.1%	5.1%	6.4%
Internal Rate of Return, %	8.4%	**37.7%**	**26.2%**	12.4%	93.8%	7.4%	6.8%	7.3%
Benefit-Cost Ratio	1.2	**2.4**	**2.0**	1.6	4.3	1.1	1.1	1.2
Discounted Payback Period, Years	15.1	**4.0**	**4.2**	9.0	3.5	14.6	14.6	15.7

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Conclusions

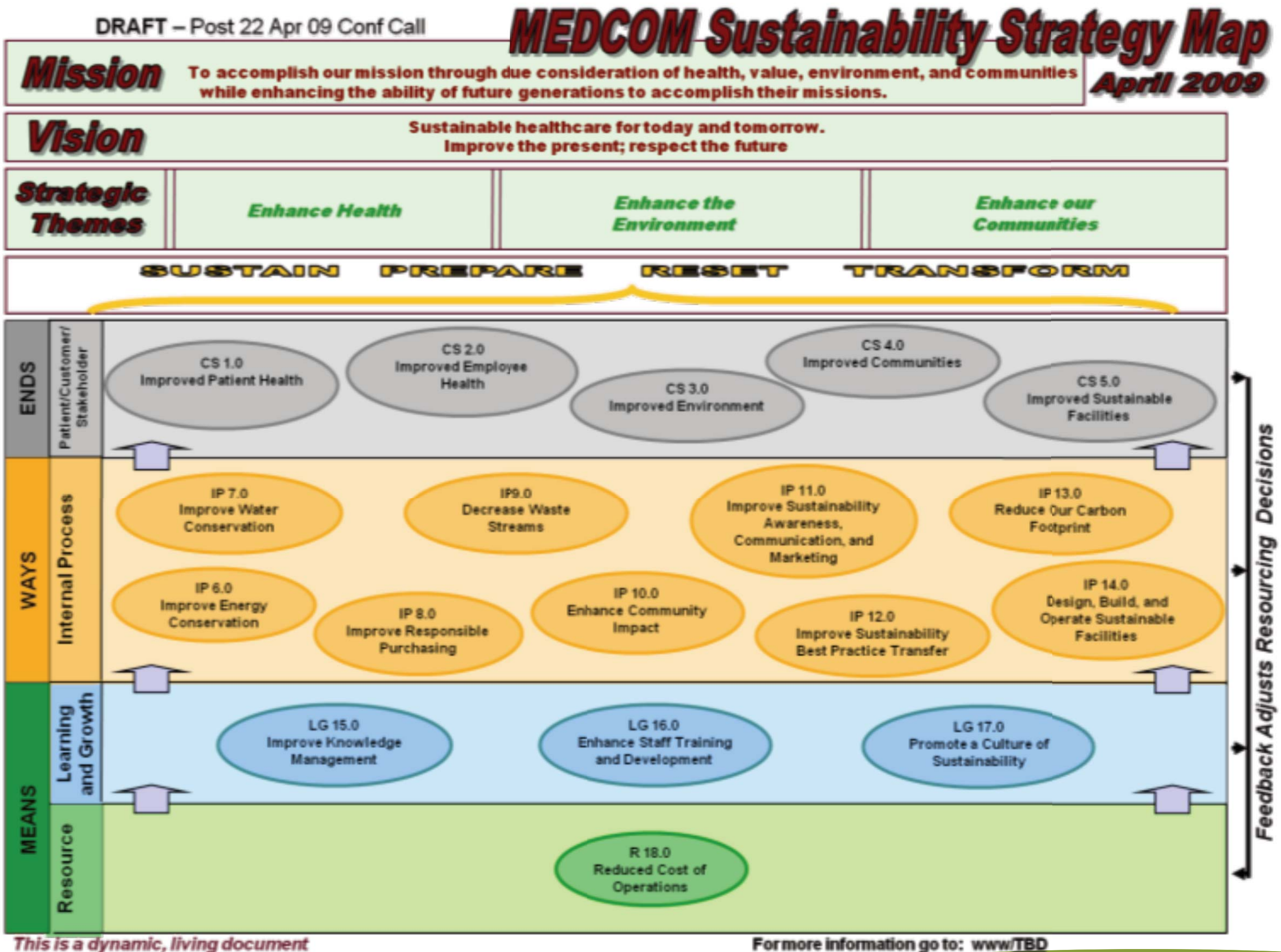
- **SROI analysis has created strong 'evidence-based' platform for policy development**
- Based on only financial costs and benefits, undergrounding cannot be justified
- Including sustainable costs and benefits, undergrounding is justified in some cases
- High potential street types identified (e.g. traditional main streets)

Next Steps

- **Finalization of SROI modelling**
- **Identification of priority streets type performance standard**
- Report to committee/Council in Q2 2011
  - Priority street types and streets
  - Funding formula
  - Near term undergrounding program

