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sustainability REDUCTIONS
Reducing Environmental Degradation & Unsustainable Consumption Trends & Impacts On Nature & Society:
Research, Policy and Practice
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More efficient use of aggregates in construction in the UK

1. Introduction and aim

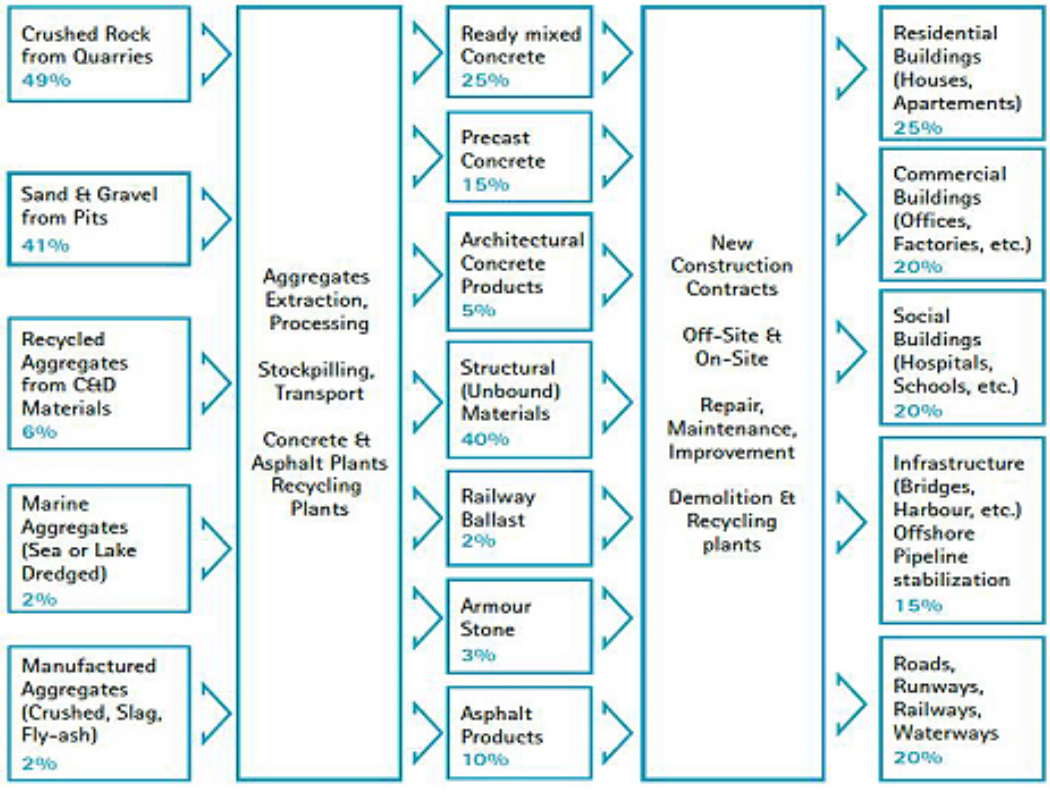
This case study considers the reduction of aggregates as basic material in the construction industry. The policy mix covers the United Kingdom (UK).

Aggregates as defined in this fact sheet are sand, gravel, crushed rock, and associated substances such as those that naturally occur mixed with sand, gravel and crushed rock. They may be extracted from land or dredged from water ('primary aggregates'), produced as a by-product of other activities ('secondary aggregates'), or recycled from construction and demolition waste ('recycled aggregates').

In the EU, aggregates are used in the following ways:

Figure 1

Use of aggregates (EU data)



Source: Bicket and Salmons 2013, p. 12.

2. Description of the case

The case described here addresses the use of aggregates and their related environmental impacts in the UK during the extraction and disposal phases. The impacts of the extraction of aggregates show a wide range of impacts: noise, dust, traffic, are part of them, also contamination of ground water and surface water, as well as impacts on archaeology, heritage and wildlife. The impacts of disposal are: disamenity; contribution to global warming risks through the release of carbon dioxide and methane; damage from leachate; pollution and accidents associated with the transportation of waste to landfill as well as road congestion, road wear and tear, and noise. The degree of environmental impacts varies across different aggregates.

The landmark policies for aggregates reduction – and thus the focus of this fact sheet – are the UK Landfill Tax, introduced in 1996 and the UK Aggregates Levy from 2002. Already before 1996, waste disposal management was subject to increasing UK legislation measures. However, they were insufficient so the insights about the environmental impacts of aggregates reach back to the research gained in the conception phase of these regulations.

