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DOCUMENT 1-440/82

REPORT

drawn up on behalf of the Committee on Energy and Research

on solar energy

Rapporteur: Mr J.H. VANDEMEULEBROUCKE

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English Edition

On 11 February 1981 Mr LINKOHR and Mrs VIEHOFF tabled a motion for a resolution pursuant to Rule 25 of the old Rules of Procedure on the promotion of solar energy in the Community, and more particularly, in Third World countries with abundant sunshine (Doc. 1-905/80).

On 4 May 1981 Mrs LIZIN tabled a motion for a resolution pursuant to Rule 25 of the old Rules of Procedure on the energy situation in Spain and Portugal with special reference to solar energy (Doc. 1-189/81).

On 12 February 1982 Mr MARKOPOULOS tabled a motion for a resolution pursuant to Rule 47 of the Rules of Procedure on the creation in Greece of a European research centre for solar energy (Doc. 1-1011/81).

On 13 February 1981, 6 May 1981 and 17 February 1982 the European Parliament referred these motions for resolutions to the Committee on Energy and Research as the committee responsible.

On 25 June, 26 June and 18 March 1982 the committee appointed Mr VANDEMEULEBROUCKE rapporteur. It considered the motions for resolutions at its meetings of 18 March and 24 June 1982. On 24 June the committee adopted the motion for a resolution and explanatory statement by 16 votes to 4 with 6 abstentions.

The following took part in the vote: Mrs Walz, chairman; Mr Gallagher and Mr Normanton, vice-chairmen; Mr Vandemeulebroucke, rapporteur; Mr Balfe (deputizing for Mr Pattison), Mrs Dury (deputizing for Mrs Lizin), Mr Enright (deputizing for Mr Adam), Mr Fuchs, Mr K.H. Hoffmann (deputizing for Mr Müller-Hermann), Mr Janssen van Raay (deputizing for Mr Rinsche), Mr Markopoulos, Mr Moreland, Mr Bröndlund Nielsen (deputizing for Mr Galland), Mr Pedini, Mr Petronio, Mr Poniridis (deputizing for Mr Schmid), Mr Price (deputizing for Sir Peter Vanneck), Mr Protopapadakis, Mr Rogalla, Mr Sassano, Mr Seligman, Mr Vernimmen (deputizing for Mr Percheron), Mr Veronesi, Mrs Vayssade (deputizing for Mrs Theobald-Paoli), Mrs Viehoff (deputizing for Mr Linkohr) and Mr Wedekind (deputizing for Mr Sälzer).

C O N T E N T S

A

The Committee on Energy and Research hereby submits to the European Parliament the following motion for a resolution together with explanatory statement:

MOTION FOR A RESOLUTION

on solar energy

The European Parliament,

A having regard to the motions for resolution tabled by:

- Mr LINKOHR and Mrs VIEHOFF (Doc.1-905/80) on the promotion of solar energy,
- Mrs LIZIN (Doc.1-189/81) on the energy situation in Spain and Portugal,
- Mr MARKOPOULOS (Doc.1-1011/81) on the creation in Greece of a European solar research centre,

B having regard to its earlier resolution concerning the possibilities and limits of energy production (soft technologies) (OJ C 28 of 9.2.81, page 50),

C having regard to its reports on:

- biomass (rapporteur: Mr SELIGMAN, Doc. 1-460/82),
- wind energy (rapporteur: Mr PRICE, Doc. 1-1081/81),
- combined heat and power (rapporteur: Mr MORELAND, Doc.1-433/82),

D having regard to the report of its Committee on Energy and Research (Doc. 1-440/82),

E noting that very rapid progress has been and is being made in techniques for the use of solar energy,

F considering that the speed and scale at which solar energy is developed will depend in part on the volume of resources devoted to research and development,

G considering that solar energy techniques offer major potential markets for European industry,

H considering that solar energy techniques can make a major contribution to regional development, through job creation and availability of decentralised energy supplies,

I noting that a shift from imported to indigenous energy supplies will have a positive impact on the Community's balance of payments,

J noting the separate Community programmes for research and for demonstration projects,

1. Calls on the Commission to propose and the Council to adopt a single pluriannual solar energy research and development programme to replace from mid-1983 the existing distinct programmes;

2. Invites the Commission to include a major effort to promote solar energy in its proposals for the implementation of the May 1980 Mandate;

3. Invites the Commission, in tabling these proposals, to put them in the context of the level of support for solar energy from public funds in the Member States and at Community level, as compared with the American and Japanese efforts, and to report on its most recent assessments of the potential contribution of solar sources to total energy needs, as compared with other sources;

4. Considers that this new research programme should contain a specific new section covering research (to be carried out in Europe or in the countries concerned) on solar energy techniques adapted to the needs of developing countries;

5. Insists that the total sum allotted in the Community budget for solar energy, in multiannual programmes, should be increased;

6. Considers that in the Community budget all expenditure on solar energy should be grouped together, to permit comparison with spending on other sources;

7. Calls in particular for a major increase in funds allotted to research and development of photovoltaic solar energy techniques in order to achieve greater efficiency and realize their potential;

8. Recalls the particular potential of combined photovoltaic and wind units;

9. Calls on Commission and Council to make urgent provision for Community support for wave energy projects;

10. Considers that the European Investment Bank should in future include solar energy projects among those which it assists;

11. Invites the Commission and the Council to take all possible steps to encourage the Member States to grant, on a harmonised basis, major fiscal and other incentives to investment in solar energy;

12. Suggests that Member States be encouraged to introduce legislation whereby public electricity utilities are required to purchase electricity, where available, from customers linked to the grid system and producing their own electricity using solar techniques; where this is technically feasible;

13. Considers that the Commission should give high priority to elaborating integrated programmes combining policies for solar energy sources, regional development, agriculture and employment;

14. Asks the Commission and the Member States to encourage the drafting of regional energy and employment plans, with the accent on the contribution of solar energy to regional development;

15. Calls on the Commission to encourage research on solar energy in Greece, and to ensure that the rest of the Community benefits from Greek experience;

16. Invites the Commission to prepare the way for rapid involvement of Spain and Portugal in the Community's work on solar energy, as soon as their accession is assured;

17. Calls on the Commission to explore the possibilities for initiating cooperation among the countries around the Mediterranean on the elaboration of a Mediterranean Energy Plan with solar energy as an important element;

18. Considers that the Community's Lome partners should be consulted in the framework of the Convention about their priorities in the field of solar energy research and how the Community can best help;

19. Considers that the Commission should seek closer cooperation in the solar energy field with Member States of the International Energy Agency, in particular as regards techniques of use to developing countries;

20. Insists that the Commission, in its public acts and pronouncements, reflect the real prospects for the various forms of solar energy, as identified by its services as a result of Community research programmes;

21. Considers that public authorities at all levels (local, regional, national, Community) should wherever possible meet their own energy requirements from competitive solar techniques thus both saving public funds and setting an example;

22. Invites the Commission to investigate the possibility of using solar energy sources to meet the energy requirements of all buildings housing Community institutions;

23. Considers that research and development of energy storage systems should go hand in hand with the development of solar energy much of which is intermittent;

24. Instructs its President to forward this resolution to the Council and Commission of the European Communities.

B

EXPLANATORY STATEMENT

The necessary transition to solar energy

1. The energy reaching us from the sun is infinitely greater than the world's maximum current or future energy needs[1]. The sun was for long mankind's sole energy source (through firewood, and wind and water power). The discovery and use of fossil fuels, a sort of convenient storehouse waiting to be broken into, provided the vital basis first for the industrial revolution, then for the economic explosion of the twentieth century - but the store was finite and bound to run out. Sooner or later, it was going to be necessary to return to relying on the unceasing flow of energy from the sun. Fortunately, the industrial-technological age has provided us with the tools and techniques with which to obtain from the sun even the vastly increased energy consumption of today's - and tomorrow's - industrialised society.

