

GLO1477

Geo-thermal tech export

## **GEOHERMAL TECHNOLOGY EXPORT**

Geothermal resources are often developed in 50 or 100 MW increments. This incremental, or staged development allows for the generation of electricity from the first stage while the developer gains knowledge about the resource and while the second stage is being constructed.

### **JOBS**

Each 50 MW geothermal field development and power plant installation will create 300 person-years of new employment at the site. To make the greatest use of the experience and expertise of U.S. geothermal companies, most of these skilled drilling and construction jobs will employ U.S. citizens. The supply of materials and equipment for a 50 MW geothermal plant requires more than 1000 person years in manufacture and transportation to the foreign site. Except for the steam turbine, which will probably be manufactured in Japan, the other facilities, well casing pipe and steam gathering pipe, the generator, and control equipment, will be manufactured in the U.S.

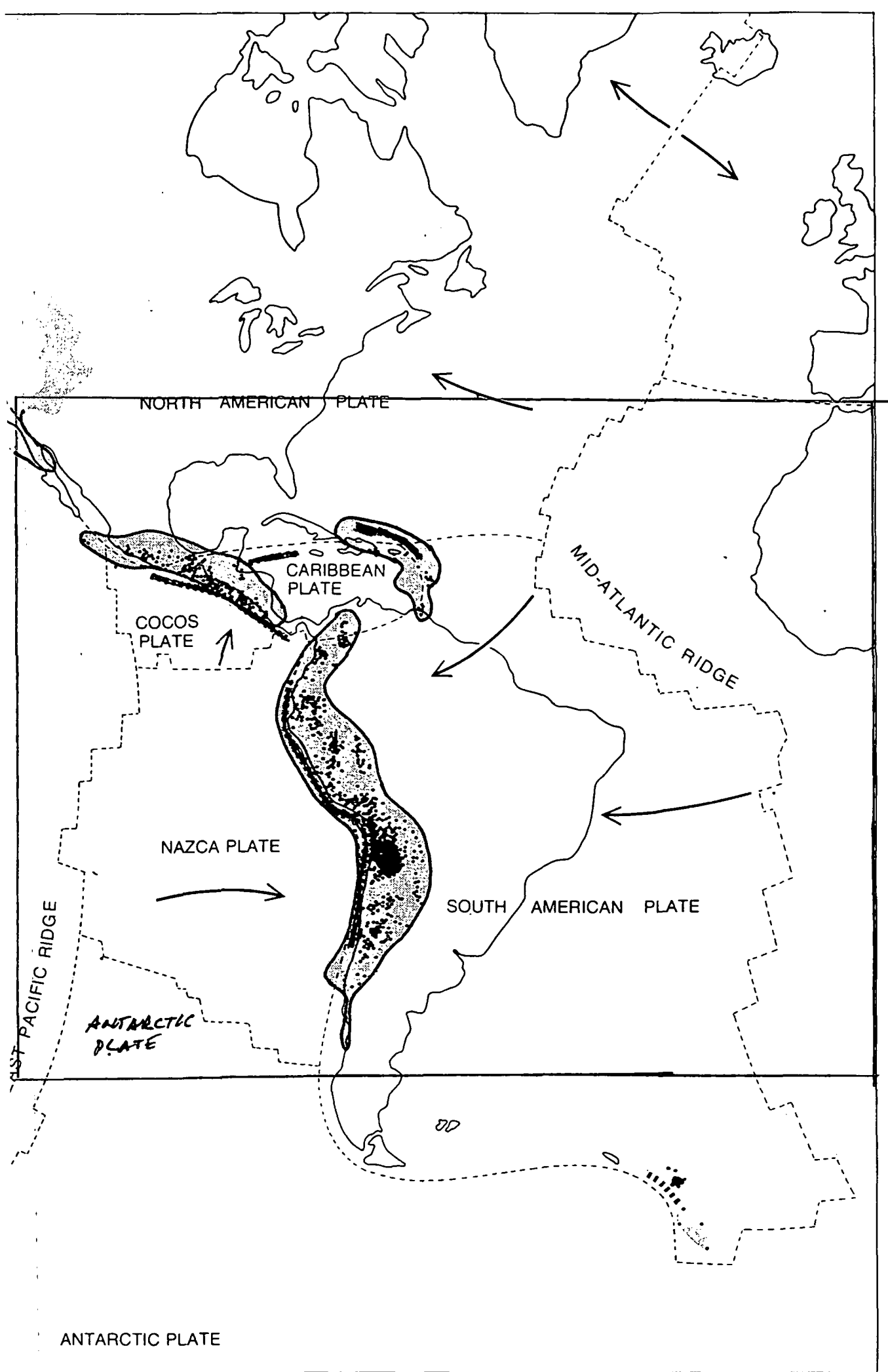
The operation of the well field and power plant will employ approximately 40 people full-time for approximately 12 years, for a total of 480 person years. At the end of that time the well field and power plant will be turned over to the host country as part of the "Build Operate and Transfer" (BOT) contract.

### **GLOBAL WARMING REDUCTION**

A 50 MW geothermal plant produces no nitrous oxides and only minor amounts of sulfur dioxide and carbon dioxide. U.S. development of geothermal resources in foreign countries directly offsets the need for fossil fuel power plants and their associated air emissions. Most geothermal plants operate at an availability factor greater than 90%, and in one year a 50 MW plant will produce about 395,000 megawatt hours (MW-hr) of electricity. In one year the geothermal plant will reduce carbon dioxide emissions by 434,000,000 kilograms (kg) versus coal power plants, by 331,000,000 kg versus oil power plants, and by 213,000,000 kg versus natural gas power plants. Geothermal electrical generation will reduce sulfur dioxide emissions during one year by 3,400,000 kg versus coal and by 1,900,000 kg versus oil. Nitrous oxides will be reduced by 1,400,000 kg for coal, by 690,000 kg for oil, and by 760,000 kg for gas.

### **IMPROVED BALANCE OF PAYMENTS**

Each 50 MW geothermal electrical development overseas requires the investment of approximately \$100,000,000 in the well field and power plant. During the approximately 12 years of operations for BOT contracts, over \$125,000,000 will be returned to the U.S. in capital, profit, and salaries. The export of the superior U.S. technology in geothermal energy development is significant in light of the potential 80,000 MW to be installed in developing countries. The U.S. geothermal industry is striving to take 25% of this world market.



ANTARCTIC PLATE

TRAINING IN ALTERNATIVE ENERGY TECHNOLOGIES PROGRAM  
PARTICIPANT LIST--SESSION 8

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TRAINING IN ALTERNATIVE ENERGY TECHNOLOGIES PROGRAM  
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                      (5) Ali, Maawad Taha  
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(12) Smith, Melvin  
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Ministry of Lands, Mines, and Energy  
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CERER  
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12. Thailand
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Head Fossil Fuel Section,  
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Bangkok, Thailand
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5/5/89

Dennis -

Here are the lists for the CEC 1987  
Geo. Reverse Trade Mission:

1. List of Vendors
2. List of International Invitees

Also included is a copy of the cover of  
the report I took these lists from. The  
report was prepared by Dave Anderson  
(GRC-hat).

Let me know if you need any more  
info. I'll talk to you the week before  
Miami Conf. about hand-out reports.

Thanks for stopping by yesterday.

Tan

**FINAL REPORT**

**TWELVE MONTH FOLLOW-UP REPORT  
OF THE  
CONFERENCE TO PROMOTE INTERNATIONAL  
SALES OF U.S. GEOTHERMAL EQUIPMENT  
(CORRECT PROJECT)**

**PRODUCED UNDER THE  
U.S. DEPARTMENT OF ENERGY  
GRANT NO. DE-FC07-87-1012709**

**DECEMBER 1988**

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## LIST OF VENDORS

The following list of vendors participated in the field tours and workshops during the program.

ANADRILL-SCHULUMBERGER Roger Ross-Smith 4000 Easton Drive, No. 21 Bakersfield, CA 93309 805/325-0271	Downhole Logging Tools
BARBER NICHOLS ENGINEERING John Ferrero 6325 West 55th Avenue Arvado, CO 80002 303/421-8111	Binary Cycle Power Plants
BEN HOLT CO., THE Clem Giles 201 South Lake Avenue Pasadena, CA 91101 213/684-2541 Fax: 818/584-9210	Power Plant Design & Construction
BRIDWELL CONTROLS Barbara Bridwell 1733 Center Avenue Martinez, CA 94553 415/228-5084	Computer Well Field Control Programs
COMPLETION TECHNOLOGY CO. Robert Johnson 7444 Getty Road Houston, TX 77086 713/961-3336 Telex: 775 781	Downhole Completion Tools
COOPER INDUSTRIES, INC. WKM Division Ray Sied P.O. Box 2117 Houston, TX 77001 713/499-8511 Fax: 713/499-5211	Well Heads and Production Valves

DRAVO CONSTRUCTORS INC.  
Jean Bodylski  
226 Airport Parkway  
Suite 200  
San Jose, CA 95110  
408/291-2757  
Fax: 408/298-2107

Power Plant Design &  
Construction

DRESSER  
Boyd Green  
P.O. Box 644  
Healdsburg, CA 95448  
707/433-9446

Drilling Mud

DRESSER-RAND  
Robert M. Hicks  
Electric Machinery  
1661 No. Raymond Avenue  
Anaheim, CA 92801  
714/879-2490

Generators

DRILEX SYSTEMS  
Jim Hanson  
P.O. Box 1231  
Healdsburg, CA 95448  
707/433-6969  
Fax: 713/880-0873

Drilling Tools

EASTMAN CHRISTENSEN CO.  
Nic Nickels  
320 Tesconi Circle, Unit P.  
Santa Rosa, CA 95401  
707/523-1751  
Fax: 707/523-1398

Directional Drilling

ELLIOTT COMPANY  
Albert Zoba  
P.O. Box 384  
City Of Industry, CA 91749-0384  
818/810-2121  
Fax: 818/964-0506

Turbine/Generators

ENERGYLOG CORPORATION  
Randy Palmer  
P.O. Box 162580  
Sacramento, CA 95816  
916/452-7541

Mud Logging Service

EXLOG SMITH  
Alan Frazer  
P.O. Box 1349  
Healdsburg, CA 95448  
707/431-1700

Mud Logging Services

FOSTER/WLG SYSTEMS DIVISION  
Robert Hayes  
3600-C Standish Avenue  
Santa Rosa, CA 95407  
707/585-1981  
Telex: 384 556

Valves and Well Heads

FLOUR DANIEL  
William Sullivan  
3333 Michelson Drive  
Irvine, CA 92730  
714/975-4034  
Fax: 714/975-6549

Power Plant Design &  
Construction

GEOTHERMAL POWER CO., INC.  
Gary Shulman  
1460 W. Water Street  
Elmira, NY 14905  
607/733-1027

Flash Steam Power Plant

GEOTHERMEX, INC.  
James Koenig  
5221 Central Avenue  
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Richmond, CA 94804  
415/527-9876  
Fax: 415/527-8164

Exploration-Reservoir  
Evaluation Engineering

GRACE DRILLING  
William Summers  
6804 Fishback  
Bakersfield, CA 93308  
805/589-6581  
Fax: 805/589-5115

Drilling Services

HALLIBURTON SERVICES  
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Well Cementing Services



H & H OIL TOOL, CO., INC.  
Joe Turk  
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Blow-Out Prevention Equipment

HONEYWELL INC.  
IASD Systems Division  
Dennis Lajoie  
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Phoenix, AZ 85023  
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Control Systems

JOHNSTON PUMP CO.  
Jack Frost  
16021 Aclolante Avenue  
Azusa, CA 91702  
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Downhole Line Shaft Production  
Pumps

LOFFLAND BROTHERS COMPANY  
James Cox  
P.O. Box 2847  
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918/622-9330  
Fax: 918/664-0828

Drilling

MAFI-TRENCH CORPORATION  
James Trotter  
3037 Industrial Parkway  
Santa Maria, CA 93455  
805/928-5757  
Fax: 805/925-3861

Turbine/Generators

MAGMA POWER COMPANY  
Richard Dalton  
11770 Bernardo Plaza Court  
Suite 366  
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619/487-9412

Crystalizer/Clarifier Systems  
for High Dissolved Solids

M-I AIR DRILLING  
Ken Deakins  
14800 Grove Street  
Healdsburg, CA 95448  
707/579-5401

Air Drilling

MESQUITE GROUP INC.  
Don Campbell  
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Fullerton, CA 92632  
714/738-8224

Exploration-Reservoir  
Evaluation

NASH ENGINEERING  
Ronald Machens  
2100 E. Howell Avenue  
Unit 211  
Anaheim, CA 92806  
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Fax: 714/978-1525

NCG Air Removal Equipment

N.L. BAROID/POLY PLUG  
Ken Baughman  
Box 280  
Sandia Park, NM 87047  
505/281-5191

Lost Circulation Control

PIPE RESTORATION SYS. INC.  
James Dodd  
136 Forster Avenue  
Mt. Vernon, NY 10552  
914/664-6867

Brine Line Cleaning Systems

PRUETT LOGGING SERVICES  
Eddy Pruett  
8915 Rosedale Highway  
Bakersfield, CA 93312  
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Brine Filters

SECURITY ROCK BITS  
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Healdsburg, CA 95448  
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Drilling Bits

UNOCAL Geothermal Division  
Harry Bain  
P.O. Box 6854  
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Major Geothermal Operator

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PORTUGAL Accepted invitation but declined in the last week due to pressing legislative commitments

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Joao Gago Tavares  
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WEST INDIES Accepted invitation but was unable to attend due to work demands.

Brinley Selliah  
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# Comparative Reserves Definitions: U.S.A., Europe, and the Former Soviet Union

J.D. Grace, Troika Energy Services  
R.H. Caldwell, SPE, The Scotia Group

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## Summary

Reserves definitions in use in the Former Soviet Union (FSU) are described and discussed. The U.S. Securities and Exchange Commission (SEC) and SPE deterministic definitions and the 1983 World Petroleum Congress (WPC) probabilistic (1P, 2P, and 3P) definitions commonly used in Europe are compared with the A, B, C, and D system used in the FSU. We discuss the strengths and weaknesses of each system, the implication for quantification of reserves and resources in each area, and the translation difficulties between systems.

## Introduction

Reserves definitions have evolved in response to specific goals. Requirements and standards are fundamentally different when the goal is consistent financial reporting or providing collateral than when the goal is making an investment decision. As a result, the fiscal environment and maturity of the reserves evaluation target have played a key role in the evolution of formal reserves definitions. The role of "certainty" is at the core of such differences. While such philosophical differences are fundamental, they are also a serious stumbling block in communicating basic quantitative information on oil and gas reserves.

U.S. definitions are most applicable to mature situations and tend to be conservative, resulting in considerable reserves growth through positive revision. Lower confidence categories normally are not formalized, which limits their use in immature field evaluations and for corporate planning. WPC definitions are probabilistic and use uncertainty as the criterion for defining reserves categories. The FSU system recognizes reserves categories as a function of maturity but tends to apply economically unfounded theoretical aspects to the quantification process. As a result, such estimates tend to err on the optimistic side.

With the U.S. oil industry rapidly becoming international and with the FSU an industry focal point, it is vital to understand the different reserves evaluation systems. We then can comprehend the difficulties in translation between systems and can better understand the valuable information in the lower confidence categories, which is vital for evaluating international investment decisions. Also, future revisions to SPE defi-



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nitions will benefit from certain concepts incorporated in the FSU system.

## Background

SPE formed a committee some years ago to investigate the merits of changing the existing reserves definitions. There was a growing concern in the industry that SPE definitions had application drawbacks in certain circumstances and that application of SPE definitions was difficult or even inappropriate when addressing many international reserves evaluation situations.

The main controversy concerns methods of integrating or translating the deterministic approach adopted by the SPE definitions into the WPC definitions, which are probabilistic and are the standard in some international areas. To add fuel to this fire, the recent "opening" of the FSU introduced a third system, which is based on concepts common to SPE and WPC systems. Because few details and little discussion on the FSU system has reached western literature, this paper documents FSU definition construction and then compares and contrasts aspects of the three systems. Refs. 1-5 provide detailed discussions of the SPE and WPC systems.

