Welcome to the CLU-IN Internet Seminar

US and EU Perspectives on Green and Sustainable Remediation, Part 3

Sponsored by: U.S. EPA Office of Superfund Remediation and Technology Innovation

Delivered: October 26, 2011, 10:00 AM - 12:00 PM, EDT (14:00-16:00 GMT)

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Visit the Clean Up Information Network online at www.cluin.org

Although I'm sure that some of you have these rules memorized from previous CLU-IN events, let's run through them quickly for our new participants.

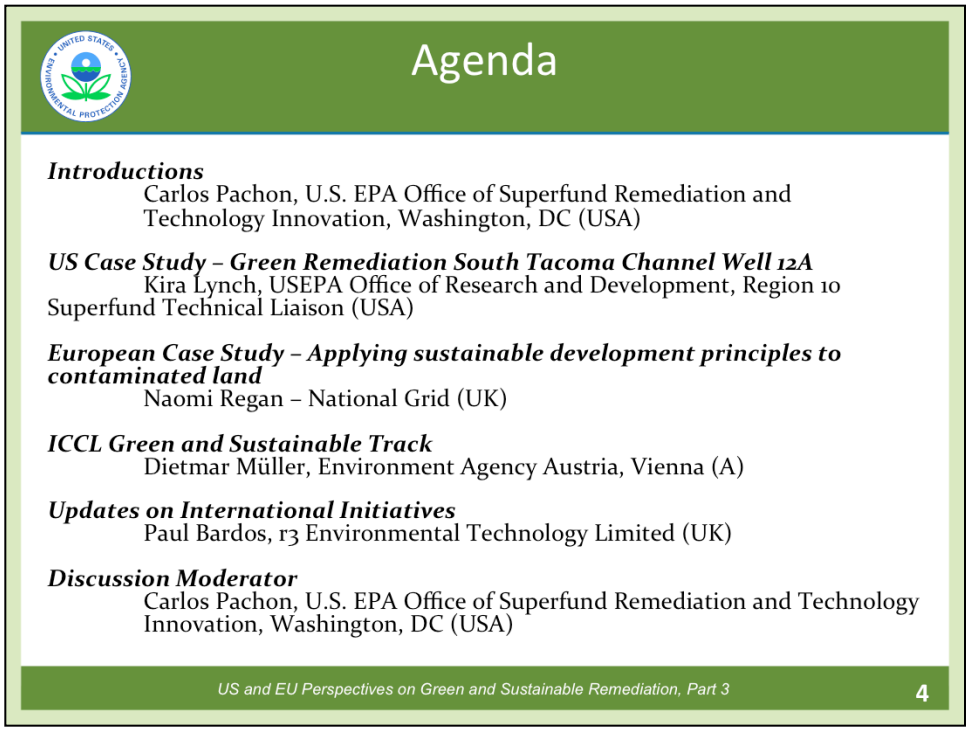
Please mute your phone lines during the seminar to minimize disruption and background noise. If you do not have a mute button, press *6 to mute #6 to unmute your lines at anytime. Also, please do NOT put this call on hold as this may bring delightful, but unwanted background music over the lines and interupt the seminar.

You should note that throughout the seminar, we will ask for your feedback. You do not need to wait for Q&A breaks to ask questions or provide comments. To submit comments/questions and report technical problems, please use the ? Icon at the top of your screen. You can move forward/ backward in the slides by using the single arrow buttons (left moves back 1 slide, right moves advances 1 slide). The double arrowed buttons will take you to 1st and last slides respectively. You may also advance to any slide using the numbered links that appear on the left side of your screen. The button with a house icon will take you back to main seminar page which displays our agenda, speaker information, links to the slides and additional resources. Lastly, the button with a computer disc can be used to download and save today's presentation materials.

With that, please move to slide 3.

US and EU Perspectives on Green and Sustainable Remediation, Part 3

EPA



Who am I?

A bit about ConSoil, and Dietmar's role, the special sessions and pre-consoil material

Bonnies' bio and a highlight from her case study

Marc's bio and a highlight from his case study

Paul's bio, a summary of what he will cover/seek to achieve, and a mention of previous seminar participants on the call

- SuRF – Stephanie Fiorenza
- NICOLE – Olivier Maurer
- COMMON FORUM – Dominique Darmendrail (not available regarding "dry-run" March 10)
- SuRF UK – Nicola Harries (?)
- CABERNET – Paul Nathanail (not available regarding "dry-run" March 10)
- SuRF NL – Hans Slenders (not available regarding "dry-run" March 10)

Greener Cleanups - EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint

Carlos Pachon

Office of Superfund Remediation and Technology Innovation (OSRTI)

Office of Solid Waste and Emergency Response (OSWER)

EPA Greener Cleanups Policy

Consistent with existing laws and regulations, it is OSWER policy that all cleanups:

- Protect human health and the environment
- Comply with all applicable laws and regulations
- Consult with communities regarding response action impacts
- Consider five core elements of a greener cleanup, as recommended in OSWER's "Principles for Greener Cleanups"

Establishment of the "Principles" is an incremental improvement in implementation of EPA's cleanup programs.

EPA Green Remediation Strategy

"Superfund Green Remediation Strategy"

Aims to reduce the demand placed on the environment during cleanup actions and to conserve natural resources

- Specifies 40 actions undertaken by EPA's Superfund Program to implement green remediation measures within the CERCLA and NCP frameworks
- ***Establishes a process for measuring improvements to environmental outcomes of Superfund cleanups***

The Role of Footprint Analysis

Footprint analysis is <u>not</u> required at any of our sites, but…

You can't manage what you don't measure.

Question: How do we evaluate the environmental effects of remedy implementation?

