

Lefeldt, Mathias

Article — Digitized Version

An emergency supply test for another oil crisis

Intereconomics

Suggested Citation: Lefeldt, Mathias (1979) : An emergency supply test for another oil crisis, Intereconomics, ISSN 0020-5346, Verlag Weltarchiv, Hamburg, Vol. 14, Iss. 1, pp. 31-36, <https://doi.org/10.1007/BF02924504>

This Version is available at:

<https://hdl.handle.net/10419/139588>

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the purpose of a division of labour which assigns to multilateral agencies the activities which

involve high administrative costs: cost-intensive activities are rechanneled while the political and economic benefit is left with the bilateral donor;

are of no particular geographical or sectoral interest to national development agencies, either because the projects are relatively remote from the market and do not call for any large supplies by the donor or because these activities would put a strain on his foreign-political relations or because the recipients have no special historic or military-strategic links with the donor or have already advanced or diversified their external eco-

conomic relations so far that no bilateral donor can stake an exclusive claim on them;

touch upon political or social sensitivities of the borrower: this has to do with the excessive country involvement of at least some donors (especially the US-AID) at certain times, the shift of development priorities to sectors where there is a greater possibility of interference with internal affairs than under old-style projects and, finally, the diversification of lending agencies through the emergence of new donors (e.g. the PR China, the OPEC states and the increased commitment of the Scandinavian countries) which puts recipient countries in a stronger position to stand up to attempts at unwarrantable interference.

ENERGY POLICY

An Emergency Supply Test for Another Oil Crisis

by Mathias Lefeldt, Hamburg *

In the spring of 1978 the International Energy Agency (IEA) staged the second "Allocation System Test", a simulation exercise designed to check the ability of 19 OECD countries to cope jointly with another oil crisis. The topicality of such a contingency test is demonstrated by the disturbances in Iran. The following article sheds light on the motives, objectives and mechanisms of the IEA concept.

Since the "oil shock" of 1973/74 interested circles in several OECD countries have been considering countervailing action in the event of a recurrence of the supply disruptions since the industrialized countries of the West depend on oil as a source of energy and OPEC countries provide 50 % of the world's output. The International Energy Programme (IEP) which was adopted by the 19 most important industrialized countries (except France) in 1974 and the International Energy Agency (IEA) which was formed as a supervisory and executive organ are the outcome of these deliberations. Their agreed aims and tasks are essentially as follows:

Emergency Mechanism: A common emergency strategy based on withdrawals from emergency reserves, economies in consumption and equitable division of all supplies available to the group will be activated should any one IEP country or the whole group suffer a significant disruption of oil supplies. Such "equitable" division between member countries calls for an international mechanism to even out supplies.

Oil Market Information System: The IEP provides for a comprehensive information system on the international mineral oil market which, in addition to its general function of elucidating the situation in the world energy markets, is of importance for providing a quantitative basis for the emergency mechanism.

Long-term Cooperation of the Consuming Countries: The cooperation between the IEP member countries is not confined to the oil market but concerns the entire energy field. A key area is the development of alternative sources of energy to reduce the dependence upon oil imports in the long term.

Relations with Producing Countries: This item on the IEP programme has been transferred in large part to the North-South dialogue and the discussion on a New International Economic Order.

The most problematic part of these arrangements is that which relates to the creation of an emergency mechanism as it necessarily involves concrete regulations on the ways and means of the equitable division of the crude oils and mineral oil

* Mineralölwirtschaftsverband Hamburg.

products available to the IEP group in a crisis. The IEA started by designing an emergency mechanism in 1975 and since has been checking its functional efficiency at irregular intervals by means of emergency tests the first of which dealt with part areas of the mechanism. The second comprehensive test – Allocation System Test 2 (AST-2) – was held in the spring of 1978 for the specific purpose of tying in national emergency organizations with the international contingency system.

Mainstays of the Emergency System

The mainstays of the emergency mechanism are the IEA, the national emergency organizations of the 19 participating countries, and 31 oil groups most of which are operating internationally. The latter hold a key position in the system because the apportionable mineral oils and the channels needed for their equitable distribution between the IEP countries are theirs. These companies are in direct contact with the IEA (IEA Reporting Companies) and recognize the IEP principles. In a crisis they will cooperate with the IEA on a *voluntary* basis, re-arranging their world-wide supply plans or drawing up new ones.

