

## **6.0 WATER ABSTRACTION TAXES / CHARGES**

### **6.1 Introduction**

Abstraction permits represent a natural resource endowment, which may justify an accompanying payment to the entity which controls property rights. Still, abstraction taxes are relatively rare in the EU member states, and where they exist they often reflect administrative payments.

Abstraction charges, other than administrative fees, have been used for several decades in France and Spain for the financing of river basin management. The charge revenues are used for water management and administrated by special purpose agencies in water management.

More pure abstraction taxes with a fiscal function have been in operation at regional level in Germany, and they have been introduced recently at the national level in Denmark (1993) and the Netherlands (1995). The two recent tax schemes differ considerably in scope and effective tax rate. While the Dutch tax is relatively low, it does not exempt industry. The Danish tax is quite high, but applies to households and some service businesses only. Both taxes exempt agriculture. The taxes have been introduced as part of a greening of the tax system, and do not rely on any valuation of the environmental pressures from water abstraction, but may be seen to have significant incentive effects.

Initially, our selection included the abstraction charge in the Spanish region of Galicia. Due to the findings that it is in fact actually a regulation levy and not an environmental charge, we have subsequently decided not to include it in the final report.

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## 6.2 The Dutch Groundwater Tax

### *Introduction*

The Dutch Environmental Taxes Act was passed in 1994 and the Groundwater Tax came into effect on 1.1.1995. The tax was part of the effort to broaden the tax base, not only in the sense of shifting the emphasis of revenue generation from conventional taxes to environmental taxes, but also in the sense of introducing a broader range of environmental taxes apart from just an energy tax.

### *Design and Development of the Tax*

The tax applies to the abstraction of groundwater by water works or by other entities (industry; agriculture) and aims to protect the scarce groundwater resource in the Netherlands, which is the source of 70 per cent of the total water supply (the remaining 30 per cent being extracted from rivers and other surface waters). For the purposes of the tax, groundwater is defined as "sweet groundwater", i.e. water with less than 300 milligrams of chloride per litre.

The standard rate of the tax is 0.34 NLG per cubic metre of water (0.15 EUR/m<sup>3</sup>). The standard rate applies to the water companies. For other abstraction (industry, agriculture) the original rate was 0.17 NLG/m<sup>3</sup> (0.08 EUR/m<sup>3</sup>). For abstraction of groundwater that has been infiltrated, the original rate was 0.055 NLG/m<sup>3</sup> (0.025 EUR/m<sup>3</sup>). Infiltrated groundwater is typically surface water that is infiltrated through sand dunes or other geological layers and is then abstracted.

One of the goals of Dutch water policy is to contribute to the reduction of the use of groundwater relative to the use of surface water in water supply. Since groundwater is cheaper to extract than surface water, the tax serves to narrow the price differential. However, the price differential is on average about 1 NLG per cubic metre (EUR 0.45) (Leder, 1998: 162) so only in exceptional cases will the standard rate of the tax succeed in making groundwater abstraction less profitable.

The reduced rate applies to industries (though industry is being made to pay the higher rate from 2001) and agriculture undertaking their own abstractions. Even at the reduced rate this resulted in a price increase of more than 100% for self extracted groundwater, relative to costs of extraction (Vermeend and van der Vaart, 1998: 36). Industries which are supplied by the water companies will become affected by the tax, which is passed through, unless explicitly exempted. (Whether the tax is specified on the invoice is not known).

The following uses of groundwater are exempted from the tax (Vermeend and van der Vaart, 1998: 37):

- Sprinkling and irrigating land, if less than 40.000 m<sup>3</sup> per year is extracted, meaning that in practice agriculture is more or less completely exempted (interview),
- Draining of building sites, if less than 50.000 m<sup>3</sup>/month is extracted for less than 4 months,
- Small pump capacity (less than 10 m<sup>3</sup> per hour),
- Sanitation of polluted groundwater,
- Emergency extractions (e.g. fire department etc.),
- Extractions for skating rinks,
- Draining and mining (at depths greater than 500 metres) are also exempted from the tax.

The Green Tax Commission recommended increasing the reduced rate for industry and agriculture to the level of the standard rate (Ministry of Finance, 1998: 13).

The tax was originally proposed in 1992, as part of the new Environmental Taxes Act. Initially the proposed tax rates were lower, but as a result of the debate in Parliament and Cabinet, which resulted in some exemptions and a desire to cap the increase of the fuel tax, the groundwater tax rate was increased (cf. Vermeend and van der Vaart, 1998: 23-24). The Environmental Taxes Act came into force following publication in the Government Bulletin on December 13, 1994.

