COMMISSION OF THE EUROPEAN COMMUNITIES

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A COMMUNITY ACTION PROGRA

AND

A DRAFT COUNCIL RESOLUTION

ON THE

RATIONAL UTILIZATION OF ENERGY

(submitted to the Council by the Commission)

COMMISSION OF THE EUROPEAN COMMUNITIES

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APPLIES TO THE ENGLISH VERSION ONLY

Brussels, 5 november 1974

CORRIGENDUM

A COMMUNITY ACTION PROGRAMME AND A DRAFT COUNCIL RESOLUTION ON THE RATIONAL UTILISATION OF ENERGY

(Communication from the Commission to the Council)

CORRIGENDUM to the English version of:

A Community Action Programme and a Draft Council Resolution on the Rational Utilisation of Energy

COM (74) 1950 final

Page 13 Under the heading 2.3 " Coordinating the work; work to be undertaken at a later stage; the role of research and development"

Add paragraph

35. As already indicated in the preceding section, all the detailed work concerning the rational use of energy will be initiated and finalized by the "Steering and coordinating Committee RUE".

COMMUNITY PROGRAMME FOR THE RATIONAL USE OF ENERGY

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I. BASIS OBJECTIVES AND THE IMPLEMENTATION OF A COMMUNITY PROGRAMME FOR THE RATIONAL USE OF ENERGY

1.1. The Community policy

1. The Commission has been examining the question of using energy in a more rational manner since the end of 1971 by which time it had become apparent that raw materials (including certain energy resources) were in short supply and were often used wastefully. The Commission's preliminary observations concerning the desirability of certain measures were outlined in its communication entitled "Necessary progress in Community energy policy" which was sent to the Council on 13 October 1972.

2. In the light of further work carried out because of the supply situation, and in particular because of the increase in energy prices since Autumn 1973, it is likely that substantial results may be achieved by limiting the growth of the demand for energy.

3. In the Annex to the Commission's Communication to the Council of 29th May 1974 - entitled "Towards a new energy policy strategy for the European Community " - the Commission indicated its approach to the problem by setting out the principles under-lying its policy, its targets and its methods. A reduction in demand may be an im portant factor in stabilizing energy supplies.

4. In this way the Commission has given its support to the work of the major energy-consuming countries in the OECD and also plays an active part in the ad hoc OECD Working Party on the subject. The measures evolved in the OECD also provide a guarantee that the Community's policy concerning the rational use of energy will be in line with those employed in other industrialized regions in the world. Thus, the results that the Community expects to achieve regarding its energy supply will be made general thoughout the world if the other major energy-consuming countries take similar action.

5. A Community programme in the field of the rational utilization of energy is necessary, particularly since the results of specific measures of State in this field, however important they may be at the national level, do not have a significant impact on the world energy market and are therefore unlikely to influence it to any degree. It therefore appears essential that the Community should define, in this field, some common objectives and attempt to reach them through a continuous effort, in selecting the ways and methods that seem most appropriate.

6. Acting on the Commission's proposals, the Energy Committee has set up a Working Party of experts in the rational use of energy which is to formulate an action programme for this field.

1.2. Objectives of the programme

7. The objectives of the Community programme concerning the rational use of energy flow from those of the "New Strategy". The following four objectives stand out in particular :

(1) reduce the increase in energy requirements,
(2) reduce oil imports,
(3) change the structure of supply,
(4) change the structure of consumption.

8. These objectives can be pursued by the parallel use of four types of measures likely to save energy, i.e. limiting the demand for useful energy, making adequate allocation of energy resources, reducing the consumption of non-useful energy and improving efficiency (see Annex 1). However, the Commission considers that the rational use of energy as the Commission understands the term applies only to the last two measures referred to, since its programme aims solely to reduce energy input while providing the consumer with the same level of energy output (see Annex IV of the "New Strategy").

The Commission considers also that a Community framework for the measures envisaged in this document is necessary; it will ensure the compatibility of all the measures which will be taken to achieve the objective established and also the compatibility with the satisfactory functioning of the Common Market.

9. This reduction in the energy input will come from a reduction in the losses arising within the internal consumption of the Community - presently 54% of total requirements. In particular, it will be necessary to reduce losses in final consumption which presently stand at 55% in the domestic sector, 83% in the transport sector and 45% in the industrial sector.

10. Accordingly, the action programme, which has been formulated with the help of national experts in the Energy Committee's Working Party on the Rational Use of Energy sets quantitative medium-term and long-term targets which could result in energy savings of 15% of the Community's internal consumption by 1985, or about 240 m toe. If the effects of this process increase constantly, the savings should total 25% at least by the turn of the century

11. In the shorter term, initial savings of 30 m toe (about 3%) can be anticipated as early as 1977, mainly as a result of measures to improve the maintenance and functioning of existing structures. These savings in consumption should total 90 m toe in 1980 (about 8% of consumption). Oil would account for about two-thirds of these savings in 1977, falling to about one-half in 1985.

12. These savings would have a direct effect on the Community's trade balance especially on the balance of payments with oil-exporting countries. Assuming a price of $10 per barrel by way of example, this might represent a reduction of the cost of oil of imports of $ 1500 million in 1977, $ 3200 million in 1980 and almost $ 8000 million in 1985.

1.3. Criteria and priorities

13. There are many techniques which could be employed in order to use energy more efficiently; the constraining factor is their economic viability. As things stand at present, the following criteria should serve as a guide for the measures to be chosen and the priorities to be fixed :

(1) viability of the measure : the measure must be worthwhile above all for the national economy (including the social cost) and also for the consumer;

(2) the fuel savings that can be made, especially savings in oil;

(3) the time required in order to implement the measure;

(4) the degree of certainty concerning the outcome, l possibilities of application and supervision;

(5) compatibility with the objectives of other policies (stability of the economy, full employment etc.)

14. These priorities flow from an analysis of different situations and are therefore not necessarily the same for each of the Member States. Although the target of reducing consumption by 15% is a Community one, the measures to achieve this reduction will in most cases have to be taken by individual Member States in accordance with their own requirements, unless Community principles such as the free movement of goods or competition are affected. However, the Committee considered that the twenty-two measures put forward are priorities amonst those which could be considered in the field of URE. This program relates solely to these measures (see Annex 2 "Summary table of priority measures concerning the rational use of energy").

1.4. Sectors of intervention, types of measure and estimated results

15. The 22 measures judged to be the most suitable are as follows, broken down according to the sectors of consumption chosen :

- Domestic and tertiary : six measures, savings estimated at 90 m toe (18%) in 1985
- Transport : six measures, savings estimated at 35 m toe (16%)
- Industry (energy consumption only) : seven measures, savings estimated at 84 m toe (15%)
- Energy industry : three measures, savings estimated at 11 m toe (6%)

16. Of course, the estimated results of the measures are subject to all the usual reservations regarding projected figures. Thus, in most cases they are targets, even if their chances of success have been assessed cautiously. The success of the measures will depend on the sustained efforts of both public authorities and consumers.

17. In addition, these estimates (like the overall target of reducing Community consumption by 15%) are only average figures for the Community as a whole and the figures for each Member State will vary depending on their particular situation.

18. These measures will take various forms such as a detailed study of the proposed measure, the exchange of information between Member States, information campaigns directed at the general public, the organization of Community competitions, measures in the form of aid, tax, tariff or financial aids, the examination of administrative provisions and technical standards as well as Community measures such as Recommendations, Directives etc. Sub-committees should examine the choice of the most suitable solution for each individual case.

19. The action and measures which could be taken are described in detail in part II of the report. The first two steps referred to above (detailed examination of the proposed measure, exchange of information between Member States) are not included in the description of each individual course of action as they form part of all twenty-two.

20. Even though all these actions are viable - that is to say financially worthwhile, the precise calculations of the economic benefits of their application should be studied in continuing work by specialist groups (mentioned in paragraph 27). As of now, an estimate has been put forward for some of the actions.

2. IMPLEMENTING THE ACTION PROGRAMME

2.1. Actions and measures to be taken

21. All the courses of action described in Part II of the action programme and the practical measures to implement them, will have to be studied in detail.

22. Subject to Community arrangements it will be the responsibility of the Member States to determine the nature of the measures to be introduced and the form which they are to take; the responsibility for implementing and monitoring them, will fall in most cases to the Public Authorities (Central, Regional of Local) of the Member States.

23. Consequently, the role of the Commission will be to make possible the pooling of information and experience, to encourage and/or organize analytical studies of facts in order to help single out the most appropriate measure(s) for each Member State.

24. An example of this process would be the preparation and introduction of "standards" which - even if they are not compulsory in the Member States - provide business interests with an optimum synthesis of the basic features of a particular appliance or process to which they can usefully refer in whole or in part.

25. Where goods are intended for circulation inside the Community it will be possible for compulsory or voluntary standards laid down in the Member States to be the subject of a Community Regulation, to avoid distortions in the operation of the Common Market.

26. The Commission will present to the Council a periodical report on the situation within the Member States and also with regard to the realisation of the Community objective; it will set, according to circumstances, particular targets for energy savings in the short term.

27. The detailed research referred to above, which will be required for each course of action, should normally be carried out on the Commission's initiative by a Working Party of national experts.

The Working Party, which will continue to be chaired by the Commission and aided by a Commission Secretariat would act as a "Steering and Coordinating Committee" for the rational use of energy; when dealing (for a given action) with problems of a specific nature it would have to call upon groups of "specialists" whose tasks would be as follows (in order of increasing importance):

(1) to examine the proposed course of action in detail, including economic and technical aspects, with particular reference to its direct and indirect implications in the Member States ; with the intention of arriving at concerted actions.
(2) to organize the pooling of information between Member States regarding studies carried out and experience gained;
(3) to organize an information drive for the general public and a programme for business interests;
(4) to organize, if need be, Community competitions in order to make the greatest use of the general public's intellectual capacity and possible active contribution, independently of the undertakings concerned;
(5) to study possible fiscal, tariff, financial measures etc. considered to be essential for carrying out the course of action;
(6) to study general administrative provisions in force in the Member States which may be helpful to Member States.
(7) to draw up minimum standards to encourage the adoption of the course of action and its wide-scale development;

2.2. Organising the Work

28. The "Steering and Coordinating Committee" for the rational use of energy would carry out the work indicated in its title among these tasks, it must first of all define priority areas and appoint "specialists" to concentrate on the "priority" areas indicated in the action programme; these areas are grouped together as follows by broad categories.

A. "HEATING OF BUILDINGS": reducing heat losses in space heating systems, including those in industrial premises and public transport vehicles. This area comprises the courses of action described in Chapter II, 1.1., 1.2, 2.4, and 3.3.