The IEA operates as an international coordination centre: it determines whether a disruption of oil supplies has occurred, which countries are insufficiently supplied and therefore need extra oil

allocations, and which member countries are obligated to surrender mineral oils to others. It has to be noted that the IEA must consult the IEA Reporting Companies and not merely the governments of the participating countries because they are the only holders of significant quantities of mineral oils. The IEA receives advice from a group of supply experts in the oil industry which keeps contact with the companies and coordinates the voluntary oil redistribution measures. If these voluntary measures in the oil industry do not go far enough, it is for the IEA, in conjunction with the national governments, to initiate measures which ensure a solution of the remaining distribution problems.

Composition of the Emergency Organizations

The National Emergency Sharing Organizations (NESOs) also keep in constant contact with the IEA. They are responsible for the internal arrangements in their countries and, in addition to other tasks, look after the interests of the smaller firms which operate on a purely national level and have no direct links with the IEA. The NESO is also the competent authority for the equitable distribution of whatever quantities of oil are available to the country among all domestic companies (National Fair Sharing).

In most IEP countries the NESOs are composed of representatives of economic and energy authori-

PUBLICATIONS OF THE HWWA-INSTITUT FÜR WIRTSCHAFTSFORSCHUNG-HAMBURG

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ÖKONOMETRISCHE PREISMODELLE

Eine theoretische und empirische Analyse

(ECONOMETRIC PRICE MODELS – A Theoretical and Empirical Analysis)

Econometric price models deal mainly with the explanation of empirically ascertained price indices. On the other hand the determination of the optimum price-sales-combination of a product, under given abstract assumptions, is the main purpose of the price theory. Such differences between the initial conditions, questions to be answered and above all the aggregation stages so far led to a broad gap between the usually theoretically less established approaches of the empirical examinations and the differentiated, frequently pretentious price theoretical models. The present study attempts to build a bridge between both types of models. (In German.)

Large octavo, 217 pages, 1978, price paperbound DM 39.–

ISBN 3-87895-175-2

V E R L A G W E L T A R C H I V G M B H - H A M B U R G

ties. The German NESO was however differently structured in AST-2: the representatives of the Federal Ministry of Economic Affairs (BMWi) and the Federal Office for Industry (Bundesamt für gewerbliche Wirtschaft – BAW) were joined mainly by representatives of the oil industry, and its offices were therefore at the headquarters of the Mineralölwirtschaftsverband e.V., the petroleum industry federation, in Hamburg. This, it was thought, had the advantage of enabling the NESO to draw on the expert knowledge of the oil industry. Moreover, direct participation by the industry underlined the voluntary nature of the arrangements: in the domestic redistribution as on the international level voluntary cooperation is to have priority over compulsory government measures.

The organs of the German NESO are a body with political responsibility, the Emergency Supplies Council (Krisenversorgungsrat – KVR), which lays down guidelines for the emergency management – and in case of doubt also the details – under the direction and with the active participation of the Federal Economic Ministry, and an operative body, known as the Supplies Coordination Group (Koordinierungsgruppe Versorgung – KGV), on which the Federal Economic Ministry is likewise represented. The KGV prepares models for the making of decisions by the Ministry and resolves problems of detail. It also sets the parameters for the evening-out of supplies to the domestic enterprises, the “Fair Sharing”. The yardsticks to be applied to this Fair Sharing are however determined by representatives of the Federal Economic Ministry. This organizational structure of the German NESO is still provisional; the Federal Economic Ministry has not yet finally confirmed that it will be kept on in the future.

Purpose of the Emergency Test

The emergency tests serve the purpose of checking the functional efficiency of the IEA emergency mechanism, of showing up weak spots and suggesting improvements. The first problem in an emergency simulation is to select the appropriate data basis. The AST-2 test which was held in the spring of 1978 was based on a historical period for which actual data existed: August-November 1977. The test was arranged in cycles. Each of these lasted for three weeks but covered a full simulation month. The emergency conditions were always assumed to prevail throughout one cycle. The firms had to report for each cycle the supply situation in the two preceding months and in the current month and to forecast the prospective development in the two succeeding months.

The “outbreak of the emergency” was timed for the beginning of July. So, allowing for the average lead time of about four weeks from a cutback in

crude oil production to the subsequent rundown of processing and consumption of the derivatives, the disruption of crude supplies in AST-2 made itself felt in the market around August. The time-lag offered an opportunity to put the requisite measures for the curtailment of consumption into effect, to adjust the world-wide supply plans of the international oil companies to the “emergency conditions”, and to activate the national emergency organizations.

