

Cost-efficient or not cost-efficient is not the relevant question

Brita Olerup, Department of Industrial Economics and Management, Royal Institute of Technology

1. SYNOPSIS

Strengths and weaknesses of four means of environmental control in their practical application en route to an energy system that is compatible with sustainable development.

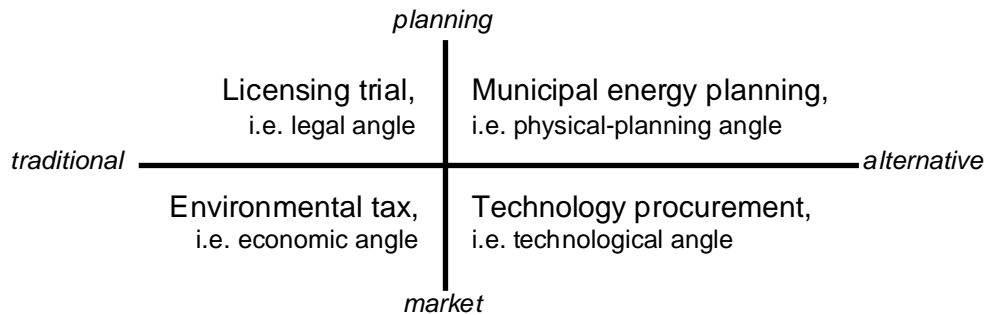
2. ABSTRACT

Economic efficiency tends to be an important argument when different means of environmental control are assessed and suggested. Considering that the most cost-efficient means are not the ones most frequently chosen and used, some other qualities seem to play an equally important role. I use findings from organisational theory and negotiation theory to better understand what is concealed in the black-box of decision-making and implementation. My empirical material consists of case studies of four different means of environmental control used in Sweden during the 1990s to mitigate the threat of global warming. These are an environmental tax, a licensing trial, municipal energy planning, and technology procurement. Each represents a particular discipline (economic, legal, physical planning, or technological) in which a context (planning or market) and an approach (traditional relay race or process-oriented) are combined. Although each means has its particular niche, some qualities stand out as superior. Such means need to be divisible in space as well as in time. It is then easier to get started. Since it is just as easy to deviate from, rather than adhere to, the predetermined course after a while, some incentive must be given to the person in charge of implementation. In other words, the classic proverb of using sticks and carrots is still valid although it is not always taken to heart and practised.

3. INTRODUCTION

Means of environmental control can be assessed from a number of perspectives. One perspective emphasises economic efficiency, where an input, e.g. administrative costs, is weighed against an output, e.g. reduced emissions. Regulative approaches of the command and control type tend to score low and market-based means score high (Turner *et al.*, 1994). Nevertheless, politicians hesitate to use economic means, so that political acceptability has become another threshold (Bohm & Russell, 1985). However, these criteria do not explain why a decision is difficult to make or why a decision that is made is not implemented. Other perspectives are thus called for in which the black-box between the end points is inspected. I use findings from organisational theory (Brunsson, 1989; Hernes, 1978) and negotiation theory (Fisher & Ury, 1982; Raiffa, 1982; Susskind & Cruikshank, 1987) to identify the strengths and weaknesses of four means of environmental control in their practical application en route to an energy system that is compatible with sustainable development. These are an environmental tax, a licensing trial, municipal energy planning, and technology procurement. Each represents a particular discipline (economic, legal, physical planning, or technological) in which a context (planning or market) and an approach (the traditional relay race or the alternative process-oriented approach) are combined (see Figure 1).

