

# **WorleyParsons**

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# Oil Sands Tailings Reclamation: Managing Non-Technical Risks and Leveraging Opportunities

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WorleyParsons is a leading professional services provider to the energy, resource, and complex process industries.

Our services cover the full asset spectrum both in size and lifecycle – from the creation of new assets to services that sustain and enhance operating assets.



With 42,000 people in 148 offices throughout 44 countries, we provide our customers with a unique combination of extensive global resources, world-recognized technical expertise and deep local knowledge.



We have seven differentiators which form the strategic focus that drives success in our business and that differentiate us in our markets.



DIFFERENTIATOR 1  
Committed, empowered and  
technically capable people



DIFFERENTIATOR 2  
Industry leadership in health,  
safety and environmental  
performance



DIFFERENTIATOR 3  
EcoNomics™ - Delivering  
profitable sustainability



DIFFERENTIATOR 4  
Outstanding operational and  
corporate performance



DIFFERENTIATOR 5  
Focus on long-term contracts  
and asset-based services



DIFFERENTIATOR 6  
Success in project  
delivery—large and small



DIFFERENTIATOR 7  
Comprehensive  
geographic presence

# **EcoNomics™:**

**Responding to Our Customers' Drivers for Risk  
Management, Sustainability and Innovation**



► We collaborate with our customers to **systematically**:

- Identify and manage the full suite of **business risks** that may impact their projects and operations
- Bridge the gap between their **commitments to stakeholders** and project delivery
- Ensure projects are aligned with their **corporate sustainability goals**
- Support decision making where trade-offs exist between **technical**, **social**, **environmental** and **commercial** performance



# Modes of Delivery



## EcoNomics™







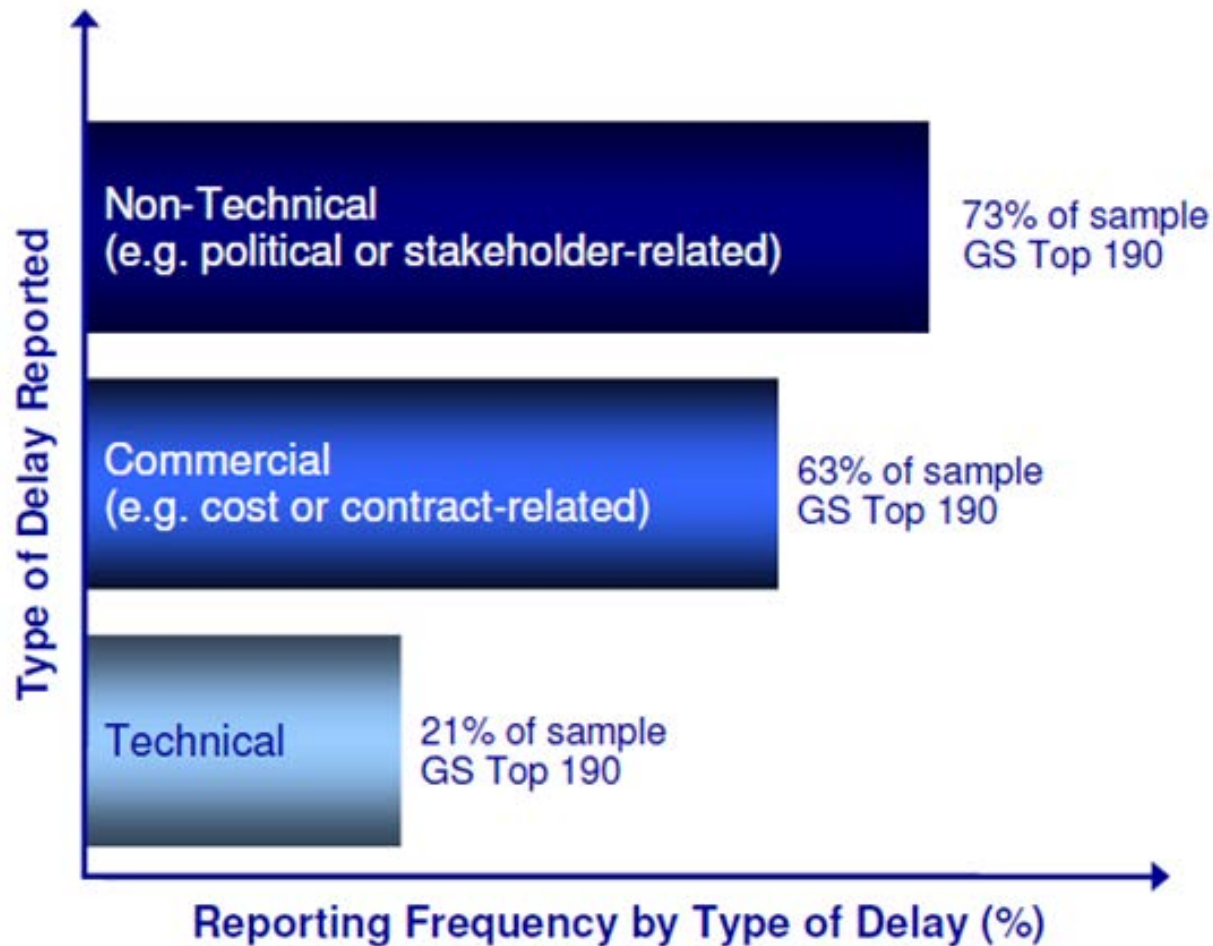
# **Sustainable Project Delivery**

# Sustainable Project Delivery

- Begins with an **Alignment Session**:

“Do you want WorleyParsons to:”	Response	Deliverable
Consider <b>non-technical business risks</b> that may impact project cost, schedule or profitability?	Yes	<b>Project Risk Workshop</b>
Identify and design for any <b>stakeholder commitments</b> with a material impact on the project?	Yes	<b>Commitments Register</b>
Identify <b>value improvement opportunities</b> that help achieve your <b>corporate sustainability goals</b> ?	Yes	<b>Opportunities Register</b>
Help make <b>optimum business decisions</b> where <b>trade-offs</b> exist between <b>technical</b> , <b>environmental</b> , <b>social</b> and <b>commercial</b> performance?	Yes	<b>Decision Support Tools</b>

# Challenge: Non-Technical Risk



## Study of Top 190 Oil & Gas Projects

- Projects in:
- N America
  - S America
  - Europe
  - Africa
  - Asia-Pacific
  - Asia-Middle East

