

THE INFLUENCE OF THE COMPLEX MACROECONOMIC ENVIRONMENT ON THE FINANCING ASPECTS OF RADIOACTIVE WASTE MANAGEMENT

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Keywords: complex macroeconomic environment, financial issues of radioactive waste management, deregulation of markets, environmental awareness

ABSTRACT:

The present paper describes some personal views of the authors regarding the influences of the prevailing complex macroeconomic environment on the financing of radioactive waste management (RWM). This analysis and its conclusions most directly apply to the Belgian situation within the European Union (EU). It may, however, be interesting for waste operators and agents in other countries as a similar evolution is being observed in many places. The paper is not supposed to provide any definite or complete responses, but it should provide some thought material on a basic issue for society.

In the first part of the paper, the impacts of the changing environment on RWM are analysed, evidencing not only risks, but also possible opportunities for sound financing. Three basic sets of rapidly changing macroeconomic parameters are being considered.

- (1) the convergence of macroeconomic parameters imposed by the introduction of the European Monetary Union (EMU) from 1.1.1999 onwards;
- (2) the opening for competition of the European Union (EU) energy market from February 1999 onwards;
- (3) the awakening of environmental awareness in public opinion in Europe.

In the second part of the paper, the macroeconomic impacts are discussed in terms of designing adequate answers to pressures, drawing at the same time the best benefit from the arising opportunities. It is shown that a successful approach depends on a harmonious balance between the market, the regulation of the national states within the EU and the needs of RWM as a public service.

GENERAL BACKGROUND

At the turn of the century and of the millennium, the macroeconomic environment is changing fast in most industrial countries. In Belgium, in the heart of the European Union (EU), several topics are moving to the top of the agenda. Three sets of rapidly changing macroeconomic variables have been identified for the analysis of financing radioactive

waste management (RWM). The two authors assume full responsibility for the conclusions presented in the following.

In the first part of the paper, a review is made of three sets of major macroeconomic variables. These are currently changing very rapidly and are thought to have a considerable impact, in particular on RWM financing policies.

- (1) From 1/1/1999 onwards a common currency, the EURO, will be introduced in 11 countries out of 15 of the European Union (EU). Prior to the establishment of the European Monetary Union (EMU), the main macroeconomic variables of the national economies have been trimmed to enable comparison. In particular the interest rates have dropped dramatically, while the level of public deficit has been forced below 3% per annum. In the year following the launch of EURO as a common currency and during the transition period extending till the end of the year 2002, the convergence effort will be continued and even reinforced. During this period the remaining four countries, among which Great Britain, will probably also join the newly established EURO-land. The EMU introduction takes place in the background of a developing economic and financial crisis, which started in Asia in 1997.
- (2) From 02/19/1998 onwards, the electricity market will be progressively opened for competition in the EU. During the process of liberalisation the monopoly prices determined by the electricity utilities will no longer prevail. Companies will become price-takers, i.e. the electricity price will be imposed by the competitive equilibrium between supply and demand on the internal market of the EU. Because RWM costs are a component of the electricity generating costs, they will undergo direct pressure from the competition, calling for their possible reduction. Some costs might become stranded, as the generating costs will be below the market price.
- (3) The increasing awareness for a sensible care towards the environment. A "green" wave has recently crossed Europe. The appearance of green-supported governments has been observed in several member countries of the EU in recent times (France, Germany, Italy and Finland). As a direct consequence, nuclear energy projects received heavy blows. Due to the fact that in the public opinion at large, nuclear energy and RWM are often assimilated, the latter is expected to suffer as well from this evolution.

The authors show that under this token, risks on financing RWM must be taken very seriously, although opportunities for policy-makers are available as well.

In the second part a discussion is started on how to design an adequate approach of financing RWM.

THE INTRODUCTION OF THE EUROPEAN MONETARY UNION (EMU)

An arbitrage will be made by the member states between the constraints of convergence and the needs of public service. For instance the much-celebrated 3% imposed by the treaty of Maastricht, as the maximum annual deficit of the national states

will rob financial means from public services. In Belgium for example, the situation of public transportation (trains or city busses) has visibly suffered from reduced investment in the past years as imposed during the transition period. The pressure on environmental management is also likely to increase with tightening convergence criteria (e.g. 2% p.a. replacing 3% p.a. as expected in the so-called stability treaty). As the aftermath of the restriction of public means, radioactive waste management (RWM) will probably experience a reduction in public and private financial streams.

