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A3-0379/92

REPORT

of the Committee on Foreign Affairs and Security

on disarmament, energy and development

Rapporteur: Mr G. ROMEOS

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Or. EN

* Consultation procedure requiring a single reading
**I Cooperation procedure (first reading)
**II Cooperation procedure (second reading) requiring the votes of a majority of the current Members of Parliament
*** Parliamentary assent requiring the votes of a majority of the current Members of Parliament

C O N T E N T S

At the sitting of 11 June 1990 the President of the European Parliament announced that he had forwarded the motion for a resolution by Mr. Goria and Mr. Guidolin on disarmament, energy and development (B3-0846/90) pursuant to Rule 63 of the Rules of Procedure, to the Committee on Foreign Affairs and Security as committee responsible and to the Committee on Development and Cooperation and the Committee on Energy, Research and Technology for their opinions.

At its meeting of 19 December 1990 the committee decided to draw up a report.

At its meeting of 7 February 1991 it appointed Mr. Romeos rapporteur.

At its meetings of 17 September 1991, 30 January 1992, 17 March 1992, 19 May 1992 and 6 November 1992 the committee considered the draft report.

At the last meeting it adopted the resolution unanimously.

The following took part in the vote: Baron Crespo, chairman; Romeos, rapporteur (for Balfe); Avgerinos, Baget Bozzo, Belo (for Cravinho), Bertens, Fernandez Albor, Ferrer (for Poettering), Habsburg, Llorca Vilaplana, Magnani Noya, Onesta, Piecyk, Planas and Sakellariou.

The opinion of The Committee on Energy, Research and Technology is attached to this report; the Committee on Development and Cooperation decided not to deliver an opinion.

The report was tabled on 19 November 1992.

The deadline for tabling amendments will appear on the draft agenda for the part-session at which the report is to be considered.

A.

MOTION FOR A RESOLUTION

on disarmament, energy and development

The European Parliament,

- having regard to the motion for a resolution by Mr. Goria and Mr. Guidolin on disarmament, energy and development (B3-0846/90),

- having regard to the Treaty on European Union,

- having regard to the Paris Charter on a New Europe, the Treaty on the Reduction of Conventional Arms in Europa and the text of the final decision of Helsinki '92 "The Challenges of Change',

- having regard to the Rome declaration on peace and disarmament (8 November 1991), the new directions of the Alliance's strategic policy and the Joint Declaration of Brussels on the future of the Atlantic Alliance (10 March 1992),

- having regard to the communications from the Commission to the Council and Parliament on export controls on dual-use goods and technologies and the completion of the internal market (SEC(92) 85 final of 31 January 1992) and on the Conference on Security and Cooperation in Europe (SEC(91) 2145 final),

- having regard to its resolutions of:
  - 13 July 1990 on disarmament, the conversion of arms industry and arms exports[1]
  - 14 March 1989 on security in Western Europe[2]
  - 17 May 1991 on security in the Mediterranean[3]
  - 9 October 1990 on the CSCE[4]
  - 12 December 1990, 12 July 1991 and 12 December 1991 on the Gulf crisis and arms exports, the European Energy Charter and employment problems due to the reduction in military spending and the closure of plants producing military material[5]
  - 11 March 1992 on the danger of nuclear proliferation due to the flight of 'nuclear mercenaries' from the former USSR[6]
  - 17 September 1992 on the Community's role in supervision of arms exports and the armaments industry[7],

- having regard to the report of the Committee on Foreign Affairs and Security and the opinion of the Committee on Energy, Research and Technology (A3-0379/92),

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[1] OJ no. C231 of 17.9.1990, p. 209.
[2] OJ no. C 096 of 17.4.1989, p. 30.
[3] OJ no. C 158 of 17.6.1991, p. 293.
[4] OJ no. C 284 of 12.11.1990, p. 36.
[5] OJ no. C 019 of 28.10.1991, p. 76, OJ no. C 240 of 16.9.1991, p. 285 and OJ no. C 267 of 14.10.1991, p. 148.
[6] OJ no. C 094 of 13.4.1992, p. 222.
[7] OJ no.

A. whereas the process of disarmament in Europe is based on two main principles: the need to convert and reorientate the arms industry and the need to use all the categories of military material withdrawn from circulation as part of this process for purposes and applications which meet energy requirements and promote development in the Community and in the rest of Europe,

B. whereas a basic precondition for implementing programmes to convert and restructure the arms industry both in the Community and - especially - in the states of Central and Eastern Europe and in the Commonwealth of Independent States is the introduction of comprehensive controls on the trade in - and export of - the arms and arms systems withdrawn from circulation, through institutionalized procedures, either at CSCE or Community level,

C. stressing that the military material, installations and expertise thus made redundant can be converted and bring enormous non-military benefits - especially in the field of energy - both in the states of Europe and in the developing countries of the South,

1. Considers that the Treaty of Paris on the reduction of conventional forces in Europe, the previous Treaties on the non-proliferation of nuclear weapons (TNP) and intermediate range nuclear forces (INF) and the statements by the USA and Russia announcing further reductions in their nuclear arsenals, along with the START agreement reached in Moscow on 31 July 1991 and the Bush-Yeltsin agreement signed in Washington on 16 June 1992, under which the size of the American and Russian nuclear arsenals will be cut to around 3 500 warheads each, have set the scene for a new phase of general disarmament;

2. Considers, however, that the vast accumulation of arms and arms systems of all categories poses a constant threat to the entire continent of Europe even in times of peace, causes irreparable environmental damage and increases tension in regions which are the theatre of - or threatened by - clashes and confrontations, typical examples being the former Yugoslavia and certain republics of the former USSR;

3. Is, therefore, concerned at the security problems posed by the production and stockpiling of weapons and weapon systems - particularly nuclear ones - the difficulties of imposing centralized controls and the flight of nuclear mercenaries from the CIS Republics to third countries;

4. Considers that the Community must take fresh measures to fill the political, economic and development vacuum opening up in the states of Central and Eastern Europe and the CIS Republics following the collapse of Socialism to see them through a transitional period which poses a variety of threats to the entire continent of Europe as a whole;

5. Notes that the arms industry is concentrating on restructuring and reorganizing production so that it can more rapidly meet the new demands emerging both nationally and internationally;

6. Notes the increasing tendency among Member States - and also in other European states - to reduce their involvement in the arms industry, thereby releasing resources for other, non-military purposes;

7. Stresses the importance of the energy sector in the process of converting the arms industry both at the production stage and when arms and arms systems are being withdrawn and converted;

