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Report

drawn up on behalf of the Committee on Social Affairs and Employment

on the repercussions of energy problems and technological developments on the level of employment in the Community

Rapporteur: Mrs H. SALISCH

English Edition

PE 67.925/fin.

At its meeting of 15 February 1980, the Bureau of the European Parliament, pursuant to Rule 25 of the Rules of Procedure, referred the following motions for resolutions relating to the repercussions of energy problems and technological developments on the level of employment in the European Community to the Committee on Social Affairs and Employment as the committee responsible and the Committee on Energy and Research for its opinion:

- motion for a resolution tabled by Mrs Bonino and others on unemployment and energy consumption in the Community (Doc. 1-485/79),

- motion for a resolution tabled by Mrs Salisch on the effects of technological developments on employment (Doc. 1-795/79).

At its meeting of 24 April 1980, the Committee on Social Affairs and Employment appointed Mrs Salisch general rapporteur.

The committee discussed the motions for resolutions and the draft report at its meetings of 16 July 1980, 17 February 1981, 18 March 1981 and 14 April 1981. At the meeting of 14 April 1981, the draft report was adopted with 8 abstentions.

Present: Mr Van der Gun, chairman; Mr Peters, vice-chairman; Mrs Salisch, rapporteur; Mrs Baduel Glorioso, Mr Bonaccini (deputizing for Mr Ceravolo), Mr Brok, Mr Calvez, Mrs Cassanmagnago Cerretti, Ms Clwyd, Mr Delmotte (deputizing for Mr Sarre), Mr Van Minnen, Mrs T. Nielsen, Mr Spencer, Mr Verhaegen and Mr Vernimmen (deputizing for Mr Oehler).

The opinion of the Committee on Energy and Research is attached.

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A

The Committee on Social Affairs and Employment hereby submits to the European Parliament the following motion for a resolution, together with explanatory statement:

MOTION FOR A RESOLUTION:

on the repercussions of energy problems and technological developments on the level of employment in the European Community.

The European Parliament,

- having regard to the motion for a resolution tabled by Mrs Bonino and others on unemployment and energy consumption in the Community (Doc. 1-485/79),
- having regard to the motion for a resolution tabled by Mrs Salisch on the effects of technological developments on employment (Doc. 1-795/79),
- having regard to the communication of the Commission of the European Communities on employment and the new micro-electronic technology (COM(80) 16 final),
- having regard to the reports of the Committee on Social Affairs and Employment and the opinion of the Committee on Energy and Research (Doc. 1-164/81),

I. The connection between employment and energy consumption

1. Draws attention to the fact that the rise in the cost of energy since 1973 has played an important part in bringing about an economic recession that has affected the whole of the European Community, and brought with it increasingly high levels of unemployment;

2. Fears that, unless the problem of continued high-cost energy consumption by European Community countries is resolved there will continue to be alarming increases in unemployment, particularly among women, young people, migrant workers and individuals with limited working capacity;

3. Perceives the danger of a more pronounced regional concentration of unemployment in weak areas and areas dependent on a single industry;

4. Fears that unless alternative energy resources are developed and better use made of indigenous materials (for example via coal gasification), the European Community will continue to be dependent on imports of the traditional energy raw materials, oil, gas and uranium, with the risks of increased prices and scarcity beyond its control and that this will directly constitute a major threat to employment;

5. Notes that although the use of uranium technology will generate project-linked employment it may create only a limited number of permanent jobs;

6. Appreciates the value of the large but exhaustible resources of coal in the European Community and the existing transport and services infrastructure as a part of the energy supply and recognizes the job-intensive nature of energy production from coal;

7. Deplores the systematic reduction of capacities, and thus the number of jobs in the coal sector and draws attention to the need for the European Community to be prepared to undertake major investment in this sector if European coal production is to rise and to meet the challenge of low-cost coal available from third countries where mining conditions are often easier and hence coal is cheaper;

8. Considers soft energy production to be part of the Community's energy supply and sees in the use of soft energy technology an opportunity to progress towards the desired regional convergence;

9. Regards the production of manufacturing equipment for soft energy both for domestic demand in the European Community and for export as likely to have a positive effect on the employment situation;

10. Takes the view that all energy-saving and recycling measures create opportunities for additional employment, thereby also stimulating employment in other sectors of the economy;

11. Places great hopes in the positive contribution to the balance on t current account, and the consequences of this for employment, of the capital released as a result of a major reduction in the dependence on energy imports;

12. Sees the need for employment-orientated guidelines in the field of safeguarding energy supplies in the European Community:

- concentrating future research policy on further developing energy generation from inexhaustible inputs, paying particular attention to regional independence,
- encouraging investments which economize on oil and natural gas products in the fields of space heating and transport,
- supporting investments aimed at supplying energy derived from renewable sources in those regions where this is appropriate,
- supporting a partial changeover in the a g ricultural sector to products designed to enable energy to be derived from the biomass.

II. The effects of technological developments (microprocessors) on employment

13. Expresses its profound concern at the constantly rising level of unemployment in the European Community and in particular the grave situation of women and young people who are increasingly faced with bleak prospects on the employment market;

14. Notes the consequences for the employment situation in individual sectors of the European Community's economy which are already emerging as a result of the introduction of microprocessors and fears that the overall volume of employment will be further reduced;

15. Draws attention in particular to the Commission's report entitled 'European Society faced with the Challenge of New Information Technologies - A Community Response[1] and stresses the need to take account of social policy aspects in the use of innovative technology;

16. Notes that both production and the markets for microprocessors are already largely controlled by the USA and Japan but takes the view that the production of microprocessors and related products in the European Community could have a favourable effect on employment, provided that all the necessary efforts are made in the European Community to ensure that the development of new products and services creates sufficient new employment;

17. Notes that the use of new technology involves new job specifications for those in employment which in turn require a higher level of professional expertise; views with great concern the fact that insufficient preparations have hitherto been made to meet the demands for higher professional qualifications; this is particularly true of those regions of the European Community which traditionally suffer from structural weaknesses;

18. Calls for greater efforts by the Community to promote forms of training which take account of the micro-electronic revolution, notably by:

- changing the European Social Fund Guidelines so as to give first priority to the task of training for new technologies,
- increasing annually by 30% the funds available for this purpose;

[1] COM(79) 650 final, Section 3.1, Part 2

19. Notes in the context of the advent of microprocessors the increasing importance of sandwich training (alternance) and calls on the Commission to renew its proposals for a Community effort in this field;

20. Takes the view that it is particularly important to use all the available budgetary resources to develop the training and education sectors in order to prevent possible conflicts in and between the differently structured regions of the European Community;

21. Recommends the use of new technologies in the field of education;

22. Recommends that the European Community, through research, make every effort to develop advanced forms of technology and ensure the creation of a sufficient number of jobs and demands, as part of the countermeasures in employment policy, that the existing scope for employment be shared among all workers while at the same time maintaining their standard of living by means of a reduction in working hours;

23. Favours support to small and medium-sized firms where manufacturing methods on their present scale are not suited to the use of micro-electronics and expects a greater commitment on the part of the Member States to developing the quaternary sector;

24. Notes that opportunities exist for small and medium-sized firms to exploit the new technologies;

25. Calls on the Commission to conduct a critical investigation of the social and employment consequences of an increase in long-range working based on telematics;

26. Attaches particular importance to both sides of industry being fully informed on the overall development and the consequences for individual firms of new technologies;

27. Calls on the two sides of industry to develop at Community level, instruments which will make the business management benefits of new technologies accessible to those affected by the use of such technologies; in particular, framework agreements and collective agreements should, for example, contain provisions on staff participation, working conditions, security, opportunities for continuous retraining and alternating working and training schemes;

28. Welcomes the Commission's efforts as regards working out a Community strategyain connection with the introduction of the new technologies; essentially approves the Commission's initial conclusions and calls on the Council to take the necessary action without delay;

29. Instructs its President to forward this resolution and the report of its committee to the Council and Commission.

B

EXPLANATORY STATEMENT

A. The employment situation - jobs in the European Community

I. The overall picture

Since the backlog demand was satisfied, which developed because the consumer and associated investment sector were neglected during the war, job security in the sense of continuous full employment has not been guaranteed. 'Economic crisis', which, according to current economic theories, have occurred more or less regularly, have produced periodic unemployment since the beginning of the 60s and this had tended to increase in quantity.

Faced with these periodic crises, which are mainly attributable to difficulties in the sale of capital and consumer goods, the European Community and all other industrialized states are now standing at the beginning of a development which may assume catastrophic proportions for employees, caused mainly by three factors: the increased cost of raw materials, technological developments and the monopolization of markets by multinational concerns.

In public discussions these three factors are described by various pseudonyms aimed at ensuring that the state assumes most of the cost on behalf of private firms. Individual factors will be considered in the following paragraphs.

The continuous fall in the number of jobs has been accompanied by a rise in the population, which at least temporarily is producing an increased number of job-seekers, thus aggravating the already critical situation.

II. Total number of unemployed

The figure of some 7 million registered unemployed in the European Community means that an average of more than 6% of the labour force in the Community are without income from gainful employment. The rates of increase in unemployment continue to rise.

With a figure of 42% for the proportion of persons gainfully employable throughout the Community, this means that approximately 15% of the persons of employable age are demonstrably financed from income other than reimbursement for an occupational activity. This statistically calculated figure may vary in the individual Member States depending on the social structure, such as the age structure, size of families, proportion of employable persons in fully commercially operated farms, etc. The number of registered unemployed, however, only gives an approximate idea of the number of those who are without work but either live on other public funds, such as national assistance and educational assistance programmes or private support.

The legislation of the individual Member States is too varied to allow these figures to be determined exactly as an average throughout the Community. To give an indication of the overwhelming size of these gloomy figures: the Economic and Social Research Institute of the German Trade Unions' Federation assesses the number of non-registered unemployed at about 400,000 in the Federal Republic of Germany, which is approximately 50% of the registered unemployed, at that time some 800,000.

It is evident that in Member States with different legislation and other methods of recording statistics this proportion is at least as high.