**Of the 190 projects, average delay of 12 months for non-producing fields**

*Source: Goldman Sachs Investment Research, 2008*

# Deliverable: Project Risk Workshop

- ▶ Facilitated by WorleyParsons risk expert
- ▶ Participation from broad expertise, covering wide range of potential stakeholder perspectives
- ▶ Involves full consideration of potential technical and **non-technical risks** that may impact project cost, schedule or profitability
- ▶ Ensures mitigation actions are identified and risk (esp. non-technical) is managed through life of project through a **risk register**

## Potential Stakeholders and Risk Sources:

- *Project Manager*
- *Project Owner*
- *Engineering*
- *Commercial*
- *Planning / Strategy*
- *Construction*
- *Operations*
- *Legal / Regulatory*
- *Environment*
- *Health and Safety*
- *Social / Community*
- *Human Resources*

# Case Study

**Project:** Oil Sands Project (2011)

**Customer:** Confidential Customer

IDENTIFY > **EVALUATE** > DEFINE > EXECUTE > OPERATE

## Issues

- ▶ Heavily contested by local stakeholders, environmental non-government organizations, First Nations

## Approach

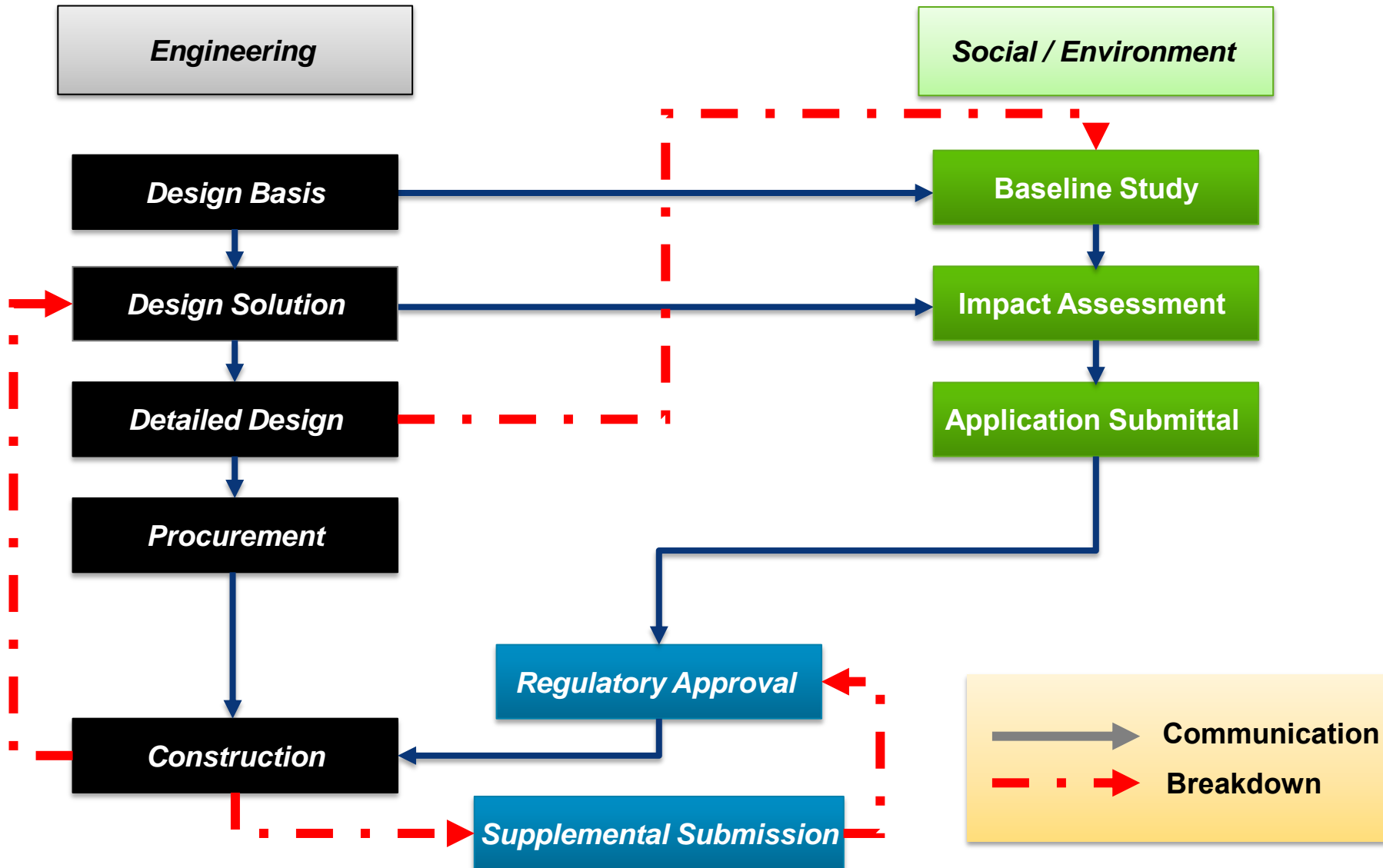
- ▶ Facilitated Project Risk Workshop, with multi-disciplinary representation
- ▶ Identified significant non-technical risks to the project:
  - **Water sourcing and disposal**
  - **Waste management**
  - **Community & Legal commitments**
  - **Customer's corporate sustainability goals**
- ▶ Embedded expertise and deliverables to address non-technical risks



## Value Provided

- ▶ Active and ongoing management of non-technical risk through deliverables
- ▶ Ensured regulatory and stakeholder commitments are met
- ▶ Supported key design decisions from a non-technical risk perspective (CHP & waste management)
- ▶ Identified and implemented value-adding sustainability improvements

# Challenge: Engineering Recycle





# Deliverable: Commitments Register

- ▶ Register of commitments made to stakeholders with a material impact on the successful design and delivery of a project
- ▶ Used to identify potential delivery gaps, incorporate requirements into project design and demonstrate compliance
- ▶ Ensures projects are **aligned to stakeholder expectations**, preventing 'engineering recycle' and supporting the Approval process

**Material commitments are often made to:**

- *Regulators*
- *Local communities*
- *Non-governmental organizations*
- *Aboriginal peoples*
- *Shareholders*
- *Investors*
- *Industry partners*
- *Internal stakeholders*

# Case Study

**Project:** Confidential Oil Sands Project (2009)

**Customer:** Confidential

IDENTIFY > **EVALUATE** > DEFINE > EXECUTE > OPERATE

## Issues

- ▶ Heavily scrutinized project -> significant number of commitments to environment and sustainability.

