

11.0 AGGREGATES TAXES

11.1 Introduction

Taxes on aggregates are an example of natural resource based taxes. Such taxes are frequently discussed in the context of promoting recycling of materials. A tax on the extraction of primary material is expected to make recycling more viable economically. Furthermore, the rate of extraction of non-renewable resources has given rise to concerns, at different times, for the sustainability of dependence on resource extraction.

The linkage to waste taxes is therefore clear. A further link is that the absence of taxes or regulation on mineral resource extraction will inevitably lead to the presence of ‘holes in the ground’. Many countries are still dependent upon landfill as the principal means of waste disposal, and there are links between such dependence and the creation of void space for future landfilling. Taxes on mineral extraction can, therefore, have an indirect effect of waste disposal costs through tightening (in the longer-term) the supply of void space available for landfilling.

In this Chapter, we look at three taxes on mineral extraction, the Danish tax, the Swedish tax on gravel and the UK aggregates tax (just agreed) – presented in sections 11.2 to 11.4 respectively. We had intended to examine the Belgian tax on aggregates (in Flanders) but we have not done this owing to a lack of information.

11.2 *The Danish Raw Materials Tax*

Design and Development of the Tax

The tax on raw materials in Denmark has always been linked with the waste tax. The two were introduced together in January 1, 1990 replacing an administrative charge that had been in place since 1987. The 'two taxes' are intended, jointly, to support movement of waste up the waste management hierarchy and reduce resource use. The tax is known as the *Tax on waste and certain raw materials (Afgift af affald og råstoffer)*. A law was first put forward on the 8th of December 1989. The Danish Parliament - Folket get - had the first discussion/reading of the law on the 12th of December 1989. The law was implemented the 1st of January 1990.

In what follows, we discuss the raw materials tax, but this has to be considered in conjunction with the waste tax. The effects of the two are, as we shall see, inseparable.

Prior to the tax on waste and raw materials being introduced, a tax existed at a level of 0.35 DKK (EUR 0.047) per cubic metre of raw material extraction (from 1977 to 1983) and later at 0.5 DKK (EUR 0.067) per cubic metre (1983 to 1990). Since 1990, the tax has been fixed at 5.00 DKK (EUR 0.67) for each m³ of raw material extracted.

The tax is levied after the following raw materials are commercially extracted (and permission is required as per the Law on Raw Materials¹), or commercially imported:

- Stones; gravel; sand;
- Clay; limestone; chalk;
- Peat; top soil;
- and similar deposits

The full list of raw materials falling under the tax together with conversion factors to cubic metre is attached to the implementing legislation (for example,. 1 tonne gravel = 0.6 m³).

The amount to pay by the extractor is based on the amount of raw materials in m³, which are delivered from the registered business during a certain period (every 3 months). Commercial extractors of raw materials and importers of raw materials are to be registered. Registered businesses, who use raw materials in further processes, have to account for the amount of raw material used as the basis of their tax assessment. Raw materials delivered to foreign countries are not subject to tax.

¹ See Statutory Notice No 569 of 30 June 1997, under the Law on the Continental Shelf, see Statutory Notice No. 182 of 1. May 1979)

There was no externality assessment used to set the level of the tax, and there was no ex ante evaluation of effects. We understand the Ministry of Taxation is currently investigating the possibility for minor revisions to the tax.

Tax exemptions exist for:

- Raw materials extracted for coastal projects to protect the beaches against erosive action.
- Sea floor materials, which originate from maintenance and capital dredging projects and which are utilised as raw materials.
- Residual products and waste products, which are extracted from already closed depots.
- Top soil and mould, which are delivered without payment.
- Raw materials commercially extracted or imported by a business, when the annual amount is less than 200 m³ of raw materials.

However, there are cases where extraction is not formally considered as “raw material extraction” and hence liable for the tax – e.g. when the removal of gravel is necessary for the completion of a road building project. Recycled materials (if not commercially extracted again) and waste do not fall under the tax regime.

Revenue and Use of Revenue

The State is the beneficiary of the tax revenue. There has never been any compensatory measure for sectors extracting or using minerals. There was no transition period for the sector when the government adopted the law.

Table 57 shows the evolution of revenues over time. The revenue accrues to the Exchequer. The 1999 revenue figure is equivalent to only 0.00015 % of GDP.

Table 57: Tax Revenues in MDKR (MEUR)

Year	Tax Revenue
1995	135.7 (18.2)
1996	134.8 (18)
1997	144.8 (19.4)
1998	156.5 (21)
1999	183.5 (25)

Intentionality of the Tax

The natural resource tax is intended solely to reduce resource extraction. Prior to 1990, the tax in place was intended to reduce extraction and to raise revenue to assist in the mapping of occurrence of raw materials).

Organisational roles and Administration

The Ministry of Environment designed the first version of the law. Later amendments (except one in 1992) were designed by the Ministry of Taxation. Responsibility for the implementation/administration (tax collection) rests with the Ministry of Taxation, which also decided upon whether there will be any exemptions, and handles the development of exemptions. The Ministry of Taxation also monitors the level of extraction. Such a system was already in place before the tax came into force.

The administration and the control of the tax constitutes a small burden relative even to this small tax. In 1989 the cost was estimated to 752.000 DKK for the implementation of the tax and 1.135.000 DKK for the annual operation. There appear to be no more recent estimates.

Complementarity within Portfolio of Policy Instruments

As mentioned above, the raw materials tax was implemented at the same time as a tax on waste. The two laws are supposed to limit the use of raw materials and to promote the recycling of construction waste.