Figure 2

Overview of the potential environmental impacts of aggregates in the UK

Source	Transport	Dust	Noise	Blasting	Visual	Water	Wildlife	Heritage	Amenity	Restoration
Hard rock quarry	O	O	o	O	o	o	o	o	o	O
Sand and gravel quarry	O	o	O	n/a	O	o	O	O	o	o
Marine dredging	O	o	O	n/a	o	n/a	o	-	-	n/a
Recycling	O	O	o	n/a	O	n/a	-	-	-	O

Major impact	Noticeable Impact	Minor Impact	Insignificant Impact
O	o	o	-

Source: adopted from Bicket and Salmons 2013, p. 8.

The aim of the Landfill Tax was to: (i) internalise the environmental costs associated with landfill; (ii) minimise waste; (iii) promote recycling; and (iv) bring UK landfill costs in line with those of nearby countries. The aim of the Aggregates Levy was to ensure that the environmental impact of aggregates extraction was more fully reflected in prices, and to encourage a shift in demand away from primary aggregates towards alternatives such as recycled construction and demolition waste, and china clay waste. It was also anticipated that the Levy would encourage more efficient use of all aggregates, greater resource efficiency in the construction industry, and the development of a range of other alternatives including the use of waste glass and tyres in aggregate mixes. Until 2011, revenues generated by the Aggregates Levy were partially recycled into the Aggregates Levy Sustainability Fund, whose aims included: reducing the environmental footprint of quarries and marine extraction; delivering more sustainable use of aggregates and transport thereof; and benefitting communities affected by aggregates extraction.

Methodologically the case is analysed following the DYNAMIX project framework. It uses a case study approach based on ex post evaluation of policy measures targeted at economy-wide resource reduction. This evaluation of the identified policy mixes usually distinguished between the **effect** of the policy mix, i.e. the results of a measure that can be attributed to its implementation (which implies a causal link between the policy action and its intended impacts on human behaviour and the environment) and its **effectiveness**, i.e. whether or not

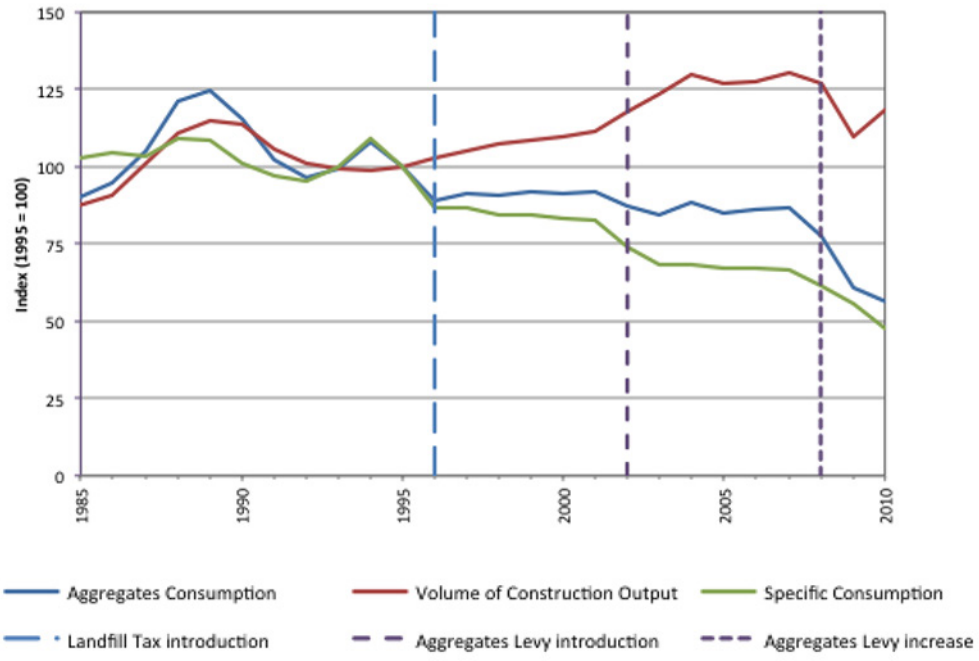
the intended objectives and targets have been achieved. In addition, the policy mix's **efficiency** and **(social) sustainability** were evaluated. The efficiency of the policy mixes was assessed by comparing the achieved level of resource and impact decoupling with the monetary (or other) resources applied to achieve the outcome. The sustainability of the policy mixes was assessed by evaluating the social effects and environmental effects that are not covered in the key targets (e.g. local effects, toxicity, marine issues). Social effects, however, were only assessed for EU countries, while environmental effects were assessed globally based on data availability. This fact sheet mainly reflects on the effectiveness.