2. This transition is not only inevitable. In the space of relatively few years it has become a matter of urgency. The pressures to carry it out are various. The growing scarcity of fossil fuels has a destabilising impact on costs, fundamentally disrupting economies that have a built-in dependence on energy-intensive techniques and offering the prospect of lasting economic instability. Dependence on outside sources brings with it political dependence and vulnerability. Lastly, and with less of a sense of urgency, there is a steady increase in concern at the many environmental and safety aspects of the massive use of fossil fuels.

3. Already, stimulated by the rise in oil prices, such progress has been made that the obstacles to the transition are no longer primarily technical. They are partly economic -the relative market costs of energy from different sources, with alternative energy forms not yet benefiting from economies of scale ; they are partly sociolgical and psychological (customs and habits established in the period of unquestioning reliance on fossile fuels); and they are partly political (powerful vested interests that have grown up around other energy forms). Among the non-technical obstacles must also be counted the legislative, administrative and fiscal practices which reflect the priority given to developing other sources[2].

The political challenge is to ensure that the transition takes place smoothly, as rapidly as possible, and in ways that help to solve - rather than aggravating - the other fundamental problems of today's society such unemployment, over-centralisation and growing economic and social unequalities.

4. This must be seen as part of a broader challenge to achieve a switch to what can best be called a sustainable society, namely one which is not using up expendable resources but achieving its goals, among them material welfare, in ways that can be sustained indefinitely without shortage, crisis or conflict[3]. This is a problem both for the developed countries, which currently consume finite resources at a rate which could not be sustained if generalised to the rest of the world, and for the developing countries, whose aspirations to higher levels of material welfare must be met in sustainable ways if they are to be met at all. The most effective contribution that the developed countries (among them the Community) can make to the autonomous development of the less developed countries, and at the same time to their own future well-being and to world peace, lies in researching and developing sustainable sources. Among these, the most crucial are renewable energy sources - solar sources.

The range of solar energy techniques

5. There is a very wide range of ways in which the energy from the sun can be harnessed - either using adaptions of traditional ways, with the benefit of modern technologies, or entirely new techniques. All renewable energy forms derive directly or indirectly from the sun's energy currently reaching us and it is necessary to take account of this in assessing the Community's general stance on solar energy. The full list of solar sources (direct and indirect) is rehearsed here for the sake of completeness, but the report concentrates more particularly on direct sources. Two other important sources, wind energy and biomass, are dealt with in separate reports. It may prove necessary in the future to devote such reports also to other sectors (e.g. wave or tidal energy).

Solar energy sources can be grouped under four general headings[4]:

a) using the sun's rays directly

   (i) passive solar architecture, which uses siting, design, materials and building techniques to ensure that the heat from the sun is absorbed and stored to the utmost[5];

   (ii) solar collectors which absorb warmth from the sun directly to produce hot water or heat living or working space;

b) transformation of energy from the sun into electricity

   (i) thermodynamic solar generators which use mirrors to concentrate the sun's rays and provide the heat source for an electric generator

(ii) photovoltaic cells, which transform sunlight directly into electric current. There is a wide range of possible techniques and materials (e.g. silicon modules, cadmium sulphide modules, silicon films, etc), and a major research and development effort is going into reducing the cost of producing the cells and raising their efficiency.

As an efficient, on-the-spot technique for producing electricity, this method has virtually limitless potential. Since the cells respond to diffuse light, they do not need direct sunshine. The method is flexible, providing a small- or large- scale energy supply according to the number of cells used. It is already competitive in many cases for "stand-alone" units where current from a grid is not available; and the major breakthrough, which comes when it is competitive with electricity supplies from the grid, is now imminent.

(iii) photochemistry, still at the experimental stage, aims at using solar energy either to produce fuels (such as hydrogen), or a combination of fuels and electricity, from a mixture of chemicals;

c) wind and water power

Wind, wave and tidal energy are all specifically included under the heading of solar energy in the Council of Minister's decisions on the two Community energy research programmes, and it is generally accepted that the movement of wind and water are manifestations of solar energy.

(i) wind energy is one of man's oldest sources of mechanical power. Today the application of modern technology and engineering skills, combined with sophisticated meteorological measurement, open up a vast potential for electricity supplies from wind-powered turbines. Wind power is dealt with in a separate report (Price report, Doc. 1-1081/81).

(ii) hydro-electric power. Maximum use of potential for large-scale projects is increasingly tempered by environmental considerations. But the potential for small-scale local projects, neglected in a period of cheap energy and of centralised electricity production, is considerable.

(iii) tidal power. There is considerable potential along the Western seaboard of Europe.

(iv) wave power. The harnessing of the gigantic energy reserves built up in ocean wave movements presents a challenge to research and engineering that has virtually been overcome. In the United Kingdom, several different techniques have been developed to the experimental stage[6]. While rapid progress is being made in Japan, lack of financial resources on the required scale is retarding the breakthrough in Europe.

d) use of the energy captured and transformed by photosynthesis

(i) bio-mass. This general term covers a wide range of techniques, a few of them old, many newly-developed, for obtaining energy from vegetable matter. The raw material is either waste from existing activities (farming, forestry), or is obtained from "energy crops" (e.g. cane plantations, short-rotation forestry). It is either burned or used to produce a gas (methanol). This is a sector where a very great potential awaits exploitation, and where a breakthrough seems predictable[7]. (Bio-mass, also considered by the Council of Ministers as a form of solar energy, is dealt with in the Seligman report, Doc. 1-460/82).

(ii) photobiology. This aims at reproducing the complex biochemical processes by which plants transform solar energy into food and fuels. Other research seeks to combine photochemistry and photobiology.

Even this list is not exhaustive. It fails to include, for instance, obtaining energy from heat transfer in the ocean (between water at different temperatures) a technique unlikely to prove attractive off Community shores, and still posing technical problems.