Answer:

- Step 1: Develop metrics associated with the five core elements of green remediation
- Step 2: Develop a methodology for quantifying those metrics (i.e., the environmental footprint)
- Step 3: Apply the methodology during remedy design, implementation, O&M, and optimization

Green Remediation Metrics

Energy

- Total energy used
- % of energy from renewable resources

Air

- Greenhouse gases
- Criteria pollutants (NOx, SOx, PM)
  - On-site emissions
  - Total emissions
- Hazardous air pollutants (HAPs)
  - On-site emissions
  - Total emissions

Water

- On-site water use (including public/potable water)
  - Quantity
  - Source of water
  - Fate of water
- Off-site water use
- Water table drawdown

Green Remediation Metrics

Materials & Waste

- Manufactured materials used on-site
  - Quantity and % from recycled materials
- Bulk, unrefined materials used on-site
  - Quantity and % from recycled materials
- Waste
  - Hazardous waste generated on-site
  - Non-hazardous waste generated on-site
  - % of total potential waste generated on-site that is recycled or reused

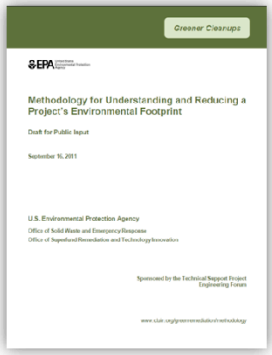
Land & Ecosystems

- Creation or protection of valuable "ecosystem services"(e.g., soil erosion control, nutrient uptake)

Methodology Applicability

Where and when is the methodology used?

- The methodology process and results are of value . . .
  - For all types of cleanup projects
  - For all cleanup programs
  - Throughout a cleanup project



How will EPA use the methodology?

- Educate RPMs and EPA technical staff
- Conduct footprint analyses at its own sites when and where appropriate
- Evaluate footprint analysis submittals to EPA by other parties

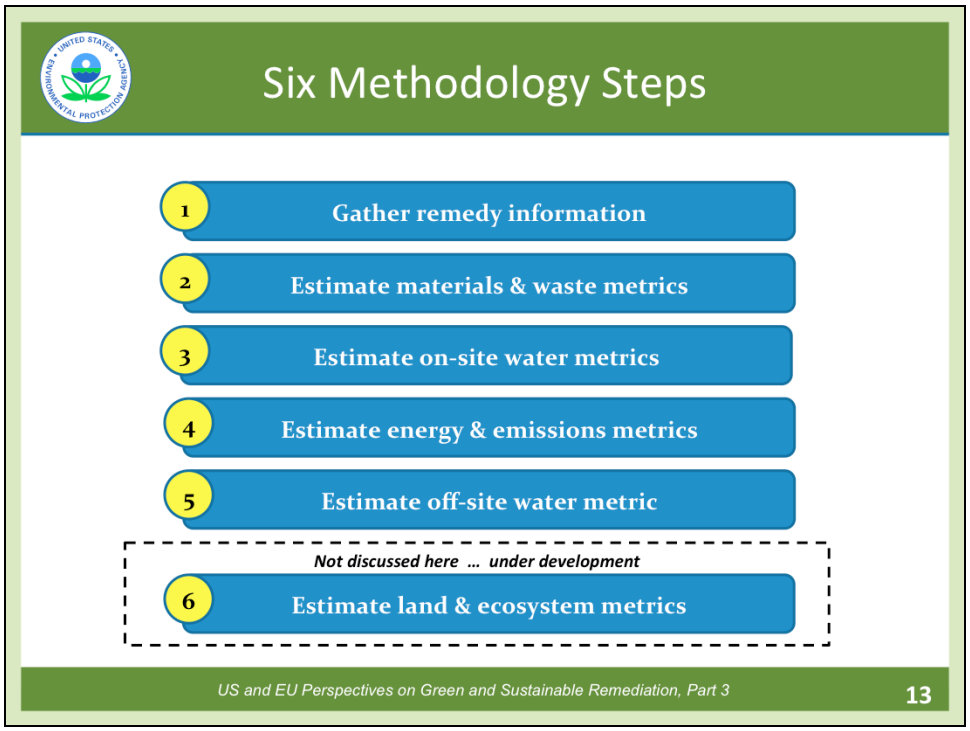
Methodology Applicability

Does the methodology call for life-cycle assessment (LCA)?

- It calculates the green remediation metrics but does not apply an "impact assessment" as required by a full LCA
- Materials and waste target the on-site use and generation
- Energy, emissions, and water have fairly broad system boundaries

Does the methodology consider economic and societal factors?

- The methodology focuses on the environmental footprint
- Social and economic factors are addressed in Superfund through existing processes such as community involvement requirements and EPA's Superfund Redevelopment Initiative


Six Methodology Steps
1
Gather remedy information
2
Estimate materials & waste metrics
3
Estimate on-site water metrics
4
Estimate energy & emissions metrics
5
Estimate off-site water metric
Not discussed here ... under development
6
Estimate land & ecosystem metrics
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We Welcome Feedback on the Draft Methodology

http://cluin.org/greenremediation/methodology

US Case Study – Green Remediation South Tacoma Channel Well 12A

Kira Lynch

USEPA Office of Research and Development,
Region 10 Superfund Technical Liaison

Well 12A Superfund Site
Tacoma, Washington

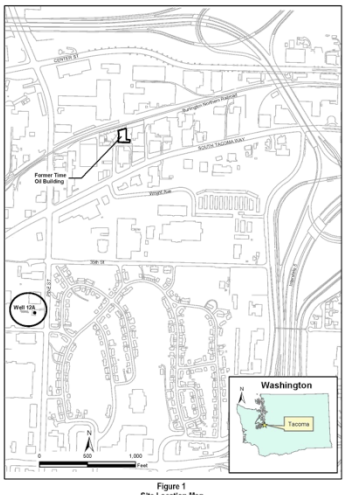

Figure 1
Site Location Map

History and Setting of Time Oil / Well 12A

- The site is a Superfund site in Tacoma, Washington State
- In 1981, chlorinated organic solvents (TCE, PCE, DCE, PCA) were detected in groundwater at Well 12A
- EPA investigations linked the contamination found at Well 12A to the Time Oil site