In addition, the economic convergence within the EU is likely to heat up internal competition within the internal market and with the outside world. This will exert further pressure on the budgets available for public services. There are also increased risks of partial loss of control on the waste management process, as waves of mergers and acquisitions will dilute the responsibility of producers.

On the positive side, competition between European engineering companies will benefit cost reductions of RWM projects. Moreover, the stabilised internal EU market will favour the reinforcement of cross-border links. A EU report evidences the need for convergence manifested by the European RWM agencies in adopting common financial approaches (European Commission [1], to be published). The economic potential of considering international RWM projects has also been investigated. An example is the use of common installations, comparable to U.S. compacts, to fully benefit from economies of scale.

Another positive aspect will be the convergence in environmental regulation. This should foster the use of environment-minded financial instruments. Among them, the so-called eco-taxation, e.g. the CO₂-tax intended to decrease the threat of climate changes, has been under discussion for a long time in the EU. These economic instruments are meant to correct the most striking deficiencies of the competitive market economies. They have demonstrated their ability of resolving difficult aspects of environmental externalities and of the unfair distribution of resources between consumers (Barde [2], Pearce [3]). As a side effect, the allocation of tax revenues can be used to fuel environmental activity, including RWM.

The financial crisis, which started in Asia in 1997, will further complicate the macroeconomic picture described above. It is generally accepted that the EURO will consolidate the economies of the national states in EU against external shocks. Therefore, the previous analysis will be accepted by many. At the same time, however, the rigidity of the money market and the frozen interest rates might deprive them from adequate control instruments, possibly fuelling recessive mechanisms. This could further reduce the space for environmental needs, as the need for growth will move to the foreground. At the same time, electronuclear energy might gain points as an employment provider and a credible alternative to polluting fossil resources.

LIBERALISATION OF THE ENERGY MARKET

The result is that the competitive internal market of the EU will progressively replace the state-regulated monopoly of national energy companies. This has important consequences for the pricing of electricity. In the monopoly situation, the rate base and the operating cost dictate the price. The mark up is a decision of the shareholders investing in a highly profitable business. In a competitive market, companies are price-takers.

Therefore, some costs stemming from RWM may become stranded as the market price lies above the total electricity generating cost. The recovery of the stranded part is still a matter of negotiation between the EU commission and the national states. As the actual conditions on the competitive market will only be known within several years, it is far from being settled. It is clear that the stranded cost issue might also affect part of the RWM cost coverage. They represent an unresolved financial risk. The authors of the European directive have been well aware of the risk that the poorest consumers in the member states could suffer from a boundless liberalisation of the electricity market. Provision is made in the directive for the universal service obligation of the utility, i.e. a commitment to a minimum delivery of electricity to all residential consumers, irrespective of their solvability. This service is guaranteed by the national state. Moreover, the governments of the member states may file requests to the EU Commission for obtaining transitory arrangements. This will be the case when there are fears that the full public service obligations will not be respected by the utilities. It is not yet clear whether these provisions will avoid the risk of costs being stranded, or in which way they can guarantee the payment of compensations to the state in case of failures.

On the other hand, as it has been depicted above, competition and new international synergies in realising RWM projects might also remove some economic pressure. This is the clear intention of the initiator of the market opening to reduce the price for consumers. There is no evidence, however, that the prices will effectively drop in the open market. It is even less clear which of the positive or negative aspects will predominate in financing RWM.

