

Solar Energy in the Economies in Transition : An Action Programme

*L'Énergie solaire dans les économies en
transition : un programme d'action*

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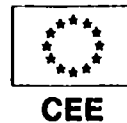
Siège de l'UNESCO
Paris, 5 - 9 juillet 1993

UNESCO Headquarters
Paris, 5 - 9 July 1993

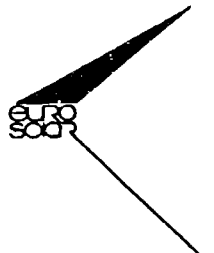
World Solar Summit Sommet solaire mondial

High-level Expert Meeting
Réunion d'experts de haut niveau

11 AUG 1993



Ademe



World Solar Summit
"The Sun in the Service of Mankind"
(UNESCO Headquarters, 5-9 July 1993)

**SOLAR ENERGY IN THE ECONOMIES IN TRANSITION:
AN ACTION PROGRAMME**

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SUMMARY

SOLAR POWER IN THE ECONOMIES IN TRANSITION ASSESSED DIFFERENTLY

At present solar energy plays an insignificant role in meeting energy demands in the economies in transition in central and eastern Europe including the former USSR. Solar power covers about 0.1% (equivalent to about 2 million toe) of total primary energy demand. According to World Energy Council estimates, under present policies solar power would cover 0.8% of total primary energy demand in 2020 (equivalent to about 14 million toe), whereas in an ecologically driven scenario solar power could more than triple its share (2.8% or 41 million toe). Johansson and others estimate the potential of solar and wind power in the economies in transition to lie 5 to 6 times higher than these numbers, provided a renewable-intensive global energy strategy was pursued.

**FRESH INITIATIVES REQUIRED BOTH AT THE NATIONAL AND INTERNATIONAL
LEVEL**

These varying scenarios show that a notable role for solar power in the economies in transition depends on the pursuit of determined policies by the Governments of these countries, which could rely on a certain body of research and manufacturing expertise developed in the past. Whatever the heritage, it is evident that a fresh stimulus is required. Accordingly the paper proposes a national and international action programme:

- to revitalize solar research and demonstration capacities
- to create a market-oriented, favourable business environment for the manufacture, use and financing of solar power equipment and installations.

**SHORT TERM INTERNATIONAL ASSISTANCE NEEDS EXPANSION AND A SHARPER
FOCUS**

With regard to short term measures the paper advocates the expansion of international technical and financial assistance to

economies in transition also in the solar power field, as well as a sharpened focus on the specific needs of these countries. Some ten issues are identified suitable for action by organizations such as UNESCO, the United Nations Economic Commission for Europe, the International Energy Agency, the European Community, the World Energy Council and others. The necessary overview and coordination could be undertaken by the UN/ECE as the body comprising all countries of the region.

A PROTOCOL AND A FUND TO PROMOTE BUSINESS INTERACTION

With regard to the longer term the paper advocates the promotion of business interaction along the lines of the European Energy Charter, but enhanced by the elaboration of a legally binding protocol on the promotion of solar power. Protocols in the fields of energy efficiency, hydrocarbons and nuclear power are already under elaboration.

It further suggests that an international fund, financed from CO₂/energy tax income or otherwise, be set up to support the creation of medium and small scale enterprises in the economies in transition specializing in the manufacture and maintenance of solar equipment.

Failure to take initiatives of the kind suggested - the report warns - would affect the global environment and climate. CO₂ emissions of the order of 1.2 Gt per year would remain practically unchanged if present policies were continued.

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L'ENERGIE SOLAIRE DANS LES ECONOMIES EN TRANSITION:
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A) THE PROBLEM

EXPOSE DU PROBLEME

In 1990, solar power (thermal and electric) contributed 2 million toe (or 0.1%) to covering primary energy demand in the former centrally planned economies in Europe. In 2020, under current policies, a solar contribution of 14 million toe (or 0.8% of total energy needs) is projected by the World Energy Council Expert Group on Renewables 1/.

