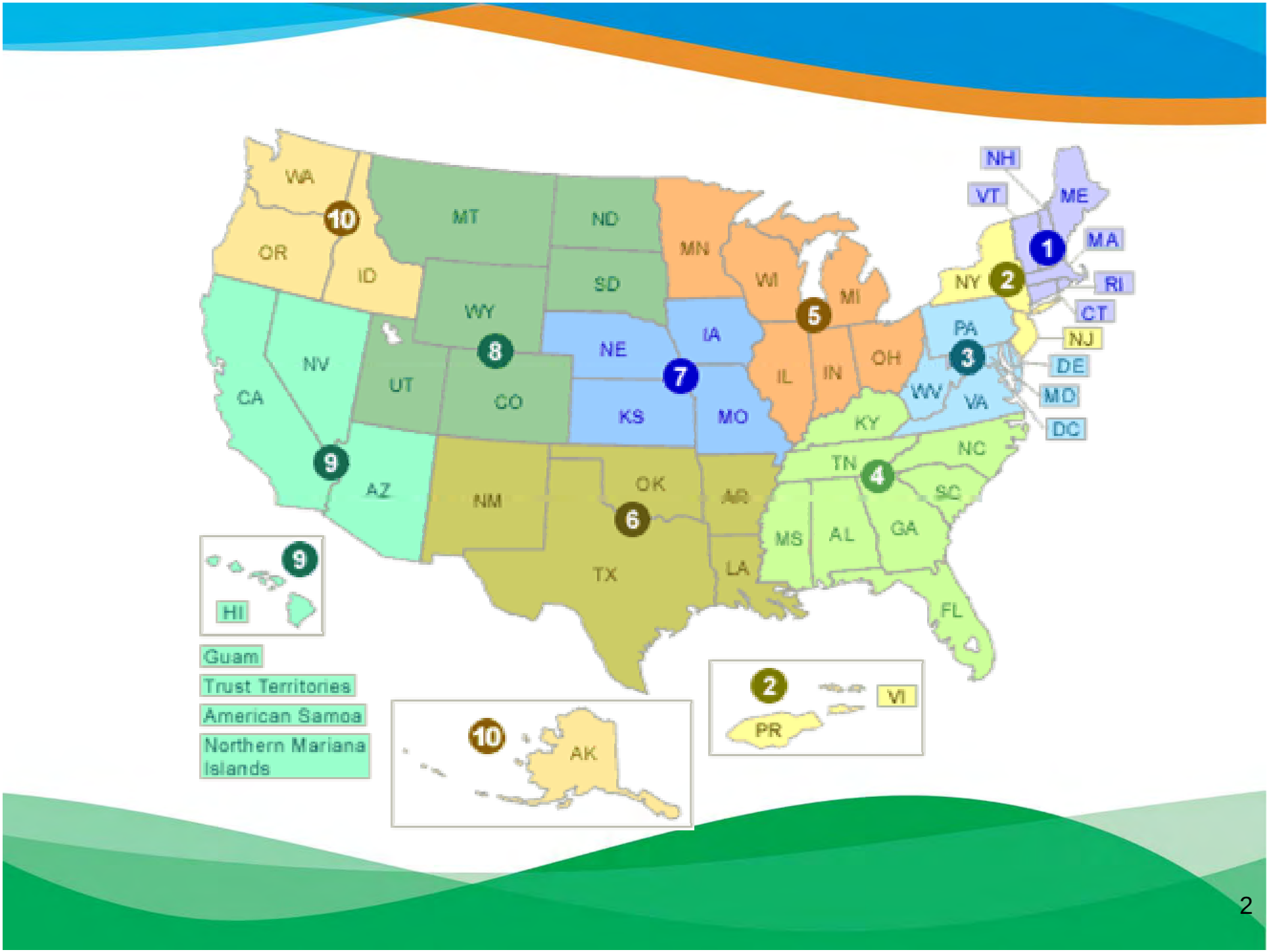
Integrating Sustainability into EPA's Cleanup Programs

Deborah Goldblum

CL:AIR Inaugural Sustainability Meeting

June 18, 2007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Background

November 2006 -

- DuPont/Region 3 Semi Annual Meeting

February 2007

- 2nd Sustainable Remediation Forum (SuRF) meeting
- Cleanup programs tasked with assessing clean energy & greenhouse gas reduction options

April 2007

- DuPont/Region 3 began work on Martinsville pilot

May 2007

- Sustainability at Nat'l Revitalization Coordinators Meeting
- 3rd SuRF Meeting

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Clean Energy/GHG Assessment

- Goal 1 – Analyze current activities
- Goal 2 – Assess new activities
- Focus on measurable contributions
  - Btu's
  - Carbon Equivalents
- Three areas
  - Energy efficiency
  - Renewable energy
  - Carbon sequestration