## Approach

- ▶ Completed and managed a register of all commitments and obligations to regulators and stakeholders
- ▶ Identified material commitments not being addressed in design, and suggested actions/deliverables to bridge this gap.
- ▶ **e.g. the project will utilize the BATEA principle in establishing project emission goals -> influences Technology Selection**



## Value Provided

- ▶ Active and ongoing management of non-technical risk through deliverables
- ▶ Identified >1800 commitments of which >20 were previously undocumented and had a high material impact on design
- ▶ Ensured regulatory and stakeholder commitments are met
- ▶ Identified and implemented value-adding sustainability improvements

# Challenge: Corporate Sustainability Goals

**"10% improvement in  
land rehabilitation"**

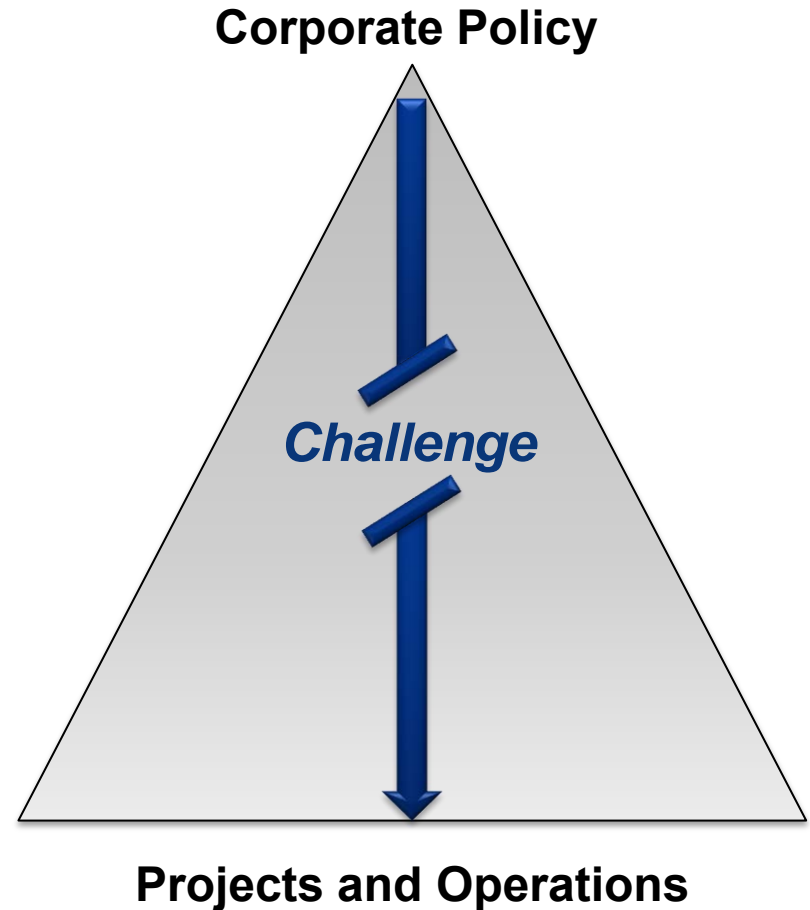
**"Improve energy efficiency  
of our production processes  
by 35%"**

**"6% reduction in GHG  
emissions per unit of  
production"**

**"80% reduction in  
emissions of VOCs"**

**"Zero significant  
community impacts"**

**"Reduce use of drinking  
water in production  
processes by 50%"**



# Deliverable: Opportunities Register

- ▶ Register to manage the identification, evaluation and implementation of opportunities that improve project value and help meet corporate goals
- ▶ Begins with the definition of sustainability goals for the project
- ▶ Communicated to disciplines in workshops to 'brainstorm' opportunities
- ▶ Opportunities are evaluated and recommended based on cost / benefit analyses
- ▶ Ensures a systematic approach to value improvement identification throughout the project, and alignment to corporate goals

## Typical Sustainability Goals:

- *Improve energy efficiency*
- *Optimize water use*
- *Reduce waste*
- *Reduce GHG and air emissions*
- *Minimize footprint*
- *Protect biodiversity*
- *Improve social licence to operate*

# Case Study

**Project:** Confidential Harbor Development (2012)

**Customer:** Confidential

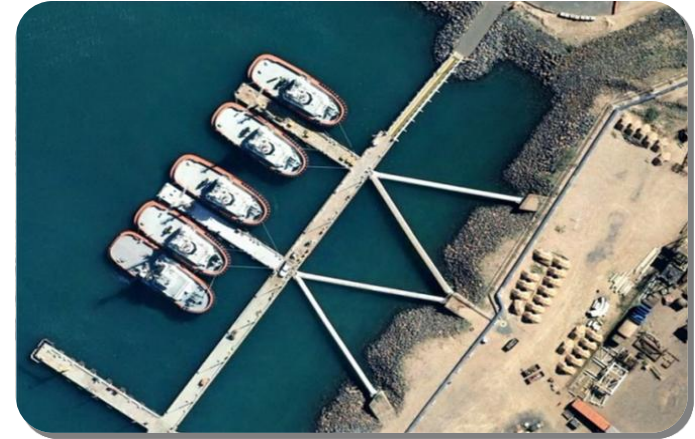


## Issues

- ▶ Internal sustainability goals, high existing materials, energy and water costs, expected to increase over time

## Approach

- ▶ Defined sustainability goals for the project
- ▶ Conducted discipline workshops to communicate goals and brainstorm value improvement opportunities
- ▶ Collated and evaluated opportunities for lifecycle cost or risk reduction using the opportunities register
- ▶ Implemented sound opportunities, and communicated value-add to Customer.