The flow of energy from several of the principal solar sources (collectors, photovoltaic cells, wind turbines) is variable or intermittent, and although this can be partly offset by combining two or more techniques (eg. photovoltaic + wind), a solution to the problem of storage of electricity using batteries or other techniques is one of the keys to the optimal use of solar energy.

6. No part of the European Community (or of the world) is without solar energy potential. Most areas have a range of potential sources. Choices about which to develop will of course have to be tailored to indigenous endowments on the one hand and to the range of needs on the other. Each region, each community, and each individual user will develop the particular combinations which prove to be best suited to their conditions, and the most efficient. This point is well illustrated by a pilot project in Luxembourg, with Community participation, which combines photovoltaic energy (with peak output in the summer) and a hydro-generator in the river (with its peaks in winter).

It would certainly be misleading to credit in any way - as the wording of the motion for a resolution (Doc.1-905/80) might seem to do - the widespread public misapprehension that solar energy is only available in certain climatic hot countries, but photovoltaic techniques, which convert diffuse light, function efficiently in northern latitudes with less direct sunshine. Other solar energy forms (wind, wave, short-rotation forestry ...) have their biggest potential in tougher or wetter climates.

A rapidly changing scene

7. As the resources of the complex industrial societies are applied to the development of solar energy techniques, rapid progress is being made, and predictions about costs, time-scales and potential have to be continually revised. Thus, the stock assessment until a few years ago was that solar energy (or alternative energy sources, or renewable energy) could at best supply "a few per cent" of energy needs "by the end of the century". As late as 1978 the European Commission's own assessment was that all solar sources could supply 5% of Community energy requirements by the year 2000. This view has been overtaken by events. Unfortunately, it continues to be peddled, sometimes in good faith by those who have not had the occasion to keep up with developments, at other times in somewhat less than good faith by those associated in one way or another with other energy sources. The European Commission and national authorities could undoubtedly play a more active part than they are doing in educating public opinion to the changed assessments that are now being made.

8. Precisely because the field is a complex fast-moving one, an overall estimate of the potential of solar sources must have limited value. Instead a few specific examples may serve to make the point:

(i) In 1978 bio-mass was just one among the many renewable sources thought of as capable taken altogether of meeting 5% of energy requirement by the year 2000. Only two years later ....

"Results show that all photosynthetic residues together represent a huge energy reserve, with which the European Community could possibly meet up to 5% of its current energy needs. Energy crops not involving radical changes in farming practice might provide another 5% of future needs".

That text comes from the preface to a book, published in 1980, "Energy from Biomass in Europe", which is based on a study carried out for the Commission and checked and approved by an official group of experts from the member countries; it is signed by the then Director General for Research, Science and Education of the European Commission, G. Schuster[8]. The contrast with the minimalist predictions of the past hardly needs emphasizing.

(ii) Wave energy has still to move, in Europe at least, from the research and development stage to pilot projects. But as long ago as July 1978 the Chairman of the United Kingdom's Central Electricity Generating Board said officially that 30 GW of wave power could be produced along Britain's Atlantic coast - enough to cover the whole of that country's electricity consumption at that time[9]. Ireland, France, Spain and Portugal clearly have similar potential.

9. Progress in the field of photovoltaic energy deserves particular attention. This technique will undoubtedly be central to the transition to solar energy. Photovoltaic energy can both reduce the demands of consumers on central electricity supplies (at present generated using mainly fossil fuels), and provide a potentially limitless input into the supply system at a cost that is being steadily reduced. So swift are developments that predictions of the rate of expansion of photovoltaic energy are largely meaningless.

A major effort of public support has gone into research and development, in the USA and Japan above all, but to a lesser extent also in Europe. But it is industry that will produce solar cells, and the most significant development has been the massive influx of private capital in the USA but also in Europe. Several different technologies for producing photovoltaic cells have proved viable, and the element of competition is strong, with new companies still moving into the sector, among them the oil giants and the major electrical engineering firms. Progress is being made constantly in developing new techniques and new materials and production capacity is expanding, bringing down costs. The cost of installing photovoltaic energy equipment - there are no fuel costs to be taken into account - is measured in US $ per "peak Watt" (Wp*), i.e.: the cost of buying and installing the cells capable of producing one Watt of current under normal conditions of irradiance and temperature[10]. The following figures give some indication of the evolution there has been and is likely to be:

		Price in $/Wp
1973	Cells used in Skylab	300
1976	Railway scheme, USA	45
1979	Large US government purchases	11
1981	Large purchases at market prices, Italy	5.50
1982	U.S. Dept. of Energy forecasts (made in 1980)	2.88
1986	U.S. DOE forecasts (made in 1980)	0.70
1990	U.S. DOE forecasts (made in 1980)	0.15-0.40
	Japan Sunshine project (1980)	0.20-0.50

See footnote 11 for sources of these figures.

For "stand-alone" uses, in places not linked to an electricity supply network, photovoltaic energy is generally admitted to be competitive at around 10$/Wp, when it is cheaper, for instance, than using a diesel generator for which the fuel has to be transported. Use of photovoltaic power packs in remote areas is expanding fast, including in the developing countries, and this remains for the moment the main commercial market. However, the greatest potential lies in the markets that open up once the price goes through the break-even barrier (at around $1.0 - 2.0/Wp, when it becomes competitive with electricity from the grid (with the grid capacity also eliminating the storage problem that remains for remote uses).

How fast the market will expand from that point on is unpredictable. Development of photovoltaic energy in the USA has been and will be greatly helped both by fiscal incentives (a 40% tax rebate on the first $10,000 of installation costs) and by legislation obliging the electricity utilities to buy surplus current from photovoltaic-equipped consumers, and to provide them with back-up supplies. In the USA photovoltaic systems for individual dwellings have just become economic[12]. At the same time the steadily rising costs of generating electricity in other kinds of large-scale power stations are expected to make photovoltaics economic, even for central power stations, by 1986. Inside the Community, the market for photovoltaic material has now overhauled in value that for solar heating material and offers greater prospects for expansion.

Advantages of solar energy

10. Solar energy sources have a number of advantages over fossil fuels which add to their attractiveness and must weigh in favour of their rapid development:

(i) safety. None of the sources concerned involves any significant threat to the health of the workers involved or of populations in surrounding areas; none is marred by the potential for major and devastating accidents; none involves any threat to the safety of future generations. Solar energy projects do not appear to arouse the same degree of passionate concern and opposition as certain other energy sources; on the contrary, they meet with favourable responses (perhaps attributable to their intrinsic simplicity, perhaps to their links to the natural world), which can be seen as an asset in obtaining the support of public opinion for major development programmes.

(ii) Employment. The development of solar energy techniques offers considerable possibilities for creating new employment. Most of the techniques (solar collectors, photovoltaics, wind, etc.) require manufacturing capacity, skilled installation and maintenance. The most promising in terms of employment is wave energy, where any of the techniques envisaged would mean demands on the steel industry, on cement producers, and on heavy engineering to

demanding standards, providing employment over many years. Biomass production could be expected to help counter the exodus from the land, particularly in areas of rural decline. The European Commission has been exploring the job-creation potential of biomass in the regional framework (See below para.22).