EPA Sustainability Efforts in the Cleanup Programs

Headquarters

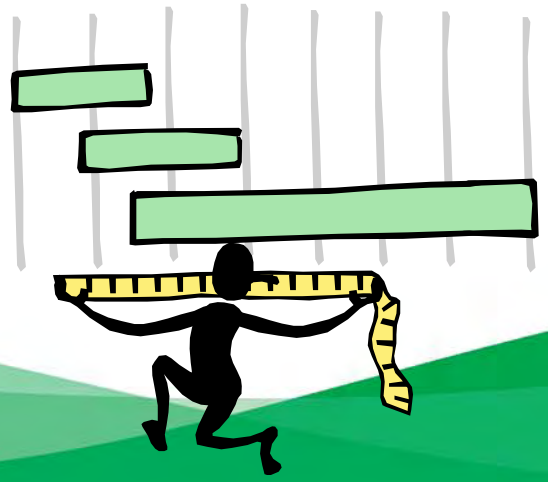
- Collecting information on current efforts
- Outreach
  - Clu-In website: http://www.clu-in.org
  - Green Remediation & Engineering Considerations Bulletin
- Estimate of energy footprint from Superfund cleanups
- Research on biosolids to amend soil & sequester carbon
- Resource Conservation Challenge – promotes recycling

Regions

- Pilots using renewable energy
- Contract and grant language

Integrating Sustainability into Cleanups

- Develop framework to assess sustainability
  - Factors (common language)
  - Measures
- Potential to use sustainability as a balancing criteria for cleanups



RCRA Remedy Selection Criteria

Threshold Criteria

- Protect Human Health & the Environment
- Control Sources
- Meet Cleanup Objectives

Balancing Criteria

- Long-term reliability
- Reduction of toxicity, mobility or volume
- Short-term effectiveness
- Ease of implementation
- Cost
- Community acceptance
- State acceptance
- Sustainability

Sustainability Measurement Factors

- Greenhouse gases (carbon dioxide equivalents)
- Resources consumed
  - Soil/solid material
  - Land
  - Water
- Energy consumed

Sustainability Measurement Factors

Media or Impact	Credit (+)	Debit[1] (-)
Greenhouse Gases (CO_2 equivalents)	❑ Sequestration ❑ Excess renewable energy generated on-site	❑ CO_2 generated by fuel used during remediation ❑ CO_2 generated by manufacturing of consumables
Resources		
• Soil/Solid Material (tons)	❑ Reused-recycled soil or soil-substitute (crushed concrete)	❑ All soil required ❑ Off-site disposal
• Land (acres)	❑ Beneficially reused ❑ Wetlands created or upgraded	❑ Permanently deed restricted
• Water (gallons)	❑ Reused-recycled	❑ All water used or captured for treatment ❑ Water for dust control
Energy (kWh)	❑ Renewable energy generated on-site	❑ Required by remediation ❑ Required for manufacturing of consumables

Feedback

- Leads to more innovation
- Fosters collaborative process

- Dangerous – too much opportunity for monkey business
- Remedy at every site will be natural attenuation
- Slow down cleanup due to review time

Solutions

- Make sustainability factors broader than just CO_2 and energy
- Use adjusted CO_2 equivalents
- Develop 3rd Party Sustainability Certification program
- Be careful w/language - Promote increased energy efficiency & use of renewable energy in cleanups rather than eliminate energy use

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Shell Global Solutions

SURF Presentation London
The Shell Approach

18 June 2007

Broader Shell Context – HSE Goals

- Pursue the goal of no harm to people
- Protect the environment
- Use materials and energy efficiently

Improved environmental performance

Preliminary Thoughts

- Need to tie in with sustainability principles
  - People, Planet, Profit
- Build on existing tools RBCA, BATNEEC, ALARP
- Pursuing the “Benefits Approach” (to society)
  - EU acceptance growing
  - Environment Agency Methodology expanded if necessary
- Currently working on example sites
  - Soil
  - Groundwater

Way Forward

- Open to all possibilities because currently end point unclear
- Collaboration essential
- Need a framework that is:
  - fit for global use (developed and developing world issues)
  - flexible, relevant and of benefit
  - implemented rapidly

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resources & energy

Economic Analysis for Sustainable Remediation Decision Making

Stuart Arch M Eng. MSc.

when experience counts

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Decision-Making

- *What should I do at this site?*
- *How much should I spend ?*

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Inputs to Decision

- Nature and extent of contamination
- Risk
  - Human Health
  - Controlled Waters
  - Resources
  - Environment
  - Property
- Regulations
- Stakeholder views

Inputs to Decision - Cost

- What is usually done:
  - Pick the cheapest way to remediate to the levels required by regulators, given the risks to be managed.
  - Internal decision about what is “reasonable” expenditure.

Remediation Decision Making

- What level of remediation is appropriate for a given site?
- Which risks should be dealt with, and to what degree?
- What is a “reasonable cost” for remediation at a given site?
- How do we justify the expenditure?
- What benefits does each stakeholder realise, for each remedial option?