8. Considers that conversion should cover not only arms production but also weapons and weapon systems that are withdrawn from circulation, since the technology is available both in the West and in Eastern Europe to convert these weapons into non-military products;

9. Calls, therefore, on the governments of the Member States and the Commission to consider the economic and technical possibilities of conversion and the scope for cooperation with the states of Eastern Europe;

10. Takes the view that particular importance must be attached to environmental protection in the process of conversion and that no environmental damage (in the form of industrial waste, etc.) should result from the new industrial installations and their products, the recycling of military materials withdrawn from circulation and the conversion process itself;

11. Notes that, as far as the Community is concerned, the process of converting the arms industry is perhaps the only solution for the regions where such plants are situated which face economic stagnation, high unemployment and the prospect of becoming an industrial wasteland;

12. Considers that the measures proposed by the Commission do not sufficiently address the adverse consequences for employment and that it should therefore plan and implement special programmes in favour of regions which are affected or are about to be affected by unemployment, owing to the dismantling of arms industry plants; recalls, in this connection, its resolution of 9 April 1992[8] on the guidelines for the preparation of the 1993 budget, in which it called for the creation of a new Community programme for conversion of the armaments industry in order to resolve the labour market problems resulting from the process of disarmament;

13. Calls on the Commission, in this context, to draw up a new regulation by 1993 which will ensure further funding for the PERIFRA II Programme and define the legal basis for the programme and the Commission's new initiatives (CONVER Programme, etc.);

14. Considers that the means are available to convert industrial plants producing components of chemical weapons and calls on those Member States which have such plants on their territory to collaborate with the Commission and examine the possibility of converting them for non-military applications (pharmaceutical, agri-chemical uses, organic farming etc.);

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[8] OJ no. C 125 of 18.5.1992, p. 246.

15. Is convinced that nuclear weapons present the most serious problems in this connection; believes that a policy of converting nuclear plants, using the installations, expertise and materials for non-military purposes, could be a subject for research and dialogue within the Community;

16. Considers that after the Commission has promoted the Energy Charter and made realistic choices over the Community's future as regards energy, the Member States must work together in the field of nuclear energy so as to phase out the autonomy at present enjoyed by individual States in this area; considers that in this process serious consideration must be given to the environment and the highest possible technical safety standards must be observed in the production process and at plants;

17. Takes the view that as regards nuclear convertibility the Commission should extend its cooperation with the CIS Republics to cover the following areas:
- vocational and technical retraining of scientific and technical staff;
- cooperation with research centres and the university institutes;
- the provision of incentives for research in the field of renewable sources of energy;

18. Stresses in this connection that if nuclear weapons are to be effectively reduced there must also be a reduction in the use of fissile materials from warheads; as primary products in the production of energy especially in the CIS Republics;

19. Supports fully the proposal by the Foreign Ministers meeting in Political Cooperation that an international science and technology centre should be set up in Moscow to offer employment to nuclear scientists who have been made redundant and to promote research in this sector;

20. Considers that the European Community should play a more active role in financing this centre - the sum of ECU 50 million may be regarded as purely symbolic - and act as a driving force behind measures of this kind which also concern other States;

21. Considers that in view of the fact that many Member States attach particular importance to dual-use products which they protect and give priority funding to as part of their research and technology policies, the Commission should examine the possibility of imposing genuine controls on the production and movement of these products as well as the scope for using them for non-military purposes;

22. Calls on the next Intergovernmental Conference to reexamine the contents of Article 223 of the EEC Treaty not only from the point of view of competition and the free movement of goods but also in the light of new information emerging today on the production and use of these products and particularly the new need to cooperate with the former COMECON states;

23. Calls on the Community and the Member States to ensure that the new economic, commercial and technical agreements that have been concluded or are about to be concluded with the states of Eastern Europe and the CIS do not further undermine the privileged relations the Community enjoys with the developing states in the Third World;

24. Urges the Member States of the Community and the Commission to channel the resources released due to arms reductions towards development activities in Third World and ACP countries, especially such activities as promote their long-term economic and technical development;

25. Considers that the Community should consider and regulate the sectoral conversion of the arms industry for non-military uses and applications; believes that the Commission should consider the possibility of doing so before the forthcoming review of the Maastricht Treaty in the light of the new information which will emerge at both geostrategic and industrial levels;

26. Instructs its President to forward this resolution to the Commission, the Council, the Foreign Ministers meeting in European Political Cooperation, the Governments of the Member States, the relevant CSCE services and the UN Secretary-General.

B.

EXPLANATORY STATEMENT

1. INTRODUCTION

The European Parliament has repeatedly concerned itself over the last few years with arms controls, conventional, chemical, biological and nuclear disarmament, controlling arms exports and the implications for economic and social progress of converting the defence industry to non-military types of production.

In the discussions arising from resolutions on these matters it was agreed that a common policy was needed to control arms and arms exports and that measures should be taken to offset the consequences which the current reduction in production and reorientation of the defence industry will have not only in the Community but also in the states of central and eastern Europe.

Taking as its starting point the resolution by Mr Goria and Mr Guidolin (B3-0846/90 of 26.4.1990) this document seeks to outline the problems which disarmament and the reduction in military arsenals will create and then make certain specific proposals as to how the funds thereby released can be used to promote development in the new political, economic and military climate obtaining in the world today. This document will focus primarily on the reorientation and conversion of the defence industry and energy and development applications of redundant military equipment.

2. THE INTERNATIONAL SITUATION

The process of democratization in the states of central and eastern Europe and the dissolution of the Warsaw Pact, COMECON and the USSR are transforming international relations in Europe and throughout the world and a new framework for cooperation has to be established to deal with this situation.

The Treaty of Paris on reducing conventional forces in Europe previous agreements on the non-proliferation of nuclear weapons (NPT) and on intermediate-range nuclear forces (INF) and the recent US proposals on reducing nuclear weapons in Europe have paved the way for general arms reductions and a significant realignment of the defence industry and the economy are expected as a result (TABLE I).

Moreover, the changes in eastern Europe and the general climate of confidence and cooperation which they engender are producing new policies and measures aimed at harnessing these newly released industrial and energy resources to attain new development objectives.

These new measures must be taken as part of the intra-state cooperation that has now been set up in political, economic and social affairs: this will both reduce the danger of military confrontation and seek to determine the new priorities for states in pursuing development and progress. It is clear that in Europe in particular the process of disarmament involving substantive cuts in production, controls on arms exports and arms sales and a restructuring of the defence industry has already begun.

However, if existing international agreements on reducing military arsenals are to be enforced and if the scope of these agreements is to be extended, there may be a corresponding reduction in the arms trade and in exports of the weapons and weapons systems thus withdrawn from circulation accompanied by verification. A reconversion and restructuring of the defence industry is only possible if this condition is met.