## Resources vs. Reserves

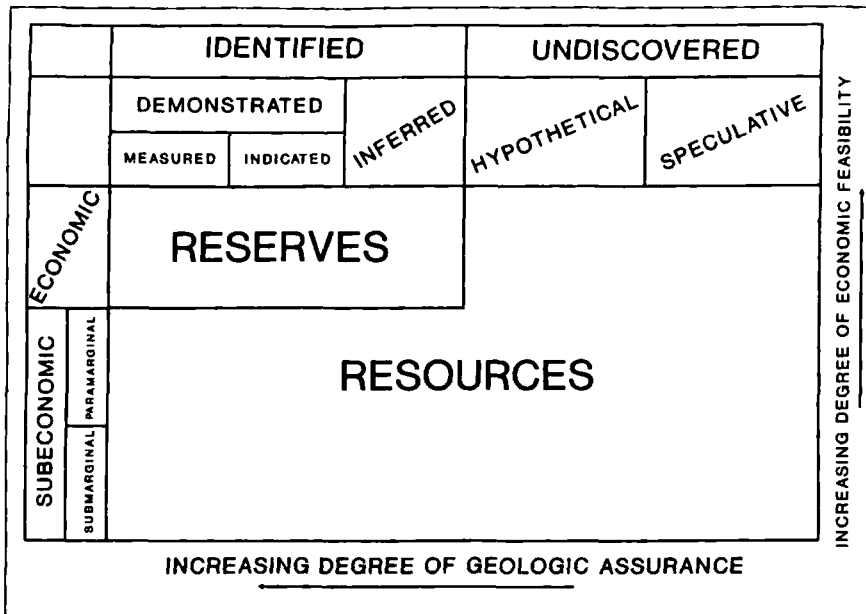
The FSU reserves classification system adopts an approach that is fundamentally different from SPE and WPC systems. The FSU approach first recognizes the natural progression of resource identification, delineation, and conversion to reserves. Resources and reserves are classified by

where a reservoir, field, or region is in this sequence. This is similar to the classic concepts proposed by the U.S. Geological Survey (USGS) and diagrammatically expressed as the McKelvey box.<sup>6</sup> While the industry embraces this concept, formal linkage of McKelvey's "measured," "indicated," and "inferred" categories with standard industry use of "proved," "probable," and "possible" has not occurred because of differences in concept and purpose.<sup>7</sup> However, the McKelvey box is extremely useful for illustrating conceptual similarities and differences between reserves classification systems.

McKelvey, former director of the USGS, developed the box in 1972. The box represents the total volume of unproduced mineral resources and classifies such volumes with reference to a horizontal axis representing degree of geologic and engineering certainty and a vertical axis representing the range of economic feasibility of mineral recovery (Fig. 1).

The economic and geologic axes each have two principal divisions. On the geologic axis, the logical division is between discovered mineral deposits and those that are postulated with varying degrees of certainty but remain undiscovered. This line moves right as more resources are discovered and converted to reserves. Likewise, as reserves are produced, they exit the upper left corner of the box to become cumulative production. On the economic axis, the division is between volumes that have technical characteristics and a combination of costs and prices that make them profitable





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**Fig. 1—The McKelvey box.**<sup>6</sup>

to recover and volumes that do not. This line moves down as technological advances increase the fraction of the resource base that is economically extractable and moves up or down in response to changing prices and costs.

The upper left sector of the McKelvey box contains reserves. The horizontal, or geologic, axis includes the oil and gas volumes for which there is the greatest confidence in their existence and characteristics. They have been discovered and characterized by information obtained through drilling. The vertical, or economic, axis includes only those volumes of discovered minerals for which there is the highest certainty about the economic feasibility of recovery.

Resources fill the rest of the McKelvey box. These resources are minerals that are undiscovered or have been discovered but for which economic recovery is uncertain. This judgment of economic and technical feasibility of recovery is one of the principal differences between the FSU and western

approaches to reserves and resource classification.

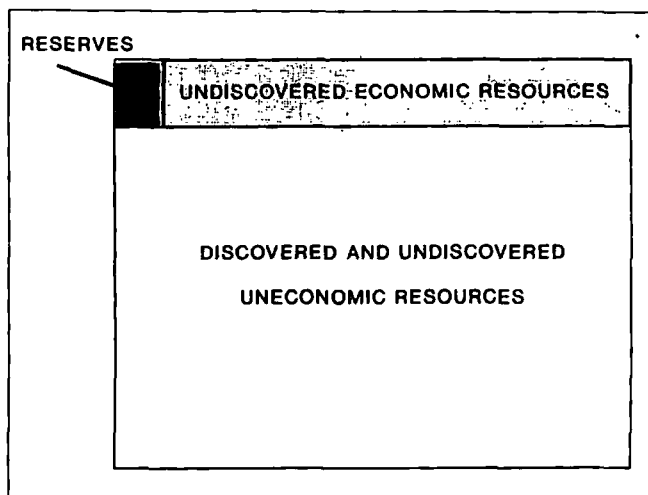
While conventional depiction of the McKelvey box involves symmetrical divisions on each axis, the actual volumes are weighted significantly toward the resource side as opposed to the reserves side. Fig. 2 is a scaled example of a McKelvey box representing resource and reserves estimates for all the U.S. This example emphasizes the long-term picture for reserves development potential as resources are converted to reserves and the relatively small reserves volume under standard U.S. definitions. As will be discussed later, the FSU system tends to encompass the entire spectrum of certainty from both geologic and economic perspectives.

We simplified the original McKelvey box (Fig. 3) by not subdividing the “undiscovered” portion of the geologic axis or the subeconomic portion of the economic axis. In addition, the “inferred” portion of the reserves area has been expanded and is

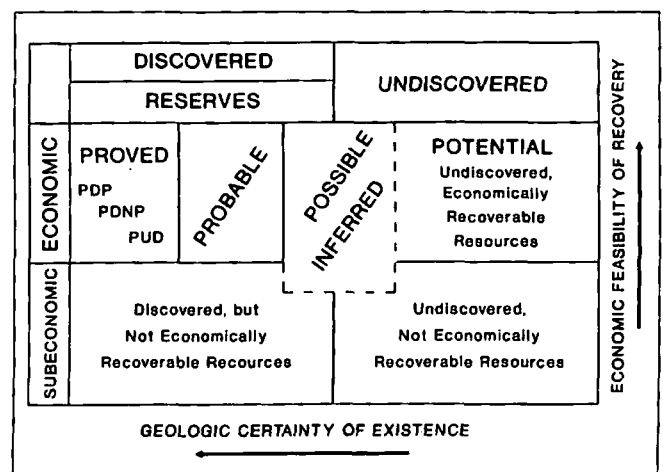
depicted by an oversized dashed box that crosses the technical and economic axes of the box. This delineation shows that such volumes are at the technical and economic margin of producibility and include volumes that remain undiscovered or uneconomic at the year of discovery (and for some time after).

**Concept of FSU Reserves Classification**

The best way to understand the evolution of the FSU reserves classification system is to imagine an E&P program in a virgin area.<sup>9</sup> The program begins with very coarse regional analysis, leading to estimates of the bulk volume of undiscovered hydrocarbons in the region. If the region is prospective, exploration ensues, leading to the identification of discrete exploration targets and drilling of the first new field wildcat exploratory wells. With a new field discovery, a new process begins that concludes with the



**Fig. 2—McKelvey box drawn to scale. 1980 U.S. Dept. of the Interior oil estimate.**<sup>8</sup> Areas represent class volumes.



**Fig. 3—Modified McKelvey box showing the position of U.S. reserves definitions. PDP = proved developed producing, PDNP = proved developed nonproducing, and PUD = proved undeveloped.**

RESERVES	
CLASS	ACTIVITY
D2	REGIONAL ANALYSIS
D1	REGIONAL EXPLORATION
C3	PROSPECT IDENTIFICATION WILDCAT DRILLING
C2	NEW FIELD DISCOVERY INFIELD EXPLORATION
C1	DELINEATION DRILLING
B	DEVELOPMENT PLAN
A	PRODUCTION

Fig. 4—CIS program and reserves class concept.

delineation of the first reservoir found and exploration within field boundaries for new accumulations of oil and gas. After each reservoir is delineated, a drilling and production plan is prepared, development drilling is conducted, and finally, full-scale production ensues (Fig. 4).

**Regional Exploration.** In the first stage, when a frontier region is being surveyed, regional geology, coarse geophysical measurements (such as potential field data and very wide-grid seismic data), and basin analogs are used to estimate oil and gas resources. These are bulk-volume estimates because the volumes of estimated undiscovered hydrocarbons are not associated with identified discrete structures but usually are forecasted as an average hydrocarbon saturation per unit of sedimentary rock volume.

These bulk-volume estimates of regional potential are the lowest class of resources in the FSU system, D2. If the region has at least one commercial discovery, bulk-volume estimates are classified as D1. Mapping at this stage is typically at 1:1,000,000 to 1:200,000. Hydrocarbon plays are identified but not as specific drillable prospects. Drilling is constituted only by stratigraphic tests and COST (expendable) wells.

**Prospect Identification.** The second stage occurs when exploration has identified a discrete prospect from geologic and geophysical data but before the first wildcat well is drilled. At this stage, a new close grid of seismic data typically has been shot over the prospect, and mechanisms for closure, sourcing, and reservoir properties have been proposed. Mapping is at 1:100,000 to 1:50,000.

This stage ends with the drilling of a wildcat exploratory well, for which the Russian term *poiskovaya skvazhina* is used. Oil and gas resources in a "drillable" discrete undrilled prospect are estimated and placed in the C3 resource category. FSU exploration organizations analyze the technical risk of

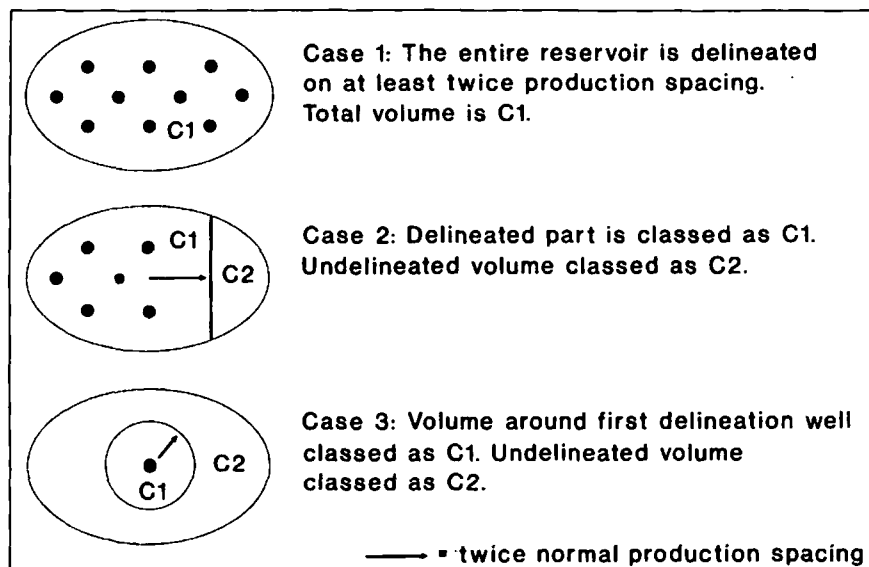


Fig. 5—Distinction between Category C1 and C2 reserves.

exploration prospects similarly to their western counterparts. Likewise, predrill estimates of prospect size are uncertain and often are expressed as a probabilistic distribution or with error terms (e.g.,  $\pm 20\%$ ). If an exploratory well is successful, the hydrocarbons discovered by that well will be upgraded to Categories C2 and C1.

**Field Delineation and Reservoir Extension.** The next stage in reservoir development is to drill confirmation and delineation wells. These types of wells are called *razvedochnaya skvazhina* in Russian. The drilling is combined with geophysical and production tests to determine the reserves volume in the same way as in the West. During this phase, for a specific discovered reservoir, the estimated volume of recoverable hydrocarbons is upgraded from Category C2 to C1 on the basis of engineering information collected on the reservoir containing those volumes. Pragmatically, categorization is tied to the delineation drilling density in the reservoir (Fig. 5).

While the discovered reservoir with Categories C2 and C1 is being studied and analyzed to support reserves certification, parallel exploratory work is conducted in the field to identify new reservoirs. An exploratory well drilled for a new pool objective in a discovered field, called a new pool wildcat in the U.S., is called a *poiskovaya skvazhina* in Russian. Correspondingly, the reserves imputed to an undrilled new pool prospect in a discovered field still are classified as Category C3.

**Certification and the Role of the GKZ.** Under the FSU system, when the delineation program for a reservoir was complete, that reservoir was proposed by the Ministry of Geology organization that discovered the field to be "certified" by the State Committee on Reserves, *Gosudarstvennyy Komitet po Zapasam* (GKZ). This "all-union" agency headquartered in Moscow served two primary functions: (1) to certify

reserves according to guidelines for each category and (2) to approve a development drilling and production plan for each reservoir. After certification, the local organization of the Ministry of Oil & Gas took responsibility for hydrocarbon production, processing, and transportation to market.

**Production From GKZ Certified Reserves.** Oil and gas production in the FSU was performed (in theory) according to the development drilling and production plan approved by the GKZ. When such a plan was proposed for a specific reservoir (or part of a reservoir) by the Ministry of Oil & Gas and approved by the GKZ, ministry engineers then could certify the volumes of oil and gas covered by the plan as Category B reserves. Development of B-level reserves implies that the field had or was slated not only for development drilling, but surface production facilities and transportation to market. In this respect, Category B and A reserves meet part of the requirements for "proved" reserves in the U.S.

Once development wells were drilled and the reservoir began producing, the reserves, in the drainage areas of producing wells, were upgraded from Category B to the highest class in the FSU system, Category A. As production continued, increasing oil and gas volumes from outside the producing well drainage area would be upgraded progressively. Category C2 reserves would be elevated to C1, and C1 reserves would be designated as B after a production plan was submitted to and approved by the GKZ. Reserves in Category B would be designated as Category A as new producing wells came on line.

### Comparison Between U.S. and FSU Systems

**Key Difference: Economic Recoverability.** A key difference between FSU and U.S. approaches to reserves classification is the way each treats the effects of technology and ec-

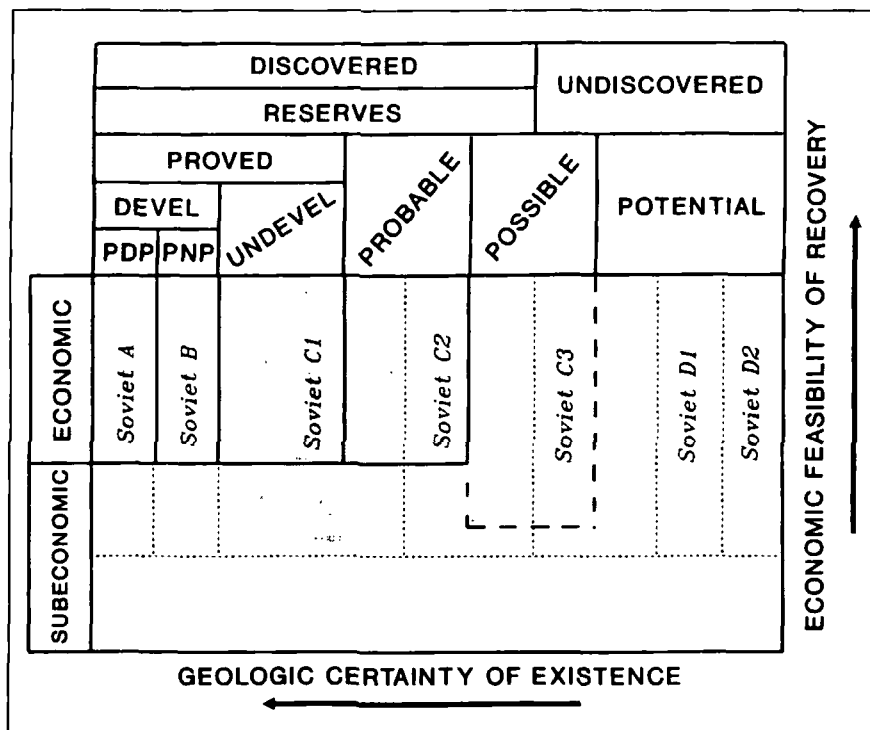


Fig. 6—Comparison of U.S. and FSU systems, PNP = proved nonproducing.

onomics on the fraction of recoverable in-place hydrocarbons. The U.S. approach is conservative, counting only volumes that are extractable under existing technologic and economic conditions. The FSU approach is to count as recoverable the highest fractions of in-place oil and gas that could be justified by technologic and economic conditions that are theoretically possible but may not exist at the time of the estimate.