Site Background

- Tacoma Supply Well 12A identified to be contaminated in 1981
- 3,000 ft x 1,500 ft chlorinated volatile organic compound plume and identified source area, Time Oil Property
- Time Oil Property
  - waste oil reprocessing 1960s and 1970s
  - oil canning operation 1976 to 1990s
- Light Non-Aqueous Phase Liquid (1.41 ft) and Dense Non-Aqueous Phase Liquid persists at source

Well 12A - Amendment to the Record of Decision October 2009

- The site completed a Feasibility Study for remedial options and the selected remedy is identified in the "Record of Decision" (ROD) as a multi-component source area remedy.
  - Excavate filter cake and source soils with disposal offsite
  - In-situ thermal remediation of deep vadose zone soil and upper saturated zone
  - Enhanced anaerobic bioremediation of high concentration groundwater
  - Groundwater Extraction and Treatment System: Operate until flux goals are met and a determination is made regarding the need for continued operation (estimate approximately 3 years)

Remedy Components Continued

- High Concentration Groundwater
  - Enhanced Anaerobic Bioremediation
  - Groundwater Extraction and Treatment System: Operate until flux goals are met and a determination is made regarding the need for continued operation (estimate approximately 3 years)
- Low Concentration Groundwater
  - Wellhead Treatment at 12A

Well 12A - Amendment to the Record of Decision October 2009

- The ROD (Amended) includes discussion of green remediation concepts in Section 7.1 Protection of Human Health and the Environment
- Consistent with the Remedial Action Objectives (RAOs), opportunities may be sought during the implementation of the remedy to reduce its environmental footprint as defined in US EPA OSWER

Green Remediation Evaluation

- Green remediation evaluation was performed on the selected remedy identified in the ROD amendment in order to
  - Estimate the environmental footprint of the selected remedy
  - Identify the largest contributors to the footprint
  - Identify potential options for reducing the environmental footprint
- Findings were used to modify the design

Table 23. Unit Footprints for Each Remedial Technology

		Excavation		ITR		EAB		GETS	
Volume Treated		4,200		26,600		76,900		76,900	
Units for Volume Treated		cy		cy		cy		cy	
		Total Footprint	Unit Footprint per cy	Total Footprint	Unit Footprint per cy	Total Footprint	Unit Footprint per cy	Total Footprint	Unit Footprint per cy
Energy	Used (btu)	1.5E+09	3.5E+05	1.0E+11	3.9E+06	2.2E+09	2.8E+04	2.8E+10	3.7E+05
Water	Used (gal)	1.2E+06	3.0E+02	6.3E+05	2.4E+01	5.1E+06	6.6E+01	2.6E+08	3.4E+03
CO_{2e}	Emitted (lbs)	2.3E+05	5.4E+01	4.4E+05	1.7E+01	3.5E+05	4.6E+00	4.8E+05	6.3E+00
NO_x	Emitted (lbs)	1.3E+03	3.1E-01	1.1E+03	4.1E-02	7.8E+02	1.0E-02	1.3E+03	1.7E-02
SO_x	Emitted (lbs)	6.2E+02	1.5E-01	1.3E+03	4.7E-02	7.3E+02	9.5E-03	4.6E+03	6.0E-02
PM	Emitted (lbs)	3.2E+03	7.5E-01	2.7E+02	1.0E-02	1.1E+02	1.4E-03	3.0E+02	3.9E-03
Landfill Space	Used (tons)	7.9E+03	1.9E+00	2.1E+02	8.0E-03	1.3E+02	1.7E-03	0.0E+00	0.0E+00
Local Electricity	Used (kWh)	0.0E+00	0.0E+00	7.4E+06	2.8E+02	0.0E+00	0.0E+00	1.8E+06	2.3E+01
Local Water	Used (gal)	5.5E+03	1.3E+00	1.9E+05	7.2E+00	3.2E+06	4.1E+01	4.7E+04	6.1E-01
Local NO_x	Emitted (lbs)	1.3E+03	3.0E-01	6.2E+02	2.3E-02	5.3E+02	6.9E-03	1.6E+02	2.0E-03
Local SO_x	Emitted (lbs)	6.0E+02	1.4E-01	4.1E+02	1.6E-02	9.6E+01	1.2E-03	1.2E+02	1.5E-03
Local PM	Emitted (lbs)	3.2E+03	7.5E-01	6.9E+01	2.6E-03	4.5E+02	5.9E-03	9.4E+01	1.2E-03
Groundwater	Used	2.0E+05	4.7E+01	3.6E+03	1.4E-01	2.8E+04	3.6E-01	2.6E+08	3.4E+03
Other Factor 1	Used	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Other Factor 2	Used	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Highest unit footprint for that metric

Lowest unit footprint for that metric

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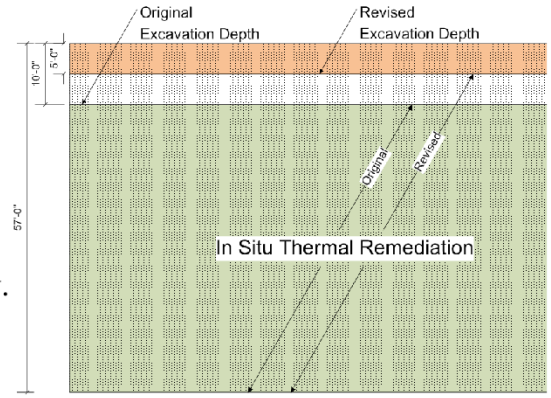
Green Remediation Design Modifications

