

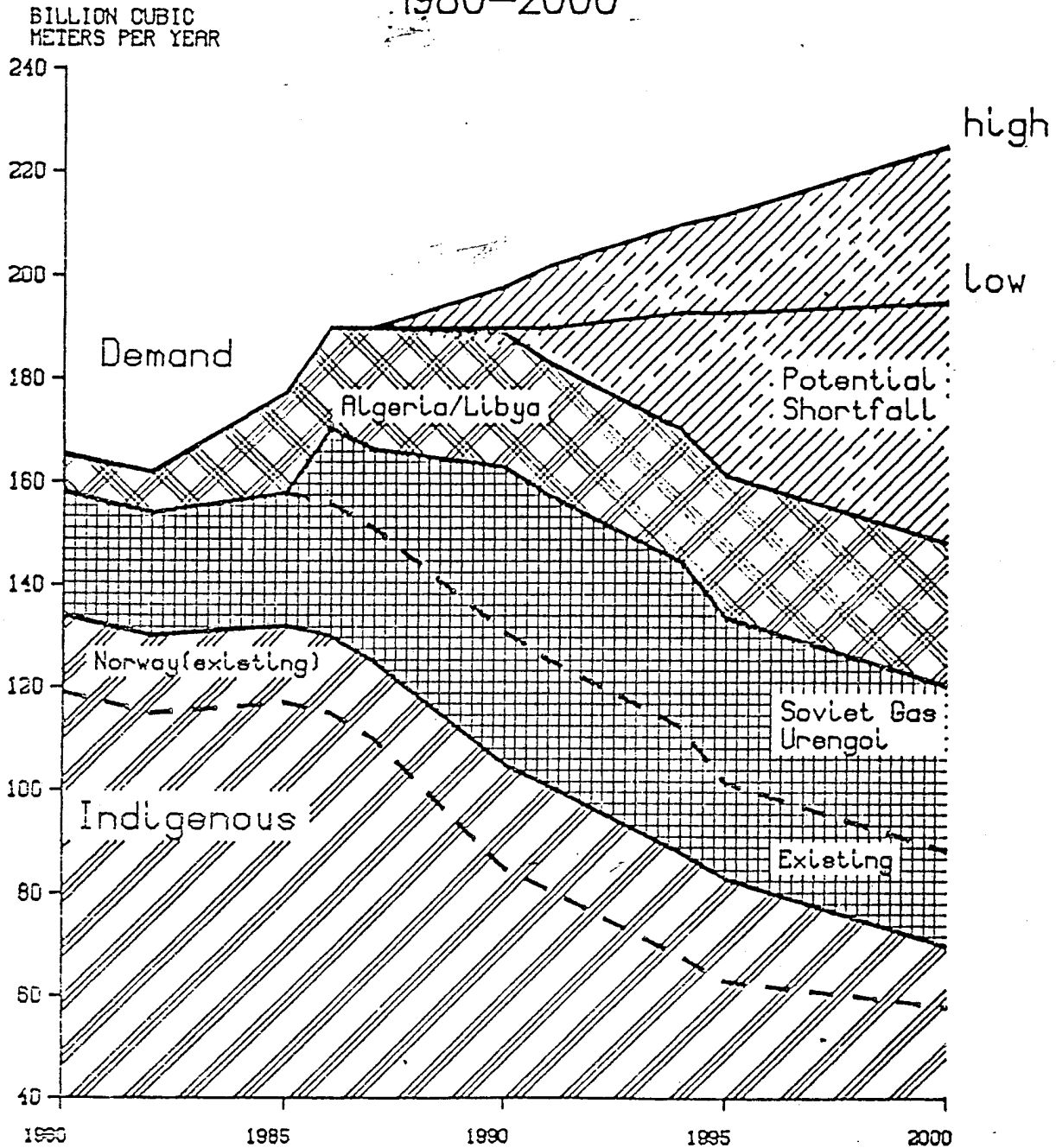
THE SIBERIA-TO-EUROPE NATURAL GAS PIPELINE:

AN OVERVIEW

OFFICE OF SOVIET ANALYSIS
CENTRAL INTELLIGENCE AGENCY

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Continental Europe: Natural Gas Supply and Demand Forecast 1980-2000



The Siberia-to-Europe Natural Gas Pipeline: An Overview

Summary

The 3,000-mile Siberia-to-Western Europe natural gas pipeline is an enormous and costly undertaking, but one that promises substantial economic and political gains for the Soviet Union. Costing about \$22 billion in combined internal and hard currency outlays, the export trunkline is the first of the two gas lines through which the Soviets hope to deliver about 40 billion cubic meters per year to Western Europe by 1990, a volume worth nearly \$6 billion annually in much-needed hard currency. Beyond 1990, after credits are paid off, Soviet earnings from the deal should reach at least \$8 billion annually.

Increased dependence on Soviet gas will almost certainly influence West European decision-making, despite likely efforts to provide a cushion against supply cutoffs. The Soviets conceivably could exacerbate West European differences with the US over future economic sanctions against the USSR or even over more sensitive issues such as NATO force modernization. [REDACTED]

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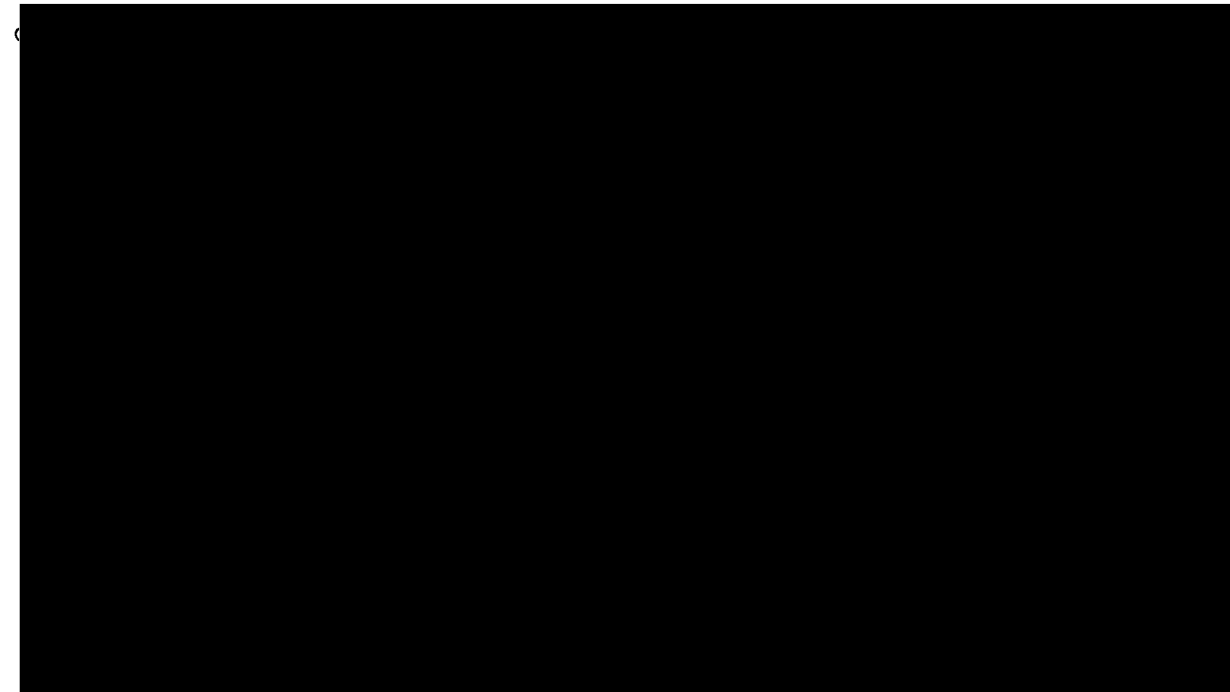
Financing and equipment negotiations for the first pipeline are nearly completed, and the Soviet press claims that pipelaying has begun.

- o West Germany and France have already agreed to purchase roughly one-half the gas to be exported through the planned pipeline system. Italy, the other large prospective gas importer under the deal, will sign very soon. Much smaller gas purchase agreements with Austria,

the Netherlands, and Belgium probably will follow in the next few months.