A figure of 10 million actually unemployed in the European Community would seem to be a conservative conclusion.

III. Structure of the unemployment figures

A breakdown of the unemployment statistics by sex and age shows trends which give cause for considerable concern: the increasingly higher proportion of female unemployed and the large number of young people. In the period from 1974 to 1979 alone the number of female unemployed has increased 2½ times: from 1.1 million in 1974 it rose to 2.7 million in 1979. It therefore rose much more steeply than the number of male unemployed; for comparison it rose by 6.3% between 1978 and 1979, while the rate of change for men was +1.5% between 1977 and 1978 and -2.1% between 1978 and 1979.

The rising trend in the proportion of female unemployed is in stark contrast to the declared employment objectives of the European Community. The directive on equal treatment is being rendered

ineffective by the employment practices of the employers. Any prospect of the professional development of women is vitiated by the threat of unemployment; faced with this situation the majority of women seeking work are forced into the role of underprivileged secondary workers.

The second major group, the young unemployed, raises even greater problems. In July 1980 an average of 41.8% of the registered unemployed in the Community were under 25. In the nine countries 2.8 million young people - a figure which is rising even when seasonally adjusted - represent a huge burden on the social community of the Member States.

Taking the German figures for unrecorded unemployed, where more than 75% of the non-registered were under the age of 25, the extrapolated true unemployment figure for young people in the European Community is some 5 million.

In view of the age structure of the population in the European Community, an increase in the number of employable persons under 25 can also be expected in the long term.

B. The relationship between jobs and energy supplies

I. The overall economic problem

Maintaining and increasing the number of jobs requires constant economic growth which is traditionally measured by the gross national product.

Since almost all economic activities involve the consumption of energy, particularly in the highly industrialized economic areas such as the European Community, safeguarding energy supplies is particularly important as a basis for employment policy, although not to the extent that economic growth goes hand in hand with equal or even overproportional rates of increase in energy consumption. Close examination of the development of growth and energy consumption shows that there is no general cause and effect relationship, but that technical developments in individual sectors, which of course have also contributed to the increase in the gross national product have temporarily induced overproportional growth in energy consumption[1,2].

The reason for particularly high rates of growth in energy consumption at periods of high rates of growth in the national product in the Federal Republic of Germany is private consumption in households.

Leaving aside new energy production techniques, energy-saving measures will make it possible to achieve an annual economic growth in the medium term of 2.5% using traditional energy sources [3,4]. To produce the required increase in the number of jobs in the medium term (up to about 1990) it is therefore first necessary to safeguard energy supplies and make the maximum possible energy savings. The possible effects of these two objectives on employment will be considered on the basis of the individual alternatives.

II. Ways of safeguarding and in the medium term increasing energy supplies.

From the technical viewpoint safeguarding energy supplies means guaranteeing the primary energy i.e. the input of energy production. The energy input includes, in the first place, the traditional mineral raw materials, coal and petroleum plus natural gas and uranium. These natural raw materials are located in relatively few areas of the earth and have hitherto been economically exploitable. The natural deposits available are finite, thus placing a time-limit on the use of raw materials as primary energy.

The second possible energy input is inexhaustible. Sunlight, geothermal energy, the wind and the biomass are available as raw materials for energy everywhere on earth. As primary energy, they are independent of the political power of individual states or economic areas, but their economic exploitation requires expenditure in terms of capital and labour.

II.1. Energy from non-renewable sources

In the medium term, energy production from the traditional materials of coal, oil and gas seems to be guaranteed. Technically it would even be possible to increase energy production considerably, the deposits have been adequately developed and the supply infrastructure is efficient. From the technical viewpoint there are no doubts about safeguarding jobs.

1.1 Oil and natural gas

Supply difficulties are occurring as a result of an

explosive increase in prices in the case of crude oil and planned shortages resulting from the restriction of production by the supplying regions.

Both factors, the increased costs and the shortages, have devastating effects on the availability of jobs. The increased costs are passed on as a general rise in prices on almost all products, since most existing manufacturing processes and the products themselves are in some form dependent on petroleum as a raw material. A rise in price with a limited budget, however, means a reduction in sales and therefore a cutback in production and thus a loss of jobs.

Secondly, the increased cost absorbs a greater proportion of the money which could otherwise be used as capital for investment and thus for the creation of new jobs.

The development of new deposits which are not subject to any political dependence is only possible by heavy capital investment, for instance other North Sea oilfields, and thus increases the pressure on jobs.

Substitution by liquefaction of coal offers the possibility of safeguarding supplies in small stages. Despite the high capital intensity, which is a disadvantage as regards employment, it offers the advantage of further jobs in energy production and in the mechanical engineering sector. The employment effect, however, is only temporary, since both sectors involve highly mechanized production lines and will be subject to correspondingly intensified automation as a result of microprocessor technology. Coal liquefaction is also a process which takes place in large-scale installations, which means that energy production is concentrated with all the disadvantages of transport losses and waste of residual energy, that is to say it is an inefficient process from the point of view of energy technology.

Other replacements for oil as a primary energy, for example by processing oil shales, are subject to the same limitations from the point of view of energy technology and employment.

With oil and natural gas supplying more than 70% of the primary energy consumption of the European Community hitherto, there is thus very little prospect of safeguarding or even increasing energy supplies.

1.2 Coal

Hard coal and lignite at present supply some 21% of the primary energy needs of the European Community.

There are no limitations on safeguarding or increasing this proportion. In the short term increases of up to 20% in production capacity are possible. In the medium term a considerable increase in capacity can be achieved by the further development of deposits within the European Community.

Although the capital investment per job in this sector is enormously high, the job component is a positive factor. Experience shows that the growth-inducing effect of coal mining, transport and processing is considerable. The direct effect of coal as a primary energy for electricity generation on the labour market is calculated as follows, for example, in a study for the Federal Republic,[5]: for a 10,000-MW power station: construction of the plant provides 100,000 jobs for three years; its operation provides 11,000 jobs permanently.

An increase in coal production as a primary energy source involves at the same time an improvement in the job situation in the traditional mining areas of England, France, Belgium and the Federal Republic of Germany which, as a result of the previous conversion of the energy industry to oil and natural gas, have been facing considerable structural difficulties for more than two decades.

Coal has two other advantages from the point of view of employment policy: once processed it can be used as a final energy source and given the environmental considerations which have arisen with the use of oil it has a stimulating effect on other economic sectors.

As a final energy source, for instance, coal can be used for space heating. In the Federal Republic of Germany some 40% of final energy is used in this area. Here is an opportunity for replacing fuel oil, gas and electricity and, with a possible extension of final energy production capacity, this can decisively improve the energy balance and balance of payments for the benefit of primary energy.

1.3 Uranium

Uranium at present supplies about 5% of the primary energy in the European Community. In principle a further increase in this proportion would seem possible. To meet the increased safety requirements, however, an enormous amount of capital is needed. In the Federal Republic some 25,000 million DM spent on research have still not produced safety standards allowing a clear decision to be taken in the political implementation of this form of energy production.

Deposits of the primary energy raw material uranium are mainly found outside the European Community. This raw material is therefore subject to the same political dependence as in the case of crude oil.

There are considerable technical constraints on the use of this form of energy. It is suitable only for the production of electricity and is therefore subject to the low efficiency level of some 50% which applies to all electricity as final energy. The high capital investment on safety in these installations make it essential to opt for very large generating units. Because of siting conditions, the residual energy arising in these installations cannot be economically used. On the contrary, the disposal of this 'residual' energy creates considerable environmental problems.

The direct effect of the primary energy uranium on employment is limited to the construction of the plant and is the same as for a coal-fired power station. Operation of the plants involves only a small number of jobs since, for reasons of safety, automation is necessary.

Secondary employment effects do not arise, for instance in the exploitation of the deposits, as uranium production mainly takes place outside the European Community.

Other forms of nuclear energy production, such as nuclear fusion, will not come into effect until the 21st century.

1.4 Summary of effects on the labour market

With about 2 million employed the energy production sector, including mining, represents about 2% of the labour force in the European Community.

A substantial permanent increase in the numbers of persons employed in the production of energy from finite primary energy can only be achieved by the development of the coal sector. Since there are adequate deposits within the European Community, the replacement of oil and uranium must be intensified for the sake of employment policy.

Above and beyond the energy production sector, the opportunity for using coal as a final energy has an enormous stimulating effect on the creation of jobs in transport and in the mechanical engineering industry.

On the one hand, this form of primary energy has positive effects on regional employment in mining areas beset by considerable structural problems. Secondly, the technical implementation of energy production from coal in small production units allows selective decentralization and thus the creation of jobs in structurally weak regions.

II.2 Energy from renewable sources

With the sudden rise in the cost of oil, methods of producing energy which previously were only advocated for environmental reasons by small groups in society have become attractive: the so-called alternative or soft energies. Apart from the main fact that they use inexhaustible natural sources or existing heat potentials to produce a technically usable final energy, these soft energies have the advantage that they do not affect the environment at all or only very slightly by the emission of harmful substances.

Units for production on a wide scale are already in mass production. Large-scale plants are undergoing trials.

Since all forms of soft energy production involve new products, they create new jobs. Skilled personnel are needed for manufacturing installation, servicing and maintenance. The small capacity of these units means that they are usually directly intended for the local consumer system. Installations over a wide area therefore involve a supply of jobs over a wide area. A secondary effect on employment is the possibility of exports, arising particularly from the needs of the Third World countries.

Another advantage of soft energies which should not be overlooked is the cost-free input or, in the case of the biomass, low-cost input. The expenditure saved on purchase or production of oil, gas, coal or uranium makes the increased investment on development and installation of the units econimically acceptable and even in the medium term releases capital for the creation of other jobs.

2.1 Solar technology

In the Member States of the European Community solar technology, i.e. the conversion of solar energy into technically usable energy will be applied mainly for space heating, air conditioning and small-scale consumption. Large-scale plants are not particularly attractive for the European Community with its high average population density, since they take up a large area (1 GW requires an area of 20 km^2).