The cooperation which the Community has proposed and is implementing with central and eastern European countries must be based, inter alia, on economic and energy agreements.

The development deficits faced by these countries and the task of restructuring and re-aligning their energy and industrial policies represent a new challenge not only for the states concerned but also for the Community.

Some observers see this as a threat to the security situation emerging in Europe today: they contend that any new threats to Europe will be of an economic, political or social nature.

A new network of relations between states is developing which, although it may not immediately get rid of the balance of fear and bring about a reduction in rivalry of a purely military nature which has become ingrained because of the cold war, will certainly bring about substantial modifications in national and super-national plans for the security of Europe.

At the present phase in the search for a common denominator in foreign policy and defence in a Europe which is espousing new forms of international cooperation, the main political priority is to exploit all factors - human as well as material - and resources - industrial and energy which may contribute to reducing the above dangers and contribute to development.

The questions facing the Community are as follows:

a) Is it realistic for the Community to adopt a policy of banning exports of arms systems - either withdrawn from circulation or currently being produced - and controlling the arms trade in Europe and exports to the Third World?

b) How will the Community respond to demands made by the states of central and eastern Europe that joint efforts should be made to construct and extend a network of political, economic and social institutions to reduce the danger of military confrontation?

c) As part of the on-going process of economic and industrial reorientation, have the means and policies been devised to exploit the resources, both material and human, that will allow a more rapid development of eastern Europe and the Third World?

3. THE SITUATION IN THE DEFENCE INDUSTRY

The defence industry first began to encounter serious production, planning and structural problems in 1989. Faced with the prospect of a sharp fall in demand and new industrial and technological challenges, the defence industry today is seeking primarily to restructure and reorganize production to improve its ability to promote development and economic recovery especially in the former communist states and Third World countries.

The main difference between the West and the East is that in the latter the resources (technological, political and military) used in the production and exploitation of military equipment are the same as those engaged in the production of non-military products. It is only the markets that are different. For instance, the 1988 report of the Arms Control and Disarmament Agency found that military budgets were stagnating at a time when the former USSR was the world's leading exporter, followed by the USA and France.

Another characteristic aspect is the absolute identification of national sovereignty and national security with the development of the national defence industries. The state has direct links with, and intervenes in, both the public (nationalized) and the private defence industries. This phenomenon began immediately after the Second World War when states began to intervene directly in this sector, developing arms production and exporting policies.

However, international détente and a tendency towards savings as regards defence purchases are still obliging defence industries to adopt a more aggressive export policy (as occurred recently during the Gulf War). For this reason it is widely acknowledged that the transformation and restructuring of this industry will be difficult as long as it continues to generate large profits.

Nevertheless, it is clear that states are now seeking to reduce their involvement in the defence industry: high production costs and demand problems have led to the emergence of new policies aimed at making the defence industry itself assume a greater share of production costs (self-financing) and developing new forms of intra-state cooperation in this area.

The same applies to the states of central and eastern Europe. They differ from the West mainly as regards their new economic orientation and the urgent need for development. The new governments in these countries are increasingly keen to disarm and transform the traditional defence industry.

The problem is much more acute in the Commonwealth of Independent States, not only because the state identified totally with the defence industry, but also because the defence industry was the basis on which production and trade and, indeed, Soviet society and the Soviet economy as a whole were built: foreign policy, defence policy, military doctrines, the human resources policy, the defence economy and military organization were all very closely interconnected and formed the basis for the entire political and military edifice.

The defence industry which began to develop during Stalin's first five year plan in the 1920's managed to exceed the requirements of the Red Army by the end of the Second World War. After the war it had to face the challenge of nuclear and

space technology, cybernetics, computers, etc. It has since grown to the point where it dominates the whole Soviet economy.

Gorbachev's original move to reduce the defence industry and control production constitutes the first significant attempt to transform part of the defence industry. However, substantial reductions in military spending and the unemployment resulting from the decision to reduce the number of soldiers by 500 000 have provoked a backlash in military circles.

It is difficult to calculate exactly what position the defence industry occupies in the former USSR's national economy. According to Russian sources, it counts for about 45 and 60% of the economy, while state budget data indicate that it contributes 11% to State revenue. Other sources put the figure at 20% of national revenue. Nevertheless, it is fair to say that the defence industry is in fact a State within a State: there are 600 000 plants producing all kinds of military equipment covering 400 000 sq km (2% of former Soviet territory).

Despite the fact that during 1990 a low military spending dropped significantly and although Soviet officials and Gorbachev himself have announced drastic reductions, the former Soviet Union remains the world's main exporter of heavy arms to the Third World (Table II) and the second largest exporter of army generally throughout the world in 1990 (see Table III) after the USA.

However, while the competitiveness of the Commonwealth of Independent States appears gradually to be declining due to domestic difficulties, Community countries headed by France, Germany and the United Kingdom are stepping up their exports of arms systems to the Third World (90% of French and British arms exports go to the Middle East) (see Table IV). Fears that the Third World would be used to absorb Community defence industry products when geo-politically opportune are thus being realised.

However, in the long term, the defence industry will only be able to cope with the expected fall in demand and crises in this sector if it converts production. Recently, the Community's defence industry has begun to develop a 'dual-use' approach, however this can only be implemented in the electronics and the chemical industries.

States with defence industries producing dual-use products are essentially the United Kingdom, Germany, France and Italy. These governments are particularly in favour of dual-use products since these can be integrated in national research and development programmes which attract substantial state subsidies and protection.

However, the fact that the defence industries are forced to pay a significant part of the 'peace dividend' in Europe with all the adverse economic and social costs that this implies means that they must switch to the production of non-military products.

The process of converting the defence industry both in the Community and in the states of central and eastern Europe will have very adverse consequences for employment (see Table V). During the years ahead it is expected that many thousands of jobs will be lost in the Community's arms industries and also in sectors indirectly linked with the defence industry. This will have serious

economic and social repercussions in Community regions with high concentrations of activities of this kind.

Statistics for 1989 show that overall Community arms production was worth ECU 48 bn, the leading producers being the United Kingdom, France, Germany and Italy. These countries alone employ 1.3 million workers in this sector. (see Table VI).

In most of the states of central and eastern Europe the defence industries have already shed tens of thousands of jobs. This phenomenon will have a devastating effect on the CIS where vast numbers of highly skilled workers are employed in the defence industry.