- o Gas deliveries are supposed to begin in fourth-quarter 1984, at a floor price of \$5.40 per 1,000 cubic feet.
- o Moscow has lined up almost \$13 billion in government-backed, subsidized credits for equipment (not including pipe) for the first export pipeline, more than twice the amount needed.
- o The Soviets have signed contracts for approximately \$4 billion in turbines, compressors, and other non-pipe equipment for the pipeline. The contracts, signed last fall, are believed to call for delivery of most equipment by late 1983 or early 1984. Another \$1 billion in equipment--primarily pipe-laying machinery--may still be ordered.

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- o The prospect of an expanded US embargo has also led

Moscow to canvass Western firms to determine whether a sufficient number of turbines not using US technology could be obtained should expanded US sanctions prevent delivery of the GE-design turbines already ordered.

- o Moscow has not ordered any pipe specifically for the export pipeline but will instead use pipe from multi-year contracts already signed with West European and Japanese firms to provide pipe for Soviet gas lines in general. The value of the pipe used on the export line will approximate \$2-3 billion. [REDACTED]

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Should US sanctions substantially reduce the availability of critical Western turbines to the USSR, Moscow would encounter considerable difficulty in building the export pipeline. The Soviets could, however, still complete the pipeline if Western Europe were willing to purchase the gas. Moscow could reconfigure orders placed with Western turbine suppliers and divert additional domestic resources to the export pipeline project. [REDACTED]

Even if all Western turbines for the export line were denied by US sanctions, Moscow could make adjustments in its internal pipeline building, but the impact on the domestic economy would be substantial. The USSR's projected tight energy position through most of the 1980s would make Moscow extremely reluctant to risk making such a sacrifice. If the gamble failed, the Soviets almost certainly would have to curtail oil exports more sharply than is now foreseen. Nonetheless, the USSR's great need for substantially increased hard currency earnings from gas could

prompt it to risk the consequences of restricting the growth of domestic gas supplies, particularly if Moscow believed that now is the time to secure a sizable share of the West European gas market for the late 1980s and 1990s. [REDACTED]

Scope of the Project

The export pipeline represents an enormous undertaking in terms of size, commercial complexity, and cost. [REDACTED]

Route

The 1,420 mm (56-inch) export pipeline will run approximately 5,000 km (3,000 miles) within the USSR. Starting at the huge Urengoy gas field, it will follow a central route generally southwestward to the Uzhgorod export terminal on the border with Czechoslovakia (see map). The route selected represents a compromise between the shorter "Northern Lights" right of way, more of which lies in difficult sub-Arctic terrain, and the longer but easier path through Chelyabinsk. Beyond the exit point at Uzhgorod, some of the gas will transit Eastern Europe, possibly through Czechoslovakia, to West Germany and central and north European customers; some will cross through Hungary to supply Austria and southern customers. [REDACTED]

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Capacity

The pipeline at full capacity could probably deliver 28 billion cubic meters per year to Western Europe. (Maximum input at the gas field will probably be 35 billion cubic meters per year, with the turbines powering the 41 compressor stations consuming at least 10 to 15 percent of the throughput). But the Soviets may want to deliver additional gas to domestic consumers

Soviet Union: Major Gas Export Pipelines



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and pay a portion of the throughput to Eastern Europe for transit fees. Moscow therefore has been planning a parallel export line to be started in 1984 or 1985. The two large pipelines would be able to deliver up to 40 billion cubic meters per year to Western Europe by the late 1980s, as well as to supply gas for transit fees and accommodate some additional Soviet or East European demand. [REDACTED]

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Gas Customers

Up to six West European countries will purchase gas delivered through the export pipeline, and others may sign up. West Germany is the largest buyer. It signed an agreement in November 1981 to import 10.5 billion cubic meters per year, with an option for an additional 750 million cubic meters per year if East Germany allows gas to flow to West Berlin. France and Italy are the next largest buyers, at about 8 billion cubic meters per year each. Austria, the Netherlands, and Belgium have not made firm commitments, but will probably each import 2-3 billion cubic meters per year. Spain has not actively participated in negotiations with Moscow thus far, but has become increasingly interested in purchasing Soviet gas following France's agreement to buy last month. Madrid wants to tie into the West European gas grid, and sees imports of Siberian gas--probably 2-3 billion cubic meters per year--as the best way of doing so around the end of the decade. [REDACTED]

Pipeline Completion Date

Moscow has contracted to begin gas deliveries to Western Europe in fourth quarter 1984. If the start-up occurs on time,

probably no more than 3-5 billion cubic meters could be delivered that year. Once the pipe for the export line is laid, deliveries to Western Europe will increase gradually until full compressor capacity is achieved. Final completion of the first export pipeline--bringing on line all planned compressor stations and ancillary equipment--would probably occur in late 1986 or early 1987. Moscow could also extend an existing domestic line by about 1,500 km from its present terminus to the Czech border in the next two years and thus ensure at least small gas deliveries on schedule. [REDACTED]

Construction Costs

The first export pipeline will cost at least \$22 billion. Western pipe and equipment paid for in hard currency will probably total \$7-8 billion. Roughly \$5 billion in equipment will be required, and \$2-3 billion in pipe. Soviet internal costs of roughly \$15 billion are estimated on the basis of analogous Western projects, such as the Alaskan-Canadian gas pipeline. [REDACTED]

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What the Pipeline Means to the USSR and Western Europe

Construction of the first export line by the mid-1980s and the second line by decade's end offers significant benefits--as well as some risks--to both the USSR and Western Europe. On balance, the Soviets would probably gain more from the project's completion than the West Europeans, both economically and politically. [REDACTED]

Soviet Benefits

Moscow wants the pipeline principally for the hard currency

it will generate beginning in the mid-1980s, but the potential political leverage inherent in the project must also be attractive. [REDACTED]

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Hard Currency Gains Hard currency earnings from the export pipeline will partially offset the expected decline in Soviet oil exports to the West (see table 1). Natural gas promises to be by far Moscow's most important source of incremental hard currency revenues, since earnings from non-fuel exports-- including arms and gold--will probably stagnate or rise only slowly during the 1980s. Although the USSR will have to make substantial outlays for equipment and pipe before the gas export pipeline is ready for full operation, most of these expenditures will be covered by Western credits on favorable terms. In 1986-- when we expect that the first pipeline could come on stream--net receipts will total nearly \$3 billion. Receipts from the

Table 1

USSR: Estimated Hard Currency Net Receipts from Gas and Oil Sales

(Billion 1981 US \$)

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
<u>Yamal pipeline¹</u>	<u>0</u>	<u>-0.6</u>	<u>0.8</u>	<u>-1.0</u>	<u>-2.1</u>	<u>2.9</u>	<u>2.7</u>	<u>2.6</u>	<u>5.0</u>	<u>5.8</u>
Gas sales	0	0	0	0	0	5.1	5.1	5.3	7.5	7.7
Downpayments	0	-0.3	-0.3	-0.3	-0.6	-0.2	-0.2	-0.1	-0.1	0
Repayments and interest on credits	0	-0.3	-0.5	-0.7	-1.5	-2.0	-2.2	-2.6	-2.4	-1.9
<u>Non-Yamal receipts</u>	<u>14.9</u>	<u>14.0</u>	<u>13.2</u>	<u>13.4</u>	<u>13.5</u>	<u>11.9</u>	<u>9.8</u>	<u>7.8</u>	<u>6.6</u>	<u>5.0</u>
Oil sales ²	11.5	10.5	9.5	9.5	9.5	7.9	5.8	3.8	1.6	0
Gas ³	3.4	3.5	3.7	3.9	4.0	4.0	4.0	4.0	5.0	5.0
<u>Net hard currency earnings from oil and gas</u>	<u>14.9</u>	<u>13.4</u>	<u>12.4</u>	<u>12.4</u>	<u>11.4</u>	<u>14.4</u>	<u>12.5</u>	<u>10.4</u>	<u>11.6</u>	<u>10.8</u>

Projections are based on the USSR's building a dual-line system in two stages, with the lines to begin operation in 1986 and 1989, respectively.