## Value Provided

- ▶ Project alignment to Customer goals
- ▶ >50 opportunities implemented, saving:
  - **CapEx – USD 10.9m**
  - **OpEx – USD 75k p.a.**
  - **CO<sub>2</sub> – 1418 metric tons p.a.**
  - **H<sub>2</sub>O – 4m gallons p.a.**
  - **Recycled content – 133 ac\*ft**
  - **Steel – 442 metric tons**
  - **Concrete – 438 metric tons**

# Engineering Deliverables

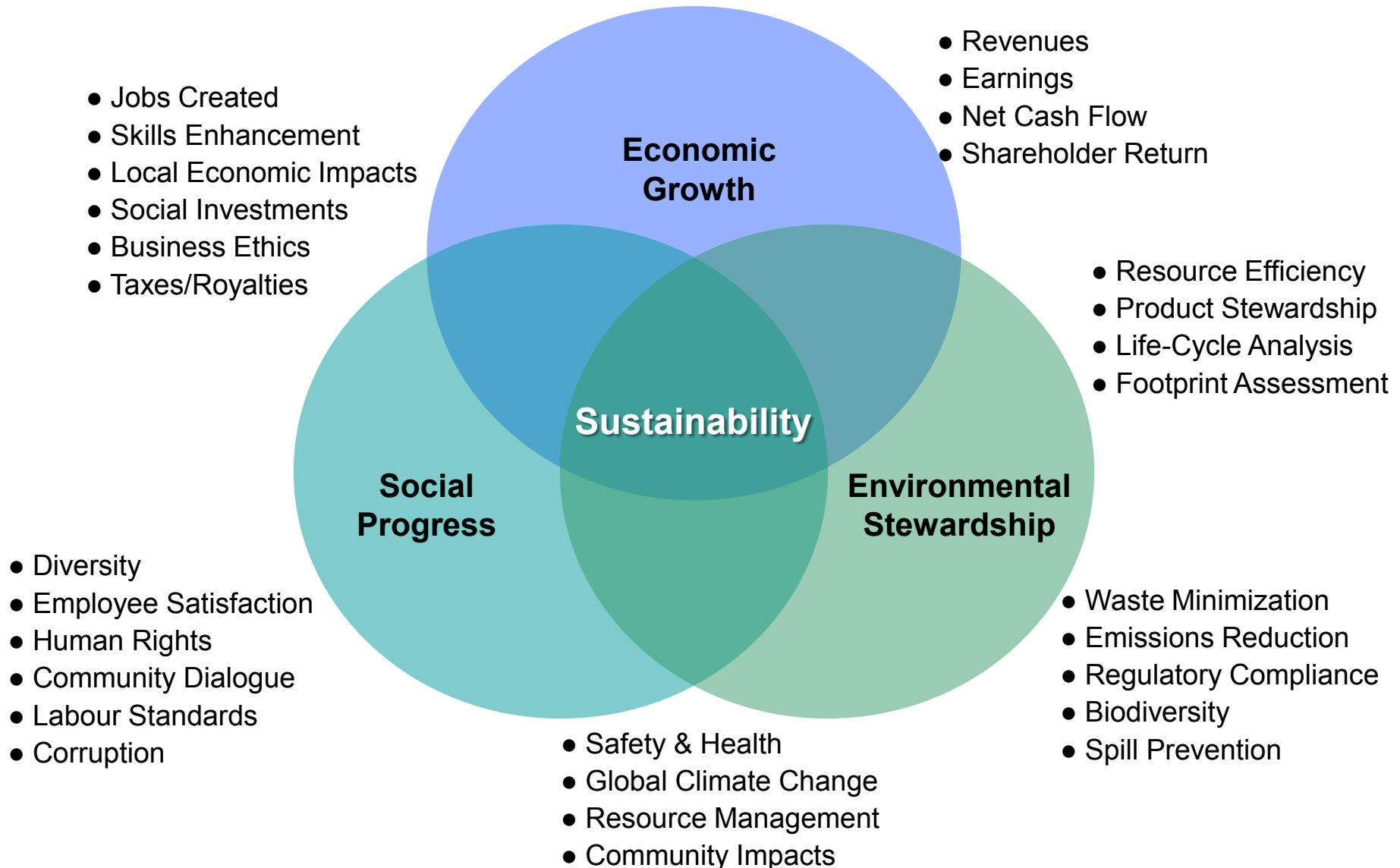
Discipline	Deliverable	Discipline	Deliverable
<b>PROCESS</b>	Air Emissions Summary	<b>CIVIL / STRUCTURAL</b>	Facility Drainage and Containment Plan
	Carbon Intensity Study	<b>PIPELINES</b>	Constraints Analysis
	Water Balance Report		Rehabilitation of Watercourse Crossings
<b>ENVIRONMENT</b>	Waste Management Plan	<b>ELECTRICAL</b>	Energy Study
	Environmental Protection Plan		Light Pollution Study
	Conservation and Reclamation Plan	<b>MECHANICAL</b>	Noise Abatement and Reduction Specification
<b>PIPING / LAYOUT</b>	Footprint Studies / Layout Optimization	<b>SUSTAINABILITY</b>	Sustainability Assessment
	Pipeline Optimization (Sizing)		Sustainable Procurement Program
<b>SAFETY</b>	HAZID	<b>PROCUREMENT</b>	Materials Reduction Study
	Chemical Storage Locations (HAZOP)	<b>ESTIMATION</b>	Financial Analysis
	MSDS of Hazardous Products		Economic Benefits Analysis