Client Case Study

Military Healthcare System-Department of Defense


DRAFT – Post 22 Apr 09 Conf Call
MEDCOM Sustainability Strategy Map
April 2009
Mission
To accomplish our mission through due consideration of health, value, environment, and communities while enhancing the ability of future generations to accomplish their missions.
Vision
Sustainable healthcare for today and tomorrow.
Improve the present; respect the future
Strategic Themes
Enhance Health
Enhance the Environment
Enhance our Communities
SUSTAIN
PREPARE
RESET
TRANSFORM
ENDS
Patient/Customer/ Stakeholder
CS 1.0 Improved Patient Health
CS 2.0 Improved Employee Health
CS 3.0 Improved Environment
CS 4.0 Improved Communities
CS 5.0 Improved Sustainable Facilities
WAYS
Internal Process
IP 7.0 Improve Water Conservation
IP9.0 Decrease Waste Streams
IP 11.0 Improve Sustainability Awareness, Communication, and Marketing
IP 13.0 Reduce Our Carbon Footprint
IP 6.0 Improve Energy Conservation
IP 8.0 Improve Responsible Purchasing
IP 10.0 Enhance Community Impact
IP 12.0 Improve Sustainability Best Practice Transfer
IP 14.0 Design, Build, and Operate Sustainable Facilities
MEANS
Learning and Growth
LG 15.0 Improve Knowledge Management
LG 16.0 Enhance Staff Training and Development
LG 17.0 Promote a Culture of Sustainability
Resource
R 18.0 Reduced Cost of Operations
Feedback Adjusts Resourcing Decisions
This is a dynamic, living document
For more information go to: www/TBD

Improve the Present

Respect the Future

Sustainability is a broad topic with several initiatives that support MEDCOM's current mission and will prepare us for future mission requirements. These initiatives include environmentally preferential purchasing, energy and water conservation, waste stream reduction, recycling, adopting sustainable construction and renovation practices, determining life-cycle costs and building community involvement.

We can protect and improve our future by initiating sound decision-making processes. We must choose wiser and less destructive uses of our planet's assets and resources.

A successful sustainability program recognizes the need for an organization to accomplish its mission and be both financially and environmentally responsible while also contributing to and protecting the surrounding community.

Sustainability is much more than just striving to be "green." It relates to the continuity of economic, social, institutional, and environmental aspects of human society, as well as the environment. For the Army, sustainability is a long-range vision to meet today's needs and anticipate tomorrow's challenges.

We must connect our activities today to those of tomorrow with sound business and environmental practices.

MEDCOM Joins PRACTICE Greenhealth

MEDCOM has become a member of Practice Greenhealth! Practice Greenhealth is the nation's leading organization for institutions in the health care community that have made a commitment to sustainable practices. Members are dedicated to the greening of health care to improve the health of patients, staff and the environment.

Does Your Facility Have a Sustainability Success Story?

If so, send it in! We want to gather lessons learned and successes to share with other medical treatment facilities.

To learn more about the MEDCOM Sustainability Strategy, or to share your sustainability success stories, contact:

HQ, MEDCOM
MCFA-E (B2792)
2050 Worth Road, Suite 22
Fort Sam Houston, TX - 78234-6022

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(210) 221-7988
DSN 471

Army Medicine...Army Strong!

U.S. Army Medical Command
July 2009

Printed on 100% recycled, 100% post-consumer content paper

U.S. Army Medical Command

SUSTAINABILITY

Accomplishing our mission through due consideration of health, value, environment, and communities while enhancing the ability of future generations to accomplish their missions.

HDR

Sustainability Mission

Accomplishing our mission through due consideration of the health, value, environment, and communities while enhancing the ability of future generations to accomplish their mission.

US Army Medical Command (USAMEDCOM)

HDR

USAMEDCOM Sustainability Defined As:

The capacity to meet the needs of the present without comprising the ability future generations to their own needs.

US Army Medical Command (USAMEDCOM)

Sustainability & Health

- **Purchasing items which have less environmental impact can create a healthier environment for our Warriors and military family members.**
- **Reusing and recycling items can reduce disposal costs.**
- **Using biodegradable dining hall containers provides a more sustainable alternative to Styrofoam and plastics.**
- **Conserving resources can decrease the utility, water, and disposal costs.**
- **Using healthier building materials can provided a more healing environment for patients.**
- **Some elements of building design, such as day lighting and views of nature can improve patient outcomes and help patients heal faster. (Evidenced Based Design [EBD])**

US Army Medical Command (USAMEDCOM)