It was intended that AST-2 should comprise two or three test cycles: in other words, two or three months of emergency conditions (equal to a total test period of six or nine weeks) were to be simulated. In actual fact two cycles were put through but the German NESO added an extra week to the simulation phase for the second cycle, for the experience gained in the first cycle made such an adjustment necessary. Furthermore, the IEA introduced additional emergency conditions in the course of the second cycle in order to test the flexibility of the system.

Seven Per Cent Shortfall as Emergency Threshold

It is one of the tasks of the IEA to determine whether and when a significant disruption of oil supplies has occurred. It performs this task by what is known as a “trigger calculation”, an estimation of the ratio of supplies expected to reach the IEP group as a whole, or a particular country, in a reference period to the final consumption in this same period. In making these calculations the IEA differentiates between the various countries of origin of the imports and computes the effects of output cutbacks, etc., on individual countries. The information about possible production cutbacks, etc., reaches the IEA through diplomatic channels or from the international companies. The IEA regards a supply shortfall of 7%, either in the whole IEP group or for one particular country, as the “emergency threshold”. The shortfall is calculated by reference to the so-called Base Period Final Consumption (BPFC) which equals the monthly average end consumption of the last four three-months’ periods before the onset of the crisis.

The IEA is in no position to make good the loss of supplies due to a break in crude oil or product deliveries; it can only take charge of the equitable distribution of such supplies as are still available inside the IEP group. Supply shortfalls remaining after equitable division between the member countries must therefore be counterbalanced by restrictive measures in the field of consumption or by withdrawals from emergency reserves in IEP countries. The task of preparing appropriate measures to this end falls on the national governments. The IEP does however provide for some

harmonization of these measures, e.g. the enlargement of the emergency reserves to cover 90 days' requirements (a condition which most countries have already fulfilled) and a minimum curtailment of demand through restrictions on consumption. The Federal Republic of Germany has made contingency arrangements for a crisis ranging all the way from "light-handed" measures such as a ban on Sunday driving to strict rationing systems. The legislative basis for these restrictions on consumption is the Energy Safeguarding Act of 1975.

AST-2 included a lengthy precursory and preparatory phase because national emergency organizations were included in the emergency mechanism for the first time. The test started officially on March 31, 1978 with the announcement that the "trigger" conditions had arisen. Simultaneously all NESOs and IEA Reporting Companies were notified through the so-called "Disruption Telex" of the foreseeable emergency conditions. The contents of this telex message were immediately passed on by the NESOs to the oil companies which had been admitted to the emergency mechanism in their respective countries.

The AST-2 emergency simulation assumed that a provisional "trigger" calculation showed the oil supplies available to the entire IEP group to be 10–12 % below BPFC in the first cycle (August–October) and 12–18 % below BPFC in the second cycle (September–November). This meant that in these three months' periods all IEP countries would have no more than c.90 % to 88 % and 88 % to 82 % of their average final consumption in the reference period at their disposal. The repercussions of the emergency conditions on individual countries differed in point of fact, in part substantially, from the IEP group average. In the circumstances assumed to exist in the test the Federal Republic of Germany would have been hit much harder than the IEP group as a whole: with-

out compensatory deliveries under the emergency mechanism the available crude oil and product supply would have been over one-third smaller in the three test months of the first cycle whereas other IEP countries would not have been affected at all or only slightly and would therefore have been in a relative surplus position. For the second test cycle it was assumed that the emergency was generally more severe and bearing more heavily on other IEP countries.

On the onset of the assumed emergency the Federal Government's crisis regulations for the saving of energy were, after consultation with the Emergency Supplies Council, at once (simulatively) put in force. The measures which were initiated were targeted on the BMWi objective of safeguarding supplies for the productive areas of the economy and consequently focused primarily on economies in the private consumption of gasoline and light fuel oils. They were intended to ensure overall consumption economies of 10–12 % and 12–15 % respectively in the first and second cycles so that for the time being there would be no need to draw on the emergency reserves in order to augment supplies. As a matter of fact withdrawals from reserves had to be permitted on application during the first cycle already in order to cope with temporary supply bottlenecks which hampered some enterprises.

Intra-Company Adjustments

The first step towards an equitable distribution of the available oil supplies in the IEA area is taken in the "Phase 1 allocation" as it is called. In this phase the international oil companies are adjusting their world-wide supply plans to the emergency conditions. The supply situation in the individual countries in which their subsidiaries operate is not the sole yardstick for their redispositions but specific group interests (e.g. optimum throughput rates in all existing refineries) are taken into account. It was not to be expected therefore that this first step would by itself result in the desired supply situations in the various countries. The test revealed however that such internal adaptive responses by the oil companies alone can give great relief to countries in deficit: the gap in the Federal Republic of Germany was narrowed by about one-half in both cycles.

