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Data and methodologies for a resource-efficient planning of primary and secondary aggregates in South East Europe (SEE) countries

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Why is this issue important?

1. Recent, complete and reliable statistics on sources and quantities of primary and secondary aggregates, actual recycling rates, and the overall aggregates requirements for the construction industry are core to resource-efficient planning
2. In the absence of such data, objectives may be hard or impossible to achieve,
3. Planned achievements may be unrealistic or even counter-productive.

What are the long term objectives?

- Overall objective 1:

Sustainable Aggregates Resources Management (SARM)

- Overall objective 2:

Sustainable Supply Mix (SSM)

What's the state of art in SEE?

1. It is necessary to understand to which degree these data are available, under whose jurisdiction their collection, storage, and reporting falls, and whether they are currently used in planning.
2. Data are largely unavailable (especially in SEE, especially in case of unconventional sources)
3. Secondary aggregates are often not considered in planning for aggregates supply
4. Methodologies for data retrieval and or data estimate are to be identified and implemented

What's the main contribution of this paper?

The contribution of this paper is mostly focused on:

1.the definition of (unconventional) aggregates and

2.the strategy to estimate the contribution of unconventional aggregates, for which data gaps and uncertainties are clearly a bottleneck

Classifications of aggregates

AGGREGATES CASE STUDY

- **natural aggregates**, from mineral sources
- **recycled aggregates**, from processing material previously used in construction
- **secondary aggregates**, from industrial processes

Directive **89/106/EEC** on **Construction Materials**

- TECHNICAL approach based on the source of aggregates, characteristics, type of processing
  - **natural aggregates**
  - **recycled aggregates**
  - **artificial aggregate**

SOUTH EAST EUROPE
Jointly for our common future

SARMa sustainable approach to aggregates

Programme co-funded by the EUROPEAN UNION

SARMa GLOSSARY

natural aggregates, from mineral resources
recycled aggregates, obtained from recycling of construction &demolition waste
manufactured aggregate, aggregate produced from industrial activities

ADOPTED CLASSIFICATION

R1: Recycling of quarry/mine by-product, waste & residues

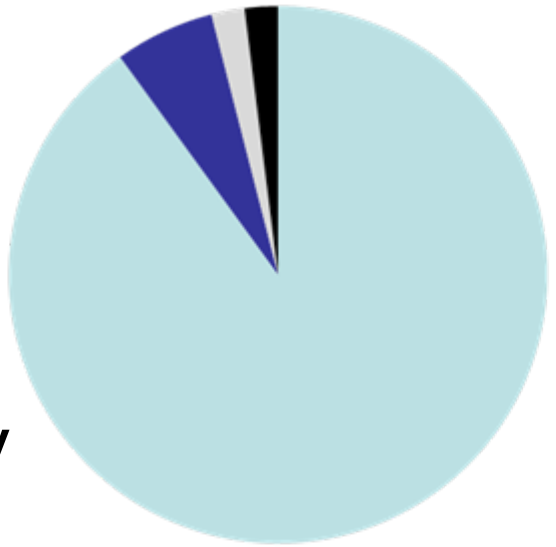
R2: Recycling of Construction &Demolition Waste (C&DW)

R3: Recycling of excavated soils/rock from civil works

R4: Recycling of industrial waste

Sources of aggregates and recycling in EU (UEPG)

- UEPG 2010 data:
  - 90% natural
  - 6% recycled
  - 2% marine
  - 2% manufactured
- UK, B, NL recycle 90% of C&D materials, that's only 20% of total demand
- Overall 40% of EU C&D materials are recycled
- If 100% recycled, that's only 15% of total demand



European average production of aggregates in 2010 was 5.5 tonnes per capita

C&D waste arising and recycling rates in the EU27

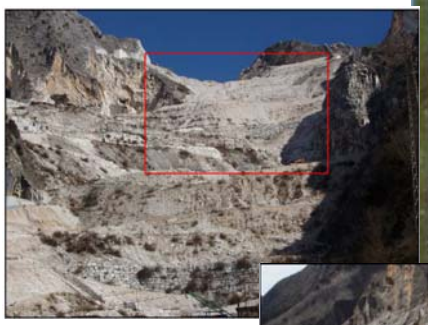
	C&D waste arising (Mt)	C&D waste arising (t / capita)	% Re-used or recycled
Austria	6.60	0.81	60%
Belgium	11.02	1.06	68%
Bulgaria	7.80	0.39	n.a.
Cyprus	0.73	0.58	1%
Czech Republic	14.70	1.44	23%
Denmark	5.27	3.99	94%
Estonia	1.51	1.12	92%
Finland	5.21	3.99	26%
France	85.65*	5.50	45%
Germany	72.40	2.33	86%
Greece	11.04	0.37	5%
Hungary	10.12	0.43	16%
Ireland	2.54	2.74	80%
Italy	46.31	0.80	n.a.
Latvia	2.32	0.04	46%
Lithuania	3.45	0.10	60%
Luxembourg	0.67	5.90	46%
Malta	0.8	1.95	n.a.
Netherlands	23.9	1.47	98%
Poland	38.19	0.11	28%
Portugal	11.42	1.09	5%
Romania	21.71	n.a.	n.a.
Slovakia	5.38	0.26	n.a.
Slovenia	2.00	n.a.	53%
Spain	31.34	0.74	14%
Sweden	10.23	1.14	n.a.
United Kingdom	99.10*	1.66	75%
EU 27	**531.38**	**1.74**	**46%**

