



## CIRCWASTE AND UUMA3 – ALTERNATIVE MATERIALS IN PLANNING AND PROCUREMENT PROCESSES

31.5.2018 / Elina Ahlqvist, Ramboll Finland Oy



# ALTERNATIVE MATERIALS

**Uusiomateriaalit** = Alternative / recovered/ recycled /waste materials, by-products, ...

- Industrial wastes and by-products (ashes, slags, crushed concrete, crushed bricks, gypsum, foam glass, tyre sherds,...)
- Technically poor surplus or slightly polluted soils (clays, silts, sediments, frost-susceptible till (moraine),...)
- Materials from existing road structures or bridges (mixed low-quality crushed stone, waste concrete,...)

Information about alternative materials (in Finnish):

- <http://www.uusiomaarakentaminen.fi/>

**RAMBOLL**



*Rengasrouhe, karkea (kuva: Rengaskierrätys Oy www-sivut)*



*Tiilimurske (kuva: Tero Elo 1999)*



*Kivihiilen leijupetipalton lentotuhka (kuva: Ramboll 2014)*

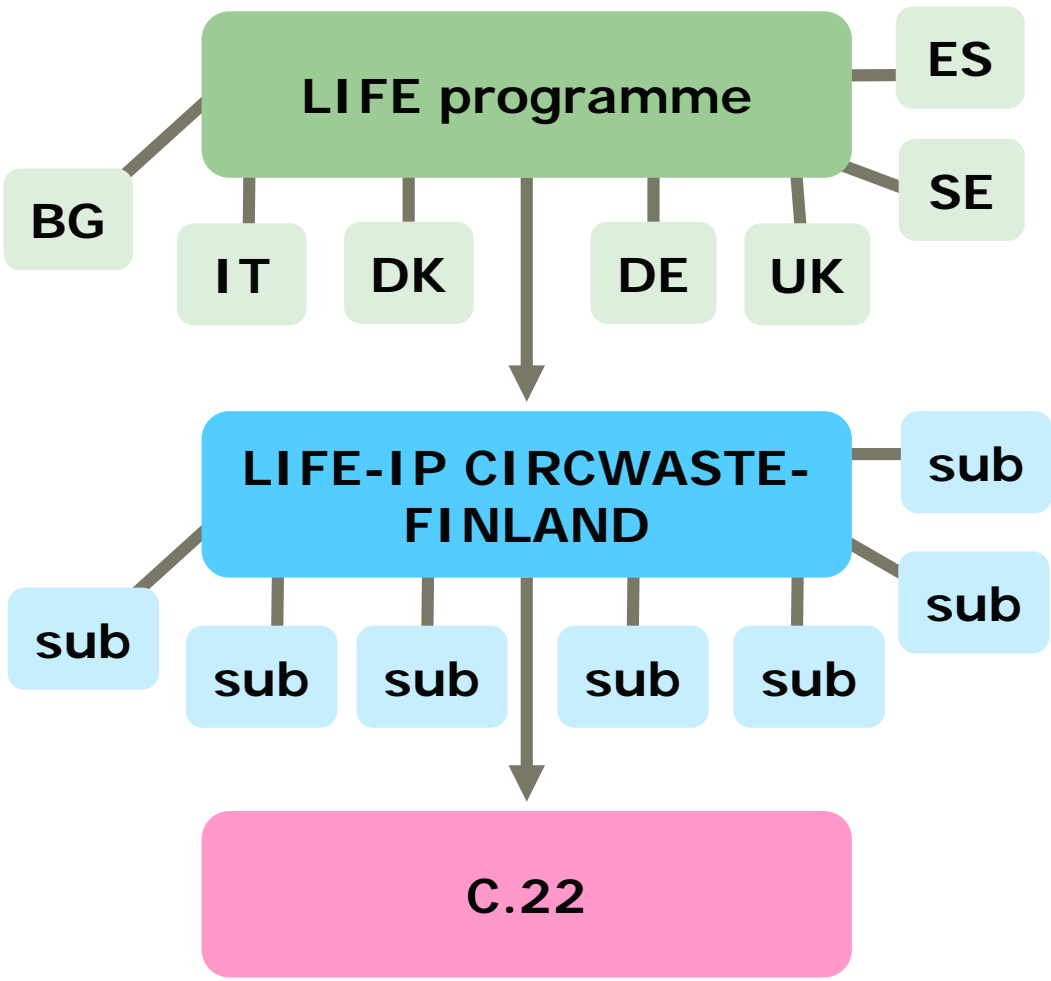
# CHALLENGES IN THE USE OF ALTERNATIVE MATERIALS

*"Alternative materials are surprisingly under-utilized in construction, although their usage saves money, reduce emissions and amount of landfill waste, save natural resources and even create new business opportunities."*