This would allow for higher recovery through the application of, for example, a surfactant-enhanced waterflood, even though that technology had not been demonstrated for a given reservoir (or even in analogous reservoirs). Moreover, the fact that the surfactant-enhanced waterflood could not be afforded with the foreseen financing or that the required chemical surfactants were unavailable would not exclude these marginal volumes of oil from inclusion in reserves.

Therefore, in each class of A through D reserves and resources, implicit recovery factors, which are the maximum theoretical recovery, are applied to in-place oil and gas resources. This is at fundamental odds with the western approach. The systematic effect of this difference is that, viewed from the western standard, FSU reserves and resource estimates are biased positively—that is, they are too high.

**“Booked” Vs. “Unbooked” Reserves.** In part to address the positive bias in all categories of FSU reserves and resources, another subdivision was established that applies to Categories A through D. The distinction is between “*balansovyye*” and “*zabalansovyye*,” or “booked” and “unbooked” reserves, respectively. The term

“booked,” used in the western industry is as close as any term to the FSU distinction.

In all four categories, booked reserves are those parts of A, B, C, and D reserves and resources that are economically producible with modern technology. The unbooked fraction is not economically producible. Economically producible seems similar to a phrase in the definition of proved reserves in the U.S. In practice, however, it is uncertain that the same division between booked and unbooked would be made by U.S. and FSU engineers with the same data. Again, FSU practice makes a greater fraction of total oil and gas in place economically producible than would be so classified in the west.

In light of this, yet another distinction is made within booked reserves, dividing them into “extractable” and “unextractable” (*izvlekaemye* and *neizvlekaemye*, respectively) reserves. Here, the word “extractable” does not refer to the technological ability to produce the oil and/or gas. Instead, it is the fraction of booked reserves that can be produced within the budget of the producing association responsible for the field. This concept comes much closer to the U.S. notion of producible under current economic and technologic conditions.

Two more classes of reserves are the “commercial” and “industrial” reserves sometimes cited in the press. These classes appear to have no place in the FSU system.

Each class, A through D, has a logical correspondence to a place in the McKelvey box. Fig. 6 illustrates a modified McKelvey box for U.S. reserves definitions. When attention is restricted to the axis of geologic certainty of existence (the horizontal axis), the western and FSU boundaries are probably quite similar. The difference is how far

**“A key difference between FSU and U.S. approaches to reserves classification is the way each treats the effects of technology and economics on the fraction of recoverable in-place hydrocarbons.”**

down the axis of economic feasibility of recovery (the vertical axis) one should come. The FSU engineer most likely would draw that line much lower on the vertical axis than his/her western counterpart.

It is unclear how much adjustment on the economic axis is required to make Category A+B, and perhaps some C1, reserves, comparable with U.S. proved, or proved+probable. Clearly, to try to refine the system to support rational planning of oil and gas supplies, the FSU added the “booked” concept to limit some of the optimistic excesses of the original Categories A through D system. However, even including the booked concept, economically producible had an open-ended aspect. It seemed to imply that booked reserves should include all volumes that would be economic if the producing association had an unlimited budget. A further refinement of booked was added in the subdivision of extractable and unextractable, where economically producible was limited to what could be paid for.

Does this make the booked and extractable subdivisions of A+B+some unknown fraction of C1 equal to the U.S. proved or proved+probable categories? Probably, but no general rule with simple fractions can be applied for any given reservoir. In the end, calculations must be made *de novo*, in the best instance beginning with the raw data. If raw data are unavailable, it is best to begin with “geologic” reserves estimates, the U.S. equivalent to original oil or gas in place. It is here in the calculations that the two systems begin to diverge systematically.

**Comparison of SPE and WPC Definitions.** SPE definitions are deterministic: that is, a single figure is calculated for each reserves category. The reserves categories

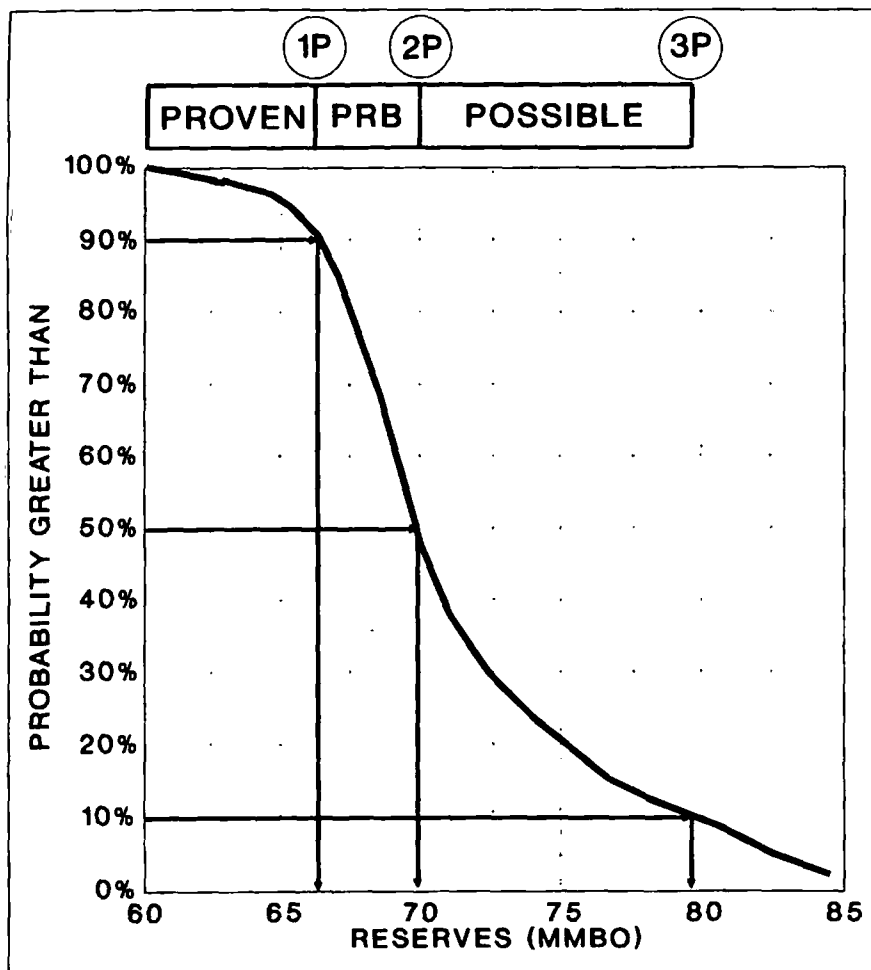


Fig. 7—WPC reserves definitions.

represent different confidence levels, with proved reserves representing those that can be recovered with reasonable certainty under prevailing economic conditions. The reasonable certainty test is not quantified, but is left to the evaluator's professional judgment.

Probable and possible reserves are defined by SPE, but such definitions are so vague, they are of little consistent quantitative value. Probable reserves are defined as being less certain than proved but likely to be recovered, and possible reserves are less certain than probable reserves. A fundamentalist approach to these statements would imply that 50% certainty separates probable from possible reserves and that proved reserves (reasonable certainty) are bounded by 100% certainty at the top end, but with the boundary between proved and probable not formally quantified by a certainty level or probability.

The U.S. reserves classification system is tuned to its legal and regulatory environment, private mineral ownership, numerous interest owners, and generally small tracts (particularly by international standards). The luxury of being able to perform a reserves evaluation at the reservoir level is a rarity. Instead, analysis tends to focus on the individual well or lease because ownership, and hence fraction of evaluated reserves and resulting cash flow, is expressed this way. This constraint contributes to placing an emphasis on performance projection (decline

curves), resulting in a status quo reserves depletion forecast. It is a rarity to study or comment on recovery factors, producing efficiency, or the potential to optimize rates and/or increase reserves through operational changes, improved pump technology, etc. In other words, probable and possible reserves are not considered in most cases. In contrast, both FSU and WPC definitions are based on reservoir-level treatment and bracketing of all potential reserves in a reservoir. Such systems thus facilitate the identification of under-recovered situations.

Proved reserves estimates tend to be conservative under SPE definitions, resulting in significant reserves growth through positive revision. Conservative estimates are a logical consequence of the requirements that such estimates be used for lending and regulatory reporting (including ceiling test for asset write downs), purposes where it is in the best interests of all parties to avoid surprises. As such, the definitions have been presented by some in the guise of a bulwark against fraudulent practices.<sup>10</sup> The tight focus on proved reserves with little or no scrutiny or quantification of the lower confidence categories can lead not only to missed reserves growth opportunities, but also to financial ruin when the assumption that the lower confidence reserves exist is invalid. This factor may be a key contributor to the demise of the so-called income funds.<sup>11</sup>

From a larger perspective, recognizing the mature state of U.S. production where major company domestic reserves are systematically being broken up and sold to smaller companies, a very real concern is that the knowledge of potential reserves growth opportunities (probable and possible reserves) will not change hands with the sale and will be lost forever. That is, the perceived creation of reserves and values by having a smaller, lower-cost operator may add reserves on the economic axis of the McKelvey box, but an equivalent or greater loss may occur on the technical (geologic) axis if critical knowledge is not passed on.

The previous comments all suggest the need for a broader view of reserves and a more logical revision process than SPE definitions embrace. A more logical revision process would allow increased use of the definitions in such areas as investment planning, where values at the proved-plus-probable level are the target. Until SPE definitions are expanded to include more precise definitions for probable and possible reserves (both of a technical and economic origin), there will not be a mechanism for logical reserves revision. Revisions will continue to be catastrophic, with proved reserves appearing and then disappearing. The caveat that all reserves estimates are imprecise and subject to revision is simply lip service to the problem, not its solution.

WPC definitions are probabilistic: the range of potential reserves in a reservoir is determined as a distribution and that distribution is sampled at defined levels of cumulative probability (certainty) to become the defined reserves values. Monte Carlo techniques are used to construct the initial distribution of potential reserves in a reservoir.<sup>12,13</sup> Although definitions and use vary, general use is that proven (1P) reserves represent a 90% certainty level; proven + probable (2P), a 50% certainty level; and proven + probable + possible (3P), a 10% certainty level (Fig. 7). The 3P case has a 10% probability that actual reserves will be greater than the estimated value and a corresponding 90% probability that actual reserves will be less. WPC definitions provide an overall indication of confidence in the evaluation itself (Fig. 8). In the immature case, 1P, 2P, and 3P values are divergent, while in the mature (higher-confidence) evaluation, values are closer together with most reserves in the proven category.

Other terms with the 2P values as a foundation have been proposed<sup>12</sup> to impart an economic bias.

1. *Commercial*—commercially recoverable at current economic conditions and with governmental approval to proceed, similar to FSU Categories A and B booked reserves.

2. *Potentially commercial*—having no accepted development plan, similar to FSU Categories C1 and C2 booked reserves.

3. *Technical*—covers operating costs but not capital costs to develop, similar to FSU unbooked reserves.

4. *Prospective*—undiscovered, similar to FSU Category C3 and perhaps some fraction of Category D reserves.

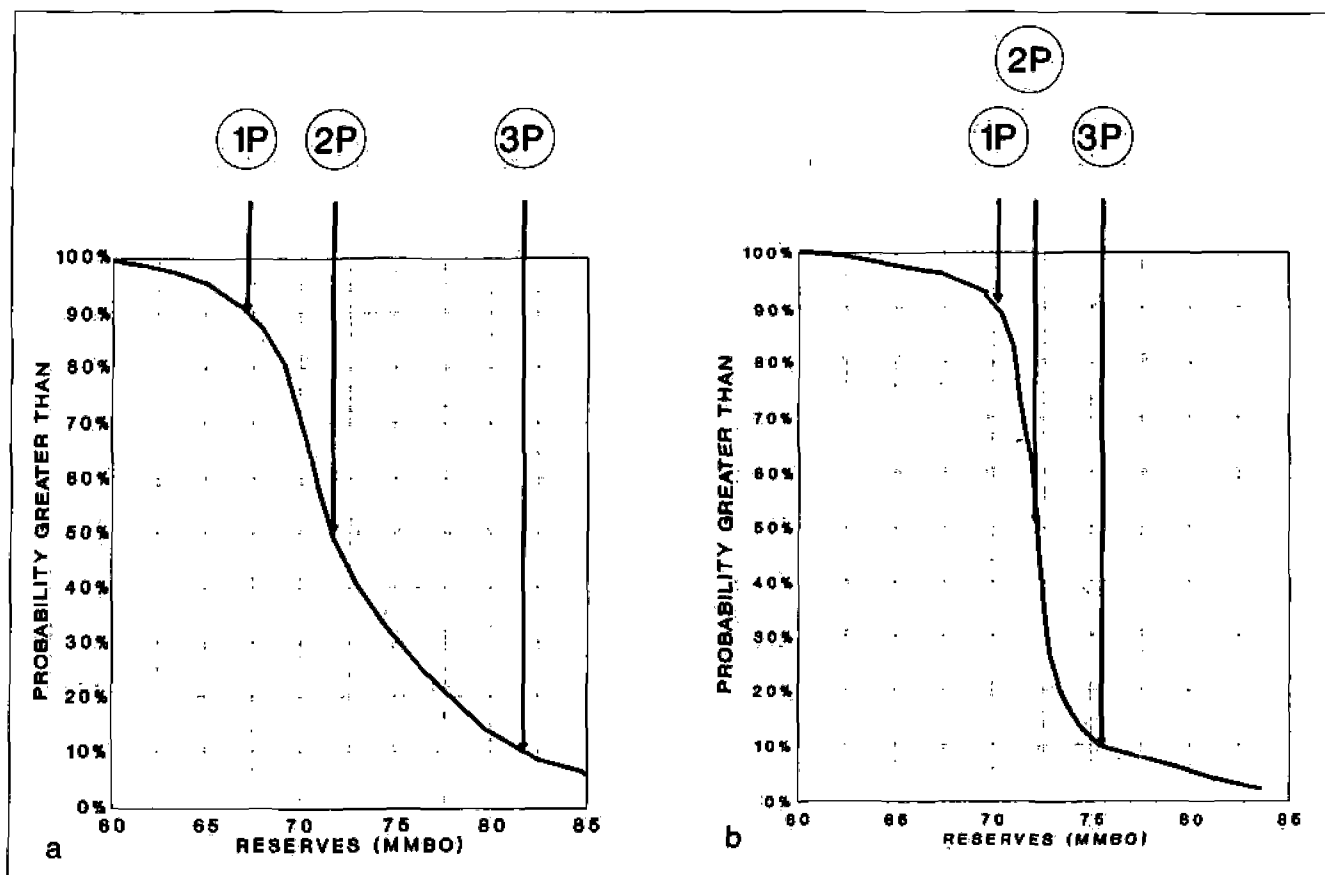


Fig. 8—WPC definitions and evaluation maturity: (a) immature evaluation and (b) mature evaluation.

For U.S. evaluation engineers, the acceptance of probabilistic reserves definitions has not been widespread. In fact, discussion of the topic seems to have a polarizing effect, dividing groups into "yeas" and "nays" with little middle ground. Part of this skepticism may be related to (1) unfamiliarity and unwillingness to accept statistical and Monte Carlo techniques; (2) unwillingness to depend on volumetrically based estimates, or having inadequate data or time to perform such estimates; (3) conceptual difficulty with applying a recovery factor range that includes improved recovery by judgmental analogy and without proof that the techniques will be beneficial; (4) difficulty in applying a reservoir-level analysis to per-well evaluations by some process of allocation; and (5) difficulty in recognizing the relevance of the technique to mature, established production evaluations.

All the reasons are valid, particularly when dealing with mature producing properties. Despite these difficulties, standard SPE approaches to difficult evaluation situations that involve a considerable degree of uncertainty can benefit from the probabilistic approach.<sup>14</sup> Because evaluation difficulties are the norm in unconventional reserves evaluations, the use of such techniques probably will build a bridge between the two approaches as time passes.

**Economic Considerations.** While the FSU system tends to envision the maximum recovery situation and requires the booked

and extractable modifiers to pare estimates back into the realm of economic reality, this system is structured to assess and express more conveniently the effect of changing oil-field economic parameters on reserves. The SPE and WPC systems focus on economic reserves and use prevailing economic conditions as the measure. This raises several issues.