1/ World Energy Council, 15th Congress, Plenary Session Paper No.2 "Renewable Energy Sources: Opportunities and Constraints, 1990-2020", Madrid, September 1992, pages 11 and 14; World Energy Council Commission "Energy for Tomorrow's World", Draft Summary Global Report of September 1992, Tables E, I, J and O.

This is a ridiculously low contribution seen the physical (insolation) and technological potential of central and eastern Europe and its heavy, environmentally critical reliance on fossil fuels. Proponents of a global reduction of CO₂ emissions will hardly visualize such a scenario as satisfactory. Indeed, in the above scenario, CO₂ emissions from central and eastern Europe would remain at best unchanged up to 2020 (at 1.2 Gt equalling 14% of world's CO₂ emissions).

Moreover in comparison with other regions of the world, the already well known backlog of the former centrally planned economies in solar power use would increase under the "current policies" scenario mentioned above. While in 1990, central and eastern Europe accounted for 17% of world's solar power use, in 2020 its share would fall to 11%. As if the change of the political and economic systems since 1989 was an impediment for solar power use!

B) A REMEDIAL COURSE OF ACTION

UN PLAN D'ACTION CURATIF

The merit of scenarios consists in pointing out, particularly to policy makers, what would happen, if the projected developments were allowed to actually unfold. Scenarios intimate that a remedial course of action be contemplated if the projected developments were undesirable.

This is the case with the projected solar power developments in the economies in transition. The slow and by international standards delayed development is harmful not only to the region, but to the global environment. It foregoes the benefits of a much desired diversification of energy supply patterns in the region. It leaves untapped a significant potential of decentralized, small scale energy provision with favorable employment and manufacturing implications. It implies a continued backwardness in a field of technologies which is expanding everywhere in the world.

With these considerations in mind remedial action is proposed:

- a) at the national level
sur le plan national

-i) the short term: revitalizing solar research and demonstration.

à court term: revitaliser la recherche et les programmes de démonstration.

However modest and insufficient, even the anticipated slow advance of solar energy applications is not yet secured by deliberate national policies. The heritage of the past and the problems of the day simply divert government attention from an option, which in the short run, is considered marginal and unprofitable.

However, any future solar power development requires as a first step a government-supported revitalization of solar research and demonstration programmes. The technological and engineering capacities, while outdated, are still available. In the former USSR, some 50 scientific research and development institutes and at least 40 factories were involved in renewable energy sources, including solar. Achievements of

the member countries of the former Council for Mutual Economic Assistance (CMEA) included the following: 2/

- photovoltaic converters based on polycrystalline surface graded silicon with 8 to 10 per cent solar-to-electrical energy conversion efficiency at a cost of 13 roubles/W;
- industrial production of solar cells from mono-crystals;
- production of 60-500 W PV cells used for the cathode protection of oil pipelines, for charging batteries or providing electrical energy to radio repeater and weather stations;
- prototype PV solar modules rated at 30 W, which are designed as modular units for up to 10 kW complete electric power plants;

2/ UN/ECE:International Co-operation for Advancing New and Renewable Sources of Energy, Geneva, March 1990, page 31, report prepared by Mr. E.Nadezhdine, Consultant to the ECE secretariat.

- solar collectors of an innovative structural design, which consist of an all-aluminium absorber and all-aluminium body;
- new structural designs of solar hot air collectors on the basis of new plastic structural materials, which will be used for drying agricultural products;
- a hybrid solar electric power plant, which consists of a PV cell, a plastic absorber and a heat-storage tank;
- a technology of production of solar collectors, which have selective absorption coatings of the "black chromium" and the "black nickel" type;
- anti-scaling technology, based on scale inhibitors, which is effective for most types of geothermal fluids occurring in underground reservoirs;
- a 2-loop heating system for heating and daylighting of a greenhouse farm and for heat supply in the city of Kizlyar;
- feasibility studies and technical evaluation in designing hybrid geothermal-heat electric generating plants.

