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CIA HISTORICAL REVIEW PROGRAM  
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MEMORANDUM FOR:

SUBJECT : Contribution to International  
Cooperation in Energy R & D

Attached are U/RE contributions on US-Soviet cooperative programs in the fields of oil and gas, hydroelectric power, and high voltage transmission, submitted in accordance with the proposed formats.

Attachment  
as stated.

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Technical Description of Cooperative Programs

Oil and Gas  
(Technology Area)

USSR  
(Country)

Interior  
(Lead Agency)

Summary

There are no known Soviet R & D programs in the field of oil and gas in which US or other international cooperation has been sought. There are, however, some non-R & D cooperative ventures in liquefied natural gas under consideration by Soviet and US firms. In addition, there are areas of petroleum technology and equipment manufacture in which the US leads the world and that are of considerable interest to the USSR. These include items in the exploration, production, and pipelining phases of the industry, especially seismic equipment, computerized playback centers, blowout preventers, mud pumps, and large compressors and valves.

Technical Description of Cooperative Programs

Oil and Gas  
(Technology Area)

USSR  
(Country)

Interior  
(Lead Agency)

D. Candidate Foreign Programs for USG Cooperation

1. Title: Liquefied Natural Gas (LNG)
2. Scope and Duration: Program involves cooperation by US firms in construction of facilities for pipelining and liquefaction of Siberian natural gas and delivery of liquefied natural gas (LNG) to the US for 25 years beginning around 1978-80.
3. Estimate of Expenditures Involved: The ventures now under consideration would involve dollar investments of some \$6.5 billion in West Siberia and perhaps \$4-5 billion in East Siberia.
4. Assessment of value: These ventures go beyond R & D programs but the know-how and equipment provided by US firms would enable the USSR to develop their own energy resources more quickly and at a lower cost. In return the US would obtain a much-needed source of energy for use in major consuming areas after 1980.

5. Parties involved: 1) In West Siberia -- Soviet Ministry of the Gas Industry and Tenneco, Texas Eastern Transmission, and Brown and Root; 2) in East Siberia -- Ministry of the Gas Industry and Occidental Petroleum Corporation and El Paso Natural Gas Company (possibly with Japanese firms).

USSR  
(Country)

Oil and Gas  
(Technology Area)

A. Bilateral vs. Multilateral Cooperation

1. Negotiations are underway between US firms and the USSR for development of Soviet gas reserves in West Siberia with subsequent delivery of LNG to the US east coast, but no contracts have been signed. This cooperative venture will be a commercial deal with, as yet, only limited R & D implications. A similar venture is also being considered by US and Japanese firms for delivery of gas (in the form of LNG) from East Siberian deposits to Japan and to the US east coast.

2. USG involvement to date has been one of cautious negotiations with Soviet officials with no decision reached for approval or disapproval of the program. The USSR, on the other hand, seeks most-favored nation treatment from the US before undertaking the projects.

3. continues to be interested in cooperating with US firms in the East Siberian project because of the need to diversify sources of imported energy. participation in the financial obligations of the deal is preferred by US firms involved.

B. Involvement of US Industry in Foreign Cooperative Arrangements

No information is available on private domestic or private foreign R & D on this subject.

C. Balance of Trade and Technology Transfer Implications

1. US technology in this field ranks with the best in the world, although France has more experience in the design and operation of LNG plants. Canada and the US are the only countries besides the USSR that have had practical experience in laying gas pipelines in permafrost conditions.

2. US technology would be employed in construction of a gas pipeline in the Siberian permafrost and in the construction of an LNG plant. The investment in these facilities has been estimated at some \$3.7 billion plus ruble construction costs equivalent to about \$1 billion. The supply of Soviet LNG to the US would provide some 10% of US east coast gas supply and perhaps 5% of west coast gas supply after 1980 at the proposed rates of delivery.

3. The net flow of technology in either of these LNG deals would be from the US to the USSR.

4. US business would benefit from the sale of equipment and technology involved in these projects. Also, anticipated as part of the deal with the Tenneco consortium is the sale

of \$500 million worth of US consumer goods to the USSR for resale to help finance the ruble construction costs.

5. Over the tenure of the 25-year period of the proposed deal with the Tenneco consortium the USSR would have net earnings of some \$9 billion which would be available for purchase of goods and services from the US.