Why it matters in our facilities - 482 Total

Buildings
- 1,882 total

SF
- 33.4 million square feet of inventory

Value
- $9 billion plant replacement value

9 Medical Centers

15 Army Community Hospitals

7 Army Health Centers

9 Army Health Clinics (supporting an installation)

71 Army Health Clinics

47 Army Troop Medical Clinics

18 Army Occupational Health Clinics

147 Dental Clinics

96 Veterinary Clinics

31 Research and Development Laboratories

32 Prevention Facilities

US Army Medical Command (USAMEDCOM)

Wrap-up

Including Denver Metro Waste Water Case Study

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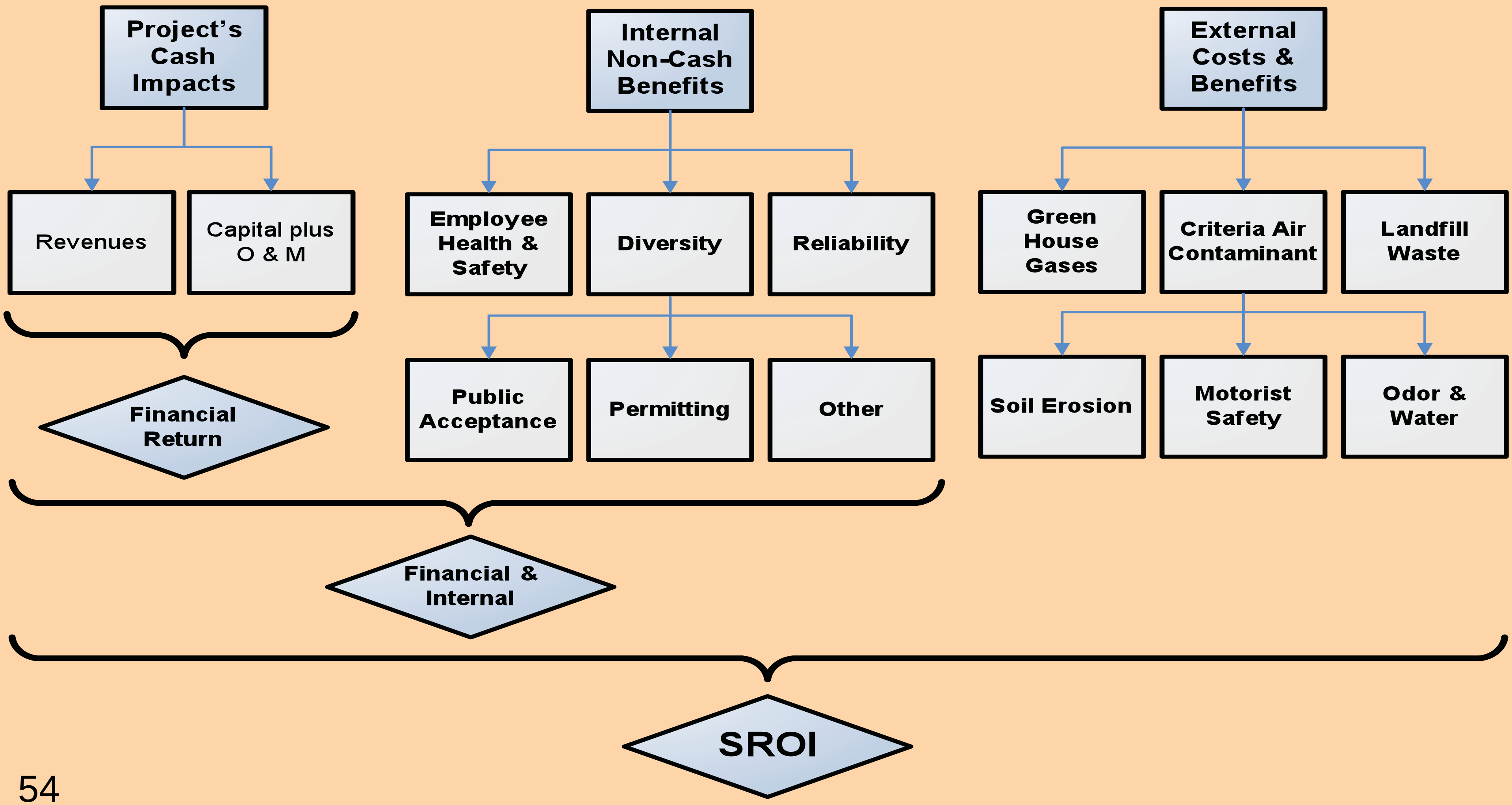
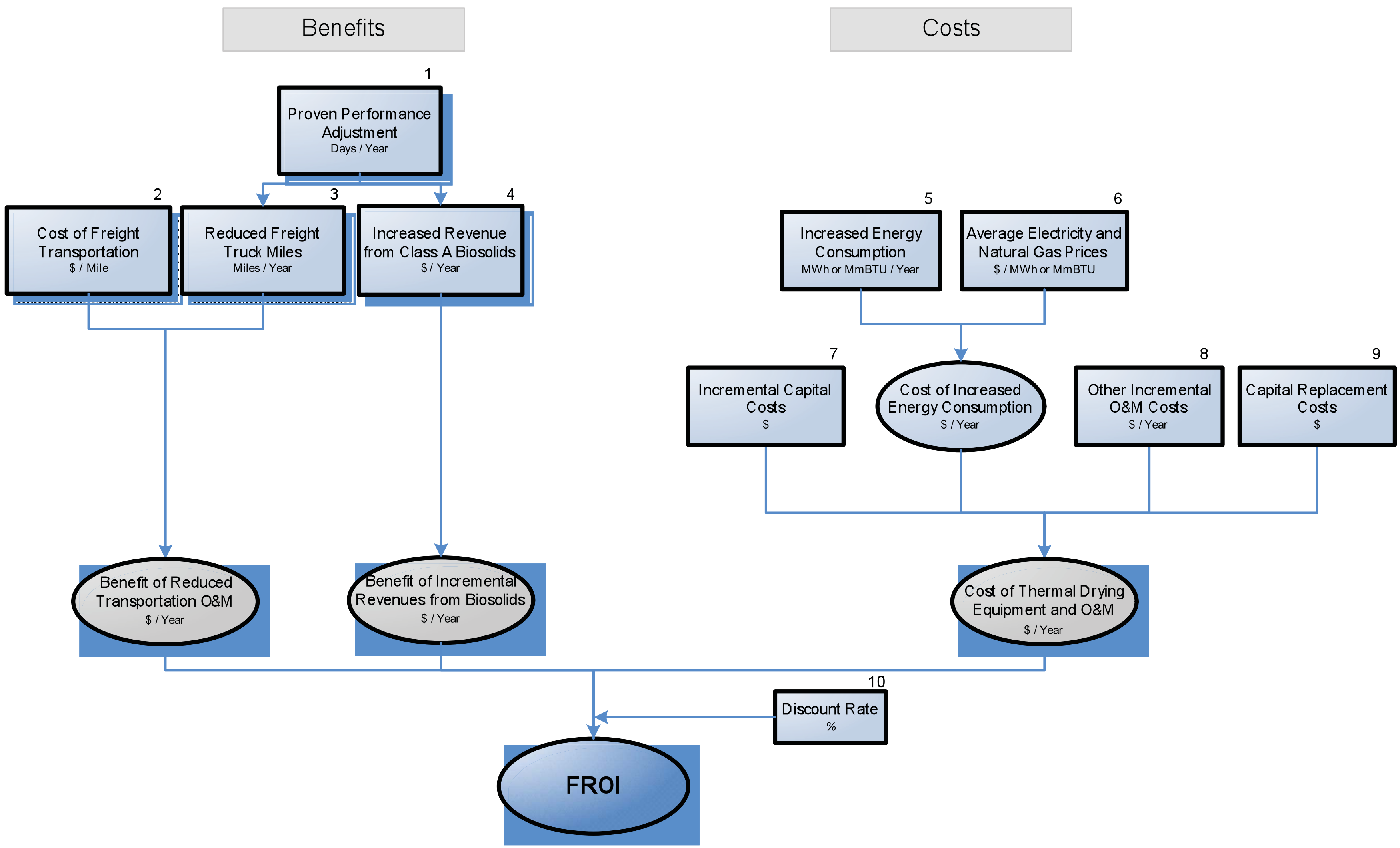
Denver Metro Waste Water - Overview



