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Sustainable Approach in Contaminated Soil Management: Lessons Learned From 20 Years of Practice

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Agenda

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2. Trends in Site Remediation
   a) General
   b) Québec
   c) Alberta
3. Sustainable Development (SD)
4. Remediation Approaches vs. SD
5. SD at Work
6. Summary

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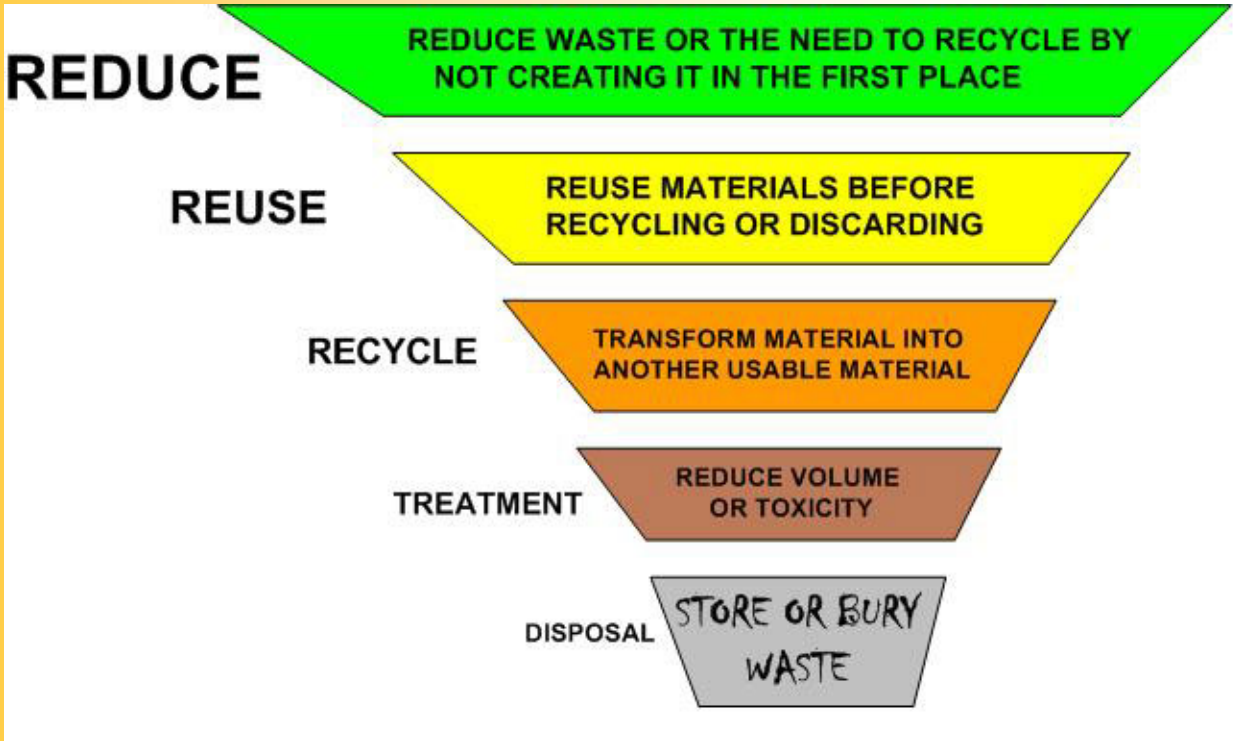
Introduction



