



Green Remediation and Risk Management: *Can We Optimize Site Remediation and Be Sustainable?*

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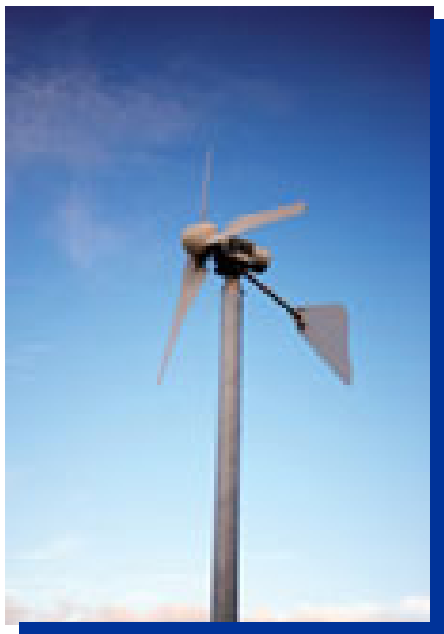
- + Introducing LVM
- + What is Sustainable Remediation ?
- + PHC's Contamination of Sediment
- + Sustainable Remediation in Alberta
- + Conclusion

+ Geotechnical Engineering, Materials & Environment (GME)



+ WHAT IS SUSTAINABLE REMEDIATION?

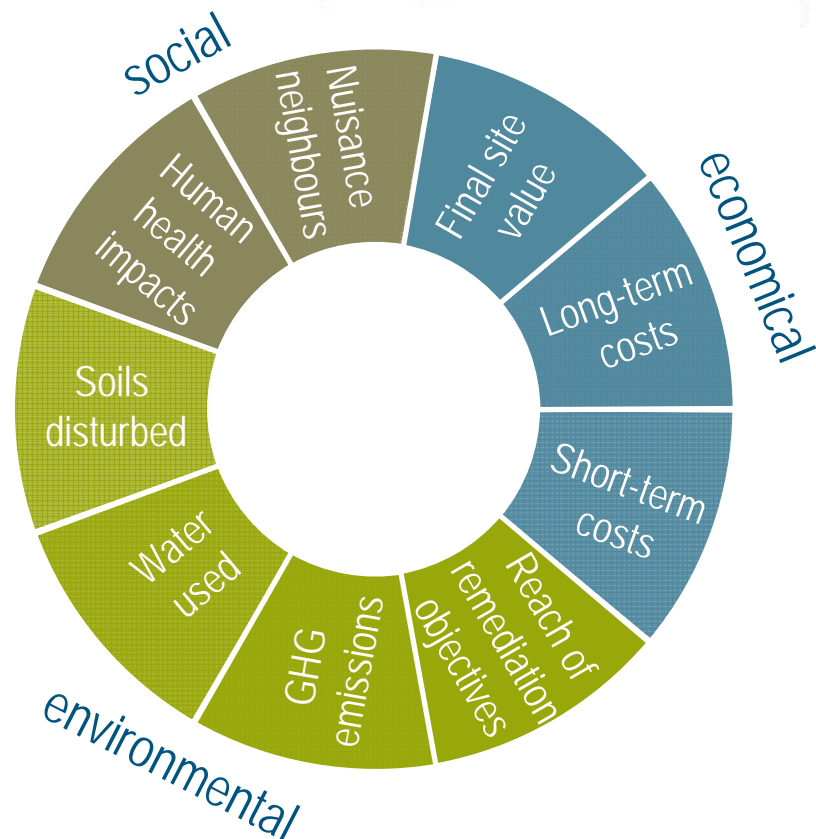
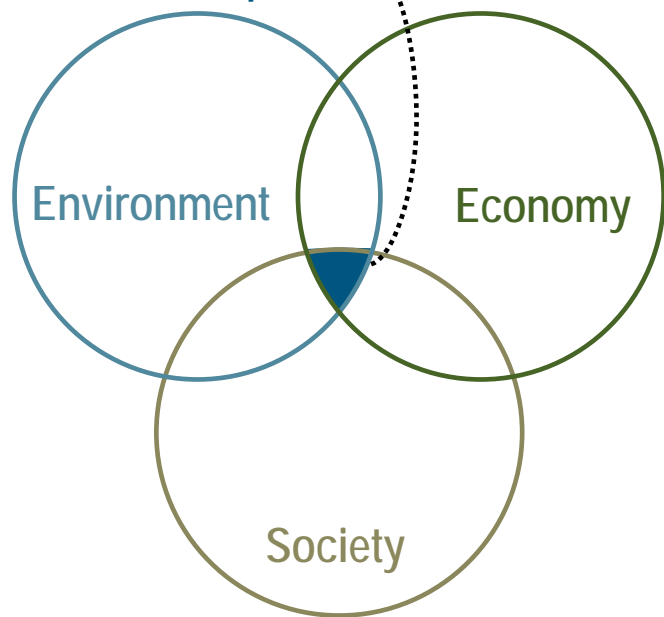
Does green mean sustainable?