Alternative 3: Diversify into Class A Product With Thermal Drying at Both Treatment Plants (Distributed Thermal Drying) FROI



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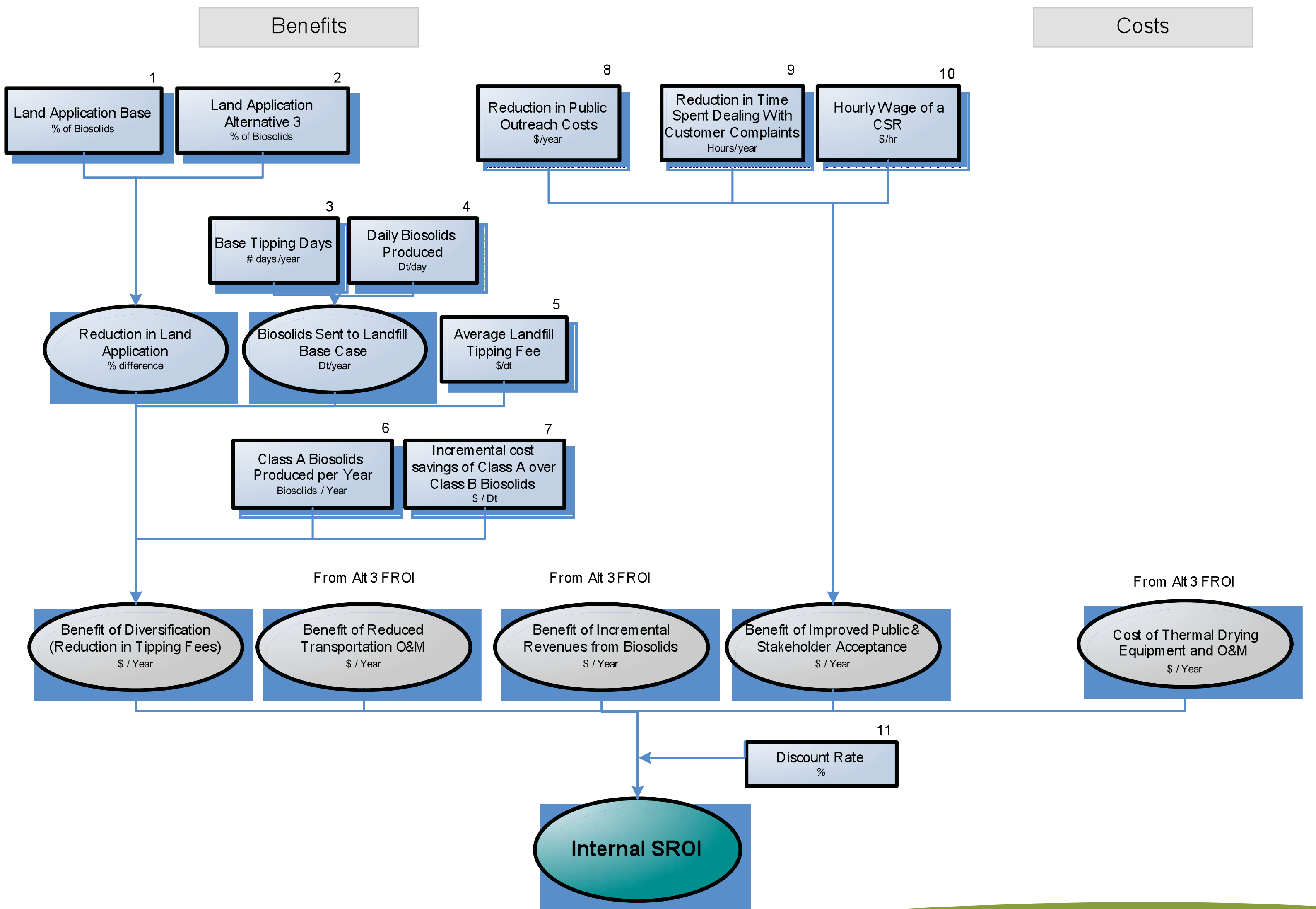
Alternative 3: Diversify into Class A Product With Thermal Drying at Both Treatment Plants (Distributed Thermal Drying) Internal SROI