(iii) Regional development. The transition to solar energy is of importance for the pattern of regional development. It is a characteristic of solar energy in that in most cases the production unit can be small - and located at or near the point of consumption. Moreover, most equipment for solar energy production (solar collectors, wind turbines, etc.) can be produced in small or medium-sized plants, which can most profitably be located near their markets. Secondly, the peripheral areas currently victims of economic decline and population exodus, as a result of the concentration of industrial activity, have major potential for the development of alternative energy sources. Thus the west of Ireland with its tracts of marginal land and heavy rainfall is ideally suited for short-rotation forestry[13]. There is limitless potential for energy from wind turbines down the entire length of the Western Sea-board, as well as along the North-Western coastline of the Netherlands, the Federal Republic and Denmark. Wave energy, too, is a potential source right down the Western coastline. The least-developed areas of the South of the Community, in Italy and Greece (and tommorrow Spain and Portugal) have the biggest potential for large-scale thermodynamic and photovoltaic energy sources. These regions, hitherto disadvantaged by the concentration of economic activity near major energy sources or supply units, will be able to combine renewable energy sources to ensure maximum energy-supply and economic autonomy: bio-mass and wind, with possibly wave and tidal power, in Ireland; wind and direct solar plus perhaps wave energy in western France and Portugal; wind and solar techniques in Greece (especially the Greek islands).

(iv) Balance of payments. Since all forms of solar energy are available, by definition, at the point where the transformation is carried out, every extra unit produced, and every increase in its share of overall energy requirements, means a cut in the balance of payments burden for hydrocarbon fuel imports (oil, coal, gas). In addition, rapid development of a substantial market for solar techniques within the Community will provide the basis for a flourishing export industry.

The Challenge for European Industry

11. One of the greatest attractions of the solar energy sector lies indeed in the prospects it holds out for European industry. It is a sector with an undeniable potential for rapid expansion, which is bound to be increased, rather than undermined, by the rising prices of other forms of energy, which hit other sectors hardest. Partly thanks to the Community research and development effort in certain areas (photovoltaic, bio-mass especially), European industry remains well placed in the race for the promising new markets (wind and wave power are for the moment unfortunate exceptions). The extent to which solar energy fulfils its promise as a growth sector will, of course, depend essentially upon European industry itself, and its ability to compete. The role of the Community as such is limited to two fields:
(a) support and coordination at the research and development stages, which can help to minimise the drawbacks resulting from language and other barriers;
(b) support for demonstration projects to ease the transition to commercial production. The European Commission has also been instrumental in promoting the exchange of information at the international level, particularly with the USA (e.g. the European Commission and the Institute of Electric and Electronic Engineers alternate in organising major international conferences on photovoltaic energy).

12. Fiscal incentives and other policy instruments can be vital in easing new sectors of industry into the stage of commercial viability. These remain mostly in the hands of national governments, and this is an area where Europe threatens to be outstripped by the United States. Typical is the American legislation obliging electricity utilities to buy current from owners of photovoltaic installations and provide back-up supplies, which so far has no equivalent in Europe. The Committee for Energy and Research feels the Commission and the Council should take the initiative in encouraging national governments in the Community to introduce far-reaching incentive schemes, which for reasons of fair competition should be harmonised throughout the Community.

13. The transition from expendable to renewable energy sources in the coming decades will be a world-wide phenomenon, and the potential for the expansion of the market for solar energy equipment is incalculable. This applies to the oil-rich, often sun-baked countries which seek to conserve their expendable hydrocarburate resources; to the newly-industrialised countries, energy-hungry and anxious to break their dependence on oil which threatens to put a brake on their development; and to the poorest countries, where solar techniques offer

them access to an indigenous energy potential which can transform the conditions of their development. European industry, exploiting its traditional skills and using an expanding home market as a base, should be well-placed to hold its own in the keen competition that will develop for this rare expanding market. But one condition of this is an adequate level of investment of public finance, above all at the Community level where the yield is greatest, in the crucial years that lie ahead. The other is a positive attitude on the part of public authorities to measures to encourage the solar energy sector.

Solar energy for development

14. Independently of the incentive to obtain its share of export markets, the Community has a responsibility to assist its Lomé partners, and the developing countries in general, in their efforts to develop their solar energy potential. This means above all contributing in the most effective ways possible to the development of techniques that can be produced locally, and operated and maintained in local conditions. This is also in the overall interest of European industry, which will be well placed to supply the more complex know-how and material it is best equipped to produce.

The activity of the Community in promoting solar energy

15. The Community has been actively involved in the promotion of solar energy since 1975. Given the rapidity with which the situation is evolving, it would seem to be inopportune to call on the Commission for a broad assessment of Community and national activity and the potential for solar sources. Such a report would absorb precious resources, and run the risk of being outdated before it was completed or could lead to proposals from the Parliament. On the other hand, the timing of the present report (and the Price and Seligman reports) is such that the Parliament has an opportunity to influence at an early stage the proposals which the Commission will soon be drafting for the renewal of the current research and development programme for renewable energy. It therefore seemed worthwhile to recall briefly the present Community involvement, to assess its effectiveness, and express a general view on the level of resources that should be engaged.

It is to be hoped that the Commission, in tabling its new proposals, will place them clearly in the context of the current effort in the field by national governments and by the Community as such, and of a comparison with main international competitors (especially USA and Japan), and back them up with the latest estimates of the cost and output potential of various forms of solar energy as compared with other forms of energy.

16. It was under the impact of the 1973 oil price rises that moves were first made to institute Community programmes for developing energy conservation and alternative energy sources. In 1975 the Council adopted a decision instituting a Community energy research and development programme[14]. Under the terms of it a first four-year programme covered the period 1975-1979, with a total of 59 MUC, out of which 17.5 MUC was devoted to solar energy (including bio-mass), and a second (1979-1983) is currently under way, with 46 MUC out of going to solar energy. In 1978, the Council adopted

generally under the heading of energy policy a series of Regulations on the granting of financial support for projects to exploit alternative energy sources[15] and in 1979 the relevant implementing regulations[16]. Out of a total of 95 MUC to be spent in a five-year programme (1979-1984), 22.5 MUC was to go on solar energy.