The Economic Argument

- Consider ALL perspectives
- Use a common unit of measure = money
- Optimise decision making
- Focus limited resources
- Society has other priorities outside that of the problem holder
- Don’t treat all sites the same
- Balance cost with benefits to all of society
- Risk reduction = benefit = damage avoided
- Economic definition of ‘benefit’ - monetized increases in human welfare

High Level Economic Analysis

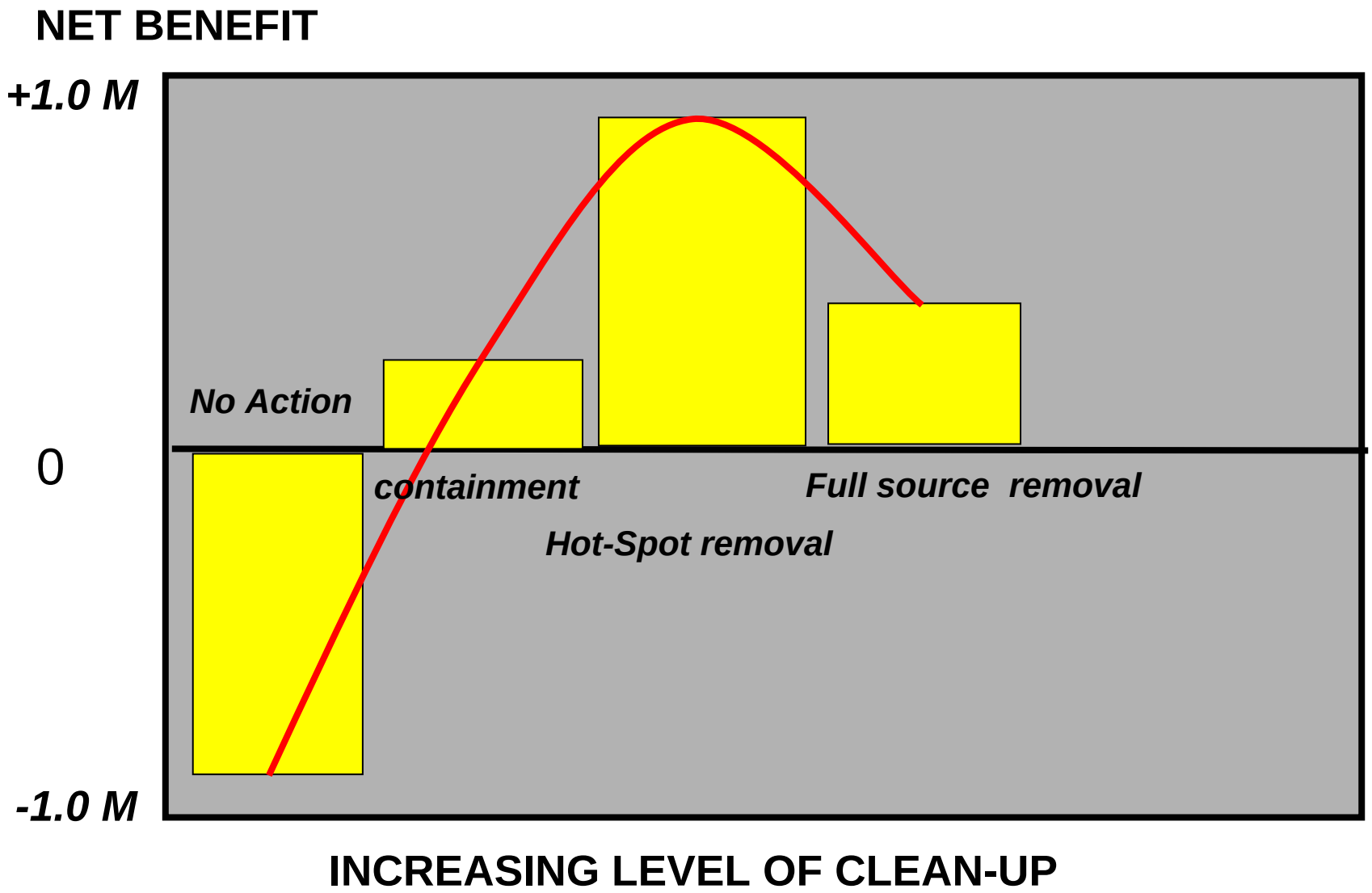
- Compare remedial approaches
- Monetize risk / damage averted
- Different approaches = different benefits
- What risks are managed by each approach?
- Which approach gives most increase in human welfare?

Rational Decisions

- Identify when lower cost solutions are justified
  - Spend less than regulators are suggesting
  - Spending more does not always mean higher NET Benefit

- Highlight when higher spend would be more beneficial
  - Spend more than conventional decision making may suggest
  - Spending less does not always mean a “better deal”