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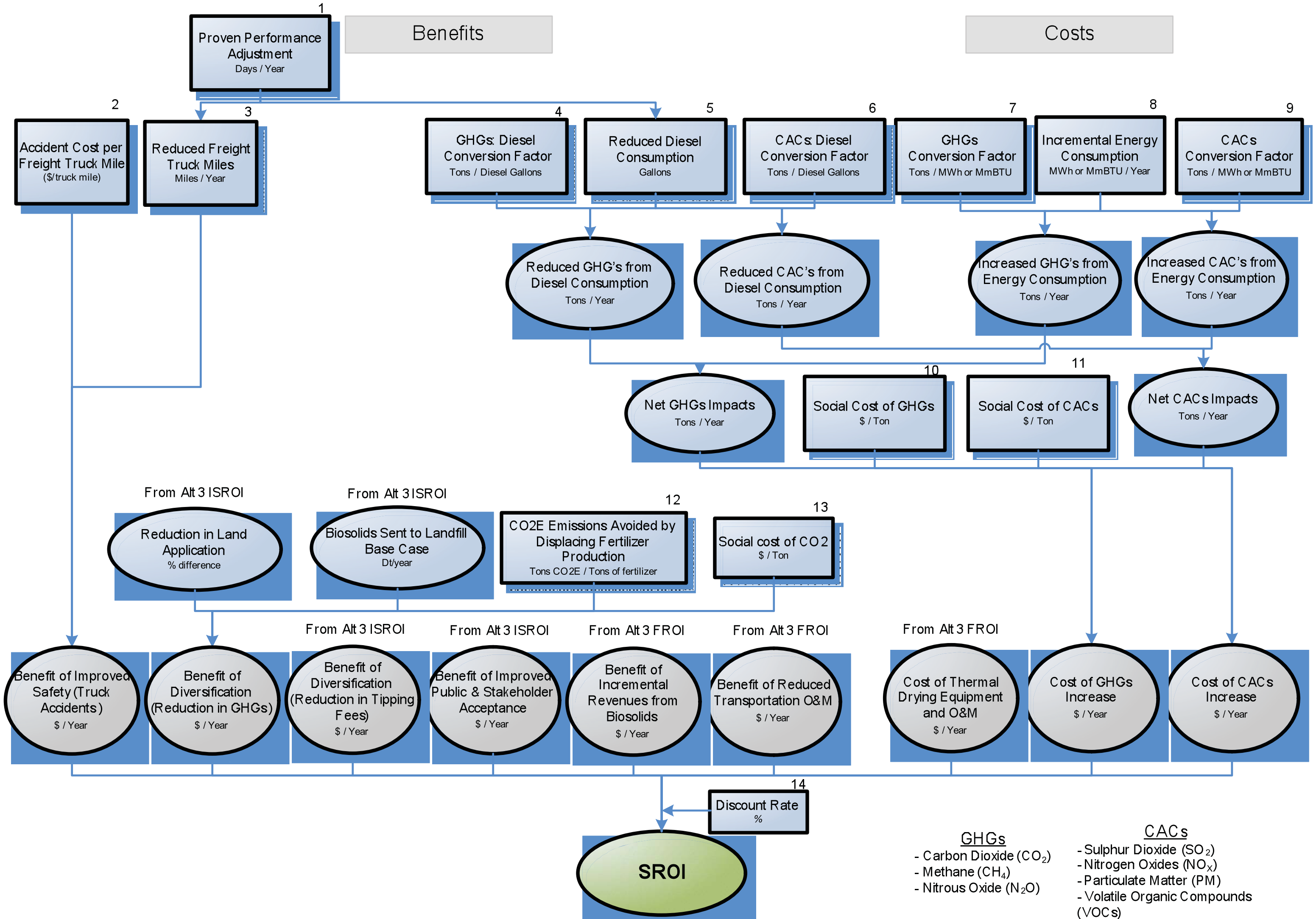
Alternative 3: Diversify into Class A Product With Thermal Drying at Both Treatment Plants (Distributed Thermal Drying) SROI



GHGs
- Carbon Dioxide (CO_2)
- Methane (CH_4)
- Nitrous Oxide (N_2O)

CACs
- Sulphur Dioxide (SO_2)
- Nitrogen Oxides (NO_X)
- Particulate Matter (PM)
- Volatile Organic Compounds (VOCs)

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Biosolids Optimization: Preliminary Results