Technical Description of Cooperative Programs

Oil and Gas  
(Technology Area)

USSR  
(Country)

Interior  
(Lead Agency)

D. Candidate Foreign Programs for USG Cooperation

1. Title: Optimum Development of Energy Resources
2. Scope and Duration: To devise a program for the balanced, long-range development of fossil fuels (coal, oil, gas) in the USSR. To evaluate the technical, economic, and logistic factors necessary for exploiting Soviet energy resources, onshore and offshore.
3. Estimate of Expenditures Involved: Unknown.
4. Assessment of Value: Economic and technical models for such a program would permit an orderly development of energy resources and enable the US to assess the Soviet role as a long-range supplier of energy.
5. Parties Involved: Soviet and US members of the scientific and academic communities and government representatives concerned with the energy industries in both countries.

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USSR  
(Country)

Coal, Oil, and Gas  
(Technology Area)

A. Bilateral vs. Multilateral Cooperation

No bilateral or multilateral cooperation exists in this field but high-level Soviet officials have expressed an interest in a fuel optimization program to officials of US oil companies. Although one or more major international oil companies would be interested in conducting such a program as a means, perhaps, of securing long-range supplies of Soviet oil or gas for the US market, it would require a revelation of Soviet data that are now jealously guarded as state secrets.

B. Involvements of US Industry in Foreign Cooperative Arrangements

This type of R & D is conducted on a regular basis by the major international oil companies for the areas they serve and as a means of assessing the world energy market.

C. Balance of Trade and Technology Transfer Implications

US technology and experience in this field is equal to or exceeds that in any other part of the world. Any benefit from the use of such technology would be derived by the USSR.

There is no way to assess the benefits US business might obtain from such cooperation, although it is likely that sizable sales of equipment and services could result.

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Technical Description of Cooperative Programs

High Voltage Transmission  
(Technology Area)

USSR  
(Country)

Interior  
(Lead Agency)

D. Candidate Foreign Programs for USG Cooperation

1. Title: Alternating Current Transmission at 1150 kilovolts.
  2. Scope and Duration: Development and design of equipment and transformer stations and construction of the first operational line during the next 3 to 5 years.
  3. Estimate of Expenditures Involved: Not available.
  4. Assessment of Value: Unknown.
  5. Parties Involved: USSR - Ministry of Power and Electrification; US - General Electric Company, Westinghouse Electric Company or others.
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1. Title: Direct Current Transmission at 1500 kilovolts.
  2. Scope and Duration: Development and design of equipment and converter stations and construction of the first operational line during the next 5-10 years.
  3. Estimate of Expenditures Involved: Not available.
  4. Assessment of Value: Unknown.
  5. Parties Involved: USSR - Ministry of Power and Electrification; US - General Electric Company, Westinghouse Company or others.

USSR  
(Country)

High Voltage Transmission  
(Technology Area)

A. Bilateral vs. Multilateral Cooperation

The US-USSR Joint Working Group on Scientific and Technical Cooperation in the Field of Energy is considering projects in this area for cooperative work.

B. Involvement of US Industry in Foreign Cooperative Arrangements

1. Private domestic research is being conducted in this field by Westinghouse Electric Company, General Electric Company, the Electric Research Council, and possibly other companies. Details are not known.

2. The USSR is conducting research and development work on high voltage transmission at several research institutes, including the Lenin All-Union Electrotechnical Institute in Moscow and the High Voltage D-C Current Institute in Leningrad. Soviet technicians are working in particular on the development of 1150 KV alternating current and 1500 KV direct current transmission. The current Soviet five-year plan calls for construction to begin on the first 1500 KV dc line, which will cover a distance of 2,500 kilometers from North Kazakhstan to the Central European area, as well

as on the first 1150 KV ac line, from Itat to Novokuznetsk in Siberia.

3. The American Electric Power system, Ohio Brass, and Allmänna Svenska Elektriska Aktiebolaget (ASEA) of Sweden are carrying on a joint research program to determine the technical and economic feasibility of a-c transmission at 1-million volts and above.

A conference is to be held in the fall of 1973 in Philadelphia between General Electric and Soviet specialists on the technology of extra high voltage, direct current transmission. Dr. Thomas Paine, a vice president of General Electric, suggested that a pooling of efforts might speed up the engineering designs of an economical high voltage transmission system.

4. Protection of company proprietary information may be a problem in these programs.

#### C. Balance of Trade and Technology Transfer Implications

1. In the field of alternating current and high voltage transmission Soviet technology is equal to and possibly somewhat ahead of US technology. In direct current transmission, Soviet technology is behind that of the US, and Soviet technicians apparently need some technical

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assistance in certain aspects, such as the production of solid state cells.