1. With the product price volatility experienced since 1986, the idea of basing a reserves evaluation on a snapshot price can be very misleading. For example, SEC reserves evaluations for year-end 1990 used a Gulf-war-inspired \$26.25/bbl west Texas intermediate (WTI) oil price. In low-decline, stripper-well situations, reserves were doubled and even quadrupled because of the extended economic life afforded by the high prices. These reserves disappeared by the next year when year-end estimates were based on a \$17.55/bbl WTI. Using an average of the previous year's prices would seem to be an obvious way to inject some reality into such evaluations. Is an SEC year-end reserves evaluation any more meaningful at a snapshot \$26.25/bbl price than if a year-average \$22/bbl price were used and evaluated again at \$26.25/bbl with the difference called the proved developed price incremental? This would be similar to FSU Category A, unbooked reserves. Running a low-price case also may have meaning. It sure does for lenders. While engineers have crafted a workable set of technical definitions in low-decline, mature, producing situations,

economic changes will have a much greater effect on reserves than latitude in picking a decline, yet the effect of such changes is not part of the definitions.

2. The abandonment issue increasingly is recognized. In the past, with an expanding industry, there was a market for used equipment, and the assumption of abandonment cost equaling salvage value normally was valid. With a contracting industry, this market is greatly diminished and abandonment costs are increased by new environmental regulations. Abandonment costs can have a significant effect on cash flow from reserves, both in how they are handled and in how (or how diligently) they are quantified. Many marginal offshore facilities are operated below break-even for a number of years to postpone platform abandonment costs. Many oil fields, and particularly those under EOR, are operated below break-even in that they cannot be shut down technically to await higher oil prices. Again, such proved producing uneconomic reserves have no formal designation (they exist as positive barrels and negative dollars).

## Conclusions

1. While comprehensive in scope, FSU reserves definitions lack consideration of current economic conditions in favor of the theoretical maximum recovery of oil and gas. Thus, FSU reserves estimates are not directly comparable with either SPE or WPC estimates.

2. WPC definitions attempt to quantify uncertainty and provide a measure of upside potential. The approach primarily addresses reserves at the reservoir rather than the well level. Application of this approach is particularly useful for unconventional plays and where quantification of the upside is needed to support high-cost development programs (e.g., the North Sea).

3. SPE reserves definitions primarily address the proved reserves category at the well level and are best suited to stable oil and gas prices.

4. The three approaches have evolved to suit the needs and circumstances of their applications.

5. The concept of creating guidelines for booked vs. unbooked reserves under the SPE reserves definitions to address price volatility and, possibly, certain types of undeveloped reserves could help in the comparison of the three classes of reserves definitions discussed here and could enhance the information imparted to the regulatory and lending agencies.

6. FSU reserves definitions provide a logical conceptual path for tracking the evolution of reserves estimates. While the estimates are too high by U.S. standards, the overall picture of reserves potential, particularly the process of reserves revision with increasing knowledge and economic change, provides useful concepts for future improvements in U.S. definitions.

7. A key criticism of the FSU system is the lack of emphasis on economic considerations. However, SPE definitions fail to accommodate the realities of today's volatile

prices. Both systems require updating to the 1990's business environment.

8. The probabilistic approach is convenient and consistent when working in an uncertain situation. The reluctance to apply such techniques to quantification of the lower confidence reserves categories is puzzling and regressive.

## References

1. "Reserves Definitions Approved," *JPT* (May 1987) 576.
2. *Guidelines for Application of the Definitions for Oil and Gas Reserves*, Monograph Series, Soc. of Professional Evaluation Engineers, Houston (1988) 1.
3. "Regulation S-X, Rule 40-10, Financial Accounting and Reporting of Oil and Gas Producing Activities, Securities and Exchange Commission Reserves Definitions," Bowne & Co. Inc. (March 1981) 3.
4. "Classification and Nomenclature Systems for Petroleum and Petroleum Reserves," 1933 and 1983 Study Group Report, 11th World Pet. Cong., London (1984).
5. "Hydrocarbon Classification Rules Proposed," *Oil & Gas J.* (Aug. 13, 1990) 62.
6. McKelvey, V.E.: "Concepts of Reserves and Resources," *Methods of Estimating the Volume of Undiscovered Oil and Gas Resources*, John D. Haun (ed.), AAPG, Tulsa (1975) 11.
7. Cronquist, C.: "Reserves and Probabilities, Synergism or Anachronism?" *JPT* (Oct. 1991) 1258.
8. "U.S. Crude Oil, Natural Gas, and Natural Gas Liquid Reserves," 1990 Annual Report, DOE/EIA-0216 [90] UC-98, Energy Information Administration, U.S. DOE (Sept. 1991).

9. Gutman, I.S.: "Metody Podchety Zapasov, Nefti i Gaza," *Methods for Calculation of Oil and Gas Reserves*, Nedra Publishing House, Moscow (1985).
10. Van Sandt, B.K.: "Due Diligence: Its Importance, Impact, and Improbabilities," *JPT* (Sept. 1990) 1097.
11. Caldwell, R.H. and Heather, D.I.: "Dismantling the Dinosaurs: A Look at U.S. M&A Trends," *Oil & Gas J.* (Nov. 9, 1992) 66.
12. Keith, D.R., Wilson, D.C., and Gorsuch, D.P.: "Reserves Definitions—An Attempt at Consistency," paper SPE 15865 presented at the 1986 SPE European Offshore Petroleum Conference, London, Oct. 20-22.
13. Øvreberg, O., Damsleth, E., and Haldorsen, H.H.: "Putting Error Bars on Reservoir Engineering Forecasts," *JPT* (June 1992) 732; *Trans., AIME*, 293.
14. Caldwell, R.H. and Heather, D.I.: "How To Evaluate Hard-to-Evaluate Reserves," *JPT* (Aug. 1991) 998.

## SI Metric Conversion Factor

$$\text{bbl} \times 1.589\,873 \quad \text{E-01} = \text{m}^3$$

## Provenance

Original SPE manuscript, **Comparative Reserve Definitions: U.S.A., Europe, and Former Soviet Union**, received for review March 29, 1993. Revised manuscript received July 12, 1993. Paper accepted for publication July 12, 1993. Paper (SPE 25828) first presented at the 1993 SPE Hydrocarbon Economics and Evaluation Symposium held in Dallas, March 29-30.

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# PREFACE

The mandate of the Office of National Security Policy of the U.S. Department of Energy is to promote economic development, political stability, efficient use of energy, and sound environmental management practices in key foreign countries around the world. To achieve this goal, the Office of National Security Policy provides technical assistance to foreign entities with a view to help defense-related industries convert to commercial/civilian use; strengthen indigenous institutions that promote economic development; and seek alternative sources and uses of energy in support of broad national security interests, including minimizing the threat of nuclear proliferation.

In recognition of the importance of securing financing to support program initiatives under the above mandate, the Office of National Security Policy has developed this Directory of Financing Sources for Foreign Energy Projects. The Directory reviews programs that offer financing from U.S. government agencies, multilateral organizations, and public, private, and quasi-private investment funds, and local commercial and state development banks.

The main U.S. government agencies covered are the U.S. Agency for International Development (USAID), the Export-Import Bank of the United States (EXIM Bank), Overseas Private Investment Corporation (OPIC), U.S. Department of Energy, U.S. Department of Defense, and the U.S. Trade and Development Agency (TDA). Multilateral organizations include the World Bank, International Finance Corporation (IFC), Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD), and various organizations of the United Nations.

The Directory lists available public, private, and quasi-private sources of financing in key emerging markets in the Newly Independent States and other developing countries of strategic interest to the U.S. Department of Energy. The sources of financing listed in this directory should be considered indicative rather than inclusive of all potential sources of financing. Initial focus is on the Russian Federation, Ukraine, India, China, and Pakistan. Separate self-contained sections have been developed for each of the countries to enable the user to readily access market-specific information and to support country-specific Departmental initiatives. For each country, the directory is organized to follow the project life cycle -- from prefeasibility, feasibility, project financing, trade financing, and venture capital through to technical assistance and training. Programs on investment and project insurance are excluded.

Descriptions of each financing program include comprehensive contact information, which allows readers to effectively utilize the resources described.

Section A on "Feasibility Funding" covers funding sources for prefeasibility and feasibility studies. Once a project has been identified, prefeasibility funds can help defray the typically high-risk up-front costs of preparing initial project-specific information that demonstrates commercial viability and interest in the host country. Feasibility studies deal with the detailed evaluation of technical, marketing, and financial information required by private lenders and U.S. and multilateral organizations.

Section B on "Project Finance - Private Sector" reviews sources of financing that provide debt and equity financing directly to U.S. companies. This section includes private, public, and quasi-private investment funds. Each section covers U.S. government, multilateral, and indigenous sources (where information is available) of financing. Private investment funds are capitalized with funds from private sources while public investment funds are capitalized with funds from U.S. government agencies, like USAID, Department of Defense, etc. Quasi-private funds are those that have received initial capitalization from



public or multilateral sources, like the EBRD or OPIC for example, but have raised additional capital from private sources.

Section C on "Project Finance - Public Sector" covers sources of financing that lend directly to the public sector, i.e., government-to-government lending mostly for infrastructure development programs. The main sources of funding in this case are the World Bank, EBRD, and ADB.

Section D on "Cofinancing" refers to programs of multilateral development banks (MDBs), like the World Bank, EBRD, and ADB that leverage their financial resources with funds from external sources. External funds originate from either "official" or from "commercial" sources. Official cofinanciers can be other multilateral banks or organizations, like some agencies of the United Nations, bilateral finance institutions and development assistance agencies, and export credit agencies. Official cofinance partners provide additional sources of funding for *public sector* projects. Commercial cofinanciers can be banks or investment funds that cooperate with the MDBs in sharing the risk and structure the financing to develop *private sector* projects. Main cofinancing techniques include parallel and joint financing, export credit arrangements, loan syndication, and guarantees. Cofinancing techniques bring several advantages: increase amount of resources available to the MDBs in support of a wider range of projects, attract private capital into countries that do not meet the creditworthiness requirements of the international capital markets, and help diversify risk.

Section E on "Trade Finance" covers programs that offer financing for equipment, products, and in certain cases, services. This type of financing does not cover the entire project, just the procurement of equipment. The main source of financing is EXIM Bank. Local commercial and state development banks that provide domestic and international services are included under this section.

Section F on "Technical Assistance and Training" refers to those programs that provide a broad range of support to overall program initiatives or specific projects, such as advice on policy and legal reform, project preparation, sectoral studies, institutional development and local capacity building, human resources development, and accounting and management practices. Technical assistance programs could also include technical, economic, financial, environmental, legal due diligence in support of specific investments or projects.

As this directory covers sources of financing in emerging markets, information is time sensitive and subject to rapid change according to the political circumstances in the country, developments in financial markets, and shifts in policies and priorities of Western donors and investors. It is intended that this directory be updated periodically to keep pace with the changing dynamics of the region and the creation of new financing instruments and sources.

For comments, corrections, or suggestions regarding this directory, please contact the DOE Project Manager:

Dr. Fred H. Abel  
Office of National Security Policy, PO-91  
Room 8F-089, Forrestal Building  
U.S. Department of Energy  
Washington, DC 20585  
Telephone: (202) 586-9399  
Fax: (202) 586-1737

This Directory was produced by Ms. Lydia LaFerla - Principal, of LaFERLA ASSOCIATES, Washington, DC under contract to the Special Projects Office (SPO) of Argonne National Laboratory. Dr. Ralph E. Stajdohar of SPO was the Program Manager.

## **A. FEASIBILITY FINANCING:**

### **A.1. U.S. Government Sources**

#### **U.S. Trade and Development Agency (TDA)**

TDA is an independent, U.S. government agency that provides funding for feasibility studies, training programs, and seminars. TDA supports major projects in the public sector that offer large export or investment potential for U.S. companies. All proposed projects must have the host government's approval, meet the country's development priorities, create significant U.S. export potential, and offer untied financing options. TDA's participation usually ranges from \$150,000 to \$750,000.

**Contact:** Dan Stein, Regional Manager  
Russia & Newly Independent States  
U.S. Trade and Development Agency  
1621 North Kent Street  
Arlington, VA 22209  
Tel: 703/875-4357  
Fax: 703/875-4009

TDA also has trust fund accounts with multilateral institutions like the World Bank, International Finance Corporation (IFC), and European Bank for Reconstruction and Development (EBRD). This mechanism can be used to support feasibility studies that are tied to specific projects these institutions would likely support. In the case of the IFC, for example, project proposals must demonstrate that they are commercially viable and meet IFC investment threshold criteria as well as the funding requirements of TDA.

**For IFC Trust Funds:** Alakadri Bose  
IFC  
Tel: 202/473-0551  
Fax: 202/676-1513

**For EBRD Technical Cooperation Funds:**

Dr. Ullrich Kiermayr  
Tel: 44-71/338-6356  
Fax: 44-71/628-2530

**At USTDA, Contact:** Barbara Bradford  
Tel: 703/875-4357  
Fax: 703/875-4009

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### The International Fund for Renewable Energy and Energy Efficiency (IFREE)

Funded by the U.S. Agency for International Development, U.S. Department of Energy, the Rockefeller Foundation, and the U.S. Environmental Protection Agency, IFREE facilitates increased access to funding for renewable energy, energy efficiency, and, generally, environmentally-sound projects in developing countries, including the Russian Federation. Under the Prefeasibility Study Program, IFREE offers up to \$50,000 to support up to 50 percent of prefeasibility study costs, which enables project developers to secure project finance or additional funding for detailed project analyses required by private lenders and U.S. government agencies for the evaluation of projects. Energy efficiency and renewable energy, i.e., biomass, geothermal, small hydropower, natural gas, solar photovoltaic, solar thermal, or wind energy projects are considered. Projects must be commercially viable, identify sources of funding for the full feasibility study and in-country partners, and use predominantly U.S. equipment, materials, and services.

**Contact:** Patrick D'Addario  
IFREE  
777 North Capital Street, NE, Suite 805  
Washington, DC 20002  
Tel: 202/408-7916  
Fax: 202/371-5116

### Export-Import Bank's (EXIM) Engineering Multiplier Program

EXIM's Engineering Multiplier Program funds project-related feasibility studies and pre-construction design and engineering services. Under this program, EXIM offers fixed-rate loans and guarantees to foreign buyers of these services. This program is designed to generate additional overseas sales of U.S. goods and services since the foreign buyer is more likely to order U.S. equipment and services for a construction project on which U.S. engineers, designers, and architects performed the work. Up to \$10 million in the value of U.S. exports are covered. Projects supported under this program must generate subsequent U.S. export orders valued at no less than \$10 million or double the original export contract, whichever is greater. Direct loans are extended for up to 85 percent of the U.S. export value. The foreign buyer must match that with a 15 percent cash payment to the U.S. company. EXIM also offers guarantees for commercial financing for approved project-related local costs in the host country of up to 15 percent of the U.S. contract cost. If the project goes forward with U.S. goods and services, EXIM may extend a loan and/or guarantee, in which case the loan can then be rolled into the later financing.

**Contact:** John Wisniewski, Vice President  
Engineering Division  
Export-Import Bank of the United States  
811 Vermont Avenue, NW, Room 1167  
Washington, DC 20571  
Tel: 202/565-3571  
Fax: 202/565-3584

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### U.S. Agency for International Development (USAID) - Feasibility Support

USAID routinely supports feasibility studies in targeted sectors in the Newly Independent States (NIS) region, namely energy, environment, agribusiness, housing, private sector and financial sector development. Interested parties should track opportunities in the Commerce Business Daily.

**Contact:** Commerce Business Daily  
Tel: 202/783-3238  
Fax: 202/512-2233

### Committee on Renewable Energy Commerce and Trade (CORECT)

CORECT is an interagency working group comprised of representatives from 14 U.S. Federal government agencies, chaired by the U.S. Department of Energy. CORECT works closely with the U.S. Export Council for Renewable Energy (US/ECRE), an industry consortium of seven renewable energy trade associations, to promote renewable energy exports in international markets and ensure that renewable energy technologies and applications are integrated in development projects.

**Contact:** Ronald Bowes, Director  
Office of Technical Assistance  
Energy Efficiency and Renewable Energy  
U.S. Department of Energy  
1000 Independence Avenue, SW, Room 5E-036  
Washington, DC 20585  
Tel: 202/586-2959  
Fax: 202/586-1605

### Committee on Energy Efficiency Commerce and Trade (COEECT)

COEECT is an interagency working group comprised of representatives from 14 U.S. Federal government agencies, chaired by the U.S. Department of Energy. COEECT works closely with the Energy Efficiency Export Council to undertake market assessment for energy efficiency products and services, identify project financing from federal and multilateral institutions, and address the specific needs of the energy efficiency products and services industry.