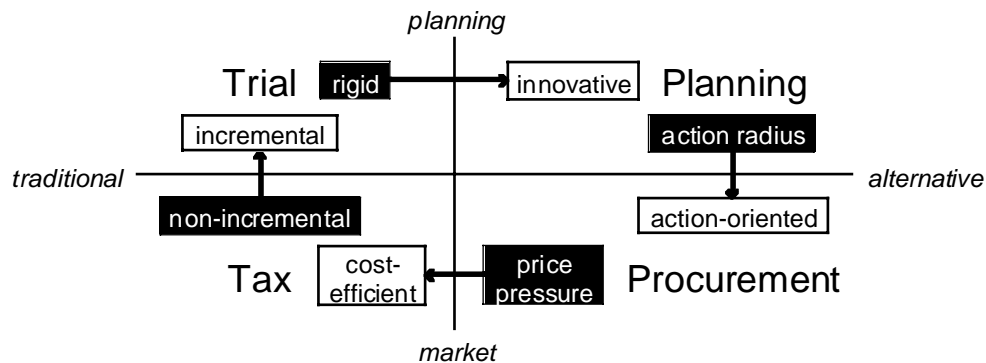
Figure 1. Four means of environmental control (environmental tax, licensing trial, municipal energy planning, and technology procurement) with a traditional relay-race or an alternative process-oriented approach in a planning or a market context. Each corner is represented by a particular discipline.



4. STRENGTHS AND WEAKNESSES

My empirical material consists of case studies previously presented and analysed (Olerup, submitted). In this section, I relate them in a condensed and somewhat modified form so as to be able to bring the analysis one step further in the next section. The cases that I have examined concern efforts made in Sweden during the 1990s to mitigate the threat of global warming. Three of the four means (environmental tax, licensing trial, and municipal energy planning) actually came to be involved in a single situation, which occurred in the City of Uppsala. One means was then launched to counteract the shortcomings in another means. This made it easy to identify their most important strengths and weaknesses. Qualities found in the fourth means (technology procurement) completed the circle (see Figure 2). Hence, there is no winner in this comparison. Each means has its particular niche.

Figure 2. Strengths (white squares) and weaknesses (black squares) of the four means of environmental control.



Environmental Tax: Cost-efficient but Non-incremental

Economic means make use of the market mechanism, where prices mark the crossroads (Hernes, 1978). Adding a tax to a price based on manufacturing costs and profit margins is meant to influence potential buyers in their choices of products and suppliers in their choices of resources and process technology. In the case of taxes and charges, market participants are informed about non-desirable aspects, whereas subsidies highlight desirable ones. This automatic function is the strength of the market mechanism. It makes economic means cost-efficient. Cost-efficiency tends to be a strong argument when different means of environmental control are assessed and suggested (cf. Ekins, 1999). However, this cost-efficiency is at the same time the source of its weakness. Since a price change generally hits all at once, it tends to be so powerful that politicians hesitate to use it or set levels that are

not high enough to have an impact (Tuner *et al.*, 1994). Hence, there seems to be certain threshold values, although it is possible to raise/lower taxes gradually. Taxes become non-incremental. Another problem could be that the market mechanism rarely functions perfectly (Gustafsson, 1998).

Sweden introduced environmental taxes in the 1950s, primarily as a state means of finance (STEM, 1999). In the 1970s the oil crises stimulated their use, and in the 1990s environmental charges took into account and reflected environmental concern. Taxes/charges still represent around ten percent of national income (SNV, 1997, Table 24). One important tax, the CO₂ tax is based on the carbon content (g/MJ) of fuels subject to taxation (SOU, 1994). Biomass, refuse, and peat are excluded because of their status as renewable energy sources, as is any fuel that is used for electricity purposes. Manufacturing industries are given a tax reduction. In Sweden, renewable sources have an additional advantage, since they are domestic, in contrast to fuel oil, which is imported. The domestic origin of peat was the reason public authorities supported its exploitation in the 1980s. However, in the mid-1990s, peat was reclassified as a fossil fuel and considered comparable to fuel oil as a global climate threat (Rodhe & Svensson, 1995; Zetterberg & Klemedtsson, 1996). One way to eliminate peat would have been to expand application of the CO₂ tax, but the politicians were irresolute.

Licensing Trial: Incremental but Rigid

Political decision-making is important in the planning sphere and is intended to lead the way for administrators in a strict hierarchy (Hernes, 1978). However, rational decision-making, in which several alternatives are compared with one another, tends to reveal uncertainties. It makes decision-making difficult and risks ending in inaction. Hence, when civil servants want action, they try to avoid politicisation of the issues (Brunsson, 1989). In the case examined, this was also the strategy used. Peat was removed from the political arena and introduced in an arena where a civil servant makes the final decision, i.e. a licensing trial. It also seems easier to make a decision on the operation of one plant than one in which a whole nation is involved, as would be the case for an environmental tax.