Estimates on the employment effect are available for the Federal Republic of Germany, for example. Covering 0.5 to 4% of final energy requirements in the year 2000, the solar energy industry will involve between 700,000 and 1.4 million jobs, 30% of these being concerned with exports[6].

Linear growth in this branch of industry would create 45,000 to 60,000 new jobs per year in the Federal Republic of Germany.

The use of solar technology is particularly important for the European Community from the point of view of regional policy: the southern regions, which have previously been concerned to a great extent with agriculture, will have an opportunity to produce energy as a result of the higher sunshine levels, thus at the same time producing jobs, cost advantages and independence for small firms. This also applies to the states which are to be new members.

2.2 Wind and water

Energy production based on air flows, wind and convection is in the experimental stage. The scientists have not yet made esimates or forecasts as to their use, but it can be foreseen that the effect on employment will be less than that of solar technology.

In the case of water power, one attractive possibility is the development of tidal power stations. Although this form of energy production can only be used for electricity generation and can be made largely automatic, it can make a considerable contribution to safeguarding energy supplies and thus to providing the basis for growth.

Sites are available where there is a considerable tidal range, i.e. on the Channel coast and the west coast of England for example.

Though the construction of tidal power stations is highly capital-intensive, their operation is economically viable even today, as can be shown by the existing installations.

2.3 Heat pumps, biomass

In the field of space heating, air conditioning and hot water production, a considerable proportion of final energy will be provided for the household and small consumers by heat pumps; these use the heat from the earth and are thus independent of the weather, or they process atmospheric heat, in which case they are dependent on the weather to a limited extent. In agriculture and horticulture this technology can contribute greatly towards safeguarding jobs. In this area there is already a wide range of industrially produced installations on offer. As an innovatory product this technology also provides new jobs for the home market and for export.

Energy production from the biomass provides liquid and gaseous energy which opens up new prospects for road transport. With a final energy component of about 20% and an efficiency of only some 20% in the use of the energy this sector of energy consumption is frequently called into question. Given the general esteem in which the motor car is held, this form of soft energy can make an important contribution and at the same time exert a stabilizing effect on employment in the car industry.

The example of Brazil also demonstrates a new area of production which is not unattractive for agriculture in the European Community. In its importance for the agricultural policy of the European Community, the value of an agricultural product as an input for energy production cannot be set too high.

With an employment component in agriculture of 8.4% (Europe of the Nine) and 34.4% in Greece, 21.5% in Spain and 27.4% in Portugal, this form of energy production can even become an integrating factor in connection with enlargement.

III. Better utilization of energy supplies

With the development of energy consciousness, strategies have been developed to reduce energy consumption and in some cases converted into programmes. They are based mainly on two categories of measures: technical measures and organizational measures.

All individual strategies for saving final energy in the technical sphere replace energy by capital and labour.

III.1 Technical measures

Whereas commercial users have endeavoured very quickly to achieve more rational use of energy in order to reduce their production costs, effective measures in the home take much longer.

Constructional measures for better thermal insulation offer the greatest opportunity both for energy savings and for safeguarding and increasing jobs.

Neither older buildings nor those constructed under the post-1945 building programmes have paid sufficient attention to rational space heating. A considerable number of jobs will arise in the areas of window construction, wall renderings and roof insulation.

A study for the European Community has shown that such measures will create a considerable number of new jobs for skilled workers in small and medium firms on a regionally distributed basis[7].

For the Federal Republic of Germany, for example, calculations show that 10% of the housing units on which insulation measures could be carried out in the next 5 years could provide 80,000 jobs per year[8]. The 'Environment Report 1978' assesses the effects of better thermal insulation in new buildings at 23,000 jobs per year[9].

Another area for savings produced by technical changes occurs in domestic appliances. Energy-saving and therefore more rational appliances open up a whole range of new products and product improvements which can safeguard or even create jobs.

As a result of the new microprocessor technology there are additional opportunities in control technology leading to considerable savings in space heating, domestic appliances and road transport. In these areas a saving of 13% or 18 million units of coal equivalent has been forecast[10].

Although microelectronics cannot be considered as a job-creating technology, the secondary effect of an improvement in the balance of payments must be considered a positive factor in relation to jobs.

In some sectors of industry the excess heat from the production process could be utilized by other users.

III.2 Organizational measures

The traditions of the energy industry and its production and distribution policy have given rise to situations which can no longer be accepted now that there is increased energy consciousness.

The concentration of electricity generation in large power stations and the associated transmission of electricity over long distances produce a low efficiency level.

By phased re-organization with a view to decentralization of generating stations and a corresponding reduction in their size, electricity generation can be brought nearer to the built-up areas and hence the residual energy can perhaps be used for district heating in densely populated regions.

The direct effect on employment is not inconsiderable. The study by the Federal Government on district heating indicates, for example, that to cover 25% of the heating demand, construction of the plants will provide 50,000 jobs and their operation a further 10,000. Secondary effects resulting from the conversion of domestic heating systems have not been taken into account[11].

One purely organizational problem arises in the delivery of excess heat produced by industry into the supply systems. Pointless dissipation of this surplus energy does not help to ease the burden of energy costs on the economy as a whole.

IV. Summary of direct and indirect effects on the labour market

To safeguard existing jobs and create new job opportunities for the unemployed and for future generations, economic growth is necessary to 1990 and beyond. An adequate supply of energy is an indispensable prerequisite for increased economic activity. There is no direct quantitative link between the rate of growth of the gross national product and the supply or consumption of energy. On the other hand, shortages in energy supplies can have detrimental effects on the growth of the economy.

The separation of economic growth and energy consumption is apparent in the effectiveness of existing savings programmes and appeals which have brought about a reduction in crude oil imports since 1974 and reduced electricity consumption in the last year.

In the medium term, safeguarding energy supplies by replacing oil with coal will produce a considerable increase in jobs. With about 650,000 jobs at present in coal mining and processing, the installation of 100,000 MW of power station capacity, for example, will provide a further 110,000 permanent jobs or 16% of the numbers employed at present in this sector in the European Community. Coal is particularly important as a replacement for oil in space heating. Considerable numbers of jobs can be expected here, together with considerable savings on imports.

Direct quantitative effects on the labour market are not to be expected from the replacement of oil by uranium.

In the medium and long term only the use of soft energies based on the renewable natural energy inputs will be independent of imports. Quantitatively solar technology, wind generators and the biomass offer job potential through product innovation and qualitatively their effects through regional dispersion are of considerable importance for the employment policy of the European Community.

The third component of a rational energy policy, the reduction in energy losses by improved thermal insulation in buildings and by re-organization of the energy distribution system will bring direct effects on employment in the operation of decentralized distribution networks, especially in areas of high population density. Jobs will therefore be created in the built-up areas where there is a high numerical potential of unemployed. One particular aspect of the direct consequence on the labour market of the replacement of the primary energy of crude oil is provided by the biomass as the input for energy production. Agricultural production for energy, as in Brazil, for example, can acquire an importance for the European Community, with its almost traditional agricultural market problems, which extends far beyond the area of safeguarding energy.

With an active policy to safeguard energy supplies indirect employment effects occur in two categories:

1. The stimulation of additional jobs in supply, servicing and maintenance and
2. The release of resources otherwise tied up in imports.

An assessment of the number of jobs created has hitherto only been made in individual sectors. An input-output analysis of all aspects will provide further information. One important consequence of substitution by soft energies, however, will be the increase in jobs as a result of the export of this technology, especially into Third World countries.

The second category, resources tied up in oil imports, is gaining increasingly in importance with the rise in oil prices. From the point of view of the economy as a whole there is an opportunity here for investments in sectors which are more labour-intensive than the energy sector[12].

An assessment of the relationship between energy replacement and employment also shows that it is unrealistic to concentrate the argument on a choice between nuclear energy or chaos.

Finally, to illustrate the total extent of the employment effect on the economic area of the European Community, reference can be made to the conclusions of a study adopted by a Congressional committee on a proposal from Senator Edward Kennedy as a basis for the energy policy of the USA[13].

Taking into account all the mitigating effects, this study demonstrates that for the USA the effect of the use of soft energies will be an increase of 1.1 million jobs and a similar number from indirect employment effects.

A forecast of 2.2 million jobs in an economic area approximately comparable with the European Community should be reason enough for an active employment policy combined with the safeguarding of energy supplies in the European Community.

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C. The relationship between technological development and jobs

I. The general situation

The effect of technological development in the manufacturing and service sectors on the number of jobs is basically the same in all industrial societies. Within this category of economies it cannot be restricted in area, for example, to the states of the European Community or the USA and Japan, etc. The only differences between the economies are the times at which new technologies are introduced.

The only consequence for the economic structure of different areas as a result of differences in the times at which new technologies are introduced is a change in the sectors in the individual states within the international division of labour.

The corollary to this is that all economies at similar industrial levels are faced by similar structural, sales and employment problems as a result of technological development. The benefits and advantages to individual economic areas as a result of the international situation of competition on the markets are very limited in time and can be offset in a relatively short time by corresponding economic policies.

I.1. The main characteristics of technological developments in the employment sector

Technological development has effects mainly in three areas: a change in manufacturing processes, the 'invention' of new products and the introduction of new job characteristics for the employed. All three concepts, processes, products and job characteristics cover all economic sectors in this context: the primary sector, i.e. agriculture and forestry, etc, the secondary sector of further processing and manufacture of industrial products, and the tertiary sector of services.

Examination of the development of the industrial economy reveals an increase in activity both in processes and products as technology advances.

Diversification of processes and the product range have largely gone hand in hand with an increase in the number of gainfully employed.

An increase in types and quantities of product presupposed that the rising net product with improved technology was passed on to the population, in part at least, as the sales of products had to be assured.

A prerequisite for product and process innovations coming in increasingly rapid succession has hitherto been for the two components of technological development to keep pace with one another, that is, the rising number of persons on the labour market could only be employed if new products arrived as savings in labour were made in the existing production lines.

