What is SROI?

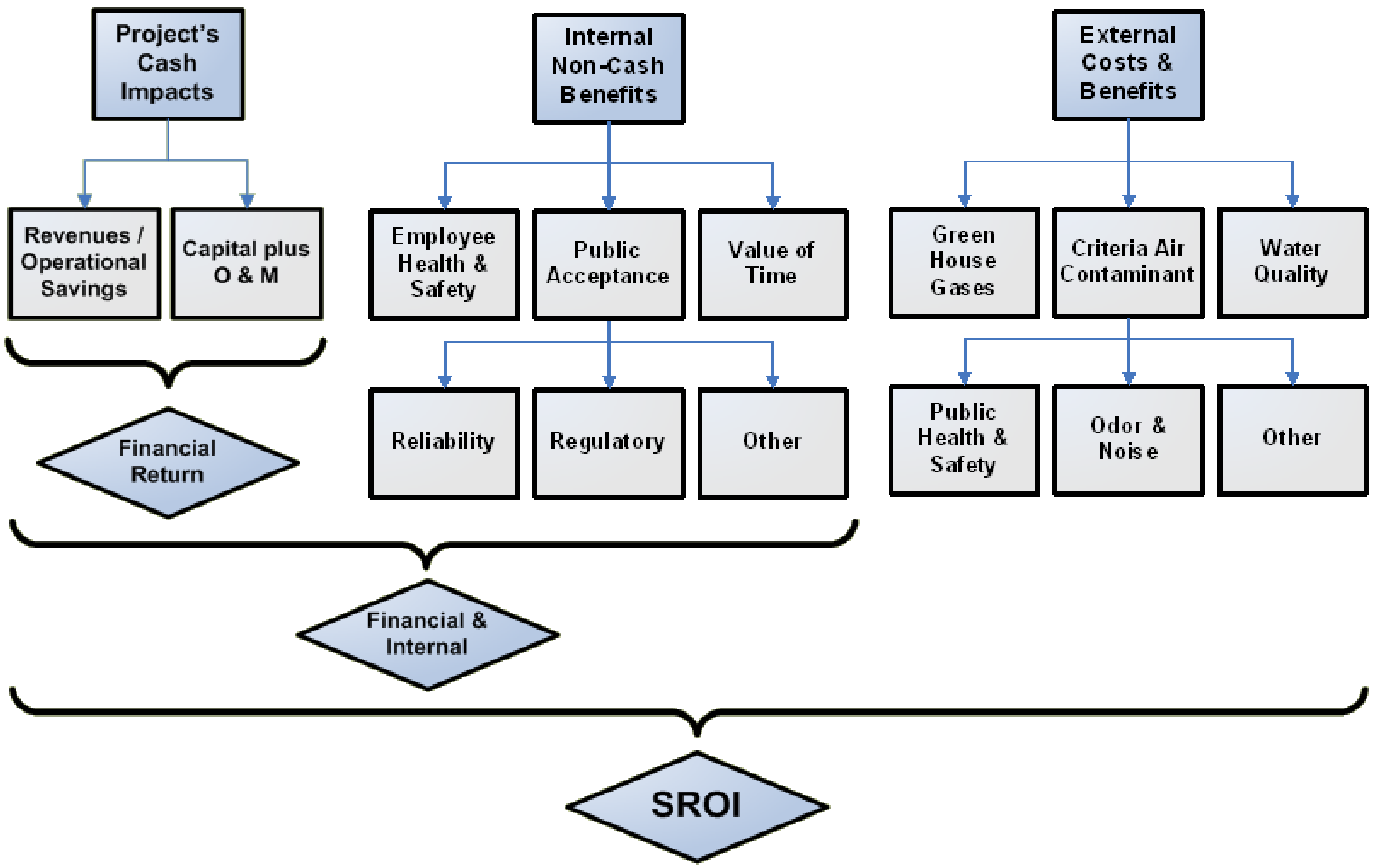
Triple Bottom Line Decision Making Framework