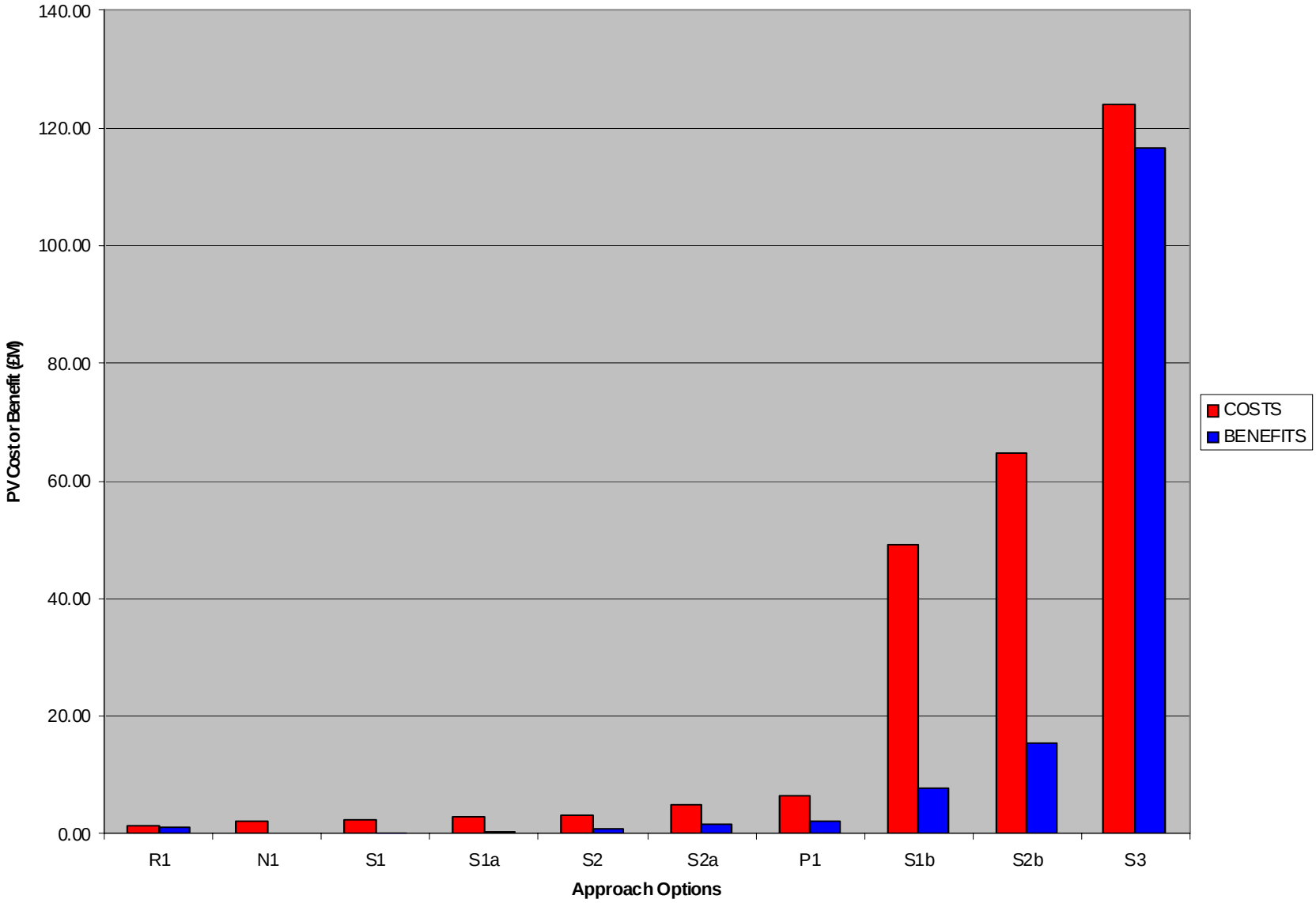
Finding the Economic Optimum



CBA Example
Shell site in the UK

			base case		
Remediation Approach	Remediation Technology for Costing	Present Value Costs (£M)	Total Benefits Realised (£M)	Net Benefit (£M)	Benefit Cost Ratio
N1	MNA	2.22	0.07	-2.15	0.03
S1	Readily Mobile NAPL Removal (local area only)	2.47	0.20	-2.27	0.08
S1a	Readily Mobile NAPL Removal (all plume area NAPL)	2.93	0.45	-2.48	0.15
S1b	Readily Mobile NAPL Removal (all site NAPL)	49.22	7.58	-41.64	0.15
S2	Full NAPL Removal (local area)	3.21	0.70	-2.51	0.22
S2a	Full NAPL Removal (all plume area)	4.92	1.53	-3.39	0.31
S2b	Full NAPL Removal (all site)	64.95	15.28	-49.66	0.24
S3	Full NAPL Removal at Facility Decommissioning	123.91	116.62	-7.29	0.94
P1	Hydraulic Containmen	6.43	2.33	-4.11	0.36
R1	Alternative Well Pumping	1.30	1.12	-0.18	0.86

CBA Example
Costs and Benefits



CBA Example Analysis

- Initial EA-advocated approach was highly uneconomic (S1).
- Remediation of the local area within the larger facility was uneconomic overall.
- Economics only improve if the whole facility is considered at time of decommissioning.

- **RESULT: EA Agreement. Reduced spend on remediation allows money to be targeted to achieve other environmental/societal benefits (e.g. improved containment, air quality enhancement, social investment).**

Wider Implications

- Need to identify goals before select technology
- External costs are explicitly accounted for
- All stakeholder's concerns are considered on an equal basis
- Helps determine the appropriate level of expenditure for a given site
- Economic analysis is a "double-edged sword" – can justify lower or higher expenditure, depending on the benefits produced

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resources & energy

Thank You

Environment & Water Resources

when experience counts

INAUGURAL SUSTAINABILITY MEETING

MEETING NOTES

18 June 2007

LAW SOCIETY, CHANCERY LANE, LONDON

Attending:

Stuart Arch	WorleyParsons Komex
Brian Bone	Environment Agency
Colin Cunningham	CLARRC Uni of Edinburgh
Russell Dixon	English Partnerships
Hans van Duijne	TNO
David Ellis	DuPont (USA)
Frank Evans	National Grid
Jane Forshaw	CL:AIRE
Deborah Goldblum	EPA
Jon Greaves	EA
Nicola Harries	CL:AIRE
Darren Luscombe	Entec
Adrian Needham	Golders
Steve Pearmain	Atkins Global
Guy Pomphrey	DEC NV
Keith Horgan	Carbon Trust
David Reinke	Shell
Walter Robertson	Entec UK Ltd
Duncan Saunders	Parsons Brinckerhoff
Philippa Scott	Shell
Paul Turner Smith	DTI
Phil Underwood	VHE
Jamil Mohamed	Treasury
Hywel Lloyd	Office of Public Management

Introductions and welcome

Hywel Lloyd (HL) (independent facilitator) from Office of Public Management welcomed everybody and asked that everybody introduce themselves. HL then described the objectives for the day and how the day would proceed in line with the agenda.