**Contact:** Ronald Bowes, Director  
Office of Technical Assistance  
Energy Efficiency and Renewable Energy  
U.S. Department of Energy  
1000 Independence Avenue, SW, Room 5E-036  
Washington, DC 20585  
Tel: 202/586-2959  
Fax: 202/586-1605

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### A.2. Multilateral Sources

#### European Bank for Reconstruction and Development (EBRD)

EBRD does perform pre-investment and/or feasibility studies usually for projects in which it is interested in investing. Interested parties should track the EBRD procurement notice bulletins. To obtain information on EBRD procurement opportunities, contact the representatives below.

**Contact:** Sara Shackelton, Commercial Specialist  
Office of the U.S. Executive Director  
One Exchange Square  
London EC2A 2EH  
England  
Tel: 44-71/338-6569  
Fax: 44-71/338-6487

-or-

Matt Handwork  
Office of Multilateral Bank Operations  
U.S. Department of Commerce  
Washington, DC 20230  
Tel: 202/482-3399  
Fax: 202/273-0927

### A.3. In Country Sources

No known available sources.

## B. PROJECT FINANCE - PRIVATE SECTOR:

### B.1. U.S. Government Sources

#### Overseas Private Investment Corporation (OPIC)

This independent, U.S. government agency provides project financing, investment insurance, and a variety of investor services. In addition to the Russian Federation, OPIC is currently open for business in all countries in the NIS except Azerbaijan. OPIC has recently supplemented its finance products by supporting privately owned and managed equity investment funds. OPIC is currently supporting equity funds that will invest specifically in the Russian Federation and in environmental enterprises worldwide, including Russia.

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### **Project Financing:**

OPIC provides medium to long-term financing (over 3 years), available through loan guarantees and/or direct loans. Loan guarantees cover both commercial and political risks. OPIC has approximately \$1 billion available to finance projects in the NIS. OPIC offers direct loans for international investment projects, which range from \$2 to \$200 million. However, OPIC typically does not support projects under \$10 million. OPIC will participate in up to 50 percent of the total project cost for a new venture and up to 75 percent of the total cost of an expansion.

**Contact:** John Harper, Regional Manager  
Russia & Newly Independent States  
Overseas Private Investment Corporation  
1100 New York Avenue, NW  
Washington, DC 20527  
Tel: 202/336-8494  
Fax: 202/408-9866

**Contact in Russia:** Eric Luhman (until 3/95) -or- Robert Feath (starting 4/95)  
Tel: 7-502/224-1105 Fax: 7-502/224-1106

*The investment funds listed below have been capitalized primarily with funds from U.S. government and-multilateral organizations:*

### CARESBAC (CARE Small Business Assistance Corporation)

This fund was capitalized through the support of the U.S. Department of Agriculture with \$3.5 million to invest in existing small- and medium-sized Russian companies. Companies with 15 to 100 employees, majority Russian ownership, and annual turnover from \$150,000 to \$2 million equivalent in rubles will be considered. Targeted sectors are the agro-food processing and distribution, light manufacturing, construction services, business services, and environmentally-sound industries. The Fund will take a minority equity position in companies and/or preferred stock and convertible debt. Only Russian entities may apply. Proposals should be sent to the Russian office.

**Contact:** Thomas C. Gibson  
CARESBAC  
1401 New York Avenue, NW, Suite 1100  
Washington, DC 20005  
Tel: 202/737-8463  
Fax: 202/737-5536  
-or-  
Graham Humes, General Director  
Lermontovsky Prospekt #7, Second Floor  
St. Petersburg 190008 Russia  
Tel: 7-812/119-6336  
Fax: 7-812/119-6337

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### The Defense Enterprise Fund

The Defense Enterprise Fund was established as a non-profit corporation to promote private sector investment in restructuring the Russian defense industry. The Fund supports investments involving the personnel and/or facilities currently or formerly involved in research, development, production or operation, and conversion of large defense enterprises, which previously contributed to production of weapons of mass destruction. The Fund also makes investments in private sector spin-off initiatives from large defense enterprises and start-up initiatives by former defense or military personnel. This Fund will provide debt or equity support to enterprises that have privatized or that have already committed in writing to privatization. An enterprise is considered privatized if greater than 50% of ownership and control is held in the private sector.

**Contact:** Michael Lehner, Vice President/Investment Manager  
Defense Enterprise Fund  
104 Crofton Road  
Waban, MA 02168  
Tel: 617/527-3307  
Fax: 617/527-2722

### EBRD Small Business Fund

The objective of this \$300 million fund is to provide debt financing to micro and small business enterprises in Russia. The Fund is concentrating on providing loans but is looking to provide equity financing at a later date. There is no minimum loan amount, but generally will not exceed \$75,000. Equity financing, once in place, will be offered up to \$200,000. The Fund is currently lending to enterprises in the following cities: St. Petersburg, Togliatta, Tomsk, Tula, and Nizhny Novgorod. By June/July, 1995, the Fund will be operative in Moscow.

**Contact:** Elizabeth Wallace  
EBRD  
One Exchange Square  
London EC2A 2EH England  
Tel: 44-71/338-6169  
Fax: 44-71/338-7380

### Environmental Enterprises Assistance Fund (EEAF)

EEAF invests in projects and companies in developing countries, including the Russian Federation. The main objective of EEAF is to catalyze the spread of renewable energy, energy efficiency, and other environmentally responsible technologies. EEAF provides direct loans and equity placements in environmentally-sound, commercially viable projects and capitalizes local investment funds. EEAF provides financial support for projects under \$2 million in renewable energy systems, energy efficient technologies, and environmentally responsible management of organic waste. Direct loans are made at concessional rates, but equity investments are expected to provide higher returns than conventional financing arrangements. On a limited, cost-reimbursable basis, EEAF may provide technical assistance for training and technical analysis of proposed projects. For project financing in Russia, EEAF works in conjunction with CARESBAC (see description of CARESBAC under Project Financing).

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**Contact:** Brooks Browne, President  
Environmental Enterprises Assistance Fund  
1901 North Moore Street  
Suite 1004  
Arlington, VA 22209  
Tel: 703/522-5928  
Fax: 703/522-6450

### **Far East Regional Venture Fund**

A \$30 million equity investment fund capitalized by the EBRD and managed by a consortium of investment firms led by Daiwa Securities and NIF Company. This fund invests in small- and medium-sized businesses in the Primorskii and Khabarovsk krais regions to facilitate the modernization, expansion and/or restructuring of privatized Russian enterprises. In addition to making equity investments, an additional \$20 million in funds will be available to provide technical assistance and pre-feasibility support for investments made by the Fund. Investments range from \$300,000 to \$3 million.

**Contact:** Martyn Nicholls  
EBRD  
One Exchange Square  
London EC2A 2EH  
England  
Tel: 44-71/338-6269  
Fax: 44-71/338-6119

### **First NIS Regional Fund**

The First NIS Regional Fund is a \$160 million close-ended investment fund managed by Baring Investment Management Ltd. The main objective of the Fund is to achieve long-term growth through equity and equity-related investments in NIS companies; those that are over-the-counter privatized corporations, joint stock companies, joint ventures, or partnerships. The primary sectors in which investments will be made will be natural resources-related companies, infrastructure, and telecommunications, which will represent 60% of the Fund's investments. The remaining 40% will be dedicated to light manufacturing, consumer products and services, and real estate. EBRD provided \$20 million in equity commitments, and \$15 million from the IFC. \$20 million for the debt portion of the Fund is expected from OPIC to cover loan guarantees.

The Fund bases their investment decisions upon the ability of NIS companies to prospect for long-term growth: whether the company has foreign currency reserves or substantial export earning potential; human, technical, financial and/or other resources necessary to compete in the marketplace; substantial assets; international accounting standards; potential for long-term earnings and cash flow growth; and a sound business strategy. The Fund is managed by Baring Asset Management.



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**Contact:** Richard Sobel, Director, Institutional Group  
Baring Asset Management  
155 Bishopsgate  
London EC2M 3XY  
England  
Tel: 44-71/214-1871  
Fax: 44-71/214-1635

### Fund for Large Enterprises in Russia (FLER)

FLER was initially capitalized at \$100 million through grant support of USAID. Additional funds will be available through the Overseas Private Investment Corporation (OPIC), FLER's co-sponsor, and other U.S. government agencies such as the Export-Import Bank of the United States and the U.S. Trade and Development Agency. This fund offers financing packages, such as equity investments, loans, and technical assistance and training to medium- and large-scale enterprises in Russia. Enterprises with 1,000 to 10,000 employees are considered that are emerging from mass privatization programs. Investments will be made in (1) Russian start-up companies as well as those emerging from mass privatization; (2) joint ventures with U.S. and other companies to create commercially viable ventures that attract private sector capital; and (3) the development of efficient management techniques and corporate governance practices in Russian enterprises. FLER will invest between \$1 and \$20 million per project.

**Contact:** Ilya Oshman, Vice President  
Laura Hoffman, Director of Operations  
FLER  
17 State Street  
New York, NY 10004  
Tel: 212/668-8395  
Fax: 212/668-0770  
-or-  
Project Coordinator  
Tsvetnoy Boulevard, 25-3  
103051 Moscow  
Russia  
Tel: 7-095/929-9810 or 44-81/913-3382  
Fax: 7-095/929-9809

Global Environmental Emerging Markets Fund, L.P. is designed to take significant minority equity or equity-related positions in private companies in emerging markets in Africa, Asia, Latin America, and Eastern Europe. The Fund has raised \$70 million in capital through an offering of its securities to sophisticated investors, including financial institutions, in the U.S. and Europe. These securities will be partnership equity interests and OPIC-guaranteed long-term partnership notes, offered together or separately. The Fund will invest up to \$10 million in alternative energy, water treatment, air pollution control and waste management. Currently, the Fund is looking at a number of opportunities

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in the area of energy conservation and demand side management. The Global Environment Fund, L.P. manages this new fund and serves as its general partner. Projects are currently being sought for review and consideration.

**Contact:** H. Jeffrey Leonard, President  
Global Environmental Fund, L.P.  
1250 24th Street, NW, Suite 600  
Washington, DC 20037  
Tel: 202/466-0529  
Fax: 202/466-6454

### New Europe East Investment Fund

Managed by Capital International, Inc., this \$130 million fund was launched in June 1993 with capital contributions by the EBRD, the International Financial Corporation (IFC), and pension funds. The Fund will make direct investments in privatized companies or newly established ventures in Central and Eastern Europe and the NIS that are managed by established Western industrial group. Investments range from \$5 - \$15 million. Up to a 20% stake is taken in each issuer's securities.

**Contact:** Mr. Lam Nguyen-Phuong  
Capital International, Inc.  
25 Bedford Street  
London WC2E 9HN  
England  
Tel: 44-71/257-6700 Fax: 44-71/257-6767

### Russia Partners Fund

This \$155 million fund will invest primarily in equity and equity-related instruments of privatized and privatizing companies, greenfield investments, and start-up ventures in the Russian Federation. The Fund will invest in hard-currency generating or export production businesses and sectors that offer high returns such as natural-resources, light manufacturing, telecommunications, distribution, and consumer products and services. The average size investment will range from \$2 to \$15 million. OPIC has fully guaranteed the Fund. Projects should demonstrate the ability to generate long-term revenue growth potential and high profit margins. The Fund may seek co-investment or other types of participation from Western partners. The local advisor to the Fund is International Economic Cooperation Company, a private Russian company. The Fund is managed by PaineWebber Inc., New York, through its asset management subsidiary Mitchell Hutchins Asset Management Inc.

**Contact:** Drew Guff, Fund Manager  
PaineWebber  
1285 Avenue of the Americas, 14th floor  
New York, NY 10019  
Tel: 212/713-3214  
Fax: 212/713-1087

-or-

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Lauralee Raddatz  
Myasnitskaya Ulitsa, Dom 35  
101959 Moscow  
Russia  
Tel: 7-095/207-9140  
Fax: 7-095/975-2449

### Russia/NIS Major Projects Fund

This fund will invest in equity and equity-related securities. OPIC will guarantee up to 75 percent of up to \$300 million. The Fund will concentrate on the telecommunications, energy, transportation, and metals processing sectors. Investments will range from \$10 to \$20 million. This fund is not as yet operational; it is expected to be fully operational by the Summer, 1995.

**Contact:** Graham Williams, Managing Director  
Overseas Private Investment Corporation  
1100 New York Avenue, NW  
Washington, DC 20527  
Tel: 202/336-8479  
Fax: 202/408-9866

### The Russian-American Enterprise Fund

The Russian-American Enterprise Fund was established in 1993 to stimulate the creation and expansion of small- and medium-sized businesses in the Russian Federation. Loans ranging from \$500,000 to \$2 million are offered directly or in conjunction with commercial banks acting as intermediary facilities. The Fund may also take equity positions or extend loans in promising small- and medium-sized enterprises (defined as firms with approximately 2,500 employees). Equity investment support is considered for wholly-owned indigenous projects, joint-ventures with U.S. partners and, to a lesser extent, subsidiaries of U.S. companies. The Fund may also support technical assistance and training related to actual or potential investments and loans. U.S. Agency for International Development initially capitalized the Fund at \$340 million for a three year period. The Fund is expected to raise additional capital from private and public sources.

**Contact:** Robert Towbin, President & CEO  
Russian-American Enterprise Fund  
17 State Street, 33rd floor  
New York, NY 10004  
Tel: 212/483-1177  
Fax: 212/483-0999

### Smolensk Regional Venture Fund

Managed by Siparex of France, this fund is capitalized with \$12 million from the EBRD. The Fund will make equity investments in medium-sized Russian enterprises (defined as enterprises with up to 1,000 employees) in the Smolensk oblast. The main objective of the Fund is to facilitate the modernization, expansion and/or restructuring of privatized Russian enterprises. The Fund will also

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provide technical assistance to support the investments it makes. Investments range from \$300,000 to \$1.2 million in all sectors; except tobacco, armaments, and liquor industries.

**Contact:** Philippe Lambert  
Siparex  
139, rue Vendome  
69477 Lyon Cedex 06  
France  
Tel: 33-78/52-41-07  
Fax: 33-78/52-61-63

### St. Petersburg Regional Venture Fund

Launched with a \$30 million capital contribution from the EBRD, this fund will make equity investments in small- and medium-sized Russian enterprises in the St. Petersburg and Leningrad oblasts. The main objective of the Fund is to facilitate the modernization, expansion and/or restructuring of privatized Russian enterprises. An additional \$20 million has been provided to support technical assistance and pre-feasibility work in support of the investments made by the Fund. Investments range from \$300,000 to \$3 million in all sectors, except tobacco, armaments, and liquor industries.

**Contact:** Wolfgang Engler  
Quadriga Capital Group  
Hamburger Allee, 2-10  
Frankfurt am MAIN  
Tel: 4969/7950-0023  
Fax: 4969/7950-0060  
-or-  
St. Petersburg Regional Venture Fund  
Tel: 7-812/350-5622  
Fax: 7-812/213-4502

### Urals Regional Venture Fund

A \$30 million equity investment fund capitalized by the EBRD and managed by Fleming Investments Ltd. This fund invests in small- and medium-sized businesses in the Sverdlovsk, Perm, and Chelyabinsk oblast regions to facilitate the modernization, expansion and/or restructuring of privatized Russian enterprises. In addition to making equity investments, an additional \$20 million in funds will be available to provide technical assistance and pre-feasibility support for investments made by the Fund. Investments ranges from \$300,000 to \$3 million.

**Contact:** George Horton  
Fleming Investments Ltd.  
25 Cophall Avenue  
London EC2R 7DR  
England  
Tel: 44-71/638-5858 Fax: 44-71/382-8155

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*The investment funds listed below have been capitalized primarily with funds from private sources:*

### Brunswick Fund

Launched in October, 1993, this \$10 million fund invests in small- and medium-sized Russian companies primarily in the oil and gas, utility, mineral extraction and processing and shipping (ocean fishing fleets) sectors. Investments range from \$200,000 to \$600,000.

**Contact:** Martin Andersson, Manager  
25/3, Tsvetnoy Boulevard  
Moscow 103051  
Russia  
Tel: 7-095/291-6358  
Satellite Tel: 7-501/929-9800  
Satellite Fax: 7-501/929-9801

### First Russian Frontiers Trust PLC

Managed by Pictet Asset Management, this fund is capitalized approximately at \$60 million. The Fund will invest in a diversified portfolio of securities of countries in the NIS and Central and Eastern Europe regions. Initially, Russia, Ukraine, Uzbekistan, Bulgaria, and Romania will be the focus of the Fund. 15% of the Fund's portfolio will be invested in the more developed markets in Central and Eastern Europe.