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

The Triple-Bottom Line Framework

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



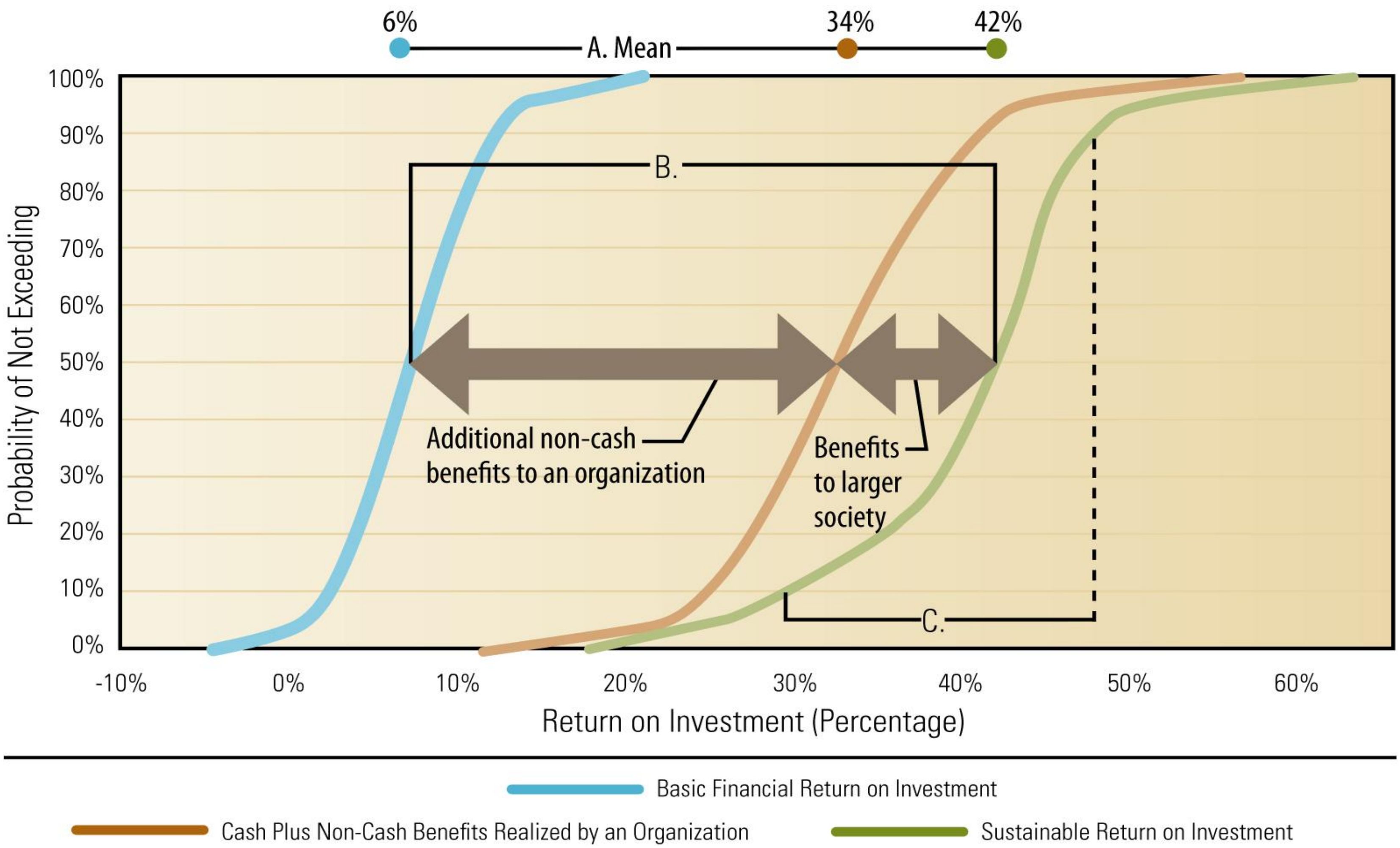
SROI Methodology

A Four-Step Process

“**SROI** reveals the **hidden value** in projects.”

David Lewis, PhD
Former Principal Economist at the US Congressional Budget Office
Author “*Policy and Planning as a Public Choice: Mass Transit in the United States*”

S-Curve Diagram



SROI Outcomes ($NPV): Changing Decision Making Processes

	Technology X	Technology Y (Tech X plus Renewable)
Traditional (FROI)	**$188**	$126
Environmental and Community Impacts	$234	**$337**
Total Impact (SROI)	$422	**$463**

- "**X**" would be selected from a fiscal perspective
- "**Y**" is the best option on a balanced SROI basis
  - $62M investment, yields >$100 in environmental benefits

SROI Process for P21

- 2 RAP sessions with stakeholders from HBPW, the Holland community, and HDR
  - Potential project costs and benefits identified
  - Preliminary and refined values discussed
- Additional research and interviews to refine assumptions and inputs
- Several refinements of technology options and costing inputs
- Generation options grouped in various scenarios
- Development of SROI model
- Impacts are incremental:
  - **relative to the "base case"**

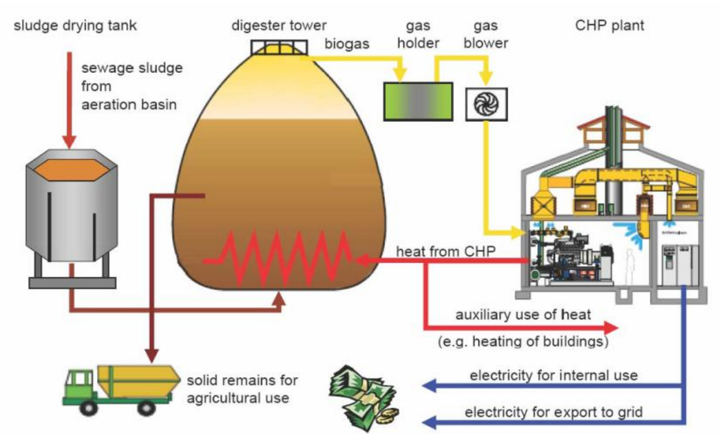
James De Young Station

- Unit 3 Retired in all cases
- Snowmelt system currently fed by U3/U4
- 46 MW Combined Capacity U4+U5
- No Capital Investment – Retire U4 &U5 by 2016 per the CEP
- Invest $28M Air Pollution Control Equipment , U4 Retires 2027, U5 Retires 2033 (Base Case)