HL explained that there was a good cross section of people present from practitioners, academics, NGOs and government, therefore CL:AIRE had specifically arranged the attendees into four groups (red, blue, green and orange) to have a mix of sectors on each table. HL then asked the audience within the tables to state if there are any rules and issues from which to work within during the day.

It was agree that the meeting would be held under Chatham House Rules, that there should be a spirit of sharing but people should be respectful of commercial concerns. Everything discussed should be as transparent as possible and that people should be able to ask obvious and simple questions. It was also stated that any input and views given at the meeting was individuals input and not that of their companies.

Context

Jane Forshaw (JF) (Chief Executive of CL:AIRE) gave a warm welcome to everybody especially our overseas visitors on behalf of CL:AIRE. She explained that the audience were hand picked to give a wide breadth of

people with various backgrounds but predominantly the contaminated land sector. It is hoped that the group will share information and knowledge and work towards developing a common framework to measure sustainability within remediation and hopefully ultimately develop a tool that the whole contaminated land industry would buy into and use.

JF gave a short presentation setting the scene and explaining in her view "Why are we bothering with measuring sustainability and gave some insight to the challenges that the world has with climate change". She explained that there is a growing body of both political and scientific opinion that recognises a 2^0C rise in global average temperature as the threshold of the dangerous climate change. The EU leaders reaffirmed their desire to stay below this threshold at the spring council earlier this month.

However we have already observed a 0.7^0C rise since the beginning of the 20th Century. Such is the nature of the climate system that even if we were to halt all further emissions of greenhouse gases today, there would still be another 0.7^0C before temperatures stabilised. She expressed concern that 1.4^0C is awfully close to 2^0C.

The best estimates currently suggest that to be confident of staying below the threshold the world needs to keep the concentration of greenhouse gases below 400 parts per million (ppm) carbon dioxide equivalent. That is the measured carbon dioxide plus the effect of all the other gases that are adding to the atmosphere expressed as their carbon dioxide equivalent.

The hard carbon dioxide concentration is today 380 ppm, up from the pre-industrial 280ppm. But the carbon dioxide equivalent number is already 425ppm. Each year adds another 2ppm carbon dioxide and about 3ppm overall. And that rate is increasing. The odds of being able to stay below the 2^0C threshold may now be worse than 3 to 1 against.

JF then explained "The drivers for having the meeting". She explained that there had been a major shift in government priorities and now sustainability is high up the agenda. English Partnerships had launched their "Sustainable Homes policy and zero carbon housing", therefore it is important for the contaminated land community to be involved. The industry is maturing and is now estimated to have a turnover of £1billion with a significant carbon impact. Therefore it is important that the industry makes the best management decisions possible to restrict its carbon impact. CL:AIRE is hoping to agree a framework for a way forward and ultimately develop a good practice tool with the help of industry for the industry.

Success Criteria

Each group was asked to agree two /three success criteria that they felt should be used for judging sustainability in remediation.

Plenary Session
The four groups shared their thoughts.

Group 1 :

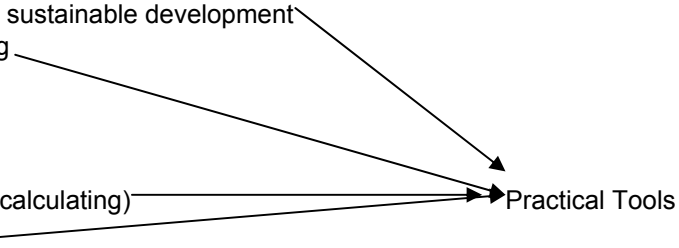
1. Invest in improved site characterisation to reduce the need for remediation

2. Sustainable remediation for one planet living
   - Link to local stakeholders
   - Consideration/benefit to community and society at all levels

3. Develop a 'measurement framework'
   - Quality
   - Quantity
   - Variable scales – global/local

Group 2 :