Licensing trials take place in the planning sphere. The applicant could be an energy company that needs a permit to be able to change its operations, e.g. invest in a new boiler or shift to a different fuel. Civil servants working in environmental authorities at the national, regional, and local levels contribute their opinions, but the final decision is made by a judge at the Environmental Court of Appeal. In the case examined here, Uppsala Energi – the largest peat user in Sweden – applied in 1995 for an increase in its use of the fossil fuel coal because of an envisioned peat shortage. Civil servants seized the opportunity to avoid political decision-making and achieve their own end. Uppsala Energi's request was denied a year later and then not only for coal but also for fuel oil and peat. The reason given was their role in global warming. Conversion of the plant should be completed within ten years, i.e. in 2006. The view of peat as a fossil fuel was soon contested (Åstrand, *et al.*, 1997), but peat was still seen as undesirable. The reason was that a new end had emerged in the meantime, preserving wetlands.

The decision constituted a turning point. For the first time, the energy source – instead of its emissions – was explicitly targeted. It actually came as a surprise to Uppsala Energi. Applicants and authorities tend to sound one another out during the process before an application is submitted. Such consultations did take place, but no-one objected at the time. According to Fisher & Ury (1982), the structure of the negotiation process leading to a decision can be crucial for how suggestions are received by the person or organisation that is supposed to implement them. Parties subject to pressures need to be heard and have their interests addressed. However, courts are not responsible for reconciling differences but for interpreting the law (Susskind & Cruikshank, 1987). Decisions are also handed over in a relay race. It makes them potentially rigid and makes implementation uncertain (Ring, 1997), particularly in a situation with rapidly changing circumstances, where time limits risk leading to passivity rather than activity. New instructions could be waiting round the corner. It would be expensive to follow all of them.

Municipal Energy Planning: Innovative but Limited Action Radius

The decision was made in the licensing trial to classify certain fuels (coal, fuel oil, and peat) as fossil and hence unacceptable. This is a non-solution, which has to be filled with content. Shortly after Uppsala Energi (at that time municipally owned) applied for increased use of coal, the City of Uppsala announced it had sustainability ambitions for its new energy plan. Sustainability was interpreted as efficient use of energy as well as use of local renewable energy sources. A plan is the perfect arena in which to be innovative. It is generally kept wide and open, which is suitable for reflection. The planning process examined here was managed by one co-ordinator placed directly beneath the local politicians in the central administration. Anybody who would later be responsible for implementing parts of the plan was included in the planning activities. Suggestions were put forth and local options were investigated, especially on the supply side.

There were no negotiations as to which of the suggested alternatives should be chosen. These could even be in conflict with one another, but they were simply described, one after another. According to Brunsson (1989), a political document needs to reflect a variety of ideas in this way to satisfy the expectations of diverse groups in its environment. The disadvantage could be that it becomes difficult to proceed to the next stage, of taking action, which needs to be kept narrow and closed to avoid uncertainties (Brunsson, 1985). However, planning participants were well aware of the potential gap between a plan and its implementation. The gap was not even considered to be a problem, since the people involved in implementing it would determine the outcome. New circumstances can then be included as they emerge. Under such circumstances there is no point in suggesting detailed measures to be taken.

An energy plan also has a limited action radius. Conditions in the energy field are determined on a national or even an international level. First, it was the licensing trial that determined which fuels were acceptable or rather unacceptable. The final decision on the plan was even postponed while the outcome of an appeal to the Ministry of Environment on exploiting new peat bogs was awaited. Second, the part of the plan that was pursued (energy conservation in municipally-owned buildings) had actually become routine before the plan was initiated. The person in charge was also unaware of the decision to postpone the plan. Third, the new ingredient in the plan was to engage an energy advisor responsible for energy conservation in other than municipal buildings. He was employed before the final decision was made. However, his main means is to inform others about any required investments to be undertaken at their own expense.