- Design modifications focused on the largest contributors to the environmental footprint
  - Excavation and offsite disposal was determined to have the greatest unit footprint per cubic yard by most metrics evaluated
  - While in-situ thermal remediation (ISTR) is energy intensive, >98% of Tacoma's electricity is generated from hydroelectric and nuclear sources and thus by the metrics evaluated has a low environmental footprint relative to excavation

Key Green Remediation Design Modification

- Excavation volume reduced by ~50% from conceptual design presented in Focused Feasibility Study (FFS) in favor of ISTR to minimize the environmental footprint of the remedy.
- Subsequent Remedial Design Investigation supported further excavation volume reduction



Transportation and Disposal

- Specified preference for local borrow sources and disposal facilities
- Concrete to be segregated and recycled locally ~3 miles from site
- Soil to be pre-characterized for disposal at nearest Subtitle C landfill to minimize transportation
- If treatment is required prior to disposal, the selected facility generates energy from the treatment process which goes back into the grid and is sold to the City of Seattle
- Transportation analysis to determine greenest transport method to disposal facility considering both rail, truck, and combination methods

Diesel Emissions

- No idling policy for all vehicles and equipment
- Require use of cleaner engines, cleaner fuel, and cleaner diesel emissions control technology on all diesel equipment > 50 horsepower
  - Engines to meet or exceed Tier I (off-road) or 2004 On-Highway Heavy Duty Engine Emissions Standards (on-road)
  - Low sulfur / Biodiesel requirements
  - EPA or California Air Resources Board (CARB) verified diesel particulate filters (DPFs) or diesel oxidation catalysts (DOCs)
- Contractor required to track emissions reduced associated with using cleaner diesel equipment and fuels

Other Green Remediation Elements

- ITR design investigation being conducted to refine CSM and delineate treatment zone using a dynamic work approach and 3-D modeling so the remedy can be implemented in the most efficient manner
  - ITR treatment zone will be refined thus minimizing the footprint of that technology
- Green remediation excavation specifications were developed specifying means and methods was avoided
- Use of off-spec or waste product for bioremediation nutrient

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European Case Study – Applying sustainable development principles to contaminated land

US and EU Perspectives on Green and Sustainable Remediation, Part 3 Internet Seminar – 26 October 2011

Naomi Regan – National Grid

Contents

- Introduction to National Grid
- Introduction to SuRF-UK
- National Grid and sustainable remediation
- How National Grid is implementing the SuRF-UK Framework
- Conclusions

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Introduction to National Grid

- An international electricity and gas company
- One of the largest investor-owned energy companies in the world
- Company vision and strategy is under-pinned by targets to focus on sustainability in every part of the business
- National Grid Property is responsible for the management of the portfolio of former gasworks - c.400 sites.

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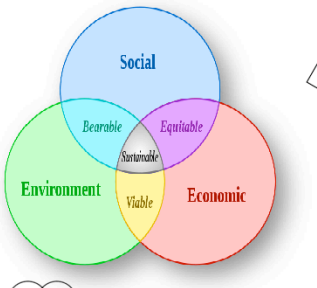
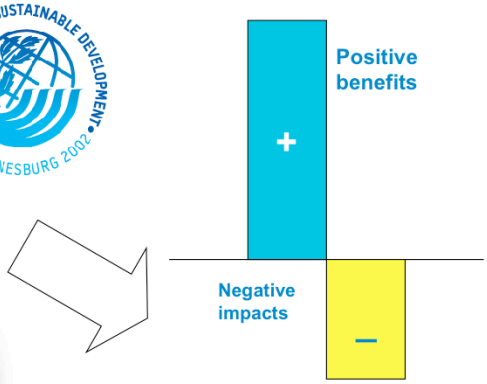
What is Sustainable Remediation?

'Sustainable Development' Brundtland (1987)





….a net benefit

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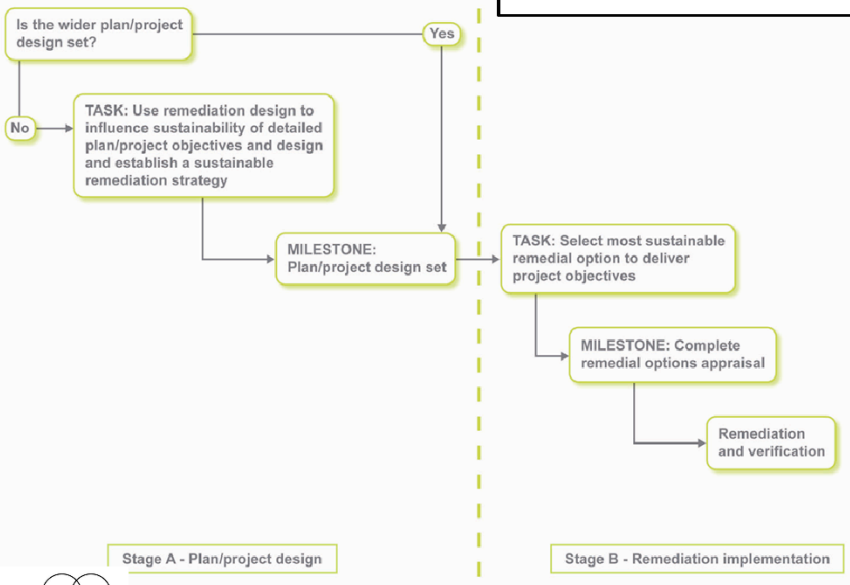
SuRF-UK framework