17. In principle, the research programme was to encourage and promote research into techniques not yet developed, while the energy policy programme was intended to provide support for demonstrating the technical and economic viability of new techniques which have passed the research stage, so as to encourage the establishment of other installations of the same sort. The end result, unfortunately, is that the Commission now has two separate programmes, run by different teams, in different directorates-general (though responsible, at least, to the same Member of the Commission). They cover different periods, and are operated under different texts, authorising different degrees of participation in projects, on different terms. The research programme finances "pilot projects" and the energy policy programme "demonstration projects", but since neither concept is defined the distinction appear to be arbitrary, and to reside more in the terms of which the support is given, which are very different: the research programme makes grants of up to 50%, whereas the energy programme contracts grant over 40% and less than 55% and require reimbursement of 50% if the project becomes commercially viable. Perhaps inevitably, the two programmes appear to have been competitive rather than complementary. More recently at the initiative of the Member of the Commission responsible, considerable progress is said to have been made in coordinating the work going on under the two programmes. It would seemn desirable that on the first possible occasion the Commission should go further and bring the research and promotion work being done on solar energy under a single administrative unit.

18. In the first Community research and development programme, solar energy got the largest share: 17.5 MUC over four years, out of a total of 59 MUC (the rest going on energy conservation, the production and use of hydrogen, geothermal energy and energy systems). A total staff of six worked specifically on solar energy. The solar programme covered six areas: solar heat collectors, self-contained generating sets, photovoltaic cells, photochemical techniques, photosynthesis, and data on solar radiation. The current solar programme (1979-1983) totals 46 MUC. The staff involved now runs to 15. The areas covered are:

A. solar heating for <u>dwellings</u>;

B. <u>thermomechanical techniques</u>. The effort here has been concentrated on the Eurelios scheme in Sicily, a relatively large project using mirrors to heat water for an electric generator, with a capacity of 1 MW. This project is now operational;

C. <u>Photovoltaic</u>. This has been seen as a key sector, receiving 25% of the funds. The Commission is contributing to the cost of 17 pilot projects at selected sites throughout the Community, covering a wide range of uses;

D. Photochemical techniques. This is a long-term research project, not seen as leading rapidly to commercially viable uses;

E. Bio-mass. The report, quoted above, which was drawn up for the Commission, brings out the significant potential of bio-mass. Under the current programme the Commission is assisting a wide range of pilot projects. But it was able to finance only a small proportion of the viable schemes submitted.

F. Solar radiation data. The initial solar radiation map which has been published, covering vertical exposure is the first of its kind;

G. Wind energy. The insignificant sum of 1 MUC was allotted to wind energy research.

H. Solar energy and agriculture.

19. The Community research programme appears to have met with a positive and even enthusiastic response from industry and from the experts. It has succeeded in stimulating increased cooperation among researchers and firms, assisting national programmes through an improved flow of information, and stimulating inclusion of new activities in national programmes. In the photovoltaic sector in particular, a key one for industrial competition with the other leading industrial powers, it seems to have filled gaps and helped improve the competitive position of Community industry.

20. The programme for 1979 - 1984, which is run by the Directorate-General for energy under the Regulation approved by the Council in 1978, is limited to demonstration projects. It should be noted that wind, wave and tidal energy, though covered by the original Regulation, were not allotted any funds. The five-year programme covers the selection of projects, drawing up of contracts, execution and evaluation. The total of 22.5 MUC available for solar energy has been committed under a total of 84 projects. These cover a very wide range of techniques: e.g. short rotation energy crops on turf beds in Ireland; production of gas from flax industry waste; drying of farm waste to produce food pellets for sheep on a farm in Sardinia, etc.

Given the limited sum involved, it is questionable if such a widely dispersed use of it can have more than a marginal impact. The one exception to this dispersion is the use of solar heating for swimming pools, where 62 projects have been assisted, throughout the Community. The assistance is limited to swimming pools built under local authority programmes as a public amenity: it is a contribution to savings by local authorities as well as to demonstration in places liable to get through to a broad spectrum of public opinion. Given the limited funds available, it may be wondered whether this selective approach should not have been taken further.

The programme is handicapped by the requirement that the Community should seek reimbursement if the projects become commercially viable. This requirement is particularly onerous in the case of solar heating, where the result is not a cash income but a saving on expenditure which would otherwise have taken place.

With the total sum for the period already committed, the Commission's role is reduced to supervising the execution of the contracts. There is no provision for measuring their operational efficiency (as is the case with the pilot projects of the research programme), and evaluation of the impact in terms of encouraging the establishment of similar installations can clearly not occur until after the projects have been functioning. There is thus no scope for continuity in this programme. The Council of Ministers failed to take a decision on a proposal tabled by the Commission in 1981 for increasing the sums that could be spent, so as to allow the partial financing of a further series of projects.

21. One aspect of renewable energy has also been tackled in the framework of the Commission's 'FAST' programme (Forecasting and Assessment in the field of Science and Technology) which has a specific mandate to explore possible future development patterns. Five studies have been carried out on the potential of biomass in terms of energy supply and job creation in the regional context. The regions covered are: Denmark, Scotland, Belgium, the Midi-Pyrénees area of France and the Puglie region in Italy.

Inadequate Community budget for solar energy

22. The sums allocated to solar energy in the Community budget are extremely modest in absolute terms, miserly in comparison with Community spending on certain other energy sectors, and patently inadequate in relation to the efforts of other countries, in particular the USA and Japan. National spending must of course also be taken into acount, which makes a straight comparison misleading: but the 11.25 m.u.c./year of the Community research programme (plus 4.5 muc/year for the demonstration programme) are out of all proportion to the $166 mi. which is the minimum likely to be spent by the US administration on solar energy promotion in 1982, with $250-275 mi. a possible figure[17].

23. The Community research programme in particular has been hamstrung by the shortage of funds: those concerned estimate that they can satisfy only 10% of the applications being made for Community grants - far too low a figure in the present context. Of the 408 research proposals submitted by early 1981, only 28% could be supported, and the financial participation amounted to only 15% of the original requests. There is a fear that without a far bigger effort to help the photovoltaic sector, European industry may lag behind the USA and Japan, achieve the breakthrough to commercial viability later, and thus lose crucial markets. It is also short-sighted for the Community to be devoting only 1 muc over 4 years to wind energy, when Denmark has made a special effort from which other member countries could benefit, and when the USA is seizing the lead in large-scale techniques, while Sweden has opted for a major national wind energy programme. Particularly regrettable

too is the absence of Community support for work on wave energy, where a potential European lead looks like being lost to Japan for lack of the funding needed to develop operational pilot projects.

Need for increased Community expenditure

24. There is thus a clear need for a major increase in funds for solar energy in the Community budget. Whilst the context of overall budgetary stringency must not be forgotten, a number of factors plead for a special effort in this sector. There is a strong case for a five-fold increase in the rate of expenditure during the next multiannual programme (or programmes). This may at first sight seem excessive but it must be remembered that Community spending on solar energy has begun only in recent years, during a period of budgetary restrictiveness. The sums involved are thus smaller in absolute terms than those implied by far more limited percentage changes in other energy sectors. In addition, allowance must be made for inflation, and for the likely accession of Spain and Portugal (both with major solar energy potential) during the next multiannual period, and these two factors alone would cancel out a two-fold increase. As has been observed, a great deal is at stake in terms of market potential for European industry, and the promise in terms of balance of payments equilibrium, independence of outside suppliers, job creation and regional development are such that a special effort can undoubtedly be politically justified. Nor can there be any doubt, lastly, that the Commission would have no difficulty in spending the larger amount on valid projects. Specific provision should however be made, in any pluriannual programmes, for upward revision in the light of new developments. Also important is the inclusion in the budget of provision for adequate additional staff. In view of recruiting time-lags, this extra staff should figure in the 1983 budget.