Technology Procurement: Action-oriented but with Deficient Price Pressure

The context for this means is the market place. A perfect market has sovereign consumers. Producers compete with one another for profits, and prices mark the crossroads. However, this ideal form is frequently perverted (Hernes, 1978). Small consumers in particular tend to receive little attention. Producers also try to avoid competition. One way out is to add supplemental services to the products, which makes it difficult for potential buyers to compare different offers from suppliers. The state has to intervene in the market to uphold competitive conditions. Technology procurement is one example of an effort in this direction.

The aim of technology procurement is to speed up the introduction of a certain technology in the market and to give it a larger share of the market. In the cases examined here, the desired technology should be energy-efficient. One co-ordinator manages the entire process. Consequently, the baton is not passed to the next person in line without there being control over the following course of events. Co-operation is used for reflection, and competition is used to achieve action. The first step is to assemble the fragmented mass market into buyer groups. Their task is to formulate demands – apart from energy efficiency – which are then launched in a contest where suppliers compete with one another. After the contest, sales are monitored and the winner is given marketing support for additional sales. Hence, everybody involved has an incentive to act in the desired direction, i.e. the cake is enlarged before it is divided (cf. Fisher & Ury, 1982).

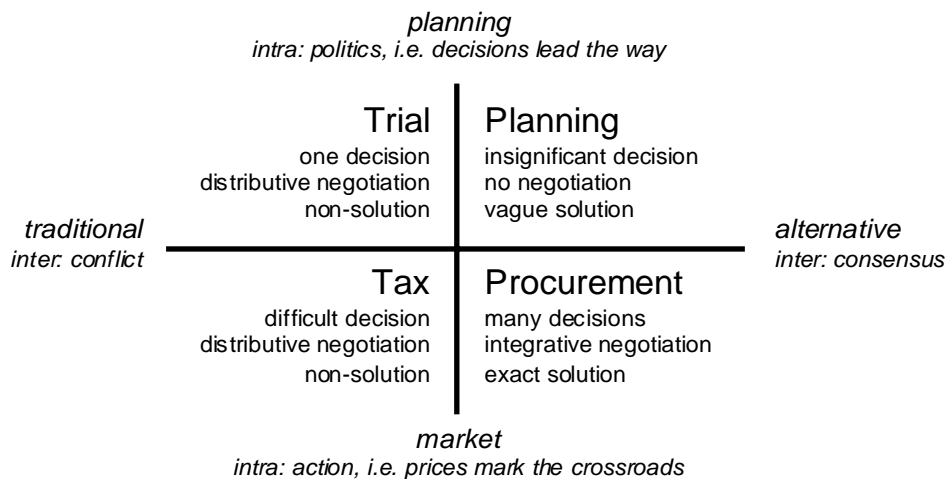
Several decisions are made in this process, e.g. what products to launch, what qualities to promote, and which winners to select. Having many decisions makes each decision less decisive and easier to make (Brunsson, 1990). Its action orientation is the strength of this process. However, there is a weakness involved. One quality that is frequently requested, besides energy efficiency, is keeping costs down. The product cycle theory tells us that it is difficult to simultaneously develop technology and restrain costs (Malecki, 1997). When technology is

developed, the focus is on quality. Economic pressure tends to naturally come later on in the process, when the product has reached its maturity level in sales volume. Backing up one supplier, i.e. the winner, could also reduce competition, just as suddenly escalating demand that exceeds supply threatens to increase margins in all links of the production chain.

5. DIAGONAL SIMILARITIES

Although there was no winner in the comparison made above, the qualities identified in technology procurement turned out to be particularly favourable considering the processes of decision-making and implementation. Those qualities can thus be turned into a model against which the three other means (environmental tax, licensing trial, and municipal energy planning) can be compared and understood (see Figure 3).

Figure 3. Technology procurement as a model against which the other means of control are compared and understood.
The x-axis represents the inter-organisational level and the y-axis the intra-organisational level.