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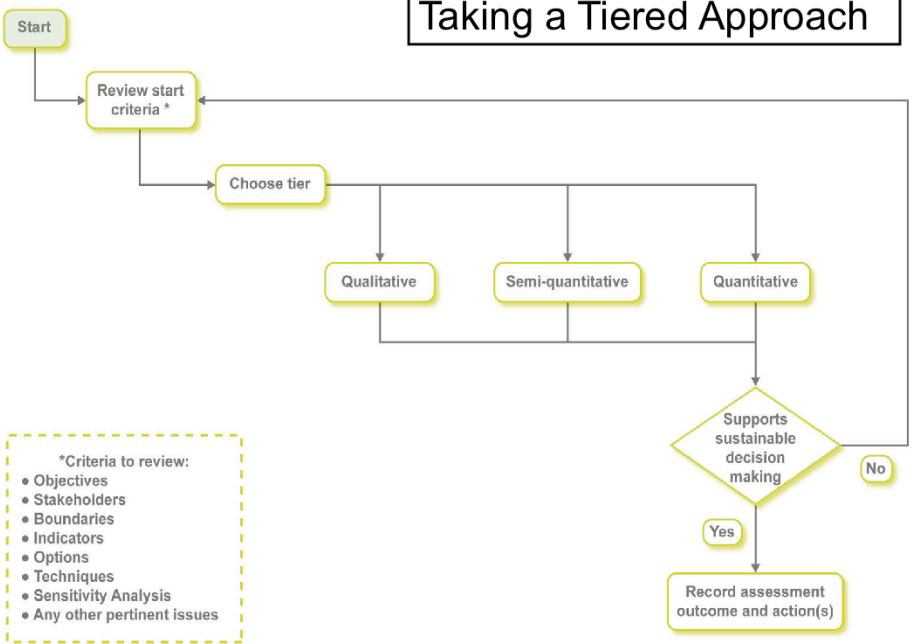
Taking a Tiered Approach



Why is Sustainable Remediation important to National Grid

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- *Development that meets the need of the present with out compromising the ability of future generations to meet their own needs (Brundtland, 1987)*
- Past development by our predecessors was not sustainable, it contaminated the ground.
- Remediation…
  - tackles the legacy of an unsustainable past
  - occurs in the present, we can eye the future but we are fundamentally correcting a past contaminating activity
  - creates impacts – what makes it sustainable is a demonstrable net-benefit / balanced decision making

Approaches that National Grid has taken in implementing SuRF-UK

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- Two examples
  - A full detailed (semi-quantitative) sustainability assessment for National Grid's first commercial scale cluster

- Learnt lessons
- Changed direction
- Emphasised the need to consider sustainability holistically

  - A process to embed sustainability into every aspect of what we do

National Grid – multiple site hub and cluster

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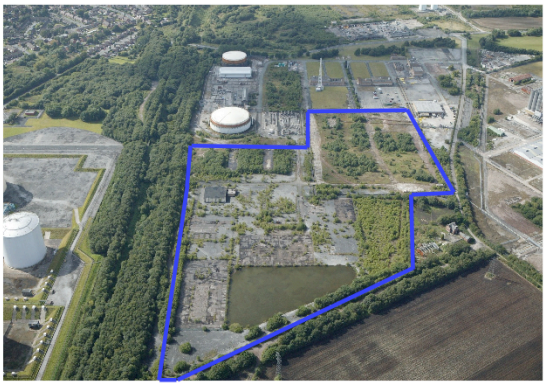
•Partington Cluster utilised the CL:AIRE Code of Practice (CoP) which provides a framework for the reuse and movement of materials

- 4 sites remediated
- 50,000m^3 material managed
- Reduction in 97,000 lorry miles
- Net saving of 109t CO_2
- 2 significantly constrained sites in residential settings have been unlocked
- Durable remediation solutions delivered across 4 sites



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Using the SuRF-UK Indicators

Site A - Environmental assessment	
Assessment Criteria	
Main heading	Sub headings
Impact on Air	Are there any indirect CO2/CH4 emissions arising from the remediation work?
	What is the Direct emissions (Carbon footprint) impact?
Impacts on soil and ground conditions	What is the impact on topsoil from the remediation work (soil erosion)?
	Are there any negative impacts on local drainage or sewers arising from the remediation work?
	Does the remediation work return the soil to its natural state?
Impacts on ground water and surface water	Does the remediation work negatively impact the groundwater quality / groundwater flow regime?
	Does the remediation work negatively impact the surface water quality / Surface water flooding / flow regime?
Impacts on Ecology	Does the remediation work effectively manage ecological systems?
	Does the remediation work have an impact on biodiversity?
	Does the remediation work impact invasive species?
Use of natural resources and generation of wastes	Does the remediation work use imported materials and consumables?
	Is there waste generated on site from the remediation work?
	Is there a lot of water consumption as a result of the work and is it disposed properly?
Intrusiveness	What is the impact on flooding or risk of flooding?

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Approach to assessment

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Assessment by Stakeholders

Site A	A: Do nothing	B: In-situ remediation	C: Excavate for ex-situ remediation on site	D: Excavate and treatment at Cluster	E: Excavate and off-site disposal
Landowner	64.1	57.5	50.4	49.2	51.1
Neighbour	34.6	35.8	42.9	40.1	40.5
Local Business	38.4	38.5	45.8	42.3	43.3
Regulator - LA	59.1	52.8	54.6	52	52.3
Regulator - EA	57.2	51.2	53.2	49.6	50.7
Total	253.4	235.8	246.9	233.2	237.9
Average	50.68	47.16	49.38	**46.64**	47.58

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Assessment Results by Site

Site A	A: Do nothing	B: In-situ remediation	C: Excavate for ex-situ remediation on site	**D: Excavate and treatment at Cluster**	E: Excavate and off-site disposal
Total	253.4	235.8	246.9	**233.2**	237.9
Average	50.68	47.16	49.38	**46.64**	47.58

Site B	A: Do nothing	B: Excavate for on site soil washing	**C: Excavate and treatment at Cluster**	D: Excavate and off-site Disposal
Total	253.4	254.7	**236.3**	248.8
Average	50.68	50.94	**47.26**	49.76

Site C	A: Do nothing	B: Ex-situ stabilisation on site	**C: Excavate and treatment at Cluster**	D: Excavate and off-site disposal
Total	253.4	238.3	**226.1**	239.4
Average	50.68	47.66	**45.22**	47.88

Site D	A: Do nothing	**B: In-situ remediation**	C: Excavate for ex-situ remediation on site	D: Excavate and treatment at Cluster	E: Excavate and off-site disposal
Total	256.5	**240.2**	255.5	252.2	251.9
Average	51.3	**48.04**	51.1	50.44	50.38

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Where did that take us…..