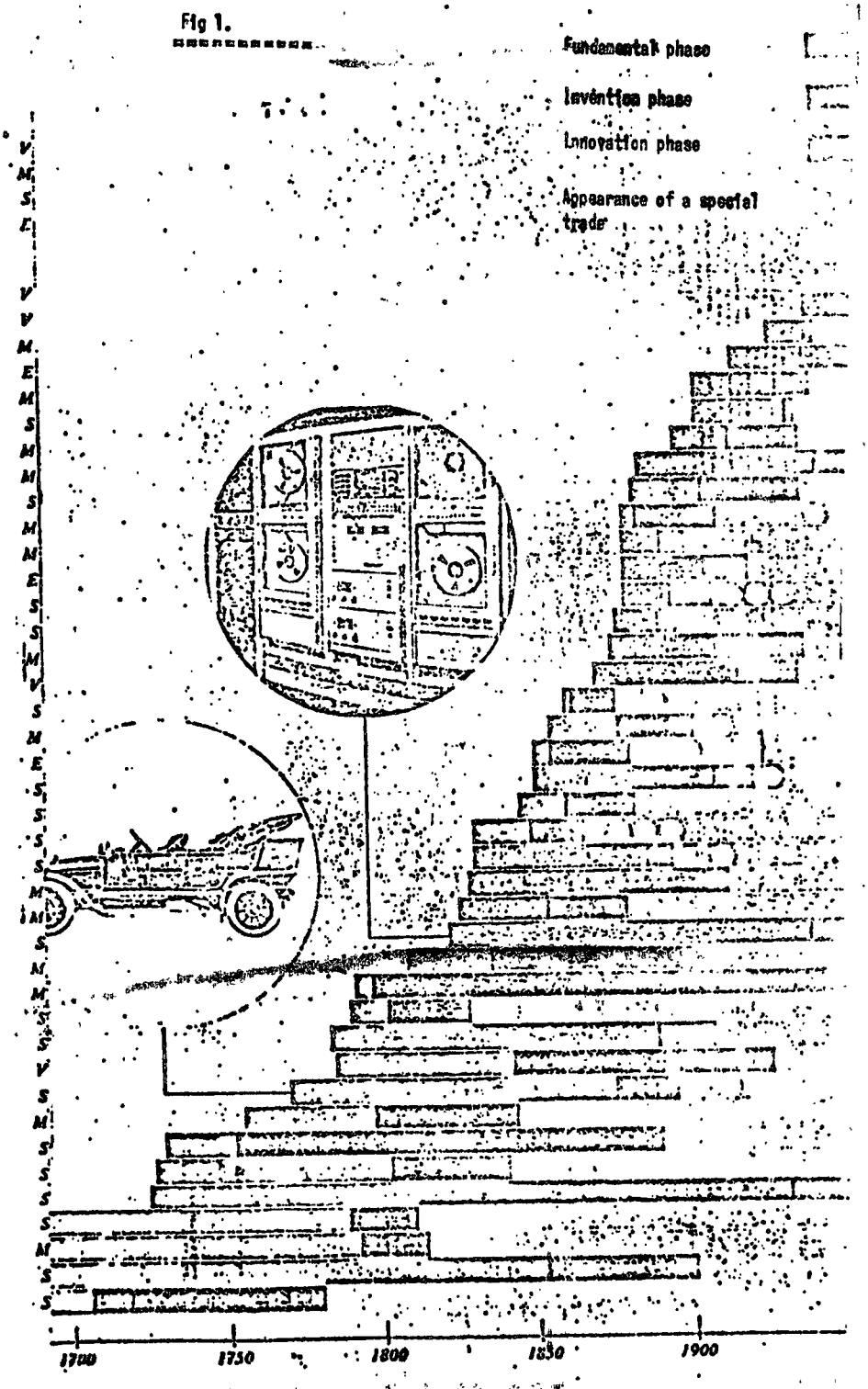
The technical changes in the manufacturing processes required new products in order for these processes to be introduced at all. This area of economic activity, capital goods production, has been an important factor over long periods in the employment policy of the industrial economies.

The most radical effect of technological development however is found in the work of those persons who have to deal with the new technology. Thus the introduction of a new process required new job characteristics for the labour force and to some extent even new job descriptions (see Fig. 1, page 19).

With an increasingly shorter time between the invention of a process and its application in manufacturing, there comes the difficulty of meeting the new job description with a traditional professional skill (see Fig. 2, page 20).

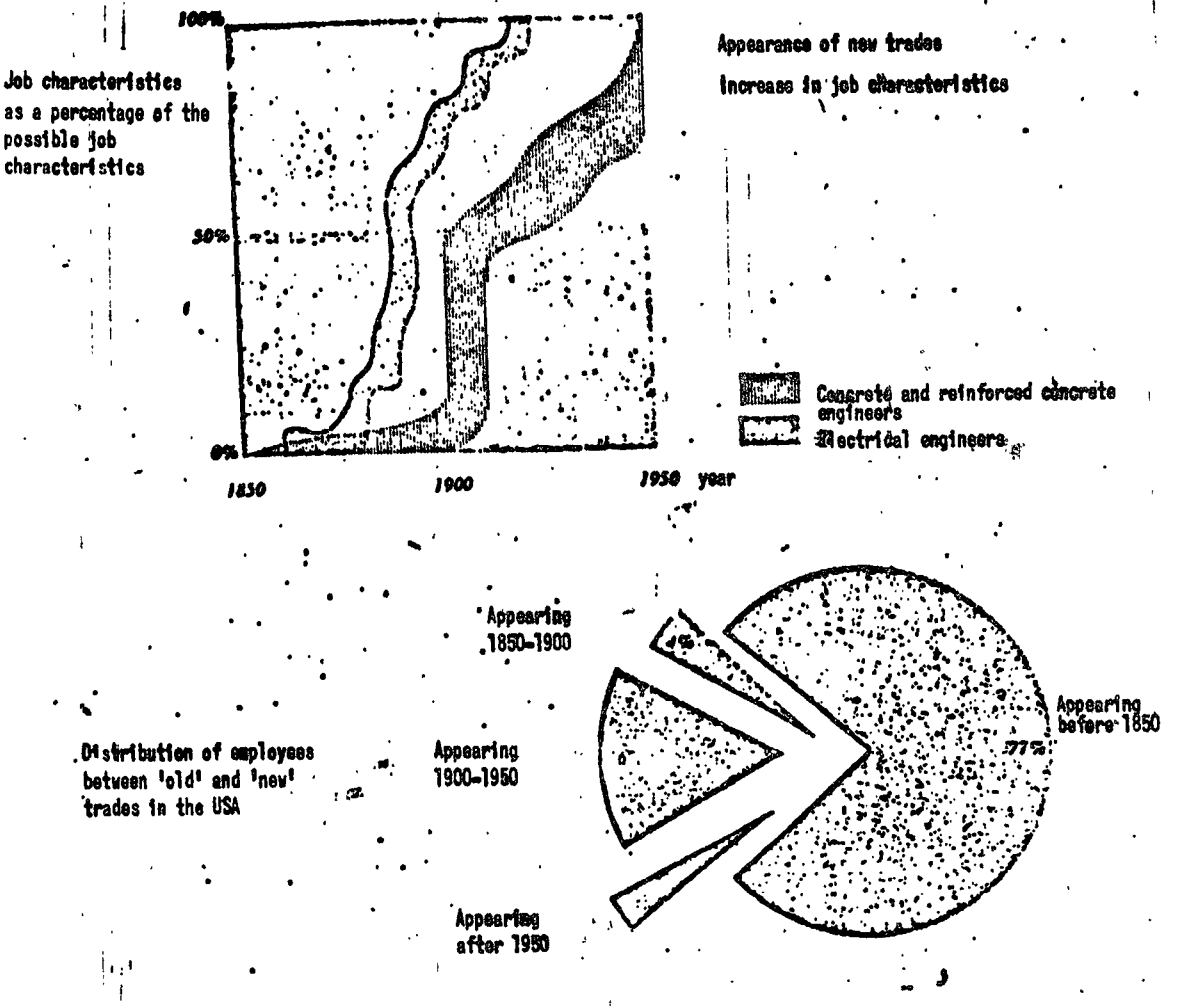
With increased mechanization, the work of every employee in manufacturing or services has also been reduced to fewer and fewer characteristics: the work process has been broken down into a large number of small steps, each worker constantly repeating one stage in the operation.

Fig 1.



Source: Quint AB 6, 1st edition 1977

Fig 2.



Distribution of employees between 'old' and 'new' trades in the USA

Source: Quint AB 6, 1st edition 1977

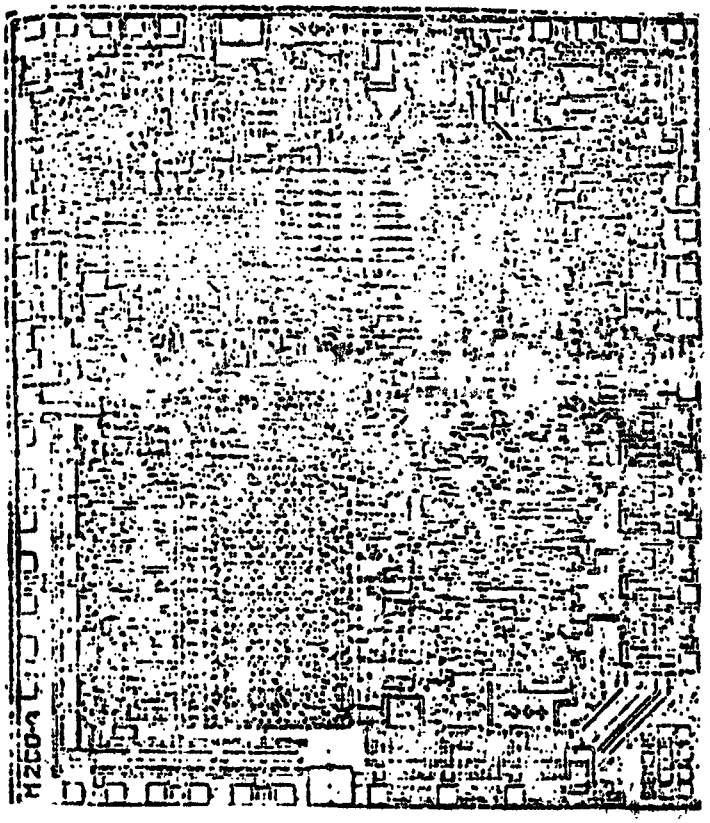
1.2. Characteristics of the microprocessor

2.1 The component

The microprocessor, or miniaturized integrated circuit, is an electrical switching and storage element which is used in an electronic machine to replace space-consuming components. The scale of reduction is from 1 to 1,000 million (see Fig. 3).