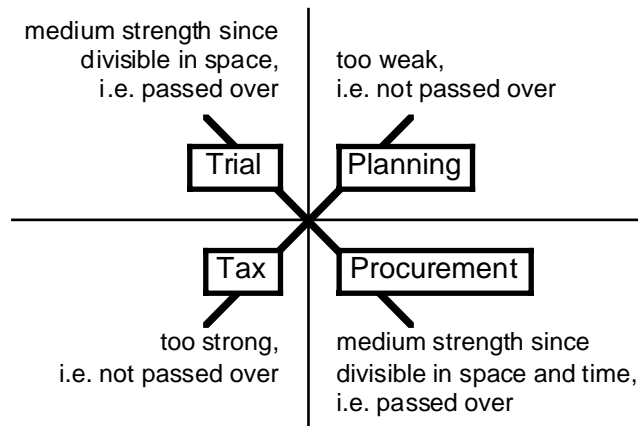


The model identifies two thresholds that have to be passed for there to be a successful outcome. First, a stick is needed in the form of a decision. It functions as a starting point for the entire process. This step was never reached for the tax and it became insignificant in the plan, since action was already under way. The trial, however, was more successful. One explanation for this difference could be that the means vary in their action radius. The tax is too strong (general application) and the plan too weak, whereas the trial succeeded in striking a more acceptable level in between (individual application). Second, a carrot is needed in the form of an incentive to the person in charge of implementation. It sets the process in motion towards a desired end. None of the three means was successful in this respect. The manner in which traditional means are structured does not even include such a consideration. On the contrary, the decision envisioned in the tax and made in the trial imply burdens for whoever implements them. In comparison, the part of the plan that is pursued, albeit independently of any planning activities, and given a budget does involve an incentive, i.e. saving money wasted on energy waste. Hence, from my collection of cases, there appear to be more sticks in circulation than carrots.

The first threshold could be further elaborated, although it is insufficient on its own. The reason that the trial involved just the right level of strength is its divisibility in space. Each plant is examined separately. This limits repercussions, which is important in the event of an unfortunate or unpredicted development. A process could also be divisible in time, as in the case of technology procurement. Such an effort was also made in the trial examined, although it was rejected during the negotiation process. This may not have influenced the outcome, since the intention would then have been to monitor results. Such intervention is more like a stick than a carrot. Nevertheless, the strengths of procurement/trial and the weaknesses of tax/planning have qualities in common in terms of their ability to create a starting point. These diagonal similarities entail supplementing the two-dimensional picture given earlier with a third dimension (see Figure 4). One conclusion that can be drawn from this exercise is that the context dimension is less decisive than the approach dimension, which is in

line with the mixed or bargaining economy suggested by Hernes (1978), but is in contrast to expectations behind market reform changes in the energy business. However, carrots for setting the process in motion are still lacking.

Figure 4. Diagonal similarities in the capacity to hand over the execution to the next person in line via a decision. If a hinge is introduced in origo, where the axes intersect, one diagonal pair can be folded down and the other one up to form a z-axis in a third dimension, supplementing the earlier two-dimensional picture.



As already stated, repercussions need to be limited because of uncertainties in the environmental field. This suggests another temporal aspect in the form of maturity, which can only be attained with experience. When uncertainties become certainties, it could be appropriate to start a new round in the circle of means. Qualities in the economic means would then be rediscovered and re-evaluated (cf. Figure 2). Maturity could perhaps even be reached earlier if multiple perspectives and criteria were allowed to a larger extent in the understanding of the functioning of different means of environmental control (cf. Söderbaum, 1999). An additional reason to broaden the perspective is that the means can strengthen each other; e.g. in the planning context, the trial constituted a starting point, which the planning process filled with content. Another reason to combine different means is that they target different areas; e.g. the alternative means include the aspect of efficient end use of energy, which tends to be neglected in traditional means.

6. CONCLUSION

Each means has its particular niche, but some qualities stand out as superior when the processes of decision-making and implementation are considered. Means need to be divisible in space as well as in time. It is then easier to get started (Quinn, 1982). Since it is just as easy to deviate from, rather than adhere to, the predetermined course after a while, some incentive needs to be given to the person in charge of implementation (Fisher & Ury, 1982). In other words, the classic proverb of using sticks and carrots is still valid although it is not always taken to heart and practised.