B. "HEATING SYSTEMS": improving the efficiency of heating systems (including the regulation and servicing of these systems) and water heating systems; Actions 1.3, 1.4, 1.5, and 3.1.

C. "ROAD TRANSPORT VEHICLES": reducing the amount of fuel consumed by means of checks on the running of vehicles and measures concerning their construction; Actions 2.1, 2.2, 2.3.

D. "TRANSPORT STRUCTURES": improving the efficiency of transport structures, particularly in public tranpsort; Actions 2.5 and 2.6.

E. INDUSTRIAL PROCESSES HEAT": recovering residual process heat, reducing energy consumption by improving production processes or introducing new ones, recovering and recycling materials; Actions 3.2, 3.5, and 3.7.

F. "POWER": improving the efficiency of motors and driving systems, including small motors; Actions 3.4 and 1.6.

G. "TRANSFORMATION IN POWER STATIONS : improving the efficiency of energy-transformation plants including the recovering of their residual heat and by means of the combined production of heat and power, Actions 4.1, 4.3, and 3.6.

H. "TRANSFORMATION IN REFINERIES": improving the efficiency of refineries, including the recovering of residual heat; actions 4.1 and 4.3.

28. In view of the special features of each of these categories and the diversity and scope of the sectors to which they relate, the same number of specialists will not be needed in each case. In addition, certain matters are - by their very nature - greatly affected by local conditions (lifestyles, customs, traditions regarding the construction of buildings, climate, personal incomes etc.), whereas others are part of current technology and are likely to be fairly uniform throughout the Community. As a result, some ten to fifteen experts will suffice for the courses of action in A and B, but in view of the extreme complexity of industrial processes more will be needed for E.

30. In fact, it must be assumed that some eighty to a hundred specialists will be required in order to put the entire programme into operation. They will be distributed in different ways according to the specific subjects involved and may be employed for very varying lengths of time.

31. Normally, each group should choose its Chairman (if required) once it has been set up and should establish its tasks and timetable. It is to be expected that the "Steering and Coordinating Committee RUE" will meet twice or three times a year (more frequently if necessary) and will put the finishing touches to work completed by some groups and also assess how the work of the other groups is progressing.

32. Given the number and size of the problems raised by the programme as a whole, and to ensure the best horizontal co-ordination both at the level of the Commission's services and at that of the national administrations, and further to reduce as far as possible the financial implications of implementing the programme, the Commission's services have made a first inventory from which the following points emerge : -

- certain parts of the programme are already being examined (though sometimes only partially) by : certain Working Parties at work in one of the Commission's Directorates-General.

- it will be possible for Working Parties that have already been set up and whose work is connected with the matters in hand - to examine certain specific topics mentioned in the chapters referred to above.

33. It is to be expected that the result of a more detailed inventory would reduce the number of groups and "specialists" envisaged above.

34. The Commission would chair the groups and provide the secretarial services supplying for this purpose officials who are experts in the field; the Commission might also consider bringing in an external expert for each of the major branches being examined and would meet the expenditure incurred thereby.

2.3. Coordinating the work; work to be undertaken at a later stage; the role of research and development

36. Once the groups of "specialists" have been given their tasks and timetable they will be able to operate independently and will be assisted by a Commission secretariat.

The role of Research and Development

37. Although the proposed programme relates mainly to courses of action which have been given priority and which will have an impact over the next ten years (target date 1985), it is nevertheless true to say that a large number of the effects will be improved as technologies being studied at present are mastered more fully and it will be possible to make use of new concepts.

38. This means to say that the solution thrown up by individual analysis of the problems involved will comprise either specific points susceptible to improvement or broad avenues of approach leading to a narrower zone of results;
These points and these bottlenecks will be of value to R. and D. (for example, panes of glass which reflect infra-red rays more efficiently, integrated electricity or solar electricity systems in houses, car powered by electricity etc.). As and when matters of this kind arise in detailed studies relating to these coures of action, precise information must be given about them and sent by the Commission to the bodies which are competent in the matter, specially CREST. (Scientific and Technical Research Committee).

39. When all the problems raised by the programme have been fully examined and all the relevant R. and D. work has been compiled and started with adequate means for a speedy result, it will be possible to make a better assessment of the length of time needed to complete the R. and D. work and to apply the results in industrial technology.

40. At that time (which is difficult to specify at present) and depending on courses of action which do not have priority and have therefore not yet been examined, it will be possible to have a more complete picture of the entire question of rational use of energy to assess more precisely the benefits which the Community may reap at the turn of the century as a result of the solutions adopted.

II. DESCRIPTION OF MEASURES TO BE TAKEN (1)

1. Measures in the field of domestic and small-scale consumption

41. As already mentioned in Chapter I, the members of the Working Party on the Rational Use of Energy have accorded "absolute priority" and "priority" respectively to measures in the fields of heating and domestic heat.

42. Some of the measures have already been implemented or are about to be implemented in a number of Member States and are being studied in the others. The proposed measures could be introduced in all the Member States of the Community within five years. The savings resulting from such measures might be estimated at approximately 90 million toe in 1985.

43. The following measures stand out in particular:

(a) as regards heating; an improvement in the thermal efficiency of construction methods and improved operation of the heating system, resulting in:
   (1) better thermal insulation;
   (2) regulated ventilation;
   (3) better regulation of heating and installation of recording calorimeters;
   (4) better burners and maintenance of heating systems;

(b) as regards heat;
   (5) more efficient hot water production;

(c) in the field of power (and heat);
   (6) more efficient appliances and installations.

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(1) Consumption in farming and trade and by public authorities and other small-scale consumers.

1.1 Better thermal insulation

(a) Action to be taken

44. The amount of useful energy required for heating (and cooling) can be reduced by:

- improving the design of walls, especially by fitting insulating layers of glass wool and expanded materials; the heat lost by a 24 cm thick outside brick wall, for example, can be reduced by 50% when a 7 cm thick insulating layer is installed (heat loss k falls from 1.2 to 0.4 kcal/m^2h^oC);
- improving the construction of roofs, likewise by installing insulating layers: a 10 cm thick insulating layer reduces the heat loss of a conventional roof (k = approximately 1.5) by more than 70% (k = approximately 0.4);
- improving windows and reducing the proportion of window space in the total external surface area of buildings: by using double glazing (k = 2.7), the heat loss is reduced by almost 50% compared with single glazing (k = 5). A double-glazed window sprayed with a transparent insulating layer reduced the amount of heat lost by a further 20% (k = 1.6), and if it is sprayed on both inner faces, the amount of heat lost falls by a further 15% (k = 0.9). If double glazing of this kind is not used (or if no improvement can be made by altering the construction of the windows), the heat loss can be diminished by reducing the proportion of window area to wall area.

(b) Possibilities of application and estimated savings

New buildings

45. In the case of new buildings it should not be too difficult to introduce and apply measures to improve thermal insulation as long as they are not on an unreasonable scale (see point (c)).

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46. Standards can be worked out for the entire range of insulation required (walls, roofs, windows, floors) and need to take into account only economic considerations, different geographical and living conditions and legal and administrative requirements in the various regions in the Community. The amount of fuel used for heating buildings erected on the basis of such standards can be expected to be 30% lower than for conventional buildings.

47. If the rate of increase in the construction of new buildings in the Community is taken to be approximately 2% per annum, assuming that the compulsory introduction and monitoring of the application of such standards is made compulsory in 1977, one might expect that fuel consumption for heating might be reduced by 2.4% in 1980, i.e. by approximately 5.5 million toe, and by 6% i.e. approximately 25 million toe in 1985.

Existing buildings

48. The improvement of thermal insulation in existing buildings gives rise to difficulties of a technical nature which are reflected in the cost of such projects. Of the thermal insulation measures referred to above, only the improvement of under-roof (gable) insulation (approx. 10%) and to a limited degree insulating walls internally or externally or by filling up cavity walls are likely to be considered. The replacement of single glazing may be possible only in a few cases. Furthermore, bottlenecks will probably appear in both the production of the requisite material and, above all, in the recruitment of the labour needed (glaziers, joiners).

49. As existing buildings will constitute 92% to 80% of the total number of buildings in the Community in the next five to ten years, accounting for the same proportion of Community fuel consumption for room heating, every effort must be made to find a better way of insulating these buildings as well as new buildings.

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50. Assuming that roof insulation can be improved in at most 60% of the buildings, and to a smaller degree the walls and windows in 35% of them (the amount of heat lost in those buildings dropping), the fuel saving in respect of room heating would be approximately 5,5%, i.e. 16 million toe in 1980, and approximately 7,0% i.e. 28 million toe in 1985.

(c) Cost

51. Measures to improve thermal insulation entail additional investment. In the case of new buildings, the additional outlay would amount to 1.5 to 2% of the building costs. However, savings would be made as a result of the use of smaller heating systems.

52. The amount by which fuel consumption can be reduced depends on the level of consumption and on the source of energy. On the basis of current prices, a family of five in a detached house with an average annual consumption of approximately 7000 litres of domestic heating oil would save approximately 200 u.a. per annum. The additional investment would therefore be covered in less than 5 years. In the case of electric heating, the paying-off period would be about 3 years.

53. The measures to be applied to existing buildings would cost considerably more, especially if they involve the replacement of windows (the fitting of under-roof insulating layers can be carried out by the occupants themselves to a large extent, sufficient information being provided on television or by brochures). To this end a study would have to be made of the extent to which improvements with a paying-off period exceeding ten years should be encouraged by means of financial incentives.

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(d) Action by public authorities

54. The competent departments in the Member States of the Community have a number of tasks to fulfill in the campaign to achieve a significant reduction in the demand for energy for heating:

(1) - The laying down of standards for thermal insulation and the calculation of heat requirements, or the improvement of existing standards;

(2) - Compulsory application of these standards to new buildings;

(3) - Information campaigns and, where appropriate, the setting up of offices providing information and advice concerning the possibilities of improving existing buildings;

(4) - Investigation of the extent to which financial assistance would be desirable for measures concerning thermal insulation (loans).

(e) Model timetable

55. (1) Examination (in the different countries) of the practical possibilities of improving thermal insulation in existing buildings: six months;

(2) Development of methods and the dissemination of information for the improvement of thermal insulation in existing buildings: six months;

(3) Implementation of the measures worked out: from the 13th month;

(4) At the same time as (1), (2) and (3): an examination of the standards already in force or being prepared in the different countries concerning thermal insulation in new buildings; for this purpose these should be an exchange of information between the competent government departments in the Member States.