² The volume of oil sales for hard currency is projected at 900,000 b/d through 1985. Sales volume then declines to zero by 1990. Oil prices are assumed to fall nearly 10 percent in 1982-83 before leveling off for the rest of the decade.

³ Natural gas exports from existing lines rise from 24 billion cubic meters per year in 1981 to 25 billion meters per year in 1983 and remain at this level through 1990. The real price of gas (currently undervalued in relation to oil) is assumed to increase 25 percent during the decade.

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arrangement will rise to almost \$6 billion by the end of the decade if the Soviets go through with construction of the second line. Earnings from the deal will not completely offset the expected drop in oil export receipts, even if oil sales for hard currency remain high through 1985 before disappearing by 1990. Nonetheless, the export pipeline will prevent a sharp decline in total Soviet hard currency earnings during the mid-1980s that otherwise would reduce imports of Western good and technology critical to the Soviet economy. [REDACTED]

Political Gains. West European reliance on Soviet gas would rise considerably if Moscow's export pipeline plans are implemented. The share of Soviet gas in the total combined energy use of the six countries currently in the deal would increase from roughly 2 percent in 1980 to 6 percent by 1990.* Total Soviet gas deliveries--on existing contracts as well as exports through the new line--would cover one-fourth of the gas requirements of the six countries by 1990 if only one export line were built. West German reliance on Soviet gas would then exceed 30 percent, [REDACTED] Under a twin-line project total deliveries would be somewhat higher, covering nearly one-third of the six countries' gas consumption. [REDACTED]

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Moscow almost certainly sees this dependence as giving it some increased influence over West European political behavior.

* Reduced deliveries of oil will be nearly offset by the increase in gas supplies. Soviet oil sales to these six countries were about 700,000 b/d in 1980. Additional gas supplies of 40 billion cubic meters per year by 1990 would be equivalent to 660,000 b/d of oil.

The Soviets, however, would be reluctant to threaten a gas cut-off, since Moscow will need the hard currency from gas sales and would not want the West Europeans to begin switching to other suppliers. Moreover, looking ahead to future credit needs, the Soviets are interested in maintaining their reputation for reliability in commercial and financial matters. [REDACTED]

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At the very least, the gas line deal will enhance the USSR's ability to influence the West Europeans on issues which they see as peripheral to their own security interests. Moscow thus might be able to dampen enthusiasm for economic sanctions sponsored by the United States in retaliation for Soviet actions elsewhere. The USSR already has threatened Western Europe with the loss of energy and other projects if it joined in either the Afghanistan or Polish-related sanctions. A substantially expanded Soviet-European gas relationship would give Moscow even more clout on questions of this sort by the late 1980s. [REDACTED]

Conceivably, the Soviets might also try to use increased European gas dependence to influence decisions on more sensitive issues such as the NATO force modernization program. If so, Moscow would probably attempt to affect the views of the groups that would suffer most economically from a cutoff of Soviet gas. The USSR could make it more difficult for the West Europeans and the US to agree on certain key issues. But West European sensitivity to Soviet pressure on military issues related to national security would be a major barrier to Soviet exploitation of European energy dependence in this area. [REDACTED]

West European Benefits

Despite increased East-West tensions over Poland, the West Europeans see greater use of Soviet gas as a clear cut economic gain and an acceptable political risk. [REDACTED]

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Economic Gains. Economically, the West Europeans argue that the Siberian gas pipeline project offers several advantages:

- o At roughly \$5.40 per 1,000 cubic feet, Soviet gas is priced competitively with alternative gas sources.
- o The approximately \$10 billion in pipe and equipment orders for just the first pipeline will go primarily to Western Europe, possibly providing up to 50,000 jobs at a time of high unemployment. (Such employment, however, is only one-half percent of the 10 million West Europeans currently unemployed.)
- o Most of the hard currency earned by the Soviets through the pipeline deal in later years will be spent in Western Europe. [REDACTED]

The Political Calculus. The political risks of the project, the West Europeans have long maintained, will be outweighed by the political gains. Increased use of gas from the Soviet Union--which in the past has scrupulously honored its gas supply contracts--will reduce West European dependence on oil and gas from less developed countries, which the West Europeans consider less reliable suppliers. The West Europeans also contend that prompting Soviet reliance on the West European market for hard currency sales and for imports of critical goods and technology will raise the costs of aggressive Soviet behavior in Europe. If continued Soviet imports of Western equipment aid Soviet energy

production, the West Europeans also argue, Moscow may be less inclined to meddle in the Persian Gulf region. [REDACTED]

Although West Europeans recognize that their potential vulnerability to an interruption in Soviet energy supplies will be greater as a result of the pipeline deal, they argue that the risks of a major gas cutoff are small. First, they count on Moscow's growing need for hard currency. Second, they believe that the impact of any interruptions that do occur would be cushioned substantially by several back-up supply systems:

- o Dutch gas fields with ample surge production capacity provide a buffer that could be tapped in any major emergency.
- o Norwegian gas from the North Sea may be available in much greater quantities by the late 1980s or early 1990s.
- o West Germany and France are planning to increase considerably their gas storage capacity. Italy has many depleted gas fields that could be converted to storage.
- o Many West European industries--the most likely targets of gas cutbacks during reduced Soviet deliveries--can switch rapidly to alternative fuels. At least 15 percent of French industry does this each winter when gas supplies are tight, and this percentage is much higher in West Germany.
- o France has reached an agreement with Algeria for resuming LNG imports, and Italy may soon start to import Algerian gas via the new Trans-Mediterranean pipeline. [REDACTED]

Nonetheless, West European ability to counter successfully a

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Soviet gas denial is not assured. The West Europeans did not respond in a unified manner to the 1973-74 oil crisis and might again follow divergent policies. Countries with surge capacity, [REDACTED] may be unwilling or unable to divert substantial supplies to other countries for a prolonged period. Norway may continue to limit gas development for reasons of conservation or because the price of Soviet gas remains considerably below that at which further development would be profitable. Moreover, because Soviet gas probably will be delivered by at least two routes through Czechoslovakia and Hungary, Moscow could attempt to create divisiveness by denying gas to some West European countries instead of to all. [REDACTED]

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Current Status of the Project

Financial and contractual arrangements for the export pipeline are nearly completed. West Germany and France have signed gas purchase contracts; Italy, despite a "pause" for reflection, is likely to sign soon. Credits sufficient to cover the pipeline's imported equipment needs have been extended, and most of the contracts for pipe and equipment delivery have been initialed. [REDACTED]

