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DREDGED MATERIAL TREATMENT TECHNOLOGIES IN EUROPE

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Aquatic Sediment Expert Centre

Ministry of Transport Public Works and Water Management

The Netherlands

Outline

➢ Introduction

➢ Overview of treatment chains

➢ Examples of treatment technologies

➢ Beneficial use

➢ Costs

➢ Conclusions and recommendations

Objectives of treatment

➢ Beneficial use

➢ Transformation into construction material

➢ Reduce volume for disposal

➢ Reduction, removal or immobilisation of contaminants

➢ Improve handling characteristics

SELECTION OF TREATMENT CHAINS

STEP 1: Preselection

TYPE of dredged material
• type and degree of contamination
• sand & org. matter content

all possible chains
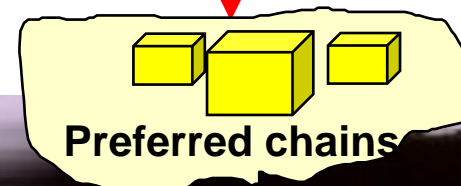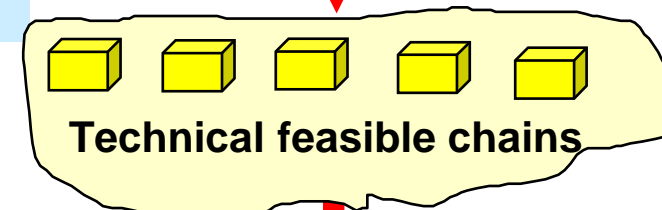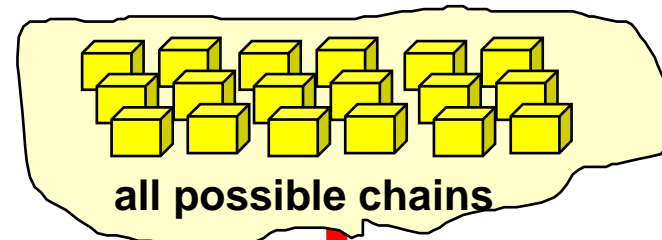
• **PERFORMANCE of TECHNIQUES**
• **PRODUCT REQUIREMENTS**

Technical feasible chains

STEP 2: CRITERIA

ECONOMICAL   **ENVIRONMENTAL**   **SOCIAL**

Preferred chains

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Relocation — Sediment → Water body
Indicators: 1, 2, 3

In-situ treatment — physical conditioning / capping — Sediment → Water body
Indicators: 1, 2, 3, 4, 5, 6

Sub-aquatic disposal — Sediment → Sub-aqueous depot
Indicators: 1, 2, 3, 4, 5, 6

In-situ treatment — biological / chemical conditioning — Sediment → Water body
Indicators: 1, 2, 3, 4

Up-land treatment — dewatering / land-farming / ripening — Sediment → Soil
Indicators: 1, 4

Up-land disposal — dewatering / land-farming / ripening — Sediment → Disposal site
Indicators: 1, 2, 3, 4, 5, 6

Up-land treatment — separation, natural / mechanical dewatering — Silt → Disposal site or beneficial use; Sand → Construction material
Indicators: 1, 2, 3, 4, 5, 6

Up-land treatment — dewatering, stabilisation — Sediment → Granulate, Construction material
Indicators: 1, 2, 3, 4, 5, 6

Up-land treatment — separation, dewatering, thermal processing — Silt → Gravel, Basalt, Brick, Artificial products; Sand → Construction material
Indicators: 1, 2, 3, 4, 5, 6

total cost (exemplary)

Legend:
1 All types, clean
2 Sandy / silty, moderate
3 silty, moderate
4 Sandy, PAHs/oil
5 Sandy / silty, rich cocktail
6 silty, rich cocktail