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1.2 Regulated ventilation

(a) Action to be taken

56. In a regulated ventilation system the air must be replaced by fresh air every two hours. In many cases the air is in fact replaced every 30 minutes by air entering and escaping around the edges of doors and windows. In addition, heat is also lost by excessive ventilation (non-regulated ventilation through windows). Thus, the amount of heat required each hour for ventilation (30% under DIN 4701) is doubled, particularly in older buildings.

(b) Possibilities of application and estimated savings

Existing buildings

57. If doors and windows are properly sealed, if loss of heat via chimneys is prevented and if ventilation through windows is regulated, the amount of heat lost can be reduced by between 10 and 20%.

58. If adequate information campaigns are carried out in a suitable manner at yearly intervals, the work entailed can be done by the occupants themselves.

59. Even if such action is taken by only half of the households and is only moderately successful, it should lead to a reduction of at least 3% in the amount of fuel used for heating in existing buildings in the Community. An estimated reduction of 9 million toe can be expected in 1980 and 11.6 million toe in 1985.

New buildings

60. In the case of new buildings, the application of suitable standards and compulsory requirements could enable a system of controlled ventilation (as far as draughts are concerned) to be developed. This should lead to a 5 to 10% reduction in the amount of heat lost and a fuel saving amounting to 3.5 million toe in 1980 and 6 million toe in 1985.

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(c) Cost

61. The cost of these measures will be low if the work is carried out during the erection of the building or, in the case of existing buildings, is carried out by the occupant himself.

(d) Action by public authorities

62. (1) - Organization of periodic information campaigns via the mass media;

(2) Recommendations or requirements concerning the sealing of doors and windows as part of the preparation or revision of insulation standards.

(e) Model timetable

63. (1) - Drafting of recommendations concerning a reduction in the amount of heat lost through draughts or non-regulated ventilation: three months;

(2) - Organization and carrying out of information campaigns (once a year).

1.3 Better regulation of heating and installation of calorimeters

(a) Action to be taken

64. Approximately half of the demand for heating in the Community is for heating systems to serve several rooms. These rooms are heated from one source and the temperature of the individual rooms cannot be automatically regulated separately, except in the case of certain electric heating systems.

65. The installation of thermostats on individual radiators or in every room heated enables the rooms to be heated more in accordance with requirements. Unlike the conventional way of regulating radiators (by adjusting them manually to the "on" or "off" position) thermostats have the advantage of preventing a room from becoming over-heated (by means of regulated ventilation).

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66. Collective heating systems, where heat consumption is calculated on a flat-rate basis, as is the case in particular with district heating and in blocks of flats, should be fitted with measuring instruments (calorimeters) and charges should be based on the amount of heat actually used. The fuel consumption of buildings fitted with air-conditioning systems could be reduced by better regulation of the atmospheric humidity and by recovering heat from the extracted air.

(b) Possibilities of application and estimated savings

Existing buildings

67. Even in existing buildings the way in which heating is regulated can be improved by the use of thermostats and the installation of calorimeters.

68. The use of a heating system in which the temperature of each individual room is controlled by a thermostat can reduce heat loss by at least 10%. As measures to this end cannot be made compulsory and, as furthermore, bottlenecks would arise in the production and installation of thermostats (even if the installation of such thermostats were to be spread over several years), recommendations for existing buildings can be expected to meet with only moederate success.

69. If every fourth central heating system were improved in this way, the total amount of fuel which would be saved can be estimated at approximately, 1.0%, i.e. approximately 2.4 million toe in 1980, and 3.9 million toe in 1985.

New buildings

70. Minimum standards could be laid down for the regulation of heating systems in new buildings. Assuming that most new buildings (80%) will be equipped with heating systems in which the temperature of each room can be regulated separately by thermostat, the reduction in fuel consumption can be estimated at approximately 1.0% i.e. 3.5 million toe in 1980, and 1.7% i.e. 6.6 million toe in 1985.

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(c) Cost

71. The cost of a thermostat, including the cost of its installation, amounts to between 15 and 20 u.a. Even in the case of a large dwelling requiring ten thermostats whose heating costs amount to approximately 500 u.a. per year for heating at present, the costs incurred would be paid off in three to four years by the reduction in fuel consumption.

(d) Action by public authorities

72. (1) Drafting of recommendations for the increased use of central heating systems and for the regulation of these systems by thermostats;

(2) Drafting of recommendations concerning the installation of calorimeters for collective heating systems (and a system of charges based on the amount of heat used);

(3) Introduction of compulsory standards for the thermostatic regulation of heating systems in new buildings;

(4) Drafting of recommendations concerning the installation of thermostats for existing heating systems and the organization of suitable information and advice campaigns.

(e) Model timetable

73. (1) (2) and (3): six months

(4) : twelve months

1.4 Better burners and maintenance of heating systems
Action to be taken

74. The efficiency of a heating system can be increased by improving the installation. The main improvements which can be made are the installation and effective regulation of more efficient burners, their better correspondence to the boiler capacity and the careful servicing of the heating system (boiler, pumps, etc.) Minimum standards could be laid down regarding the installations and subsequent checking (servicing onee or twice a year) of burners, boilers and the entire heating system.

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(b) Possibilities of application and estimated savings

Existing systems and installations

75. The only requirements that can be set in respect of existing installations are that the burners be checked to ensure that they are adjusted for optimum efficiency and, where appropriate, that proof of regular servicing be given. The corresponding measures could result in a 5% energy saving.

76. In this way a reduction of approximately 2.0% could be made in fuel requirements for central heating systems in the Community, i.e. 4.5 million toe in 1980 and 7.8 million toe in 1985.

New Systems

77. By implementing suitable measures such as minimum efficiency standards, new types of burners could be manufactured which would increase efficiency by at least 10% (less sooting, constant flame height, greater reliability etc.)

78. As a result a reduction in fuel consumption of at least 10% can be expected when a new heating system is installed, especially as provision should also be made for the regular checking and servicing of these new models. The reduction in the amount of fuel required for heating can be estimated at 3.5 million toe in 1980 and 6.6 million toe in 1985.

79. Particular attention must be drawn to the compatibility of such measures with the aims and requirements of environmental protection.

(c) Cost

80. The checking and servicing of burners and heating systems (approximately once a year) entails only a small expenditure which is, in any case, more than compensated for by the savings on fuel.

81. The slightly higher outlay on installing improved burners as compared with that on conventional burners of average efficiency is likely to be covered in a short time by the reduction in fuel consumption.

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(d) Action by public authorities

82. (1) Organization of a competition in the Community for the development of a particularly efficient and reliable burner.

(2) Development and introduction of minimum efficiency standards.

(3) Development and introduction of inspection standards;

(4) Drafting of recommendations for improved servicing of heating systems.

(e) Model timetable

83. (1): Six months

(2),(3), et (4) Twelve months

1.5 More efficient hot water production

84. After room heating, a considerable percentage (approx.15%) of the energy consumed by households is used for heat and especially for the production of hot water.

(a) Action to be taken

85. A reduction in the amount of heat lost in the production of hot water can be achieved by:

(1) Reducing losses during production;

(2) Reducing losses during storage;

(3) Reducing losses during distribution.

86. The amount of heat lost in the production of hot water (which is negligible in the case of electric water heaters) can be reduced by better heating methods, and regular servicing in the case of other water heaters which operate at approximately 60% efficiency. The considerable amount of heat lost in hot-water production linked to the boiler - up to 90% during periods when no heating is required - can be reduced by using other water heaters. Furthermore, by installing a suitable system of pipes, the heat from water in use (in the kitchen and bathroom) can be used for pre-heating.

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87. The amount of heat lost during storage can be reduced by means of better thermal insulation. By improving the insulation of pipes, heat losses in the distribution of hot water can also be reduced. A reduction in the temperature of the water, e.g. to 45°C can enable the amount of heat lost to be reduced considerably.

(b) Possibilities of application and estimated savings

88. Measures to increase the efficiency of hot water production must be implemented for practical reasons in new buildings. A reduction of at least 10% in the amount of energy required for the production of hot water can be achieved if the general public are supplied with adequate information, and if standards are laid down concerning water heaters, hot-water storage tanks and hot-water pipes. This would lead to savings of 0.5 and 1.2 million toe in 1980 and 1985 respectively.

(c) Cost

89. The cost of improving existing installations and of producing better new installations for the production of hot water cannot be estimated at present. However, it may be assumed that in the case of new installations, improvements brought about by increased thermal insulation, for example, will be worthwhile at any rate; the problem is the length of time it will take before the additional costs are covered (5 years or longer).

(d) Action by public authorities

90. (1) Development and compulsory introduction of standards for the production, storage and distribution of hot water;

(2) Organization of an international competition for the recovery of heat for preheating storage tanks.

(3) Drafting of recommendations for the improvement of existing hot-water installations.

(e) Model timetable

91. (1) : 18 months

(2) and (3) : 6 months

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1.6 More efficient appliances and installations

(a) Action to be taken

92. Some household appliances and installations which require a relatively large amount of energy, and have good improvement potential, could be made more efficient. (Ovens, refrigerators and freezers, and small electric motors which are often used in household appliances).

93. Energy could be saved by improving thermal insulation and reducing the amount of heat lost around the edges of ovens, refrigerators, freezers (up to 50%) and by using pressure cookers etc. By replacing the valves in colour television sets by semi-conductors, power consumption would be reduced by 60% by example. Efforts should also be made to use appliances such as dish-washing machines and washing machines more efficiently and to determine their optimum size.

(b) Possibilities of application and estimated savings

94. The extent to which the measures referred to above can be carried out depends on the individual cases. If the general public is given adequate information and standards are laid down for the production and operation of appliances with a low specific energy consumption, savings could be made of at least 5% in 1980 and 8% in 1985, i.e. 0.5 million toe and 2.0 million toe respectively.

(c) Cost

95. The cost of the various measures must be calculated separately. It should be assumed that the extra costs will be low and will be covered during the life of the appliance by a reduction in the amount of energy needed.

(d) Action by public authorities

96. (1) Recommendations to the appliance manufacturers to produce better appliances from the point of view of energy consumption;

(2) Laying down of suitable standards in particular fields (e.g. thermal insulation of ovens, refrigerators, small electric motors);

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(3) Marking of appliances (indication of energy consumption) to enable the consumer to make a rational choice.

(4) Supplying information to the consumer concerning the purchase and use of appliances (television campaigns).

(e) Model timetable

97.(1) : three months
(2) and (3) : eighteen months
(4) : periodically

2. MEASURES IN THE TRANSPORT SECTOR

98. The measures for this sector which have been selected as most promising by the Member States of the Community relate mostly to the field of road traffic.