Renewable Generation Options

20MW Wind Farm

8MW Solar Photovoltaic

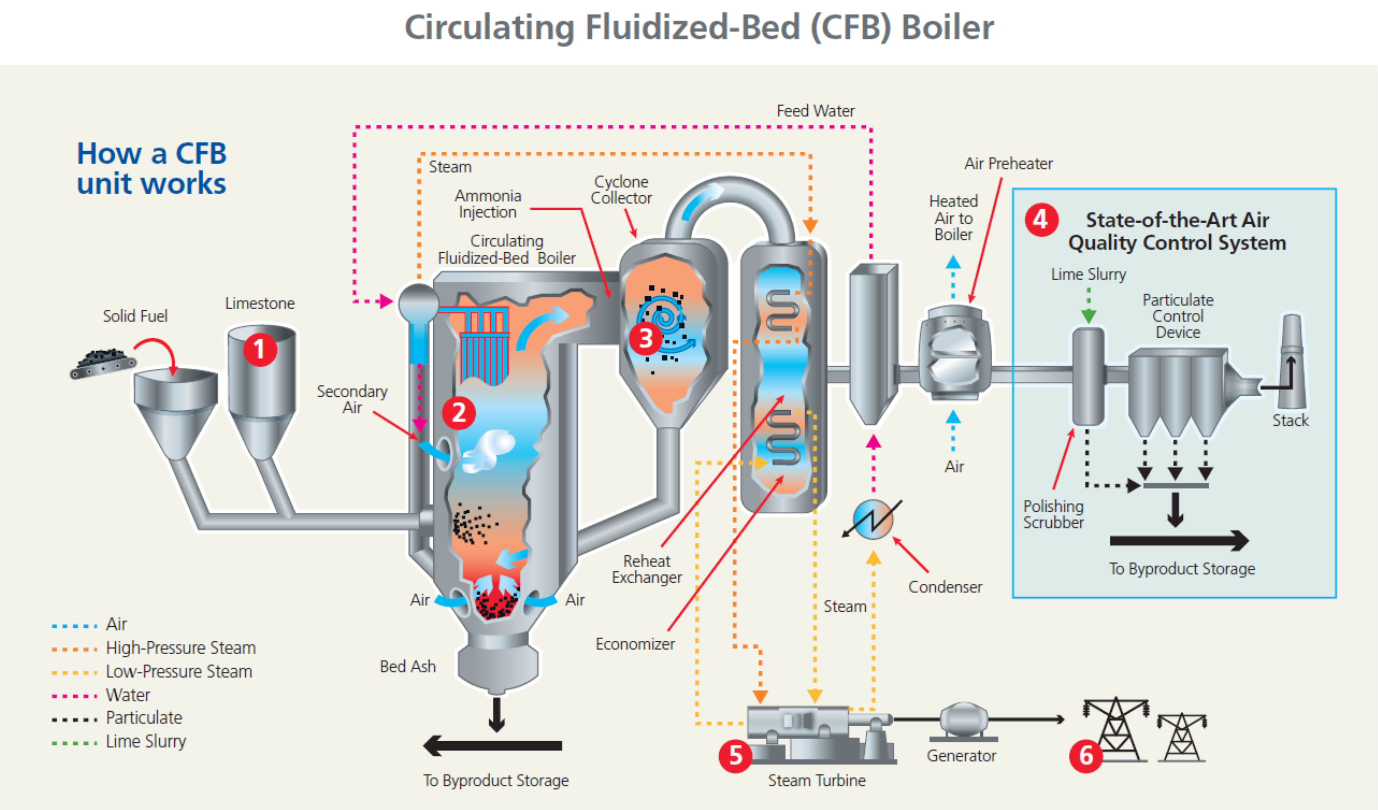


4MW Digester Gas CHP

22MW Biomass Conversion JDY - U5

HDR

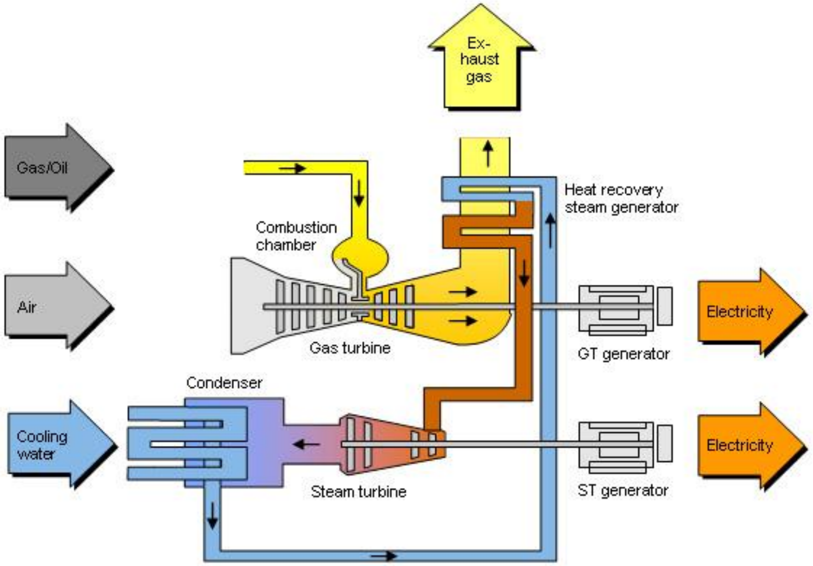
New Solid Fueled Unit 10 at JDY



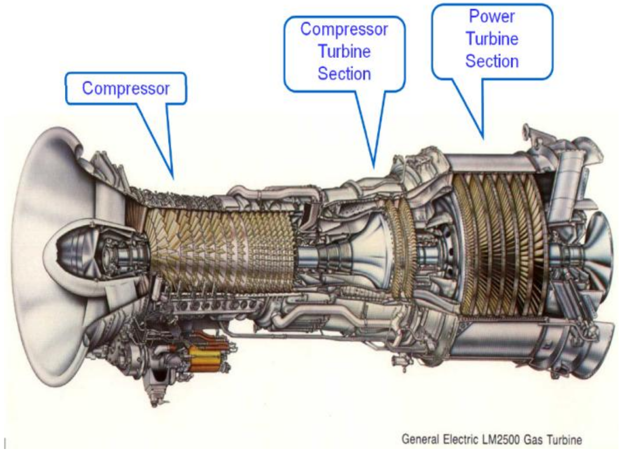
70 MW Capacity

- 50% Petroleum Coke
- 30% Biomass
- 20% PRB Coal

Natural Gas Fired Combined Cycle



GE LM2500 Aeroderivative Gas Turbine