Environmental Effect

The evidence reported to us is that since the tax today is not very high, it has probably had very little - if any - effect on the extraction of raw materials. With a tax increase the demand for raw materials could change but the elasticity is quite low and so the tax would have to change significantly.

It is felt that annual rates of extraction are poor proxies for the effectiveness since the amount of raw material required in any given year depends mainly on the need for construction materials (between 25 and 40 million m³). The relative effect of the tax will be insignificant in influencing whether or not the material will be extracted.

It is felt that a better indication of effectiveness is the rate of use of recycled construction materials. 90% of all demolition materials are now recycled (this equals 1 million m³ and is the maximum realistic amount). This is in line with the tax's aims but is much more likely to be down to the waste tax and new environmental thinking on behalf of the companies involved.

The rates of tax as applied to waste materials and raw material extraction are compared below:

- Waste delivered to landfill sites: DKK 375 per tonne
- Waste delivered to electricity production plants: DKK 280 per tonne
- Waste delivered to different types of incineration: DKK 330 per tonne.
- Raw materials: DKK 5 per m³

Since the materials extracted are relatively dense (densities greater than 1 kg/cubic metre) the rate of tax on raw materials will be less than DKK 5 per m³. In practice, only the landfill rate applies for construction materials since these cannot be burned. Thus, the economics of whether or not to use primary or secondary materials in the context of demolition / disassembly and construction are that one pays a raw materials tax of less than DKK 5 per cubic metre or one recycles and avoids a disposal tax that is 75 times greater! Clearly, the relative strength of the two incentives is such that one would expect the recycling to be a consequence of the benefits of avoiding disposal as opposed to the avoidance of a raw materials tax.

On top of this, since the instigation of the 1990 tax, all aggregates used at sea (harbours, defences) must be taken from recycled materials. This now amounts to 8 million m³. This is part of the legislation.

Effect on Producers and Consumers

The key industry sectors affected are the construction (and demolition via the waste tax) and cement production sectors. We have no information on the effects on the value chain, though we would expect that the tax is passed through in full since it is small relative to the value of most of the end products (construction infrastructure), demand for which could be assumed to be relatively inelastic. Hence, the tax burden will fall principally on end consumers. We have not been made aware of any concerns on the part of consumers.

The sales price for the materials subject to the tax differ from one material and product to another. They range from approximately 15 DKK to approximately 150 DKK per cubic meter. As such, the percentage price increase implied by the tax varies between 3 % and 33 %.

Competitiveness Impacts

Competitiveness concerns led to the design of the tax such that raw materials delivered to foreign countries are not subject to tax and foreign firms importing into Denmark are subject to the tax. No adverse competitiveness impacts have been reported, possibly as a direct result.

Internal Market Effects

There have been no Single Market concerns raised. Because of the nature of raw materials there have been no 'external EU' effects. Foreign firms exporting raw materials into Denmark are also subject to the tax while Danish firms exporting them are not subject to the tax. The design of the tax has not been influenced by Single Market issues.

Impacts on Trade

No changes in trade patterns have been reported.

Impacts on Employment

No figures are available but the effect of the tax is so minimal that no effects would be expected unless coming from the recycling of demolition wastes (used for construction and at sea), but this is mainly due to the waste tax. As discussed above, these were brought in under the same legislation and their effects are difficult to distinguish.

Equity and Distributional Effects

For reasons discussed above, there appear to be none.

11.3 *Aggregates Tax in Sweden*

Tax Design and Development

For environmental reasons, the Swedish Government introduced in 1996 a Law Concerning a Tax on Natural Materials (1995: 1667), which imposed a tax on the extraction/sale of gravel. Any company or body that exploits a site that requires a permit under the Nature Conservation Act, Water Act or Road Act must pay the tax. However, activities within gravel pits and for aftercare at the site are exempt from the charge. The tax was introduced on 1st July 1996, at an *initial* rate of SEK 5 (EUR 0.5674) per tonne of natural gravel. Natural gravel is defined as naturally-sorted earth materials, which consist mainly of sand, gravel, cobble and boulder size fractions. As of 1st January 2000, the tax rate was still SEK 5.

The tax rate was set low in order not to put too much economic pressure on smaller gravel pits. Whilst the Housing and Building Ministry were keen to see the tax set at 10 SEK, generally, it was felt that any higher rate might lead to established gravel pits closing down prematurely, before their gravel reserves had been fully exploited.

Intentionality of Tax

The rate was considered to have both an “informative” and “incentive” effect to aggregate users.

Since gravel is relatively cheap to extract the intention of the tax is to make alternative materials more cost-competitive. These materials include crushed rock and recycled material such as concrete. It is important to appreciate that the term "aggregate" typically refers to three primary raw materials in construction and civil engineering, including gravel, crushed rock and sand, of which the first and last are subject to the tax.

Gravel is regarded as an invaluable resource in Sweden since it is an important groundwater reservoir (i.e. aquifer) material, and in certain parts of Sweden gravel beds are essential for drinking water supply. The Swedish EPA recognises that “there is a great shortage of natural sand and gravel in many parts”² of Sweden. In fact, this shortage is occurring mainly in southern Sweden, and also parts of east and west Sweden. The Geological Survey of Sweden predicted in 1994 that at the existing rate of gravel consumption, 80 municipalities³ would have exhausted their natural gravel by 2024 – 40 of these municipalities (in southern Sweden) would have no natural gravel left by 2004. Conversely, in northern Sweden gravel reserves will have a 700 year lifetime. For Sweden overall, however, there was clearly a need to

² Natural Gravel Tax (pp. 104/5), Environmental Taxes in Sweden – economic instruments of environmental policy, 1997, Swedish Environmental Protection Agency.