**Contact:** Douglas Polunin, Senior Investment Manager  
5 Devonshire Square  
EC2M 4LD London  
England  
Tel: 44-71/972-6800  
Fax: 44-71/972-6876

### The Fleming Russia Securities Fund, Ltd.

This \$54 million close-ended fund invests in shares of Russian companies that are active in the oil and gas telecommunications, utilities, mining, and automotive sectors. The Fund will also invest in debt securities. As the Fund's objective is to maintain a high percentage of liquidity, the Fund will not support any portfolio investment that exceeds 20% of the Fund's total assets.

**Contact:** Stephanie Bishop  
Fleming Investments Ltd.  
25 Cophall Avenue  
London EC2R 7DR  
England  
Tel: 44-71/638-5858  
Fax: 44-71/374-0263

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### Framlington Russian Investment Fund

This is a close-ended investment fund capitalized at \$66 million that invests in small- to medium-sized Russian companies in the energy, forestry/paper, real estate, communications, tourism, advanced technology, food processing, and retail sectors. The Fund usually takes minority positions in companies of 20% and invests in the range of \$500,000 to \$4 million. Shareholders include the EBRD, IFC, U.S. pension, hedge, and mutual funds.

**Contact:** Gary Fitzgerald, Managing Director  
155 Bishopsgate  
London EC2M 3XJ  
England  
Tel: 44-71/374-4100  
Fax: 44-71/330-6642

### Junction Investors Ltd. (JIL)

This venture capital fund is capitalized at \$50 million by private sources. The Fund provides equity investments and arranges for debt and/or additional equity funding for small- and medium-sized businesses that demonstrate the potential for long-term growth and infrastructure development. Investments range from \$1 to \$5 million.

**Contact:** Thomas R. DiBenedetto, President  
Junction Investors Ltd.  
84 State Street, 2nd Floor  
Boston, MA 02109  
Tel: 617/248-9600  
Fax: 617/248-9652

### NCH Advisors

This group was launched with \$160 million of capital from large institutional investors and U.S. and European investment managers in 1993. This group provides equity in existing businesses, start-up capital, joint venture financing, short- and medium-term financing, real estate financing and the purchase of government and commercial obligations. Natural resources, telecommunications, banking, real estate, agro-business, pharmaceutical, and high technology are targeted sectors for investment.

**Contact:** Alexander Papachristou  
NCH Advisors  
635 Madison Avenue, 4th Floor  
New York, NY 10022  
Tel: 212/308-4343  
Fax: 212/308-4398

## RUSSIAN FEDERATION

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### New Russian Small Business Investment Fund

This facility will provide debt financing through selected Russian banks for small Russian enterprises. There is no strict definition of what constitutes a small enterprise, but companies capitalized over \$4 to \$5 million do not qualify. Between \$50,000 and \$200,000 will be invested in each project. Loans are granted directly from Russian banks to Russian enterprises.

The Fund is currently capitalized at approximately \$4 million through the sale of agricultural commodities provided by the U.S. Department of Agriculture. The source of funding is from USAID and is an integral part of its small business development activities in Russia.

**Contact:** Jack Heller, President  
New Russian Small Business Investment Fund  
1200 New Hampshire Avenue, NW  
Suite 230  
Washington, DC 20036-6804  
Tel: 202/466-4700  
Fax: 202/223-4826

### Newstar Fund

This fund is a small venture capital and merchant bank operation capitalized at approximately \$20 million. Newstar invests in equity in private, small- to medium-sized undervalued companies that are

that are export oriented with a strong management and solid cash flow potential. Projects must involve a Western partner. The Fund is interested in supporting investments in the range of \$500,000 to \$5 million.

**Contact:** Brad Wegner, Manager of Investment  
Newstar, Inc.  
1001 Pennsylvania Avenue, NW, Suite 480-North  
Washington, DC 20004  
Tel: 202/783-4155  
Fax: 202/628-5986

-or-

Jeffrey Hammer, Director of Investments  
Vspolni Pereulok, 19/20  
103001 Moscow, Russia  
Tel: 7-095/291-8338/8341  
Fax: 7-095/291-2926  
Satellite Fax: 7-502/221-1470

### Pioneer Fund

This fund expects to raise \$100 million by the end of 1995 to support long-term projects in Russia with export potential. The Pioneer Group has a similar fund for Poland, which was launched with only \$100,000 seed capital and now has \$1 billion portfolio of Polish equities and government bonds.

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**Contact:** Susan Shepard, Assistant to President  
The Pioneer Group  
60 State Street  
Boston, MA 02109  
Tel: 617/742-7825  
Fax: 617/422-4286

### Red Tiger Investment Co. Ltd.

This \$15 million open-ended fund invests in publicly traded company stock on the Moscow and St. Petersburg exchanges, joint ventures, and in pre-IPO investments (companies before the time of the "initial public offering"). The Fund aims to invest in a diversified portfolio of Russian entities.

**Contact:** Sophia Shaw or Philip Franklin,  
Aldermay House 10-15 Queen Street  
London EC4N 1TX  
England  
Tel: 44-71/332-0360  
Fax: 44-71/332-0341

### Russia and the Republics Equity Partners LP (RARE)

This small venture capital fund invests in small- to medium-sized start-up businesses or new joint venture operations that demonstrate strong short-term profitability and long-term growth potential. The Fund supports investments in the range of \$1 to \$5 million. The Fund is currently capitalized at \$25 million.

**Contact:** Herbert Denton, Partner  
Providence Capital, Inc.  
730 5th Avenue  
New York, NY 10019  
Tel: 212/888-3200  
Fax: 212/888/3203

-or-

Joseph Condon, Chairman  
Kamergersky Pereulok, #5  
Moscow, Russia  
Tel: 7-095/247-9051  
Fax: 7-095/229-1327

### Russia Technology Fund

This fund is in the process of raising capital. It is anticipated that the Fund will be capitalized at \$15-\$20 million. The Fund will be managed by Top Technology Ltd.



## RUSSIAN FEDERATION

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**Contact:** Harry Fitzgibons  
Top Technology Ltd.  
20-21 Tooks Court  
London EC4A 1LB  
England  
Tel: 44-71/242-9900  
Fax: 44-71/405-2863

### Russia Value Fund, L.P.

Launched in September, 1994, this \$50 million fund invests in publicly traded shares of Russian companies and other capital market instruments, including sovereign debt. The oil and natural gas, electrical generation and distribution, telecommunications, and construction sectors are being targeted for investment. The minimum initial investments are \$100,000 and provides quarterly redemptions.

**Contact:** Claudia Diaz  
San Antonio Capital Management Co.  
P.O. Box 690327  
San Antonio, TX 78269-0327  
Tel: 210/694-4400  
Fax: 210/561-3316

### Russian Sector Development Corporation

This \$50 million fund provides equity and debt financing, investment banking services, seed capital, and co-financing services with major Western and Russian institutional investors. Investments range from \$5 to \$50 million and will focus on the Far East region of the Russian Federation.

**Contact:** Natalya Romanova or Evgeny Okun, Managing Directors  
Sovcap, Inc.  
Leninsky Prospekt 13, Suite 122  
117071 Moscow  
Russia  
Tel: 7-095/237-4680 or 237-9009  
Fax: 7-095/237-9009

### Russian Venture Capital Fund of America

Managed by Palms & Co., Inc., this fund was capitalized with \$100 million of funds from private and institutional investors. The Fund will co-invest with other private or quasi-governmental funds in projects that involve major participation from Western investors. The Fund seeks a diversified portfolio of investments and does not target particular sectors for investment. To enable Western companies to reach the required threshold of necessary funding or capital, the Fund, in certain cases, will provide the required level of co-investment needed by institutional investors and government agencies.

## RUSSIAN FEDERATION

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**Contact:** Peter Van de Waal  
515 Lake Street South  
Kirkland, WA 98033  
Tel: 206/828-6774  
Fax: 206/827-5528

### **B.2. Multilateral Sources**

#### European Bank for Reconstruction and Development (EBRD)

EBRD provides loans, equity investments, debt guarantees, debt and equity underwriting, advice, and technical cooperation to promote private and entrepreneurial initiatives and foster transition toward democratic, market-oriented economies in the CEE and NIS regions. The Bank does not issue guarantees for export credits or undertake insurance activities. The Bank's operations are structured along geographic lines: Northern and Southern tier country teams headed by two vice presidents that report directly to EBRD President Jacques de Larosière. The Russia country team falls under the Northern Tier Vice Presidency. Each country team brings together merchant and development banking operations, sectoral expertise (i.e., natural resources and tourism, power and energy utilities) and cross-support functions (i.e., environmental appraisals, procurement, syndication) for each country team.

The mandate of the EBRD requires that 60 percent of its loans be directed to funding private enterprises and privatization efforts. These loans are more risky than World Bank loans, which carry sovereign guarantees. The balance of its funding is directed to physical and financial infrastructure or development projects. EBRD will only finance projects that benefit the country in which they are located. Although U.S. companies may approach the Bank with specific project proposals, host government support is looked upon favorably.

**Contact for Russia:** Guy de Sellis  
Russia Country Team  
EBRD  
One Exchange Square  
London EC2A 2EH  
England  
Tel: 44-71/338-6662  
Fax: 44-71/338-7470

**EBRD Moscow Office:**  
Lou Naumovski  
Deputy Representative  
EBRD  
8/10 Gasheka Street  
125047 Moscow  
Russia  
Tel: 7-503/956-1111  
Fax: 7-503/956-1122

**Contact for Energy:** Martin Blaiklock, Team Leader  
Power/Energy - Northern Tier  
EBRD  
One Exchange Square  
London EC2A 2EH England  
Tel: 44-71/338-6663  
Fax: 44-71/338-7280

Ananda Covindassamy  
Power/Energy - Southern Tier  
EBRD  
One Exchange Square  
London EC2A 2EH England  
Tel: 44-71/338-6872  
Fax: 44-71/338-7280

## **RUSSIAN FEDERATION**

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### **International Finance Corporation (IFC)**

IFC, a member of the World Bank, is the largest source of direct financing for private sector projects in developing countries, including the Russian Federation. Unlike the World Bank, IFC lends directly to private companies and does not request guarantees from host-country governments. It can provide loans, make equity investments in private businesses, and mobilize additional loan and equity financing in international financial markets through syndication efforts. Although IFC invests and lends on market terms, it finances projects unable to obtain sufficient funding on reasonable terms from other sources. Increasingly, the IFC is working through intermediary financial facilities in order to support smaller scale projects and supporting co-finance arrangements with the World Bank (GEF) and EBRD.

Loans and equity investments are usually limited to no more than 25 percent of project cost. IFC's minimum investment project support is \$10 million. Funds may be used for foreign or local expenditures related to overall project costs, i.e, fixed assets, permanent working capital, interest during construction, and pre-operating cost. IFC can invest up to 35 percent of the share capital as long as it is not the major shareholder. It turns over its equity often by sale to local investors when the investment has matured. Both fixed and variable rate loans are offered; rates are determined on a commercial basis. Terms normally run from seven to twelve years.

**Contact for Russia:** Anthony Doran, Manager  
Europe Department  
International Finance Corporation  
1850 I (Eye) Street, NW, Room I-9151  
Washington, DC 20433  
Tel: 202/473-3929  
Fax: 202/676-9593

**Contact for Energy & Environment:** Martyn Riddle, Manager  
Environmental Unit  
International Finance Corporation  
1850 Eye Street, NW  
Washington, DC 20433  
Tel: 202/473-0661  
Fax: 202/676-9495

### **B.3. In Country Sources**

No known available sources

## C. PROJECT FINANCE - PUBLIC SECTOR:

### C.1. U.S. Government Sources

#### NIS Industrial Partnering Program

The 1994 Foreign Operations Appropriations Act provided for a \$35 million *NIS Industrial Partnering Program*. The \$35 million effort is designed to promote partnerships involving US industry, universities, DOE National Laboratories and key institutes of the NIS. The main objective of this program is to assist NIS institutes with converting from defense to commercial applications and to prevent and reduce proliferation of weapons of mass destruction. As a general guideline, these funds will be allocated according to the following percentages: 80% Russian Federation, 10% Ukraine, 5% Belarus, and 5% Kazakhstan. This effort is managed by the Department of Energy (DOE).

This program consists of three components: \$20 million for stabilization, \$12 million for cost-shared industrial partnering, and \$3 million for academic support.

The stabilization component provides \$20 million of funding to NIS institutes and DOE national laboratories to commercialize appropriate technologies. This program builds on existing linkages and prior collaboration among NIS institutes and DOE national laboratories. Project proposals are reviewed by an Inter-Laboratory Board and by DOE and the U.S. Department of State. The Inter-Laboratory Board will attempt to incorporate all project proposals into a comprehensive, unified program of scientific cooperation.

The \$12 million component for cost-shared industrial partnering is designed to promote the commercialization of technologies developed for the NIS weapon programs. An industrial consortium, *US Industry Coalition (USIC)*, will be formed to develop and commercialize projects on a cost-shared basis with the laboratories. The \$12 million will be held in an escrow account for the purposes of developing projects. To supplement these funds, industry members are expected to contribute matching funds equivalent to approximately \$8 million in 1994. The goal of this program is to establish the framework and successful commercialization so that US companies can provide approximately \$30 million/year to initiate and renew partnerships with NIS weapon's institutes without US government assistance.

The remaining \$3 million will provide funding for a consortium of academic institutions led by the University of New Mexico to develop a telecommunications network, provide management and business training support to the NIS institutes and USIC.

**Contact:** Michael Deegan, President  
United States Industry Coalition  
901 University Blvd., SE  
Albuquerque, NM 87106-4339  
Tel: 505/272-7344  
Fax: 505/272-7355

## **RUSSIAN FEDERATION**

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### **Export-Import Bank's Project Finance Program**

EXIM Bank recently launched a new program to finance projects that are dependent solely on the project cash flow of the particular project for repayment. Projects under this program can not rely on sovereign guarantees to assure repayment as is normally required under typical EXIM Bank export credit packages. Under this program, EXIM offers (1) allowance of up to 15% foreign content in the US package; (2) financing of interest accrued during construction related to the EXIM Bank financing facilities; (3) financing of host country local costs of up to 15% of the US contract value; (4) maximum repayment term allowed under the OECD guidelines; (5) no minimum/maximum limitations on project size; (6) flexible coverage and equity arrangements; (7) exposure fee commensurate with risk; and (8) rapid application processing.

**Contact:** Dianne Rudo, Vice President  
Project Finance Division  
Export-Import Bank of the United States  
811 Vermont Avenue, NW  
Washington, DC 20571  
Tel: 202/565-3690  
Fax: 202/565-3695

## **C.2: Multilateral Sources**

### **International Bank for Reconstruction and Development (WORLD BANK)**

The World Bank, a multilateral lending agency, is the largest source of financial and technical assistance to the public sector in developing countries. The Bank also makes policy-oriented structural and sectoral adjustment loans to support market-oriented institutional reforms. The Bank lends to member governments for public sector, development projects, not to the private sector. The Bank affiliate that lends to the private sector is the IFC. Loans are made only to governments or to agencies that can obtain a government guarantee for repayment. Bank funds are used by member governments to import food and equipment, fund project construction, and obtain consultant services. Interest rates on Bank loans are set a half a percentage point above the Bank's average cost of borrowing and repayment terms are normally twelve to fifteen years, including a three to five year grace period.

The Bank is particularly active in the energy sector, mostly in oil and gas-related projects. However, there is increased interest in supporting energy efficiency and conservation projects, especially in the CEE and NIS regions.

**Contact for Russia:** Yukon Huang, Director  
Europe & Central Asia Department  
World Bank, Room H3-051  
Washington, DC 20433  
Tel: 202/473-5357  
Fax: 202/477-3274

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**Contact for Energy:** Jonathan Brown, Division Chief  
Infrastructure, Energy & Environment Division  
World Bank, Room H3-139  
Washington, DC 20433  
Tel: 202/473-2469  
Fax: 202/477-3285

### Russian Energy Savings Fund (RESF)

Under a loan package for gas distribution from the World Bank through the Russian Ministry of Finance, a Russian Energy Savings Fund is in the process of being established to support energy efficiency investments in several pre-approved cities in the Russian Federation.