Pipe and Equipment Orders

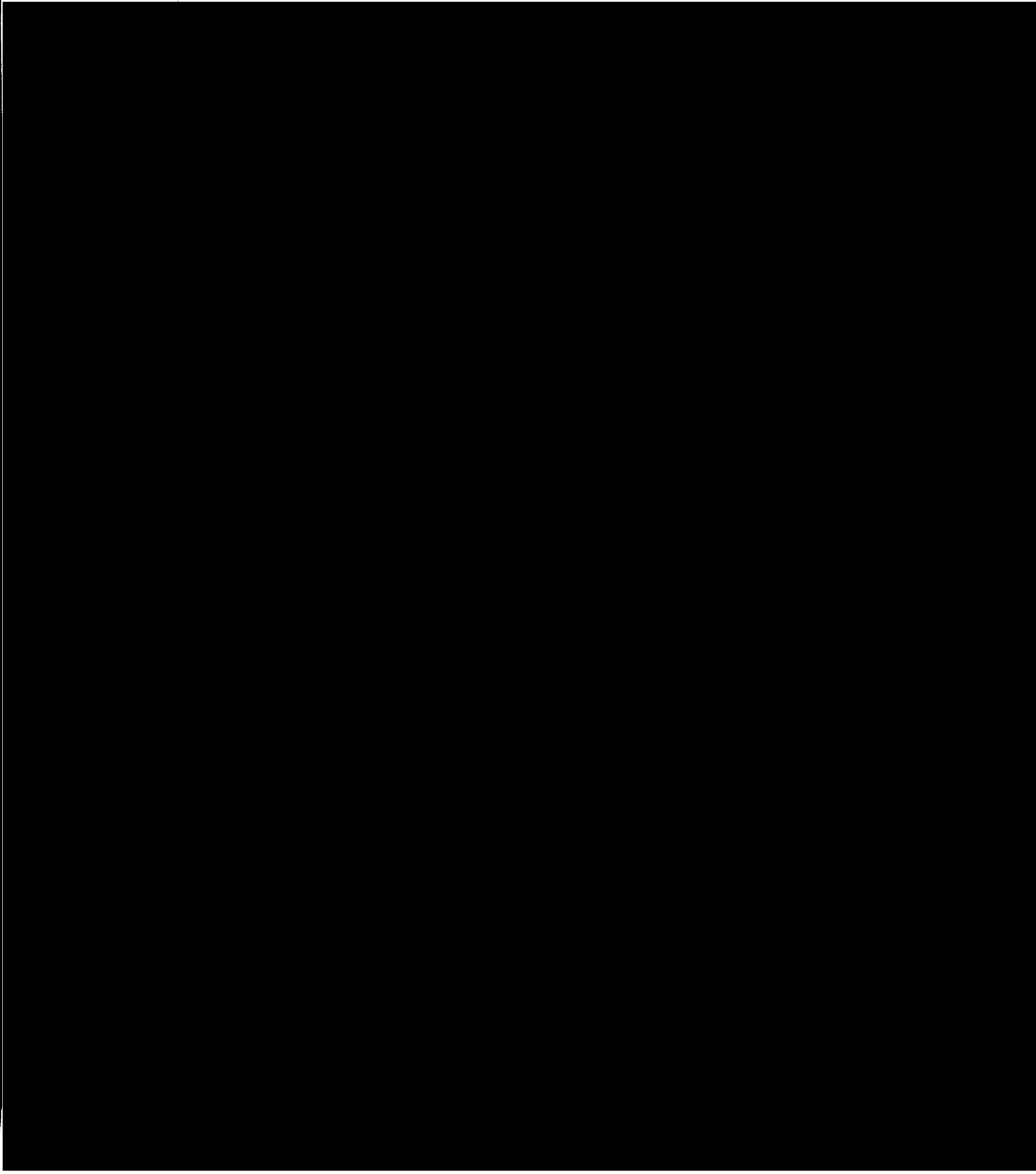
Moscow has initialed contracts for almost \$4.3 billion in pipeline equipment, excluding pipe (see table 2). Although Japan is intensely interested in obtaining large equipment orders, West European firms won most of the supply contracts for the first export pipeline in return for buying Soviet gas. Non-pipe contracts have been signed specifically for the export pipeline,

while separate, existing credit arrangements with West European and Japanese firms (listed in table 2) will finance the pipe for both domestic and export lines. The value of the pipe required for the export pipeline should be roughly \$2-3 billion. [REDACTED]

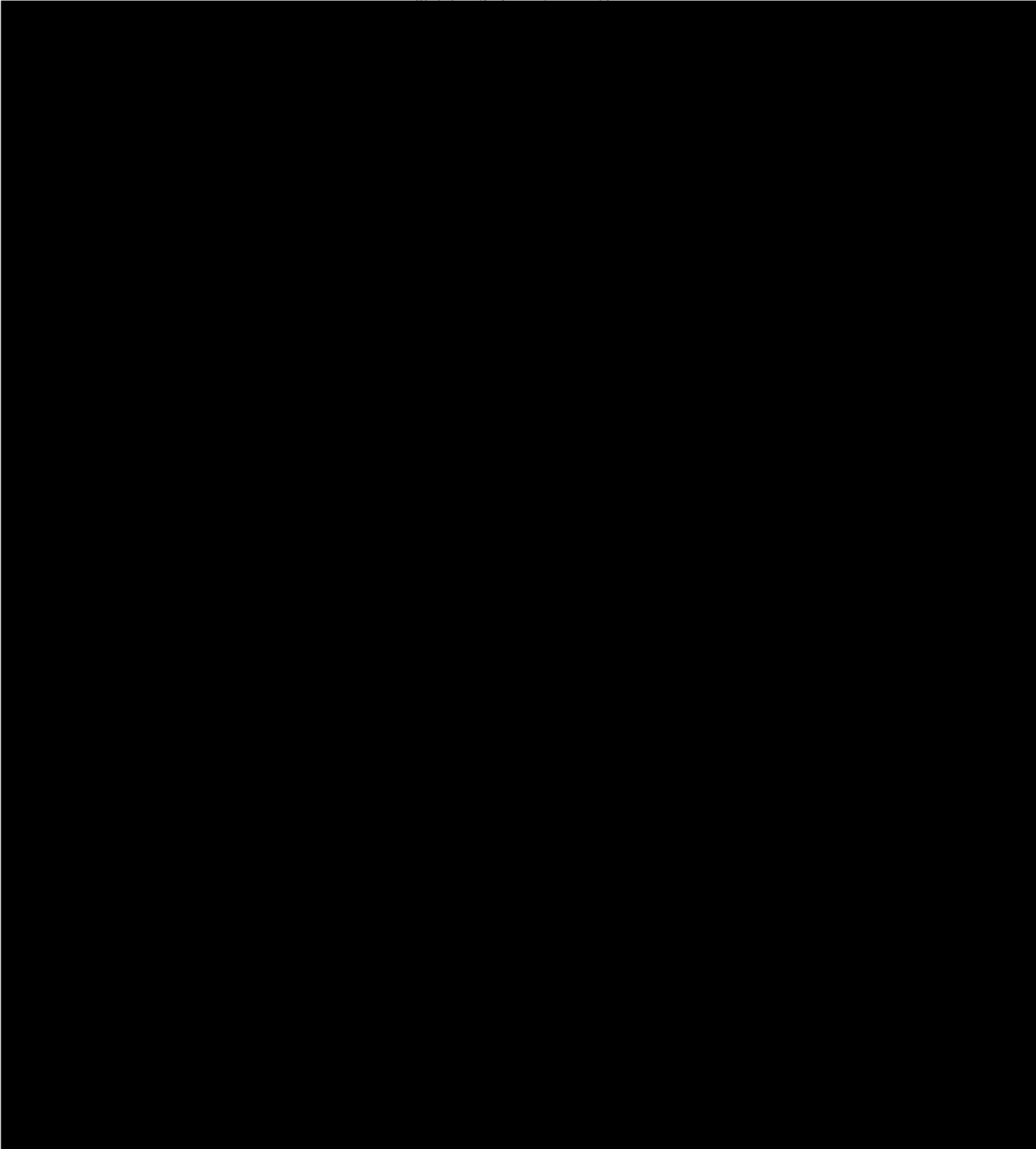
The largest portion of equipment orders is for turbine-compressors, related equipment, and engineering services for the pipeline's 41 compressor stations. [REDACTED]