+ WHAT IS SUSTAINABLE REMEDIATION?

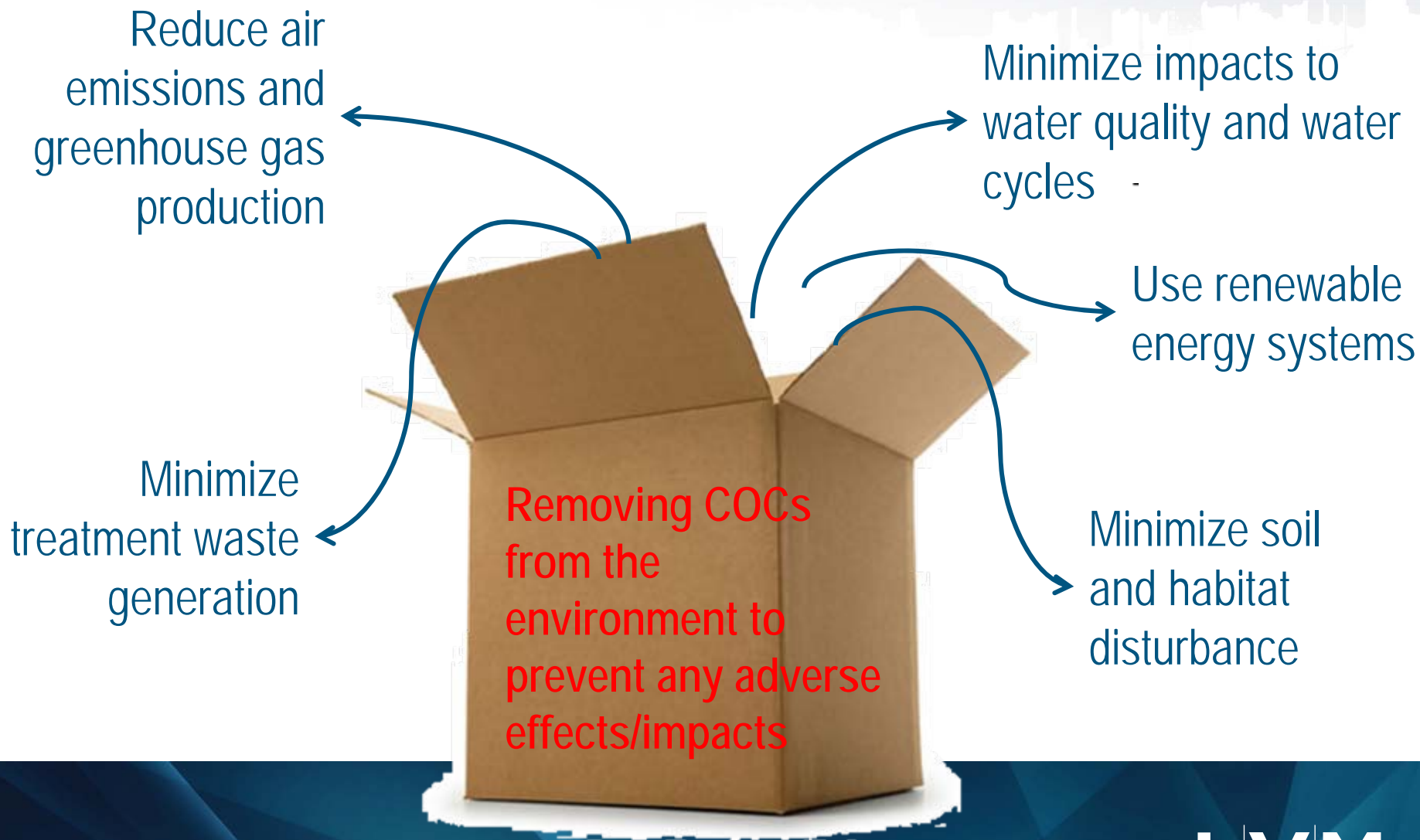
How could we apply this concept to site remediation?