- Ability to test the SuRF-UK Framework and apply it to a real site(s)
- Ability to identify the potential areas of gain for future cluster projects
- Ability to test from the viewpoint of Stakeholder

However

- Too complex for every project
- Emphasised the need to go back to basics
- Re-iterated the belief that sustainability should be factored in to every decision
- Key is that decisions are transparent at whatever level

Minimum Standards

- Developing **'minimum standards'** for qualitative assessment
- Minimum Standard:
  - Pre-determined standard for each indicator:
    - Define the impact / benefit that National Grid will accept / seek
  - Non-achievement = further assessment / elimination of options
- Aspirational Target:
  - Pre-determined target for each indicator:
    - To drive improvements

Tier 1 assessment & minimum standards

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Indicator	Sub-Indicator	Scale	Assessment Boundary Conditions		Comments	Potential Minimum Standard	Potential Aspirational Targets	Possible Mitigation (over and above standard practise)
			Inclusions	Exclusions				
Ecology	Invasive Plant Species	Site/ Local	Plant Species listed in the Wildlife and Country Act 1981	Other unwanted plant species. Invasive species other than plants	What impact will the scheme have on invasive species on the site or Boundary	**Works will not cause the spreading of invasive species**	**Eradication of invasive species on site**	Remove invasive plant species from in and around work and Vehicle trafficking Areas

Pre-determined set of minimum standards → **Assess feasible options** → **Where minimum standards are not met – consider those indicators in more detail**

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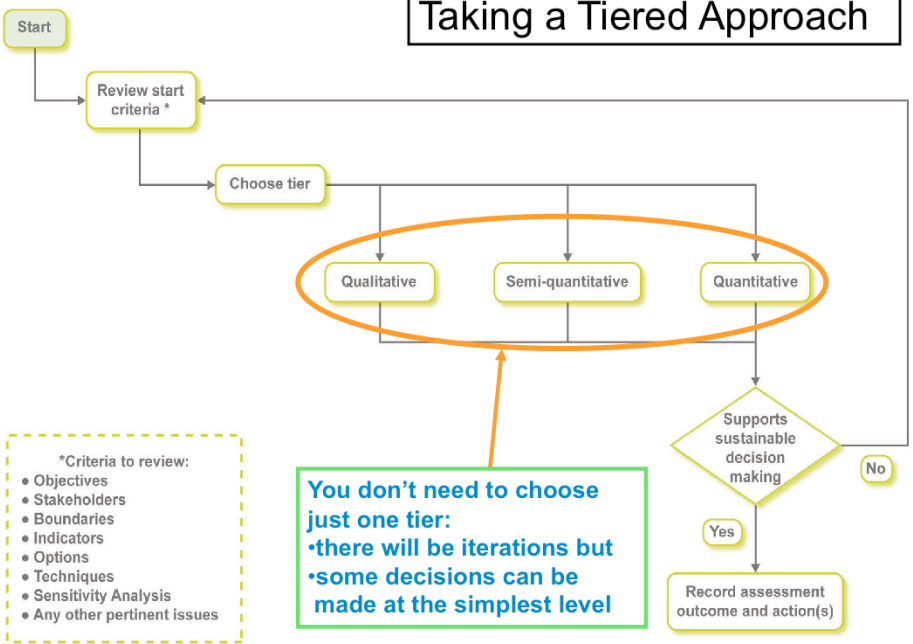
What this approach creates….

- A simple early opportunity to demonstrate sustainability
- A framework to eliminate options and to identify where you need more information
- A process to build up the detail of assessments as appropriate
- A process to ensure that effort is spent on the most contentious decisions
- A process for clear and structured and transparent decision making
- A process to enable early engagement with stakeholders – initial stage is a good tool for this

Allows commitment to sustainability at all levels to be made clear

Taking a Tiered Approach



*Criteria to review:
- Objectives
- Stakeholders
- Boundaries
- Indicators
- Options
- Techniques
- Sensitivity Analysis
- Any other pertinent issues

You don't need to choose just one tier:
- **there will be iterations but**
- **some decisions can be made at the simplest level**

Similarity to Risk Assessment Process??

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Risk Assessment

Preliminary Qualitative Risk Assessment

↓ Elimination of PLs

Generic Quantitative Risk Assessment

↓ Elimination of PLs

Detailed Quantitative Risk Assessment

Sustainability Assessment

Qualitative Assessment

↓ Elimination of Options / Indicators

Semi-Quantitative Assessment

↓ Elimination of Options / Indicators

Quantitative Assessment

Next steps for National Grid

- Fully develop the minimum standard and aspirational targets
- Test with a number of sites and stakeholders
- Establish what the different tiers feel/look like

Conclusions

- SuRF-UK Framework allows for transparency and recording of decisions
- Sustainability assessments don't need to be complex
- The most important thing is to embed sustainability into decision making
- The same level of effort is not necessarily needed for all decisions – Focussed effort is important
- More often than not it is no more than being done already – just a logical process

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Thanks to:

- SuRF-UK Steering Group
  - Prof Jonathan Smith, Shell Global Solutions (UK)
  - Prof Paul Bardos, r3 environmental technology ltd
  - Dr Richard Boyle, Homes & Communities Agency
  - Dr Brian Bone, Bone Environmental Consultant Ltd
  - Ms Naomi Regan, National Grid
  - Ms Alison Hukin, Environment Agency
  - Dr Dave Ellis, Du Pont
  - Ms Nicola Harries, CL:AIRE
  - (formerly) Mr Frank Evans (National Grid)