³ The Use of Economic Instruments in Nordic Environmental Policy 1997-1998, TemaNord 1999:524, p.142

develop an economic instrument to divert consumption away from this valuable resource, especially in the south of the country.

Revenue and Use of Revenue

The Swedish State government receives all Gravel tax revenues. There is no known hypothecation of the tax.

Revenue from the gravel tax has risen progressively over the past 4 years, as shown in Table 58 below. It is somewhat surprising that revenue, and hence gravel extraction, has increased given that producers are known to be moving away from the use of gravel, concentrating instead on alternative materials. The Gävle Tax Authority believes that the rise may be due to not all operators reporting their taxes in the early years.

Whilst extraction licences give an indication of the total permitted tonnage of gravel that can be extracted until a given date, this is not a good means of measuring annual usage. Therefore, gravel producers are obliged, under the conditions of their extraction licences, to inform both the County Administration Boards and the Swedish Geological Survey, the exact tonnage of gravel they have extracted in the previous year. It is hoped that these figures will eventually be used by Gävle Tax Authority to cross-check tax returns. It could also help verify the effectiveness of the tax.

Table 58: Revenues from the Gravel Tax

<i>Tax Year</i>	<i>Revenue in Million SEK (EUR)</i>
1996	~66 ⁴ (7.3)
1997	120.5 (13.4)
1998	128.1 (14.2)
1999	144.4 (16.0)

Source: Gävle Tax Authority.

Organisational Roles and Administration

The competent Tax Authority for the tax is Gävle Tax Authority, located at the Special Tax Office in Ludvika. The tax is paid when the gravel is either sold or used within the business (i.e. in a vertically integrated construction company). The frequency with which companies are required to submit their taxes depends on the annual tax threshold into which they fall (see table below). The majority of producers are known to be paying their tax on a monthly basis.

⁴ www.autoeval.com - OECD database of environmental taxes in OECD

Table 59: Frequency of Tax Submission

<i>Annual tax threshold in SEK (EUR)</i>	<i>Frequency of payment</i>
<10,000 (1110)	Once a year
10,000—20,000 (1110-2220)	Twice a year
>20,000 (2220)	Every month

Source: Gävle Tax Authority

A 1995 study examining the cost of administering the Gravel tax was completed by the Swedish EPA prior to its introduction. This estimated the administrative costs and control of the tax as SEK 3.5 million SEK per year. This figure did not take account of the additional costs incurred by companies. However, the Swedish EPA estimated that the costs to companies would be of a similar figure. A recent evaluation report carried out by the Swedish EPA into the Gravel Tax did not investigate the administrative costs any further. The conclusion therefore is that the total administrative cost in Sweden of the Gravel Tax is of the order of SEK 5-10 million every year.

Complementarity Within Portfolio of Instruments

The National Roads Administration (Vägverket or NRA), commissions all surfacing of 100,000 kilometres of public roads in Sweden which requires a significant use of aggregates (to prevent frost penetration and the continual action of freeze/thaw). The NRA has been raising its quality standards for road construction materials since 1994 and gives a ‘bonus’ to tendering construction firms that use crushed rock instead of gravel. Frequently, crushed rock is the only practicable material to meet these strict conditions and the use of gravel for road surfacing is reduced through these standards.

Whilst the NRA state that they are “now using a lot more crushed rock in roads”, this has not been marked since the tax was introduced in 1996. Table 60 below clearly shows that from 1996 to 1998, sand and gravel use increased as a proportion of total aggregate use. Only in 1999 did this ratio decline, although the total sand and gravel usage in this year was unchanged from 1998.

Table 60: National Roads Administration Use of Sand and Gravel

Year	Total Sand, Gravel & Crushed Rock Used by NRA (mt)	Sand & Gravel (million tonnes)	Sand & Gravel (% of total aggregates)
1996	11.37	2.5	22%
1997	8.6	2.16	25%
1998	10.81	4.36	40%
1999	14.56	4.34	29%

Source: National Roads Administration

Since the NRA's road standards run in parallel with the gravel tax, the effects of the NRA's standards could be clouding some of the tax's impact.

Another key instrument that directly affects the overall extraction of gravel is a fixed charge on excavation and dredging. In Sweden, all companies apply a charge of SEK 0.26 per tonne (1996-2000) for the excavation costs of "raw material", i.e. sand, gravel. This instrument was also introduced in 1996, although the charge is not regarded as 'environmental'.⁵ There are no exemptions for the tax. To date, there have been no studies to examine the total revenue from this charge. One of the problems is that the money has been dispersed, since it is collected by County Administrative Boards. The Swedish EPA confirmed that the original intention of the charge was to fund research into alternative construction materials within the industry. However, to date, this has not occurred. Interestingly, it is understood that the aggregates industry commissioned a study to examine whether the income generated by the charge was being spent. However, we were unable to obtain details of this report.

Other policy instruments relating to natural materials:

- **The Environmental Code (1999)** - is now the main legislation for environmental protection, subsuming many other older regulations, including the Act Concerning the Management of Natural Resources (1987). Whilst the Environmental Code does not give details of the Gravel tax, it does publish details of the charges for extraction of natural materials.
- **Excavation Charge for limestone** - Introduced in 1996, the rate of SEK 0.0004 per tonne of limestone raised \$4.47m in 1997. The money is earmarked to cover those costs incurred by authorities in processing permit applications for and exercising regulatory control over abstraction operations. The charge should also finance research and survey work.⁶
- **Landfill tax** – gravel, earth, clay, slates, limestone, and 'other kinds of stone' are exempt from the tax of 250 SEK (28.3697 EUR) per tonne if deposited in 'special landfills' not used for other wastes.