AWAKENING OF THE ENVIRONMENTAL AWARENESS

In the last year, a "greening" of the economy has been observed in several European countries. This has to do with the awakening of environmental consciousness triggered by several visible inefficiencies of deregulated market economies. In particular the questions of externalities arising from industrial activities, like pollution, greenhouse gas, and all kinds of waste forms have moved to the top of the agenda. The appearance of "green"-supported governments in several member countries of the EU in 1998 (France, Germany, Italy, Finland) has confirmed the eagerness of the European public opinion to obtain sufficient environmental protection from the national states. In the case of RWM, the problem gets entangled with the rejection of energy production based on the use of nuclear power plants (NPP). This is why the need of safekeeping the environment from radioactive waste is often not recognised. Anti-nuclear activists have presented the abolition of NPP as being equivalent to the elimination of the waste issue. This attitude is

now being shared by many: it tremendously complicates RWM activities. In extreme cases it could become a threat to their continuation. Some attempts of dismantling RWM activities have already been observed in several European countries like England, Germany, Switzerland, etc.

On the other hand, the "green awakening" might represent a tremendous opportunity for RWM. The unbundling of problems is a prerequisite for success; the option of using NPP for electricity production will have to be distinguished from the need to provide solutions for the waste. This will be true for waste production in the energy sector, but also for waste arising in sectors using radioisotopes (hospitals, industries, research laboratories, etc.). If this is achieved, RWM can acquire its legitimisation as being a full-pledged environmental activity. They are steps in that direction. Like ANDRA in France before, ONDRAF/NIRAS in Belgium has recently been entrusted by law with the elaboration of a detailed catalogue of all waste sources and of contaminated sites on the national territory. The intention is to prevent any spills of radioactive material into the environment. This so-called "inventory" will have far-reaching implications in the environmental issue. Cases have been reported in France for supportive actions of green movements or of consumer organisations for establishing the inventory. The next step will be to establish and to enforce the existence of sufficient and appropriate sources of financing for safe site restoration and/or the disposal of the existing radwaste. This is particularly true for the so-called "orphan sites" for which no solvable person or industry can be identified or held responsible. In some cases, innovative financial instruments will be set in place with the backing of governments. "Refund" gives an example: a charge on the purchase of radioactive sources will be repayable at the time of returning the spent material to the vendor or the original manufacturer. Like the energy market, the radioisotope market will participate in the opening to competition. As a result, the manufacturer side will increasingly suffer from the substitution of new techniques replacing radioisotopes, e.g. NMR for medical diagnoses (though some techniques generating radioactive waste seem to be developing, e.g. cyclotrons). The private or industrial consumer side will be tempted to handle the waste issue with some negligence as compulsory collecting systems are still largely absent in many countries.

RESPONSES TO THE RAPID MACROECONOMIC CHANGES

Table 1 summarises the potential risks and opportunities in financing RWM. The three sets of macroeconomic parameters described above appear as entries on the left hand side. For each set information is provided on the type of agents of the economy responsible for the observed evolution. This deserves an explanation. According to a basic idea of Kolm [4], Kunsch and Chevalier [5] have investigated the well-functioning of complex micro- and macroeconomic systems. They came to the conclusion that, in many cases, a suitable balance of strength between at least three sets of agents is a necessary (if not sufficient) condition for experiencing a successful economic trajectory in time. Translating this condition to RWM, one would have to reconcile the interests of three basic sets of agents. Each set corresponds to the equivalent set of macroeconomic parameters.

Table 1. Risks and opportunities for financing radioactive waste management (RWM) under the rapid evolution of three sets of macroeconomic variables (*ME=macroeconomic*)

Set of ME-agents	Set of ME-parameters	RISKS	OPPORTUNITIES	Comments on financial policies
"State"	<i>EMU integration</i>	• Heating up economic competition • Financial resource drain for the public service	• Stabilisation and regulation of the main ME-parameters • Development of tailor-made instruments for the environmental management of the integrated market	• Intervention of the "state" to correct the deficiencies of the "market"
"Market"	<i>Opening to competition of the energy market, including nuclear electricity</i>	• Competition on the demand (client) side for RWM resulting in pressure on costs • Stranded costs • Financial resource drain detrimental to non-commercial activities	• Competition on the supplier (subcontractor) side for RWM projects resulting in relief on costs	• Competition on the supply side • Monopoly on the demand side • No vertical integration of RWM into energy production
"Autonomy"	<i>Development of environmental awareness</i>	• Dismantling of nuclear projects • Equivalence between closing down NPP and solving the RWM issue	• Unbundling of nuclear energy acceptance and RWM • Increasing attention for waste issues, including RWM	• Promotion of RWM image as an environmental activity

1. The "Market" represents the set of all private commercial and industrial agents in the economy.
2. The "State" in its extended meaning represents the set of all public actors and the national and supranational structures in the EU.
3. The "Autonomy" represents the set of unstructured micro-actors, i.e. citizens, consumers, associations ("green" ones or others), acting in complete autonomy without interference of commercial or state-owned organisations.