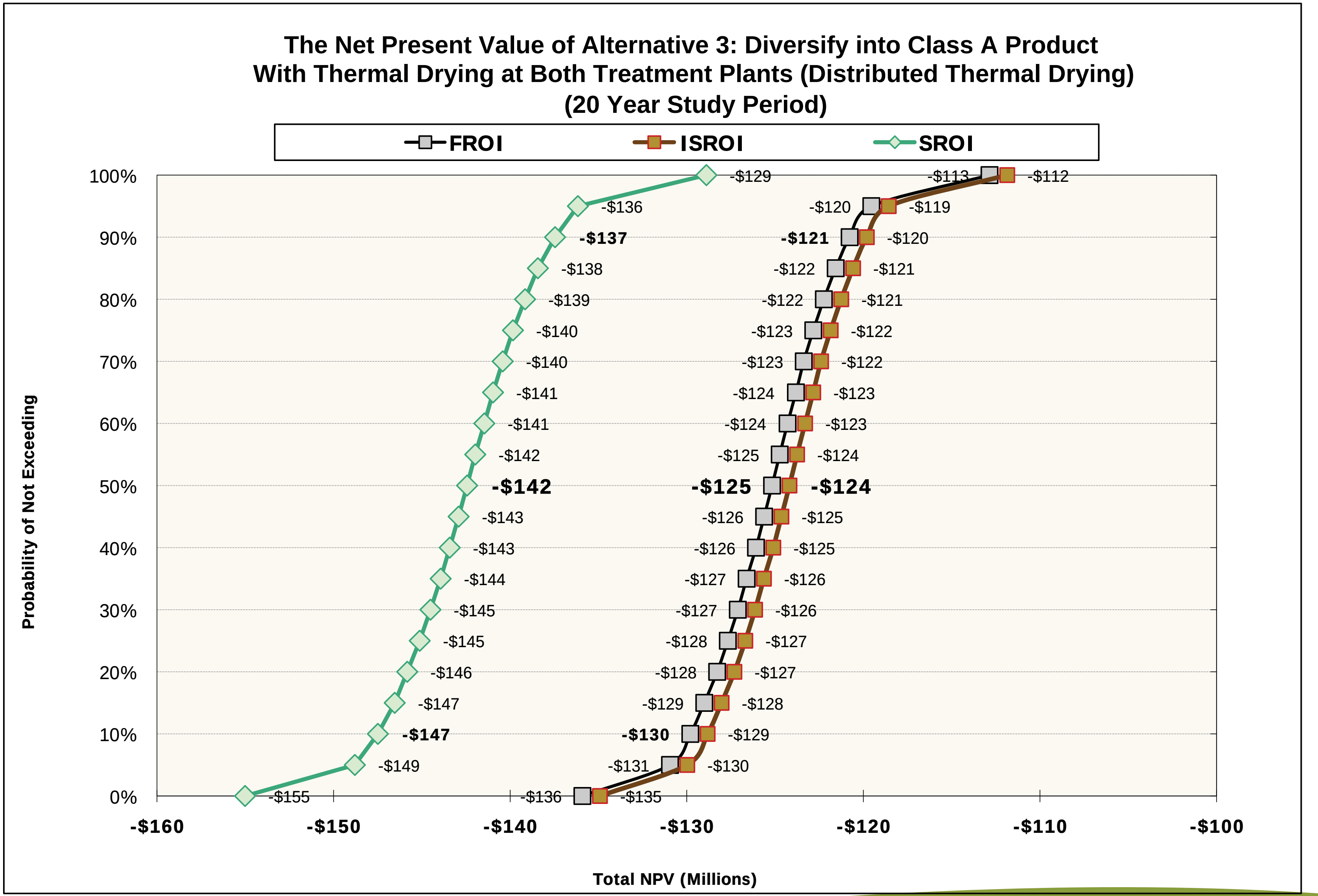
	Alternative 2: Continue with 100% Class B Biosolids Production But Lessen Emphasis on Land Application by Expansion of Contract Composting	Alternative 3: Diversify into Class A Product With Thermal Drying at Both Treatment Plants (Distributed Thermal Drying)	Alternative 4: Diversify into Class A Product With Thermal Drying at RWHTF Only (Centralized Thermal Drying)	Alternative No. 5: Diversify into Class A Product With Enhanced Digestion using CAMBI at the Northern Treatment Plant	
FROI					
Metrics	**Values**	**Values**	**Values**	**Values**	**Notes**
Avg Annual Value of Benefits	$279,863	$4,458,150	$3,947,714	$1,575,510	Average Annual Nominal Value of Benefits (over 20 year period)
Avg Annual Value of Costs	$355,531	$14,809,587	$13,103,947	$937,373	Average Annual Nominal O&M and Capital Costs (over 20 year period)
Net Present Value	($787,864)	($125,233,009)	($112,908,953)	$4,040,701	PV Benefits - PV All Costs - PV Taxes + PV of End of Study Value
Return on Investment	N/A - no capital	-17%	-15%	6%	Arithmetic Average Rate of Return on Capital Investment
Discounted Payback Period	N/A - no capital	0	0	16	Time in years until positive discounted cash flow
Internal Rate of Return (%)	N/A - no capital	N/A	N/A	11%	Discount rate which would make NPV = 0
Benefit to Cost Ratio	0.8	0.2	0.2	1.3	PV Benefits / PV Costs
ISROI					
Metrics	**Values**	**Values**	**Values**	**Values**	**Notes**
Avg Annual Value of Benefits	$318,983	$4,550,715	$4,042,285	$1,626,714	Average Annual Nominal Value of Benefits (over 20 year period)
Avg Annual Value of Costs	$355,531	$14,809,587	$13,103,947	$943,041	Average Annual Nominal O&M and Capital Costs (over 20 year period)
Net Present Value	($327,989)	($124,252,685)	($111,904,190)	$4,569,933	PV Benefits - PV All Costs - PV Taxes + PV of End of Study Value
Return on Investment	N/A - no capital	-17%	-15%	7%	Arithmetic Average Rate of Return on Capital Investment
Discounted Payback Period	N/A - no capital	0	0	15	Time in years until positive discounted cash flow
Internal Rate of Return (%)	N/A - no capital	N/A	N/A	12%	Discount rate which would make NPV = 0
Benefit to Cost Ratio	0.9	0.2	0.2	1.4	PV Benefits / PV Costs
SROI					
Metrics	**Values**	**Values**	**Values**	**Values**	**Notes**
Avg Annual Value of Benefits	$351,882	$4,689,385	$4,194,546	$1,158,130	Average Annual Nominal Value of Benefits (over 20 year period)
Avg Annual Value of Costs	$355,531	$16,933,255	$15,311,886	$1,158,130	Average Annual Nominal O&M and Capital Costs (over 20 year period)
Net Present Value	$20,465	($142,470,502)	($131,004,852)	$3,047,706	PV Benefits - PV All Costs - PV Taxes + PV of End of Study Value
Return on Investment	N/A - no capital	-19%	-18%	5%	Arithmetic Average Rate of Return on Capital Investment
Discounted Payback Period	N/A - no capital	0	0	17	Time in years until positive discounted cash flow
Internal Rate of Return (%)	N/A - no capital	N/A	N/A	10%	Discount rate which would make NPV = 0
Benefit to Cost Ratio	1.0	0.2	0.2	1.2	PV Benefits / PV Costs