State of the art (BAT)
State of the scientific and technical knowledge

Subaquatic CDF's

23 million m³

IJsseloog

Sandefjord

55.000 m3

200.000 m³

Marseille

area 300.000 m²

capacità 1.600.000 m³

Livorno

uscita effluente

Ripening fields and sedimentation basins near Slufter

Volume

90 million m^3

Biological techniques

bioreactor

landfarming

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Dewatering techniques

lagoons

geotubes

filter press

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Sand separation techniques

sedimentation basins

hydrocyclones

METHA **Process**

Classification

Dredged Material

Cutter with pre-screening

Hydro cyclones (63 µm stage)

Hydro-cyclones (20 µm stage)

Stock basin

Rotary screen (10 mm)

Upstream current classifier

Sand Dewatering screen

Spirals

Vacuum dewatering belt

Coarse fraction

Sand

Fine sand

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Sednet Final Conference Venice 2004
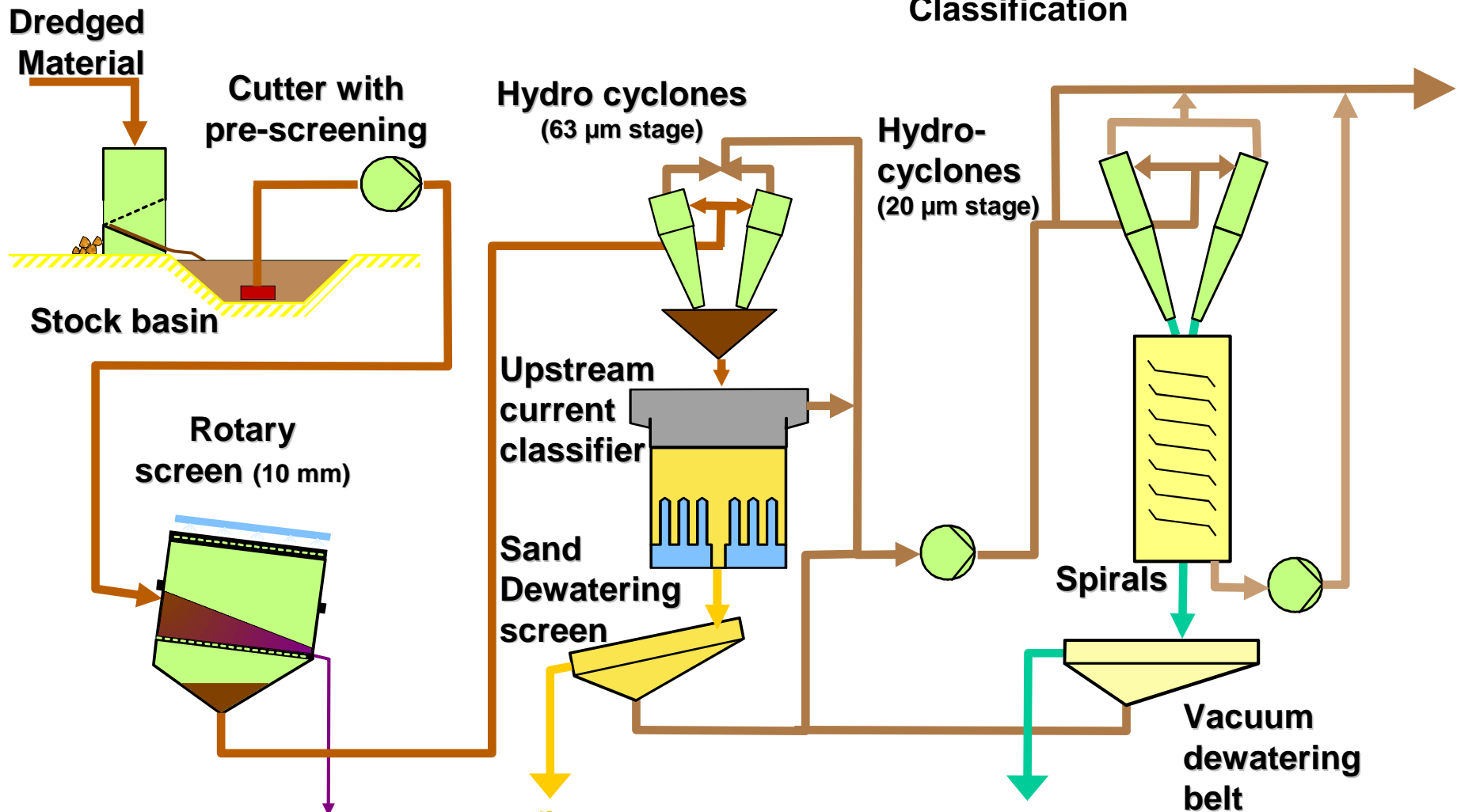
METHA – Treatment Plant