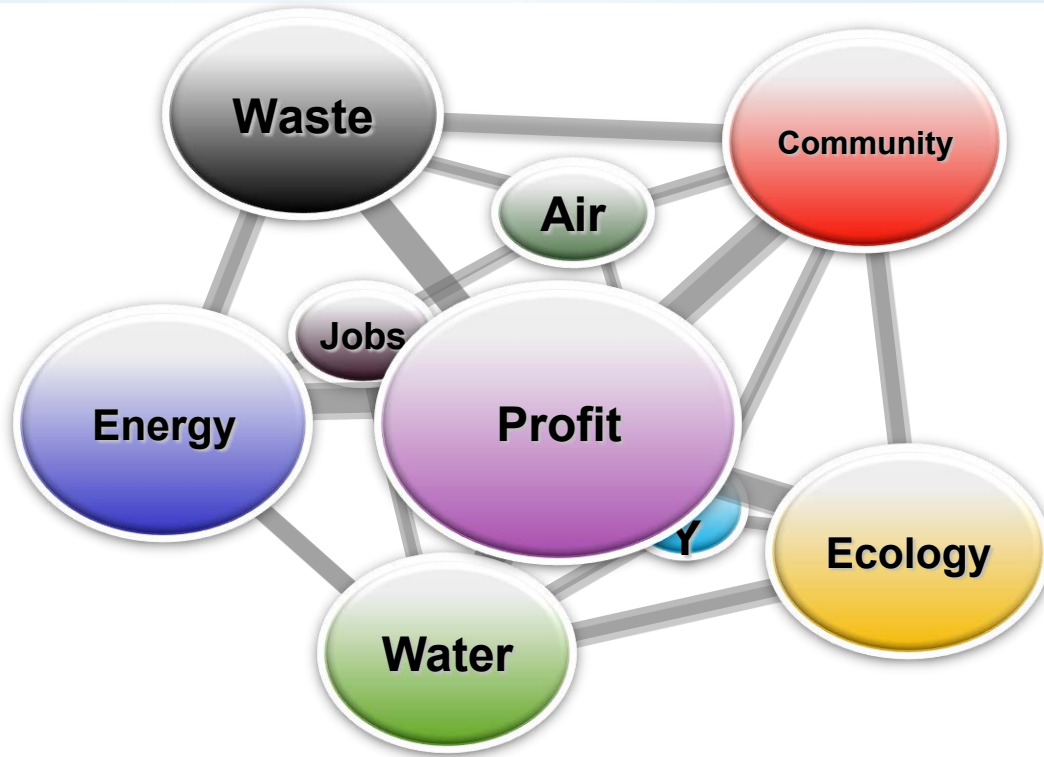


# **Sustainable Decisions**

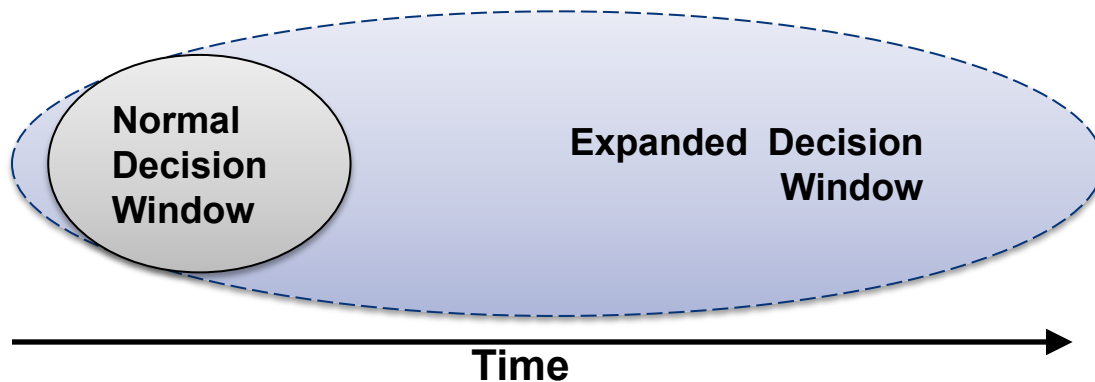
# Internal and External Drivers



# Business Trade-offs

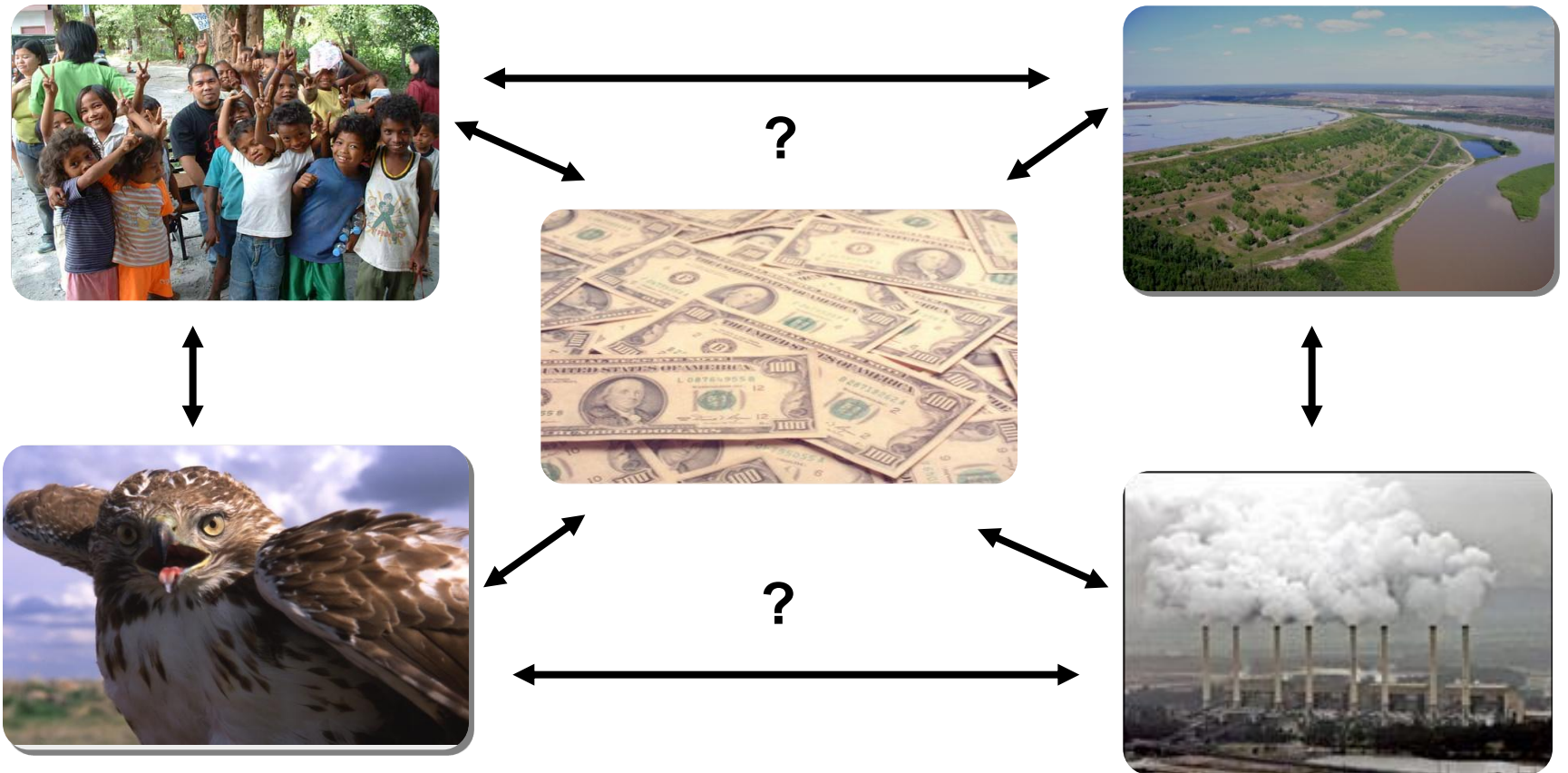


Sustainable decisions recognize and value the relationships that exist between multiple risks and opportunities ...