Biosolids Optimization: Preliminary PV of Benefits & Costs

Present Value of Each Benefit & Costs Category	Alternative 2: Continue with 100% Class B Biosolids Production But Lessen Emphasis on Land Application by Expansion of Contract Composting	Alternative 3: Diversify into Class A Product With Thermal Drying at Both Treatment Plants (Distributed Thermal Drying)	Alternative 4: Diversify into Class A Product With Thermal Drying at RWHTF Only (Centralized Thermal Drying)	Alternative No. 5: Diversify into Class A Product With Enhanced Digestion using CAMBI at the Northern Treatment Plant	
FROI					
Metrics	**Values**	**Values**	**Values**	**Values**	**Notes**
Reduced Transportation O&M:	$2,948,259	$11,094,794	$12,290,396	($310,453)	Total discounted value of benefits over the life of the study
Incremental Revenues from Biosolids:	$0	$2,150,666	$2,150,666	$0	Total discounted value of benefits over the life of the study
Residual Value:	$0	$22,856,181	$18,120,681	$2,210,522	Total discounted value of benefits over the life of the study
Reduced Natural Gas Consumption at NTP:	$0	$0	$0	$1,211,354	Total discounted value of benefits over the life of the study
Reduced Other O&M Costs:	$0	$0	$0	$13,129,419	Total discounted value of benefits over the life of the study
Increased Electricity Consumption at RWHTF:	$0	$3,045,218	$3,882,210	$0	Total discounted value of costs over the life of the study
Increased Electricity Consumption at NTP:	$0	$899,856	$0	$3,417,475	Total discounted value of costs over the life of the study
Increased Natural Gas Consumption at RWHTF:	$0	$14,540,159	$18,473,986	$0	Total discounted value of costs over the life of the study
Increased Natural Gas Consumption at NTP:	$0	$2,954,876	$0	$0	Total discounted value of costs over the life of the study
Incremental Other O&M:	$3,736,123	$54,742,338	$47,687,625	$0	Total discounted value of costs over the life of the study
Incremental Capital Costs:	$0	$85,152,202	$75,426,875	$10,352,915	Total discounted value of costs over the life of the study
ISROI					
Metrics	**Values**	**Values**	**Values**	**Values**	**Notes**
Improved Diversification:	$24,116	$544,565	$569,004	$152,406	Total discounted value of benefits over the life of the study
Improved Public & Stakeholder Acceptance:	$435,759	$435,759	$435,759	$435,759	Total discounted value of benefits over the life of the study
Cost of Proven Performance (Landfill Tipping Fees):	$0	$0	$0	$58,933	Total discounted value of costs over the life of the study
SROI					
Metrics	**Values**	**Values**	**Values**	**Values**	**Notes**
Improved Safety (Truck Accidents):	$258,307	$972,051	$1,076,802	($27,200)	Total discounted value of benefits over the life of the study
Improved Diversification (Reduction in GHGs):	$5,168	$1,643	$1,643	$449	Total discounted value of benefits over the life of the study
Reduced Transportation (Reduction in GHGs):	$54,383	$218,406	$240,784	$0	Total discounted value of benefits over the life of the study
Reduced Transportation (Reduction in CACs):	$30,596	$82,079	$93,047	$0	Total discounted value of benefits over the life of the study
Reduced Transportation and Natural Gas Use (GHGs):	$0	$0	$0	$714,930	Total discounted value of benefits over the life of the study
Reduced Transportation and Natural Gas Use (CACs):	$0	$0	$0	$98,150	Total discounted value of benefits over the life of the study
GHGs Social Cost from Energy Use:	$0	$13,481,966	$14,151,772	$735,578	Total discounted value of costs over the life of the study
CACs Social Cost From Energy Use:	$0	$6,010,030	$6,361,167	$1,572,978	Total discounted value of costs over the life of the study

HDR ONE COMPANY *Many Solutions*®

S-Curves: NPV, Alternative 3



So Why Use SROI?

- ✓ It's a proven Cost-Benefit Analysis based approach to making planning & budgeting decisions
- ✓ It fully incorporates non-cash benefits and externalities into the decision making process
- ✓ It provides a full range of possible outcomes using state-of-the-art risk analysis techniques
- ✓ It helps generate consensus by being both interactive and transparent
- ✓ It is an invaluable tool to help projects secure internal approval, public support, funding, etc.

Questions?

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Or

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SROI@hdrinc.com

"Doing the right thing is good. Doing the right thing for the right reason and with the right intention is even better."

HDR