2x1 LM2500 - 78MW
2x1 LM6000 – 114MW

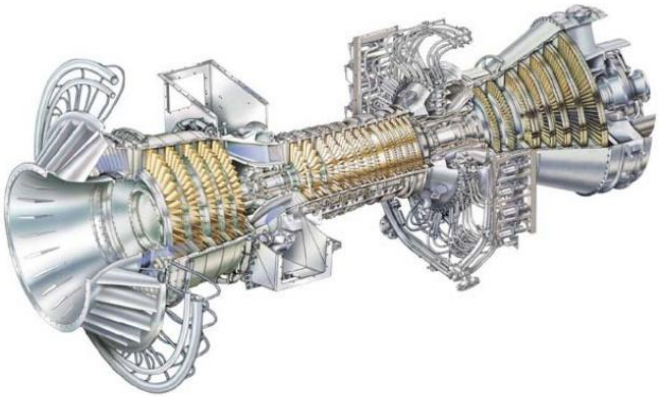
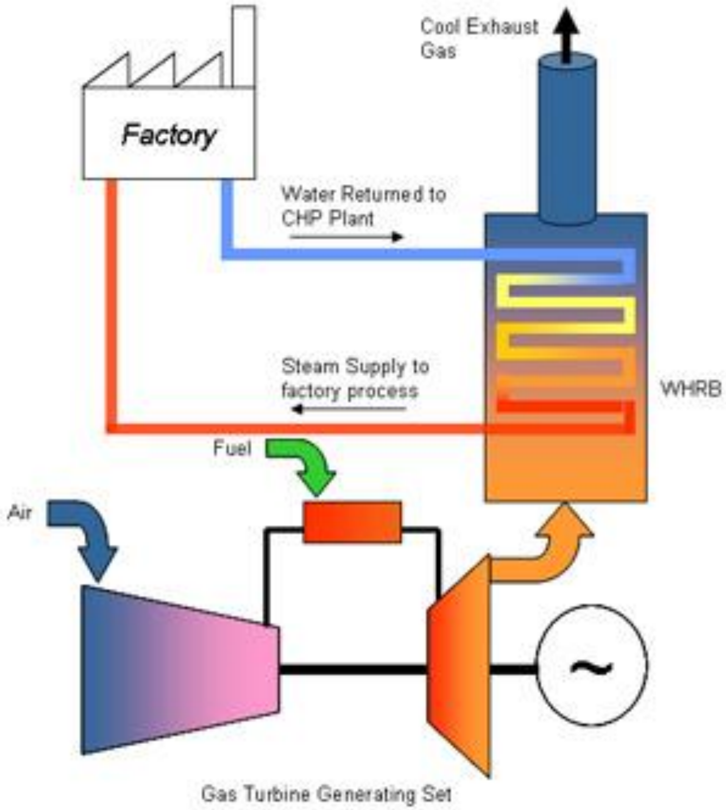


Fig. 13. The GE LM6000 (aeroderivative of the CF6-80C2). (Source: GE Power Systems)

HDR

Natural Gas Fired Combined Heat and Power (CHP)



The Gas Turbine based Combined Heat & Power Cycle

Combined Heat & Power is the simultaneous production of Power and Heat from a single fuel source.