over the long term

# Challenge



# Sustainable Decisions

- ▶ **An EcoNomics™ options assessment enhances decision quality by quantifying financial and non-financial benefits, costs and risks to inform decision making**
- ▶ Key features:
  - Identify and analyze relevant **financial** and **non-financial costs, benefits** and **risks** through monetization (NPV)
  - Adopt a **long term** perspective, to help **future-proof** projects against potential future risks (costs)
  - Utilize **dynamic sensitivity analysis** to evaluate and overcome uncertainties
  - Produces **defensible results** based on reliable, objective methodologies and data
  - Improved ability to **communicate value of action** to stakeholders, incl. regulators

# Enhanced consideration of risk in decision making

## NON-TECHNICAL RISKS



↓  
\$

↓  
\$

↓  
\$

↓  
\$

↓  
\$

$$NPV = \sum_0^t \left[ \frac{(\textcolor{green}{B}_{financial} + \textcolor{green}{B}_{external}) - (\textcolor{red}{C}_{financial} + \textcolor{red}{C}_{external})}{(1+i)^t} \right]$$



# Monetization sources

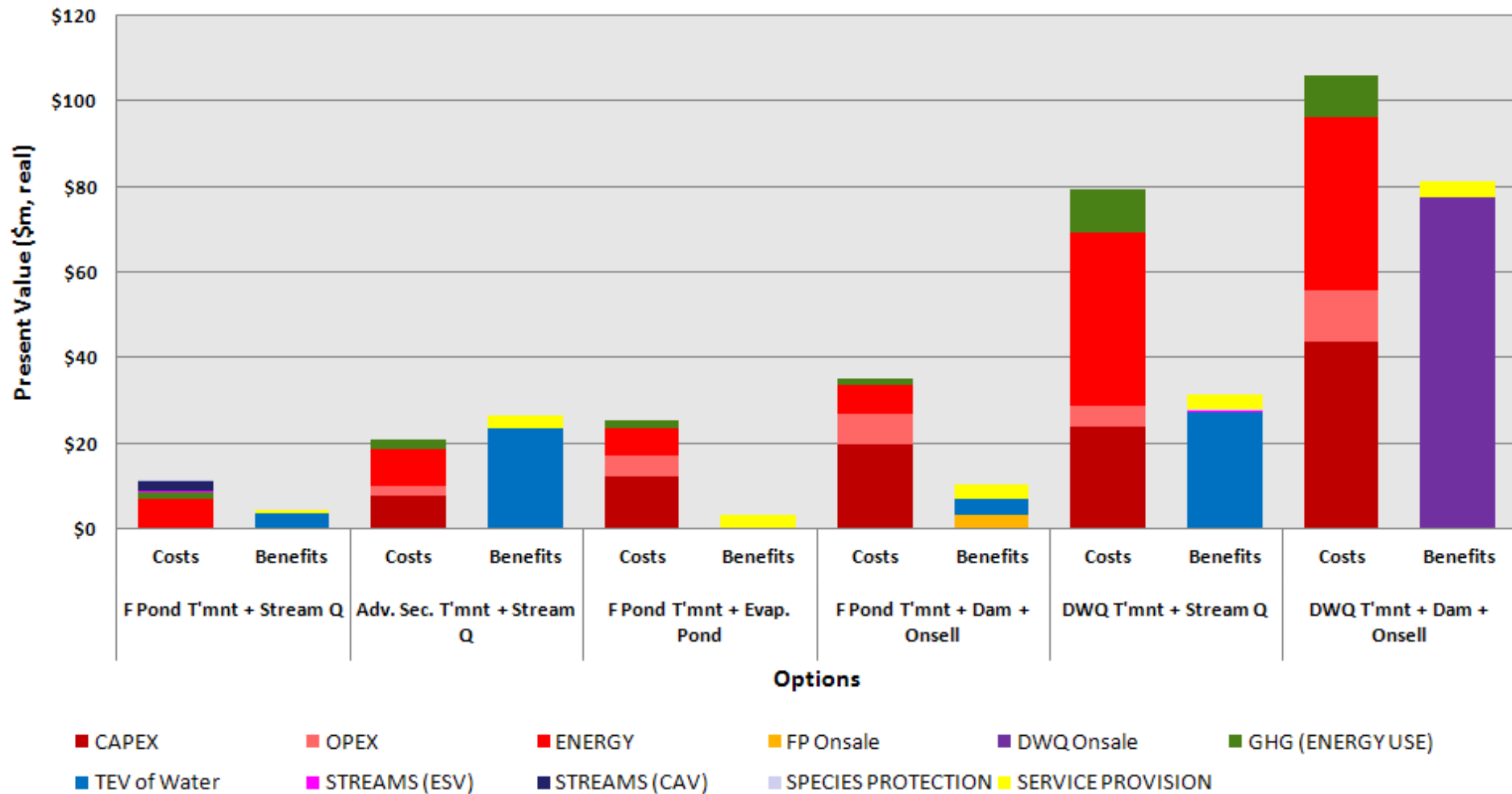
## ► Potential business risks

- Energy prices
- Water prices
- Greenhouse gases
- Air emissions
- Noise
- Dust
- Biodiversity
- Ecological impacts
- Social issues