#### *Revenue and Use of Revenue*

The tax is mainly a fiscal tax, aimed at raising revenue for fiscal reform. However, the tax does also have the purpose of curbing the use of groundwater. The tax revenue (actual and expected) is shown in Table 19.

**Table 19: Revenue from the Dutch Groundwater Tax**

Year	MNLG (MEUR)
1995	288 (130.7)
1996	312 (141.6)
1997	314 (142.5)
1998	320 (145.2)
1999	328 (148.8)
2000 (expected)	360 (163.4)

*Sources: CBS, Kosten en financiering van het milieubeheer 1995-96: 31 and Dutch Ministry of Finance, Environmental Tax Unit.*

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### *Organisational Roles and Administration*

The tax is administered by the Ministry of Finance and the Central Environmental Tax Unit in Rotterdam. Monitoring of water abstraction is done by the water companies, and in the case of other abstractors self-monitoring is in place, with sample control. The administrative costs of the scheme are considered as insignificant. There are about 44 water companies, which are subject to the tax, and who pass it on to their customer bills. With regard to industry and agriculture no figure is available on the number registered, but the tax authorities describe the system as simple to administrate. There is little disagreement over the tax base.

### *Complementarity within Portfolio of Policy Instruments*

The groundwater tax is supplementary to the basic system of abstraction licenses. It supports the national plan for water management. Groundwater is also protected through specific designation of zones.

### *Environmental Effect of the Tax*

It is important to note up front that the exemptions and reduced rates in place, affecting mainly industry and agriculture (e.g. the exemption related to small pumping capacity of 10 cubic metre per hour) have considerably reduced the (potential) environmental effectiveness of the tax by creating room for environmentally-adverse practices. For example, the pumping capacity exemption created an incentive for farmers to use several smaller pumps, thereby reducing their capacity and not paying the tax. In terms of environmental effects, this resulted in an overexploitation of groundwater. It is thus fair to state that the groundwater tax has a limited environmental effect.

Despite the main fiscal objective of the tax, some estimates of the (groundwater consumption) price elasticities have been produced. The original assessments range widely: from  $-0.05$  to  $-0.30$ , from inelastic to medium elasticity levels. In 1997 a first evaluation of the groundwater tax was made and sent to Parliament (Vermeend and van der Vaart, 1998: 38). It seems that water savings by industry were found to develop in line with expectations, e.g. a decline in consumption between 2-12 % of the 1995 consumption levels.

The Green Tax Commission found elasticities to be of the magnitude of  $-0.1$  hence rather inelastic demand. The decrease in groundwater consumption which could be expected from the implied response amounts to only half of the goal set by policy-makers for reduced groundwater abstraction. This demonstrates the true goal of the tax (i.e. to raise revenues). The precise effect of the tax on demand from households (which account for 52 per cent of total revenue from the tax) is unclear.

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### *Effects on Producers*

For SME's and industries supplied by water works the groundwater tax results in a price increase of about 40% when assessed against the water supply tariffs. For industry with self-extraction of groundwater the price increase is relatively more substantial, e.g. of the order 113%. This is due to the low costs of self-extraction. For Dutch industry as a whole, the revenue collected by the groundwater tax amounts to 0.03 per cent of turnover, or 0.08 per cent of value added. In 1996 it was equivalent to 0.33 per cent of pre-tax profits in industry (calculated on basis of CBS, 1998: 8).

There were some complaints about the tax during the decision-making process, in particular from water-intensive industries such as beer- and soft-drink producers and dairies. The expected increase in the reduced rate to the standard rate has not resulted in any re-opening of this debate. The reason may be that the groundwater tax remains a minor element of the total water bill, when all costs for sewerage services are included.

### *Competitiveness, Trade Internal Market Impacts*

The main competitiveness issue raised by the tax is related to the position of industries which are supplied by water companies relative to those with self-extraction. This issue has been solved with the agreed increase to the standard rate for all abstractions. As regard internal market issue, the tax scheme has been approved by the European Commission. In conclusion, the tax is not considered to have had any significant impact on any of these issues.

### *Impact on Employment*

No information available.

### *Impact on Consumers*

For households the groundwater tax results in a 27 per cent price increase, measured against average water tariffs excluding sewage costs. Households pay about 52 per cent of the groundwater tax revenue. Due to lack of data, the extent of the regressive effects of the tax cannot be assessed – though it is clear that on average water accounts for a higher proportional of total household expenditure, the lower the level of income.