99. These measures are as follows:

(a) Increasing the energy efficiency of vehicles by:
(1) Better ignition timing and carburettor setting
(2) Improved vehicle design
(3) Promoting the use of diesel engines
(4) Better thermal insulation and heat use for public transport vehicles

(b) Altering the traffic structure, especially by an increasing change-over from private to public transport.
(5) Restricting the growth of private urban traffic in favour of public transport
(6) Improving the traffic flow.

2.1 Better ignition timing and carburettor setting

Action to be taken

100. Of the measures to increase the energy efficiency of vehicles only one relates to existing vehicles: better servicing of the vehicles and, in particular, better and regulated ignition timing and carburettor setting. Optimum ignition timing and carburettor setting can enable average fuel consumption to be reduced by 5 to 10%.

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(b) Possibilities of application and estimated savings

101. The ignition timing and carburettor setting should be adjusted at least twice a year (especially before a long journey). As it seems hardly possible, for organizational reasons, to make it compulsory for all motor vehicles in the Community to be taken to garages once or more times a year purely for that reason, normal servicing visits should be used for this purpose.

102. The extent of the reduction in fuel consumption which could be achieved would depend on whether the measures were compulsory or voluntary. If they were voluntary, even the repeated supply of comprehensive information would probable meet with only limited success and might affect only 20% of total consumption, i.e. 1.0 million toe in 1980 and 1.6 million toe in 1985. If the maintenance of good ignition timing and carburettor setting were compulsory, the problem arises of determining suitable standards and of ensuring that they are constantly respected; this would be difficult from the organizational point of view (road traffic checks, special action by the police etc.)

103. If minimum efficiency standards were made compulsory and checks carried out to ensure that they were respected, a reduction of 5% could be expected, i.e. 5 million toe in 1980 and 8 million toe in 1985.

(c) Cost

104. The cost of implementing such measures amounts to approximately 20 u.a. (including VAT) per servicing. If the average annual consumption of a medium-sized vehicle (1500 cm^3) were 1200 litres of petrol, the cost of such adjustment work would be more or less covered by the reduction in fuel consumption.

(d) Action by public authorities

105. (1) Drafting a recommendation concerning good ignition timing and carburettor setting (where appropriate, introducing financial incentives).

(2) Examining the possibility of laying down compulsory standards in this field.

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(e) Model timetable

106. Both measures : six months

2.2 Improved vehicle design

(a) Action to be taken

107. The amount of fuel required by motor vehicles can be reduced by improving their construction, in particular by:

- reducing the weight of the vehicles (by reducing the body size or making the construction lighter)
- introducing a more streamlined design to reduce wind resistance
- improving engines and power transmission
- reducing the rolling friction of the tyres.

(b) Possibilities of application and estimated savings

108. The first three measures referred to above can be implemented only by the manufacturer. As the weight of the vehicles is an important factor in determining its fuel consumption, a reduction in weight would enable fuel consumption to be reduced considerably. A 10% reduction in weight could result in an 8% reduction in fuel consumption. It would also be the manufacturers' task to introduce a more streamlined design. There would be a great reduction in fuel consumption (20 to 40%) at high speeds (from 120 km/h); consequently this would have little effect on urban traffic. Better designed engines and power transmission would result in a 5 to 10% reduction in fuel consumption. The total reductions which could be achieved by these three improvements in design should not be overestimated as they depend on the speed at which the vehicles is travelling and on the way in which it is used. Even if the application of these standards were made compulsory, the reduction in fuel consumption in urban traffic would probably not exceed 8%, especially since only a small proportion of the vehicles in service in 1980 and 1985 will be affected.

109. The rolling friction of the tyres can be reduced by the user himself by fitting radial tyres. Furthermore, tyre manufacturers should market better tyres to enable rolling friction to be reduced by 20 to 30%. The use of radial tyres available on the market so far has enabled fuel consumption to be reduced by approximately 1.5%.

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110. Thus, the total reduction in fuel consumption which could be brought about by the measures indicated can be estimated at approximately 10% i.e. 5 million toe in 1980 and 13 million toe in 1985. If such improvements were introduced on a voluntary basis, the reduction would probably amount to half of the sstimated figure, or even less.

(c) Cost

111. The costs entailed are primarily development and production costs and can be estimated only in the light of detailed studies.

(d) Action by public authorities

112. (1) Examination of improvements in the design of motor vehicles from the point of view of energy consumption (including tyres)

(2) Laying down of standards as a result of this examination;

(3) Recommendation or compulsory implementation of such standards;

(4) Encouraging the design of the best possible car from the point of view of energy consumption (also observing safety and environmental protection requirements), possibly by holding an international competition.

(e) Model timetable

113. (1) and (2) : in each case between 18 and 24 months

(3) and (4) : in each case six months

Projects (1) and (4) can be begun at the same time.

2.3 Promotion of the use of diesel engines

(a) Action to be taken

114. Diesel engines have up to 30% greater efficiency than carburettor engines and therefore require correspondingly less fuel. Diesel engines have so far been used to only a limited extent in passenger cars (4%) and in only 57% of lorries and other goods vehicles. The use of diesel engines in passenger cars could be promoted by means of suitable regulations or financial incentives.

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(b) Possibilities of application and estimated savings

115. The use of diesel engines can be increased only gradually. In the first place, factories would have to be converted and in the second place, diesel engines can be installed only in new vehicles and therefore only new vehicles can contribute to increasing the share of this type of engine.

116. Consequently, one can merely hope that the share of diesel engines in the total fuel consumption of passenger cars will rise from the current figure of 4% to 10% in 1980 and 25% in 1985. The reductions brought about by such a measure can be estimated at 2 8 million toe in 1980 and 9 million toe in 1985. Particular attention should be drawn to the fact that diesel engines are less harmful to the environment than petrol engines (no lead content and considerably less CO in the exhaust gas).

(c) Cost

117. The higher cost of the diesel engine compared with that of the petrol engine is counterbalanced to a large extent by its longer life. If any case, lower fuel requirements would not only compensate for any remaining difference in cost, but would represent a profit over the years.

(d) Action by public authorities

118. (1) Supply of information to the consumer on the use of motor vehicles fitted with diesel engines;

(2) Establishment of standards and drafting of recommendations for lessening the disadvantages of diesel engines (noise, weight, sensitivity to adjustment) and for increasing the life of motor vehicles fitted with diesel engines;

(3) Introduction of fiscal measures to encourage the use of diesel engines (lower rates of taxation - according to engine size - than in the case of petrol engines, lower rates of fuel tax);

(4) Examination of possible investment aids or fiscal advantages (permission to apply a faster rate of depreciation) for motor vehicle manufacturers who convert their factories.

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(e) Model timetable

119. (1) : three months
(2) and (3) : eighteen months
(4) : twelve months

2.4 Improved thermal insulation and better use of heat in public transport

(a) Action to be taken

120. One course of action which would not normally affect the road transport sector is an improvement in the thermal insulation of public transport vehicles. The means of transport particularly affected are railways, high-speed urban trains and trams. Heat loss, which can be very great in certain regions in the Community in winter (for example, in some cases as much energy is consumed in heating Germany railway carriages as in pulling them), can be reduced considerably by better insulation. The walls, windows and roofs of railway carriages must be insulated in such a way as to reduce heat loss to an acceptable level. Furthermore, the ventilation of these carriages must be regulated and the temperature in overheated cars must no longer be regulated by opening the windows.

(b) Possibilities of application and estimated savings

121. Improvements in the thermal insulation of public transport vehicles and in the use of heat in these vehicles will be achieved in stages as and when new rail carriages come into operation and existing ones are serviced. Assuming that insulation can be improved by 1985 in about one-third of the carriages (particularly in the colder regions of the Community), with a corresponding reduction of 20% in the amount of energy consumed in heating the public transport vehicles concerned, the saving made can be estimated at about 0.6 million toe (2%). In 1980 the corresponding saving should be about 0.2 million toe (1%).

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(c) Cost

122. The cost entailed in installing additional thermal insulation is relatively high but the saving in electricity and the combined use of thermal insulation and regulated ventilation (which is much cheaper) should make the course of action a good economic proposition.

(d) Action by public authorities

123. (1) Examination and introduction of standards to improve the construction of public transport vehicles from the point of view of energy consumption.

(2) Drafting of a suitable recommendation or directive for applying the standards concerned.

(e) Model timetable

124. (1) : 18 months

(2) : six months

2.5 Restricting the growth of private urban traffic in favour of public transport

(a) Action to be taken

125. The growth of private urban traffic, with all its disadvantages such as high fuel consumption (as a result of frequent stoppages and slow-moving traffic) and environmental pollution, must be restricted. The following measures, which have already been introduced in some built-up areas to encourage passenger car users to make use of public transport (including taxis), ought to be made more widespread;

- Increasing the speed of public transport vehicles (e.g. by setting aside special lanes for such vehicles)
- Using public transport capacity more efficiently
- Improving the comfort and cleanliness of these vehicles
- Developing car parks at public transport termini
- Restricting private urban traffic in certain areas (pedestrian, public transport only).
- Introducing flexible working hours in order to extend public

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transport rush hours over longer periods of time (public authorities and public undertakings could set an example).

(b) Possibilities of application and estimated savings

126. The type of measures to be introduced to promote the use of public transport, and hence to reduce the growth of private urban traffic, largely depends on the conditions affecting the individual congested areas and on the existing infrastructures in the towns concerned.

127. Although in terms of the specific consumption of energy (Wh/persons - km) public transport has a clear advantage (car = 100, bus = 40, train = 25, tram = 10), it is virtually impossible to estimate the extent of the reduction in fuel consumption because operating conditions differ and account must be taken of the utility for the individual user.

128. By reducing the rate of growth of private urban traffic recorded to date by approximately 20%, a 4% reduction in fuel consumption can be expected, i.e. 315 million toe in 1980, and 8 million toe in 1985.

(c) Cost

129. No overall estimate of the cost of these measures can be given.

(d) Action by public authorities

130. These measures fall largely within the scope of the local authorities. The principal measures to be carried out at a higher level concern the carrying out of information campaigns directed at the general public and, in some cases, fiscal and tariff measures to assist public transport.

(e) Model timetable

131. (1) Introduction of measures to provide users with information: three months

(2) Introduction of measures to promote public transport: according to each individual case.

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2.6 Improving the traffic flow

(a) Action to be taken

132. Improving the traffic flow in towns could also create better conditions for private vehicles, but care must be taken to ensure that the measures implemented do not jeopardize the success of measures to promote the use of public transport. Traffic flow can be improved by:

- improving traffic control (by means of electronic systems and in keeping with the flow of traffic).
- introducing flexible working hours especially in public undertakings.