The particular solar energy potential of Greece

25. The motion for a resolution tabled by Mr Marcopolous (Doc. 1-1011/81) draws attention to the particular importance of solar energy for Greece. Conversely, Greek accession offers the rest of the Community the possibility of benefitting from Greek experience and research in this field. Not only does Greece have a very high rate of sunshine, meaning high potentials for passive solar energy use. In 1981 Greece already had 127.000 m^2 of installed solar collectors, and this figure will reach 200.000 in the course of 1982. The Greek islands are ideally suited for the combination of photovoltaic and wind energy installations, which by relieving dependence on transported energy supplies can give a major boost to regional development in the islands. Greece has already made a major effort in the field of solar energy research, and it is clearly in the Community interest for this research to be supported by EEC funds, and the results made widely available. Contracts and grants supporting the existing Greek research effort would however seem to be a more realistic option in present circumstances than the idea, advanced in the motion for a resolution, of creating a new, special Institute (or even a branch of the Joint Research Centre). Alternatively, if the Community takes the initiative in promoting a Mediterranean solar energy plan, Greece might be a suitable place to locate the agency established to coordinate this.

How best to help Third World countries?

26. The motion for a resolution (Doc. 1-905/80) makes particular reference to the promotion of solar energy in third world countries, and rightly emphasized the suitability of solar energy for de-centralised electricity supply in remote areas. The energy crisis of most of the third world is more dramatic than that of the industrialised countries, for the traditional source of heat for cooking has been firewood and population growth is causing demand to outstrip supply. One of the most urgent needs is for the widespread use of technical improvements which can achieve manifold increases in the efficiency of traditional heating methods. Electricity from solar sources has a vast potential for contributing to basic economic development, providing power for irrigation pumps and current for refrigeration (above all for dispensaries) and for communications (including radio and television, which are vital for progress in education). There are few estimates available of what needs have to be met: but over a million villages, and over one and a half billion people have no electricity. The potential for progress is unlimited: but it will depend on the development of techniques that are acceptable because they fit local conditions and customs. The question of how the Community can best help is not a simple one.

27. In the early years of the association between the Community and its partners in Africa, the Caribbean and the Pacific, the only energy projects financed were large-scale ones. Alternative energy projects began to make their appearance, without any official change of policy, from 1972-3 onwards; and in March 1977 the contract was signed for the first solar energy project, for a solar-powered pump in Mauretania. A series of projects were financed under the Lomé I Convention, and in Lomé II considerable attention is paid to alternative energy. However, only 30 of the 61 partner countries have included solar energy in their overall development programmes, and by the end of 1981 projects had been submitted for only 20 muc of the 60 muc available. This serves to emphasize that the bottle-neck is at the level of research, - and there is as yet no Community programme to support research, whether in Europe or on the spot, into solar energy techniques adapted to the needs of the developing countries. In the absence of this, the Commission has sought to promote an "energy reflex" in the approach to all projects for financing. Thus photovoltaic energy is being used in a range of countries, for communications in isolated areas, refrigeration (for dispensaries), transport (railway signalling equipment), and pumping (often in tandem with wind power).

28. The Energy and Research Committee considers there is an urgent need for Community funds for research into the application of solar energy to the priority needs of the Lomé countries in particular, and the Third World in general. Such a programme should be additional to research programmes planned for the Community. It should be run in team by the Directorate-General for Research, which can tap European know-how, and the Directorate-General for Development, which is aware of the particular problem. Such a programme should concentrate on promoting research in the countries concerned, aimed at developing techniques adapted to local circumstances, and should extend to the training of maintenance staff.

Solar energy in Spain and Portugal

29. The second motion for a resolution Doc. 1-189/81 draws attention to the particular potential of solar energy in Spain and Portugal, both candidates for Community membership. Both countries are anxious to develop their resources, and Spain enjoys considerable bilateral support, in particular from the Federal Republic of Germany. There can be no doubt that both states would benefit from access to the improved flow of information promoted by the Community's research and demonstration programmes. The Energy and Research Committee is, however, doubtful whether cooperation could be in any way formalised during the period of negotiations for membership. Nor could the Community on its own initiative undertake an assessment of Spanish or Portuguese solar potential, a task to be tackled jointly as soon as membership is assured. The special problems and potential of the Azores should not be forgotten.

30. The Community is ideally placed to promote the establishment of a Mediterranean Energy Plan, in which the development of the area's solar energy potential would have a central role to play. Pooling of research and resources in the solar energy sector, in the framework of cooperation between all the countries round the Mediterranean, could provide a constructive take-off point for broader economic cooperation arising out of the inter-action between solar energy development and agricultural and regional policies, in particular. In view of the increasing importance of the Mediterranean area for the Community, following the accession of Greece and the imminent accession of Spain and Portugal, the Commission should explore this idea and make suitable proposals.

European Investment Bank

31. The motion for a resolution 1-905/80 contains the suggestion that the European Investment Bank should include solar energy projects in its financing. It is indeed striking that while the Bank has granted a long

series of loans to projects involving other energy sources, and usually involving large scale projects requiring massive capital investment, no grant has so far been made in the solar energy sector. The Energy and Research Committee feels the Bank should be encouraged to include solar energy development among its priorities. This would be all the more justifiable in view of the way solar energy development links in with regional development, and with cutting the Community's balance of payments deficit. It is not hard to identify areas where the scale of capital outlay on solar energy projects would justify Investment Bank intervention, e.g. bio-mass from short-rotation forestry; wave and tidal power schemes; thermo-dynamic solar generators and photovoltaic generators, etc.

Cooperation with other countries:

32. There is undoubtedly scope for the Community to cooperate closely with many third countries on projects of mutual benefit and interest for the development of solar energy. There is particular scope for extending cooperation at the institutional and industrial level, with Japan, which in view of its heavy dependence on imported energy is making a major effort in the promotion of solar energy. The Commission should explore ways of working closely with Japan on techniques adapted to the particular needs of the developing countries.

Conclusions and proposals

33. Although the members of the Committee on Energy and Research vary in the degree of enthusiasm with which they regard solar energy, and in their assessment of both its potential contribution and the rapidity with which it can be developed, the Committee generally endorses the positive attitudes to the development of solar energy which underly the four motions for resolutions which are the subject of this report. The motion for a resolution contained in the present report does not take up all the specific proposals contained in those texts, and the reasons for this have been set out above. On the other hand certain immediate priorities, in keeping with the spirit of the four motions, have been identified and are incorporated in the text which is hereby submitted to Parliament.