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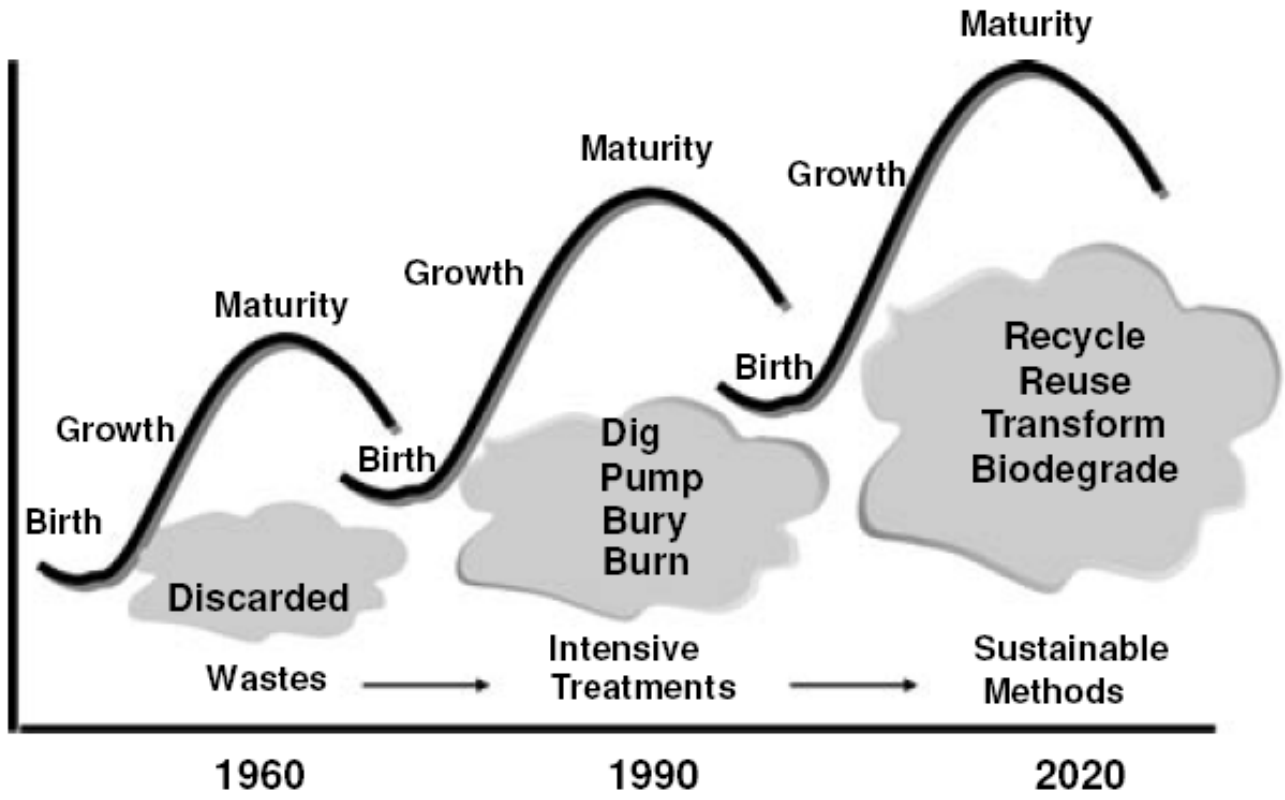
Introduction

Evolution of the Thinking About Waste and Cleanup



Trends in Site Remediation – General

1. Regulations and incentives are put in place to promote treatment and beneficial reuse
2. Direct landfill of contaminated soil is more and more restricted
3. More and more options are available to manage contaminated sites

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Trends in Site Remediation – Québec

1985: Hazardous Waste Regulation is adopted

1988: The Contaminated Land Rehabilitation Policy

Dutch derived generic criteria (A, B, C)

First "contaminated soils only" landfill sites

1991: Petroleum Products Law and Regulation

UST replacement 10 year plan: led to first soil treatment facilities

1998: Soil Protection and Contaminated Sites Rehabilitation Policy

Favor soil decontamination vs. landfill disposal

Dictate beneficial reuse of decontaminated soil

2005: Quebec Regulation with Respect to Landfilling and Incineration of Residual Materials

Contaminated soil must be treated before being landfilled

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Trends in Site Remediation – Québec

Incentives:

1998-2005: Revi-Sols Government Program

$113 million to favour rehabilitation/reutilization of urban contaminated sites

2007-2010: Climat-Sol Government Program

$50 million to favour decontamination and implementing green buildings (GHG reduction)