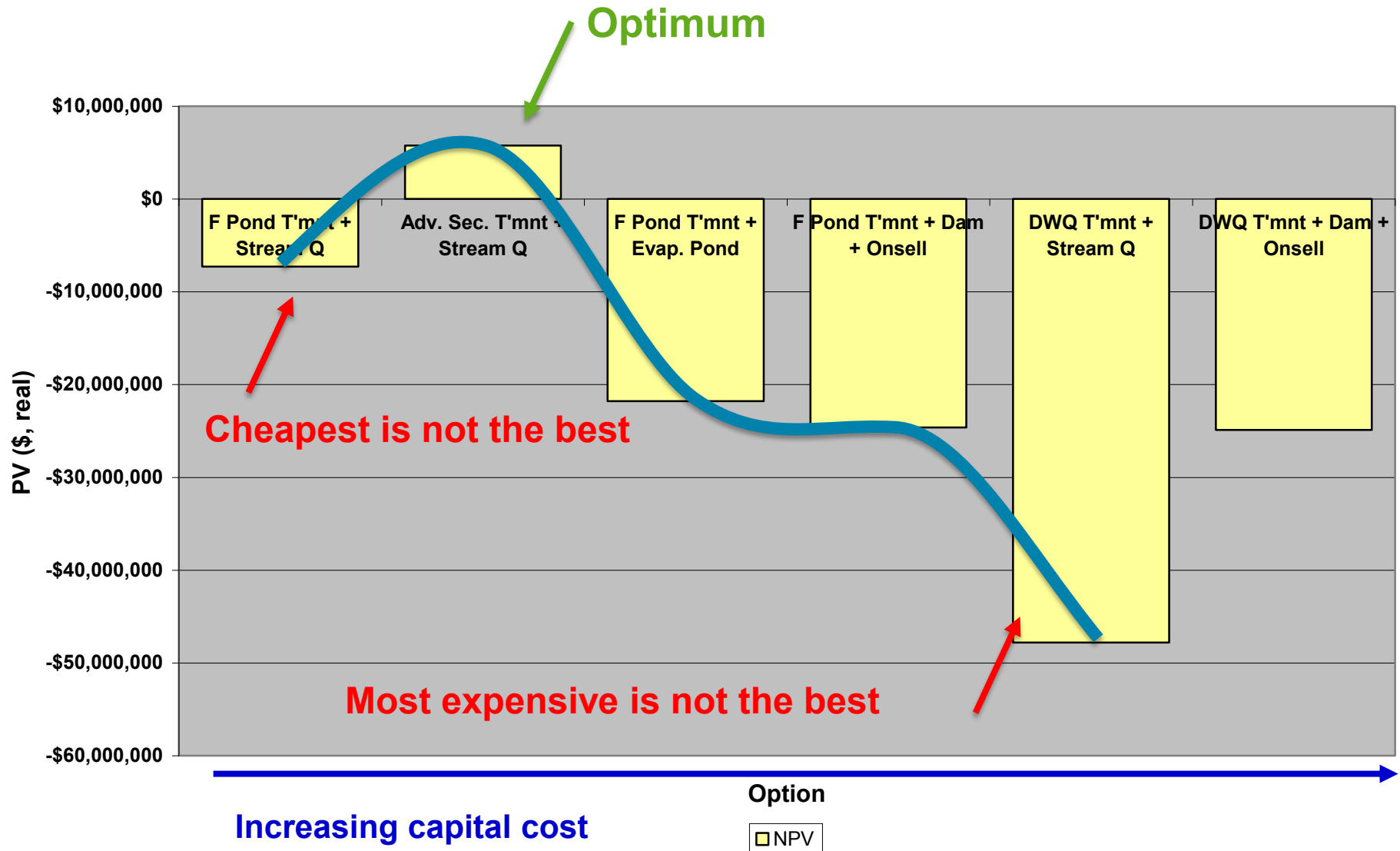
## ► Information sources

- National and international market prices
- Market proxies
- Published guidance from
  - UN
  - World Bank
  - US EPA
  - UK HM Treasury
  - EU ExternE-Pol
- Published peer reviewed studies and economic literature
- Bespoke socio-economic studies