Dewatering Hall

- Annual Throughput 1 Mio. m³/a
- Corresponding 300.000 t/a dry matter silt

- In operation since 1993

- Investment   70 Mio. €
- Operation   6 Mio. € / year
- Staff   92

Silt Mound Disposal Feldhofe

Disposal capacity 20 million m³

Area   79 hectares

Final height 38 m above ground

Chemical immobilisation and stabilisation

Biogenesis soil washing

BIOGENESIS SEDIMENT TREATMENT
PILOT PROJECT
GENERAL OVERVIEW OF THE
BIOGENESIS[SM] SEDIMENT WASHING PROCESS
FIGURE 2-2
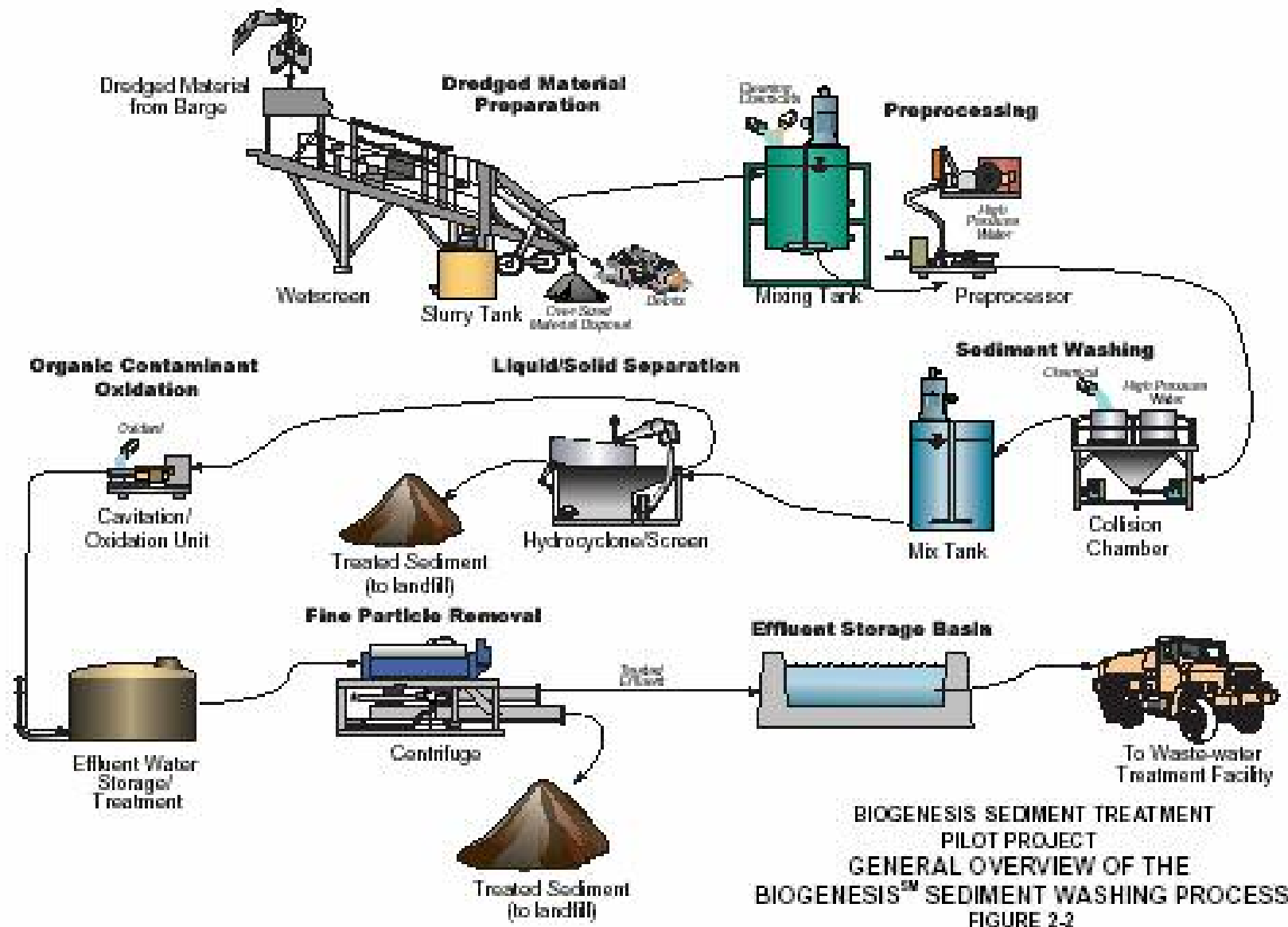
Thermal immobilisation