ANNEX I

Information note on the solar energy situation in Greece.

As is well known, Greece lies in the southern part of Europe (Crete is on the 35th parallel). It has 300 days of sunshine on average per year and there are more than 1500 islands in the Aegean. In view of Greece's privileged position (in terms of the amount of sunshine it receives and its great length of coastline) and because of the increasing energy problem, Greeks have turned their attention in recent years to the use of solar energy. Several operators from friendly European countries have already shown an interest in utilizing Greece's sunshine for both research and commercial purposes. Some basic data on the solar energy situation in Greece are set out below.

I. Efforts by private enterprise to develop solar energy for heating purposes.

Industries specializing in the production of solar-powered water heaters began to develop intensively in 1975 and have made rapid progress since then.

- In 1978 there were only 25 factories producing solar collectors whereas by 1981 this number had risen to more than 150, quite apart from the numerous small-scale enterprises (more than 600) and foreign import companies existing today.

The total surface area of solar collectors installed has grown steadily during these years, with the result that Greece now leads the Community in this field according to the Solar Trade Association's statistics:

Surface area of solar collectors installed in Greece in m^2

1976	1977	1978	1979	1980	1981	Total
700	5,800	11,500	23,000	41,300	55,000	137,300

- According to the same statistics, Germany ranks second in the Community with 133,400 m^2 of solar collectors, but annual progress has not been constant. For example, for the years 1978, 1979, 1980 and 1981 the corresponding figures were as follows: 29,300, 68,700, 25,900 and 10,000 m^2.
- Of the remaining countries in Europe Sweden comes first with 75,600 m^2 of collectors, Austria second with 63,600 m^2, while Spain is a long way behind with only 19,700 m^2 and Portugal is near the bottom of the table.

  Greek production capacity of solar collectors in 1982, according to official statistics produced by the Association of Solar Collector Enterprises, will be in the region of 200,000 m^2 or 70,000 domestic units of 2-3 m^2.

- The cost of solar collectors in Greece is now cheaper than in any other european country. It costs only Dr 15,000 per square metre, in other words about 250 ECU, compared to 350 ECU in Spain, 400 ECU in Portugal and Germany, and 550 ECU in France.

II. Efforts by the State to extend the use of solar energy for heating purposes.

(1) The national Energy Programme envisages that 2% of energy requirements during the period 1980-85 will be met by solar energy.

(2) A law introduced in 1978 provides for a tax exemption of Dr 35,000 for private individuals who install solar water-heating.

(3) Further, interest-free loans are made available to factories and hotels that install solar collectors, and the same applies to private dwellings.

(4) The Greek Standards Institution has brought out two construction

models for solar collectors following a scientific study on how best to exploit solar energy.

(5) The Scientific Research and Technology Department of the Ministry of Coordination, in cooperation with the National Energy council, is directing the following programmes of solar-energy-based heating:

a. Sun village of Likovrisi in Attica: 500 dwellings (Greek-German cooperation).

b. Workers' dwellings in Aghios Nikolaos in Crete: 300 dwellings.

c. SOS village of Vari in Attica: 250 dwellings.

d. Village of Frangokastello in Crete: Greek-American cooperation on research to adapt soft and traditional forms of energy to the needs of a community consisting of 2,000 dwellings.

e. Study to develop a methodology for planning communities with solar-powered energy systems. Greek-Italian-American cooperation under the aegis of the International Energy Agency.

(6) Universities are running the following main programmes:

a. Study on the construction of a high-concentration plane solar collector (Univ. of Patras).

b. Study on the storage of solar energy (Univ. of Patras).

c. Study on refrigeration by suction (Univ. of Patras).

d. Application of solar energy to the drying of porous materials (National Polytechnic of Metsovion).

e. Application of solar energy to air-conditioning in schools (National Polytechnic of Metsovion).

f. Application of solar energy to office heating (Democritos Centre for Nuclear Research).

g. Drying grapes by solar energy (NATO grant).

h. Green-houses and agricultural heating installations powered by solar energy (Ministry of Agriculture).

III. Photoelectric power station programmes

1. Public Electricity Company programmes

a. Programme for the use of 50 kW photocells in Crete. Franco-Greek cooperation with investment of $1.2 million.

b. Programme for the use of 100kW photocells at Kithnos. Greek-German cooperation with investment of $2.1 million.

2. Scientific Research and Technology Department Programmes.

a. Programme for a 10kW power station (in cooperation with the Democritos Centre for Nuclear Research). Greek-German cooperation with investment of $1 million.

b. A 5mW dual power station for the production of electricity. Construction on a semi-industrial scale. State funding only.

3. National Energy Council Programme

Participation in the programme for the 0.5mW power station in Almeria, Spain, under the aegis of the International Energy Agency. Greek Metal Construction Enterprises are participating.

IV. Programmes carried out by various research centres.

In addition to the above programmes there are some 40 further programmes connected with solar energy in progress at various research centres. These programmes are funded by Greek and international organizations.

REFERENCE NOTES

1. "Ninety-nine per cent of all the energy that will ever be available for human use is in the sunlight that strikes the earth. Humankind's current energy budget equals only 0.01 per cent of this solar influx; a hundredfold increase would equal only 1 per cent. Fundamental physical limits will constrain energy growth long before it multiplies a hundredfold": Denis Hayes, Director of the U.S. Solar Energy Research Institute in "Non-Technical Obstacles to the Use of Solar Energy" (see below No. 2), page 2. ".. solar energy is more than adequate to meet all our needs. The amount of solar energy reaching the surface of the earth in twenty days is more than all the reserves of fossile fuels that the earth contains": Sir George Porter, F.R.S. in Solar Energy at the Service of Development, published by the European Commission, p.40.

2. Cf Non-Technical Obstacles to the Use of Solar Energy, Proceedings of the International Symposium Brussels May 1980, Ed Strub and Steemers, Harwood Academic Publishers.

3. Cf "Building a Sustainable Society" by Lester R. Brown, published by Norton (New York and London) for the World Watch Institute, 1981.

4. More details on those techniques where the Community is supporting research are contained in a wide range of Commission pamphlets.

5. Of Solar Houses in Europe. How They Have Worked Ed Palz and Steemers, published by Pergamon Press for the Commission of the European Communities, 1981.

6. Of Energy from the Waves, David Ross, Pergamon, 1979.

7. Cf Energy from Biomass in Europe, Ed Palz and Chartier, Applied Science Publishers, London, 1980.

8. Ibid. Preface p. v.

9. Energy from the Waves op. cit. p. 104 Speech by Mr Glyn England at Fawley oil-fired power station. He said "As we see it at present, wave power is the most promising of the renewable energy sources ... Averaged over the year there is about 80 kilowatts of power in each metre of wave front approaching Britain from the N. Atlantic. This implies a total annual availability of 120 gigawatt .... probably only about one-third could be got to the electricity consumer. Nevertheless this is still a substantial amount of power - enough, in fact, to supply the whole of Britain with electricity at the present rate of consumption".