Sustainable Development

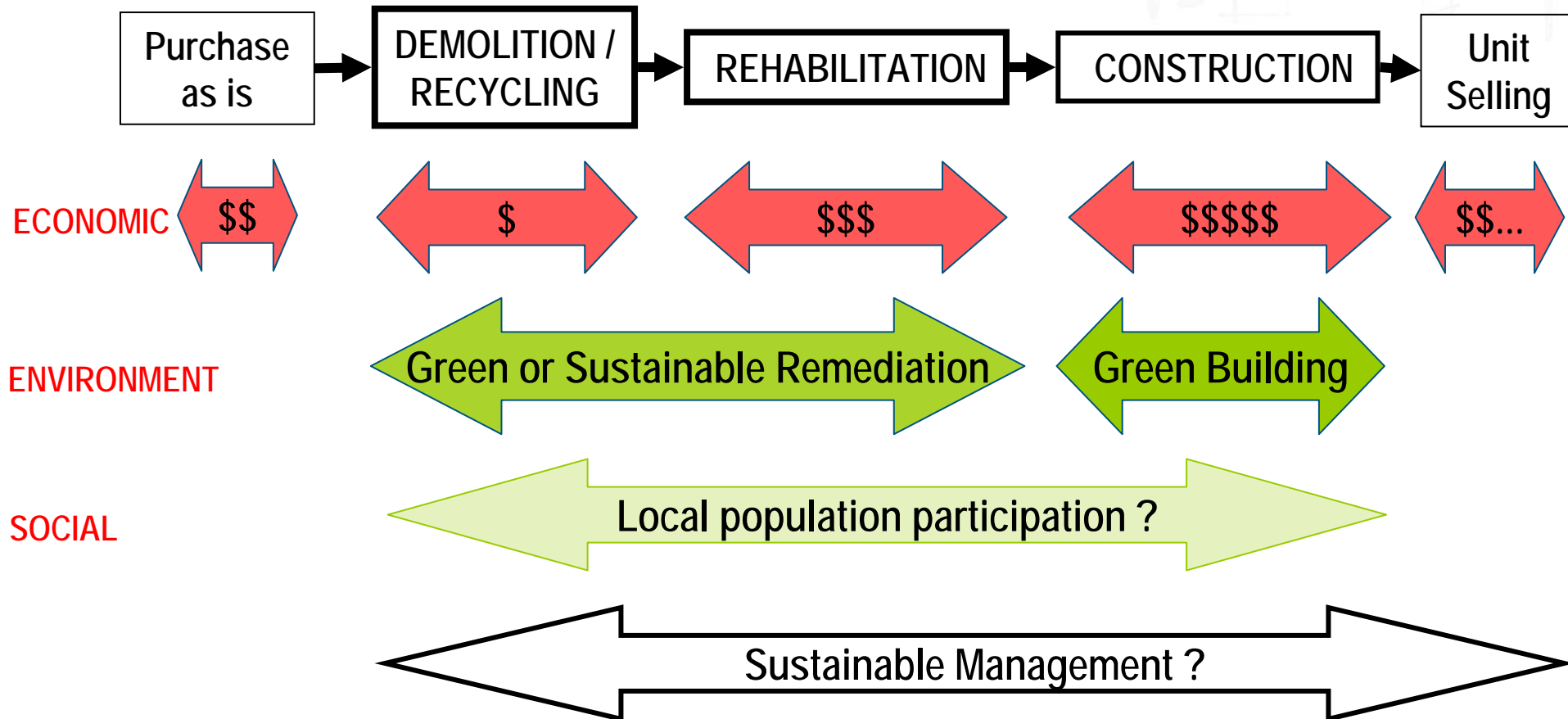




GREEN REMEDIATION- *Thinking outside the box*



+ Sustainable Site Rehabilitation and Redevelopment

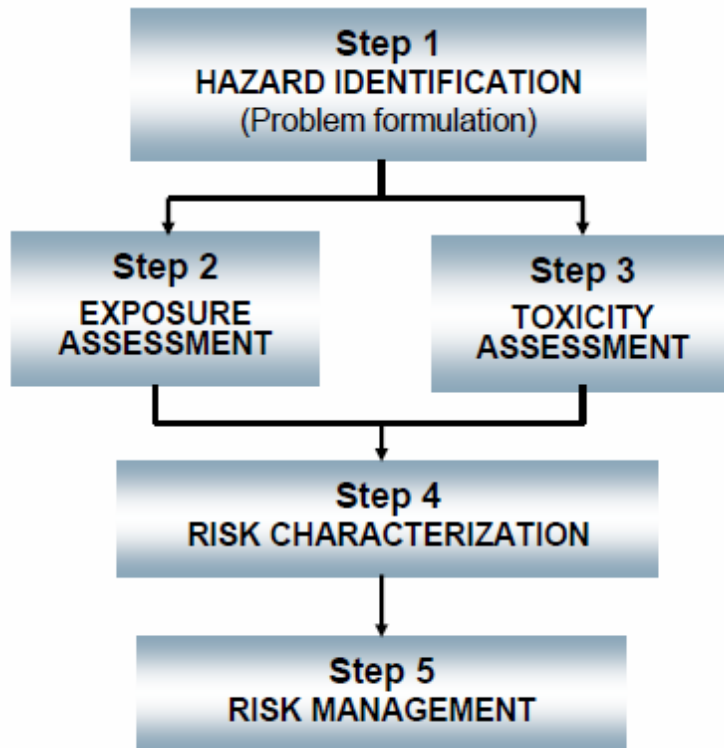


+ Sustainable Rehabilitation Tools

- + Life Cycle Analysis (local to global impacts)**
- + Software (indicators of sustainability)**
- + Multicriteria Decision Analysis (MCDA)**
- + Green Remediation (U.S.EPA)**