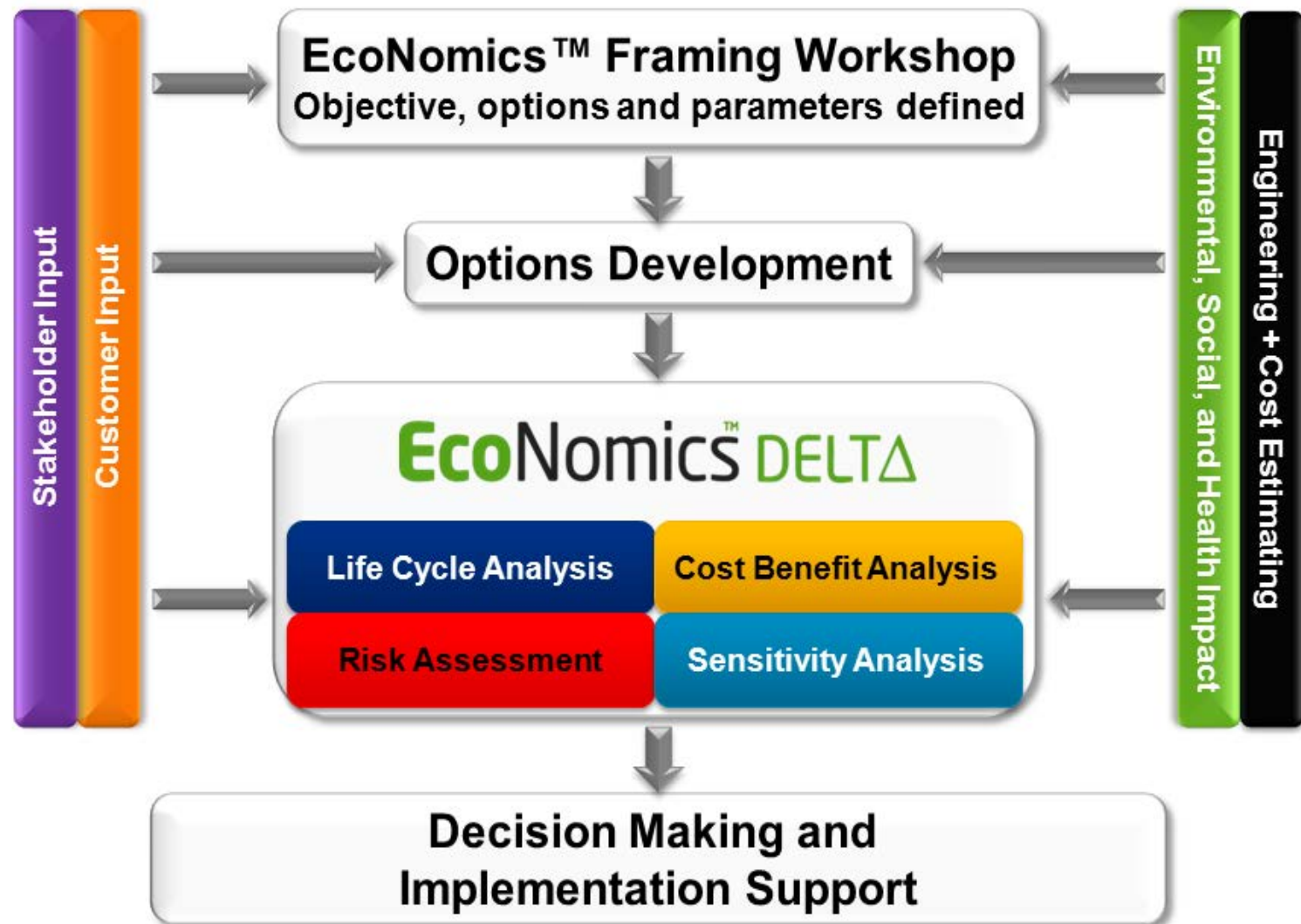
# Example Outputs



# Example Outcomes



# Refined Process



# LRQA Approved



- ▶ **EcoNomics™ Assessment is a rigorous, gated process**
  - Externally audited by Lloyd's Register Quality Assurance
  - Approved as a process under our ISO 9001 qualification
  - Guided by WorleyParsons' own rigorous internal quality assurance and review protocol
- ▶ **EcoNomics™ DELTA software has been independently validated by IV&V**

# Case Study

**Project:** Treated Water Disposal (2009)

**Customer:** Water Corporation

IDENTIFY

EVALUATE

DEFINE

EXECUTE

OPERATE

## Context

- ▶ Community and regulator pressure to upgrade to higher cost treatment and disposal methods due to real and perceived impacts of discharges

## Approach

- ▶ Facilitated framing workshop with multidisciplinary customer input
- ▶ Identified 6 potential solutions, from do nothing (cheapest) to zero impact (most expensive)
- ▶ Determined financial and non-financial costs, benefits and risks of each option
- ▶ Performed 30-year analysis using DELTA to identify and recommend optimum solution

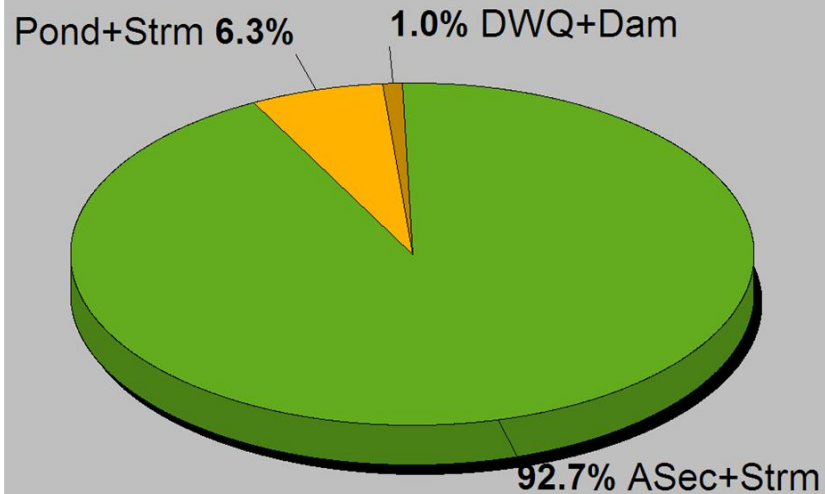


## Issues Considered

- ▶ CAPEX and OPEX
- ▶ Energy usage and costs
- ▶ GHG and air emissions ( $\text{NO}_x$  &  $\text{SO}_x$ )
- ▶ Regional value of water
- ▶ Social perception of discharge impacts
- ▶ Environmental impacts to waterways
- ▶ Likely change in regulation



## Best Outcome Makeup

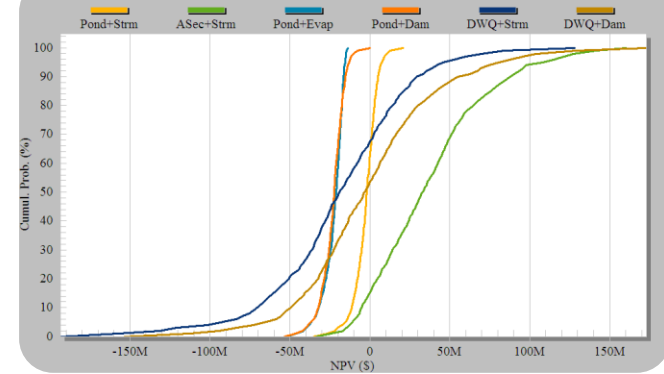


\* Zero Data, Pond+Evap, Pond+Dam, DWQ+Strm

## NPV (\$) for 2039



## NPV Cumulative Distribution for 2039



# Case Study

**Project:** Treated Water Disposal (2009)

**Customer:** Water Corporation



## Summary

- ▶ Expanded analysis, explicitly considering commercial, regulatory and community concerns (non-technical risks), over a long-term horizon.

## Results

- ▶ Identified the most economic and sustainable option under the majority of possible future conditions.
- ▶ Results in NPV improvement of USD \$10M (financial and non-financial) when compared to current approach.

**USD \$10 M in NPV benefits identified**

*\*Optimum option vs. BAU (3.5% discount rate, base case conditions)*

**USD \$14 M in saved CapEx**

*\*Optimum option vs. Regulator Preferred*

## Implications

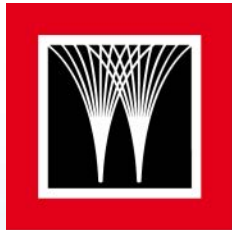
- ▶ Agreement between customer and regulator (resolved 2-year deadlock)
- ▶ Identified solution saves **USD \$14M in CapEx** when compared to regulator preferred option, with less external impacts than current practice.
- ▶ When applied across all sites, potential CapEx reduction benefit **>USD \$200M**.

# Summary

## ► We collaborate with our customers to **systematically**:

- Identify and manage the full suite of **business risks** that may impact their projects and operations
- Bridge the gap between their **commitments to stakeholders** and project delivery
- Ensure projects are aligned with their **corporate sustainability goals**
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