**Contact:** Valery Vasiliev, Vice President of RESF  
Deputy Head, Energy Efficiency & Renewable Energy  
Ministry of Fuels and Energy  
Tel: 7-095/206-6912  
Fax: 7-095/975-2045

### Nuclear Safety Account

An outgrowth of the G-7 Munich Summit of 6-8 July, 1992, the Nuclear Safety Account was set up by the EBRD to receive contributions totalling ECU 115 million (approximately \$150 million) by donor countries for grants to support nuclear safety projects in countries in the CEE and NIS regions. The main objective of the Account is to finance, through grants, projects designed to implement immediate operational safety and technical safety improvement measures for nuclear reactors in the CEE and NIS regions. Priority will be given to those reactors that present a high level of risk which can be significantly reduced by short-term and cost-effective safety improvements, and to those reactors that are necessary to ensure the continuity of national electricity supply in the region. The majority of the projects, therefore, will address security problems in existing REMK and VVER-230 reactors. Since donors are supporting efforts to undertake feasibility studies and technical assistance to address these problems, the Account will focus on providing the necessary funds to purchase equipment.

**Contact:** Francois Demarcq, Director  
Nuclear Safety Account  
EBRD  
One Exchange Square  
London EC2A 2EH  
England  
Tel: 44-71/338-6792  
Fax: 44-71/338-6109

### Global Environment Facility (GEF)

Established in 1990, GEF provides grants for investment projects and technical assistance to assist developing countries to address four main global (transboundary) environmental problems: global warming, pollution of international waters, destruction of biological diversity, and depletion of the

## **RUSSIAN FEDERATION**

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ozone layer. GEF is co-managed by the World Bank, U.N. Development Programme, and the U.N. Environmental Programme. To qualify for funding under the GEF, projects must be innovative, demonstrate the effectiveness of a particular technology or approach, and fall into one of the four priority areas. GEF funding is possible if the project offers substantial global benefits, but it unlikely to be viable without some concessional funding or if a project is economically viable but requires supplemental finance to bring about global benefits.

GEF projects can either be free-standing, components of World Bank projects, or pass through the IFC to support private sector ventures that have both important demonstration benefits and host government endorsement. Free-standing GEF projects are limited to \$10 million, and GEF components of World Bank projects must not exceed \$30 million. GEF funds can leverage regular Bank projects by paying the additional cost of incorporating environmentally benign technologies in Bank-supported projects. GEF funds would cover the difference in cost between what the host country is willing to pay and the cost of the benign technology. Use of GEF funds through the IFC can be used if the sponsor/lender could not otherwise underwrite the risk under prevailing market conditions; funds cannot be used to avert normal commercial risks.

**Contact:** Mr. Ken Newcombe, GEF Coordinator  
World Bank, Room S2-141  
Environment Division  
Washington, DC 20433  
Tel: 202/473-6010  
Fax: 202/522-3256

Ms. Jocelyn Albert  
GEF Regional Coordinator  
European Community & Middle East  
World Bank  
Washington, DC 20433  
Tel: 202/473-3458  
Fax: 202/522-3256

### **C.3. In Country Sources**

No known available sources

## **D. CO-FINANCING:**

### **D.1. U.S. Government Sources**

Not applicable.

### **D.2. Multilateral Sources**

#### International Bank for Reconstruction and Development (World Bank)

Although the Bank mainly lends to governments and government agencies, it can also provide guarantees to commercial lenders for public and private sector projects. The Bank's guarantee program currently covers loans totalling \$1 billion. As a way to attract private sector capital and encourage direct foreign investments in developing countries, the Bank's Executive Director's approved a proposal making guarantees a mainstream instrument of Bank operations in September

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1994. There are two types of guarantees offered: (1) partial risk guarantee that covers non-performance of sovereign contractual obligations or other contractual non-performance problems in a project and (2) partial credit guarantee which extends maturities beyond what private lenders could otherwise provide.

By covering risks that the market would not bear, the Bank's guarantee program helps reduce the cost of financing projects by guaranteeing against contractual non-performance, offers flexibility to structure project financing by extending maturities, and attracts private sources of capital by sharing risks of undertaking infrastructure projects in developing countries.

**Contact:** Nina Shapiro, Manager  
Project Finance Group  
Co-Financing and Financial Advisory Department  
World Bank  
Tel: 202/473-1650  
Fax: 202/477-0218

### European Bank for Reconstruction and Development (EBRD)

The EBRD utilizes both private and official cofinancing techniques to supplement its own capital in support of private and public sector projects.

In addition to providing direct loans to facilitate the financing of *public sector* projects, the EBRD jointly finances or co-finances on a parallel basis with other multilateral banks or organizations, bilateral financial institutions or development assistance agencies, and Export Credit Agencies (ECAs). The EBRD has developed a co-financing technique with ECAs called "Export Credit Loan Arrangement Technique (ECLAT)". ECLAT permits the EBRD to tap into additional sources of funds for procurement of equipment and provides a vehicle to insure transactions between the commercial bank and the borrower. ECLAT allows for open procurement opportunities and establishes a direct lending relationship between commercial banks and its borrowers that would not be possible under conventional financing arrangements.

To mobilize additional sources of funds for *private sector* projects, the EBRD participates in loan syndications with other commercial banks; in this way, commercial banks can benefit from the EBRD's preferred creditor status, its knowledge of specific countries, and financial expertise.

**Contact:** Noreen Doyle, Director  
Credit and Syndications/External Financing  
EBRD  
One Exchange Square  
London EC2A 2EH  
England  
Tel: 44-71/338-6196  
Fax: 44-71/338-6108



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### **International Finance Corporation (IFC)**

The IFC syndicates participations in loans and provides parallel and joint financing as a way to enable commercial banks to take on the risks of lending to developing countries and its clients access additional financing sources from international capital markets, and to raise long-term finance on reasonable terms on behalf of its clients.

Contact: Richard Parry  
Syndications Department  
IFC  
Tel: 202/473-0398  
Fax: 202/334-8713

### **D.3. In Country Sources**

Not applicable.

## **E. TRADE FINANCE:**

### **E.1. U.S. Government Sources**

#### **Export-Import Bank of the United States (EXIM)**

EXIM is an independent, U.S. government agency that provides support for U.S. exports through short- and medium-term export credit insurance, medium- and long-term loan guarantees, medium- and long-term direct and intermediary loans, working capital guarantees, and project financing. On April 1, 1992, the Stevenson and Byrd amendments were repealed, removing both the \$300 million cap on total EXIM authorizations to support U.S. exports to the NIS and restrictions on fossil fuel transactions. EXIM does finance energy efficiency and renewable energy projects that incorporate geothermal, solar, wind, hydroelectric, cogeneration and biomass technologies.

EXIM will only help finance exports of U.S. goods and services containing at least 50 percent U.S. content. The entire value of the shipment is covered under short-term export credit programs, while 100 percent of the U.S. content of the shipment is covered under medium- and long-term programs provided that EXIM's support does not exceed 85 percent of the export price. EXIM's short-term programs cover up to 360 days, medium-term programs cover up to five years, and long-term programs cover twelve years. EXIM is only open for short- and medium-term lending in Russia.

In Russia, EXIM offers four main programs:

#### **Sovereign Risk:**

Currently, EXIM offers short-term export credit insurance and medium-term loans for the Russian Federation. For transactions involving state-owned or quasi-public entities, EXIM has arrangements with the Bank for Foreign Trade of the Russian Federation (Rosvneshtorgbank/VTB) and the Bank for

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Foreign Economic Affairs (Vnesheconombank/VEB). VTB and VEB act as sovereign guarantors on behalf of the Russian government and, as such, carry the full faith and credit of the Russian Federation. EXIM requires clearance from the Ministry of Finance (MOF) and either VEB or VTB for projects that may involve sovereign risk before processing applications for financing.

**Contact:** Ministry of Finance  
Mikhail Kasyanov  
Tel: 7-095/298-9161  
Fax: 7-095/925-0889

**VEB**  
Alexander Zhitnik or Ludmila Rybakova  
Tel: 7-095/204-6384  
Fax: 7-095/975-2069

**VTB**  
Ms. Tatjana Pavlova Tel: 7-095/928-4638  
Mr. Vladimir Litvinenko Tel: 7-095/204-6840  
Mr. Andrei Shipilov Tel: 7-095/204-6552

New York Office of VEB and VTB  
Mr. Oleg Enoukov  
Tel: 212/421-8660  
Fax: 212/421-8677

### **Credit Guarantee Facility:**

EXIM will only consider Russian commercial bank risk on an exceptional basis. For private sector transactions, EXIM has a \$15 million credit guarantee facility for medium-term financing with Tokobank, a Russian private commercial bank, extended through the Bank of New York.

**Contact:** Mr. Oleg Baguirov  
Tokobank  
Tel: 7-095/204-7003  
Fax: 7-503/956-3138

Ms. Natasha Gurfinkel  
Bank of New York  
Tel: 212/635-8130  
Fax: 212/635-8936

### **Limited Recourse Project Finance:**

Under the Project Incentive Agreement, EXIM offers project financing whereby EXIM finances Russian purchases of U.S. goods and services for new projects, namely energy projects. No sovereign or private commercial guarantees are required. Projects will be evaluated on the basis of their commercial viability and ability to generate hard currency revenues to cover repayment.

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Repayment terms and security arrangements will be determined on a case-by-case basis. Public sector projects may require a waiver of the World Bank's negative pledge clause.

### **Export Contract Security:**

EXIM signed an Oil and Gas Framework Agreement in July 1993 under which \$2 billion of financing for purchases of equipment and services to rehabilitate existing Russian oil and gas production facilities. EXIM will be secured from hard currency sales of oil or related products. Repayment terms will be five years or longer and the minimum amount of financing will be \$25 million. Energy efficiency and conservation projects will be considered as long as they can generate hard currency revenues and meet EXIM requirements, such as U.S. content requirements. The terms of the loans will be determined on a case-by-case basis. All other terms and conditions will be set in accordance with EXIM's procedures.

EXIM signed a Memorandum of Understanding with GAZPROM in November 1994 that allows EXIM to support \$750 million in U.S. equipment and services to GAZPROM for rehabilitation of Russia's natural gas sector. EXIM will be secured through the hard currency export sales by GAZPROM.

**Contact:** Dmitry Ermolov  
GAZPROM  
Tel: 7-095/163-1184  
Fax: 7-095/164-4645

**Contact for Russia:** Tom Moran, Vice President  
Europe & Canada Division  
EXIM  
811 Vermont Avenue, NW  
Washington, DC 20571  
Tel: 202/565-3801  
Fax: 202/565-3816

Danielle Montgomery  
Loan Officer, Russia & NIS  
EXIM  
811 Vermont Avenue, NW  
Washington, DC 20571  
Tel: 202/565-3813  
Fax: 202/565-3816

**For General Inquiries, Contact:** Michelle Roling  
International Business Development  
Tel: 202/565-3900  
Fax: 202/565-3931

### **Russian Commodity Import Program (CIP)**

CIP is a \$90 million grant program to the Russian Government to help Russian entities finance imports of U.S. equipment and technology that improve the efficiency of energy use and environmental quality. This program targets the natural gas transmission, distribution and use; oil production; district heating systems; power generation, transmission, and use; environmental protection agencies; and coal mining sectors. The main purpose of the program is to offer equipment at attractive, no-cost, or cost-sharing terms to beneficiary Russian commercial enterprises and public-sector or quasi-private agencies. Funds are to be allocated where there is reasonable assurance that

## RUSSIAN FEDERATION

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the importer will be able to pay a share of the value of the commodities to be imported. Russian entities targeted for CIP assistance have already been selected.

Although Russian entities have already been selected to receive CIP grants, opportunities exist to procure equipment to fulfill grants to these Russian enterprises. Procurement notices will be published in Commerce Business Daily or procurement notices may be obtained directly from USAID's Office of Procurement. USAID honors fax requests only.

**Contact:** Office of Procurement  
USAID  
Fax: 703/875-1957

### U.S. Small Business Administration (SBA)

SBA provides financial and business development assistance to assist small businesses in developing export markets. SBA offers the following programs: Regular Business Loan Program, Export Revolving Line of Credit Program, and the International Trade Loan Program. All these programs require the participation of an eligible commercial bank since they provide guarantees for loans.

**Contact:** U.S. Small Business Administration  
Tel: 800/U-ASK-SBA  
Fax: 202/205-7064

### U.S. Commercial Banks

*Listed below are a sampling of U.S. commercial banks that are active in Russia some of which have offices in Moscow:*

#### Bank of America

David Rees, Vice President & Representative  
World Trade Center, Office 1605  
Krasnopresnenskaya NAB 12  
Moscow Russia  
Tel: 7-095/253-7054  
Satellite Tel: 7-502/253-1910  
Fax: 7-095/253-9565  
Satellite Fax: 7-502-253-1910

-or-

Shahzad Shahbaz, Regional Manager  
1 Alie Street  
London E1 8DE  
England  
Tel: 44-71/634-4876 Fax: 44-71/634-4690

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**Chase Manhattan Bank**

Sergei Boboshko  
World Trade Center  
Krasnopresnenskaya NAB 12  
Moscow 123610  
Russia  
Tel: 7-095/253-2865  
Satellite Tel: 7-502/253-9565  
Fax: 7-095/230-217

-or-

Christopher Piparo  
4 Chase MetroTech, 20th Floor  
Brooklyn, NY 11245  
Tel: 718/242-1391 Fax: 718/242-4267

**Chemical Banking Corporation**

Kerry Annett, Vice President  
270 Park Avenue, 17th Floor  
New York, NY 10017  
Tel: 212/270-3388  
Fax: 212/270-4379

**Citibank**

Stephen Reece  
Gacheka Street, Bld. 8  
Moscow  
Tel: 7-095/956-2345  
Satellite Fax: 7-503/956-2345  
Satellite Fax: 7-503/251-4991

**Credit Suisse-First Boston**

John Zuckerman  
Belinsky Street, 5  
Moscow 103009  
Russia  
Satellite Tel: 7-502/225-8768  
Satellite Fax: 7-502/225-8799

**West Merchant Bank Limited**

Michael Dunne, Managing Director for Project & Export Finance  
33-36 Gracechurch Street  
London EC3V OAX  
England  
Tel: 44-71/220-8713  
Fax: 44-71/626-4270

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### **E.2. Multilateral Sources**

No known available sources.

### **E.3. In Country Sources**

#### Rosvneshtorgbank (VTB) - Russian Bank for Foreign Trade

For its corporate clients, this Bank offers both hard currency and ruble accounts, correspondent banking services domestically and internationally, and other trade support services.

**Contact:** Yuri Poletaev, Chairman  
Rosvneshtorgbank  
Kuznetsky most 16  
Moscow 103031  
Russia  
Tel: 7-095/204-6442  
Fax: 7-502/956-3727

#### Vnesheconombank (VEB) - Bank for Foreign Economic Affairs

9, Akademika Sakharov Prospect

Moscow 107078

Russia

Tel: 7-095/204-6519

Fax: 7-095/975-2104

-or-

New York Representation

Tel: 212/421-8660

Fax: 212/421-8677

#### International Moscow Bank

5/6 Pushkinskaya Street

Moscow 103009

Russia

Tel: 7-095/292-9632

Fax: 7-095/975-2214

#### Moscow Import-Export Bank

5/3 Ananiewsky Per.

Moscow 103045

Russia

Tel: 7-095/208-4445

Fax: 7-095/207-7518

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### Incombank

14 Nametkina Street, block 1  
Moscow 117420  
Russia  
Tel: 7-095/332-0699  
Fax: 7-095/331-8833

### Mosbusinessbank (Moscow Bank for Business Promotion)

15, Kuznetsky Most  
Moscow 103780  
Russia  
Tel: 7-095/924-3038  
Fax: 7-095/924-0490

### Moscow Industrial Bank

5 Ordzhonikidze Street  
Moscow 117419  
Russia  
Tel: 7-095/952-7408  
Fax: 7-095/952-7794

### Tokobank

7, Masha Poryvaeva Street  
Moscow 107078  
Russia  
Tel: 7-095/204-7000  
Fax: 7-095/975-2578

## **F. TECHNICAL ASSISTANCE & TRAINING:**

### **F.1. U.S. Government Sources**

#### Nunn-Lugar Funds

The Nunn-Lugar Act of 1991 provided for defense conversion assistance to the NIS. The four republics that are recipients of defense conversion assistance are the Russian Federation, Belarus, Ukraine, and Kazakhstan.