Environmental Effect and Effectiveness

Gravel and crushed rock are used primarily in foundations for buildings and civil engineering works and in the production of concrete and asphalt for roads. Sand is unsuitable for use in foundations and is used mainly in concrete production (sand also accounts for less than 5 % of the Swedish aggregates market⁷).

⁵ Discussions with Swedish EPA and referenced in 'The Use of Economic Instruments in Nordic Environmental Policy' 1997-1998, TemaNord 1999:524, p. 81

⁶ www.autoeval.com - OECD database of environmental taxes in OECD

⁷ ibid (CEC)

There is a significant amount of waste material produced each year in Sweden (e.g. around 1m tonnes of concrete waste and 200,000 tonnes of brick waste), so good alternatives exist for gravel substitution. The NRA confirms that there is a lot of research currently being carried out on alternative materials for road surfacing, using materials such as crushed concrete, metal slags, and both fly and bottom ash (from power or waste incineration plant). Sweden produces a lot of steel, so slag could be used as material for local construction purposes.

It is understood that existing technical requirements for roads do make it difficult for certain materials to be recycled. However, the NRA noted that new road materials are often laid on top of old roads, particularly in the north of Sweden, which prevents the reuse of the existing road surface material. Whilst some asphalt recycling does occur in the south of Sweden, there is some debate as to whether recycled concrete should be used in road construction from 2001, since opinions are divided as to whether concrete is strong enough to be used effectively. The NRA, Swedish EPA and other parties are currently discussing these issues.

Prevailing Aggregate Market Conditions

Figures obtained from the NRA (see table 61 below) clearly show a dramatic decline in sand and gravel usage for Sweden overall, from 82% in 1984 to 40% by 1998. The table does show a larger percentage reduction (i.e. 6%) since the tax was introduced in 1996, than the corresponding 2 year period from 1994 to 1996. This may indicate an impact of the tax, although without a year-on-year analysis this may simply reflect the ongoing downward trend. The table does appear to confirm the general view in Sweden that aggregates manufacturers were actively considering diversifying out of gravel extraction both before and as the tax came into effect.

Table 61: Total Sand and Gravel Use as a Proportion of Total Aggregate Use

Year	Total Sand, Gravel & Crushed Rock Usage (mt)	Sand & Gravel (million tonnes)	Sand & Gravel (% of total)
1984	85	70	82%
1994	85	41	48%
1996	70	32	46%
1998	75	30	40%

Source: National Roads Administration

Recessionary Effects

According to the CEC, Skanska claimed that by 1999 the Swedish “aggregates” market had declined to almost half its previous size in 1990, reflecting the reduction in Swedish construction activity coupled with recession. The total aggregates market is believed to have

declined by almost one third from 1995 to 1997, with market share increasing with the largest operators. Consequently, there was considerable over-capacity in the market, with many quarries having substantial reserves. In 1999, approximately 50% of gravel “pits” were in use in Sweden.

Market Sizes

The Swedish Geological Institute (Sveriges Geologiska Undersökning) produces an annual report on production volumes in Sweden by county (län) and local area (kommun). The statistics are gathered by the county administrative boards and cover pit and crushing operations. According to these calculations, the total value of the Swedish market for aggregates is estimated at between Euro 326 and 370 million. Skanska believe that in 1997 aggregate sales amounted to 62,629,000 tonnes, equivalent to approximately Euro 366 million, a figure shared by other large companies in Sweden. These are slightly lower than the figures in Table 61 above.

Effects on Producers

By 1997, only six months after the Gravel tax had been introduced, the county administrative boards that process extraction permit applications started to notice considerable interest in rock quarry applications, implying a shift towards crushed rock products.

The Natural Gravel Commission estimated that the price difference in extraction and production between natural gravel and crushed rock was SEK 7-8. However, the final price to the customer needs to take into account the transportation costs. Prices of gravel range from 40 –50 SEK up to 120 SEK per tonne depending upon quality and location. Transport costs influence the prices that can be charged for the material. Hence the impact of the tax is to increase gravel costs by 4%-12% assuming this is passed through to the consumer. Interestingly, a ruling by the CEC on the dealings between two Swedish construction firms, Skanska (the largest construction company in Sweden) and Scancem, noted that the gravel tax “has served to equalise the cost of using crushed rock and gravel (crushed rock otherwise being more expensive).”⁸

In 1999, the tax was submitted by 817 taxpayers, these being companies extracting/producing the gravel products.

⁸ 1999/458/EC: Commission Decision of 11 November 1998 declaring a concentration to be compatible with the common market and the functioning of the EEA Agreement (Case IV/M.1157 - Skanska/Scancem) (notified under document number C(1998) 3434); Official Journal L 183, 16/07/1999, pp. 0001-0028

Competitiveness Impacts

At national level

The largest competitors in Sweden are Skanska/ Scancem, Ballast/NCC, Swerock and the National Road Administration (Vägverket) (see table below). The remainder of the market consists of a large number of small, local competitors.⁹

Table 62: Companies and Market Shares in Sweden

Company	Estimated Aggregates Market share
Skanska & Scancem	20-30%
Ballast/NCC	15-25%
Swerock	~7%
Vägverket (National Road Administration) ¹	~7%
Small and local suppliers	31-51%

Adapted from CEC Communication. Note 1. NRA is split into an 'authority' and a 'maintenance' division

Whilst the National Gravel Commission recognises the existence of a large number of local competitors in Sweden, the aggregates market appears to be undergoing a change in the proportions of gravel and crushed rocks used which may make the competitive conditions more difficult for smaller companies. Since investment costs are considerably higher for the production of crushed rock than for gravel, this will favour the large and financially strong suppliers. However, it is understood that a number of small suppliers of aggregates currently have significant overcapacity in rock crushing plants and are not expected to invest in new rock-crushing capacity for the foreseeable future.