Top view of integrated circuit, chip size: 4 x 5 mm
(Microprocessor SAB 8080 with about 5,000 transistors)

Fig. 3



Source: References to Section B, No. 10

The raw material silicon required for the manufacture of the elements, called chips, is present in nature in almost unlimited quantities. Manufacture is extremely simple: by exposing a light-sensitive coating with various masking arrangements, the circuits are reproduced as electrical conductors on the base plate.

Development is already at such a stage that the computing capacity of the largest computer can be accomodated on one such chip.

Production costs are determined by the capital investment for the manufacturing equipment. The energy and raw material consumption per microprocessor are negligible. Production therefore is aimed at large quantities.

The cost per function reproduced, comparable with the cost per valve or transistor, is in the region of 0.0001 EUA.

The systematic structure of the functions on a chip makes for an exceptionally wide variety of possible applications.

2.2 Properties and applications of microprocessors

Microprocessors have all the properties of computers, i.e. they can receive, store, compare and deliver information.

Accordingly they are suitable for the control and regulation of manufacturing processes.

It is foreseeable that by combining these properties and incorporating the programming of logical decisions following comparisons, these electronic machines will be able to undertake the design and planning of products and manufacturing processes.

Because of the low costs of mass production, chip technology will find application in all sectors where large quantities of a product are manufactured. Regulation and control is already being undertaken by microprocessors, especially in long production lines for the manufacture of complex products, for example, car production lines in Japan and word processing.

Information processing also embraces the interface between man and machine, for instance the conversion of the spoken word into other signals or even other languages. This also covers learning machines which acquire information from man.

As well as possible applications in manufacturing and communications, microprocessors can also be used for the development of new products.

Two forms of product innovation can be expected:

- new products, expecially mass products using chips, for example, pocket computers
- machines and technical equipment for preparation and conversion in data processing by microprocessors, for example, visual display units in word processing.

I.3 Importance of microprocessors for employment

The possibility of using the chip as a major inexpensive component in the control of repetitive sequences of movements and data processing evokes the prospect of the fully mechanized, automated world which has been imagined for so long in literature. This prospect is supported by the evidence that the period between the invention and the application of a technical innovation has continuously decreased in the course of the last century (see Fig. 1, page 19).

At the moment we are in the third decade since the invention of the integrated circuit. Following the extensive use of this technology in weapons and space engineering, the chip has also been used in civil production since the end of the sixties. Clear evidence of the consequences of the use of this technology has been apparent in the field of employment since the beginning of the seventies (1).

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(1) European Trade Union Institute:
The impact of microelectronics on employment in Western Europe in the 1980's, pp. 82-4:

One such firm was the German company, Walther Büromaschinen which manufactured office calculators. In the early 1970's, the company attempted to switchproduction from mechanical to electronic calculators, cutting its labour force from 1,800 to 400. Even this was not sufficient to match American and Japanese competition and the company went bankrupt in 1974.

The American company - National Cash Registers (NCR) - stated in its 1975 annual report that the labour content of the electronic cash registers it was then manufacturing was 25 per cent that of their mechanical or electromechanical predecessors; as a result, it reduced its labour force in manufacturing plants from 37,000 in 1970 to 18,000 in 1975.

../..

(1) (cont'd)

NCR carried out a similar rationalization programme in its plants in Western Europe. In the Federal Republic of Germany the labour force was cut from 4,200 employees in 1974 to 400 in 1977 in the company's Berlin and Augsburg operations. The main areas of job loss were in casting operations (a reduction of 400 jobs to 10), milling machine operators, turners, press workers, mechanics and supervisors. In addition, all 50 jobs in production planning were lost, to be replaced by jobs for EDP electronics engineers and systems specialists.

In the United Kingdom similar rationalization has taken place in the manufacture of cash registers. NCR's Dundee operations were reduced from 3,000 employees and four factories in 1975 to 1,000 employees and two factories in 1978. In other United Kingdom firms manufacturing cash registers, estimates suggest a halving of the labour force required for the manufacture of electronic cash registers compared with that required for mechanical cash registers.

One study carried out for Olivetti considered a sample of mixed companies producing mechanical and electronic 'information products' - four American, three German and one Italian. The eight companies reduced employment by 20 per cent between 1969 and 1978; besides NCR, the employment reductions were 35 per cent at Olympia Werke, 20 per cent at Adler Werke, 18 per cent at SCM and ten per cent at Olivetti. There was also a reduction in the proportion of production personnel in total personnel; between 1970 and 1978 it fell from 44 per cent to 31 per cent at Burroughs, from 37 per cent to 27 per cent at NCR, from 38 per cent to 22 per cent at Nixdorf and from 45 per cent to 31 per cent at Olivetti.

The effect of microelectronics on the number of jobs is determined mainly by five factors:

- new jobs in the manufacture of chips
- new jobs in secondary products
- loss of jobs as a result of the introduction of the technology in existing manufacturing processes and services
- loss of jobs as a result of the replacement of products by chips
- loss of jobs as a result of changed production lines.

3.1 New jobs

About 90% of integrated circuit production is located in the two economic areas of the USA and Japan. In 1980 about 10% of manufacturers were in the Community compared with 64% in the USA and 25% in Japan.

International studies indicate an increase of 400,000 jobs by 1987 in the Community[1]. With a total forecast of 1 million jobs following product innovation as a result of chip technology this would seem to be rather optimistic.

The increase in jobs arising from chip manufacture seems negligible within the overall framework of the Community labour market balance. Permanent advantages from the point of view of employment could occur in the regional balances, for example, in Ireland and Scotland. Japanese manufacturing plants are at present being planned for those places.

However, since automation of chip production is already at a very advanced stage, these regions will experience only a very slight increase in jobs.

The estimate of 400,000 additional jobs as a result of product innovation includes the services sector. There has already been an increase in the numbers of employed, especially in the credit and insurance business, as a result of the expansion of the areas of activity of existing firms. The use of data processing machines has opened up additional areas of work for the traditional credit industry. How far this expansion of jobs is only temporary and will be reversed by the introduction of microprocessors remains to be seen.

3.2 Loss of jobs

There are no general statistical data for the loss of jobs following the introduction of new technologies.

Empirical data are based on research and information from the two sides of industry.

The loss of jobs occurs in two different forms:

- replacement of human labour by the use of microprocessors
- saving of additional jobs as a result of the increase in productivity.

3.2.1 Loss of existing jobs

The replacement of human labour in existing manufacturing processes involving the same products has led to the most dramatic arguments between the two sides of industry.

The abolition of the typesetter in the newspaper industry is a striking illustration of this development (1).

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(1) European Trade Union Institute:

The impact of microelectronics on employment in Western Europe in the 1980's, pp. 87-88:

The changeover in the printing industry from hot metal to computerized typesetting, referred to in paragraph 113, has also already had significant employment effects. In the Federal Republic of Germany employment in the printing industry has fallen by 35,000 since 1972; the new technology allows the setting of eight million characters per hour compared with 25,000 formerly. In the newspaper industry, the key jobs lost have been those in print-setting, correcting and lay-out. The union, IG Druck und Papier, in the Federal Republic of Germany has given an example of the reduction in the number of jobs per shift in a newspaper printing plant from 52 to 29 following the introduction of computerized typesetting. There was a major dispute in the printing industry in the Federal Republic of Germany in the winter of 1977-78 over the treatment of displaced typesetters and printers. The final settlement gave an eight year job guarantee for skilled workers with a six year guarantee of wages comparable to their former status.

In the United Kingdom printing industry employment fell from 259,000 to 196,000 between 1967 and 1976, reflecting technological change. The British Royal Commission on the Press, reporting in 1975, estimated that 7,000 of a total of 20,000 print production workers in the national newspaper industry would be made redundant as a result of the introduction of new technology.

Further automation in the newspaper industry can be expected: further progress in the development of data processing, such as the conversion of the spoken word into print, will affect journalists and/or the number of jobs in this sector.

The same development can be seen, for example, in the car industry. Electronically controlled machines are replacing human labour to a considerable extent.

The many-sided and inexpensive applications of chip technology will also find their way into less complicated product lines and processes such as storage, price marking of goods for sale, etc.

One typical example from the services sector is the use of automatic typewriters. The state of the art is such that 30 jobs on conventional electric typewriters can be replaced by one automatic machine.

The second way in which the new technology will lead to a loss of jobs, i.e. the replacement of products by microprocessors, is difficult to assess.

There is, of course, the electrical equipment sector, for example the replacement of traditional lift-off rotary switches in telephone switchboards by completely electronic digital units. The switchboard installations used in most of the telephone networks of the Community countries require a large number of mechanical devices. The effect of conversion from the conventional product to chip assemblies will lead to a considerable change in production in the electrical industry and thus in employment.

The unpleasant consequences of replacement of the rotary switch by completely electronic units are demonstrated at the same time by the fact that fully electronic switchboards require less maintenance. This means that jobs will also become superfluous in the maintenance and servicing sector.

Telephone switchboards provide an example of the general problem which will arise in all mechanical machines: the replacement of this mechanical machine work by fully electronic units means the abolition of whole product ranges in the capital goods industry, particularly in the mechanical engineering industry, and the abolition of the servicing and maintenence programmes associated with these products.