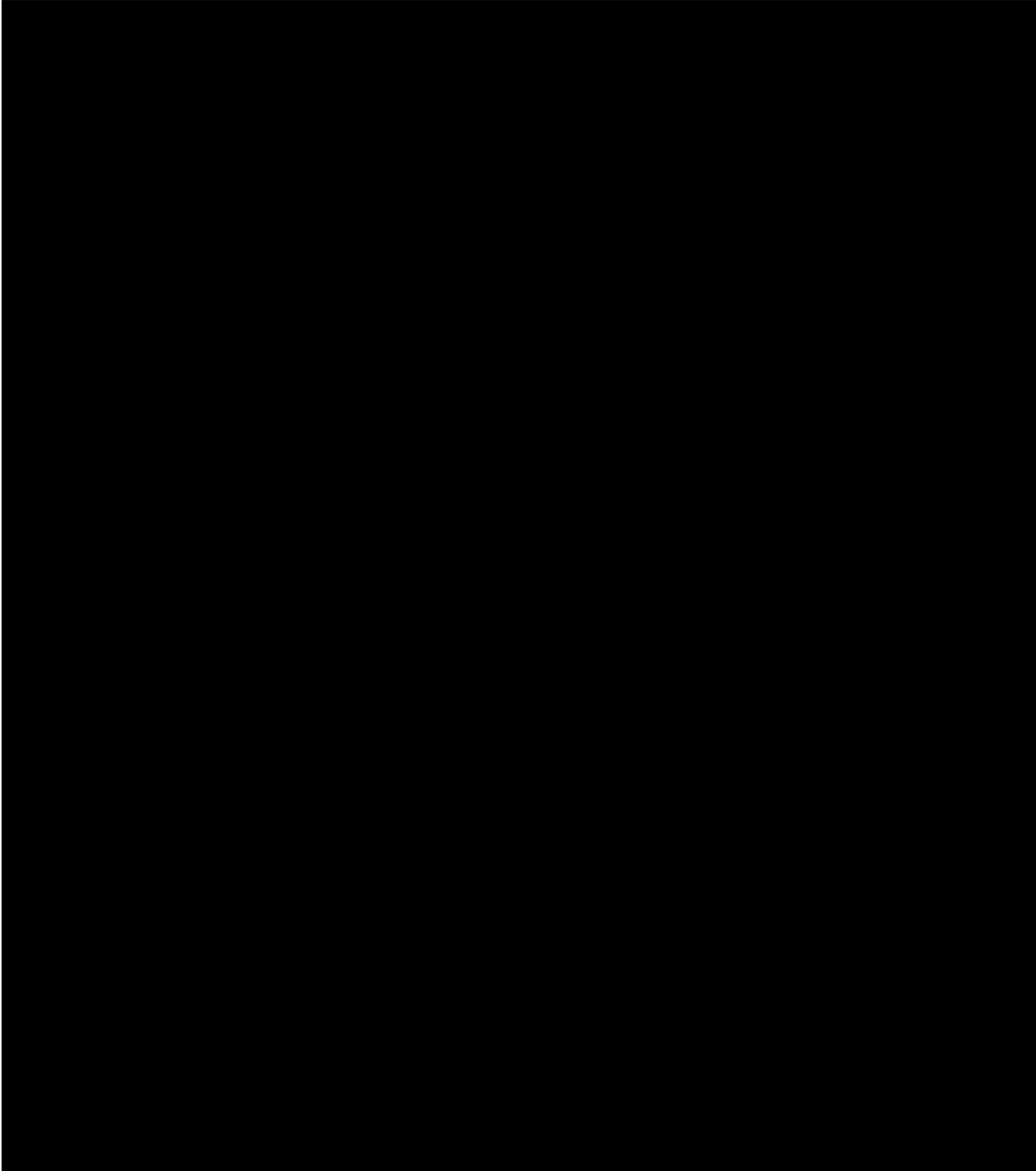
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* Forty compressor stations will each use three of the 25-MW GE turbines; the station at the gas field will use five lower-capacity turbines.