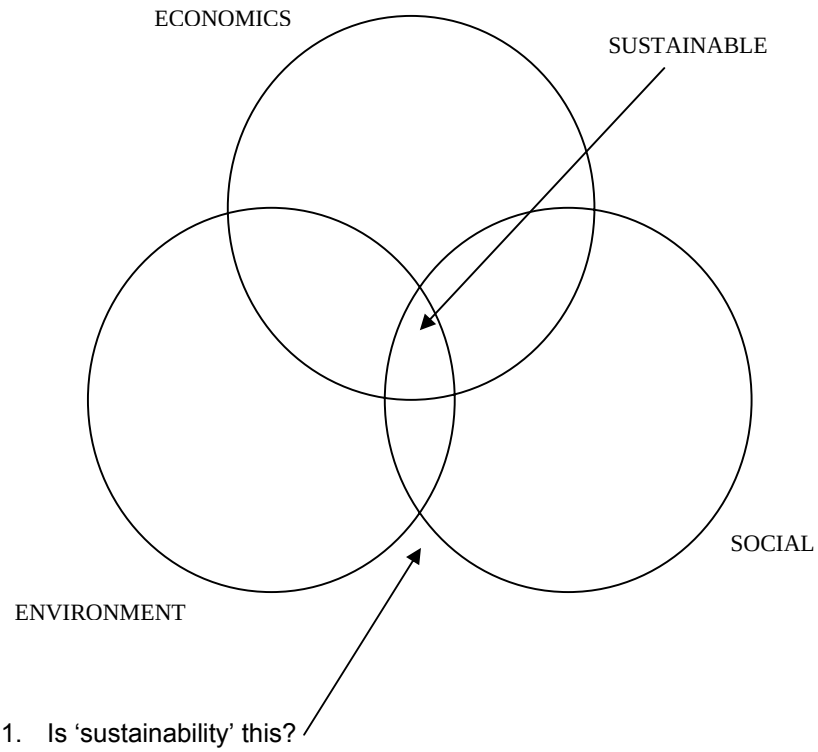
1. Policy
   - Responsibility/stewardship
   - Zero carbon (net) ie Code for sustainable development
   - Framework – decision making
2. Metrics
   - Qualitative
   - Quantative
   - What works now (measuring/calculating)
   - Transparent standards
3. Today
   - Ongoing interest
   - Sharing perspectives



Group 3 :

1. Need for common approach
2. Link it to verification
3. Increase weighting in options appraisal (currently only 5-10 points out of 100)
4. Carbon labelling vs. carbon footprint
5. Verification role – perhaps Carbon Trust ?
6. Where to start – eg Atkins start at operational phase rather than go to minute detail
7. Threshold of significance for sustainability vs. Cost benefit Analysis
8. Embed sustainability in remedial design
9. Have teeth without being prescriptive
10. Offset elsewhere
11. Use of existing metrics for air, land, water

Group 4 :



1. Is ‘sustainability’ this?
2. Define aspects and KPIs
3. Define boundaries
4. How do we compare aspects?
5. How do we get buy-in from stakeholders?
6. How do we incentivise stakeholders?
7. What are the barriers to implementation of sustainable redemption (eg waste regs!)?

Summary of Group Session

HL then summarised the main priority areas/common themes that had been identified from the group sessions that needed addressing to demonstrate sucess. It was agreed that these could be grouped under the following headings:-

1. Metrics/ Framework – buy-in of a trusted system
2. Incentives/Barriers

2a Carbon Trading

2b Investment in Characterisation

3. Affect on Design and Delivery eg Peer Review, what works where, Policy eg Brownfield Strategy

Presentations of Examples of Developing Good Practice

Six presentations were then given giving different perspectives on work that has been carried out to measure sustainability within remediation:

- Regulator Perspective – Brian Bone, Environment Agency
- European Perspective - Innovation, Policy and Costs for Remediation - Hans Vanduijne, TNO
- Industry Perspective, National Grid's Sustainability Calculator – Frank Evans, National Grid
- US Perspective, US SURF & Duponts sustainability estimation tool – David Ellis, Dupont
- USEPA Pilot Trials – Deborah Goldblum, USEPA
- R & D Sustainability Accounting Tool – David Reinke, Shell & Stuart Arch, WorleyParsons Komex

Risks and Opportunities 'walk'

After lunch HL requested that people pair up to discuss the risks and opportunities that they envisage there could be with developing a tool to measure sustainability for remediation.

Organise For Success?

HL then restated the key areas that had been identified by the group discussion that needed further investigation.