Ceramic Processing

Construction, covering and sealing

Construction materials from dredged material

Constraints beneficial use

➤ In general higher costs of treatment compared with disposal

➤ Lack of markets for products as secondary raw materials

➤ Limitations for beneficial use due to standards for the products

➤ Low awareness to consider treatment and reuse and/or acceptance of products

➤ No guaranteed or continuous supply for treatment to justify high investments by private sector

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Measures to encourage beneficial use

- Adapt standards on building materials
- Certify quality of products
- Development of markets
- Link dredging projects to infrastructure
- Apply products in governmental projects
- Forbid disposal of easily treatable dredged material
- Improve perception on dredged material
- Subsidy on treatment & reuse
- Large-scale pilot projects

Large-scale treatment pilot NL

➢ European tender granted in medio 2004

➢ 2 contractors 1 NL and 1 from Belgium

➢ Volume 450.000 m^3 contaminated dredged material

➢ Treatment into building materials and beneficial use of at least 50%

➢ Techniques: ripening, sandseparation and chemical immobilisation

➢ Project will be completed in 2009

➢ Results important for Dutch policy on treatment & beneficial use

Costs of treatment & beneficial use are site specific

➢ Scale

➢ Characteristics of dredged material

➢ Logistics

➢ Contract

➢ Legal constraints

Indication of treatment and disposal costs