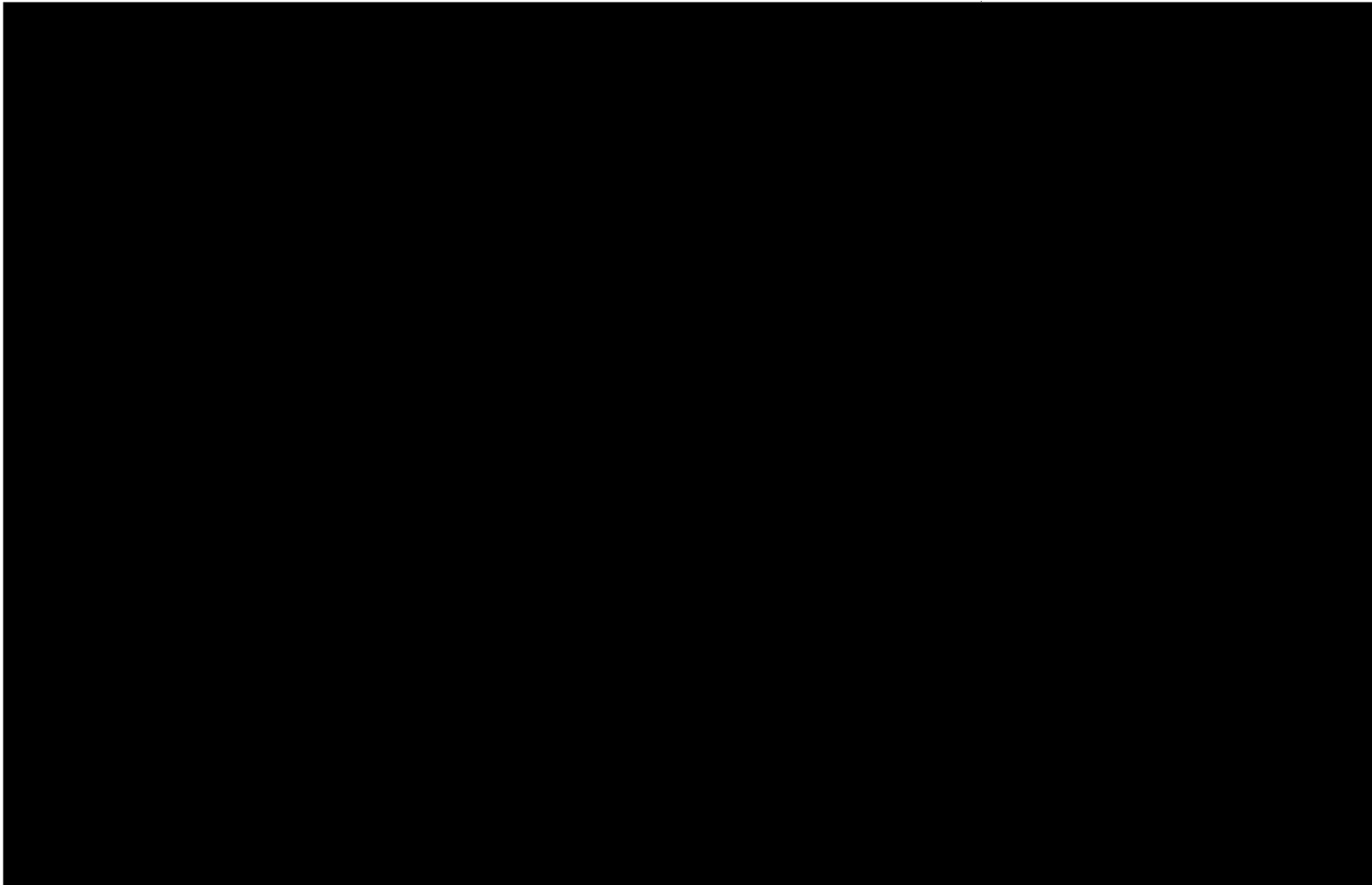


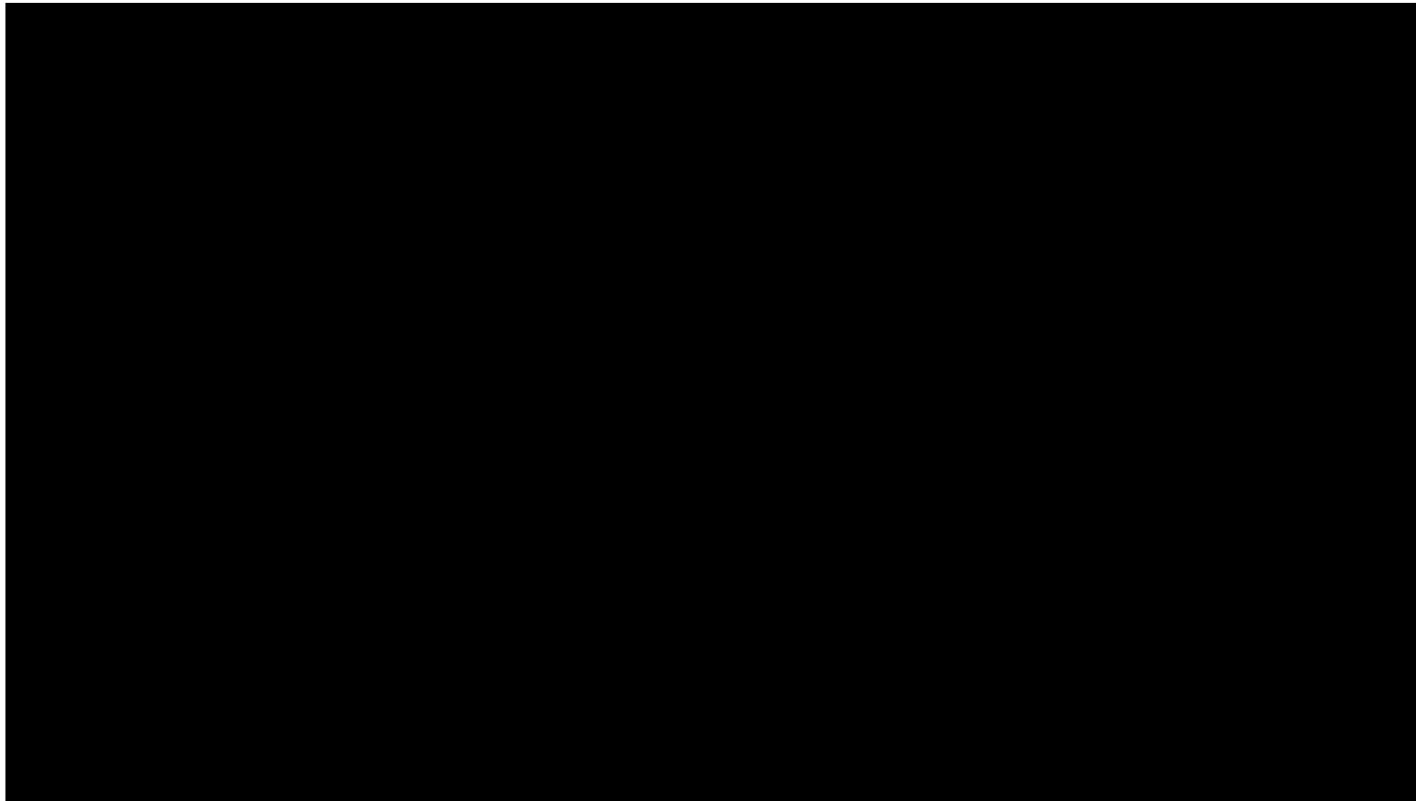
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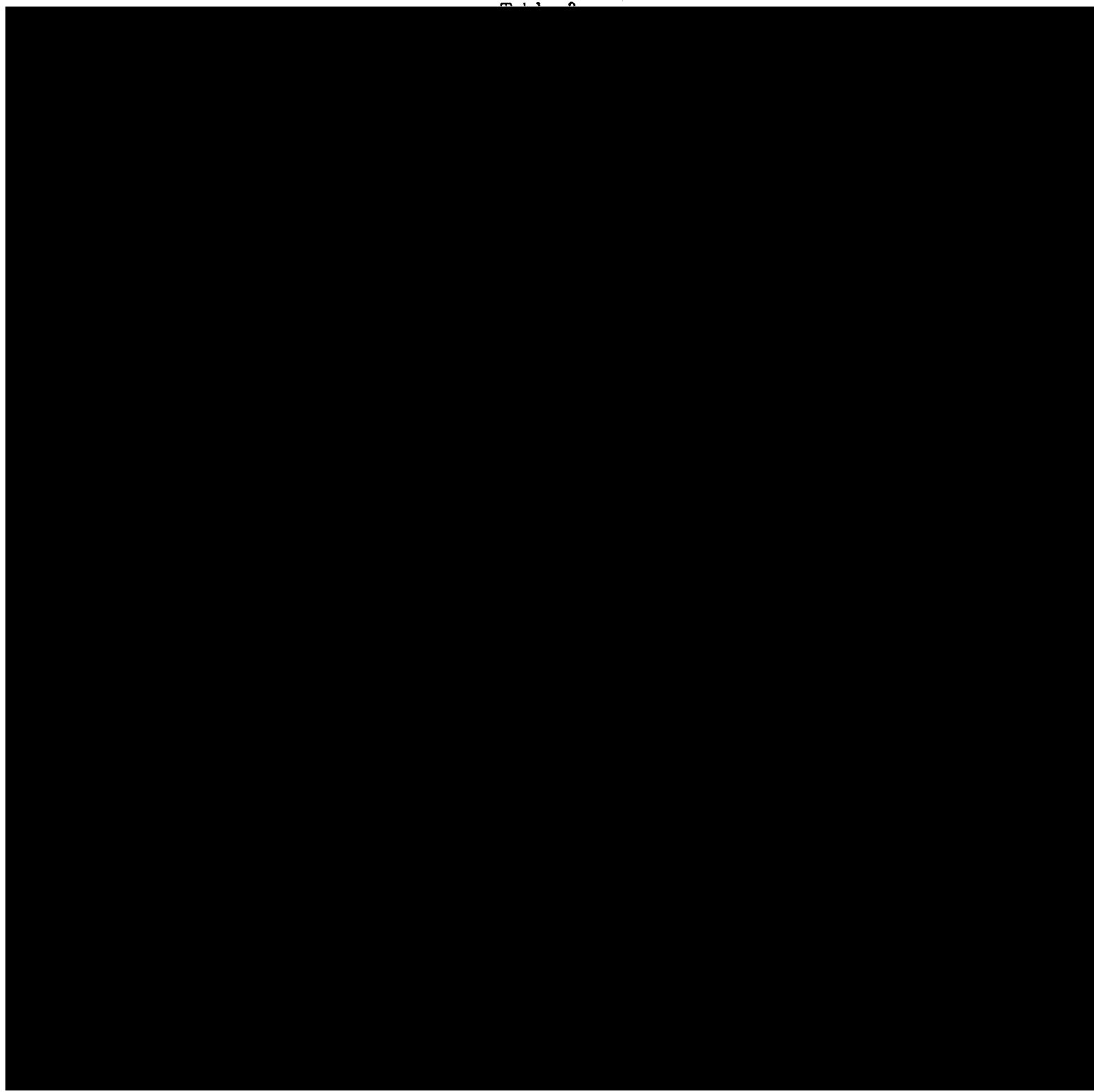
Credits

In seeking equipment contracts for the export pipeline, Western Europe and Japan have made offers of government-guaranteed credits totalling about \$13 billion (see table 3). These lines of credit cover 85 percent of the value of equipment contracts.

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Work on the Pipeline to Date

Construction of the export pipeline is just getting underway. Moscow has assigned this project very high priority in the 11th Five-Year Plan. Including the export line, the Soviets plan to build six gas trunklines from Siberia during 1981-85. These lines, which will average more than 3,000 km. (2,000) in length, are to carry virtually the entire 195 billion cubic meters increment in planned aggregate Soviet gas production during 1981-85. One domestic line (Urengoy-Petrovsk) has just been laid, and the Soviets are trying to finish another (Urengoy-Novopskov) by mid-1982. Thus far, clearing of the right of way for the export line has commenced, and some infrastructure, linepipe, and pipe-laying equipment have been positioned along the route. To permit initial exports of gas to Western Europe under the new contracts by late 1984 or early 1985, the Soviets may first build a pipeline segment of about 1,500 km connecting a domestic pipeline from Urengoy to Novopskov (or that from Urengoy to Petrovsk) with the export terminal at Uzhgorod. Gas from the domestic system could then be diverted for export until the new export pipeline from Urengoy is built. [REDACTED]

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The US Embargo and Soviet Options