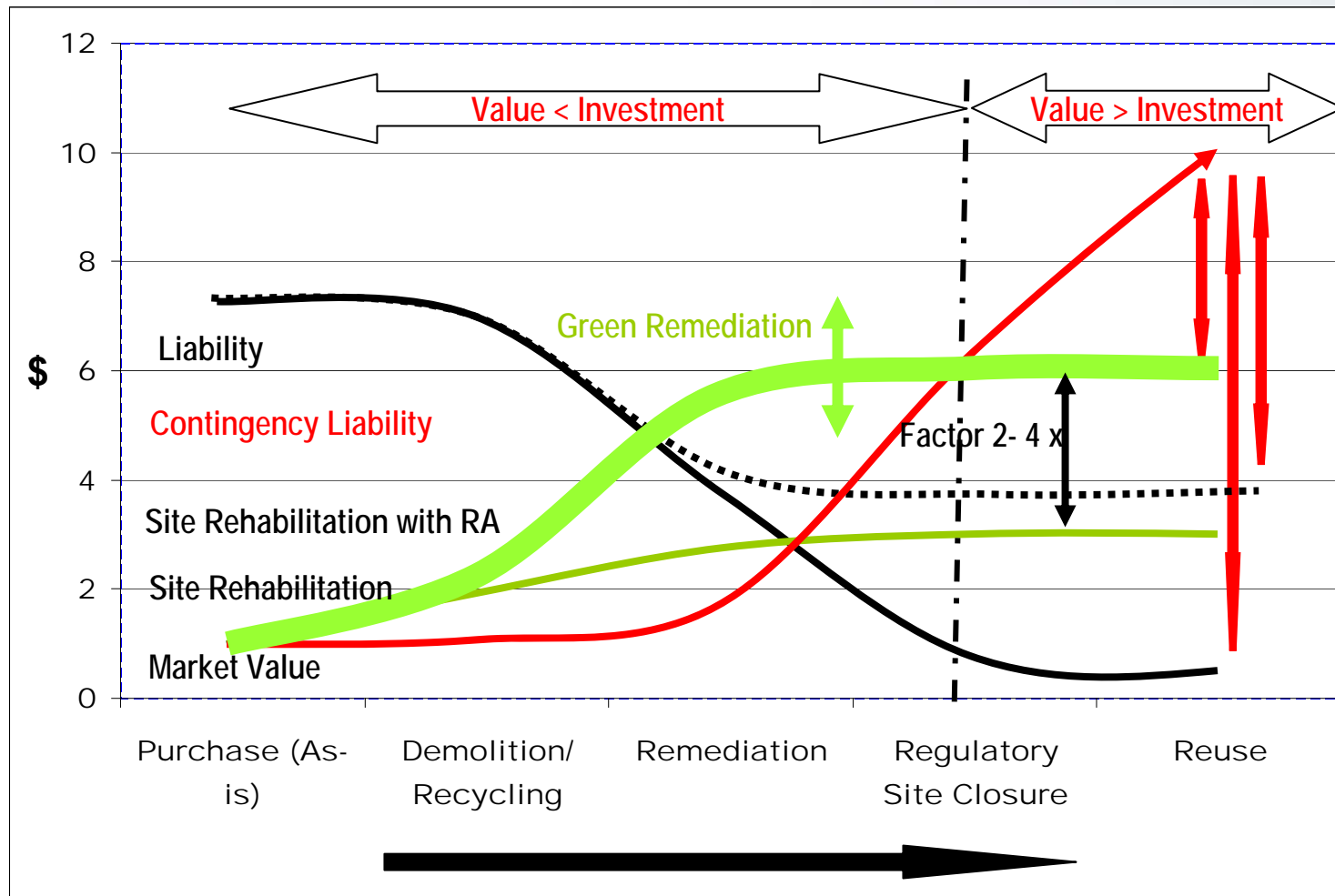
+ Sustainable Rehabilitation Tools

+ Risk Assessment



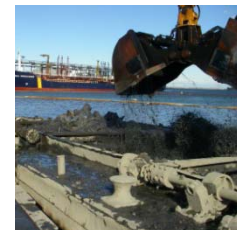
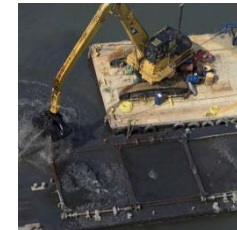
- + Reduce Rehabilitation Cost by a factor up to 