Perhaps of greater importance to the market is the belief that aggregates producers face competition from "on-the-line" aggregates (obtained as a result of the construction activity itself – for example, crushed granite from tunnelling activities). "On-the-line" aggregates can either be used by the contractor for its own construction purposes on site or, less frequently, sold on the market.

At international level

The Swedish Government's website on Sustainable Development recognises that its ecological tax policies are restricted by the level of uptake of similar taxes in other countries:

“The Government will continue to pursue a policy to increase the use of taxes and charges in the environmental sector. The pace at which this can be done is, however, restricted by the pace of development in the rest of the world. Sweden must take into account the terms of competition that apply to small, open economies. The further imposition of environment-related taxes in Sweden must therefore be accompanied by

⁹ *ibid*

parallel developments in other countries. Since the realization of long-term sustainability requires economic instruments, it is of the utmost importance for Sweden to play a leading role internationally in this area.”

Impacts on Trade and Internal Market

Of Swedish trading partners, only Denmark has an explicit tax on raw materials, which includes gravel. Finland has considered introducing a Soil Abstraction Fee, which might by definition include sand and gravel. However, by 1998 this fee had not come into force.

Whilst it is generally rare for large quantities of aggregates to be imported/exported, due to the high transport costs, this does need to be considered. Sweden taxes both imports and exports of gravel but does not allow exporters to reclaim this tax unlike the Danish system. This implies that there is some discrimination against Swedish exporters of natural gravel to Denmark: while Danish exporters only pay the tax in Sweden, Swedish exporters pay it twice (as imports in Denmark and exports in Sweden). However this is consistent with the objectives of the tax – exporting a national natural resource threatened by diminishing stocks might be seen as perverse in this context.

The generally localised use of aggregates means that the Gravel tax is not believed to have an impact on the single market.

Impacts on Employment

It is unknown to what extent the Gravel tax has affected the aggregates industry. Whilst gravel pits may have shut, the overall labour involved with the industry may have remained stable. It seems likely that the relatively low labour intensity of the industry would make it likely that the net impact of the tax might be positive in employment terms as the use of these funds for public expenditure would be more employment intensive.

Impacts on Consumers

Transport costs are very high in Sweden. For example, according to the CEC, the cost of moving low quality gravel 20-30 kilometres equals the cost of the gravel itself. So, the distance from the gravel pit to the customer is crucial in determining the gravel price. The tax therefore increases the viability of the customer buying crushed rock products / recycled products instead.

Equity and Distributional Effects

The aggregates industry is polarised by the presence of large companies (which are believed to form an oligarchy) and much smaller operators. It is still unknown whether the tax has had any equity effect on the industry or households.

11.4 *The UK Aggregates Tax*

Introduction

The UK Aggregates Tax is not yet in place. An announcement was made in the March 2000 budget that such a tax would come into force in April 2002 at £1.60 (EUR 2.55) per tonne. The study of how this tax has evolved is an interesting one since as negotiations proceeded, Government sought to extract concessions from operators through asking them to develop a voluntary initiative (See Annex 4).

The term "aggregate" has no specific legal definition in the UK, but it is used throughout the construction industry to mean sand, gravel and crushed rock used for construction purposes. The levy will apply to sand, gravel and crushed rock. The levy will "catch" materials whether they are:

- Quarried in the UK;
- Mined underground in the UK;
- Dredged from UK waters; or
- Imported into the UK.

A consultation document issued by HM Customs and Excise during the negotiations between industry and government sought to further clarify the boundaries of the definition of aggregates. Three areas requiring clarification were addressed

- Materials that are not strictly aggregates but which are used for similar purposes - clay, shale and slate;
- Minerals (mainly for industrial use) whose extraction necessarily involves the extraction of stone, gravel or sand-anhydrite, ball clay, barytes, calcite, china clay, china stone, fireclay, fluorspar, gypsum, potash, sodium chloride, and talc; and
- Materials that are outside the definition but which need to be mentioned for the sake of clarity - coal, metals and peat

These were all (following discussions among HM Treasury, the Department of the Environment, Transport and the Regions and HM Customs and Excise) presumed outside the levy as it was accepted that they were not aggregates.

Rationale for the Tax

The rationale for the tax, as publicly stated, has been principally two-fold. In the first instance, the concern has been to reduce the environmental impacts associated with quarrying. In the second instance, the Government has been concerned to increase the rate of recycling of construction materials so as to reduce the rate of primary materials extraction.

It should be noted that the overall supply of aggregates is managed by a minerals planning system, which seeks to keep supply roughly in line with demand, subject to environmental considerations. The limitation on supply is not believed to be a pressing one under current market conditions. Indeed, demand has fallen in recent years from a peak of around 300 million tonnes in the late 1980s to below 250 million tonnes in most years during the early 1990s (estimates for 1996 being as low as 215 million tonnes). In the late 1990s, demand appeared flat at around 220 million tonnes.