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Thanks to:

- RSK – Partington Cluster Sustainability Assessment
- MDK Environmental / Firth Consultants / WorleyParsons – Wider (in progress) sustainability work
- VHE / WorleyParsons / WYG Environmental / RSK / Amec – Cluster project

nationalgrid
THE POWER OF ACTION

SuRF-UK Framework Document

CL:AIRE

SuRF

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International Committee on Contaminated Land (ICCL) 2011 Green and Sustainable Track

Dietmar Müller
Environment Agency Austria

ICCL – 10th Biennial Meeting

	Session A: Integrating Contaminated Site Remediation and Reuse Strategies, *Salon 5-6*
9:40 a.m. – 9:50 a.m.	**Introductions and Overview of Presentations** Moderator: Carlos Pachon, US EPA OSRTI
9:50 a.m. – 10:10 a.m.	**A1: Towards Sustainable and Risk-Informed Land Management in Europe** Dietmar Müller, Environment Agency, Austria
10:10 a.m. – 10:30 a.m.	**A2: Brownfield Redevelopment: Joint Effort by Industry and Authorities Working Together** Anja Sinke, NICOLE, & Co Molenaar, Ministry of Housing, Spatial Planning & Environment, The Netherlands
10:30 a.m. – 10:50 a.m.	**A3: Survey of the Future Quebec Soil Protection & Contaminated Sites Rehabilitation Policy & How it Plans to Integrate Site Cleanup & Reuse Strategy** Michel Beaulieu, Quebec Sustainable Development, Environment and Parks Ministry
10:50 a.m. – 10:55 a.m.	**Questions and Answers**
10:55 a.m. – 11:05 a.m.	Bre
11:05 a.m. – 11:15 a.m.	**Introductions and Overview of Presentations** Moderator: Carlos Pachon, US EPA OSRTI
11:15 a.m. – 11:35 a.m.	**A4: Do Australian Clean Up Projects Currently Accord with the Concept of Sustainable Remediation?** Peter Nadebaum, Australia
11:35 a.m. – 11:55 a.m.	**A5: The Flemish Approach Towards Green and Sustainable Remediation** Marijke Cardon, OVAM Public Waste Agency of Flanders, Belgium
11:55 a.m. – 12:15 p.m.	**A6: Remediate (risk), Reclaim (land), Redevelop (sites), Reuse (space), Revitalize (communities)** Paul Nathanail, CABERNET, Europe & University of Nottingham, United Kingdom

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- Dietmar Müller (EAA – Environment Agency Austria)
  - IRGC Framework on Risk Governance (see www.irgc.org)
  - Risk Management and Sustainability – Differences & Complementarity
  - Existing concepts, tools and metrics
  - Improving state of the practice in site cleanup as well as participatory process
- Anja Sinke & Co Molenaar (NICOLE / Netherlands)
  - Challenges ensuring maintenance of institutional controls at cleanups in urban environments
  - Concepts to share responsibility/liability – soil, site, groundwater
  - Case study in heat pumps used as part of a site reuse and remedy enhancement (green remediation & sustainable development)

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- Michel Beaulieu (Quebec, Canada)
  - Quebec's new soil policy: 4 components and 3 goals - Protecting HH&E, in a sustainable way, informing players
  - The 4 part strategy seeks to:
    - assess liability
    - promote sustainable development
    - foster sustainable remediation technologies
    - foster reuse of soils
  - 8 intervention strategies / 35 actions
- Peter Nadebaum (Australia)
  - Regulations are flexible allowing site-specific remedy end-points
  - Land use considerations are allowed
  - Balance is sought in environmental, social, and economic considerations

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- Marijke Cardon (OVAM; Belgium, Flanders)
  - Flemish multi-criteria tool – revision to update and include sustainability issues
  - Integrating life cycle analysis & CO_2-calculator
  - Procedure allowing a tiered approach of qualification and quantification
- Paul Nathanail (CABERNET & LQM University of Nottingham)
  - Conceptualizing "Start with the end in mind" – setting objectives
  - Provided his "Seven Habits of Effective Regeneration"
  - Suggested we replace the term "sustainable cleanup" with SMART
    - Successful, Measured, Appropriate, Respectful, Temporal

Risk and Sustainability
What's common? What's different?

	Risk	Sustainability
origin / use	economy / science	ecology / policy
based on …	a mental construct	an ethical construct
objective	transparency	fairness
Important	• single target • accountability • effectiveness	• multi-objective • interdependency • efficiency
question	Should we act?	How can we act?
support to …	better decisions	better action
strategy	prevent or limit	synergies

Risk and Sustainability
How to make it complementary?

Clarifying …

- **objectives (values)**
- **system and system boundaries**
- **principles**
- **milestones** along the land management process
  - understanding risk prepares a judgement
  - sustainability prepares management actions
  - risk & sustainability control implementation

WATCH OUT:

- **Not trading risks against sustainability!**

"NON-PAPER": Understanding our frames …
… to prepare better decisions

CONCEPTUAL FRAMEWORK

- Risk-Based Land Managment
- Sustainability: SuRF UK & NICOLE
- ➢ Governance: Risk and Sustainability

ANALYTICAL TOOLS - simulating + understand different choices:

- **Simple indicators** (e.g. carbon footprint, specific energy use)
- **Complex environmental accounting/balance**
- **Economic + ecological balances & stakeholder discourse**

METRICS - to condense, simplify and communicate

- Organising complex information to provide the complete picture, e.g. *Environmental footprint*
- Use simple things creating impacts, e.g. *Carbon footprint*

REMARK: RBLM

QUESTION: CURRENT STATE OF PRACTICE

- Building awareness on concepts of sustainability and site remediation and reuse
- European Concepts to reduce "Land consumption", e.g.
  - European "Roadmap on Resource Efficiency" (2011): no net land consumption by 2050
  - Austria: reducing land consumption by 90 % within one generation
- Moving to new and more stringent sustainability policy for remediation
- Flexibility in remedy decisions
- Developed tool for quantitative sustainability in remedy decisions
- Robust definition of objectives

QUESTION: CHALLENGES FOR THE FUTURE

- Improving and considering the concept of sustainability in site cleanups
- Achievement of greenfield development while using green cleanups
- Avoiding grayfields resulting from a o greenfield policy
- Additive "triple bottom line" metrics in evaluating remedy sustainability
- Adapting a quantitative approach to a rapidly evolving process
- Achieving a shared vision of definitions – for example, who defines "practicable"?