Landfill taxes reinvested in recycling/treatment

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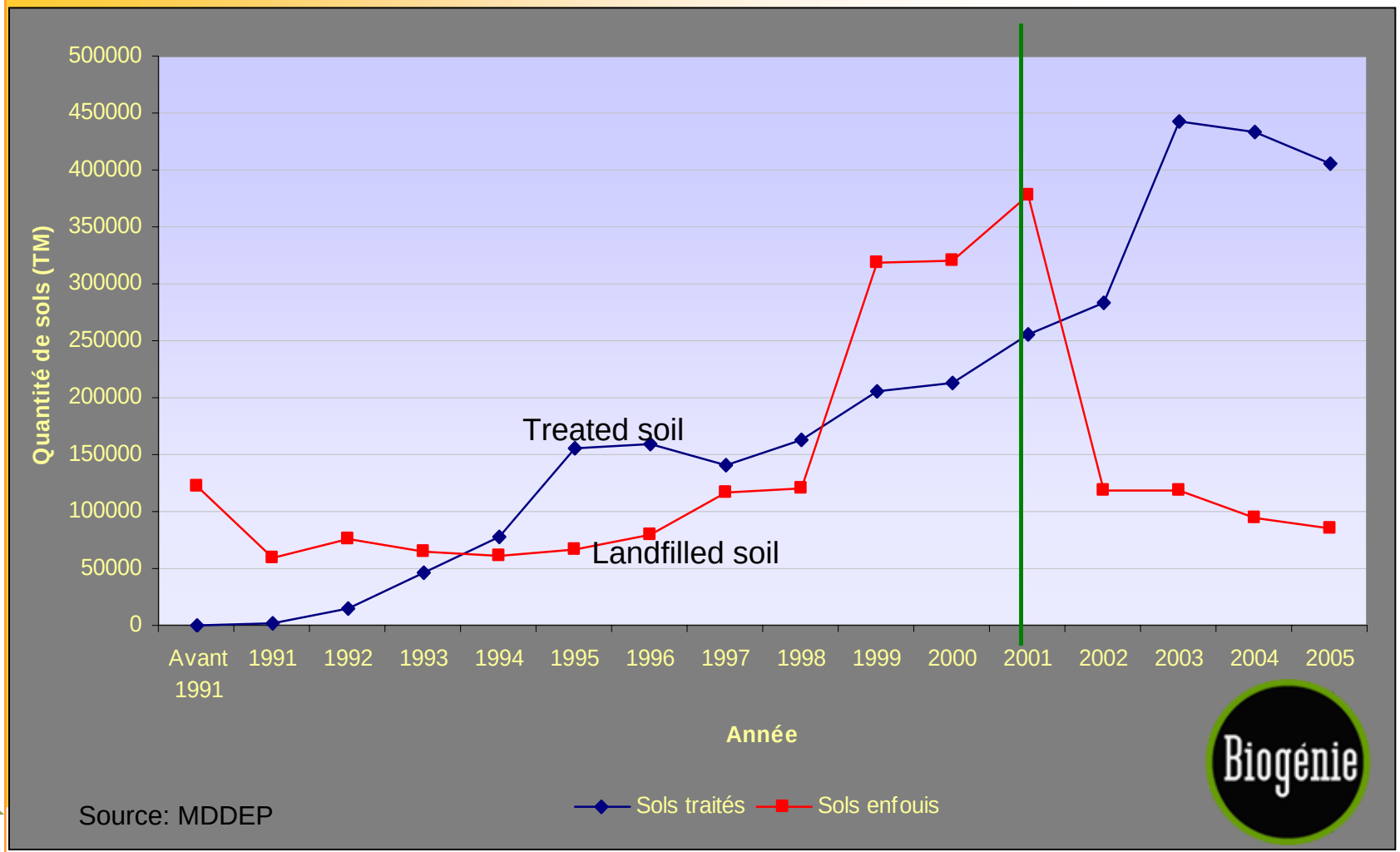
Trends in Site Remediation – Québec



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Trends in Site Remediation – Québec

The ministry of environment (MDDEP) has clearly manifested its preference for treatment over landfill disposal or containment and its willingness to act to foster it:

a) Soil is a resource and not a waste

b) If a technology exists, treatment should be favoured
   An extensive soil treatment facility network is there to support

c) Petroleum product must be treated (vs. risk analysis)

d) Treated soil may be reused as daily cover/final capping in a municipal landfill

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Trends in Site Remediation – Québec

Future

a) Diversify reuse of decontaminated soil (revegetation of degraded sites, sound/visual barrier, etc.)

b) Implementation of a sustainable approach in site remediation (on-site, *in situ*, etc.)