10. "The 'peak' or rated power of a photovoltaic generator is its output at the nominal working voltage under standard conditions of irradiance ($1000W/m^2$) and temperature (25^oC or 28^oC)" Third E.C. Photovoltaic Solar Energy Conference, D. Reidel Publishing Company, for the European Commission. Summary report, p. xxviii footnote.

11. Figures for 1973, 1976, 1979/quoted by Lester Brown, in Building a Sustainable Society (op.cit.) p 234. 1981 figure from European Commission sources. 1982, 1986 and 1990 (USA forecasts from U.S. Department of Energy publications. 1990 Japan forecast from paper by Yoshihiro Hamakawa in "Third EC Photovoltaic Conference (op. cit.) page 22.

12. Paul D. Maycock, Director, Photovoltaic Systems Division, U.S. Department of Energy, in "Third EC Photovoltaic Conference" (op. cit.) pp 10-12.

13. Cf "Short Rotation Forestry as a source of energy", Neenan and Lyons, in "Energy from BioMass: 1st EC Conference", Applied Science Publishers, 1981 p 232 et seq.

14. O.J. L 231 2 Sept 1975.

15. Council regulation 1302/78, O.J. L 158 Vol 21 16 June 1978.

16. Council regulations 726/79 and 727/79 O.J. L 93 Vol 22 12 April 1979.

17. World Solar Markets (Financial Times publication) Dec. 1981.

18. (to insert after the words "to outstrip supply" line 8 para 25).
Cf Energy for Development: Third World Options, Worldwatch Paper 15 by Denis Hayes, Worldwatch Institute, Dec 1977.

Cf also the official reports on the UN Conference on Renewable Energy, Nairobi, August 1980.

ANNEX II

MOTION FOR A RESOLUTION (DOCUMENT 1-905/80)
tabled by Mr Linkohr and Mrs Viehoff
on behalf of the Socialist Group
pursuant to Rule 25 of the Rules of Procedure
on the promotion of solar energy in the Community, and
more particularly, in Third World countries with
abundant sunshine

The European Parliament,

- having regard to the fact that solar energy can make an important contribution to energy production in the European Community and even more so in the sunny countries of the Third World (most Third World countries lie between the latitudes 40° N and 40° S, where the sun's rays are sufficiently strong),
- having regard to the fact that solar energy permits the decentralization of energy supplies and is thus appropriate for use in areas where transport facilities are poor or would be difficult to provide,
- having regard to the fact that many simply solar installations are already in operation and merely require technical improvements,
- having regard to the fact that solar energy lends itself to the production of freshwater, heating and electricity and is by its nature better suited than other sources of energy to solve many social and ecological problems,
- having regard to the fact that solar energy could give rise to a new industry in the Community and in the countries of the Third World, creating a large number of safe, mainly export-orientated jobs, especially in small and medium-sized undertakings,
- having regard to the fact that owing to their climate the Mediterranean countries of the Community offer a particularly suitable site for the development of a solar industry, and that this would provide a significant boost to regional policy,
- having regard to the fact that this new industry could help to bring about a genuine European industrial policy,

Calls on the Commission

1. to submit a report on the present state of solar technology in the Community;
2. to draw up proposals for a comprehensive European research and development programme on the use of solar energy with reference to national programmes;
3. to draw up a planning programme, complete with time-schedule and estimates of the financial support and manpower it would require;
4. to investigate whether the present programmes at national and European level are satisfactorily organized and if necessary, to draw up further proposals;

5. to investigate, in collaboration with the ACP countries, to what extent these countries and the Community can cooperate more closely than has hitherto been the case in making full use of solar energy in the Third World countries;

6. to examine how solar energy can be supported by a policy of generous loans, for example from the European Investment Bank;

7. to submit this report, together with proposals and the planning programme to the European Parliament by the end of 1981 at the latest.

ANNEX III

MOTION FOR A RESOLUTION (DOCUMENT 1-189/81)
tabled by Mrs Anne-Marie LIZIN
pursuant to Rule 25 of the Rules of Procedure
on the energy situation in Spain and Portugal with
special reference to solar energy

The European Parliament,

- whereas the delay in negotiating the accession of Spain and Portugal should not prevent the Community from stepping up cooperation with these two countries in every useful field and whereas energy, and in particular energy conservation and renewable sources of energy, is an especially suitable area for such cooperation, since with the accession of Spain and Portugal the Community will be joined by two states whose dependence on oil imports is extremely high but which offer enormous potential for the use of solar energy given their climate and the advanced stage of economic and industrial development which they have reached,

- whereas close cooperation would enable the applicant countries to develop new industrial and agricultural activities and to make substantial savings on imported oil,

- whereas such cooperation would also enable Community industries which have established a lead in developing new energy technologies to take advantage of new markets with considerable potential for expansion and would contribute, amongst other things, to a faster recovery of research and development costs and consequently to a reduction in prices, in addition to opening many new markets for the technologies in question,

Calls on

1. the Commission to take measures to step up cooperation between the Community and the future Member States in the field of energy conservation and renewable energy sources, to a level at least on a par with existing cooperation in these fields with a number of non-member countries and the Third World in particular;

2. the Commission to produce an analysis of the potential offered by renewable energy sources in the countries of the Iberian peninsula and their contribution to the energy situation in a Community of Twelve;

3. Instructs its President to forward this resolution to the appropriate authorities.

ANNEX IV

MOTION FOR A RESOLUTION (DOCUMENT 1-1011/81)
tabled by Mr MARKOPOULOS
pursuant to Rule 47 of the Rules of Procedure
on the creation in Greece of a European
research centre for solar energy

The European Parliament,

- having regard to the Community's increasing dependence on imported energy and the growing demand for energy,

- having regard to the undeniable need to save energy and to conduct research into and exploit new sources of energy,

- whereas the world's scientific community has made a considerable research effort with regard to the utilization of solar energy,

- stressing that there is a clear need to coordinate the efforts of European research workers to achieve better results more rapidly on the exploitation of solar energy, which must be considered as a major possibility for solving the energy problem;

- having regard to the favourable geographical position of Greece - in this area - as the southernmost Member State of the Community with 300 days of sunshine a year and with extensive Mediterranean beaches both on mainland Greece and on the thousands of islands which form part of its territory,

Requests :

1. that a European research centre for solar energy should be set up in Greece to accelerate the development and exploitation of this form of energy and to centralize and intensify research into the production of energy through photovoltaic techniques;

2. that this centre should be financed under budget items provided for energy research;

3. that this centre should be staffed by specialists from all Member States of the Community;

4. Instructs its President to forward this resolution to the Commission and Council of the European Communities and to the Greek Government.