(b) Possibilities of application and estimated savings

133. As for restricting the growth of urban traffic, the possibility of implementing these measures depends largely on local conditions. If traffic flow in the larger towns in the Community is improved systematically (if only to reduce pollution from exhaust gas) a reduction of at least 1% in fuel consumption can be expected, i.e. approximately 1.2 million toe in 1980 and 2.0 million toe in 1985.

(c) Cost

134. Although it is impossible to estimate the total cost of such measures, the relatively low investment and servicing costs involved indicate that the total costs cannot be so high as to make them economically impossible.

(d) Action by public authorities

135. (1) Drafting suitable recommendations to the competent local authorities.

(2) Informing the general public

(e) Model timetable

136. Both measures could be carried out in six months.

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3. MEASURES IN THE INDUSTRIAL SECTOR

137. Measures to which the national experts have given the highest priority in the interests of the rational use of energy in industry are the following:

(1) improved combustion efficiency
(2) recovery of residual heat
(3) improved insulation and heat efficiency in the heating of industrial premises and buildings
(4) more efficient motive power and lighting equipment
(5) use of continuous production processes and other manufacturing methods
(6) combined heat/power production in industry
(7) recycling and recovery of material.

138. It should be pointed out that the following additional information may help to define better the actions to be taken in this field:

- comparative studies of similar industries in Member States showing how energy is used; this information to be made available to the other Member States:
- statistical charts of the flow of energy showing how and where energy is used in industry (quantity of energy, form, source, quality etc.), which will reveal the industrial areas or processes where improvements can be made;
- data concerning the energy input required for various manufactured articles with information as to the processes employed and the forms of energy used, and concerning the possibilities of recycling waste or used articles economically.

3.1 Improved combustion efficiency

(a) Action to be taken

139. - Combustion must take place under the optimum fuel/air ratio conditions.
- The external and internal surfaces of the combustion chamber must be clean.
- Combustion must be controlled so that it is complete and clean.
- The boiler or furnace must be operated with a high load factor.

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(b) Possibilities of application and estimated savings

140. For existing plant, regular maintenance, cleaning and adjustment programmes must be planned and carried cut. The rising cost of fuel should speed up the replacement of heating plant which is both old and inefficient. Efficient combustion can reduce fuel consumption by 5 to 10%.

141. For new plant, efficiency and suitable capacity ensuring a load factor exceeding 75% should be the main criteria for the compulsory introduction of standards relating to thermal combustion. Savings would amount to approximately 10 to 15%.

142. In 1985, savings in industry achieved by improving combustion efficiency may be estimated at 28 million toe, i.e. 7% of the energy consumed for industrial heat.

(c) Cost

143. The cost of improving combustion efficiency in both existing and new plant is not high and should be largely offset by the savings made.

(d) Action by public authorities

144. Creation of information and consultation services concerning possible ways of improving combustion efficiency (mainly for small and medium-size firms).

145. For existing plant, it could be compulsory for industrial heating equipment to be maintained and regulated at least to a minimum level of efficiency. Technical experts should be given the task of studying how uniform criteria can be fixed to ensure that this minimum level of efficiency is obtained and maintained. Depending on their findings a standard could be made compulsory throughout the Community.

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146. To speed up the replacement of old plant and the installation of improved equipment, industry could be given incentives such as special loans or tax benefits on investments for this purpose.

147. Subject to the findings of the experts referred to above, new industrial heating equipment should also comply with standards (which might be more stringent than those for existing equipment) requiring a heating efficiency not less than a permitted minimum.

(e) Model timetable

148. Measures to improve combustion efficiency should have absolute priority and technical experts should be given the task of establishing, as quickly as possible, the criteria underlying the standards. These standards should be applicable within 12 to 18 months' time and the resulting fuel savings should make themselves felt within the next two years or so.

3.2 Recovery of residual heat

(a) Action to be taken

149. In many industrial processes a substantial amount of residual heat is released into the atmosphere at temperatures justifying its recovery. Recovered heat can be used:

- to preheat product (substances supporting combustion, raw materials) before they enter the actual process
- to produce steam or hot water from combustion gases after they have been used for the process itself. If this hot water is not needed for manufacturing processes, it could be used to heat buildings.
- to produce hot water from the exhaust steam
- to raise the return temperature of the inflow water in steam-raising boilers to as high a level as possible.

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150. As experience has often shown, the recovery of residual industrial heat can cut energy losses by between 10 and 20%.

(b) Possibilities of application and estimated savings

151. The measures described in the previous paragraph are of general application, but they cannot be put into effect until each individual industrial process has been studied. Large-scale consumers are usually more capable of ensuring optimum use of the heat produced. There is therefore more scope for improvement in medium-sized industries and new plant. If by 1985 there can be improvements affecting 40% of industrial heat consumption, savings made in that year by the recovery of residual heat may amount to an estimated 20 million toe, or 5% of the energy consumed in industrial heating.

(c) Cost

152. There is substantial scope for saving fuel and the savings made as a result of these measures should, therefore, outweigh the cost of their implementation.

(d) Action by public authorities

153. It would be useful to collect all existing studies and collate past experience in the Member States in the recovery of residual heat and disseminate the results (information campaign especially among medium-sized consumers).

154. At first sight, and pending more detailed study, it seems difficult to apply general standards to the recovery of residual heat. However, for certain clearly-defined industries which consume large amounts of heat at low efficiency rates, standards could be laid down for certain criteria regarding energy use. The work involved could be carried out by specialists in the industries concerned.

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(e) Model timetable

155. Measures for the recovery of residual heat should have absolute priority. Under the combined impact of higher fuel prices and/or the internal or external implications thereof, the rreoovery of residual heat will soon become a factor which industry will have to take into consideration. The type of measures taken by public authorities can speed up this trend considerably.

It should be possible to assemble and disseminate existing studies within some six months. The experts and specialists could complete their work within a year or so.

3.3 Improved insulation and heat efficiency in the heating of industrial premises and buildings

(a) Action to be taken

156. The heating of buildings, factories, workshops and offices in industry represents about 15% of the energy consumed by this sector. So far little thought has been given to reducing heating losses in such premises.

157. Some of the measures recommended in the domestic sector can be applied to the heating of industrial premises:

- improved insulation
- more efficient burners
- improved regulation of temperature and ventilation

158. The fresh air intake in industrial premises is often very large. For processes which release toxic or unhealthy products a balance must be struck between heating and ventilation costs and the costs of filtering heated air for re-circulation.
The value of heat exchangers to transfer heat from stale air to incoming fresh air should not be overlooked for premises where the air must be changed frequently.

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159. For some large areas with a small number of working points, other heating possibilities can be considered and put into general use; e.g. partitioning off the working points by means of light structures which alone would be heated or using direct heating without air convection (radiant and directional panels).

(b) Possibilities of application and estimated savings

160. For existing buildings, certain measures such as insulation and improved burner efficiency could be taken at once in most premises. They could produce a reduction in heat losses of 20 to 30%.

161. For premises to be built, the installation of plant and equipment which meet the requirements of the rational use of energy should bring about substantial savings in consumption, of up to at least 20%.

162. In 1985 savings in the heating of industrial buildings are estimated at 16% or 12 million toe.

(c) Cost

163. The additional investment required to improve the insulation of industrial buildings and the cost of making heating plant more efficient should soon be covered by the savings achieved.

(d) Action by public authorities

164. For existing and new plant, the heating installations in industrial premises should be subject to standards similar to those advocated for the domestic sector and, in some cases, for industry (improved combustion efficiency). These include standards for the insulation of premises and the regulation and maintenance of heating equipment.

(e) Model timetable

165. Improvements in the heating of buildings with a view to the rational use of energy can be made in existing buildings without the need for large investments, and in view of the savings which can be made, should have absolute priority.

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On the basis of a study to be carried out by experts it should be possible to apply standards within 12 to 18 months; appreciable savings would be made immediately afterwards.

3.4 More efficient power and lighting equipment

(a) Action to be taken

166. The motive power used by industry in the Community comes mainly from electric motors. In most instances the motor running speed needed for driving the industrial plant is below the level of the design speed of the motors used. Furthermore, the time during which the electric motors are actually operating under load is sometimes low in comparison with the time during which they are consuming power.

167. It ought to be feasible therefore to increase the performance of power-producing equipment by employing more efficient speed-reduction devices and by rearranging the operations of the machines to allow the electric motors to be shut down between such periods. Last but not least motors could be used more efficiently by matching their rating to the work to be performed and by connecting certain types of three-phase motors in a different way (star connection in place of delta connection, for example) and thereby reducing the active and reactive power absorbed.

168. The probable savings as a result of improvements to lighting equipment in industry are much smaller in quantitative terms and may be made by giving greater thought to the level of lighting at working-points and by making use of more localised lighting set nearer to the surfaces which need to be illuminated. Any change in the lighting conditions must take into account both fuel savings and optimum working conditions and safety.

(b) Possibilities of application and estimated savings

169. An improvement in the efficiency of motive power equipment can result in a saving of some 10 to 15%. With the exception of a number of improvements in this field which can be effected fairly quickly, most of the savings which can be anticipated will be made

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as and when power equipment is replaced. The improvements will be all the greater if buyers are aware of possible savings and producers of driving machinery (particularly electric motors and speed-reducers) react to this problem by concentrating on products which make more rational use of energy. By 1985 a substantial amount of the present machinery should have been replaced.

170. The possible savings where motive power and lighting equipment are concerned could be as much as 4 million toe, or nearly 8%, by that date.

(c) Cost

171. Existing technology should allow adjustments and improvements to be made to machines and their transmission systems without the need for a great deal of research and development; the cost will be offset by the savings made.

(d) Action by public authorities

172. It is the authorities' task to alert the whole of industry to the possibilities of improving the efficiency of power equipment. Industry could be informed in various ways, for example by means of technical information sheets circulated to the representatives of the relevant industrial sectors and by recommendations to the various branches of industry.

173. Research undertaken by experts could lead, for example, to the definition of criteria for certain types of motors and for efficient speed variators, which could be embodied in standards at a later date.

(e) Model timetable

174. The operation should be begun as soon as possible so that, taking into account the rate of replacement of industrial installations, considerable results are achieved by 1985.

175. Depending on the results of the experts' research, some motive power equipment could be standardized within two or three years.

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3.5. Use of continuous production processes and other manufacturing methods

(a) Action to be taken

176. The aim of the measures proposed is to replace certain step-by-step and batch production processes by continuous production processes, and orientate production methods towards operation cycles which are economical as regards the rational use of energy. For example, the following changes are possible.