It follows from the above that research, demonstration and manufacture would not need to start from scratch, but could benefit from still available expertise and institutions.

ii) the longer term: creating a market-oriented environment.

à long term: créer un environnement offrant des conditions propices à l'économie de marché.

A more dynamic growth of solar power use, on a larger and more decentralized basis, is possible if in addition to launching R&D programmes, the governments of the economies in transition were to create a market-oriented institutional and socio-economic environment in which a multitude of large, medium and small manufacturers, users and bankers would find solar technologies a feasible, viable and sustainable business proposition. Such an environment would presuppose a longer term perspective and commitment of governments towards demonopolization, if not privatization also in the energy sector, towards energy pricing at full cost (if not at world market levels) and equal access of investors to capital and particularly hard currency. Innovative financing of solar investments (such as offering hard currency credits for oil or gas saved) would offer additional incentives for "going

solar". To the extent that short term employment and social problems discourage such policies, compensatory incentives for manufacturers and users of solar power should be granted.

Among these incentives: the provision of initial funding for starting solar business, and hard currency credits for each ton of oil or cubic meter of gas saved through solar installations. Such "credits" would allow international lending institutions to advance hard currency loans to businesses in central and eastern Europe desirous to import equipment or components for the manufacture of solar appliances. 3/

Creating a market-oriented environment is not an easy task though it may be easier for solar power equipment manufacturers and traders than for the suppliers of conventional sources of energy. It may be interesting to note in this regard what measures were taken by the German

3/ UN/ECE, Role of Small and Medium Enterprises in the Promotion of Solar Energy in Various Economic Sectors of the Former USSR, Geneva, 2 April 1991, page 4 (ENERGY 14/R.1), prepared by Mr. V. Kozlov (Russia), consultant to the ECE secretariat.

government to support a market-oriented transition in the former GDR. According to "Wirtschaftliche Förderung in den neuen Bundesländern", these measures comprise: 4/

General aids

- fiscal aids
- regional aids
- SME - political aids
 - equity aid programmes
 - loan programmes
 - investment loans
 - warranty programmes
 - support of fairs
- information, training, consultancy

Special aids

4/ UN/ECE, The Role of Small and Medium Enterprises in the Field of Renewable Energies and in Promoting Co-operation with the Countries in Transition to Market Economy Systems, Geneva, 7 July 1992 (ENERGY/AC.14/R.2), page 19; report prepared by Mr. H. Selzer (Germany), consultant to the ECE secretariat.

- export promotion
- regulations to support the competitiveness of SME within the Euro-Fitness Programme
- regulation for infrastructure

Aids for labour market

Trust establishment

Other services

- central employee market
- central market for industrial estates
- central market for co-operation.

Certainly, experience gained in Germany will be of interest to the economies in transition when encouraging a market-oriented energy economy.

But more experience is available. Indeed, all governments in the ECE region have established policies and programmes for new and renewable sources of energy, or have included the development of these energy sources in national economic plans or energy strategies. Some countries, such as Denmark, Germany, Netherlands or Switzerland have set quantitative

targets for the share of renewable sources of energy or CO₂ and other emission reductions to be reached by the year 2000. The measures taken and the experience gained by these countries in the pursuit of such targets could be usefully shared with the countries in transition in central and eastern Europe.

Progress in the market penetration of now traditional technologies such as hydro or nuclear power, has been dependent on government support. It gave industry the confidence to invest in building capabilities in a new sector. European governments have the capability to pioneer a solar energy action programme and to assist the formerly centrally planned economies in Europe in the integration of their energy systems into a sustainable European energy system.

b) at the international level

sur le plan international

- i) the short term: expanding intergovernmental technical and financial assistance and sharpening its focus.