### *Equity and Distributional Effects*

Apart from the possible regressive impact of the tax on poor households, the main equity issue seems to have been the partial exemption offered to industries with self-extraction. The Green Tax Commission recommended abandonment of this exemption, and it expects the main effect to be a beneficial substitution in the supply of low-quality water by the water companies for industrial use (Ministry of Finance, 1998: 13).

With regard to the exemption for companies which use groundwater to rinse packaging, there were provisions which made it possible to apply the exemption both to companies with self-extraction and to those supplied by the water companies.

### 6.3 *The Water Supply Tax in Denmark*

#### *Design and Development of the Tax*

The water supply tax was introduced as part of the so-called green tax reform in 1993. The current rate of the tax is 5 DKK (EUR 0.67) per cubic metre of water supply of piped water. The implementation was phased in gradually with a successive increase of 1 DKK (EUR 0.13) per year from 1994 to 1998. Value Added Tax (VAT), which is charged at 25%, is imposed on the tax, so that the effective full rate of the water supply tax is 6.25 DKK (EUR 0.84).

The tax mainly applies to households (including individual wells which are common in rural areas). The tax does not apply to the agricultural sector because water used for irrigation (the vast majority of water used by the sector) is abstracted directly from the ground and does not use the normal water supply infrastructure. Most other enterprises in other sectors can deduct the tax from their VAT liability (see exemptions). However, there are certain selected types of business which cannot do this and are therefore liable for the tax. These include service-sector businesses (lawyers, accountants, architects etc.) and some entertainment services.

The tax is imposed on metered water delivered to customers. However, if metered water amounts to less than 90 per cent of the quantity abstracted by the water work, the latter will be subject to the remaining tax. This mechanism is meant to provide an incentive to reduce leakages from water pipes.

Apart from the staged introduction of the tax and some minor procedural modifications, no changes have been made to the tax.

#### *Revenue and Use of Revenue*

The tax is expected to generate a revenue of about 1,6 billion DKK (EUR 214 m) at its full rate, which is less than the 2,3 billion DKK (EUR 208 m) originally expected (see Table 20). The Ministry of Taxation did not seem to foresee the decline in water consumption and to have produced its forecast on the basis of rather dated figures. In the first four years of operation the tax produced 25-30 per cent less revenue than expected. The revenue goes to the general Government budget.

**Table 20: Revenue (actual and expected) from the Danish Water Supply Tax**

<b>Year</b>	<b>Revenue million DKK (Million EURO)</b>	
1994	295	(39.6)
1995	652	(87.4)
1996	970	(130.1)
1997	1279	(171.5)
1998	1544	(207.1)
1999	1482	(198.7)
2000	1555	(208.5)

*Source: The Danish public accounts*

### *Intentionality of the Tax*

The tax is a fiscal tax, which was introduced to enable a lowering of income tax (Andersen, 1994). The tax was also accorded a certain environmental resource protection incentive function, i.e. to reduce water demand from households.

The background to the tax is the fact that groundwater is the predominant source of water supply in Denmark, accounting for 99% of total water supply. During the 1980's the available resources began to diminish due to leakage of different pollutants into the groundwater. As a result the water balance on the main island Zealand became a delicate issue with extraction reaching a level which affected the flow of water in major streams and the level of ground water reserves falling in many places.

### *Organisational Roles and Administration*

The tax is collected by the Customs- and Tax Agency and its regional offices.

Normally the tax is specified directly on the annual water bill, along with sewage treatment, VAT etc. There are 171 public (municipal) water works and 2680 privately managed water works; while the former are common in urban areas, the latter are predominant in rural or formerly rural areas.

Regarding water supply from individual wells, the tax is collected by the local municipality, but the revenue is then paid to the Customs and Tax Agency. A standard consumption of 170 m<sup>3</sup>/year is assumed where no metering takes place. However, metering of water was already common before the introduction of the tax, and has been extended even more.

The administrative costs of the scheme are minor. The identification of households without a supply of piped water was done by the municipalities. They compared customer registrations of the water works with the local building register.

Water consumption is regulated by a concession system. The 14 regional Counties and the municipalities of Copenhagen and Frederiksberg are responsible for granting concessions. The tax can be seen as a kind of natural resource payment for the use of these concessions.

### *Environmental Effect*

Reducing household water consumption is the main environmental aim of the tax. It increased through the 1980's, but reached a peak in 1989. Since then it has been steadily decreasing. From 1989 to 1998 consumption decreased from 360 million m<sup>3</sup> to 266 million m<sup>3</sup>, i.e. about 26 per cent. About half of the reduction took place prior to the introduction of the water tax, the remaining half since its inception. There are no studies which explore the precise effect of the tax, but it is likely to represent less than a 13 per cent reduction since 1994.