The Gas Turbine generates electricity to power the plant.

The hot exhaust gases are passed through a Waste Heat Recovery Boiler*

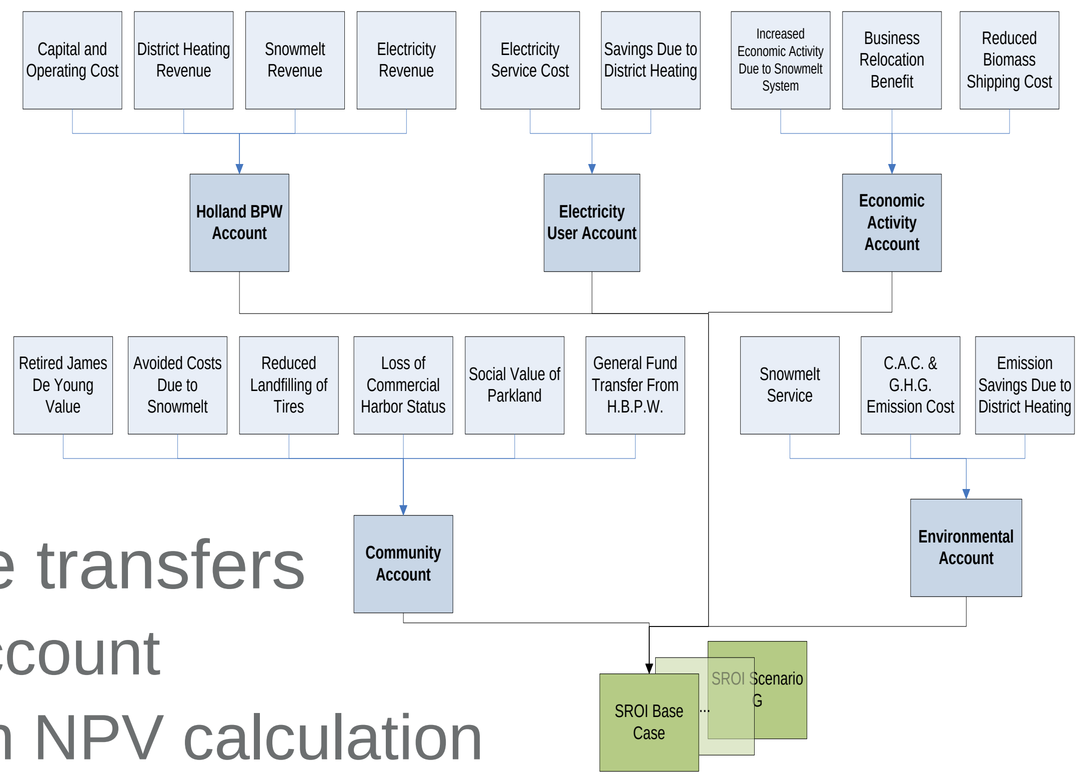
The hot gases heat water which is supplied either as hot water or steam to the factory/facility processes.

* Waste Heat Recovery Boilers are also known as Heat Recovery Steam Generators (HRSG)

LM2500 CHP – 30.5MW

Benefit and Cost Impacts

- A range of impacts were identified by stakeholder group or "account"
- Key stakeholder accounts:
  - Holland BPW
  - Electricity User
  - Environmental
  - Economy
  - Community



- Some impacts are transfers
  - Quantified by account
  - But cancel out in NPV calculation

Holland BPW Account

- Capital, EPC, O&M, Fuel, and Fixed Costs
- Retail Electricity Sales
- Interchange Purchases & Sales
- District Heating Costs & Recovery
- Snowmelt Costs & Recovery
- Retired JDY Value
- Reduced Biosolids Treatment Cost
- Capacity Purchases & Sales
- Renewable Energy Credit Purchases & Sales
- Site Remediation Cost

Electricity User Account

- Savings Due to District Heating
- Electricity Service Cost

Environmental Account

- Criteria Air Contaminant Emissions
- Greenhouse Gas Emissions
- Additional Emission Savings Due to District Heating

Economic Activity Account

- Business Relocation Benefit
- Reduced Biomass Shipping Costs

Community Account

- General Fund Transfer from HBPW
- Loss of Commercial Harbor Status
- Social Value of Parkland
- Landfilling of Tires
- Retired James De Young Land Value
- Snowmelt Service Cost

Results & Outcomes

High-Level Outcomes:

- The 3 scenarios with natural gas (e.g., A, B, G) provide the highest SROI
  - The largest benefit is reduced emissions
  - Electricity cost reductions significant too (>$100M)
- Two individual impacts dominate the overall results:
  - Value of electricity service cost reduction
  - Value of emissions reductions