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Trends in Site Remediation – Alberta

1. ERCB regulates upstream Oil &Gas waste management
2. AENV regulates downstream Oil &Gas and other waste (municipal, industrial, etc.) management
3. Oct 2007: AENV launched its long-term waste strategy:

   "Too Good Too Waste"

   Primary goal: reduce waste disposal at landfills

   Outcomes seen:

   a) Improved resource conservation and waste minimization
   b) Integrated resource recovery and waste management systems
   c) Protection of air, land, water, and human health

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Trends in Site Remediation – Alberta

1. Contaminated soil is, by weight, Alberta's single largest waste stream
2. Landfill disposal remains the main solution for soil remediation

   More than 3M tons of contaminated soil per year

3. On site soil treatment is in its growing phase
   a) Cost
   b) Sustainability

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Trends in Site Remediation – Alberta

Incentives:

1. The Alberta Petroleum Tank Site Remediation Program

2. Additional funds available to decontaminate orphan upstream Oil & Gas sites

Trends in Site Remediation

Lessons learned from trend in site remediation:

1. Ca$h i$ King/Queen!
2. Time is the essence of business
3. Appropriate incentives and regulation are the main drivers for site remediation and promoting treatment
4. Environmental business is selling environmental compliance not decontamination

    Regulation should integrate concept of sustainability

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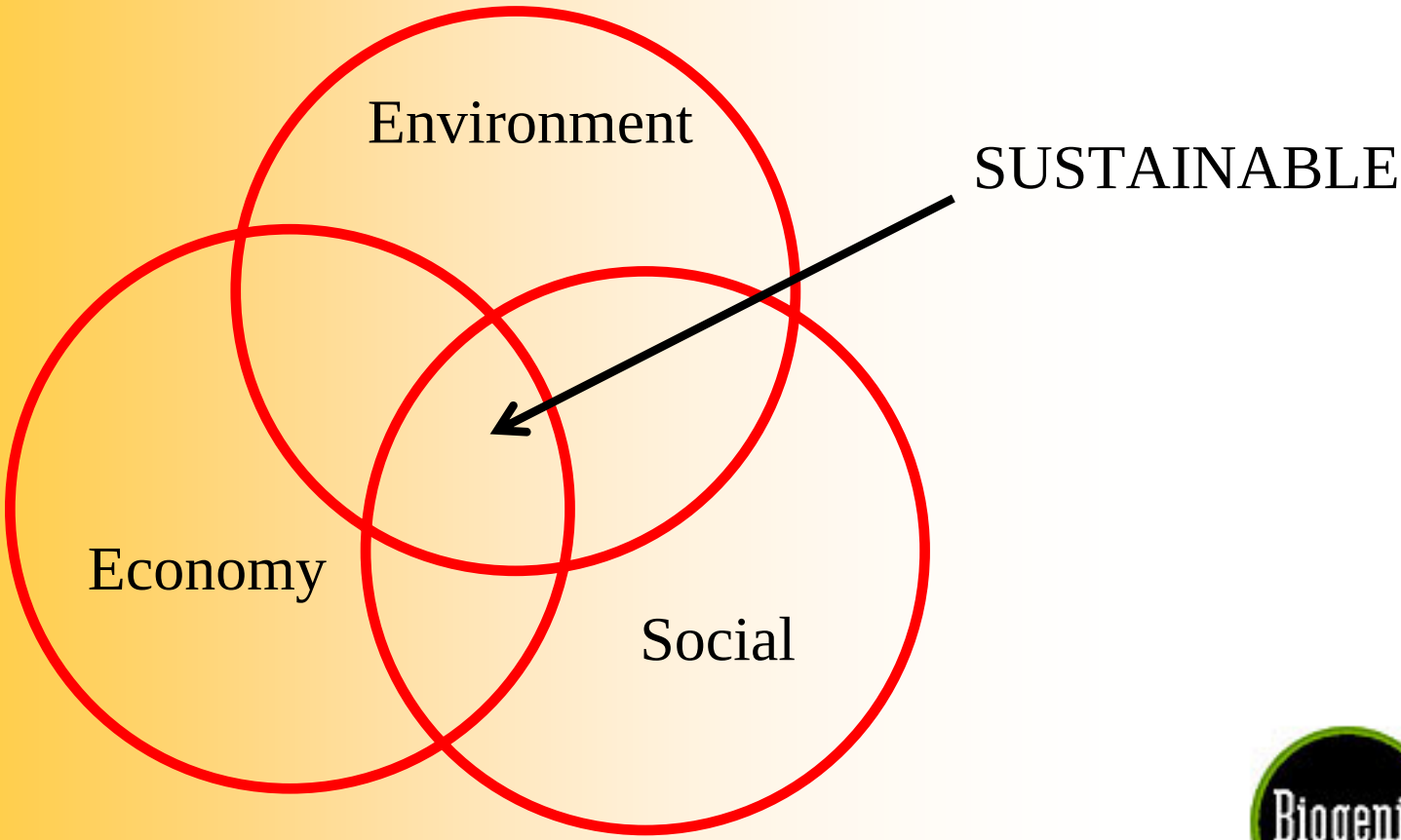
Sustainable Development (SD)