Given the Government's wish to reduce environmental impacts from aggregates extraction, it is interesting to note that this flat demand contradicts historical trends which have seen close links between GDP and aggregates demand. Indeed, the 1994 Minerals Planning Guidance predicted that aggregates demand would grow steadily to 426 million tonnes per annum in 2010. It is not clear why this 'structural break' has occurred. Part of the reason may relate to more efficient building practices and waste minimisation. Part is almost certainly due to increased recycling of construction and demolition wastes occasioned by the landfill tax (see UK landfill tax study in this document). Lastly, controversy over the impact of more and more roads being constructed, frequently in quite sensitive areas (Sites of Special Scientific Interest and the like), led to a curtailment of the road building programme in the wake of a spate of environmental protests in the mid 1990s.

Development of the Tax

The Government first announced that work was to be undertaken on the environmental costs associated with the extraction of aggregates and other quarrying in the July 1997 Budget. In the Budget speech, the Chancellor stated:

“Work is to be carried out on the environmental costs attached to quarrying, including damage to the landscape. Results will inform consideration of whether there is a case for further measures, which could include tax measures, to ensure that these costs are reflected in prices. Greater use of recycled materials could then be encouraged”.

The Department of the Environment, Transport and the Regions (DETR) was asked to commission research into the valuation of environmental costs ("externalities") attached to various types of minerals extraction. The research included quarrying and dredging of aggregates - stone, sand and gravel. The environmental costs covered were the impact on landscape and on local residents, such as the effects of noise and dust. These were expected to vary for different types of extraction. The research was expected to address this and the extent to which the environmental costs are currently addressed through planning consents and regulation. Results will be considered alongside a review of the operation and level of landfill tax, which Customs & Excise will be carrying out.

Following this announcement, the Department of the Environment, Transport and the Regions (DETR) commissioned London Economics to undertake a study into the

environmental costs and benefits of the supply of aggregates. In parallel, the trade body, the Quarry Products Association (QPA), asked ECOTEC to carry out work on the possible effects of a tax were such an instrument to be introduced.

The London Economics report *The Environmental Costs and Benefits of the Supply of Aggregates, Phase 1, April 1998* detailing the findings of their research was published in April 1998, and is referred to as 'Phase 1'. This research, a contingent valuation analysis using stated Willingness to Accept as a measure of the externalities associated with aggregates extraction. The report purported to show that there are significant environmental costs associated with aggregates extraction and transportation that are not already covered by regulation. It also showed that there were significant environmental costs associated with recycling of materials for use as aggregates.

The ECOTEC (1998) report questioned the need for such a tax when similar goals might be achieved through increasing the landfill tax, or by re-specifying the exemptions from waste management licensing which enabled construction and demolition wastes to be buried in developments such as bunding and golf courses. It suggested that as far as an aggregates tax was concerned:

- ⇒ A tax on primary aggregates would need to be very high to have a major impact on demand as the elasticities of demand were relatively low (they were estimated in the report at -0.21 to -0.35 for sand and gravel and -0.3 to -0.5 for crushed rock);
- ⇒ The resulting percentage reduction in externality (i.e. the net environmental benefit derived) was likely to be less than the reduction in demand since many of the externalities from aggregates extraction are likely to be invariant with output (e.g. the disamenity from the quarry); and
- ⇒ Since there was already in existence a planning policy seeking to match supply and demand on a regional basis, then one could achieve what one sought through a tax by restricting the supply of aggregates.

In addition, although the tax might be a good revenue raiser, the point was made that because the public sector (through housing, roads, etc.) is a major user of aggregates, the revenues derived from the tax would be paid in the first instance by government departments and local authorities (although this might be passed on to users of these services).

Because of the highly political nature of the subject, and the fact that work had not progressed quite as intended, the London Economics report was subjected to an independent review. Subsequently, the Chancellor announced in his 1998 Budget speech that further work would be necessary to inform a final decision on a tax. A second phase of research was commissioned to look at both the local and national environmental costs. This took account of the recommendations of the independent review of the first phase of the research. This second phase also benefited from the guidance of a group of internationally recognised experts in this field.

Based on questionnaires on the local environmental impacts of quarrying, over 1000 surveys on the national environmental costs were completed. The resulting second report (*The Environmental Costs and Benefits of the Supply of Aggregates, Phase 2, July 1999*) showed that there were environmental costs associated with quarrying, including noise, dust, visual intrusion, loss of amenity and damage to biodiversity, which together, were valued at an average of around £1.80 per tonne of aggregates.

The Announcement

Following the work, the Government considered three ways of responding to the findings of the research:

- a) Do nothing (keep the status quo);
- b) Consider whether a possible voluntary package of measures put forward by the industry could address the environmental impacts identified (see below); and
- c) Introduce an aggregates levy, and recycle all revenues back to business through a cut in employer NICs and a new 'Sustainability Fund' aimed at delivering local environmental benefits to areas subject to the environmental costs of quarrying.

Government also decided to reject a voluntary package put together by the industry trade body (the QPA). The decision to introduce the tax was announced on March 21, 2000 in the Budget speech.

The tax will come into force in 2002. Its design has been informed by an earlier consultation process, which began before the Government began considering the merits of a negotiated agreement as an alternative to a tax (see Table 63).