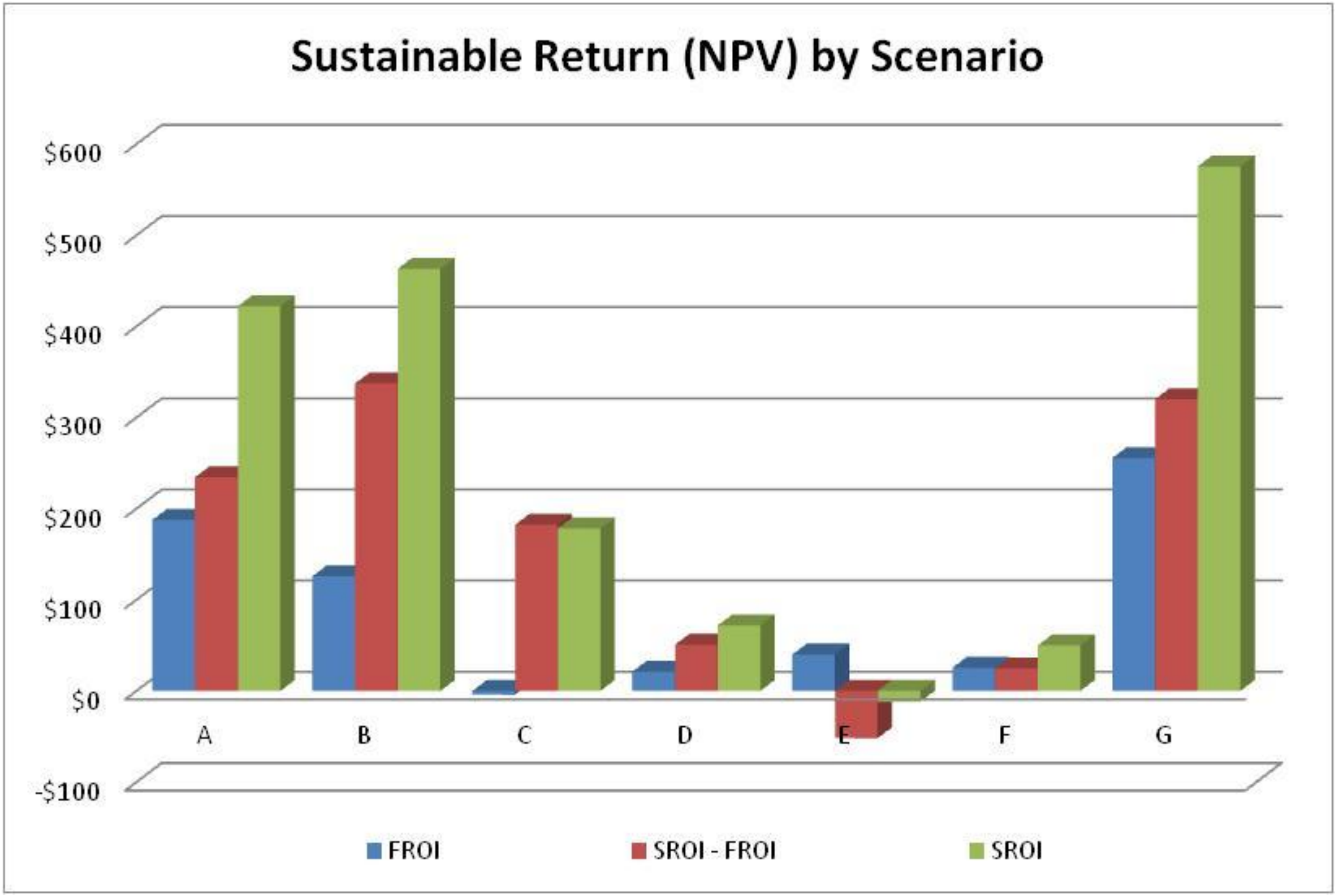
High-Level Outcomes (cont'd):

- The scenario providing the greatest incremental value (<u>at the mean</u>) from both an FROI and SROI perspective relative to the base case is Scenario G
  - FROI ~$250M
  - SROI ~$575M
    - Range from about $300M to $800M
    - Range includes low, medium and high gas price
- Scenario G:
  - reduces both electricity costs and emissions
  - Increases Holland's competiveness
  - Provides district heating and snowmelt benefits