4 times compared to soil excavation/disposal and soil treatment
- + Reduce GHG emissions
- + Create a safe and healthy environment

+ Redevelopment Life-cycle



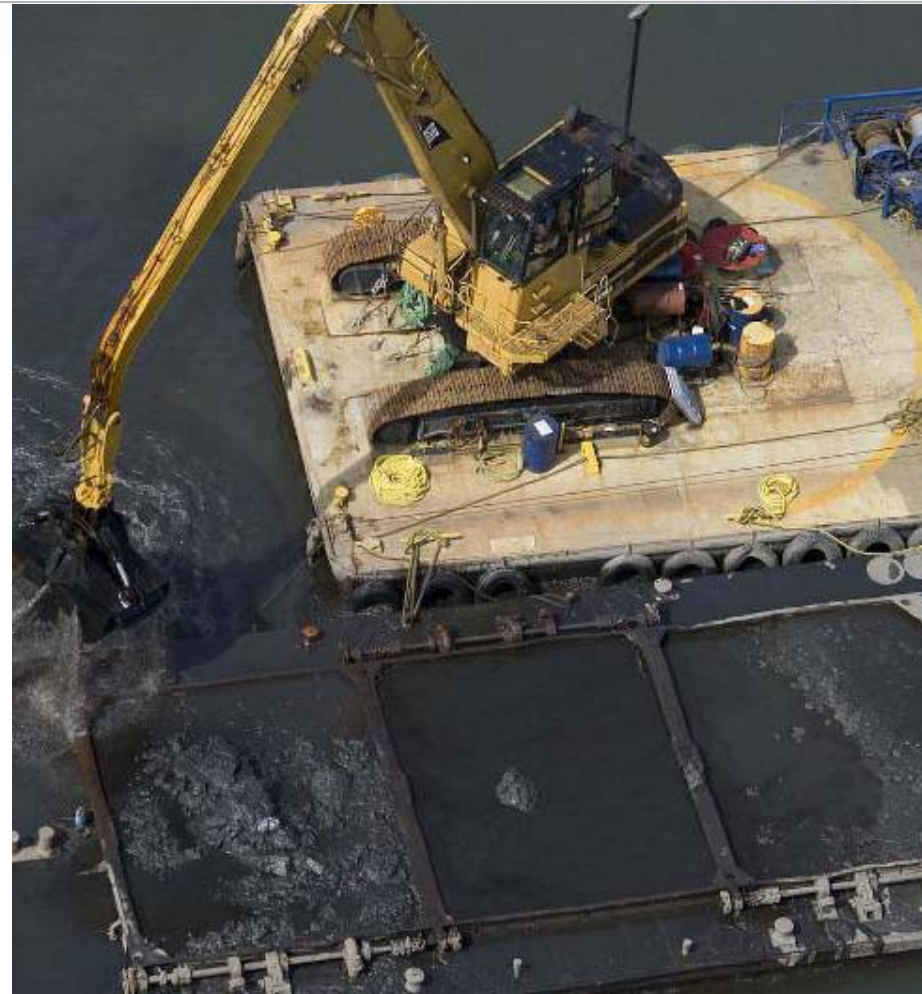
Sustainability Project:

Petroleum Hydrocarbons
Decontamination at the Port
of Montreal



Sustainability challenges

- + Dredge more than 1.8 million cubic feet of contaminated sediment
- + Minimize impact on neighbour properties by controlling noise, dust and smells
- + Prevent hydrocarbon emissions from entering the river during dredging works
- + Create a healthy environment for aquatic life
- + Respond to the specific needs of all parties involved



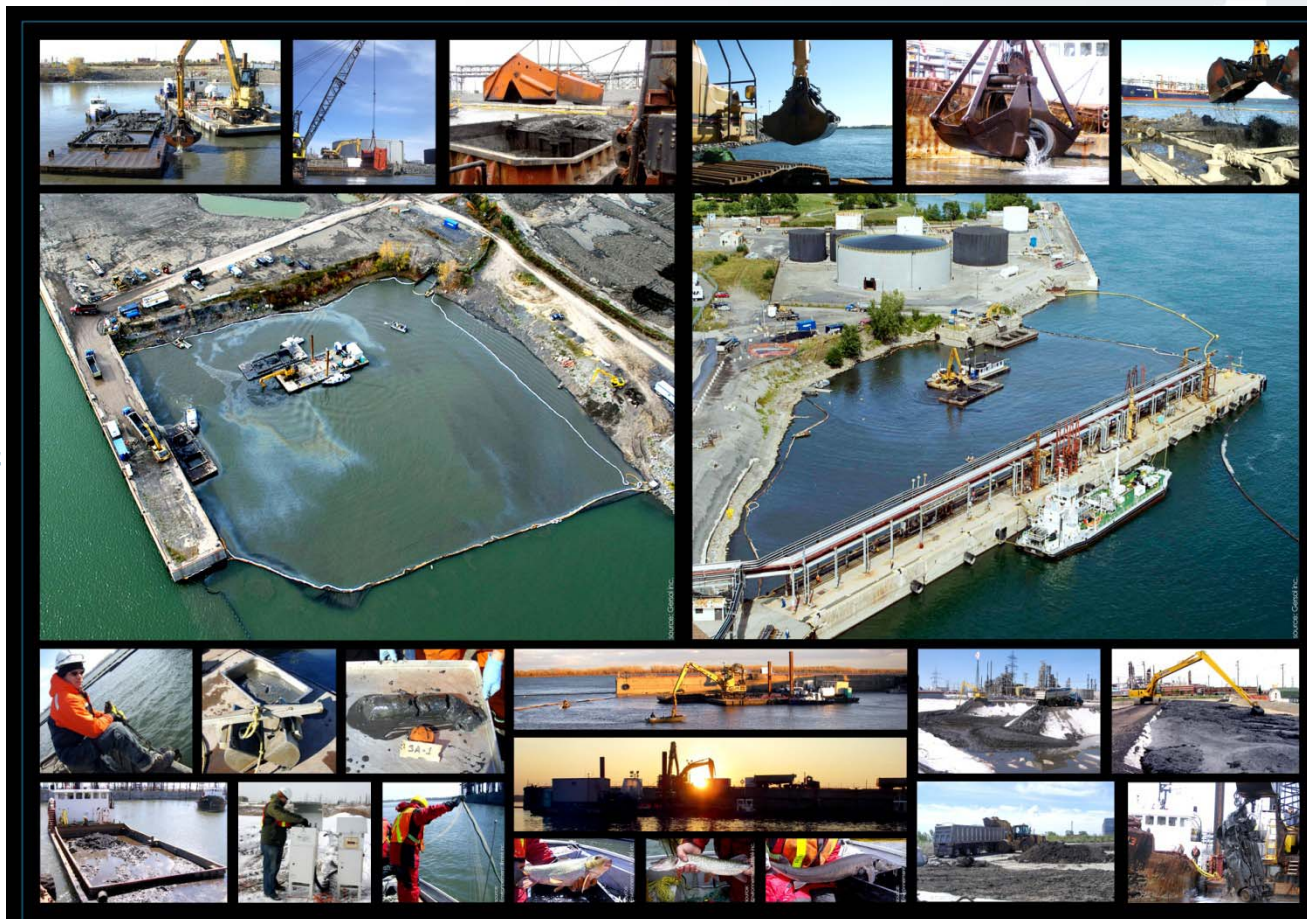
Keys of Success

- + IOL, Shell, Xstrata and the Montreal Port Authority joined forces to **voluntarily** rehabilitate the bays
- + A Consultation Group was set up including the industry, the local community, government representatives, environmental groups and LVM experts
- + A Work Supervision Committee was also formed



Outcome

- + Thanks to efficient communication between stakeholders, the project was accepted by the MDDEP
- + 99% decontamination of the riverbeds
- + A successful sustainable development project



+Alberta's Framework for the Management of Contaminated Sites