Table 63: Milestones in the Development of the Aggregates Levy

Budget 1997	Research announced on the environmental costs of quarrying and supply of aggregates
Pre-Budget Report 1997	Research commissioned, covering tax, planning consents and regulations.
Budget 1998	Conclusion that there are significant environmental costs not already covered by regulation. HM Customs & Excise to issue consultation document on how a tax might work.
April 1998	DETR report "The Environmental Costs and Benefits of the Supply of Aggregates", carried out by London Economics. This later became known as the Phase 1 report.
September 1998	DETR report "The Environmental Costs and Benefits of the Supply of Aggregates— A review of the London Economics Report". This identified weaknesses in the research methodology of the phase 1 report.

Pre-Budget Report 1998	In the light of criticism, further research by London Economics undertaken to remedy the shortcomings in the first exercise. HM Customs & Excise are analysing response to consultation. Ministers are also reviewing alternative proposals offered by industry.
November 1998	The Quarry Products Association submits its "New Deal"—voluntary proposals as an alternative to a tax. During 1998 QPA also commissioned a report which argued that demand for aggregates was very inelastic and would be little affected by a tax. ("Environmental Effectiveness of a tax on the Supply of Aggregates", Ecotec 1998)
Budget 1999	Government would introduce an aggregates tax if industry could not commit to an improved package of voluntary measures. HM Customs and Excise publishes draft clauses for a tax.
July 1999	QPA submit revised "New Deal" proposals to Government.
July 1999	DETR report "The Environmental Costs and Benefits of the Supply of Aggregates—Phase 2", by London Economics. This superseded the original Phase 1 research and estimated that the total cost externalities associated with aggregates extraction were about £380 million.

Taxable Event

The aggregate will become liable to the levy when it is commercially exploited. In practical terms this will mean the earliest of:

- Physical removal from the site where it was extracted (except when it is moved to another site which is registered in the same name as the originating site);
- Sale to another person;
- Use for construction purposes; or
- Mixing with anything which is not chargeable aggregate or water.

As mentioned above, the levy will not apply to other quarried or mined products, such as coal; clay, shale and slate; metals and metal ores; gemstones or semi-precious stones; and industrial minerals.

Registration for the Tax

Anyone who is responsible for commercially exploiting aggregate in the United Kingdom is required to register to pay the levy. In most instances this is likely to be the operator of the site where the aggregate is extracted although under certain circumstances it could be the owner of the aggregate. Anyone importing aggregate from outside the UK and agreeing to supply it or using it for construction purposes would also be required to register and account for the levy.

It is expected that around 600 companies will be liable to register and pay the levy. Fewer than 10 businesses have more than 500 employees in the aggregates industry.

Analysis by Customs and Excise suggests total set up costs to the industry of approximately £1.2 million - equivalent to less than 0.5 pence per tonne extracted. Total recurring costs are estimated at approximately £750,000 per annum - equivalent to an average 0.3 pence per tonne extracted.

Exemptions

Cut stone (or "dimension" stone, used for repairing historic buildings, facing new ones and for monumental masonry such as gravestones) is to be exempt from the levy as it is not an aggregate. Some will find this somewhat strange as there are likely to be similar impacts flowing from extraction of such materials. However, the waste material from the production of dimension will be levied if sold as aggregate.

Recycled aggregate will also be exempt from the levy, given that one of the policy objectives of the levy would be to encourage recycling, so that the need for the extraction of virgin material would decrease.

Importantly in the context of this study, responses to the HM Customs and Excise consultation document argued strongly on economic grounds for an exemption for silica sand, and also for non-aggregate industrial and agricultural use of limestone, including cement making, lime burning and the use of powdered limestone in certain processes.

The further case for exemptions and reliefs of the above materials from the levy, as perceived by Government, are as follows:

- Some of the above materials form significant constituents of products that are traded internationally, whose UK producers would be put at a competitive disadvantage against importers and in export markets;
- Unlike aggregates, most of the materials have no recycled substitute;
- Some of the materials are already used for the direct benefit of the environment; and
- The materials were not the target of the environmental research and have been potentially caught only because they are derived from the same source as aggregates.

Silica sand and limestone used for prescribed industrial or agricultural processes will therefore be relieved from the levy.

Revenue and Use of Revenue

Government estimates that the £1.60 per tonne tax will raise revenues of £380 million (MEUR 605). This implies a market of 238 million tonnes.

The levy will encourage purchasers of aggregates to substitute towards using recycled aggregates. There will therefore be a reduction in output of primary aggregates. Government estimated reductions in demand using elasticities estimated by ECOTEC for the QPA in

1998. A best estimate of the impact of a £1.60 levy on the demand for primary aggregates would be a reduction of around 10%, or approximately 25 million tonnes. These estimates are subject to a wide margin of error.

One of the levy's more recently stated objectives is to raise 'revenues which could be used to lower other distortionary taxes in the economy and deliver local environmental improvements.' It is odd that this has appeared so late in the debate since arguably, had this been used a principal rationale from day one, it would have been very difficult to argue the case against the tax.

Organisational Roles and Administration

The levy will be administered by HM Customs and Excise, in common with other C&E taxes and duties. Traders will account for the levy themselves. Administration and enforcement will be undertaken by HMCE, with a range of penalties and interest for late payment, misdeclaration, non-compliance and evasion.

There is a cost to the Government of legislating for a levy. Set up and on going administrative costs to Customs and Excise would be in the region of £2 million in the year of implementation and £1 million a year for following years.

More interestingly, in the context of the negotiations between industry and government, would be some consideration of what might be termed the ex ante transaction costs associated with the tax's implementation. Consultancy studies alone funded by Government may have run in excess of £1.5 million. To this might be added the time devoted by industry representatives and civil servants in negotiation. This is likely to have been significant given the duration of the debate.