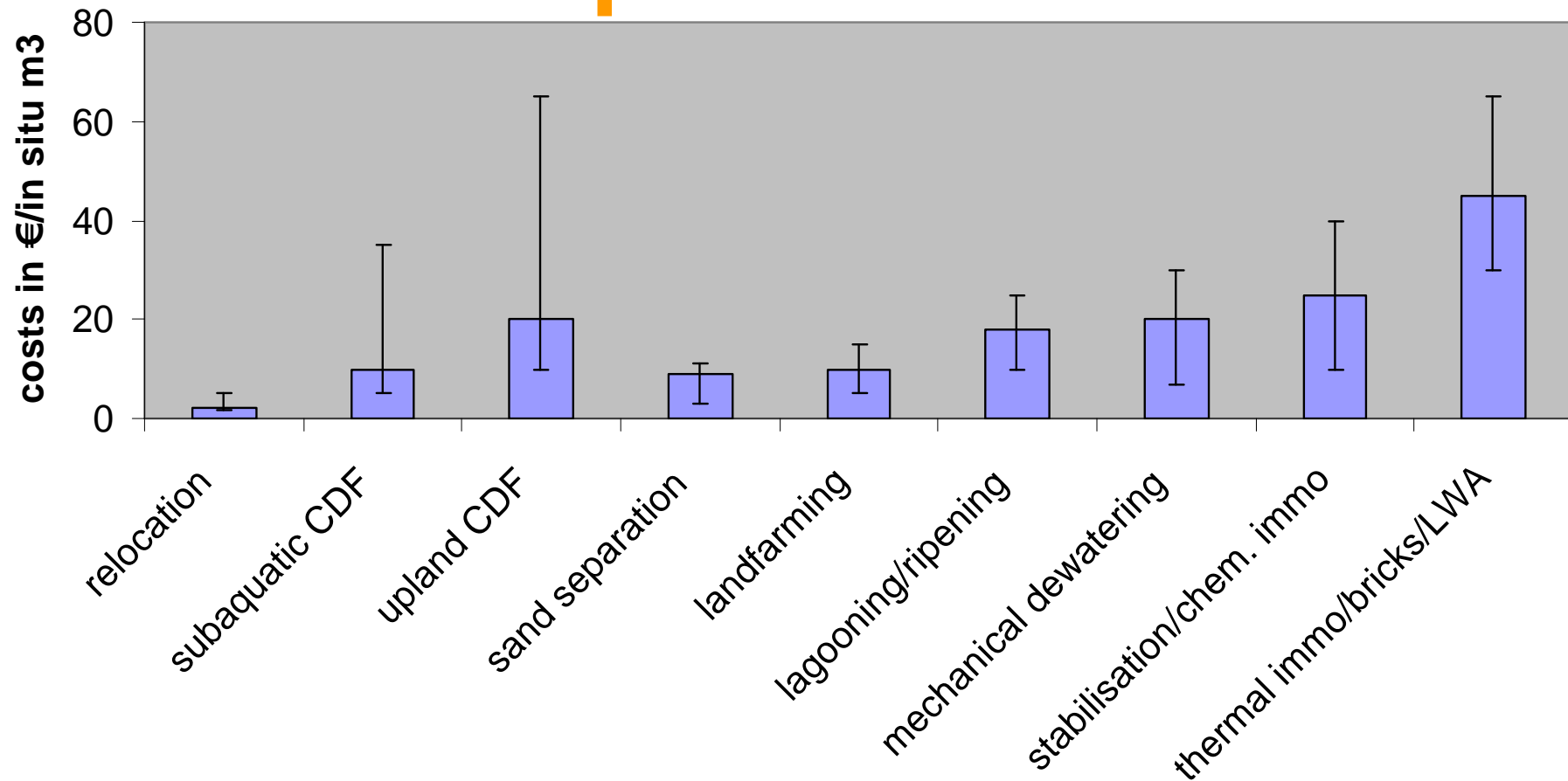
Conclusions (1)

➢ Technology is not the problem, but innovation that leads to more efficiency is welcome

➢ Mainly low tech methods are operational

➢ Advanced treatment has only been done on a small scale

➢ Treatment is done mainly for optimisation of disposal

➢ Markets for beneficial use is the key problem

Conclusions (2)

➢ Scale, logistics and legislation are important cost factors

➢ Treatment is in general more costly than confined disposal, but in some cases treatment can compete with disposal

➢ Confined disposal remains necessary option

➢ CDF's can be a environmentally sound solution

➢ Treatment and confined disposal can be complementary options

Recommendations (1)

➢ Treatment is only useful if it leads to:

  – beneficial use that is economically feasible

  – less disposal or less disposal costs

➢ Treatment & beneficial use need to be demand-driven additional to be driven by legislation

➢ Treatment & beneficial use need encouragement by financial incentives

Recommendations (2)

- ➤ Large-scale pilots are useful to gain experience on large-scale application of technologies, logistics, costs and market potential
- ➤ Involve the public and stakeholders
  - Communication on the actual risks
  - Dredged material is resource instead of waste
- ➤ Realistic and tailor-made solutions are needed

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Thank you for your attention

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