SD was defined in the 1987 “Brundtland Report” as:

“development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

World Commission on Environment and Development (WCED). “Our common future.”, 1987, p. 43.

Sustainable Development (SD)



Sustainable Development (SD)

Environment

- Impacts on air/water/soil/ecology
- Intrusiveness
- Resource use and waste

Economics

- Costs and economic benefits (direct and indirect)
- Liability
- Employment / human capital
- Life span and “project risks”
- Flexibility

Social

- Community involvement and community satisfaction
- Human Health
- Ethical and equity considerations
- Impacts on neighbourhoods or regions
- Fit with planning and policy strategies and initiatives
- Uncertainty and evidence

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SD in Site Remediation

1. There is no consensus on:
   a) How to best define a “unit of remediation”
   b) Parameters to use and the weight to give to each of them
2. SD studies in site remediation give variable results
3. Trend in integrating sustainability evaluation in remediation

White paper published (Summer 2009 *Remediation Journal*)

Sustainable Remediation Forum (SuRF)

(www.sustainableremediation.org)

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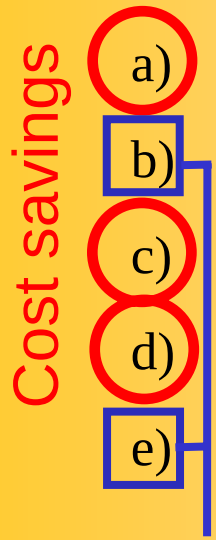
SD in Site Remediation

1. Consensus on “sustainable remediation”:

   “remedies whose ***net benefit on human health and the environment*** is maximized through the judicious use of ***limited resources***”

2. Sustainable remediation:



a) Minimize/eliminate energy or natural resources consumption

b) Reduce/eliminate releases to the environment: especially to the air

c) Harness or mimic a natural process

d) Promote reuse or recycling of land or undesirable materials

e) Permanently destroy contaminants

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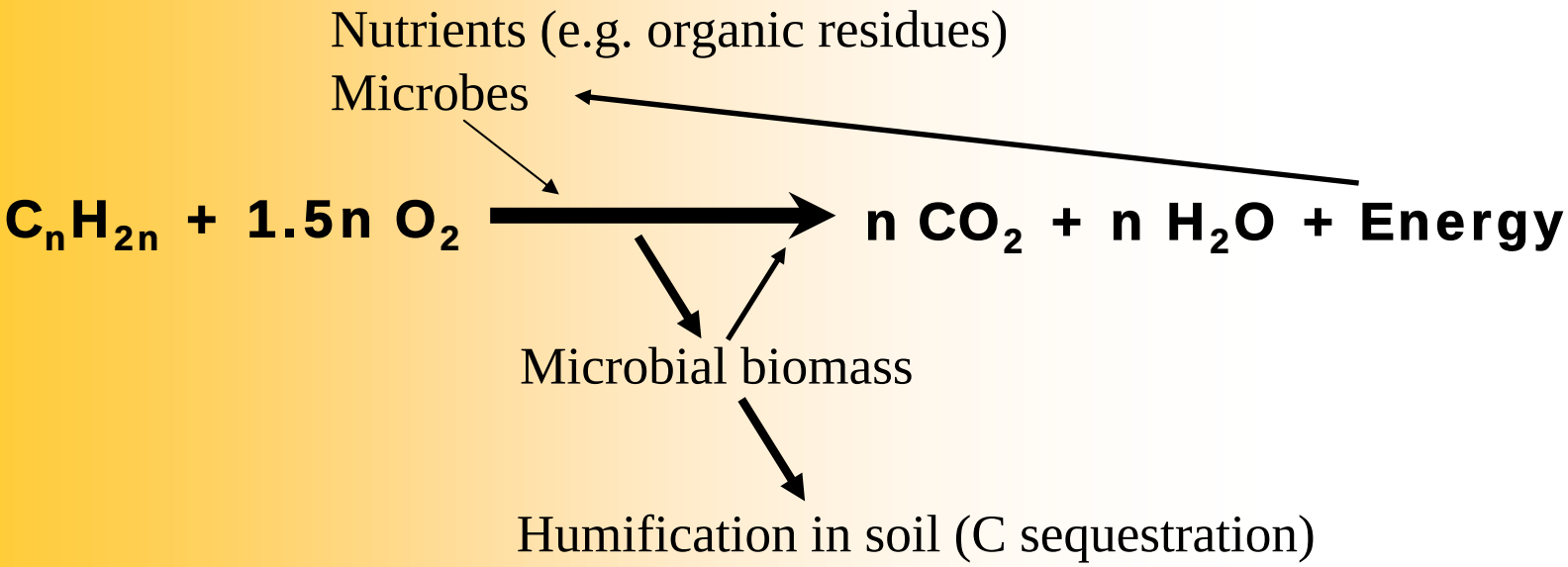
SD in Site Remediation - Bioremediation