The progressive replacement of mechanical components in consumer goods has a disastrous effect in the servicing and maintenance industry sector. Whole groups of professions, for example, that of the traditional watchmaker will be lost.

The third component which affects employment arises from changes in the production structure: the incorporation of fully electronic control and regulating elements in products which previously contained more expensive mechanical or semi-electrical components will give rise to new product lines, reflected in the vertical concentration of component manufacture. The use of integrated circuit elements eliminates production stages such as the assembly of components and sub-systems up to final assembly. The new technology requires only the manufacture of the components and their assembly into the final product.

This considerable reduction in the manufacturing process will involve a substantial saving in jobs (1).

Vertical concentration will cause further job problems through product substitution.

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(1) European Trade Union Institute:
The impact of microelectronics on employment in Western Europe in the 1980's, p. 79:

Singer now manufacture a sewing machine in which one microprocessor has replaced 350 mechanical parts. Standard Electric Lorenz, a subsidiary of ITT, produce a electronic telex machine in which one microprocessor has replaced 936 parts in its electromechanical predecessor. An electronic watch is assembled from five basic components - a battery, quartz crystal, LED, integrated circuit and case.

The reduction in the number of components results in a reduction of the labour required for the manufacture of components and also a reduction in the labour required for the assembly of components and the sub-systems which they form. Thus, an electromechanical telex machine took75.3 manhours to manufacture whereas an electronic machine takes only 17.7 manhours; an electronic taxometer takes 3.7 hours compared with 11.7 for an electromechanical one. A mechanical watch takes some 1000 operations to assemble compared with the assembly of the five components of an electronic watch. The assembly time of an electronic calculator is four hours compared with 12 hours for a mechanical calculator. The production of a mechanical accounting machine - Olivetti Audit 24 - required 33 working hours compared with less than 13 hours for its electronic replacement. The production of electronic typewriters requires half the labour content of electromechanical models.

A SCHEMATIC VIEW OF STRUCTURAL CHANGE IN MANUFACTURING AS A RESULT OF THE USE OF MICROELECTRONICS IN PRODUCTS

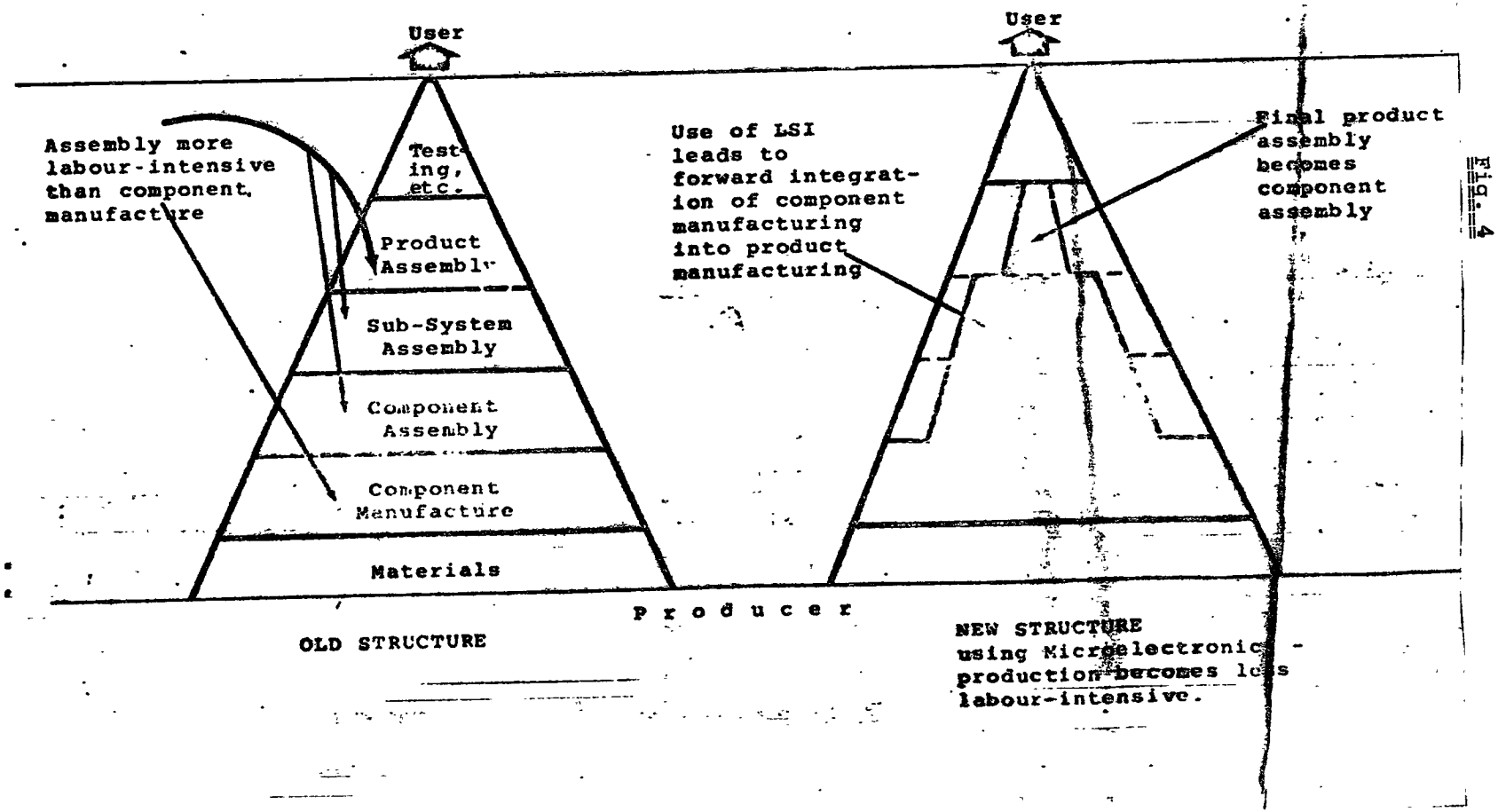

Fig. 4

3.2.2 Saving additional jobs

The study of the effects on employment of computer technology in industries in the Federal Republic of Germany revealed in only a few cases an associated reduction in jobs when the numbers of employees in the firms were considered[2]. None of the studies, however, covers productivity in the firms.

With the introduction of computer technology there was a substantial increase in productivity per employee, shown by the increase in sales in the period under investigation[3]. The increased net product of the firms per product line and employee does however mean a saving in jobs.

The consequences of these 'notional displacements', in conjunction with the three other components of the loss of jobs through microprocessor technology, have considerable implications for the labour market.

1.4 The effect on the job characteristics of the employed

In the case of partial automation of a production line the effects of the use of microprocessors in the manufacturing process are that the work of the employee becomes easier insofar as senseless, repetitive manual jobs are largely eliminated.

Jobs such as 'valve fitting' in the electrical industry, with repetition rates of less than 0.6 seconds, become superfluous.

With further automation, right up to full automation of the manufacturing process, which, for example, is a feature of chip manufacture, only supervisory and to a small extent servicing and maintenance operations are needed, requiring higher skills from the employee. In the partial automation stage during the next few years it will therefore be necessary to develop new job descriptions in order to create assured working opportunities at least for the residual functions of human activities (for example, Nixdorf, Paderborg).

II. Effects of the new technology on the economic regions

Although the European Community as a total economic area is amongst the highly mechanized economies, there are of course considerable regional differences in mechanization.

Whereas the continuity of the gradual development to microprocessor technology is imperceptible in countries with a very high level of conventional technology as shown by the development and production of chips, in areas of a predominantly agricultural character with a low level of technology there is a yawning gap evident on transition to the new techniques.

Encouragement of the capital goods industry to convert to the new technical era seems economically feasible and from the point of view of the labour market potential relatively free of problems, having regard to the high proportion of skilled workers and employees in the technical professions with different levels of skill.

In the 'technically backward' regions, however, conversion will always involve weighty social problems: the mass of the population has hitherto been without technical skills and will remain so. The explosive social component in this development should not be overlooked.

This problem will be considerably aggravated for the Community by the entry of the three new countries.

Even the hitherto overworked solution of geographical mobility of labour will not provide the answer here, as the difference in technical skills on the one hand and the negative trends in the labour market balance for the Community as a whole will leave no opportunity for the job seekers concerned.

The consequence for the development of the economic regions in the Community will be a widening of the differences in the level of technology.

III. Consequences for employment policy in the Community

Of the three recognizable types of change in economic activity following the introduction of chip technology, two are now so recognizable in outline that a need for political action can be seen.

The two changes are process innovation and increased productivity per production line. The effect of these is demonstrably the displacement of employable persons and prevention of the creation of new jobs in the existing manufacturing and service sectors.

The third change, product innovation, cannot be assessed either qualitatively or quantitatively. Assumptions concerning its effects on the job balance are pure speculation. Conclusions as regards employment can only be based stochastically on measures in the research policy sector.

As a result of the regional differences in levels of technology in the Community, the consequence as regards employment policy in the Community is that there is a need for a Community employment policy integrated over all regions.

III.1 Sectors of possible employment policy

The effect of the new technology will be felt in all areas which either manufacture technical products or use them to a considerable extent for production, such as the services sector.

On the assumption that existing products and services are assured, employment policy in these sectors can only concern itself with the distribution of the available work, i.e. it can only react.

An active employment policy, on the other hand, is possible in all sectors of activities relevant to society in which no technical products are manufactured or in which the use of such products plays a subordinate role.

These sectors are mainly the social sector and education.

III.2 Reactive measures

The introduction of microprocessors, in line with the long-term trend of a reducing period between the discovery of an invention and its technical application, will take place

relatively quickly. The consequences for employment are therefore to be expected very soon on a large scale.

The extent of the employment policy measures in the reactive sector, insofar as this can be foreseen, depends on the speed at which chip techniques are introduced.

The time factor is determined, on the one hand, by developments in the population and thus the number of persons of employable age. Secondly, it has a decisive effect on possible product substitution, the extension of product ranges and the associated creation of new jobs.