4. POTENTIAL FOR TRANSFORMATION - PROSPECTS

There is an urgent need for political, economic and military doctrines to be thoroughly reviewed in the light of recent events and notably: the disarmament agreements concluded so far, the progress of democratization in the former socialist countries, changes brought by Perestroika, the new situation emerging after the recent coup, the disintegration of the USSR and the creation of the CIS and finally popular demand for development and economic and social progress.

Disarmament must fuel development, particularly in the countries of Eastern Europe, and economic policies must pursue this end.

One factor will play a very important role in the conversion of defence industries both in production and during withdrawal and conversion: namely energy.

Under the terms of the agreements for a reduction of conventional forces in Europe a considerable volume of military equipment is being withdrawn from circulation, a process due to be completed by 1994.

REDUCTIONS BY TYPE OF WEAPON	NATO	FORMER WARSAW PACT
Tanks	6 600	12 500
Armoured vehicles	4 500	14 500
Rocket systems	1 200	11 700
Warplanes	-	3 600
Helicopters	-	1 600

As the above table shows large numbers of weapons and weapons systems are being scrapped, especially in the former Warsaw Pact countries.

Both in the West and in the countries of eastern Europe the technical means exist to convert conventional weapons into non-military products; indeed various studies drawn up by international organizations such as the UN and also a number of governments have found that equipment for use in various areas such as agriculture, mining and the energy sector can be made from redundant weapons and weapons systems.

Examples :

TANKS and ARMOURED VEHICLES	>	AGRICULTURAL MACHINERY TRACTORS IRRIGATION PIPES DIGGING EQUIPMENT, ETC.
GUNS	>	MINING EQUIPMENT (LAND AND SEA)
HELICOPTERS and AIRCRAFT	>	FIRE PREVENTION AND FIRE-FIGHTING WIND AND HYDRO-ELECTRIC POWER PRODUCTION

It is, of course, essential that weapons withdrawn from circulation are not exported to third world countries; (an impressive example of the non-military use of weapons withdrawn from circulation is the innovative use by a team of Polish experts of Soviet military aircraft engines to extinguish fires at oil-wells in Kuwait).

In this process particular attention must be paid to environmental protection and energy savings. The reutilization of material withdrawn from circulation and the conversion process and the recycling of basic materials must not harm the environment (through industrial waste etc.), nor lead to an increase in energy consumption through energy-intensive procedures.

As far as energy costs are concerned, account must be taken of the energy consumed in production and energy losses during conversion and utilization of the products concerned.

The Paris Agreement on chemical weapons (January 1989) provides for a total ban on the use of such weapons and establishes the need for a new treaty banning the production and stockpiling of all kinds of chemical weapons. Agreements on chemical weapons adopted so far specifically stipulate that such weapons must be completely destroyed.

Only recently military circles in the former USSR agreed to provide information regarding its arsenal of chemical weapons. According to these figures the former USSR had stockpiled 50 000 tonnes of toxic substances; Western sources on the other hand give a figure of up to 800 000 tonnes.

According to American estimates, 42 chemical weapons arsenals are controlled by the former Soviet Union control. The same sources give the following breakdown by country:

USSR: 9
former Eastern Germany and Czechoslovakia: 9
Hungary and Poland: 5
Roumania: 4
Bulgaria: 1

However, the same military circles in Moscow maintain that no chemical weapons are stored in former Warsaw Pact countries.

The chemical substances used in chemical weapons have a number of important non-military applications, notably in biotechnology, the pharmaceuticals industry and environmental protection. The basic chemical substances are as follows:
- toxic gas containing hydrocyanic acid
- asphyxiating gas,
- germ gas,
- 'mustard gas' (many different types) etc.

Examples of the non-military use of substances used in chemical weapons are as follows:

APPLICATIONS	CHEMICAL SUBSTANCE	MLITARY USE
PHARMACEUTICALS INDUSTRY AGRI-CHEMICAL PRODUCTS	CHLOROETHANOL	PRODUCTION OF THIODIGLYCOL
PHARMACEUTICALS INDUSTRY RESEARCH	THIODIGLYCOL	MUSTARD GAS
PHARMACEUTICALS INDUSTRY AGRI-CHEMICAL RESEARCH	DIMETHYLAMINE	NERVE GAS
THE PETRO-CHEMICAL ELECTRONICS AND PHARMACEUTICALS INDUSTRY	PHOSPHOR CLORIDE METHYL AND ETHYL COMPOUNDS OF PHOSPHOR	NERVE GAS

Approaches to this problem so far and the above examples give rise to the following questions:

(a) Is it ultimately realistic to expect weapons withdrawn from circulation to be given non-military applications and how can this be achieved? It goes without saying that weapons thus withdrawn from circulation must not be supplied to countries that have not signed the Paris Charter.

(b) How can defence industries be converted so that they promote development and how can costs be minimized? As stated above, the defence industry consumes vast financial and energy resources but also employs millions of workers both in the West and in eastern Europe and it cannot therefore simply be dismantled.

(c) The chemicals plants which produce the basic substances used in chemicals weapons can switch to non-military production. The problem is whether these states concerned intend fully to restructure this sector. The basic question is whether the Community and the EFTA countries will make an attempt genuinely to implement the double use approach which so far has merely provided an alibi for governments and industries.

Nuclear weapons obviously pose a more serious problem. As negotiations on the monitoring and gradual reduction of nuclear arsenals progress, the main problem facing us today is to determine to what extent nuclear weapons can be converted for non-military applications. In other words, to what extent can we really see nuclear energy as the main source of energy for development?

In the Nuclear Non-proliferation Treaty the contracting parties state their desire to develop non-military applications of nuclear energy. Will the states concerned seek immediately to use the fissile matter and the installations for producing energy? The role of existing nuclear power stations, both in the Community and in the states of central and eastern Europe and in the Commonwealth of Independent States will be decisive in this process.

As a result of this process it is expected that the Community will become less dependent on oil and more dependent on nuclear energy as a source of primary energy (see Table VII).

- How will the Community react to this new challenge?

- What solution does the Community have and what policies does it intend to implement to overcome the present arrangement whereby individual states pursue their own autonomous energy polices?

- What solutions are there to the problems which have accumulated in the past due to the reckless use and uncontrolled production of energy?

As regards the critical matter of nuclear energy it is not enough merely that a political decision should be taken on whether or not to increase the use of nuclear energy: the safety of installations and the functioning of nuclear power stations in the CIS and the other former socialist states as well as serious technological shortcomings and deficiencies raise very real problems and increase the dangers involved.

- How do our new partners in the East intend to tackle the overall problem of nuclear energy?

To what extent should the Community be involved in programmes to convert the defence industry - including nuclear weapons - in the Member States and in the other states of Europe?