Brainstorm Actions

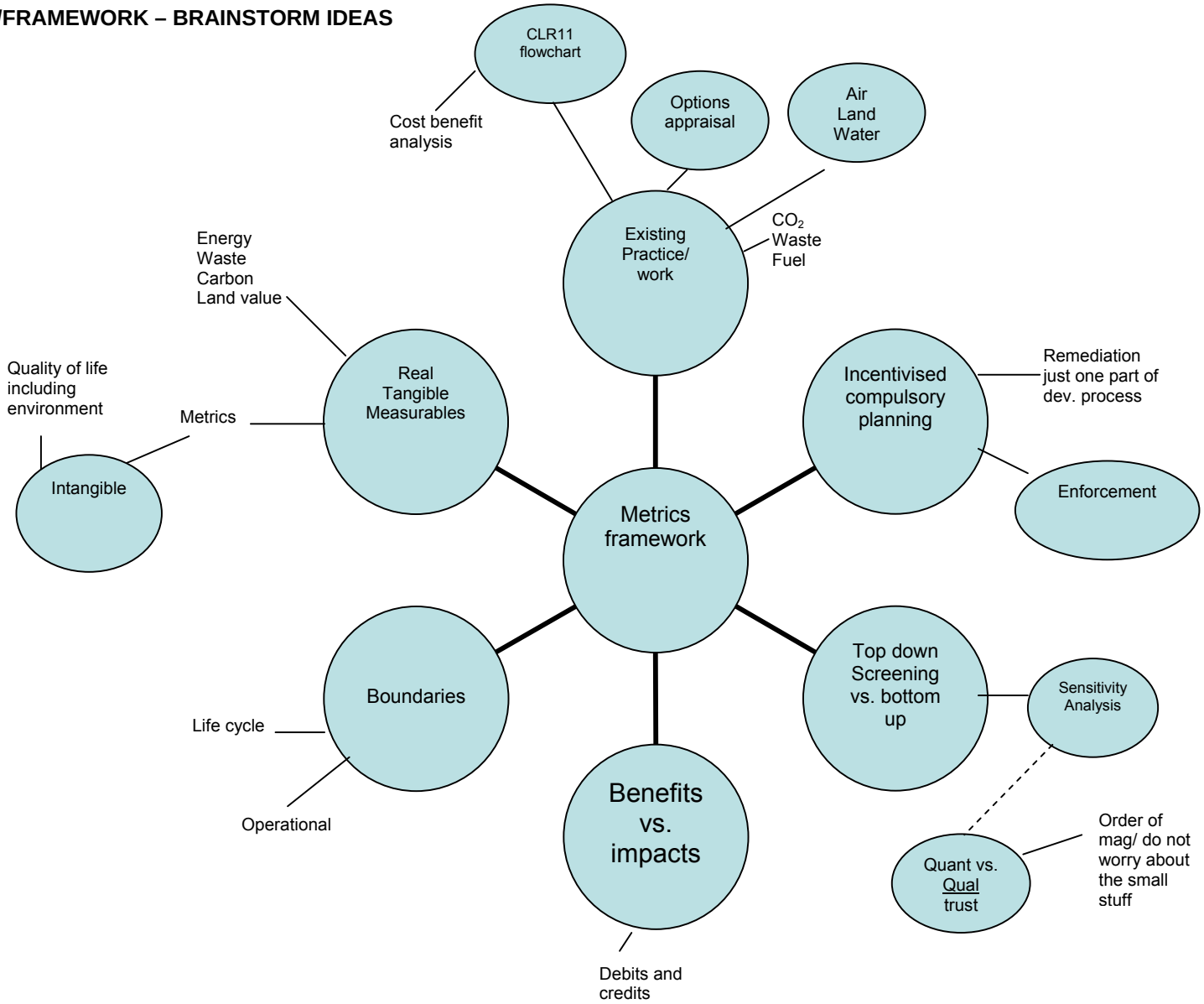
HL requested that people split into groups according to their areas of greatest interest. It was decided due to overlap that areas 2 - Incentives/Barriers and 2b – Investment in Characterisation would be part of 3 – Design and Delivery, leaving just three areas for further discussion:

1. Metrics/Framework
2. Carbon Trading
3. Affect on Design and Delivery

The three groups were then requested to brainstorm priority actions relating to their areas identifying those areas that require action, when can the actions be carried out, taken forward and by who, taking account of 3 aspects:-

- Urgency
- Importance
- Ability to lever action

1. METRICS/FRAMEWORK – BRAINSTORM IDEAS



2. CARBON TRADING – BRAINSTORMED IDEAS

- Soil trading*
- Bank of Clean soil traded for contaminated soil to be cleaned *
- Carbon Trading*
- Carbon avoidance versus. Reduction * - setting up remediation projects as profit centres
- Independent validation of schemes
- Water trading*
- Resource trading*
- Carbon value now/future
- 'British Bank of Sustainability'*
- Ethical investment funds
- Effect of future land use on carbon value over life time of use
- Operation and management of a carbon market – who, how?

3. DESIGN & DELIVERY – BRAINSTORMED IDEAS

- Would it change what we do now? (1)
- Need for partnering (1)
- More expensive? (1)
- Impact on 'cowboys' – raise standards (1)
- Stop a lot of clean up jobs happening – monitoring (1)
- Assessors? (4)
- Penalties and incentives/Green procurement (2)
- Need to build on knowledge now and test and pilot (full scale demonstrations) (1)
- How do we implement, can we use existing regulations. framework, ie can Cost Benefit Analysis/Life Cycle Analysis be used with sustainability? (3)
- Link with planning system – modify? DCLG and Defra are currently consulting on planning process. Planning does not cover all remediation (about 90%). IPPC is used for existing sites. (1)
- Tiered approach (3)
    - Low impact/low cost
    - Good robust metrics
    - Conceptual model
- Generic screening/generic processes and flexible (3)

Four areas for further work:

1. Pilots/ Demonstration projects
2. Incentives
3. Tool
4. Assessors

Final Plenary Session

HL asked the whole group to consider the overarching themes that had come out of the brainstorming session, and develop an action plan. Each main action needs to identify who should carry out the action, next action needed to secure ownership, proposed outcomes and key milestones.

ACTION PLANS

METRICS/FRAMEWORK

1. Proposed action

- Review sustainability assessment tools from outside remediation community. (Look for simple approaches).
- Review existing tools within industry, eg CLR 11.
- Determine what can be re-used/adapted and identify where are there gaps/and where new tools are needed.

Who should carry it out:

Volunteer working group from meeting – mix across community – include some sustainability/non-remediation expertise.

Next action needed to secure ownership?

Agreement within group.

Proposed outcomes:

Will know what sustainability assessment tools are most appropriate and how these can be married with existing guidance.

Key milestones:

Recommendations back to future meeting of this group.