*Why?*

- Technical properties are unknown
- Quality and/or availability is not constant
- Long time behavior of structures is unknown
- Use requires environmental permit
- Guidelines are incompleting or totally missing
- Environmental legislation is strict
- Procurement processes do not recognize alternative materials

# EU LIFE-IP



- The **LIFE programme** is the EU’s funding instrument for the environment and climate action. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation.
- **LIFE-IP CIRCWASTE-FINLAND – TOWARDS CIRCULAR ECONOMY IN FINLAND** is a 7-year LIFE-IP project promoting efficient use of material flows, waste prevention and new waste and resource management concepts. All actions contribute to implementing the Finnish National Waste Plan (NWP). Coordinator is the Finnish Environment Institute.
- The **CIRCWASTE** project includes 19 separate cases and it puts into practice demonstrations and pilot plants and carries out studies and trials related to resource efficiency solutions. In addition to the LIFE IP budget, the CW gets its complementary funding also from other European Commission funding instruments and national funds and private companies.

# EU LIFE-IP CIRCWASTE-FINLAND SUBPROJECT C.22

## “PILOTING OF THE USE OF RECYCLED MATERIALS IN A HIGHWAY CONSTRUCTION APPLICATION (2016-2023)”

### **PARTICIPANTS**

- The Finnish Transport Agency, co-financer and main client of the subproject C.22.
- Ramboll Finland, coordinator of the C.22 and partner of the CIRCWASTE project.

### **BACKGROUND**

The waste management targets of the Finnish Waste National Plan:

- to replace 5 % of the natural gravel and crushed rock used in construction with industrial and mining waste by 2020.
- to improve the materials efficiency, promote recycling, reduce harmful effects on the climate from waste management, develop and clarify the organisation of waste management and improving waste management know-how.

The FTA's circular economy target:

- to increase the use of recovered materials in groundworks in order to reduce the volume of natural materials brought in from outside. (Sustainability report 2017)

# EU LIFE-IP CIRCWASTE-FINLAND SUBPROJECT C.22

## “PILOTING OF THE USE OF RECYCLED MATERIALS IN A HIGHWAY CONSTRUCTION APPLICATION (2016-2023)”

### AIM

- to promote the use of alternative materials in earthworks for road and railway projects in Finland.
- to share knowledge of developed planning and procurement processes with other relevant parties.

### PLANNED ACTIONS

- to carry out piloting activities on selected pilot road during various stages of its construction.
- to test and demonstrate the utilisation of various waste streams in versatile road construction applications.
- to perform LCA/LCC studies.
- to develop a Material Logistic Model and an approach model which will interconnect the design and construction process with material acquisition activities.



# EU LIFE-IP CIRCWASTE-FINLAND SUBPROJECT C.22

In progress:

- “*Alternative materials in road structures*” - Handbook and Background study
- “*Report of alternative materials for road and railway planning projects*” - content recommendations for a report of alternative materials in different planning stages
- Developing of dimension methods for road structures containing alternative materials. University research and computing work (master’s or doctoral thesis).
- Pilot sites (highways and other roads)
- Updating of procurement document templates of the FTA. A separate sub-website will be set up under the ‘Procurement guidelines’ page in the Agency’s Intranet for compiling up-to-date information on alternative materials.
- Performing and developing of LCA/LCC studies.
- Developing of a network among all the parties involved (alternative materials producers, infrastructure designers, decision makers and constructing companies).