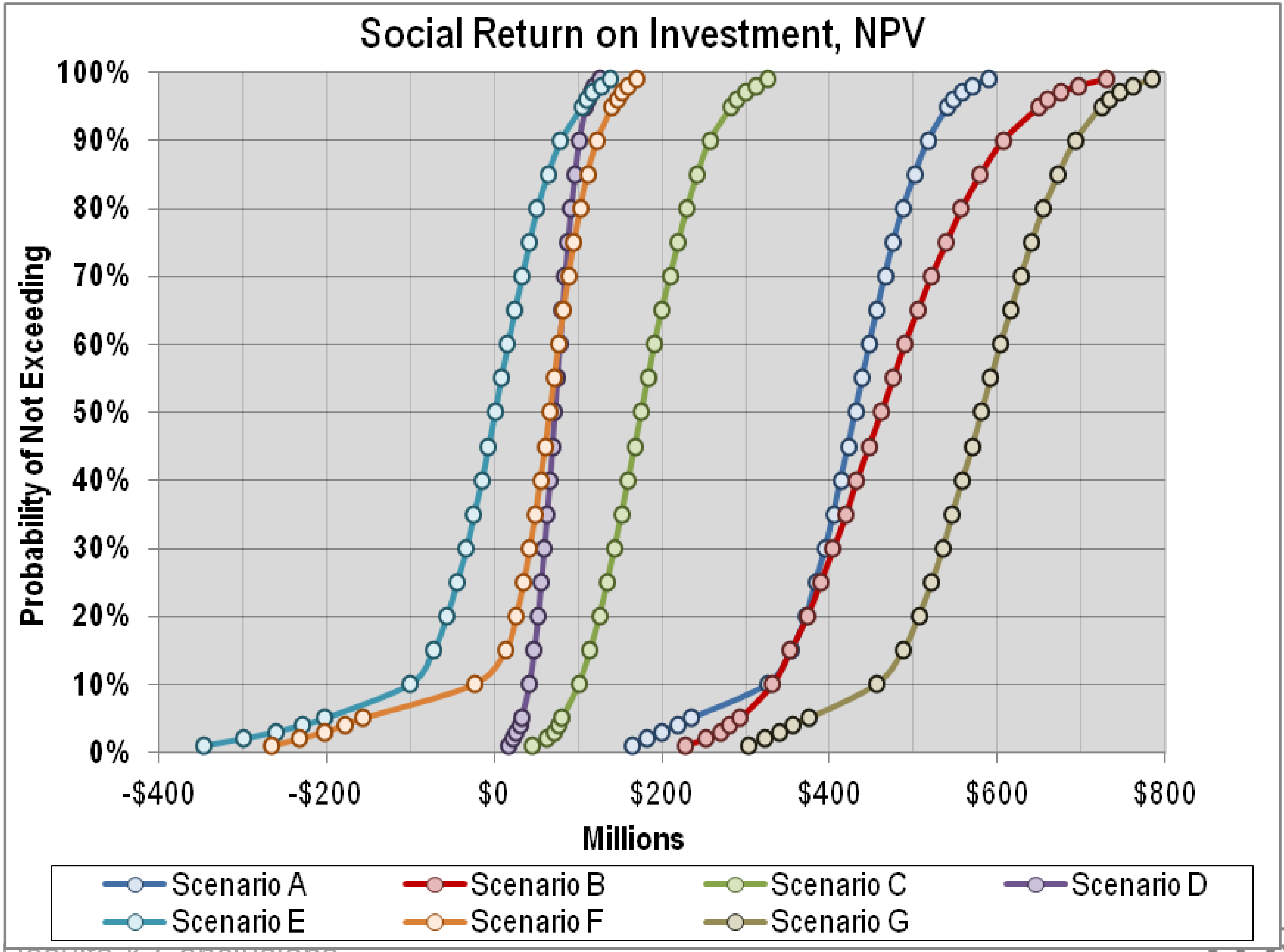
High-Level Outcomes (cont'd):

- On a macro-level, district heating shows potential for significant cost savings
- Owning and operating electric generation is in the best interest of the City
- Investing in controls for the James De Young coal units may not be economic
- Location of new generation not necessary to be located on the waterfront