How will the problem posed by the restrictions laid down in Article 223 of the Treaty be tackled? Will attempts be made to abolish Article 233 or will the lists of banned products be changed (a new COCOM list)?

- What new arrangements will be made to establish a legal basis for Community initiatives in converting the arms industry.

Will the Community support transfrontier cooperation either between Member States or between undertakings in this field?

- How will the social costs of converting the defence industry be met?

The European Parliament has repeatedly attempted over the past few years to draw up policies to tackle and solve all these problems. It is hereby urged to put forward proposals and ideas to investigate the crucial subject of disarmament, energy and development in this new era of détente and peaceful co-existence and cooperation in Europe.

TABLE I

DEPENSES MILITAIRES (EN LIAISON AVEC LE G.D.P.)

AUX PAYS MEMBRES DE L'OTAN

PAYS	80-84	1986	1987	1988	1989	1990
BELGIQUE	3,2%	3,1%	3,1%	2,9%	2,7%	2,6%
DANEMARK	2,4%	2,1%	2,1%	2,2%	2,2%	2,1%
FRANCE	4,1%	3,9%	3,9%	3,8%	3,7%	3,6%
ALLEMAGNE	3,3%	3,1%	3,1%	2,9%	2,8%	-
GRECE	6,6%	6,2%	3,9%	6,4%	5,7%	5,6%
ITALIE	2,2%	2,3%	2,3%	2,3%	2,2%	2,1%
LUXEMBOURG	1,2%	1,1%	1,2%	1,3%	1,2%	1,3%
PAYS BAS	3,0%	3,1%	3,1%	3,1%	3,0%	2,8%
NORVEGE	3,4%	2,9%	3,1%	2,9%	2,9%	3,0%
PORTUGAL	3,4%	3,2%	3,1%	3,2%	3,2%	3,0%
ESPAGNE	2,4%	2,2%	2,4%	2,1%	2,0%	2,0%
TURQUIE	4,8%	4,7%	4,3%	4,3%	4,7%	4,9%
ROYAUM UNI	5,3%	4,8%	4,5%	4,2%	4,2%	4,0%
OTAN - Total	-	3,6%	3,4%	3,4%	3,2%	3,2%

Source: Revue de l'OTAN - Fèvrier 1991

TABLE II

Les principaux pays exportateurs d'armes lourdes

Les pays sont classés à partir des exportations 1984-1988. En millions de dollars à prix constants 1985.

	1984	1985	1986	1987	1988	1984-88
A. Exportations vers le tiers monde						
1. URSS	7.422	8.634	9.136	11.672	9.001	45.866
2. USA	4.905	4.009	4.845	6.229	3.490	23.479
3. France	3.345	3.664	3.420	2.635	1.671	14.736
4. Chine	1.207	1.011	1.313	2.187	2.011	7.730
5. Royaume-Uni	1.136	849	1.396	1.717	1.464	6.562
6. RFA	1.830	395	649	252	482	3.609
7. Italie	611	575	397	317	334	2.434
8. Brésil	271	172	124	466	338	1.372
9. Israël	263	160	242	394	178	1.237
10. Espagne	475	139	163	139	205	1.121
11. Pays-Bas	57	38	132	263	570	1.059
12. Egypte	237	122	164	195	229	947
13. Tchécoslovaquie	306	124	124	168	146	897
14. Syrie	47	35	141	298	240	762
15. Corée du Nord	36	95	46	98	109	385
Autres	740	652	557	566	409	2.921
TOTAL A	23.069	20.674	22.851	27.627	20.877	115.118
B. Exportations vers les pays industrialisés						
1. USA	5.321	4.497	5.128	5.997	5.877	26.819
2. URSS	2.695	4.311	3.769	3.331	3.767	17.923
3. France	507	382	702	438	1.209	3.239
4. RFA	705	550	456	464	973	3.149
5. Royaume-Uni	772	797	409	135	122	2.235
6. Tchécoslovaquie	356	373	373	373	259	1.775
7. Canada	64	99	433	350	61	1.007
8. Suède	57	117	177	173	266	809
9. Pologne	92	92	92	92	92	462
10. Pays-Bas	41	51	109	2	186	388
11. Suisse	13	54	46	15	80	208
12. Italie	58	16	6	61	63	204
13. Arabie saoudite	—	—	39	125	—	164
14. Autriche	42	42	—	34	34	151
15. Israël	—	59	—	66	8	134
Autres	238	170	57	184	95	744
TOTAL B	11.023	11.610	11.796	11.890	13.072	59.411
TOTAL A + B	34.112	32.284	34.647	39.517	33.969	174.529

Sources: CRIP DATA; SIPRI data base (*SIPRI Yearbook 1989*).

TABLE III

LES CINQ PRINCIPAUX VENDEURS D'ARMES (1990)

	En milliards de dollars	En pourcentage
Etats-Unis	8,738	40 %
URSS	4,373	21 %
France	1,799	8,2 %
Royaume-Uni	1,220	6,8 %
Allemagne	0,963	4,4 %

Source : SIPRI Yearbook, 1991.

TABLE IV

Arms supply contracts with Third World regions 1982-1989
(size in US $ millions)

	East Asia/Pacific		Middle East/S. Asia		Latin America		Africa (less N. Africa)	
	1982-85	1986-89	1982-85	1986-89	1982-85	1986-89	1982-85	1986-89
Western World								
USA	5 851	5 937	22 358	18 138	1 401	1 408	455	372
France	240	80	14 820	6 030	670	1 170	620	420
UK	320	1 300	10 380	7 730	130	200	610	300
FRG	270	1 430	1 050	960	480	210	350	30
Italy	130	50	3 240	410	240	290	630	250
Others	1 330	600	11 030	8 520	1 590	1 180	1 170	1 420
Western World total	7 397	9 397	62 878	41 788	4 511	4 538	3 835	2 792

Source: Richard F. Grimmet, Trends in Conventional Arms Transfers to the Third World by Major Supplier 1982-89, Congressional Research Service, June 19, 1990

TABLE V

EFFECTIFS SALARIÉS DANS LES INDUSTRIES D'ARMEMENT DE DOUZE PAYS D'EUROPE OCCIDENTALE (1988-1989) (1)

	Emplois directs	Emplois induits
Royaume-Uni	330 000	?
France	280 000	100 000
Allemagne (sauf ex-RDA)	260 000	?
Belgique	25 000	?
Pays-Bas	16 000	?
Italie	98 000	?
Espagne	40 000	20 000
Portugal	6 000	?
Grèce	5 000	?
Norvège	10 000	?
Suède	10 000	?
Suisse	25 000	?