[illegible]

+ Sustainable Remediation in Alberta

+ Better integration of this approach at early stage and all phases of the process according to the specificity of the site:

- Brownfields (urban environment, local population)
- Oil Sands (site remoteness, native population)
- Etc.

+ Implementation of Directives or Incentives to achieve Sustainable Remediation?



SUSTAINABLE REMEDIATION 2011

STATE OF THE PRACTICE



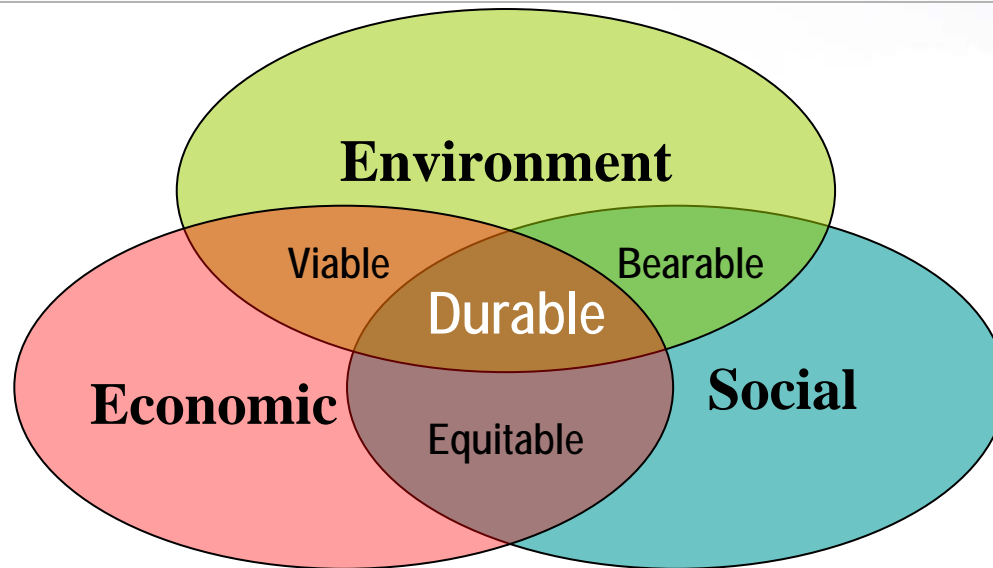
INTERNATIONAL CONFERENCE
JUNE 1-3, 2011
UNIVERSITY OF MASSACHUSETTS
AMHERST



GREEN CHEMISTRY • HUMAN HEALTH • ENVIRONMENTAL RESPONSE



CONCLUSION



ECONOMY REMAINS THE DRIVER OF THE PROCESS FOR CONTAMINATED SITE REDEVELOPMENT EVEN **SUSTAINABLE**

+ENVIRONMENT: IS ORIENTED TOWARD **GREENER TECHNOLOGIES** AND **SUSTAINABLE MANAGEMENT** OF MATTER (WATER, SOIL, AIR AND WASTE) AND ENERGY (OIL & GAS, WIND, SUN)

SOCIAL ASPECTS REMAIN THE POOR PARENT OF **SD** BECAUSE OF LIMITED INVOLVEMENT OF THE POPULATION IN THE PROCESS OF SITE REDEVELOPMENT

Thank you!

LVM.CA