Environmental Effects of Recycling of Aggregates

Government estimates that some of this reduction in demand would be replaced by recycled and secondary aggregates, with offsetting benefits for firms which supply those products (often the same firms which produce primary aggregates). The data concerning the recycling of aggregates is very sketchy indeed. Throughout the discussions concerning the tax, this proved a major point of contention.

Not all construction and demolition wastes are suitable for re-use as aggregates. There are limits to the recyclability of such materials. The QPA claimed that the effect of various initiatives, some of them funded by Government, as well as the Landfill Tax, had increased rates of recycling (and certainly recovery) to levels where little more could be done. Though Government suspected this not to be the case (and are most probably right in their suspicions), no reliable figures exist for the extent of this type of activity. As such, the effects of the tax on recycling will be very difficult to surmise.

The environmental benefits from reductions in demand will depend upon the manner in which that demand reduction occurs. If the effect is to marginally reduce output at a number of quarries, the effect will probably be very little indeed. If, on the other hand, either in the short- or the long-term, the impact is such that the number of quarries is reduced, the environmental effects are likely to be more positive (on the basis that the environmental costs associated with quarrying are not strongly related to the scale of output).

Effect of Tax on Price

The price of aggregates in the UK is of the order £5 per tonne, some being lower in price, some higher. The effect of the £1.60 tax, therefore, is to increase prices by something of the order 30%. Some lower quality products will see greater percentage increases

Effect on producers and consumers

It is expected that much of the burden of the levy would be passed onto the purchasers of aggregates. This reflects the low elasticity of demand for the product, which in turn, reflects the low value in terms of end product, of the materials. BACMI (1996) and limiting the impact on profit margins in the aggregates industry estimates of the use of aggregates per £1000 of construction output (in constant prices) place the figure at just under 2 tonnes for sand and gravel, and just under 3 tonnes for crushed rock.¹⁰ This would imply, based on an output price of around £5 per tonne, that aggregates purchases constitute only 2-3% of construction costs. Furthermore, aggregates demand is significantly influenced by the decisions of the public sector which is responsible for some 40% of all aggregates use.

Competitiveness Impacts

The competitiveness effects of the levy are likely to be small. Aggregates are traded internationally, though import penetration of the UK market is believed to be of the order 1%. A tax could lead to increased imports from superquarries, but the intention is that imports of aggregates will be levied to remove the danger of damage to UK competitiveness and avoid the risk that policy objectives of the levy were undermined by a shift towards imported rather than recycled material. Imports will therefore be subject to the levy on first sale or use in the UK.

Similarly, exports will be relieved from the levy. Note that over 90 per cent of aggregates exported from the UK are from one coastal super quarry. The rationale for the exemption of exports was partly based on the view that, due to the remote location of the site and the fact that all the aggregates leave by sea, the external costs were relatively low. This appears not to have been properly tested by the research and reflects the fact that CV based valuations inevitably bear some relationship to population densities around sites being examined.

¹⁰ There does appear to be a secular trend towards more efficient use of aggregates per £1000 of output (measured in constant price terms), the total figure falling from 5.2 tonnes in 1980 to around 4.9 tonnes in the early 1990s.

The exemptions outlined above are explicitly designed to ensure the minimisation of any competitiveness effect on, for example, farmers, producers of glass, and other industrial users (e.g. foundries). Hence, one would expect the impact on other industries' competitiveness to be limited or zero.

Internal Market Effects

There appear to be no obvious single market effects since the tax is based on first sale or use in the UK. Those selling into the UK are no worse off than before in respect of their ability to sell into the UK. In any case, as mentioned above, the high transport costs associated with aggregates means that the potential share of the market affected by any levy is small. There may be a requirement for importers to register for the tax where previously they had not. It is the intention that anyone carrying out taxable activities (ie. subjecting a quantity of aggregate to commercial exploitation in the UK) should be registered for the tax. In the majority of cases this will be the site operator.

11.5 Summary

Two of the aggregates taxes we have examined are in place, one will come into force in two years' time. The two in place are used to generate revenue for the general budget, and whilst in Denmark, the intention is to encourage recycling and recovery, in Sweden, the principal aim is to conserve the stock of the resource.

The scope of the taxes reflects their intent. In Sweden, hard rock is exempt from the tax as part of the intention is to encourage switching to hard rock through closing the price differential (which currently favours gravel).

The taxes imply different changes in price, but in Sweden, it is not clear that the effect on demand has been significant. It would appear that higher taxes may be required, or that the effect may only show through in the longer term. In Denmark, the effects of the aggregates tax and the waste tax (they are part of one 'whole') are difficult to separate. Increased recycling of aggregates is believed to have occurred, but in addition, we understand that some wastes are used in recovery projects at unlicensed sites.

The interesting aspect of the Swedish tax is that exports are not exempt. This presumably reflects the view that the resource should be conserved, so that the resource should not be exported. Whilst this clearly affects competition between Denmark and Sweden, the degree to which this affects market shares is not likely to be enormously significant given the significance of transport costs in determining sales.

To the extent that aggregates extraction does not employ large numbers of people, the use of revenue through public expenditure may generate more jobs than are at risk through the demand reducing effect of a tax. As such, the employment effect could be positive.

It is worth commenting that the UK has followed a more 'orthodox' approach in setting its levy broadly to reflect average external costs of extraction. There is a desire to increase recycling, and revenue will be used to fund a reduction in employer NICs, and to fund environmental projects.