2. The use of very high voltage transmission makes it possible to move large amounts of electric power over long distances. This would enable greater exploitation of hydro resources in remote areas, and the transmission of electric power to areas of high demand.

3. There would be mutual benefit resulting from joint development, but the net flow of technology probably would be from the US.

4. US business might benefit from the sale of certain items of equipment for high voltage transmission lines.

5. No information is available to assess the value of international trade associated with this technology.

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Technical Description of Cooperative Programs

Gas Turbine Technology  
(Technology Area)

USSR  
(Country)

Interior  
(Lead Agency)

D. Candidate Foreign Programs for USG Cooperation

1. Title: Large Gas Turbines for Peak Power Production.
2. Scope and Duration: Development, design, and construction of gas turbines of 100-200 megawatt capacity with a start-up time of no more than 2 to 3 minutes.
3. Estimate of Expenditure Involved: Not available.
4. Assessment of Value: Unknown.
5. Parties Involved: USSR - Ministry of Heavy, Power, and Transport Equipment.

USSR  
(Country ?)

Gas Turbine Technology  
(Technology Area)

A. Bilateral vs. Multilateral Cooperation

1. The US-USSR Joint Working Group on Scientific and Technical Cooperation in the Field of Energy is considering projects for cooperative work in gas turbine technology.

B. Involvement of US Industry in Foreign Cooperative Arrangements

1. Private domestic R & D unknown.
2. Private foreign R & D unknown.

C. Balance of Trade and Technology Transfer Implications

... the Soviet Union has made important advances in the development of compressors, one of the key components of gas turbines, and ... as made advances in the

The US has many gas turbines in operation for peak-load production of electric power, mostly with capacities of 16 to 36 MW. The Soviet Union has only 3 or 4 gas turbines operating for the production of electric power, one of which has a capacity of 100 MW, but it does not yet meet the requirements for a peak load unit. Joint efforts in the development of a 200 MW gas turbine could offer benefits to both sides.

2. Gas turbines are very efficient for use in periods of peak production of electric power, because they can be started up and stopped in <sup>a</sup>very short time. For this reason they provide a great saving of fuel, in contrast to a conventional thermal powerplant, which takes many hours to start up, and also to shut down.

3. The net flow of technology would probably be to the USSR, because of the greater experience in the US in the production and operation of gas turbines.

4. US business might benefit from the sale of gas turbines, as the USSR needs more gas turbines than it has the capability to produce in the next few years.

5. No assessment is possible on the value of international trade associated with this technology.

Technical Description of Cooperative Programs

Hydroelectric Power  
(Technology Area)

USSR  
(Country)

Interior  
(Lead Agency)

D. Candidate Foreign Programs for USG Cooperation

There are no known or proposed R & D cooperative programs in the field of hydroelectric power involving the USSR. However, the Soviet Union leads the world in technology in this field and could contribute beneficially to the US.

USSR  
(Country)

Hydroelectric Power  
(Technology Area)

A. Bilateral vs. Multilateral Cooperation

2. The US-USSR Joint Working Group on Scientific and Technical Cooperation in the Field of Energy is considering projects in this area for cooperative work.

B. Involvement of US Industry in Foreign Cooperative Arrangements

1. Private domestic R & D unknown.

2. Considerable research and development work has been carried out in the USSR in the field of hydroelectric power, particularly on exploitation of resources in high mountain areas; the development of very large hydro turbines, for use at sites such as those on the rivers in Siberia; the development of bulb-type generating units for use in a low-head dam; and the development of tidal power plants.

C. Balance of Trade and Technology Transfer Implications

1. The Soviet Union has a great deal of experience in building large hydroelectric power stations, has produced the largest hydro turbines now in operation, and is ahead of the US in hydro technology.

2. The use of modern technology in the development of unexploited hydro resources, particularly in the north-west part of the US, could help to alleviate energy shortages.

3. The net flow of technology would be to the US.

4. The US would not be likely to benefit from the sale of equipment, services, or material to the USSR in this area of technology. The USSR has contracts for the sale of hydro-electric generating equipment to Canada and several South American countries, and is endeavoring to sell such equipment to the US. However, sales of Soviet equipment to the US would have no significant effect on the US-Soviet balance of trade.