(1) Principales sources : *Economie et Humanisme*, dossier spécial, n° 316, janvier-mars 1991 ; confédération Amicale des ingénieurs de l'armement, « L'industrie européenne d'armement » ; *Heracles*, coll. « Défense et armement », éd. Lavivière, Paris, 1989.

TABLE VI

Données sur les industries européennes d'armement

Pays	Production (10^9 Écu)	Exportations (en 10^6 Écu)	Exportation/ Production (en %)	Recherche et développement (en 10^6 Écu)	Emploi (unités)
RFA	9 650	2 420	25	438	290 000
Belgique	920	415	45	1	30 000
Espagne	1 400	700	50	n.d.	138 000
France	12 820	6 130	40	1 514	400 000
Italie	4 000	2 400	60	77	100 000
Pays-Bas	1 730	570	33	24	30 000
Royaume-Uni	16 600	5 000	30	1 350	516 000
Total CEE	48 100	17 160	36		1 540 000
Suède	1 380	550	40	n.d.	40 000
Suisse	1 300	520	40	n.d.	30 000
Total Europe	52 140	19 010	36		1 650 000

Source : Estimations du Groupement de recherche et d'information sur la paix (GRIP), moyennes pour 1980-1988, n° 16/17, 1989 : « L'Europe des armes ».
Pour la recherche et développement militaire : assemblée de l'UEO, doc. 1051, 1986 : « Le secteur armement des pays membres ».

TABLE VII

Europe des Douze : consommation d'énergie primaire

Secteurs	1973 (1)	1982 (1)	1988 (1)	1995 (1)
Pétrole	63	51	47	42-45
Combustibles solides	23	24	22	21-23
Gaz naturel	11	16	17	16-17
Électricité primaire	3	9	14	17
dont nucléaire	2	7	12	15
Total	100	100	100	100
Total (en Mtep)	1 029	990	1 073	1 160

(1) En %.

Source : CEE.

ANNEX

Motion for a resolution (B3-0846/90) by Mr Goria and Mr Guidolin, pursuant to Rule 63 of the Rules of Procedure, on disarmament, energy and development

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The European Parliament,

A. whereas the Non-Proliferation Treaty (NPT) which came into force in 1970 and has been signed by the majority of nuclear weapons states and non-nuclear weapon states commits the parties to the further development of nuclear energy applications for peaceful purposes, in particular in the territory of the non-nuclear weapons signatory states, with due consideration for the requirements of the developing regions of the world,

B. whereas the Treaty on Intermediate Nuclear Forces (INF) signed on 8 December 1987 paved the way for substantial reductions in the nuclear arsenals of the two superpowers,

C. whereas, moreover, if the process of nuclear disarmament is to be irreversible, it must entail the conversion of the relevant equipment and fissile material,

1. Stresses the need for the process of reducing and dismantling nuclear weapons to go hand in hand with the process of converting fissile material for nuclear warheads into energy for peaceful purposes;

2. Stresses the importance of using existing nuclear power plants to effect this conversion;

3. Points to the need for a wider agreement including not only the two superpowers but also the industrialized countries with industrially advanced and safe technology;

4. Points out that the developing countries, particularly those in the southern hemisphere, should be the main beneficiaries of the economic results of the conversion operation;

5. Calls on the governments of the Member States to give active support, in the appropriate bodies and with a view to the future disarmament negotiations (such as the START talks), to the important process of converting nuclear weapons, in particular fissile material, into energy for peaceful purposes.

O P I N I O N

(Rule 120 of the Rules of Procedure)

of the Committee on Energy, Research and Technology
for the Committee on Foreign Affairs and Security

Draftsman: Mr Virginio BETTINI

At its meeting of 29 June 1990, the Committee on Energy, Research and Technology appointed Mr Bettini draftsman.

At its meetings of 19-21 February, 13-14 April, 22-23 September and 15-16 October 1992 it considered the draft opinion.

At the latter meeting it adopted the conclusions as a whole by 14 votes to 0, with 1 abstention.

The following were present for the vote: DESAMA, chairman; ADAM and VERWAERDE, vice-chairmen; BETTINI, draftsman; BARTON, BREYER, CHIABRANDO, GOEDMAKERS, GÖRLACH, LARIVE, MAYER, POLLACK, PORAZZINI, ROBLES PIQUER and SELIGMAN.

A. Introduction

The United Nations Conference on the Relationship between Disarmament and Development (New York, 1987) led to international research into relations between the use of armaments, the environment and development. The subsequent publication of the Final Report of the World Commission on Environment and Development and the Brundtland Report provided opportunities to focus specifically on the problem.

A further step forward was taken at the Moscow Conference on the Environment, Development and Disarmament (3-5 December 1990), which showed that disarmament could yield a 'peace dividend' for use in development projects and projects to design a non-military international security system.

If the concept of the peace dividend is accepted and recognized, more resources will become available for development. Recent experience on the basis of the INF (Intermediate-Range Nuclear Forces) Agreement and the reduction of conventional weapons deployed in Europe have shown that the process of disarmament and conversion is extremely costly[1]. Dismantling existing arsenals, especially chemical, biological and nuclear, is an expensive process, but releases resources for use in other sectors.

It is clear that it will take a relatively long time to absorb the cost of disarmament and conversion of the arms industry. The Moscow conference concluded that disarmament and conversion would release the best scientific minds, powers of technological innovation, talent and productive capacity in engineering, electronics, informatics and other high-technology industries which could be used to create new ecological and economically sustainable models of development.

B. Conversion

Premise

Technology could become a means of transforming the instruments of death and destruction into socially useful commodities. However, the ultimate solution must be to halt arms production altogether.

We must eliminate the very rationale for manufacturing arms and for the theory of deterrence, expressed in Thomas Schelling's famous saying: because the enemy thought I was about to kill him in self-defence, he was on the point of killing me in self-defence, so I had to kill him in self-defence.

(a) Conversion of conventional weapons

The Romeos report summarizes the technical options for conversion of weapons, but without going into detail on the technology involved. Its arguments will not be repeated here, although a more thorough discussion of the issues would be possible.

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[1] Samland report on the importance of conversion planning in the Community (PE 210.229)

(b) Conversion of chemical weapons

The Romeos report also deals with this subject, but provides little indication of ways in which the raw materials and compounds used could be processed chemically. However, the issue is eminently political. A chemical pesticide plant can very easily be used to produce chemical weapons.

(c) How can the dividing line between biotechnology laboratories and bacteriological arms factories be policed?