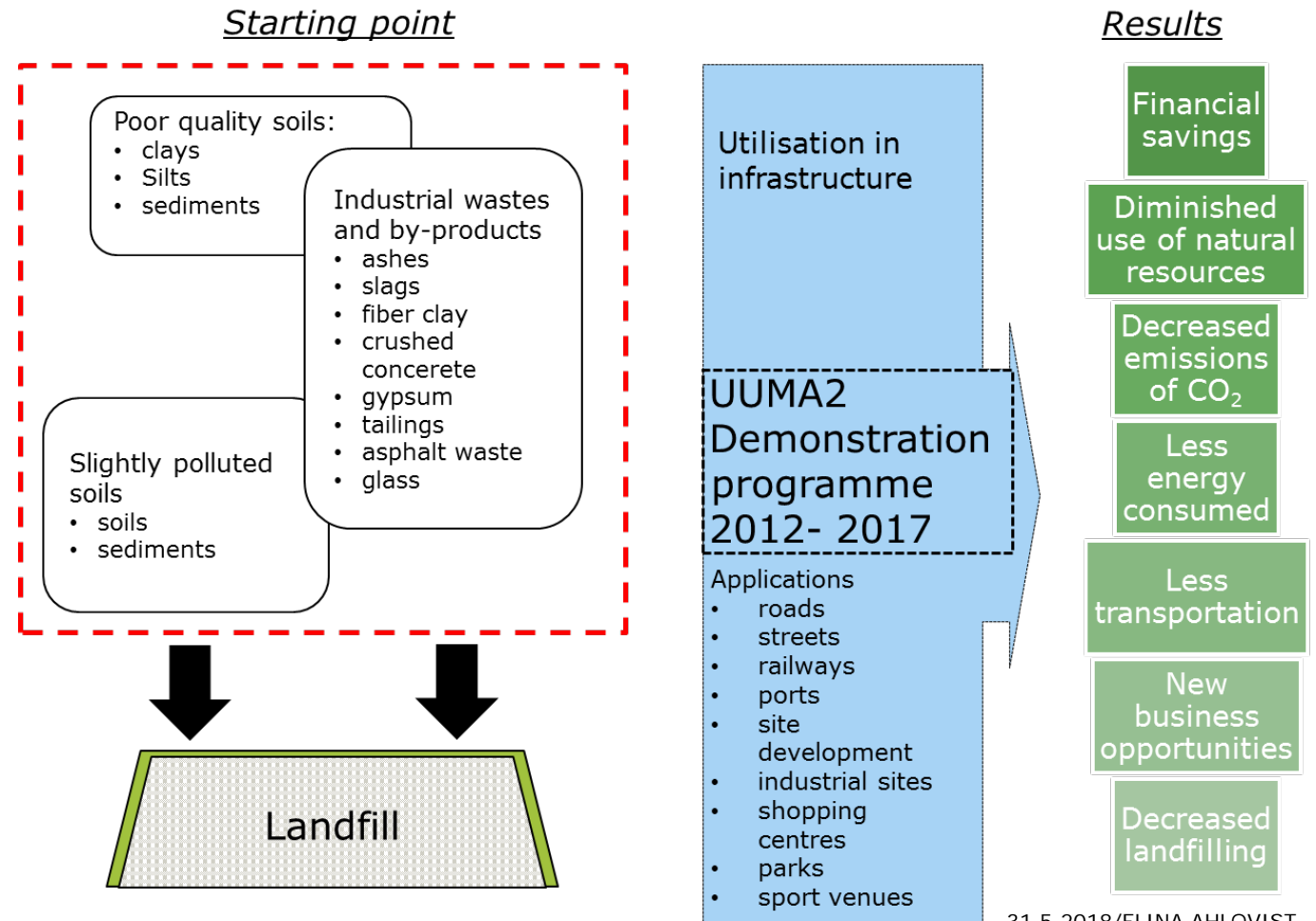
# UUMA PROGRAMMES (RECOVERED MATERIALS IN EARTHWORKS)

UUMA (2006–2010)  
UUMA2 (2013–2017)  
UUMA3 (2018-2020)

Development of

- product process for materials
- construction technologies
- planning and design processes
- acquisition methods (procurement)
- environmental legislation

## UUMA2 – in nutshell





## UUMA3 (2018-2020), MAIN TARGETS

- FTA and UUMA3 cities have included alternative materials in their planning and procurement processes from zoning/preliminary planning to the construction phase.
- Guidelines and guidebooks on using alternative materials in road structures and municipal engineering construction planning are ready.
- New regulations on the recovery of certain wastes in earth construction (ns. MARA) and use of surplus soil (ns. MASA, not yet published) are well known and applied.
- National guidelines for testing, evaluating and handling of acid sulphide soils (ASS) in public infra construction projects are published.
- Generally accepted methods for LCC and LCA calculations are developed or under construction.
- New commercialized alternative materials products and construction solutions are developed and available at cost-effective price.
- Several pilot sites for testing alternative material solutions are going on.
- Education/courses on alternative materials are available in universities, universities of applied science and seminars.

# DOCTORAL DISSERTATIONS ON ALTERNATIVE MATERIALS

- *“Fly Ash Mixtures as Flexible Structural Materials for Low-Volume Roads.”* Pentti Lahtinen, Helsinki University of Technology (Aalto University), 2001.
- *“Converting raw materials into the products - Road base material stabilized with slag-based binders.”* Marko Mäkikyrö, University of Oulu, 2004
- *“Risk Assessment of Modern Landfill Structures in Finland.”* Hannu Aurinko, Lappeenranta University of Technology, 2015
- *“Recovered Municipal Solid Waste Incineration Bottom Ash: Aggregate-like Products for Civil Engineering Structures.”* Annika Sormunen, Tampere University of Technology, 2017
- *“Innovative methods for measuring and improving the bearing capacity of forest roads.”* Tomi Kaakkurivaara, University of Helsinki, 2018
- Several dissertations in road structure behaviour and mass stabilisation are in the making

A construction site featuring a green truck with a trailer, a yellow tractor, and a red tractor on a dark, muddy surface. A white banner with the text "THANK YOU!" is overlaid on the image.

**THANK YOU!**