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2. Proposed Action

- Define boundaries – where to start/stop in lifecycle analysis
    - Take examples of a variety of remediation sites
    - Map supply chain for different sites
        - Map available data/measurements – keep practical
        - Develop lifecycle inventory
    - Draw actual boundaries and keep practical and avoid possible duplication with automotive, design, manufacturing, materials sector
    - Time factor and future use of site (modelling?)

Who should carry it out?

- Remediation contractor and consultant working together (feed into)
- Carbon Trust with consultant
- Everyone (broad consensus)
- Local authorities/planners

Next action needed to secure ownership?

Appoint small, dynamic (focused and passionate!) working group to oversee process

Proposed outcomes:

Robust definition of boundaries.

Key milestones:
As above.

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3. Proposed action

- To develop a UK approved atmospheric emissions modelling tool (CO_2, Nox etc). May be something simple like P20 that regulator understands.
    - Considering pertinent remedial technologies
    - Research emissions data
    - Boundaries? Investigate supply chain

- Further research to consider what should be assessed (and how), ie
    - Landfill resource, imported materials (resource depletion)
    - Land value
    - Societal value
    - Ecosystem value

- Straightforward?

Who should carry it out?

Led by the Regulator – supported by pertinent organisations (steering committee)

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4. Proposed action

- Include (system) within planning system and offer incentives (eg save time (quick process) or money (tax incentive). (Mirror CLR11 Approach in Part IIa sites (through options appraisal))
    - (Build on best parts of both – multi-tiered (reasonable and proportionate))
    - (Not sure on voluntary remediation)

Who should carry it out?

Planners (developers, consultants) supported by regulators – DEFRA, EA, SEPA, Treasury.

Next action needed to secure ownership?

Interface (working party created) with (RITP – town planners) and Local/national government (and EU) = Buy In leads to action.

Proposed outcomes:

Becomes a material (qualitative and quantitative) consideration in all developments/clean ups.

Key milestones:

Develop Framework (common – Part IIa) → consultation → review → implement → periodic review as knowledge grows.

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CARBON TRADING

1. Proposed action

- Time effects on carbon trading
    - Derivative from carbon market
    - Derivation from robust measurement framework

Who should carry it out?

Decided by other groups!

Next action needed to secure ownership?

Development of standards for measurement methodology.

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2. Proposed action

- British Bank of Sustainability
    - Soil trading
    - Resource trading, eg water trading

Who should carry it out?

- Investment funds
- Remediation contractors
- Public/private partnership

Next action needed to secure ownership?

- Whoever produces maximum carbon emissions in site remediation
- Brownfield developers
- Greenest banks
- Treasury incentives

Proposed outcomes:

Profit mechanism for cleaning soil/water/sites.

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3. Proposed action

- Carbon trading facility/bank
    - Linked to energy use)current schemes
    - Linked to emissions control)
    - Method (robust) for measurement of carbon impact
    - Validation /audit scheme (independent)
    - Carbon valuation/appraisal
    - Set of standards for method of measurements

Who should carry it out?

- BSI
- Clean Development Mechanism (CDM)

- UKAS, etc
- Treasury guidance on appraisal

Next action needed to secure ownership?

- Action through "surf-like" body drawn from wide range of stakeholders

Proposed outcomes:

Workable carbon trading mechanism

Key milestones:

- Carbon forms an integral part of appraisal
- Establishment of SURF body

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DESIGN AND DELIVERY

1. Proposed action

- Assessors (LA, consultants, independent)
    - Training
    - Raise awareness
    - Competence framework

Who should carry it out?

Difficult to take forward without previous actions. Independent organisation?

Next action needed to secure ownership?
Demonstrate that there is a need

Proposed outcomes:
Competent auditors/assessors at strategic locations/organisations

Key milestones:

Develop competency framework

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2. Proposed action

- Demonstration Projects (based on framework implementation)
    - Identify site owners/partners (eg EP, Olympics, Developers)
    - Steering Committees: regulators and all stakeholders (site owners, consultants and UK SURF)
    - CLG
    - Europe

Who should carry it out?

CL:AIRE and help from SURF members

Next action needed to secure ownership?

Scope up and secure funding/partners

Proposed outcomes:

- Feasibility of framework being useful (usability)
- Pros/cons

Key milestones:

- Funding
- Identify projects
- Identifying steering committee

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3. Proposed action

- Identify incentives to push sustainability forward (also penalties)
- Steering Committee to commission scoping study or assessment of measures that could be implemented/used (eg green procurement, planning gain, etc)

Who should carry it out?

Steering Committee appointed through CL:AIRE.

Next action needed to secure ownership?

Proposed outcomes:

Understanding of opportunities to push initiative forward.

Key milestones:

Scoping study.

SUMMARY & NEXT STEP

HL concluded the day by asking whether there was enough enthusiasm and commitment to take this forward, there was a resounding yes.

Therefore actions to take forward are:

1. Arrange another meeting/sub meetings to discuss the actions highlighted.
2. To arrange for additional resources (time and money) to take initiative forward as CL:AIRE does not have the funding to do this.
3. Start to carry out detailed peer review of the different modules kindly made by Dupont.

JF thanked everyone for attending and confirmed that all those that attended will be provided with a summary report of the day.

CLOSE