- In the paper and cement industries, the use of dry processes instead of the current wet production process;
- In the textile industry, the replacement of part of the fibre-drying process by mechanical spin-drying to eliminate some of the water content;
- In engineering industries, the replacement of scrap-producing machining processes (shavings, scrap with high energy content) by methods which produce the required shape more exactly (welding, powder techniques, cutting by means of laser or electron beams etc) the replacement of thermal treatment processes (hardening, melting) which heat the whole mass to the required temperature by localized heating processes (hardening or heating by induction):
- In the food industry, the replacement of heat sterilization techniques by more advanced methods (gamma or high frequency rays).

Possibilities of application and estimated savings

177. Industry generally selects the most economical production processes. If a saving can be made by improving or replacing certain processes or by a change in energy prices, such action could be encouraged by the public authorities.

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178. However, the implementation of measures relating to the use of continuous production processes and other methods of production will entail structural and industrial changes and in some cases these changes will be substantial. Thus, measures would be implemented only if a considerable saving (of the order of 15 to 20%) were possible. If only 15% of industry's energy consumption were affected in 1985, there could be an energy saving for the Community of 10 million toe i.e. 2.5% of energy consumed for industrial heat.

(c) Cost

179. The cost of those of the proposed measures which are technically feasible at the present time must be evaluated case by case and will determine the course of action to be selected. The cost ought not to be greater than the saving made on fuel within five to ten years. However, it is not certain that current technology can offer economic solutions for all the measures proposed in this area. Some research and development work will therefore be required.

(d) Action by public authorities

180. One or more Working Parties ought to be able to define the fields in which work should be carried out and the priorities of the research to be undertaken. This research should make a substantial contribution to the more rational use of energy and could be undertaken at Community level. For work undertaken in the Member States, public authorities could help by awarding contracts or certain facilities to private research institutions.

(e) Model timetable

181. An information drive in industry can be launched within six months. Public authorities ought to be able to draw up proposals in this field within 12 to 15 months.

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3.6 Combined heat/power production in industry

(a) Action to be taken

182. In certain Member States of the Community several large-scale industrial consumers (or groups of medium-scale consumers) generate the heat and power required for their production processes. As the steam which they require is produced on the spot, as is the electricity (which is also generally used on the spot), the overall efficiency of such small heat/power continuous production units is 50 to 60%, and in some cases up to 70%. This process certainly has a far higher efficiency than that achieved in thermal power stations (maximum 43%).

183. Industrial consumers could be enabled to produce their own heat and power if the overall efficiency of the installation makes it an economic proposition to do so. The terms of purchase or supply for the surplus electricity produced, or the additional electricity required may be fundamental to the viability of a project. The exchange prices should be set on a basis which is fair to both sides.

Possibilities of application and estimated savings

184. The combined production of heat and power entails a number of difficulties.

- The amount of heat and power to be generated by one concern must be sufficient to justify this course of action; in many instances several undertakings would have to combine production.
- Tariffs for the supply or purchase of electricity by public or semi-public producers to or from industries with combined heat/power production processes must be fair and equitable. In certain Member States public authorities have the power to ensure that they are applied correctly.

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- The fact remains that in many cases it would be difficult to incorporate such measures into existing regional or local supply structures (infrastructure). They would therefore be better suited to new industrial complexes.

185. The average reduction in energy brought about by such measures would amount to more than 20%; assuming that such measures would apply to approximately 5% of total industrial consumption by 1985, a reduction of around 13 million toe, i.e. 2% of the total consumption of energy by industry, could be achieved.

(c) Cost

186. It is difficult to assess the cost of measures concerning combined heat/power production, which must be examined in the context of the overall profitability of the industrial sector. A number of factors have to be taken into consideration, such as the expenditure incurred by electricity producers in creating reserve capacity and the problems caused by the need to stabilize the cycle frequency and voltage of the current in the mains, since these valves may be affected by those of the combined heat/power installation.

(d) Action by public authorities

187. Depending on each Member State's legal and technical provisions governing electricity producers and the possibilities of installing combined heat/power production units, the public authorities (possibly with the assistance of experts) should examine each and every obstacle preventing industry from developing autonomous heat/power production.

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(e) Model timetable

188. It should be possible to implement the course of action proposed in (d) within six months. Its impact on investments in combined heat/power production would depend on the level of the tariffs for the purchase and supply of electricity to be fixed by the electricity companies.

3.7 Recycling and recovery of materials

(a) Action to be taken

189. A number of industries (the steel industry and the pulp industry, for example) already recycle materials; increasing importance should be attached to this process in future (fly ash in power stations could be used in cement factories, building materials and public works projects). Recycling makes it possible to conserve raw material resources, some of which are rapidly being exhausted, and also to reduce energy consumption by eliminating certain stages in preparation (extraction of ores, reduction, refining etc.) The total energy content of different raw materials expressed in toe/t is 7 for magnesium, 4 to 5 for aluminium, 1 to 2 for copper and 0.2 to 0.4 for steel. Recycling reduces these figures to 1 for aluminium and 0.2 for copper, for example.

190. Detailed studies have been carried out in certain areas to assess the respective advantages and disadvantages of returnable and non-returnable bottles and the recycling of glass compared with the use of paper or plastic. In many cases the findings were conflicting and no clear-cut conclusions were possible. Attention must also be given to possible implications on environmental pollution.

191. Another factor in the recovery of materials is that in many cases the articles and products are no longer usable as they have lost their initial properties (wear and tear, rust). Better protection of surfaces would make it possible to increase the life of products (motor cars, metal structures) and at the same time reduce the amount of waste to be recycled and the industrial production needed to replace worn articles.

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(b) Possibilities of application and estimated savings

192. In certain branches of industry a considerable amount of recycling is carried out, but not always because of simple economic factors. The motives and degrees of gain are often masked by market imperfections. For example, aluminium has been recycled for a number of years because in certain Member States the price of newly-manufactured aluminium is fixed by schedule whereas the price of remelt aluminium is not. Similarly, price fluctuations on the market for scrap iron, which are sometimes very great, have curbed investments in more advanced techniques for the recovery of used metals for recycling.

193. If savings of the order of 20 to 25% could be made by 1985 in respect of 4% of the energy consumed in the industrial sector, the savings as a result of recycling and recovering materials would amount to about 5 million toe or 1% of the total amount of energy consumed in industry. To this saving will be added, at the same time, savings in the non-energy requirements of industry. Taking account, in particular, of the likelihood of an increased durability of products, of the replacement of products with a high energy content, the savings in raw materials due to the recuperation and recycling of materials, first estimates show feasible savings in 1985 of around 14% or 20 M.toe in addition.

(c) Cost

194. It is difficult to estimate the cost as the factors which have to be taken into account, such as collection, sorting, transport and refining are in many cases not easy to quantify or to single out for each particular material.

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(d) Action by public authorities

195. One or more Working Parties should be instructed to carry out the following tasks in order to make it possible at a later stage for the industries concerned to be better informed:

- To assess the amount of energy needed to recycle various materials as compared with that needed for normal production;
- To assess methods and processes for the recovery of materials (sorting, separation, processing) to be re-used by industry;
- To assess processes for the recovery of materials to be used as fuels (household waste, for example) or other products (fertilizers).

196. A Working Party should be given the task of carrying out research and development work into the recovery of materials specially of pastics, some of which cannot be re-used or require complex processing before.

(e) Model timetable

197. The study groups should be able to carry out their work within six months. Their findings could be circulated within three months from that time. The research and development experts should complete their work within twelve to fifteen months.

4. MEASURES IN THE ENERGY INDUSTRY SECTOR

(a) Actions to be taken

198. Consumption in the energy industry sector consists of the consumption of energy by producers and transforming industries to operate their plant. It includes the consumption by pipeline pumping stations and compression stations. The amount of energy lost during transformation varies according to the type of energy and the product (about 8% in refineries, for example). Consumption by this sector throughout the Community is expected to amount to 186 million toe in 1985 (excluding losses during transformation into electricity).

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199. Two measures seem particularly suitable for improving the energy efficiency of the transformation process:

1. Improving the efficiency of transforming plant

It would seem that only minimal savings can be made in power stations by 1985, even allowing for the closure of the oldest power stations whose efficiency is in some cases barely higher than 20%.

Major improvements to refineries are planned by certain Member States. In view of the quantities of oil which are refined in the Community, every improvement in the refining process which leads to a reduction in the amount of energy required for refinery operation represents a considerable saving in quantitative terms. In the case of power stations built near coal mines, a study should be made to ascertain whether priority could be given to the consumption of either run-of-mine coal, washery discard or waste heap pickings.

Other branches of industry could also use these products both for their calorific value and their value as raw materials (manufacture of bricks, cement, expanded materials).

2. Combined production of heat and power

The use of combined heat and power production by electricity producers could enable their overall efficiency to be increase and even doubled, depending on the conditions in which electricity and industrial steam are produced (see 3.6).

3. Use of residual heat

A third measures in the energy industry sector could relate to the use of residual heat from power stations. This would lead to a reduction in the quantity of thermal pollutants released into the atmosphere and would also enable large quantities of heat of low calorific value to be used (heating of greenhouses, for example).

(b) Possibilities of application and estimated savings

200. The three measures mentioned above are being examined and in some cases are already being applied in certain Member States.

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Possible savings vary considerably from one Member State to another, ranging from 5 to 30%. The total saving which could be made in this way throughout the Community would probably amount to 11 million toe in 1985, i.e. 6%.

(c) Cost

201. The cost of the operation is difficult to estimate. The work involved will entail structural changes requiring very large investments. The savings should be considered in the long-term perspective (thirty years in the case of power stations). Any saving, however small, would be significant in quantitative terms because of the large amount of fuel and energy involved.

(d) Action by the public authorities

202. The combined production of heat and power is a very complex question but the action to be taken by public authorities could include the following:

(1) A study of the efficiency of the various industries from the point of view of their electricity and steam consumption;

(2) An attempt to define certain principles and criteria to make it easier to assess the desirability of developing the combined production of heat and power in the industrial sector and/or the energy industry.

(e) Model timetable

203. Because of their nature the effect of the measures to develop combined heat/power production will be felt beyond 1985; however, they should be launched as soon as possible if appreciable savings are to be made by 1985.

The action proposed under (d) (1) should be completed within six months. That under (d) (2) would be carried out during the following twelve months.