QUESTION: OPPORTUNITIES TO ADRESS CHALLENGES IN THE FUTURE

- Expand technical options to reduce cleanup footprints
- Learn from fellow peers how to establish a quantitative approach to sustainability
- Adopt full suite of regulatory, policy, incentive tools, etc. to foster sustainable cleanups (governance & environmental stewardship)
- Improve the participatory process

ICCL – 10th Biennial Meeting

WATCH OUT: CONFERENCE, November 2012

More information to follow soon

Towards Sustainable and Risk-Informed Land Management in Europe

CULTURE  NATURE

ENVIRONMENT AGENCY AUSTRIA umweltbundesamt

Chairs of EUROSOIL and recent hosts of 2010 ConSoil

Updates on International Initiatives

Paul Bardos
r3 Environmental Technology Limited

European Roadmap on Resource Efficiency Setting the right targets?

"**Roadmap to a Resource Efficient Europe**" (EC, 20.9.2011)

- **Natural resources:** Minerals, Metals, Energy, Fish, Timber, Water, fertile Soils, Biomass, Biodiversity…
- Adressing the need of a **4 to 10 fold increase in resource efficiency by 2050**, with significant improvements needed already by 2020
  - A policy framework : reducing needs & limiting impacts
- Targets regarding land use:
  - MS should have inventories on contaminated sites by 2015
  - No net land consumption by 2050

EURODEMO (2007 final reporting):

- "**eco-efficiency**": should be key to innovation with regard to soil and groundwater remediation
- "**factor-4-technologies**": to half costs and doubling environment benefits

SURF

SURF continues to provide a forum for environmental consultants, industry, government, and academia to develop and advance the application of sustainability concepts throughout the lifecycle of remediation projects, from site investigation to closure.

To allow diverse stakeholder participation, meetings have been held with invited government speakers (at EPA Region 5 in May 2011, Seattle in September 2011) or at universities (UC San Diego in February 2012, Univ. South Florida in Feb 2011, Colorado State in July 2010) with academic participants.

Initiatives on development of a sustainable remediation framework, application of life cycle analysis to remediation, and metrics mapping are complete, papers published in Remediation and available on www.sustainableremediation.org

Future efforts will focus on development of technical initiatives, student chapters and education initiatives.

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SuRF-UK Update

- Framework published March 2010 titled: A framework for assessing the sustainability of soil and groundwater remediation with UK wide regulatory acceptance
- 15 Headline Indicators with detailed descriptions to be released as a report by end of 2011
- Case study examples currently being written up using the framework and will be released shortly
- Series of Frequently Asked Questions now available to help encourage the use of the framework
- Currently assessing requirements for next phase of work
- All information freely available through www.claire.co.uk/surfuk

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SUSTAINABLE
REMEDIATION FORUM
NETHERLANDS

SURF-NL

- **Participants:** Ministry I&E, R&D institutes (Deltares, RIVM), consultancies, contractors, authorities (municipalities and provinces), Shell, Port of R'dam, Railways etc.
- **Not only Remediation**; Sustainable management of soil and groundwater Quality (future: also protection)
- **Goal SURF-NL:** Transition in the soil sector to a transparent and integral way of working based on sustainability principles
- **Launch of Position Paper** during National Soil Conference end November
- **Sustainability:** Balancing benefits-impacts in terms of indicators of PPP
- "**Business plan**" ready end 2011, detailing the scope of platform, planning, tools etc.

Common Forum on Contaminated Land in Europe

- **Risk-informed & sustainable land management (11th ICCL-meeting, Washington, D.C; 4.10.2011)**
  - *Aims at developing a position paper to transform and complement RBLM towards a 4th generation policy concept*

NEXT STEPS:

- »Non-paper» (mid-November 2011)
- 2 feedback & discussion loops (until February 2012)
- Revision, presentation & discussion (April 2012)

NICOLE Sustainable Remediation Working Group

- NICOLE Sustainable Road Map published early 2011 and available on-line from www.nicole.org/documents/stream.aspx?o=2&fn=NICOLE_Docs_279.pdf
- Supporting guidance on risk assessment and sustainable remediation linkages, indicators and tools will be available on line from www.nicole.org soon
- Current focus is on
  - Pilot testing of the road map by NICOLE members, to refine the road map and report out to the wider community in 2012
  - Engage collaboration and dialogue with CF and other networks
- NICOLE is open to those who wish to join and participate

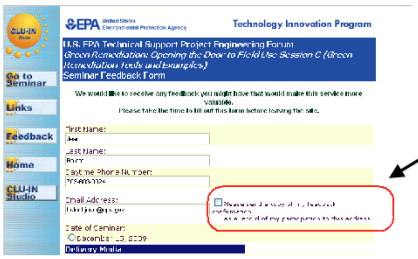
EPA

Discussion

Carlos Pachon
OSRTI/OSWER

Resources & Feedback

- To view a complete list of resources for this seminar, please visit the **Additional Resources**
- Please complete the **Feedback Form** to help ensure events like this are offered in the future



Need confirmation of your participation today?

Fill out the feedback form and check box for confirmation email.