Is there any difference between a bacteriological weapon for use against people and one for use against the nature of which he is part? Everyone knows that bacteriological weapons have been used since the 1960s in many wars, declared or undeclared. The nature 'around' man has been targeted in order to target him indirectly. The only possible solution is to outlaw this type of weapon completely and destroy those which exist.

It goes without saying that research in this sector should be banned and that the UN should be able to guard against, inspect for, verify and denounce any violation in this area, using a body of inspectors with suitable powers.

(d) Conversion of nuclear weapons

The Committee on Energy, Research and Technology intends to dwell on this particular aspect of conversion because of the advanced technologies involved in the problem and various uncertainties as regards the solutions to be adopted in order to neutralize the destructive potential.

1. The obvious way of getting rid of atom bombs

Dismantling missiles is not enough. Nuclear disarmament will only be genuine once the warheads have been rendered unserviceable. Two ways of doing this have been suggested: one - the obvious method - is by burning the nuclear material in power stations, so as to produce energy; the other possibility is to store it under the international supervision of the UN pending the development of safe technologies for its disposal.

The USA and the former USSR will be scrapping a further 3000 nuclear warheads by 1993. What will happen to the fissile material recovered is therefore a very legitimate question; nuclear weapons will not be definitively eliminated simply by dismantling them.

When a nuclear warhead is dismantled, its mechanical and electronic components are destroyed, but the nuclear material remains: because uranium and plutonium are so toxic (1 kg of plutonium is enough for one billion lethal doses), they are dissolved in acid, converted into oxide and preserved in this form. This chemical conversion does not constitute genuine disposal. It leaves the isotopic components of the two elements intact (U-235 and Pu-239). In a few days, or a few weeks at the most, the pure metal can be recovered from the oxides and the devices can be reconstructed.

The FAS (Federation of American Scientists) suggests taking this material away from the military and using the uranium and plutonium recovered to produce energy in civil reactors where the fuel would be consumed by fission and

converted into elements which are admittedly also hazardous, being highly radioactive, but which cannot be used for military purposes.

From both the technical and the economic point of view, there is a substantial difference between nuclear fuel for civil and military purposes. For civil use, the fissile isotope content needs to be around 2%, whereas for military use it needs to be around 90%. Thus oxides of U-235 or Pu-239 must be mixed with 50 times the quantity of natural uranium oxide. This mixture is used to synthesize reactor fuel pellets.

To continue with the example of the USA, 1600 t of fuel would be obtained from the remaining 30 t of material which can be recovered from missiles before 1993 - enough to fuel fifteen 1000 MWe reactors for a year. Much the same is true for the former Soviet Union.

2. Can fissile material from nuclear weapons be used for peaceful purposes?[2]

The implementation of the Treaty on Intermediate-Range Nuclear Forces (INF Treaty, 1987) holds out prospects for a substantial reduction in nuclear weapons and is likely to make available large quantities of fissile material which will have to be made secure - in other words its use for military purposes must be rendered impossible or at least very difficult.

2.1 The fissile materials concerned

The materials concerned are so-called weapons-grade plutonium and uranium, which are ideal for the production of nuclear explosive devices, namely:

Plutonium containing 98% Pu-239
Enriched uranium containing more than 90% U-235.

The quantity of fissile material with these characteristics is estimated at around 2000 t: the total quantity of plutonium is thought to be in the region of 200 t, 95% of which is in the USA and the former Soviet Union, while the total quantity of uranium is around 1500 t, of which 90-95% is in the USA and the former Soviet Union.

2.2 The problems

Loss of control over material of this kind would entail very serious risks, as it is far simpler to produce nuclear devices with it than with the same materials containing lower levels of Pu-239 and U-235: it should not be forgotten that the safeguards agreements between the IAEA and non-nuclear states (concluded pursuant to the Non-Proliferation Treaty, (NPT, 1970)) apply to all types of plutonium except that containing more than 80% Pu-238 and uranium of any isotopic composition.

Stocks may take the form of yellow metal ingots, especially in the case of plutonium, which after being stored for a few years following extraction from the spent fuel, contains a not inconsiderable quantity of decay products

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[2] Observations and proposals by Sergio Finzi, Director of Nuclear Safety Research, and Lopez Menchero Ordouez, Head of the Nuclear Installations Safety Division at the Commission of the European Communities

emitting beta and gamma particles, which makes it difficult to handle and use. It is assumed that stocks of plutonium exist which have periodically undergone chemical purification to prevent these problems, whether metal ingots or nuclear warheads. However, it is also thought that other stocks exist in the form of ingots or warheads containing old plutonium, making it even more difficult to dismantle weapons and recover the material from them. In the case of highly enriched uranium this problem does not arise.

The guarantee of non-use for the purposes indicated in the 1987 treaty requires not only international verification but also physical protection by the state which owns the stocks. Thus once stocks of weapons-grade plutonium and uranium are available, there will be an urgent need to dispose of them or convert them into products which present less of a danger of proliferation. The only way of eliminating them completely is by means of explosive fission (underground). On the other hand, converting them into products less open to proliferation could provide important opportunities for an energy strategy with a high ecological profile.

The two main methods currently available are recycling of military plutonium or uranium in existing LWR power stations, which could probably be shown to be immediately effective, and recycling in fast reactors.

2.3 Recycling in existing LWR power stations

This is an established method of recycling plutonium. Plutonium oxide is mixed in a ratio of 4% with depleted uranium oxide. In MOX fuels produced in this way, the plutonium used comes from recycling of standard fuels and contains around 58% Pu-239. Technically, the use of weapons-grade plutonium presents fewer problems, as the difficulties which arise with recycled plutonium, which contains significant quantities of Pu-241 and americium, would no longer occur. It is also possible to create MOX fuels using only weapons-grade plutonium oxide and natural uranium oxide.

MOX fuels are recycled at existing LWR power stations using 1/3 MOX and 2/3 standard fuel. Weapons-grade uranium could similarly be used in standard fuels, mixed in the form of an oxide with natural uranium oxide.

After use, the products from the recycling of 'military' MOX fuels or 'military' uranium fuels would have properties comparable to those of products from the recycling of MOX or standard enriched uranium fuels.

2.4 Recycling in fast reactors

Fast reactors (specially designed) could burn quantities of 'military' plutonium similar to those burned by an LWR station of the same capacity using MOX fuels. Although this method of disposing of 'weapons-grade' plutonium has the side effect of producing degraded plutonium, the quantity produced is less than from an LWR using MOX fuels. With this type of reactor, in which actinides from the recycling of LWR fuels could also be burned, it would thus be possible to reduce civil and military plutonium stocks.