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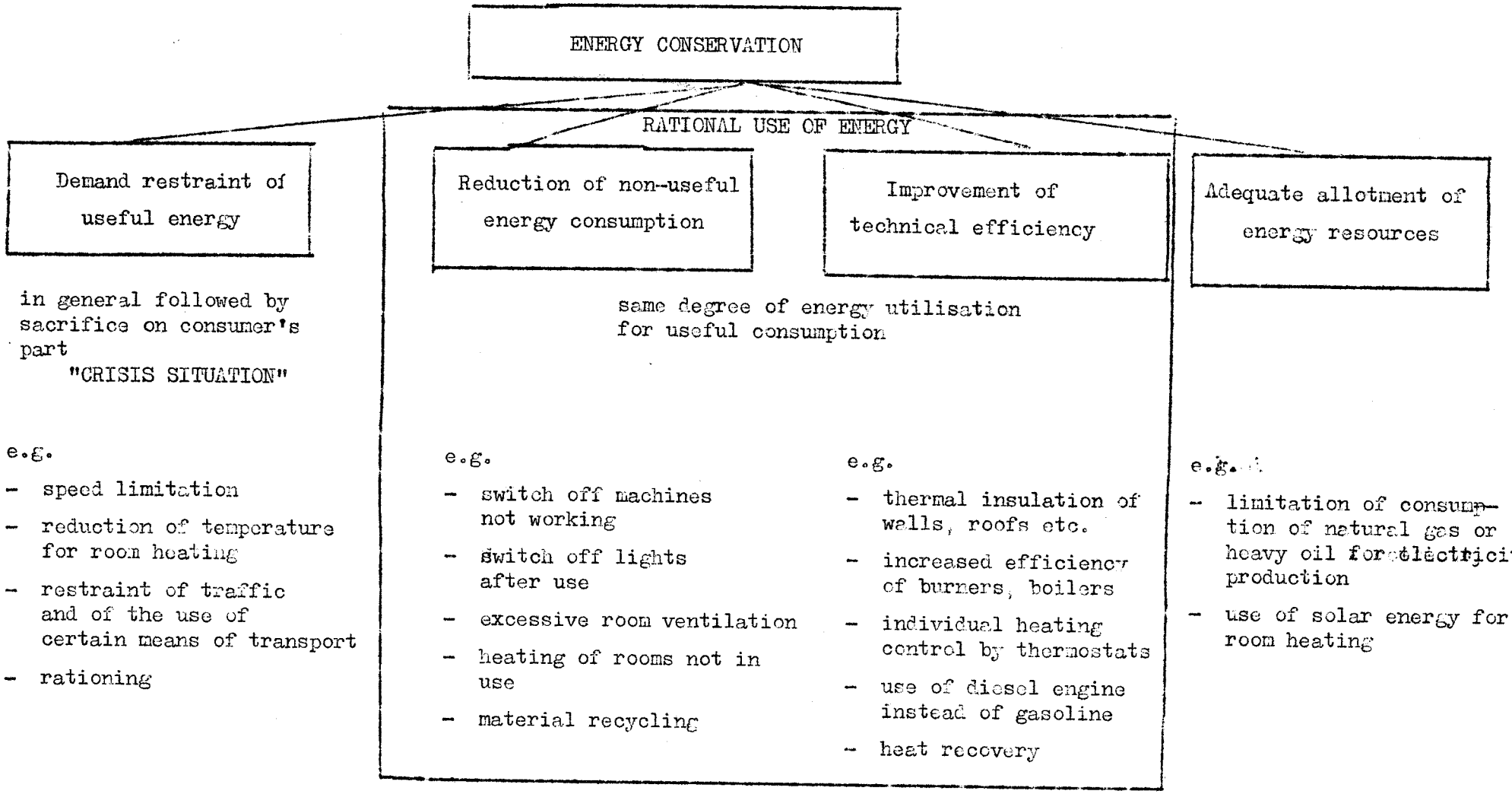
ANNEX I


ENERGY CONSERVATION
RATIONAL USE OF ENERGY
Demand restraint of useful energy
Reduction of non-useful energy consumption
Improvement of technical efficiency
Adequate allotment of energy resources
in general followed by sacrifice on consumer's part
"CRISIS SITUATION"
same degree of energy utilisation for useful consumption
e.g.
- speed limitation
- reduction of temperature for room heating
- restraint of traffic and of the use of certain means of transport
- rationing
e.g.
- switch off machines not working
- switch off lights after use
- excessive room ventilation
- heating of rooms not in use
- material recycling
e.g.
- thermal insulation of walls, roofs etc.
- increased efficiency of burners, boilers
- individual heating control by thermostats
- use of diesel engine instead of gasoline
- heat recovery
e.g.
- limitation of consumption of natural gas or heavy oil for electricity production
- use of solar energy for room heating

Summary table of priority measures concerning the rational use of energy in the Community in 1985

SECTOR	Estimated consumption in 1985 M toe	%	RUE measures Action to be taken	Par Saving % (1)	Part of consumption on which a saving can be made %	M toe	Estimated total saving (2) M toe	%
1. DOMESTIC AND TERTIARY								
(a) Heating	391	76	I.1. Improved thermal insulation.					
- existing buildings	309	60	- existing buildings	15	60	185	28.0	70
- new buildings	82	16	- new buildings.	30	100	82	25,0	6,5
			I.2. Regulated ventilation (reducing the rate of air flow)					
			- existing buildings	10-20	50	156	11.6	3,0
			- new buildings	5-10	100	85	6.0	1,5
			I.3. Regulated heating					
			- existing systems	10	12.5	39	3,9	1.0
			- new systems	10	80	66	6.6	1.7
			I.4. Better burners and maintenance					
			- existing systems	5	50	156	7,8	2,0
			- new systems	10	80	66	6.6	1.7
(b) Domestic heat (hot water	60	12	I.5. More efficient hot water production.					
			- new buildings	10	100	12	1.2	2,0
(c) Power (and domestic heat - excluding hot water)	50	10	I.6. More efficient household appliances					
			- new appliances	8	50	25	2,0	4,0
(d) Lighting	15	2	No priority measures	-	-	-	-	-
Total for the sector	516	100	All measures (The total makes allowance for the interdependence of the effects of the measures)				90,0	18,0

1
2

SECTOR	Estimated consumption in 1985 M toe	%	RUE measures Action to be taken	Part of consumption on which a saving can be made: Saving	%	M toe	Estimated total: M toe	%
2. TRANSPORT								
a) Road transport (and better use of heat in public transport)	159	73	2.1. Better ignition timing and carburettor setting	5	100	159	8,0	5,0
			2.2. Improved vehicle design	10	80	128	12,8	8,0
			2.3. Promotion of the use of diesel engines	30	20	30	9,0	5,5
			2,4. Improved thermal insulation and better use of heat in public transport	20	10	3	0,6	2,0
			2.5. Restricting the growth of private urban traffic in favour of public transport	10	50	80	8,0	5,0
			2.6. Improving the traffic flow	2,5	50	80	2,0	1,0
b) Other forms of transport	58	27	(no priority measures)	-	-	-	-	-
Total for the sector	217	100	All measures (The total makes allowance for the interdependence of the effects of the measures)				35	16

1 Energy saved by the measure in terms of the energy consumption directly concerned and at which the measures is aimed.

2 Energy saved by the measure in terms of total energy consumption for the relevant category.

SECTOR	Estimated consumption in 1985		Action to be taken	Saving	Part of sector where saving level can be made		Saving level	
	M toe	%		%	%	M. toe	M toe	%
3. INDUSTRY								
(energy consumption)								
(a) Industrial heat	411	76	3.1. Improved combustion efficiency.				28	7
			- existing plant.	7	80	250	18	4,5
			- new plant	12,5	100	80	10	2,5
			3.2. Recovery of residual heat	10-20	40	160	20	5
			3.5. Improved or different production processes.	15-20	15	60	10	2,5
(b) Heating of buildings	76	14	3.3. Improved heat efficiency in the heating of buildings	20	80	60	12	16
(c) Power and lighting	54	10	3.4. More efficient motive power and lighting equipment.	10	75	40	4	8
(d) All uses	541	100	3.6. Combined heat/power production	50	5	27	13	2
			3.7. Recycling of materials	20-25	4	22	5	1
Total for the sector	541	100	All measures. (The total makes allowance for the inter-dependence of the effects of the measures)				84	15
4. ENERGY INDUSTRY	186		4.1. Improving the efficiency of transforming the plant					
			4.2. Combined production of heat and power				11	6
			4.3. Use of residual heat					
Total energy consumption sectors 1-4			All measures. (The total makes allowances for the interdependence of the effects of the measures).				220	6
NON ENERGY CONSUMPTION OF [illegible]								

SUMMARY CHART OF RUE MEASURES

SECTOR AND COURSE OF ACTION / WORK TO BE CARRIED OUT BY SPECIALIZED WORKING PARTIES (x)	1. DOMESTIC AND TERTIARY						2. TRANSPORT						INDUSTRY							ENERGY INDUSTRY		
	I.I. Thermal insulation	I.2. Regulated ventilation	I.3. Regulated heating	I.4. Burners and maintenance of heating systems	I.5. Hot water	I.6. Appliances and installations	2.I. Ignition timing and carburettor setting	2.2. Vehicle construction	2.3. Promotion of diesel engines	2.4. Heating of public transport vehicles	2 5. Private/public urban transport	2.6. Urban traffic flow	3.I. Combustion efficiency	3.2. Recovery of residual heat	3.3. Insulation and heating of premises	3.4. Efficiency of motive power equipement	3.5. Production processes	3.6. Combined production of heat and power	3.7. Recycling of materials	4.I. Efficiency of plant	4.2. Combined production of heat & power	4.3. Recovery of residual heat
	e n	e n	e n	e n	e n	e n	e n	e n	e n	e n	e n	e n										
Detailed study of the course of action proposed	xx	xx	xx	xx	x	x	xx	x	x	x	x	xx	x	x	x	x	x	x	x		x	
Pooling of information by Member States	xx	xx	xx	xx	x	x	xx	x	x	x	x	xx	x	x	x	x	x	x	x		x	
Informing the public and sectors concerned	xx	xx	xx	xx	x	x	xx	x	x	x	x	xx	x	x	x	x	x	x	x			
Organizations of Community competitions			xx	x	x	x	x	x	x													
Examination of fiscal, tariff, financial measures etc.	xx					x		x	x	x			x				x	x				
Examination of administrative provisions	xx	x	x			x	xx			x	x					x						
Examination of standards	x	x	xx	xx	x	x	xx	x	xx			xx	x	x	x	x						
Preparationoof Community measures (Recommendations, Directives etc.)	xx	xx	xx	xx		x	xx	x	x			xx	x	x	x	x		x	x		x	