Contaminant = carbon and energy sources

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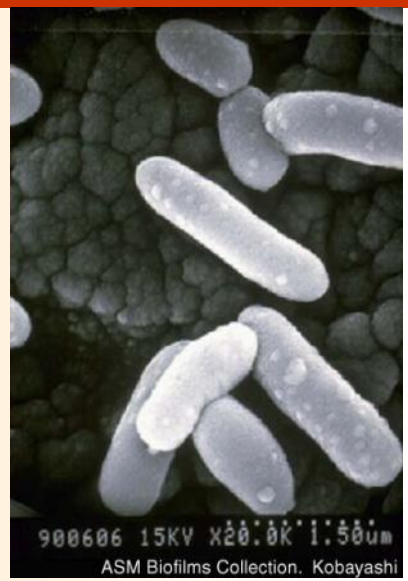
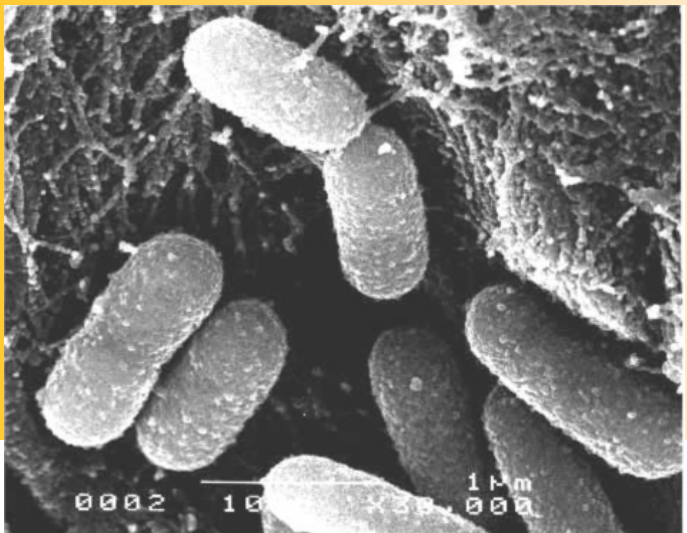
SD in Site Remediation - Bioremediation





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SD in Site Remediation

Landfill vs. On-site Bioremediation vs. MNA

	Landfill Disposal	On-site Bioremediation	Monitored Natural Attenuation
Minimize energy or natural resources	+	+++	++++
Minimize releases to the environment	short term: ++++ long term: ???	++++	-
Harness or mimic a natural process	-	++++	++++
Promote reuse or recycling of land/material	-	++++	-
Permanently destroy contaminants	-	++++	-

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SD in Site Remediation

Lessons learned from sustainable remediation

1. Sustainability is more than “carbon footprint” only
2. Sustainability may generate cost savings
3. Need more robust framework to efficiently implement sustainability concept as decision-making
4. On-site bio-destruction of the contaminant is in line with sustainability