This supply situation in the Federal Republic of Germany as "planned" by the international oil companies for the three months of each cycle was worked out by means of an IEA data collation system which monitored the output, imports and exports and provided (combined) figures for crude oil and oil products in each country. The German NESO made, besides, use of the national data bank which differentiates between the various

Table
The AST-2 Supply Situation for Crude Oil
and Oil Products
in the Federal Republic of Germany

(in % of the Average End Consumption;
Base Period Final Consumption)

| Supply Situation | Cycles | Cycles | |
|--|--------|------------------|-------------------|
| | | First Test Cycle | Second Test Cycle |
| 1. Crude Oil Availability | | 41 | 46 |
| 2. Oil Products Availability | | 19 | 19 |
| 3. Total Availability: Test Start Position | | 60 | 65 |
| 4. Shortfall from Average Final Consumption | | 40 | 35 |
| 5. Total Availability after "Phase 1" | | 78 | 83 |
| 6. Remaining Shortfall compared with Average Final Consumption | | 22 | 17 |
| 7. Restrictions on Consumption and Withdrawals from Stocks | | 12 | 13 |
| 8. IEA Allocations in "Phase 2" | | 12 | 3 |
| 9. Allocation Entitlement in "Phase 2" | | 10 | 3 |
| 10. Uncovered Entitlement | | 2 | 0 |

products. While the IEA calculated the overall supply surpluses and deficits of the individual countries from the monitored data, it was left to the NESOs to analyse such detailed problems as for instance:

To what extent are individual enterprises in the country affected more severely than others?

It is one of the NESO's major tasks to see to it that the historic market structures are in great measure preserved. To give an example, the NESO must keep national refinery companies from "running dry" because they are incapable of transnational redistributions. This was a real danger, especially in the first cycle when firms of this kind would in "Phase I" have had to bear the brunt of the shortfall although they provide no more than about 10 % of the refinery output.

Are product-related imbalances between available supplies and requirements to be expected?

The product spread of the refineries may alter because of shifts in crude oil inputs, and requirements may change in response to dissimilar product-related restrictions on consumption. The Federal Republic of Germany experienced in AST-2 large deficits in heavy fuel oils and relative surpluses in naphtha and gasoline although the refinery inputs and consumer requirements deviated in the same direction. It is interesting to note that this problem arose in almost all the countries taking part in AST-2. This was due to the overriding importance of the economies in the gasoline sector. The IEA is therefore urging the member countries to pursue a more availability-oriented policy of demand restraint. The NESOs are to inform the IEA by standardized telex messages what imbalances are expected to affect firms and products, and these will, as far as possible, be taken into account when the residual supply entitlements are assessed; the IEA will for instance allocate extra-heavy crudes to a NESO for distribution to refinery companies operating only in the particular NESO's country.

Voluntary Offers of Supplies

When the supply position as it emerges after Phase I has been mapped out, the IEA calculates the remaining supply surpluses and deficits and puts the NESOs and IEA Reporting Companies into the picture. If an allocation is accorded to a NESO for its country, it makes inquiries among relatively undersupplied companies to find out their specific requirements, for instance in regard to crude qualities or oil products. If, on the other hand, the NESO's country is obliged to surrender supplies, it invites tenders for voluntary deliveries from relatively oversupplied firms. The IEA Report-

ing Companies notify the IEA directly of their offers to the NESOs. It is only natural that requirements are reported more quickly to the NESOs and the IEA than surpluses and, moreover, tend to involve larger quantities, but the participating companies are, on the other hand, aware of the fact that adequate tendering of deliveries is the touchstone for the voluntary character of the whole IEA emergency system.

The reports on residual requirements and offers of voluntary deliveries to the IEA are passed on by the NESOs to the IEA which now decides on the redistributions in the "Phase 2 Reallocation" by accepting the offer of Company A in Country 1 and placing the quantity of mineral oils in question at the disposal of Company B in Country 2. The individual countries are in this way put in a position to compose their delivery entitlements and obligations under the IEP. The IEA conceded to the Federal Republic of Germany an allocation entitlement corresponding to about 12 % of the average final consumption in the reference period for the first cycle and to about 3 % for the second cycle. The supplies voluntarily offered by companies in other countries which the IEA designated as suppliers to the Federal Republic did not cover the whole of the German allocation entitlement in the first cycle. The shortfall was taken into account for the second cycle so that the total deliveries in the end tallied approximately with the allocation entitlement.