As now widely recognised by most modern economists, the only forces of the "Market" can never tackle environmental issues. Externalities with respect to the environment are giving an important example of the admitted "market deficiencies" (Pearce, op. cit.). Deregulated commercial and industrial activities have the sole objective of reducing the prices to the end-users of products. This is in many cases not sufficient for responding to a basic request of the "Autonomy": life in an unpolluted environment and controlled exposure to all types of waste hazards. Therefore, there is a permanent risk of conflict between maximum economic efficiency, i.e. least price and environmental protection. This implies an intervention of the macro-agent "State" in the broad sense (as described in the above definition international authorities like the power organs of the EU). Most of what has been mentioned above is applicable to any type of waste form, including radioactive waste.

The necessary interplay between the three basic agents has therefore essential consequences for policy-makers in the field of RWM financing. Let us now discuss the implications on financial policy-making resulting from the findings in table 1. The result is summarised in the far right column of this table.

First, it appears to the authors that the role of the state is of overwhelming importance, as already stressed in NEA [6]. Basically, the state is the necessary safeguard against any excess of purely profit-oriented approaches of the waste issue. The requested services of waste management should never be questioned in regard of economic efficiency, i.e. least price. The view that RWM is an environmental activity with an important collective added value should be promoted by education. Additional means should be made available by the state, if necessary in the form of taxes. Also suitable forms of coercion to remove any risk of industrial abuses should be developed by the governments. Authorities, including the EU Commission and Council, should support the idea that accepted RWM costs are not inducing any market distortion.

Second, the authors think that RWM should not be part of the commercial competition on the demand (client) side, i.e. the delivery of waste to a specialised agency. Therefore a vertical integration of waste activities into the producing branch of the open market industry necessitates the active control of the state. It has to be accepted by the industry that some form of monopoly on the demand side will always be necessary. Competition will only be acceptable on the supply side. Least prices and thus least costs should only be achieved by means of a fair competition between the qualified suppliers of the waste management projects or infrastructures. Of course, international co-operations should not be hindered in implementing RWM projects. As an example, common

installations and exchange of waste could become common accepted practice in the internal market of the EU [1].

Third, the striving for more convergence and stability in the EMU gives opportunities to promote innovative financial formulas, like eco-taxation. The experience made in the Netherlands and in several Scandinavian countries has shown the win-win character of well-thought measures of this type. Private industries get access to new markets promoting the efficient use of energy in all economic sectors. The state draws on additional resources for financing the public service. The general public observes an improvement in its quality of life. For these reasons, the "green" wave traversing industrialised countries is not doomed to have detrimental consequences for RWM. On the contrary, the environmental awareness helps promoting a positive image of RWM in the interest of all parties. It also helps clarifying the common confusion between the NPP option and the need for waste solutions.

CONCLUSION

As a conclusion, there are many potential risks for adequate RWM financing. They are induced by the rapid macroeconomic evolution. However, the interplay of influences exerted by the three main sets of agents, i.e. "Market", "State" and "Autonomy", can create adequate responses to the expected pressures. In order to have a chance of success, strategies for designing new financial policies must be timely prepared and implemented. In doing so, the "State" will have a major role to play. It is supposed to regulate the "Market" which has shown its limits and deficiencies in environmental issues. A respectful approach of the environment is currently widely asked for by the third agent, i.e. the "Autonomy", as a prerequisite for any sound economic activity.

New opportunities are created thanks to the global balance between the three macro-agents in the multiple-faceted macroeconomic environment. In that case, shortfalls in funding RWM policies are no fatal consequences of the increasing economic competition and globalisation. The risk of transferring an undue financial burden to present and future generations can be kept within bounds for what regards that type of environmental activities.

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