In the three sectors of agriculture, manufacturing industry and private services, three possible alternative situations can be imagined with fundamentally different effects on the labour market:

The introduction of chip technology which saves on labour and increases productivity will take place

a. slower than

b. at the same rate as

c. faster than

product innovation.

Case a.

The effect on the labour market would be extremely favourable in the sense of an overproportional increase in jobs. If process innovation lagged behind product innovation then even with microprocessors the classic case would again arise of growth in the gross national product with human labour making a decisive contribution to the net product.

This situation is inconsistent with experience, both in overall economic development since the consequences of the World War were overcome, and experience from the sectors, as described in paragraph C.I.3., and thus conflicts with the reasons underlying the discussion about employment policy.

Case b.

Automation of production in the broad sense and product innovation are in balance. In this case a situation could be imagined where in the stages of development up to complete automation the job balance at first becomes slowly negative but then this trend accelerates as development progresses (to be seen in banking and insurance for example). Thus the present job situation with 7 million registered unemployed in the Community would at first continue for a certain period, but in the longer term the unemployment figures would go higher.

Judged by previous developments in the highly industrialized countries this case also seems unrealistic.

Case c.

The third alternative is clearly fully under way. Seen over the economy as a whole the rate at which process innovation and increased productivity are being introduced is out of all proportion with the employment effects of product innovation.

It is here that the reactive side of employment policy must come into effect.

On the basis of the total volume of work done, the available work must be allocated between those wanting to work. In purely quantitative terms this means a reduction in the working time of those at present employed, by the amount necessary to ensure that all those wanting to work are employed for equal periods of time.

In the longer term this also means the disappearance of particular forms of employment, such as piece work, as the net product per employee becomes less important from the point of view of employment policy where there is increasing automation, and the yardstick of work allocation must be based on working time.

As work allocation based on time between all those who wish to work can raise qualitative problems in terms of professional skills depending on the requirements which the job places on the employee, the necessary reduction in working time can only be implemented in sectors if not trades.

The three forms of reduction in working time which have been generally discussed hitherto:

- working life
- annual working time
- daily working time

will have to be applied either singly or in combinations depending on production requirements, by agreements between the two sides in relation to sectors and in certain circumstances even products.

A reduction in working life need not necessarily mean earlier retirement from working life. In connection with the need for retraining and improvement of vocational skills on a large scale, alternating work and training is also conceivable.

The reduction in working time can be statistically quantified as a proportion of those gainfully employed to unemployed. With some 7% registered unemployed in the Community and an average working week of 40 hours per worker, for example, there would have to be a reduction of some 3 hours a week to ensure that the whole labour force could work.

Similar calculations could be made to give an overall figure for the reduction in working life and annual working time, but these figures assume that the unemployed could be employed in any jobs, which is a question of vocational skills and the skills required by the jobs.

The above aspects are some of the problems involved in bringing about a reduction in working time calculated in this way in specific sectors and production lines.

From the overall economic viewpoint the reduction in working time with a full compensatory wage adjustment offers considerable advantages over all other solutions based on a division of persons willing to work into the gainfully employed and the unemployed.

1. The increased or unchanged net product of the firms resulting from automation is allocated direct to those willing to work, without being skimmed off by corporations or the state.

2. From the geographical point of view those persons at present unemployed who are willing to work can be employed where they live and have hitherto been employed. Further demands on geographical mobility with all its social disadvantages and extra costs are avoided.

Coupled with the active employment policy meausres of vocational training, the reactive measure of a reduction in working time offers the solution with the smallest social and financial frictional losses.

The disadvantages of a reduction in working time are to be seen in the traditional manufacturing processes. One hundred years' experience of continous reduction in working time from the original 80 hours to the present 40 hours reveals however that firms, sectors and the whole economy can overcome this organizational problem, so that there are grounds for hope that the greatest difficulties in labour organization associated, for example, with the introduction of a fifth shift in the continuous production process can also be overcome.

Brief reference to the cost factor of the compensatory wage adjustment has already been made under paragraph I. In general there will be an increase in costs as a result of the wage adjustment. Compared with the cost to society in the form of unemployment benefit, the process whereby all firms add the cost to the price is the obvious solution and one which suits the social market economy. Sales problems arising from international competition cannot occur, since the cost of ensuring the livelihood of the non-gainfully employed also has to be paid for from the profits made by firms in other areas.

III.3 Active measures

The only effective and indispensable reactive measure, a summary reduction in working time, must be supplemented by active measures to avoid qualitative and regional bottlenecks and undesirable trends.

3.1 The quaternary sector: social and education

On the above assumption that in the transition period before complete automation of traditional manufacturing processes the quantitative problem of reduction in the number of jobs can be solved by dividing the work, additional

measures have to be taken in connection with the qualitative problem of the requirements imposed on the workers by the new manufacturing techniques.

The opportunities for obtaining professional qualifications which will keep the worker capable of working in an increasingly wider range of manufacturing processes must be systematically extended.

Apart from the development of new training and job descriptions, one effective factor in employment policy is the creation of centralized training and further training establishments. These facilities cannot simply remain in the hands of the firms, or workers who leave would not have the opportunity for further training or retraining. Centralized training and further training establishments must also be designed to preserve vocational opportunities for women. It is precisely this group of workers whose training in private firms is affected by traditional obstacles such as out-of-date regulations and laws. On the other hand, women as a group, being employed to a very great extent on the simplest mechanical operations (with repetition rates of less than one second!) are affected first by new technologies.

Apart from the job potential, which is a positive advantage from the point of view of employment policy, raising the level of education and training throughout the Community offers two further advantages which will also pay in the long term:

- improvement of the technical knowhow potential of the economic area
- increase in the potential for solving social conflicts which automatically arise with increasing automation.

The introduction of the process innovation associated with microprocessors even in short mechanical production lines will lead, especially in Third World countries, to problems similar to those which have been indicated for the relatively weakstructured regions of the Community, but to a much greater extent. Thus it is precisely in the process of development aid as a means towards self-help that the knowhow of the Community will become an export commodity, even at the lower levels of technology, and this will be vital for our area.

The second aspect of the enhanced level of education concerns a potential social conflict which will arise with the necessarily expanding amount of leisure for all inhabitants of the Community. The need for proper renewal of one's capacity for work places severe demands on each person's ability to achieve self-fulfilment without aggression or even without psychosis. The avoidance of phenomena such as have become familiar in the U.S.A. in abuses by fanatical religious groups calls for great personal efforts towards further human education.

For fundamental reasons this sphere of human education must be kept free at all costs of the mechanization resulting from chip technology. The use of microtechnology in the form of automatic learning devices necessarily leads to human disorientation as the programmed and automated transmission of information allows no room for doubts and forces the learner to surrender his individuality.

3.2 Promotional measures: research and regional development

The basis for the development of semiconductor technology and microprocessors was the promotion of research facilities with an extremely high capital intensity. The direct advantages to the economy of the U.S.A. in this area stem from military research programmes.

The capital intensity of research for product innovation, which is important for employment policy, will rise even further with the increasing use of microelectronics. The enormous lead held by the economic areas of the U.S.A. and Japan in the production of semiconductor components, raises doubts about intensification of highly technical research in this sector in the Community, as such research can only have the direct effect of safeguarding and extending jobs in research institutes.

A much more effective measure from the point of view of employment, on the other hand, would seem to be the promotion of those areas of research which are not directly linked with the microprocessor product, i.e. all disciplines concerned either with the development of by-products and the software of chip technology or in general operate in areas which are not affected by microelectronics.

Under the Damocles sword of automation the only promising research will be that which produces socially relevant results and whose main direction of emphasis is towards areas of employment for mankind.

There must be particular emphasis on the position of companies and businesses in the areas of the Community which are today designated as structurally weak. Since, as a result of the rising investment costs of highly mechanized production, the employment opportunities for the population in the rural areas of the Community will not increase in this sector even in the long term, the development of employment oriented away from microelectronics will be the only effective instrument of regional development policy in the long term.

In the area of goods manufacture, those articles whose production can only be slightly mechanized or which attain their value from manual production are particularly suitable. Employment in environment protection will offer wide scope for activity, at the same time maintaining or restoring the traditional values of the natural environment in the broadest sense. This does not just apply, however, to mechanized measures for protection, cleaning and conservation but also to the restoration of the natural ecological balances.

By research and development of programmes, specific action can be taken here to initiate regional activities which have prospects of being effective from the point of view of employment.

Socially relevant activity in the educational and social spheres will help to eliminate unjustified differences in levels between built-up and rural areas. To achieve genuine equality of opportunity, the use of skilled personnel in the structurally weak areas will be necessary.

Listing ideas for the promotion of regional development is merely the first stage; the actual tasks and areas of work will only be found from an analysis of the needs of those concerned.

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OPINION OF THE COMMITTEE ON ENERGY AND RESEARCH

Draftsman: Mr P. BEAZLEY

On 19 June 1980 the Committee on Energy and Research appointed Mr BEAZLEY draftsman of an opinion on the motion for a resolution tabled by Mrs BONINO, Mr COPPIETERS and Mr CAPANNA pursuant to Rule 25 of the Rules of Procedure, on unemployment and energy consumption in the Community (Doc. 1-485/79) and the motion for a resolution tabled by Mrs SALISCH, pursuant to Rule 25 of the Rules of Procedure, on the effects of technological developments on employment (Doc. 1-795/79).

It considered the draft opinion at its meeting of 24 September 1980 and adopted it unanimously with one abstention.

Present: Mrs Walz, chairman; Mr Ippolito, Mr Gallagher and Mr Normanton, vice-chairmen; Mr Beazley draftsman; Mr Adam, Mrs Bonino, Mr Calvez (deputizing for Mr Pintat), Mr Croux, Mrs Dekker (deputizing for Mr Capanna), Mr Hoffmann (deputizing for Mr Fuchs, Mr Kellett-Bowman (deputizing for Mr Seligman), Mr Linkohr, Mr Moreland (deputizing for Sir Peter Vanneck), Mr Paisley, Mr Price, Mr Purvis, Mr Rinsche, Mr Sälzer, Mr Sassano, Mr Schmid, Mr Veronesi.