e = existing n=new

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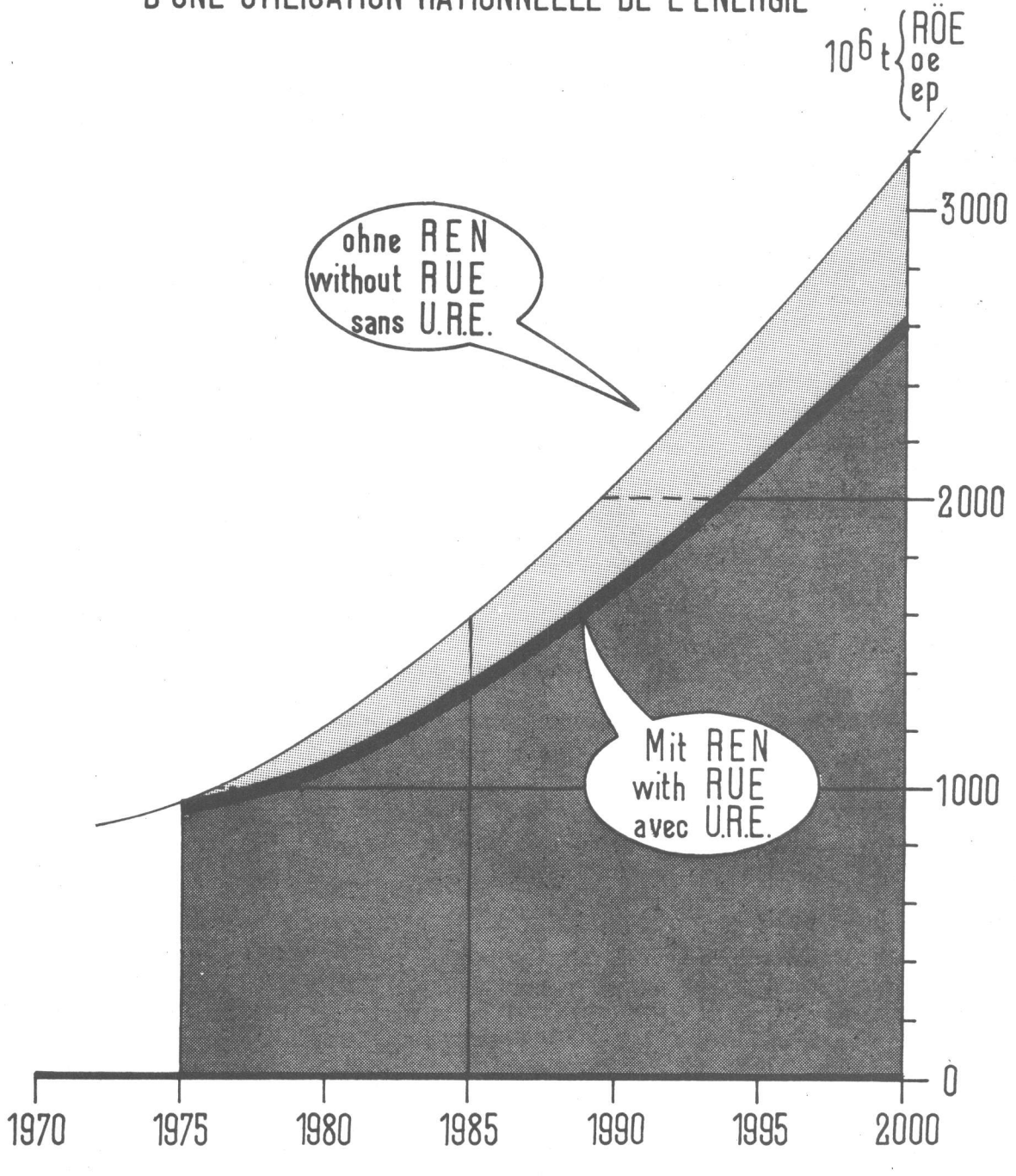
ENERGIEBEDARF DER GEMEINSCHAFT IN ABHÄNGIGKEIT
EINER RATIONELLEN ENERGIENUTZUNG

COMMUNITY ENERGY DEMAND IN FUNCTION OF A RATIONAL USE OF ENERGY

BESOINS ENERGETIQUES DE LA COMMUNAUTE EN FONCTION
D'UNE UTILISATION RATIONNELLE DE L'ENERGIE



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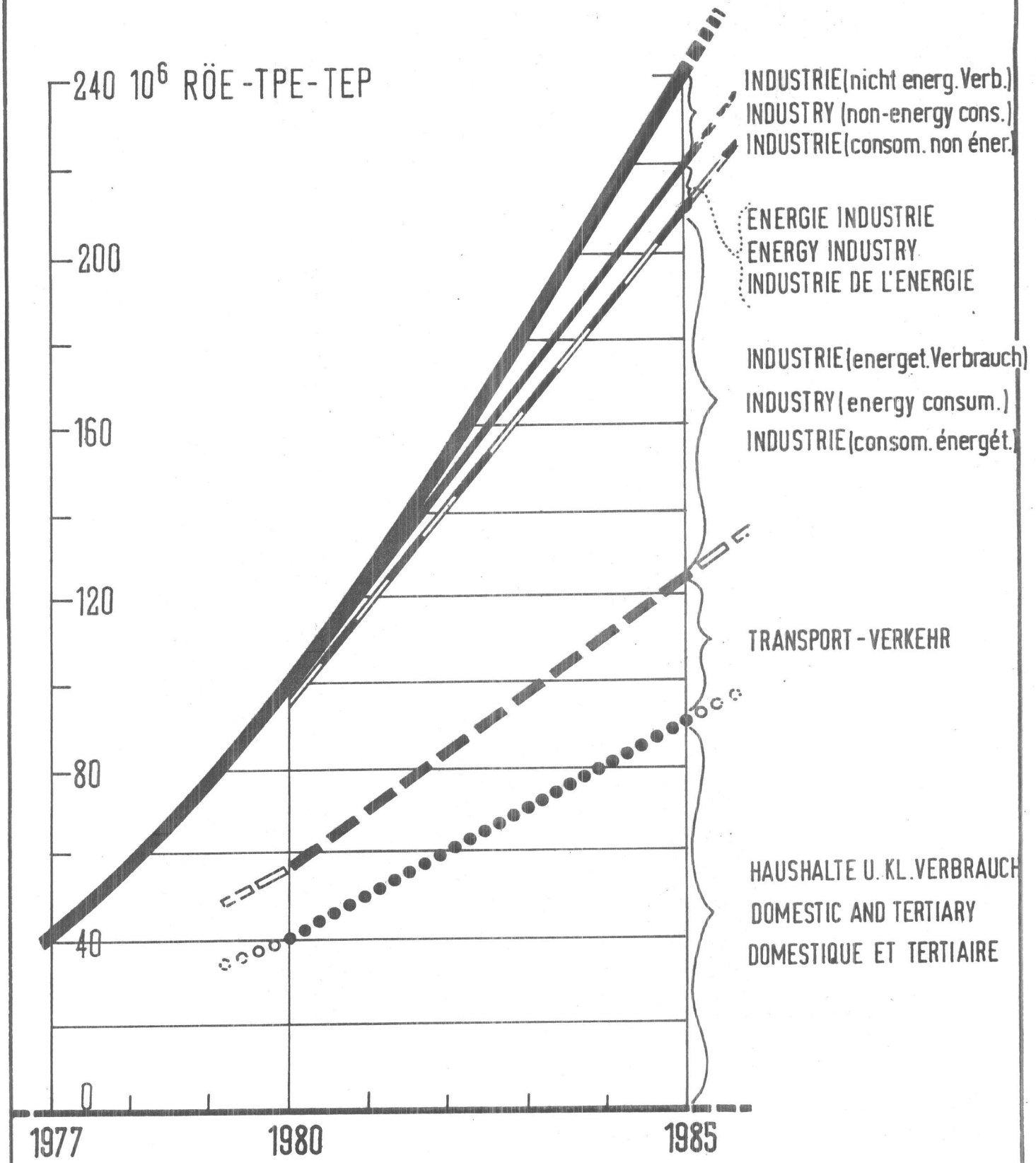
ENERGIEEINSPARUNGEN BEI AKTIONEN R.E.N.
ENERGY SAVINGS BY ACTIONS R.U.E.
ECONOMIES D'ENERGIE PAR ACTIONS DE L'U.R.E.



COMMISSION
OF THE
EUROPEAN COMMUNITIES

PROJECT OF RESOLUTION OF THE COUNCIL RELATING TO A COMMUNITY ACTION PROGRAMME IN THE FIELD OF RATIONAL UTILISATION OF ENERGIE

The Council of the European Communities,

Considering that the development of a Community energy policy has the objective, as stated by the heads of State or Government, meeting in Paris on the 19th October 1972, of guaranteeing" a secure and stable supply under satisfactory economic conditions ",

Considering the new situation which prevails in the world market for energy, in particular the rise in price of energy resources,

Considering that a more rational utilization of energy involves the more efficient use of energy through the reduction of losses and the curtailment of non-useful consumption,

Considering that such action may contribute to reduce the growth of the energy demand of the Community, without however conflicting with the objectives of economic and social development,

Considering that the Commission has transmitted to the Council on 5 th June 1974 a guideline document entitled "Towards a new energy policy strategy for the Community,

Considering that the Council, in its Resolution of 17th September 1974, adopted the objective of "reduction of the rate of growth of internal consumption by measures for using energy rationally and economically without jeopardizing social and economic growth objectives",

Considering that the Commission in its communication to the Council entitled "Rational utilisation of Energy", has established a Community action program in this field,

./...

Considering that in this program the Commission proposes to create a "Steering and Coordinating Committee for the Rational use of Energy",

Considering that the Commission has transmitted to the Council on 5 th August 1974 a communication entitled "Energy for Europe".

1. approves the global Community objective which is there expressed, involving a saving of the order of 15 % in respect of the internal energy consumption foreseen for the Community in 1985, taking into account that the figures for each Member State will vary depending on their particular situation,

2. adopts the measures defined in order to attain this objective, as well as the degree of priority which is attached to them, conforming to the criteria, mutually agreed,

3. adopts the procedure proposed for the implementation of this programme,

4. invites the Commission to present to the Council, a periodical report on the situation within the Member States and also with regard to the realisation of the Community objective, and to set, according to circumstances, particular targets for energy savings in the short term,

5. invites the Member States to submit to the Commission all relevant information to this effect, and to notify also any proposed legislation, regulation or administrative action to enable the Member States to consult each other and to exchange information at the Commission's initiative,

6. takes note that the Commission will present to the Council, should such be the case, proposals for appropriate measures,

7. agrees to come to a decision on the proposal mentioned above within a period of six months of their transmission by the Commission.