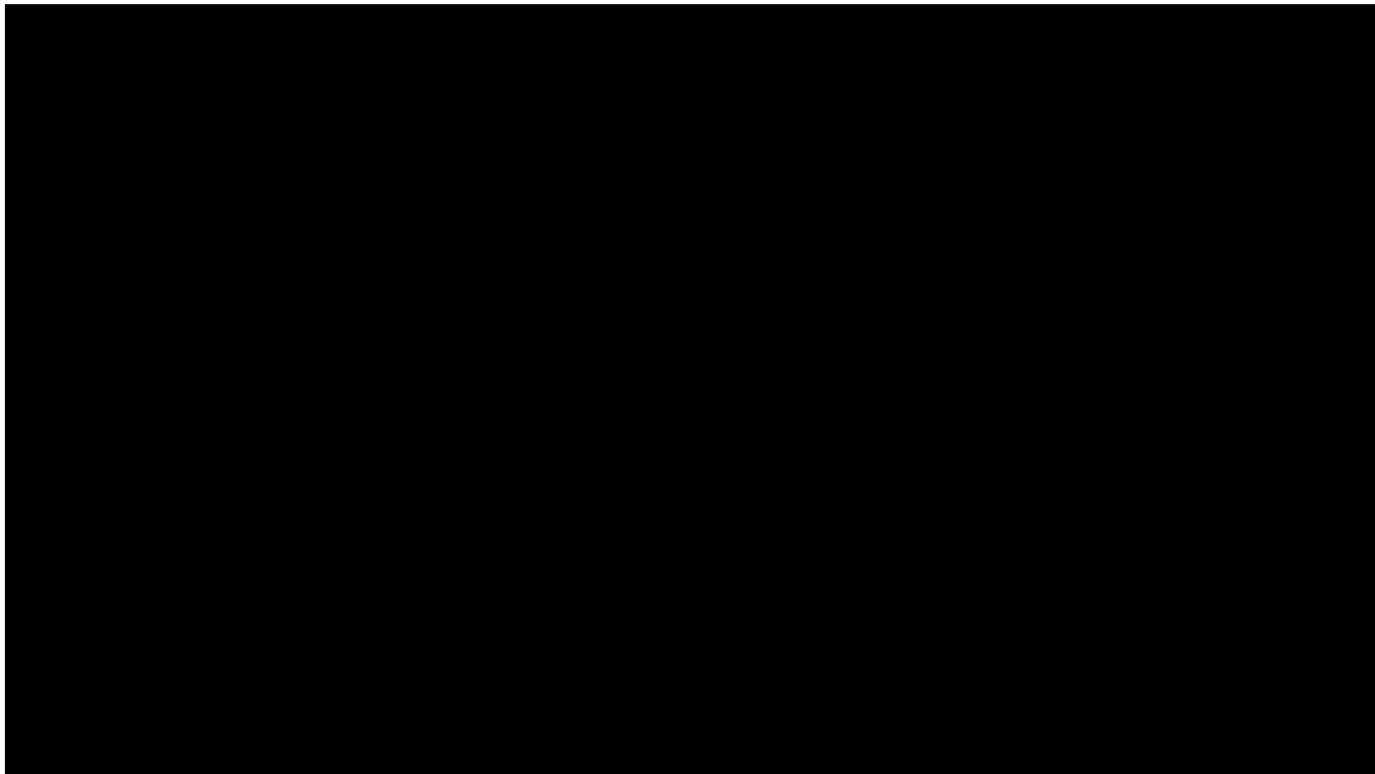
Should US sanctions substantially reduce the availability of Western turbines to the USSR, Moscow would encounter much greater--but not insurmountable--difficulty in building the export pipeline. An expanded embargo preventing Western sales to Moscow of equipment embodying US technology would increase considerably the cost to the USSR of continuing with the

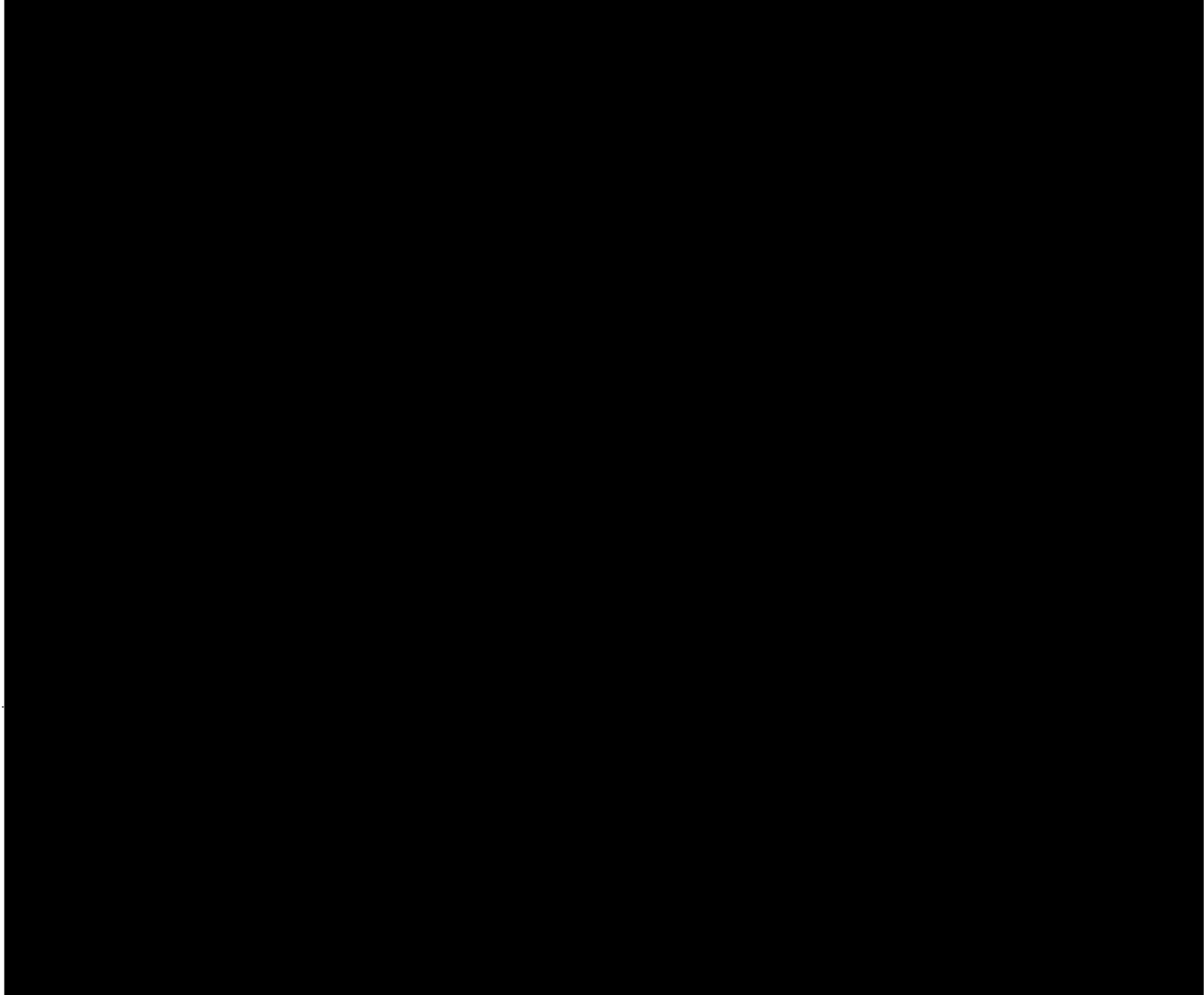
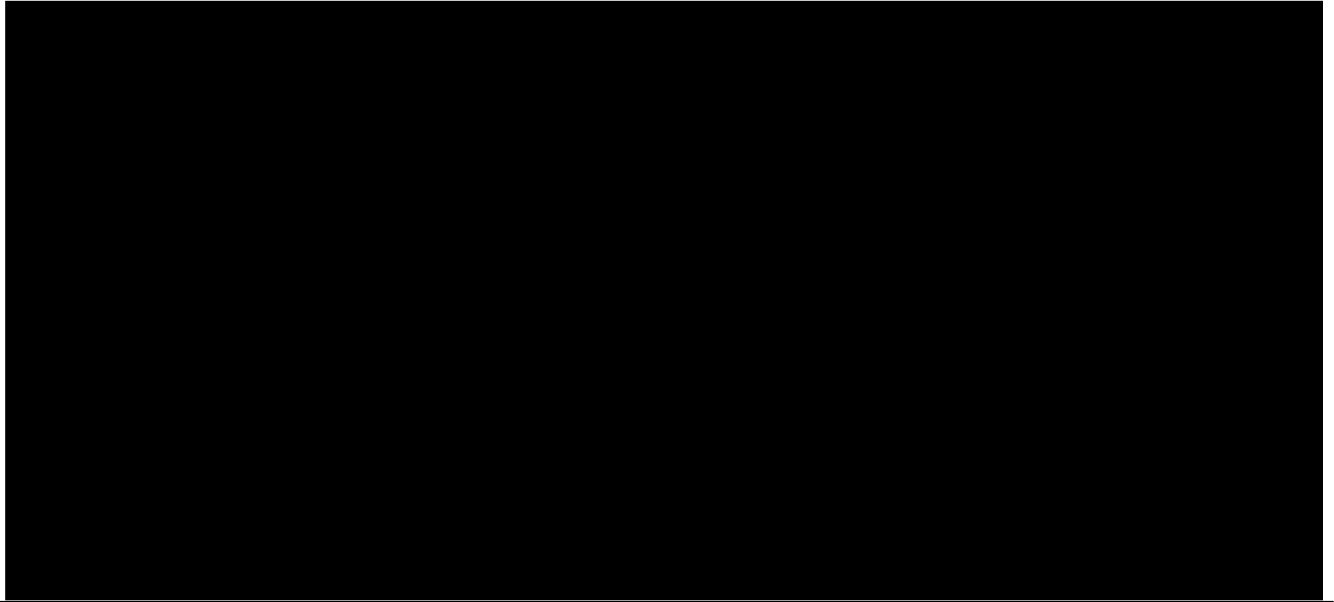
project. The Soviets could still complete the pipeline, however, if Western Europe were willing to purchase the gas and if the critical large-diameter linepipe and ball valves (as well as an adequate park of pipelayers) were available. Moscow could reconfigure orders placed with Western turbine suppliers and divert additional domestic resources to the export pipeline project. [REDACTED]