7. ACKNOWLEDGEMENT

This work was funded by the Swedish National Energy Administration (STEM).

8. REFERENCES

- Bohm, P. & Russell, C.S. (1985) Comparative analysis of alternative policy instruments, in A.V. Kneese & J.L. Sweeney (eds.) *Handbook of Natural Resource and Energy Economics*, vol. 1, North-Holland, Amsterdam, 395-460.
- Brunsson, N. (1985) *The Irrational Organization. Irrationality as a Basis for Organizational Action and Change*, John Wiley & Sons, Chichester.
- Brunsson, N. (1989) *The Organization of Hypocrisy. Talk, Decisions and Actions in Organizations*, John Wiley, Chichester.
- Brunsson, N. (1990) Deciding for responsibility and legitimation: alternative interpretations of organizational decision-making, *Accounting, Organizations and Society*, 15 (1/2), 47-59.
- Ekins, P. (1999) European environmental taxes and charges: recent experience, issues and trends, *Ecological Economics*, 31 (1) 39-62.
- Fisher, R. & Ury, W. (1982) *Vägen till ja. En nyckel till framgångsrika förhandlingar* [Getting to yes. Negotiating agreement without giving in], Liber, Malmö.
- Gustafsson, B. (1998) Scope and limit of the market mechanism in environmental management, *Ecological Economics*, 24 (2-3) 259-274.
- Hernes, G., ed. (1978) *Forhandlingsøkonomi og blandningsadministrasjon* [A bargaining economy and mixed administration], Universitetsforlaget, Oslo.
- Malecki, E.J. (1997) *Technology & Economic Development. The Dynamics of Local, Regional and National Competitiveness*, Addison Wesley Ltd, Harlow.
- Olerup, B. (submitted) Mitigating global warming: traditional versus alternative approaches in a planning versus a market context, *Ecological Economics*.
- Quinn, J.B. (1982) Managing strategies incrementally, *Omega*, 10 (6) 613-627.
- Raiffa, H. (1982) *The Art and Science of Negotiation. How to Resolve Conflicts and Get the Best Out of Bargaining*, Harvard University Press, Cambridge, MA.
- Ring, I. (1997) Evolutionary strategies in environmental policy, *Ecological Economics*, 23 (3) 237-249.
- Rodhe, H. & Svensson, B. (1995) Impact of the greenhouse effect of peat mining and combustion, *Ambio* 24 (4) 221-225 (first published in 1994 as SNV Report No. 4369).
- SNV (Swedish National Board for Environmental Protection) (1997) *Miljöskatter i Sverige—ekonomiska styrmedel i miljöpolitiken* [Environmental taxes in Sweden—economic means of control in environmental policy], Stockholm.
- SOU (State's Public Investigations) (1994:85) *Ny lag om skatt på energi. En teknisk översyn och EG-anpassning* [New law on energy tax. A technical overhaul and EU adaptation], Report from the Energy Tax Investigation.
- STEM (Swedish National Energy Administration) (1999) *Energy in Sweden 1998*, Eskilstuna.
- Susskind, L. & Cruikshank, J. (1987) *Breaking the Impasse. Consensual Approaches to Resolving Public Dispute*, Basic Books, New York.
- Söderbaum, P. (1999) Values, ideology and politics in ecological economics, *Ecological Economics*, 28 (2) 161-170.
- Turner, R.K., Pearce, D. & Bateman, I. (1994) *Environmental Economics. An Elementary Introduction*, Harvester Wheatsheaf, London.
- Zetterberg, L. & Klemetsson, L. (1996) The contribution to the greenhouse effect from the use of peat and coal for energy, Swedish Environmental Research Institute (IVL), Report No. B 1237. Stockholm.
- Åstrand, L.E., Ericson, S-O. & Nyström, K.L.E. (1997) *Torvbränsle och växthuseffekten* [Peat fuel and the green house effect], Report from Vattenfall Utveckling AB, Project Bioenergy, 1997/8. Stockholm.