2.5 Safeguards

Disposal of military fissile materials necessarily entails reducing the amount of Pu-239 and U-235 in the materials concerned. To do this economically, they

would have to be recycled in power stations under the conditions described above. If large recycling programmes had to be carried out, it would have to be ensured that during the production of MOX or 'uranium' fuels from military fissile materials, absolutely none of the materials to be reduced by recycling could be diverted. The fuel rod production stage could thus be carried out under a more stringent safeguards system, which would also permit a method of conversion. The following stage - using the fuel rods in civil power stations - would present less serious safeguards problems than with normal fuels.

2.6 The costs

The cost of reusing military fissile materials is the same as that of running a conventional nuclear power station. However, it should be borne in mind that before reusing 'old' weapons-grade plutonium (which has been stored for more than a few years) further chemical separation of plutonium and its natural decay products has to be carried out.

2.7 Arguments for and against[3]

The quantity of U-235 and Pu-239 fissile material suitable for the construction of nuclear warheads which exists worldwide is estimated at around 2000 t. The majority of the stocks are in the USA and the CIS and a small proportion in France and the United Kingdom, while other countries have the rest. Pu-239 is inflammable and its oxide extremely toxic, so storing it would be very risky. However, U-235 could be advantageously mixed with natural uranium and then burned in civil reactors.

Pu-239 can be used either as mixed oxide (MOX) or in fast reactors of the Superphenix type, which are extremely dangerous, or it could be stored for 100 000 years.

When Pu-239 undergoes fission, it yields fission products which can be vitrified and neutrons which, if absorbed by U-238, can regenerate Pu-239. However, if the burn-up exceeds 3000 MWd/te, Pu-239 in turn absorbs neutrons and becomes Pu-240, which is not fissile and can be used for military purposes. Superphenix has burn-up rates of about 100 000 MWd/te, and virtually all the Pu-239 therefore undergoes fission or is converted into Pu-240 and other products.

There are therefore some people who insist on long burn-up cycles in order to prevent military use of the plutonium; one or two fast breeder reactors would be kept in operation for the sole purpose of consuming plutonium stocks and waste. This would constitute a change in the role of Superphenix, which was originally intended to be a breeder reactor producing plutonium for other reactors. However, Superphenix has never yielded any plutonium: all the Pu-239 has undergone fission in situ, thereby tripling the effective burn-up from the normal figure of 30 000 MWd/te to 100 000 MWd/te.

However, some 30% of the energy generated by a conventional reactor (LWR or PWR) is provided by the Pu-239 generated in it. Military reactors, with very short

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[3] Observations and proposals by Tullio Regge, Professor of Relativity Theory at the University of Turin, member of the EP Committee on Energy, Research and Technology

burn-ups of around 3000 MWd/te, have radically different operating and safety arrangements from civil reactors.

Fast breeder reactors would be the most suitable type of reactor in which to consume waste and actinides such as Pu-240 and Pu-242, Cu-242 and Ne-237, which pose even more serious problems; curium is the most hazardous of all.

3. Transmutation

The problem of long-term radioactivity due to the presence of alpha-emitting elements gives cause for concern. Can it be reduced?

The problem was posed[4] as early as 1982 when the Castaing Committee called on the French Government and the CEA to consider it - albeit without much result: the subject was too complex and the economic benefit doubtful.

As time goes by, mentalities change. The enemy has been identified: it is the actinides, elements whose radioactivity declines slowly and takes the form of emissions of alpha radiation. Members of this unhappy family include the following:

* Ne-237, which takes a little over two million years to lose half its radioactivity;
* Am-241, with a half-life of 430 years;
* Am-243, with a half-life of 7400 years;
* Cu-245, with a half-life of 8500 years.

As 10 half-life periods have to elapse before nuclear waste becomes harmless, this will take 20 million years in the case of Ne-237. What should be done in this situation?

The answer is to add two stages to the reprocessing operation: further separation and transmutation. At the further separation stage, the minor actinides (neptunium, americium and curium) should be separated from one another. The first which should be tackled is neptunium, with its half-life of two million years.
The next should be Am-242, which although its half-life is 'only' 432 years, has the disadvantage of gradually becoming transformed into neptunium. Work is currently being done on the basic chemistry of americium, in the hope of discovering a genuinely selective procedure for extracting it. One possible and original solution would be to use cryptates (discovered by the winner of the Nobel Prize for Chemistry Jean-Marie Lehn), which should make it possible to separate the various radioactive elements selectively.

The initial results are encouraging, but the technique, which is very expensive, is not yet available for use on an industrial scale. If these minor actinides could really be separated, ways of transmuting them could be sought, with the aim of converting them from products with very long half-lives to shorter-lived ones. How could this be done? By exposing them to the nuclear fire of a fast reactor or bombarding them with a particle accelerator.

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[4] Angerean J.F., Des déchets radioactifs à vie courte, Le Monde, 29 May 1991

It is estimated that about twelve reactor cycles are required to eliminate 92% of a given quantity of neptunium. Accelerated reprocessing is therefore not an option, either now or in the immediate future, in spite of the results obtained by the Institute for Transuranium Elements in Karlsruhe in 1989.

The Japanese are also working in the same field, with the OMEGA project. Ought Community funds to be made available for the construction of an incineration reactor and a special-purpose accelerator? The Japanese allocated the equivalent of 13 million French francs for separation and 42 million French francs for transmutation in 1991.

The Americans, for their part, started up an actinide and lanthanide separation and extraction plant at Hanford in 1991 and, at the prompting of Argonne National Laboratory, a new incineration reactor system in 1990.

4. Possible solutions

4.1 Storage above ground rather than in geological formations, pending more specific results from transmutation research.

4.2 Comparison of possibilities of recycling nuclear material from nuclear weapons using MOX, bearing in mind however that there are major problems with reprocessing.

4.3 Placing stocks under international control.

4.4 Promoting research by the JRC and universities on transmutation so that Europe can match the research efforts of the Americans and the Japanese.

4.5 Resolving the Superphenix syndrome: Superphenix has been shut down since 1990 because it is too dangerous on account of the presence of plutonium in the sea and of thousands of tonnes of liquid sodium which would ignite on contact with water and air, and numerous shutdowns since it was commissioned in 1985[5]. It has operated for a total of two years in the 6 1/2 years of its existence, at a cost of FF 27.5 billion. Will fast reactors be needed to overcome the shortage of nuclear fuel or to solve the problem of nuclear weapons?

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[5] May 1987: sodium leak in the carousel
September 1989: shutdown for adjustments to the core and study of a hypothetical argon bubble
April 1990: sodium leak shortly after restarting
June 1990: restart
July 1990: shutdown due to contamination through oxidation of the liquid sodium required to cool the reactor