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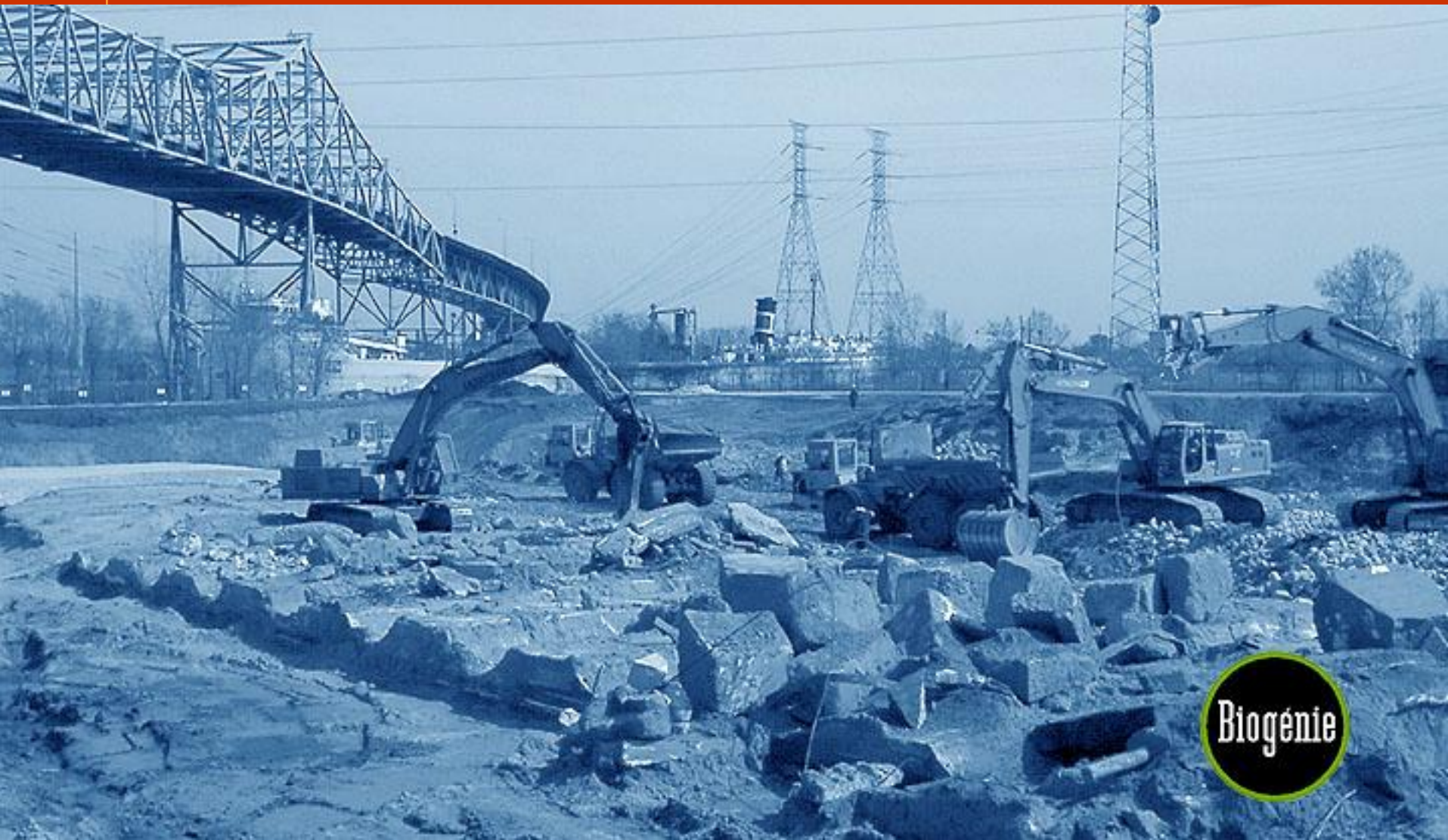
SD at Work

SD at Work

SD at Work



SD at Work

SD at Work

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SD at Work

Conclusions

1. Appropriate regulatory frameworks and incentives are necessary to promote sustainable remediation
   - Cost and time frame are not the only bottom lines
2. Technological solutions/innovations are there to implement and support sustainable approach in site remediation
3. Sustainable site remediation is trending upward but requires increased promotion and support from stakeholders