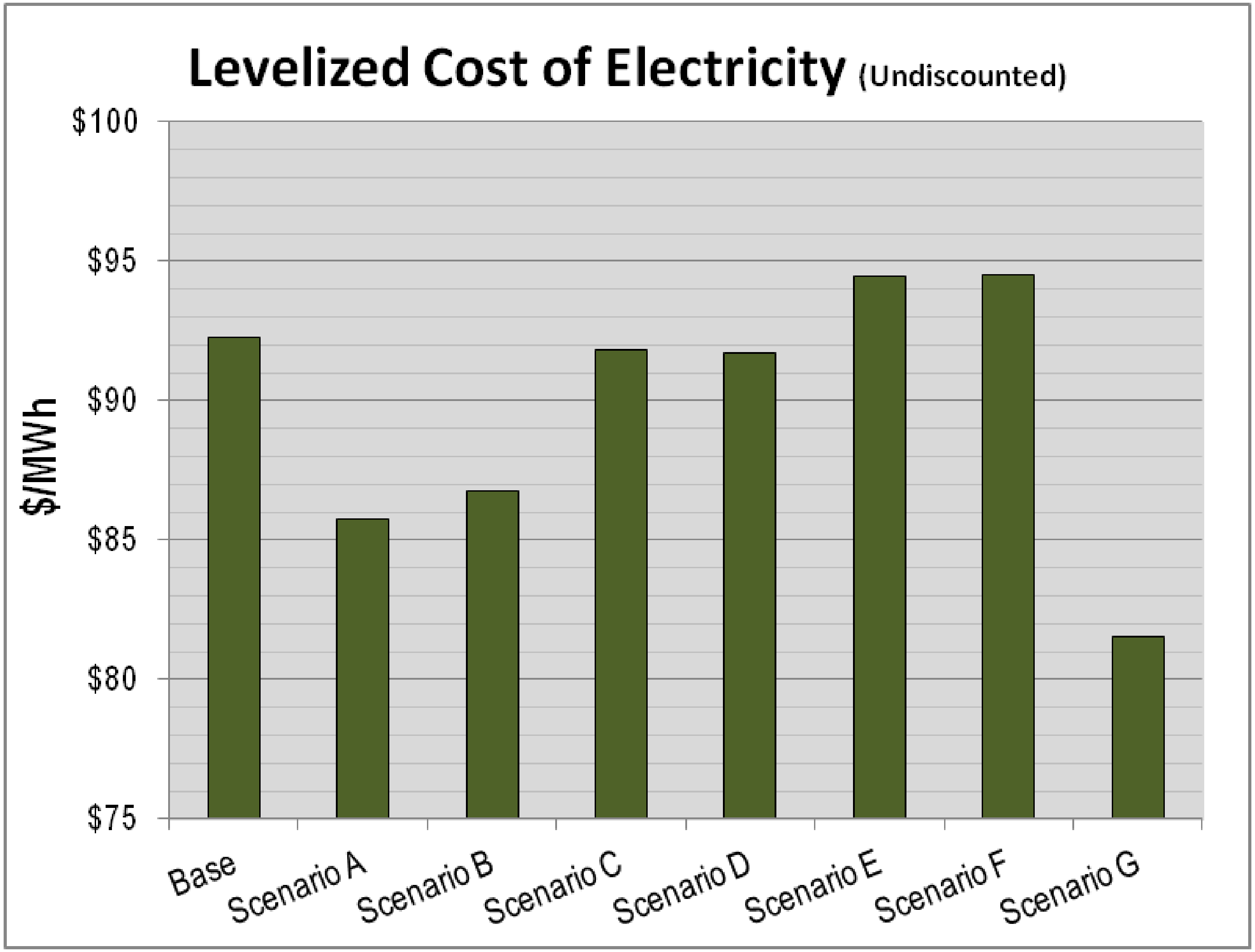
Sustainable Return on Investment ($M)



Sustainable Return on Investment (SROI)



Levelized Cost of Electricity



Concern about amount of Natural Gas

	Scenarios A&B	Scenario G
Combined Cycle Size	78 MW	114 MW
Combined Heat & Power Size	30 MW	0 MW
Total Gas Capacity	108 MW	114 MW
Combined Cycle Cost	$147 Million	$182 Million
Combined Heat & Power Cost	$ 60 Million	$ 0 Million
Total Gas Generation Cost	$207 Million	$182 Million

The amount of gas generation in all three scenarios is essentially the same. However, Scenario G costs $25 Million less to build and has a higher energy efficiency for electric generation.

HDR

Concern about Scenario G Generation Overbuild

	Scenario A	Scenario B	Scenario G
Combined Cycle	78 MW	78 MW	114 MW
Combined Heat & Power	30 MW	30 MW	0 MW
Biomass Conversion	0 MW	22 MW	0 MW
Wind	0 MW	20 MW	0 MW
Bio-digester	0 MW	4 MW	0 MW
Solar	0 MW	8 MW	0 MW
Total New	**108 MW**	**162 MW**	**114 MW**
- Loss of James De Young	- 60 MW	- 60 MW	- 60 MW
Net of Retirements	**48 MW**	**102 MW**	**54 MW**

In Scenario A and G, the HBPW experiences a capacity deficiency by 2029. In Scenario B, there is no deficiency through 2036.

HDR

HBPW Commitment to Energy Efficiency

	EO Revenue	EO Investments	KWh Goal	kWh Savings
2009	$ 383,179	$ 412,865	3,089,387	3,252,003
2010	$ 542,435	$ 682,760	4,849,100	5,480,600
2011	$ 705,136	$ 917,544	6,476,661	7,762,398
2012 Budget	$ 943,248	$ 1,448,815	9,356,393	TBD
Total to Date	$ 2,573,998	$ 3,461,984	23,771,541	

Using an average home consumption of 10,000 kWh per year, HBPW's EO program in 2012 will save the equivalent energy use of over 900 homes

Through 2011, the HBPW invested $382,000 (23.4%) more than revenue received in EO program investments and saved 2,079,853 (14.4%) more kWh than required. Equivalent to 200 homes annual usage.

HDR

HBPW Commitment to Renewable Energy

- 20-year contracts with numerous landfill gas generation sources throughout lower Michigan
- Long-term biomass generation contract
- Current arrangements meet or exceed PA295 requirements through 2018
- Spent hundreds of thousands of dollars on two wind developments
- In negotiations regarding two purchased power agreements with wind developers
  - One 10-year and one 20-year
  - Potential of up to 15 MW in each contract
  - Would exceed requirements well beyond 2030

HDR