Leakage from water works has decreased from 43 million m<sup>3</sup> in 1993 to 33 million m<sup>3</sup> in 1998, i.e. about 23 per cent. This is generally seen as a result of the tax.

#### *Effects on Producers*

The water tax does not affect industry.

#### *Competition and Trade Impacts*

The tax does not apply to enterprises and agriculture, to avoid negative impacts on their competitiveness.

#### *Internal Market Effects*

There is no internal market issue. The increase in sewage charges (the desire to reduce sewage disposal has knock-on effects on the amount of water used in production processes – energy conserving measures) is considered to represent a more significant share of the total cost of companies than the water supply tax.

#### *Impact on Employment*

The tax has a positive influence on employment, in particular for sanitary engineering companies, which renovate water installations. New products have been developed and are being marketed such as new types of water-saving sanitations, in particular low-flush toilets. However, the impacts cannot be quantified. And no analysis is available on the net effects of the employment effects of the tax, i.e. taking into account losses in employment related to “old” technology production.

#### *Impact on Consumers*

The tax seems to have fostered some behavioural change among households. Indeed, the use of water saving appliances is now common among Danish households. 45 per cent of Danish households have installed water saving taps, and 39 per cent of households indicate that they have invested in low-flush toilets (3- and 6-litre flush versus former 10-litre flush). 53 per cent indicate that they have a modern water saving washing machine.

Consumers mention both environmental reasons and the increased price of water as reasons for saving water. While 60 per cent of the consumers find that the influence of environmental reasons is significant or very significant, 40 per cent of them indicate a similar importance of the price. These answers may represent more of an altruistic than their actual behaviour .

This relative distribution between price and environmental reasons (40%/60%) can also be applied to the household water consumption reductions which have taken place since and because of the introduction of the tax. From the 13 per cent water consumption reduction achieved since 1994, one can assume that only 40 per cent of the reduction may be due to the

price increase – while about half of the price increase is due to the tax. In other words, 20 per cent (or 10 million m<sup>3</sup>) of the water savings can be attributed to the tax. This saving is of the same order as the 10 million m<sup>3</sup> leakage reduction, which also resulted from the tax. All in all, the tax has reduced (in gross terms) water consumption by about 20 million m<sup>3</sup>.

#### *Equity and Distributional Effects*

Surprisingly, there has been little debate on the possible regressive effects of the water tax. The tax is levied at an equal rate irrespective of the income of the consumer. Income tax on the other hand increases incrementally as a person's income rises.

## 6.4 Summary

There are both similarities and differences in the application of abstraction taxes between the Netherlands and Denmark. Both have been introduced as part of more comprehensive green tax reforms. In this sense they are also levied for financial reasons and are used to raise revenue for the general budget.

The Dutch tax is rather modest (EUR 0.15 m<sup>3</sup>) and the Danish tax is more substantial (EUR 0.84 m<sup>3</sup>), but the latter applies only to households and some service sector businesses. While the Danish tax revenue amounted to MEUR 214, the Dutch one generates just MEUR 163, despite the Netherlands being approximately three times more populated than that of Denmark.

It is clear that there are weaknesses with both taxes. The Dutch tax applies only to groundwater, but the rate is not sufficiently high to make a shift to infiltrated surface water profitable. The Danish tax has too many exemptions to promote efficiency in industry, but has nevertheless, to a certain extent, contributed to additional water savings in the magnitude of about 13 per cent of residential use over the period 1994-1999. The history of both taxes show that fiscal considerations had the upper hand in the design process, while efficiency and environmental considerations were marginalised.

Clearly, more careful design, with environmental considerations brought to the fore in the context of this design, could lead to more beneficial effects. Other possibilities would be the use of permitting mechanism designed to allocate water resources to the most efficient end-users. This would enable river basin authorities to set levels of abstraction designed to ensure that surface and groundwater abstractions do not compromise the ecological quality of the resource.

It is perhaps worth noting that any attempt to levy charges or taxes at an 'efficient level' is likely to be dashed on the grounds of *location-specificity*. Attempts to assess the external costs of water abstraction have been made through seeking to understand citizens' willingness to pay for water quality / availability, and also, through the recreational services provided by surface waters. These are difficult to transfer across applications. Hence, an 'efficient' incentive-based tax is likely to prove elusive in its design, though clearly, greater incentives can be conveyed without resort to such a purist concept.