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Bauer Vapor XX
VAPOR XX
Easton Synergy Si-Core
EASTON
Easton Synergy
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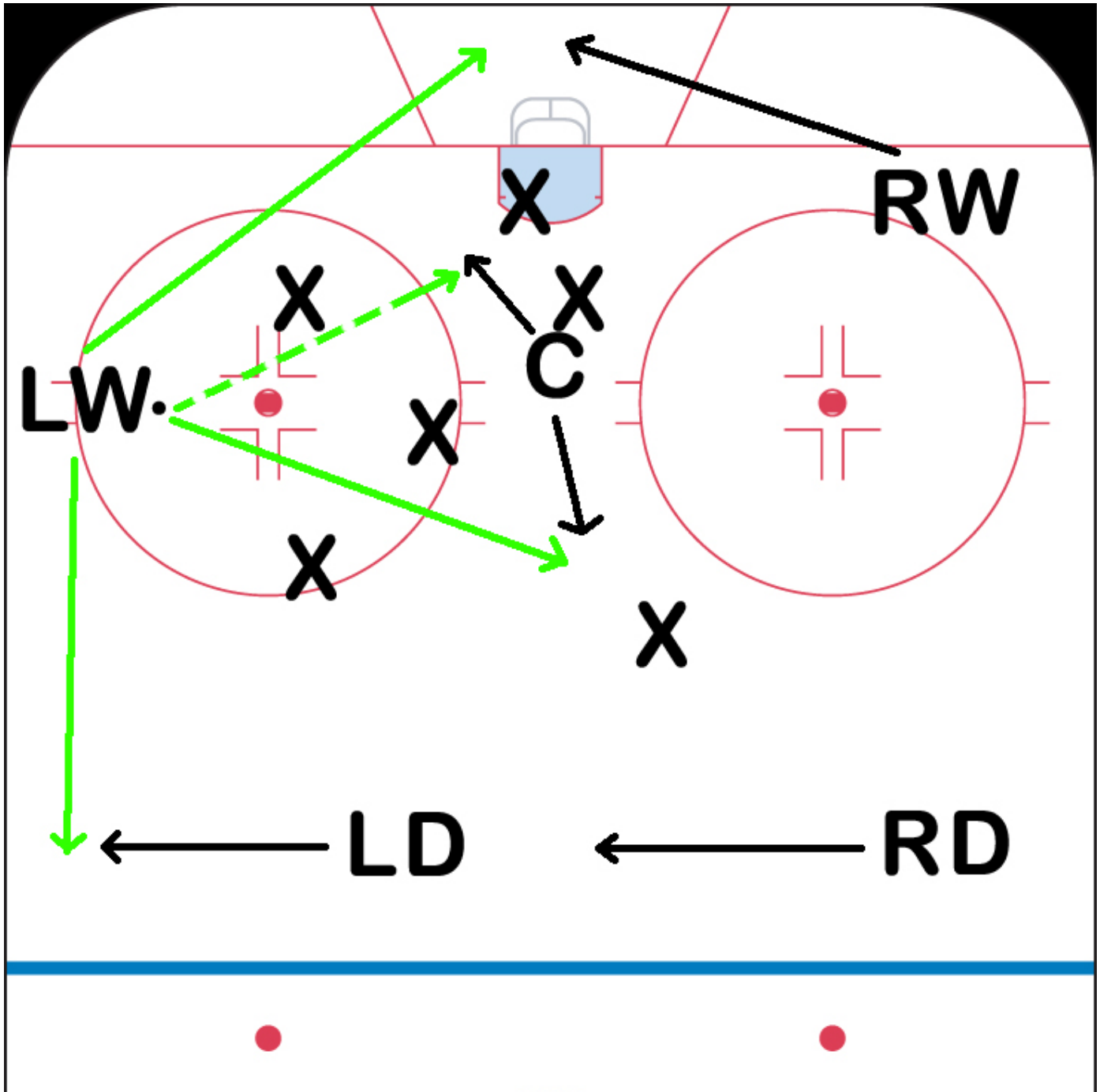
Easton Grip Synergy
EASTON
Louisville Response+
TPS
Louisville Response
TPS
RESPONSE
Louisville Response XN10
TPS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Questions ?
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