I. INTRODUCTION

1. The two motions for resolutions - insofar as they have common features - call for more careful consideration to be given to the links between energy consumption, modern technological developments and employment. What is required from the Committee at the present stage, therefore, is not a thorough in-depth study of the problems involved but merely preliminary consideration of the basis for a decision on how the problem might be tackled and from which basic premises to proceed.

II. SPECIFIC COMMENTS ON THE MOTION FOR A RESOLUTION TABLED BY Mrs BONINO, Mr COPPIETERS AND Mr CAPANNA (Doc. 1-485/79)

2. To some extent the recitals preceding this motion for a resolution anticipate the findings of a closer examination of this problem in a manner which is quite unacceptable. The first indent assumes that there is a simple causality between industrial developments and 'the humiliation of permanent unemployment'. But it makes no mention whatsoever of the positive contributions which technological developments have demonstrably made in the past to increasing employment and the quality of life in society. For instance, as a result of technological developments in industry, machines have already been introduced to carry out numerous types of humiliating and hence degrading work, and this will happen again. In this way they can enable people to live a decent life.

3. The fourth recital contains another clearly untenable statement: on several occasions in the past the European Parliament has unequivocally deprecated the Community's excessive dependence on imported oil and petroleum products to meet its current energy requirements and called for the reduction of its dependence on petroleum by means of an expansion of the nuclear energy programme. (See in particular the FUCHS report on the energy objectives for 1990 - Doc. 1-704/79).

4. As regards the fifth recital, it should be noted that there are no grounds for questioning the safety standards set for the utilization of nuclear energy in the European Community, and experience to date supports the European Parliament's view that the present nuclear programmes should be fully implemented and further developed.

5. The proposed time limit laid down in point 1 of the motion for a resolution has already expired. The committee responsible - the Committee on Social Affairs and Employment - must take the major responsibility for

deciding whether a hearing should be held or not. If it decides that a hearing should be held, the arrangements provided for in Rule 44(6) of the Rules of Procedure could be applied.

6. The Committee on Energy and Research must firmly reject the second point in the motion for a resolution. Each project, even if it does involve increased energy consumption, must be considered on its own merits and may be approved on economic grounds - for example, in view of its likely profitability or because it will create new jobs. Nor can the stand against the development of nuclear energy be approved. In this context, the European Parliament has already clearly declined to adopt such a stand.

III. SPECIFIC COMMENTS ON THE MOTION FOR A RESOLUTION TABLED BY Mrs SALISCH (Doc. 1-795/79)

7. The recitals preceding this motion for a resolution refer to the probable effects of technological developments on society and in particular on the employment situation. The wording of the recitals is properly restrained. At present, we must appreciate that society will be affected, but we have no means of knowing exactly how. Historical experience has indicated that successfully developed technology has tended in the long run to improve the standard and quality of life and to provide increased employment opportunities. However, compilation of the relevant information would be useful for a future report to the European Parliament.

IV. CONCLUSION

8. Both motions for resolutions state correctly that there is a link between employment, technology, energy and other social conditions. Not only are they parts of a common socio-economic matrix but they are also directly or indirectly dependent on each other and consequently can affect each other. Closer study should reveal that their interaction is even more complex, since other factors may also play a part, such as political decisions and social models.

9. Without anticipating the results of the studies - which it believes should be undertaken - the Committee on Energy and Research would take this opportunity to point out that as regards the development of new technologies and their application, economic arguments will always play an important role. Constant efforts must therefore be made to gear them to a satisfactory employment policy.

10. In the past, technological developments have never been held up by political decisions; they have always won acceptance if they were economically 'sound'. Any attempt to hold back a permanent restructuring process in the future would not only be pointless, it would also contribute to greater inflexibility in the system, and in the long run this would result in far

more painful adjustments having to be made.

V. RECOMMENDATION

The Committee on Energy and Research asks the Committee for Social Affairs and Employment to note its views expressed below and to include them in its considerations:-

11. The history of the world is the search for technological improvement, so we must continue to find ways of improving man's lot. Technology can be defined as the use of natural laws by man. New technology not only removes man's dependence on "muscle power" but provides many benefits including increasing the wealth of the world thereby enabling its population to multiply, removing the dirtiness and drudgery of jobs and improving the safety of the worker.

Whilst new technology alters the structure of society and employment, it also creates new and better jobs.

The European Community requires high technology in order to fulfil the aspirations of its peoples and to meet the competition of the USA and Japan who would otherwise reduce its standard of living. Only by employing new and higher grade technology and in the energy field, in particular, nuclear energy, can the European Community provide appropriate technology to the Third World and so reduce the rate at which oil prices increase and improve its availability.

12. The Third World is becoming more dependent on energy and imported oil in particular, as it imports more Western technology to improve its standard of living.

The West is meanwhile importing more labour intensive products from the Third World. The inter-dependence of the West and the Third World is crucial to the successful development of both in future.

The nature of technology supplied to the Third World should be adapted to meet its needs and potential skills. The West must adapt itself to the consequences of the Third World employing Western technology by moving on to higher technologies itself and importing more of its needs based on lower technologies from the Third World. This has an implication on the West's investment policy.

13. In the past the economic growth in the West largely overcame the problem of its utilizing higher and more labour saving technologies. The demand for labour was high and the gap arising in changing jobs was covered by social benefits and retraining which maintained the worker at a reasonable standard of living.

The problem of certain new technologies - particularly when they are adopted at the present juncture during a time of recession - is that they

not only reduce the need for human "muscle power" but also of human "intelligence" in certain types of job. "Micro-electronics", "informatics" etc, are cases in point.

The fear therefore arises that unemployment may become a permanent rather than a transitory feature of the modern world for an unacceptably high percentage of its population.

It is therefore important to make better evaluations of the level of future growth and the impact of new high capital/low labour technologies on the totality of industry and services and as compared with other new technologies being introduced which may increase jobs.

14. A considerable number of studies of the relationships between new technology, energy consumption and employment, have been made in the European Community and elsewhere. The Energy and Research Committee therefore recommends that the Commission should make a synopsis of the conclusions of these reports and arrange for them to be further pursued. Particular attention is drawn in this respect to the Saint Geours report.

It should be remembered that there is an inter-dependence between different industrial and service sectors regarding the effects of the implementation of new technology on employment. The eventual balance between losses of jobs and new jobs created must be carefully considered. At the same time it must be appreciated that the West can only maintain its standard of living and so fulfil the aspirations of its citizens and sustain a necessary level of assistance, financial and technological, to the Third World, if it maintains its competitiveness and productivity opposite other major industrial powers.

15. As regards the relationship between energy and employment, it is necessary not only to consider the level of its consumption but the price paid for energy. In some cases the highest level of unemployment occurs where the price of energy is highest and not where its consumption rate is highest. Attention must be paid - particularly where the Third World is concerned, to "hard" and "soft" forms of energy and "centralization" and "decentralization" of energy sources. The needs of the West and of the Third World are different. The forms of energy employed must be appropriate to a country's needs. The Energy and Research Committee and the European Parliament have confirmed the need for increased investment in nuclear energy in the European Community. However, research on alternative forms of energy more suitable to the Third World must be carried out in the Community.

16. The role of the European Community and of Member States in addition must be carefully considered in regard to the problem of unemployment and its relationship with energy and technology.

Both the European Community and Member States must be prepared to provide suitable forms of aid to ease the difficulties which arise in the restructuring of the Community's industry and society. The extent of intervention desirable or necessary must be considered together with any possible need to consider the balance between changes in working hours or the level of unemployment aid including assistance to improve workers' mobility in changing jobs.

17. The Energy and Research Committee believes that the relationships between energy, technology and employment are sufficiently complex as to justify the Social Affairs and Employment Committee, as the one responsible for this matter, to ask the Bureau to grant permission for a Public Hearing of Experts on this subject. The Energy and Research Committee would support such a request and would wish to participate in any such Hearing in accordance with Rule 44(6) of the Rules of Procedure. Accordingly it would wish to participate with the Social Affairs and Employment Committee in preparing a suitable plan and list of questions for such Hearings.

ANNEX I

MOTION FOR A RESOLUTION (DOCUMENT 1-485/79)

tabled by Mrs BONINO, Mr COPPIETERS and Mr CAPANNA

pursuant to Rule 25 of the Rules of Procedure

on unemployment and energy consumption in the Community

The European Parliament,

- noting with dismay that millions of Community citizens have been condemned to the humiliation of permanent unemployment by developments in industry which result in the replacing of human labour by machinery,

- noting that in many industrial sectors where employment has declined energy consumption has gone on rising steadily,

- recalling that the Community's dependence upon imported oil and oil products is a source of continual concern to governments,

- recalling that rising energy consumption has served as an alibi for the nuclear lobby in pushing for the application of nuclear programmes which are put of proportion to real energy requirements,

- considering that the use of nuclear energy involves dangers which have yet to be fully appreciated,

1. Calls on its social, energy, economic and financial and external economic relations committees to hold joint hearings on the relationship between employment and energy consumption, and to report back to the Parliament within six months;

2. Requests the European Commission in the meantime to refrain from proposing or granting European Community financial assistance of any kind for projects which involve increased energy consumption, or which in any way favour the development of nuclear energy.

ANNEX II

MOTION FOR A RESOLUTION (DOCUMENT 1-795/79)
tabled by Mrs H. SALISCH
pursuant to Rule 25 of the Rules of Procedure
on the effects of technological developments on employment

The European Parliament,

- considering that future technological developments will lead to profound changes in the production and distribution of goods in the European Community,

- convinced that these developments will have serious repercussions on the employment situation in the European Community,

- awaiting the social effects of these new production methods,

- maintaining its interest, as initially demonstrated in the employment debate on 15 January 1980, in the development of a common industrial and employment policy,

Instructs the Committee on Social Affairs and Employment and the Committee on Energy and Research, in connection with the motion on energy consumption and employment already referred to those committees for report or opinion, to draw up a report investigating the effects of technological developments on employment in the European Community.