R1: quarry/mine by-product, waste and residues

Mining waste (according to Directive 2006/21/EC on the waste from extractive industries)

By-product (according to COM(2007) 59 on waste and by-products)

Carrara marble, Toscana, Italy



1.4 Mt/y marble blocks

2.1 Mt/y mining waste

Waste deposits:

- **516 ha**
- **136 Mt (years: 1838-2005)**

R2: Construction and Demolition Waste (C&DW)

C&DW are classified in the European Waste Catalogue (2000/532/EC)

(17 01 cement, bricks, tiles - 17 02 organic materials – 17 03 bituminous materials - 17 04 metals 17 05 excavation waste - 17 07 mixed C&D waste)

Directive 2008/98/EC ⇨ within 2020 C&DW recycling of 70%

Natural aggregates

Recycled aggregates

C&DW can be turned into secondary recycled products ⇨ used in substitution or in mix with natural aggregates for several end-uses, saving land and non-renewable resources

R3: soil and stones from civil works

Waste (EWC 170504) **(according to Directive 2008/98/EC on waste)**

Soil and stones: waste arising from land leveling, civil works etc.

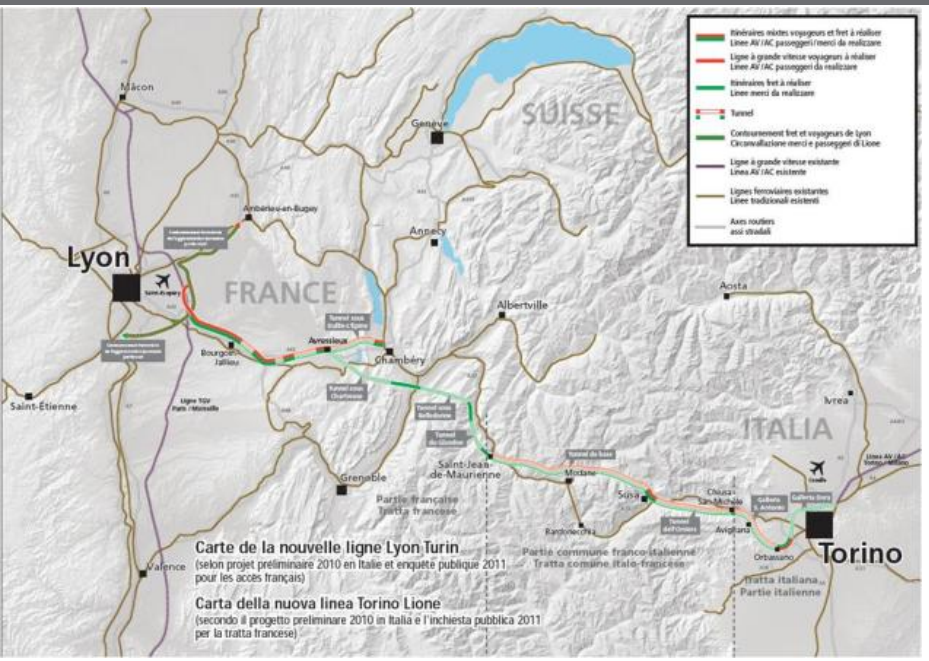
By-product **(according to COM(2007) 59 on waste and by-products) –**

For example the Italian environmental law allows this classification but it requires the respect of constraining physical-mechanical and environmental rules

Remarkable problem in densely populated cities (e.g. Turin, Italy: R3 might supply 3 times the demand of aggregates for some years… relevant issue for extractive activities planning)

Aggregates from R3 can be similar to natural aggregates...

R3: soil and stones from civil works



LTF Lyon Turin

RFI Rete Ferroviaria Italiana
Gruppo Ferrovie dello Stato

2013-2023

Lyon – Turin railway link

	Mm³	%
RE-EMPLOYABLE WITHIN THE SAME CIVIL WORKS	8.7	47
TO BE PROCESSED OUTSIDE OFF-SITE	4.7	26
FILLING	5.0	27
TOTAL	**18.4**	100

Extractive activities plan of the Torino Province

Aggregates supply in the Torino Province

⇨ 9 Mm³/y (3 Mm³/y road – 6 Mm³/y concrete)

R4: industrial waste

Examples: slags from ferrous metal production, bottom ash from Municipal Solid Waste (MSW) incineration, ashes from coal combustion processes etc.

⇨ **Directive 2008/98/EC on waste**

Proposed scheme for data collection (focus on unconventional aggregates)

	Quantity of waste/materials generated(2) (t/y)	Quantity sent to recycling(3) (t/y)	Quantity of produced unconventional aggregates(4) t/y)
R1			
R2			
R3			
R4			

!!! There is lack of data and statistics to fill in this table. However, this scheme seems to be the most straightforward in order to understand the overall quantity of generated waste/materials, the quantity sent to recycling and (finally) the quantity of aggregates.

(2) Only part of the waste generated can be recycled into aggregates; for instance only the mineral fraction of C&DW can be turned into aggregate).

(3) In case of missing information about the actual destination of waste/materials, it is incorrect to assume that destination is recycling!

(4) The difference between "quantity sent to recycling" and "quantity of produced recycled aggregates" might be a rough measure of the efficiency of recycling.

Conclusions

- Demand for aggregates depends on the technical quality of products and end-uses, rather than on the origin of aggregates
- Planning of primary and secondary aggregates must be carried out in an integrated way
- Data are key to resource-efficiency, SARM and SSM, however they are largely unavailable
- Strategies have to be deployed to estimate the contribution of unconventional aggregates

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