3. Measured absolute reductions

Before 1995 aggregates consumption and construction output was closely correlated. This changed with the introduction of the Landfill Tax in 1996. Analysis implies that absolute decoupling was achieved with an overall increase in construction output and an overall decrease in aggregates consumption over the period between 1995 and 2010. Figure 3 illustrates the trend in aggregates use against construction output in the UK compared to 1995 baseline levels. The vertical lines mark key relevant policy changes: the introduction of the Landfill Tax in 1996; the Aggregates Levy in 2002; increases in the Landfill Tax and Aggregates Levy in 2008; and another increase in the Landfill Tax in 2009.

Figure 3

Policies and decoupling of aggregates consumption from construction output against a 1995 baseline



Source: Bicket and Salmons 2013, p. 11. Based on: Idoine, N. E., T. Bide, and T. J. Brown. 2012. "United Kingdom Minerals Yearbook 2011", Nottingham, British Geological Survey

4. Policy implications for waste reduction

The combination of instruments targeting both supply and disposal has contributed to the success of the policy mix. They provided "a signal to producers of the need to change production methods and practices". The policy mix managed to better internalise externalities of aggregates production, as well as those related to landfilling. Through revenue recycling, funding was allocated to research and development of alternative uses of recycled aggregates. To adopt the resource efficiency concepts, UK policy makers explicitly rooted their arguments in the Polluters Pay Principle and waste hierarchy of 'reduce-reuse-recycle'.

The business sectors identified as having a key impact on the supply of aggregates included operators of quarry sites producing aggregates and importers of aggregates. The Aggregates Levy was designed to target these, although it was anticipated that much of the financial burden of the levy would be passed on to purchasers of aggregates.

Some expected the Landfill Tax would increase fly-tipping to avoid the new charges associated with such a tax, but there is no strong evidence to support this. However, border leakage was observed as an unintended outcome of the Aggregates Levy; a high level of illegal trade was observed across the border between Northern Ireland, which was subject to the Aggregates Levy, and the Republic of Ireland, which was not. To address competitiveness concerns and to attempt to reduce the level of illegal trade, the Aggregates Levy Credit Scheme was introduced in Northern Ireland in 2004, giving aggregates operators a tax credit of 80% in return for signing an agreement to make environmental improvements on-site.

5. Transferability to other areas

Drawing upon findings from the assessment of aggregates policy in the UK, the following recommendations have been made for countries considering the introduction of a tax on aggregates[1]:

• A tax on aggregates should be combined in a package with other policy instruments (such as permits or standards).

• The elasticity of demand for aggregates has to be considered, i.e. to what extent producers and consumers will be sensitive to price changes. Generally, due to their low cost relative to transport and overall construction costs, demand for aggregates is inelastic. The role of the tax in affecting the cross-price elasticity between primary and recycled or secondary aggregates plays a vital role in encouraging the substitution of primary aggregates.

• Revenues should be recycled to correct market failures and further reduce external costs (e.g. through training in best practice methods to make extraction and transport more efficient and less disruptive). Recycling revenues is also likely to improve the public acceptability of a tax.

• Tax distortions across country borders need to be considered when setting the tax rate. Different tax rates for regions with borders may be necessary to discourage illegal trade activity which is otherwise costly to monitor and penalise.

[1] The recommendations were made by the European Environment Agency for EU Countries

6. Other reflections and conclusion

The trend in absolute decoupling of aggregates consumption from construction output, observed in Figure 3, is consistent with the introduction of policy mix elements related to the Landfill Tax and the Aggregates Levy. The corresponding substitution of primary aggregates with secondary and recycled aggregates has contributed to a reduction in the environmental externalities associated with the aggregates industry.

The Aggregates Levy acted as a stimulus towards environmental improvements, and the combination of the Aggregates Levy and the Landfill Tax are credited with giving a signal to producers of the need to change production methods and practices.

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Related website: http://dynamix-project.eu/results

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