The Possible Options

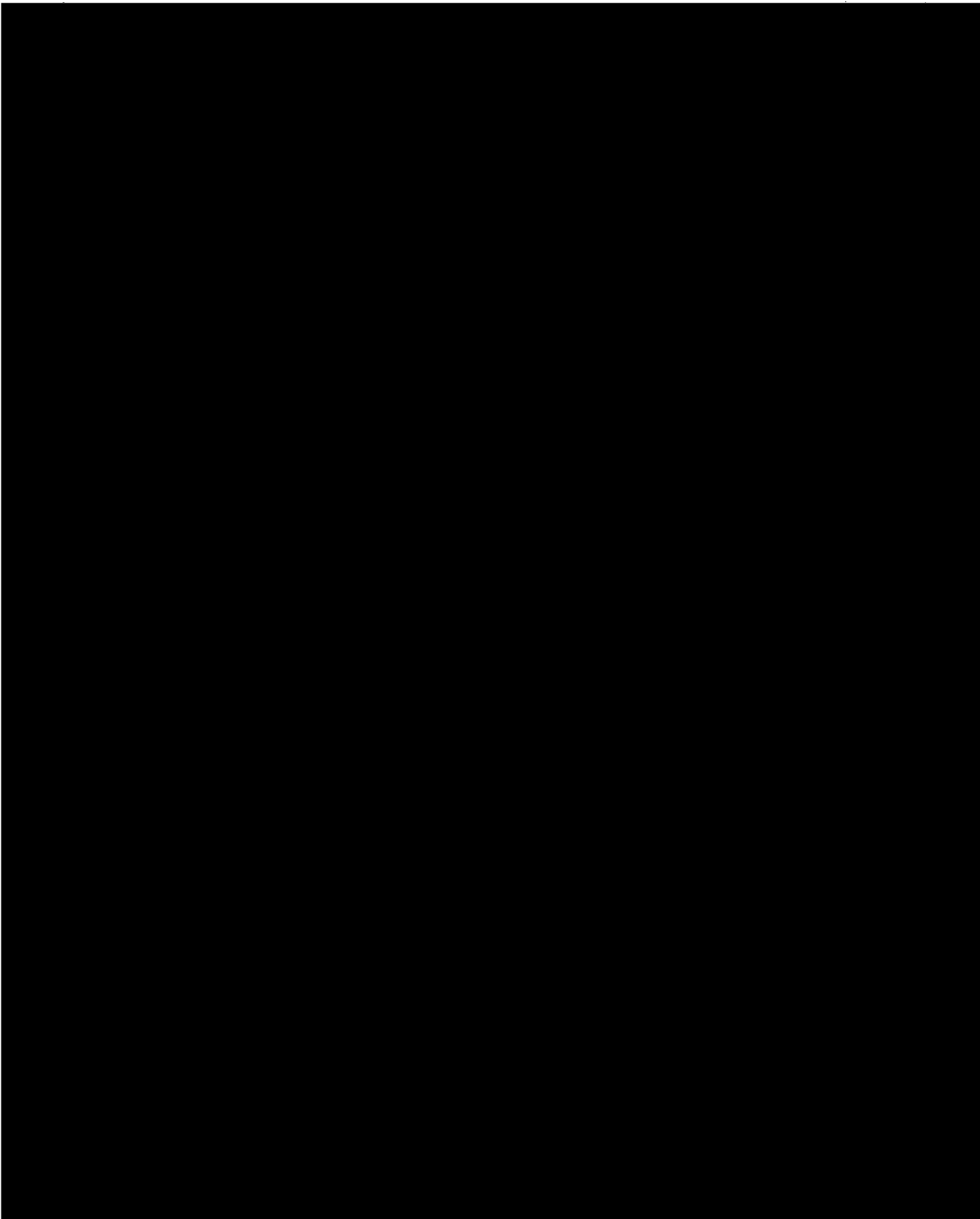
The USSR probably is actively working to counteract the US embargo by exploring technical and financial alternatives with West European firms. Without imposition of further US restrictions, the Soviets have several options for obtaining Western equipment:

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Relving on Domestic Production

Even if expanded US sanctions severely reduced the number of foreign-made turbines available to the USSR, gas deliveries to Western Europe could probably begin by late-1984 or early 1985 at

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up to one-third of planned capacity. Moscow has several options. It could:

- o "Loop" or "twin" the export pipeline by laying a second strand of pipe. This configuration would permit delivery of as much gas as a fully powered 75-atmosphere pipeline but would require only 25 to 30 percent as much compressor power.
- o Transfer surplus turbines and compressors to the export pipeline from existing lines.
- o Reallocate to the export pipeline material, labor, and domestically produced turbines intended for building compressor stations on domestic lines.
- o Increase, with some difficulty, the rate of conversion of retired aircraft turbine engines to pipeline service.
- o Extend an existing trunkline in the European USSR to the Czech border for West European linkup by 1984-85 while continuing to build the export pipeline, as discussed above. [REDACTED]

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Nonetheless, the domestic cost would be substantial.

Completion dates for reaching full capacity on one, and possibly two, of the five planned domestic trunklines would have to be postponed as turbines, labor, and compressor station materials and equipment were transferred to the export pipeline. We believe that Soviet production of suitable gas turbines--about 300 or so 6-MW and 10-MW units per year from series currently in production plus a small number of 25-MW units (if serial production of these indeed can be started)--will almost certainly

fall short of needed new capacity for the planned expansion of the domestic gas pipeline system. An all-out effort on the export line, therefore, might delay for one or more years domestic gas deliveries of up to 32 billion cubic meters per year (or the equivalent of 530,000 b/d of oil). [REDACTED]

The USSR's projected tight energy position through most of the 1980s would make Moscow extremely reluctant to risk making such a sacrifice. The Soviets almost certainly would have to curtail oil exports more sharply than is now foreseen or be forced to reduce oil deliveries to Eastern Europe more rapidly during 1981-85 than Moscow now deems politically feasible. Nonetheless, the importance of substantially increased hard currency earnings from gas could prompt the Soviets to restrict the growth of domestic gas supplies, particularly if Moscow believed that now is the time to secure a sizable share of the West European gas market for the late 1980s and 1990s. [REDACTED]

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