National Fair Sharing

The IEA allocations do not however automatically ensure the equitable division of the mineral oils available to a country among the companies operating in its domestic market, the less so as each country decides its own criteria for the National Fair Sharing (e.g. constant market shares for all enterprises or equal capacity loading of refineries, etc.). In the Federal Republic of Germany the Supplies Coordination Group, the operative organ of the NESO, has been preparing parameters for the evening-out of supplies on a national level and also for the Fair Sharing according to specifications drawn up by the Federal Economic Ministry. Although the prerequisites for official intervention exist under the Energy Safeguarding Act, the redistributions on the national level are also based primarily on voluntary delivery offers and on the reports of domestic firms about their requirements. In the first cycle they came to a little under 10 % and in the second cycle to 17 % of the average final consumption. That the internal transactions in the Federal Republic in the second cycle reached almost twice the volume of the first cycle is not indicative of more complex supply situations but suggests rather that the les-

sons of the NESO's work have been taken to heart: larger quantities of mineral oils were moved around in an effort to improve the supply.

In the two test cycles together IEA crude oil and product allocations reached over 99 % of the cumulated allocation entitlement of the Federal Republic of Germany. Adding the oil companies' internal Phase 1 supply flows, the "fulfilment quota" of the IEA emergency mechanism rises to nearly 100 %. This is a result which — at least from the German point of view — may be regarded as positive evidence of the fundamental functional efficiency of the IEP system.

Viability of the Emergency System

In the post-test phase the German NESO prepared a report on the experience gained through AST-2 which confirmed the essential functional efficiency of the IEA emergency system but also indicated weaknesses of the mechanism on the international and national level and offered recommendations for their elimination. The responsible bodies in the German mineral oil industry endorsed these recommendations by and large, and the Federal Economic Ministry also takes a positive view of them although it is deferring a final judgment. The details are to be clarified by a working group in which the Ministry, the Federal Office for Industry, the Federation of the Mineral Oil Industry and the mineral oil trade associations are represented. The recommendations focus on the following points:

- The NESO set-up was regarded as, fundamentally, practicable, sensible and efficient and therefore meriting validation.
- To allow swift and effective action to be taken in the event of a disruption of oil supplies a minimum of stand-by facilities has to be provided beforehand. The prerequisites for this are being created by the Federation of the Mineral Oil Industry in Hamburg.
- The test revealed the existence of congruity problems, symmetrization faults and gaps in the data systems used by the IEA and NESO. The data banks should therefore be complemented and in great measure integrated.
- The German NESO collected only overall figures for the supply situation in the Federal Republic. As regional imbalances may arise and are indeed very likely to arise, the Federal Republic should be regionalized into four large supply areas.
- The complexity of the IEA emergency mechanism and the national supply equalization system made it sometimes impossible for the people operating the test to keep all the details in view

and appreciate their implications. A national "Handbook" should therefore be prepared to supplement the Emergency Management Manual which has been published by the IEA and to explain all the operational processes, organizational patterns, etc., in the NESO and the enterprises reporting to it.

A National Data Test seems to be called for and should be arranged before the next IEA emergency test — AST-3 — in order to check the revised data systems and also to provide training for the NESO members and the emergency experts of the companies which participate in the system.

Simplifying assumptions had to be made in AST-2 regarding the conditions at the launching and in the course of the test, partly because the preparations by the various national emergency organizations had not progressed to the same stage. For instance, it was assumed that the supply of oil products would continue with relatively little disruption. This does not seem to be a very realistic assumption, especially in view of the volatile nature of the Rotterdam market which would react strongly in the event of an emergency, at least in the short term. AST-2 was thought to suffer from another shortcoming: it was a purely quantitative exercise. If price movements were considered as well, the test would however acquire a further simulation dimension and become unworkable.

The Next Stage

The technical details of the IEA emergency mechanism tested in AST-2 are not the last word. It was one of the purposes of this test to check the practicability of theoretical notions. Besides, viable supply equalization systems, being of necessity very complicated, have to be built up step by step and to be tested in practice. A dynamization of the test procedure is therefore contemplated as the next "development stage" of the system, and this will be tested by AST-3. The *intra-* and *extra-*company reallocations which it is impossible to keep apart in practice will also be made to overlap in this next IEP test which will, moreover, be launched without the long and intensive preparatory period which was needed for AST-2.

Although the IEA emergency mechanism and the national equalization systems are in some parts still incomplete, it can be stated that the mineral oil industries of the major industrialized countries of the West are today already prepared for a crisis and would be able to cope with occurring allocation problems. It is to be hoped that this outcome of the AST-2 contingency test has helped to forestall a real disruption of supplies.