International consultations and co-operation are essential in fostering solar power policies and developments in the economies in transition. Seen the limited efforts in this regard, expanded international programmes of assistance will be needed to close information gaps and establish professional and business contacts. However meritorious the activities of UNESCO, the UN/ECE, the European Community, or the World Energy Council may have been, more must be done with a sharper focus on the specific needs of the economies in transition. Activities which advance information transfer and dialogue include the following:

- Periodic reviews of the present state-of-art of solar thermal, photovoltaic and hybrid technologies.
- Exchange of experience with curriculae/training courses in higher engineering schools on solar energy use and application.

- Directories/inventories of the main actors: research and test centers; equipment manufacturers; bodies and programmes of intergovernmental organizations; national administrations and agencies and non-governmental associations.

- Guides to existing national and international solar energy data bases and information centers, and literature.

- Reviews of opportunities and conditions for direct foreign investments and international financing of solar power facilities (in co-operation with international lending agencies).

- A comparison of national solar energy incentives programmes in various countries.

- Exchanges of experience with economic transition pertaining to renewable sources, particularly solar.

- Measures to support the creation of small and medium size businesses for the manufacture and use of solar equipment (in co-operation with international lending agencies).

- Pilot programmes to demonstrate solar power applications in rural areas and areas unconnected to national grids.

More systematic and visible solar power exhibitions at the occasion of trade fairs and business conventions would serve to open new business opportunities.

According to their respective mandates, international organizations such as UNESCO, UN/ECE, IEA, the European Community, the WEC and others could address these and other issues. The UN/ECE - as the organization comprising all member States of the region - could direct its Committee on Energy and ad hoc Meeting of Experts on Renewable Sources of Energy to secure the necessary transparency, overview and stimulus.

- ii) the longer term: favouring business creation and interaction.

à long terme: favoriser un climat propice à la création et aux relations d'affaires.

However, in the last instance, it is the market that determines the penetration of solar power, the most powerful stimulus being the integration of the energy systems of the economies in transition into the European and world energy economy. International business partnerships are a particularly forceful vehicle. The wage differential between eastern and western partners is such that direct western investments in the manufacture of solar systems or components would be attractive, if only they could be undertaken in a favourable business climate. Related facilities and legislation are being put into place. In this regard the European Energy Charter is likely to play a determining role. Its impact on solar power development could be enhanced by the elaboration of a legally binding protocol on the promotion of solar power (as possible under Title III of the Charter). Protocols on energy efficiency, hydrocarbons and nuclear energy are already being elaborated.

Recognition of the role of markets does not imply that incentives are to be banned. Particularly in the economies in transition which are lacking a "tissue" of small and medium sized enterprises, incentives for the creation of enterprises specializing in the manufacture and maintenance of solar equipment are a necessary precondition for a solar "take

off". An international fund, financed from CO₂/energy taxes or otherwise and administered by the EBRD in co-operation with executing agencies would appear to be an appropriate vehicle to promote solar energy businesses in central and eastern Europe.

C) PERSPECTIVES

LES PERSPECTIVES

Without remedial action, the development of solar power in eastern Europe appears undetermined, - hence, insignificant. As a result, the region's carbon dioxide emissions would at best remain unchanged over the period 1990-2020, at 1.2 Gt.

By contrast the World Energy Council Experts on Renewable Sources consider that a renewed national and international commitment could triple solar power output to reach 41 million toe in 2020, compared with 14 million toe which would be attained under the "current policy" scenario already referred to. This growth may still appear unsatisfactory in absolute

terms and below the potential. Johansson and others 5/ consider this potential to lie 5 to 6 times higher, at 987 TWh or 220 million toe (by the year 2025), under the assumptions of a "renewables-intensive global energy scenario".

Whatever the potential, what matters at this juncture is that governments and the international energy community commit themselves to initiatives such as the ones suggested in this paper.

And take them.

5/ Thomas B. Johansson, Henry Kelly, Amulya K. N. Reddy, Robert H. Williams: Renewable Energy, Sources for Fuels and Electricity, Island Press, Washington D.C., 1993, page 1137.