Nunn-Lugar is a \$1.2 billion program authorized by Congress for the funding of US assistance to republics of the former Soviet Union to (1) destroy nuclear, chemical, and other weapons; (2) safely transport, store, disable, and safeguard weapons in conjunction with their destruction; and (3) establish safeguards against their proliferation. The program authorized funds in \$400 million increments for FY 1992, 1993 and 1994 to the Department of Defense under the Defense Appropriations Act. It is anticipated that an additional \$400 million will be made available for FY 1995. There are no definitive plans beyond 1995. The Nunn-Lugar Act has been recently renamed

## RUSSIAN FEDERATION

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the "Cooperative Threat Reduction (CTR) Program". The Defense Nuclear Agency has been delegated the authority for program and financial management, procurement, and performance oversight. Support for Russia has been targeted for industry conversion and housing demobilization programs currently underway.

U.S. companies interested in bidding on contracts under the Nunn-Lugar program should track opportunities announced in the Commerce Business Daily or contact the Defense Nuclear Agency Hotline at 703/325-1175.

### Eurasia Foundation

Established with the support of USAID, the Eurasia Foundation is a private, non-profit organization that supports technical assistance, training, and educational and policy programs in the NIS. The Foundation's objectives are to support private sector development, public sector reform, and media and communications. Although the Foundation is looking to support approximately \$16 million in grants per year, the average size grant will remain in the range of \$50,000 to \$75,000 but may consider grants up to \$150,000. Grant proposals must demonstrate support of private sector development and/or democratic institution building; indigenous institution building and strengthening; and transfer, adaptation, or development of local skills. Letters of inquiry regarding project proposals should be addressed to the contact below.

**Contact:** Program Office  
Eurasia Foundation  
1527 New Hampshire Avenue, NW  
Washington, DC 20036

### U.S. Agency for International Development (USAID)

#### ● **Energy Efficiency and Market Reform**

USAID established a NIS Task Force in January 1992 to support technical and humanitarian assistance programs in NIS region. Approximately \$235 million for FY'92 and \$410 million for FY'93 was authorized under the Freedom Support Act. In FY'94, USAID budgeted \$215 million for energy sector projects in the NIS. Approximately \$75 was budgeted for FY'95. The project has four components: efficiency and performance improvement; production and delivery systems; pricing, policy, and institutional reform; and nuclear power plant safety and regulation.

USAID has supported numerous activities in Russia to date: energy efficiency improvements in district heating systems, establishment of an energy efficiency center, work with DOE on analyzing alternatives to nuclear based power and ways to shut down plutonium production facilities, technical assistance to support a World Bank gas distribution loan, establishment with DOE of an Oil and Gas Center in Western Siberia to facilitate transfer of technology, assistance on the management and safety of coal mines in the Kuzbass and Vorkuta regions, identification of investments in thermal and hydro power plants, establishment of an energy industry partnership program between NIS and U.S. companies to transfer information on free market energy sector operations and management practices, development of petroleum commodity exchange in Moscow,



## **RUSSIAN FEDERATION**

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and the improvement of safety and operations of the Balakovo power plant in Russia.

New initiatives underway are activities to perform energy audits at district heating facilities at other locations, undertake a study of alternative energy sources in Russia, development and application of reduced sulphur and nitrogen emissions in coal combustion, screening and analysis of investment needs of GAZPROM's capacity, upgrade nuclear and fire safety systems, implement training program for plant personnel, install safety/accident alert system in plant in Moscow, privatize the state-owned electric energy company, reform price and tariff structure, and introduce an appropriate regulatory energy framework.

All USAID programs are administered in conjunction with the USAID representative in country.

**Contact:** Robert Ichord, Director  
Office of Energy and Infrastructure  
Bureau for Europe & NIS  
USAID  
Washington, DC 20453  
Tel: 202/647-8274  
Fax: 202/647-6962

-or-

Gene George  
USAID Representative  
Office of Energy  
Tel: 7-095/956-4281  
Fax: 7-095/956-3406

- **International Executive Service Corps**

\$1 million in funds were provided to USAID under the Foreign Appropriations Act of 1994 to support the International Executive Service Corps (IESC). USAID provided a \$1 million grant to IESC in FY 1992 to support general industry conversion activities. Technical advisors were placed in 4 cities: Nizhny Novgorod and Yekaterinburg, Russia; Kharkiv, Ukraine; and Almaty, Kazakhstan. This program will run until the end of FY 1994. DOD will continue to support this effort in FY 1995 providing the IESC with \$1 million per year.

**Contact:** Richard Shriver, Vice President  
IESC  
Stamford Harbor Park  
333 Ludlow Street  
Stamford, CT 06902  
Tel: 203/967-6342  
Fax: 203/359-3233

- **Energy Partnership Program**

## RUSSIAN FEDERATION

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Through the support of USAID, the U.S. Energy Association launched the Utility Partnership Program in July 1992. The Partnership Program links U.S. utilities with those in the NIS region to form industry partnerships between U.S. electric power and natural gas utilities and associations with their counterparts in the NIS. The objective of the program is to enable energy executives to work together in reshaping the NIS energy industry by introducing new concepts and industry structure and management under a free enterprise system. The areas of focus are industry restructuring, general utility management, energy efficiency, and the environment. In Russia, there are currently seven energy partnerships that have been established.

**Contact:** William Polen, Program Manager  
U.S. Energy Association  
1620 Eye Street, NW, Suite 1000  
Washington, DC 20006  
Tel: 202/331-0415  
Fax: 202/659-0578

### U.S. Department of Agriculture (USDA)

USDA provides export credit guarantees, export subsidies, and food aid throughout the NIS region to facilitate commodity exports. USDA also has a number of on-going technical assistance programs to provide support for agricultural reform and environmentally-sound agricultural practices.

**Contact:** DeAndra Beck  
Director, CEE & NIS Programs  
U.S. Department of Agriculture  
South Building Room 3214  
Washington, DC 20250-4300  
Tel: 202/720-8875  
Fax: 202/690-0892

### Special American Business Internship Training Program (SABIT)

Through the support of USAID, SABIT provides support for the exchange of senior NIS scientists and managers to come to the U.S. for a three to six month training internship with U.S. companies. The SABIT program provides NIS managers and scientists with hands-on experience in working in the U.S. to familiarize them with U.S. products, services, and management techniques in their field of expertise. Training NIS scientists in U.S. companies allow them to apply their skills to peaceful research and development and expose them to the role of scientific research in a market economy. SABIT focuses on the agribusiness, defense conversion, energy, environment, medical, telecommunications, financial services, transportation, and medical/pharmaceutical/health care management areas. SABIT grants to U.S. firms help to defray the cost of the internships. This program is managed by the U.S. Department of Commerce.

**Contact:** Liesel Duhon-Winski  
SABIT  
U.S. Department of Commerce  
Washington, DC 20230

## RUSSIAN FEDERATION

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Tel: 202/482-0073  
Fax: 202/482-2443

### Consortia of American Businesses in the Newly Independent States (CABNIS)

CABNIS has provided grants to trade organizations to establish a non-profit consortia to assist small- and medium-sized companies in key sectors develop a commercial presence in the NIS region. The consortia provides member companies with export information, trade leads, marketing and promotional services. This effort is managed by the U.S. Department of Commerce.

**Contact:** Eric Cimon  
U.S. Department of Commerce  
International Trade Administration  
Washington, DC 20230  
Tel: 202/482-5004  
Fax: 202/482-1790

## **F.2. Multilateral Sources**

### World Bank

#### **Energy Efficiency Cross-Support Team**

In addition to the Russia and energy divisions of the World Bank, the Industrial and Energy Department of the Central Vice-Presidency for Finance and Private Sector Development of the World Bank provides cross-support for sectoral and geographic departments of the Bank. Cross-support is provided for project lending, institutional development, and technical assistance related to energy efficiency and conservation and rural, household, and renewable energy initiatives. This cross-support team can provide implementation support for energy efficiency components of on-going Bank project lending and technical assistance as well as assess and monitor state-of-the-art technology and energy management practices for key end-user sectors.

**Contact:** Karl Jechoutek, Division Chief  
Industry and Energy Department  
Vice Presidency for Finance and Private Sector Development  
World Bank  
Washington, DC 20433  
Tel: 202/458-6391 Fax: 202/477-0542

## **F.3. In Country Sources**

### Moscow Center for Energy Efficiency (CENEf)

CENEf is a non-profit, non-governmental organization established in partnership with Battelle, Pacific Northwest Laboratory and the Energy Research Institute of the Russian Academy of Sciences in September 1991. The main objectives of CENEf are to demonstrate projects using state-of-the-art energy efficiency technologies and provide support to Russian and Western investors seeking to create joint ventures in production and distribution of energy-saving technologies; assist in drafting energy

## **RUSSIAN FEDERATION**

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efficiency policy and legislation and policy; develop proposals to implement energy efficiency measures and economic incentives to promote energy savings; and to develop information databases and information networks as well as to promote awareness of the ecological and economic benefits of energy conservation. For U.S. companies seeking to do business in Russia, CENEf can provide market information on the market for energy efficiency, business opportunities, assistance in financial matters, logistical and translation support, and information on relevant legislation.

**Contact:** Igor Bashmakov  
CENEf  
Verkhniya St. 1, Ste. 16  
127550 Moscow  
Russia  
Tel & Fax: 7-095/482-2507

**CONFIDENTIAL**  
**EXPORT MARKET SURVEY QUESTIONS**  
**FOR GEOTHERMAL INDUSTRY REPRESENTATIVES**

***Please note that information will be treated as confidential. All data will be compiled and published to show collective results only.***

**Background Information**

1. How would you rate your company's interest in identifying and developing export markets for geothermal technologies?

- 1 no interest
- 2 slightly interested
- 3 neither interested or uninterested
- 4 considerable interest
- 5 very interested

2. How would rate your company's success in identifying and developing export markets for geothermal technologies?

- 1 not successful
- 2 below average success
- 3 average success
- 4 better than average success
- 5 very successful

3. Please circle the range in which your company's 1990 total revenues and export revenues fall.

<b><i>Total</i></b>	<b><i>Export</i></b>
\$0 - \$5 million	\$0 - \$1 million
\$5 - \$10 million	\$1 - \$3 million
\$10 - \$15 million	\$3 - \$5 million
\$15 - \$20 million	\$5 - \$7 million
\$20+ million	\$7+ million

4. Circle the type(s) of geothermal equipment or services your company provides.

Exploratory Drilling

Development

Oilfield Service and Supply

Engineering/Consulting

Project Design/Construction Management

Operating Company

Turbo Generator Manufacturer

5. Please circle each of the countries in which your company is conducting or plans to conduct geothermal export business during the next year.

Dominica	Kenya	Bolivia
Indonesia	El Salvador	Panama
Guatemala	Honduras	Azores/Portugal
Costa Rica	Taiwan	Turkey
Mexico	Argentina	Puerto Rico
Philippines	Peru	Greece
Chile	Nicaragua	

*Please fill in your responses to questions 6 through 14 on the attached scoring sheet.*

### Technology

6. Of those countries listed, please rank each in terms of its market potential for geothermal technologies based on resource potential. (1 = potential market is very bad; 2 = potential market is poor; 3 = average potential market; 4 = potential market is good; 5 = potential market is very good)
7. Are technology advances, performance improvements, or other breakthroughs necessary for significant market penetration in the list of countries under consideration? (place a yes or no [Y or N] for each country)
8. For each country, indicate if your company is likely to seek export markets over the next two years. (1 = have no intention of seeking export markets; 2 = unlikely to seek export markets; 3 = will seek export markets if warranted; 4 = likely to seek export markets; 5 = will certainly seek export markets)
9. For each country, indicate if your company is likely to seek export markets over the next two to five years. (1 = have no intention of seeking export markets; 2 = unlikely to seek export markets; 3 = will seek export markets if warranted; 4 = likely to seek export markets; 5 = will certainly seek export markets)

## Competition

10. How would you rate the following market characteristics in each country?
- 1 = has no impact on commercial success
  - 2 = may impact commercial success but does not warrant significant consideration
  - 3 = is analyzed prior to market entry but alone does not warrant market entry decisions
  - 4 = impacts commercial success and warrants consideration
  - 5 = has a major impact on commercial success and should be carefully considered prior to market entry
- a. Overall market competition
  - b. Market competition from host country firms
  - c. Market competition from other exporters
  - d. Market demand for the technology
  - e. Market sustainability
11. Rate each country in terms of the degree to which host country and foreign competition impacts export sales by U.S. geothermal companies.
- 1 = little or no market competition
  - 2 = slight market competition
  - 3 = typical level of market competition
  - 4 = significant market competition
  - 5 = market competition is strong enough to significantly impact market share

## U.S. Host Country Relations

12. Characterize each country in terms of your perception of host government receptiveness during the project initiation phase versus receptiveness in the project development phase.
- 1 = not receptive in either phase
  - 2 = somewhat receptive in project initiation but not receptive in project development
  - 3 = receptive in project initiation but not in project development
  - 4 = receptive in project initiation and somewhat receptive in project development
  - 5 = receptive in both phases

13. For each country, rank each of the following types of exporter-host country characteristics or relationships in terms of facilitating successful technology use in that country.

- 1 = detrimental to success
- 2 = could potentially lessen opportunity for success
- 3 = has no bearing
- 4 = helps in achieving success
- 5 = very important for success

- a. Presence of an Export Agent
- b. Joint Venture with a host country company
- c. Joint Venture with third country partner
- d. Direct Foreign Investment (wholly-owned subsidiary)
- e. Arrangements with host country government participation
- f. Arrangements without host country government participation
- g. Host country experience with the technology
- h. Technology supported by an existing infrastructure

### Risk

14. Based on your experiences or expectations for each country, rate each type of risk on the following scale:

- 1 = has proved to be a major risk factor which has significantly detrimented export opportunities
- 2 = is a serious risk factor which has at times impacted export opportunities and requires ongoing monitoring
- 3 = is a risk factor which could potentially impact export opportunities and should be monitored
- 4 = could potentially impact export opportunities yet does not warrant a significant level of effort to address it
- 5 = does not affect export market opportunities

- a. Political instability/hostility
- b. Civil unrest/terrorism
- c. Natural conditions (i.e., natural disasters or inhospitable topography)
- d. Unqualified or inexperienced local labor force
- e. Foreign currency exchange risk (i.e., managing exchange gains/losses and interest rate differentials)
- f. Financing foreign investments
- g. Expropriation of assets
- h. Collecting on accounts receivable



**Scoring Sheet**  
**Questions 6 through 18**

Question	Country
6	Dominica
7	Indonesia
8	Guatemala
9	Costa Rica
10a	Mexico
10b	Philippines
10c	Chile
10d	Kenya
10e	El Salvador
11	Honduras
12	Taiwan
13a	Argentina
13b	Peru
13c	Nicaragua
13d	Bolivia
	Panama
	Azores/Portugal
	Turkey
	Puerto Rico
	Greece

**Scoring Sheet**  
**Questions 6 through 18 (cont'd)**

		<b>Country</b>
<b>Question</b>		
13e		Dominica
		Indonesia
		Guatemala
		Costa Rica
		Mexico
		Philippines
		Chile
		Kenya
		El Salvador
		Honduras
		Taiwan
		Argentina
		Peru
		Nicaragua
		Bolivia
		Panama
		Azores/Portugal
		Turkey
		Puerto Rico
		Greece
13f		
13g		
13g		
13h		
14a		
14b		
14c		
14d		
14e		
14f		
14g		
14h		
15		

15. Rank each country in terms of barriers to trade.

1 = none or insignificant barriers to trade

2 = minor barriers to trade but which rarely impact export business

3 = some trade barriers which represent normal constraints of doing export business

4 = trade barriers which could significantly impact export potential

5 = trade barriers prohibit export potential

16. In regards to the model weighting, do you believe that the variable weightings accurately reflect the risk/opportunity value? If not, what would you change?

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17. Rank (high, medium, low) the prime issue(s) that impede your efforts the most in getting started in your top market?

\_\_\_ Financing

\_\_\_ Buyer awareness of technology

\_\_\_ Lack of host government supported laws

\_\_\_ Lack of U.S. support

\_\_\_ Other \_\_\_\_\_

18. Provide an estimate of export assistance funding you would need to enhance your success for each international project:

\$\_\_\_\_\_ Pre-feasibility

\$\_\_\_\_\_ Reconnaissance trip to country

\$\_\_\_\_\_ Market study

\$\_\_\_\_\_ Engineering design

\$\_\_\_\_\_ Financing analysis

\$\_\_\_\_\_ Deal development

19. What can the Energy Commission do to help your market penetration efforts?

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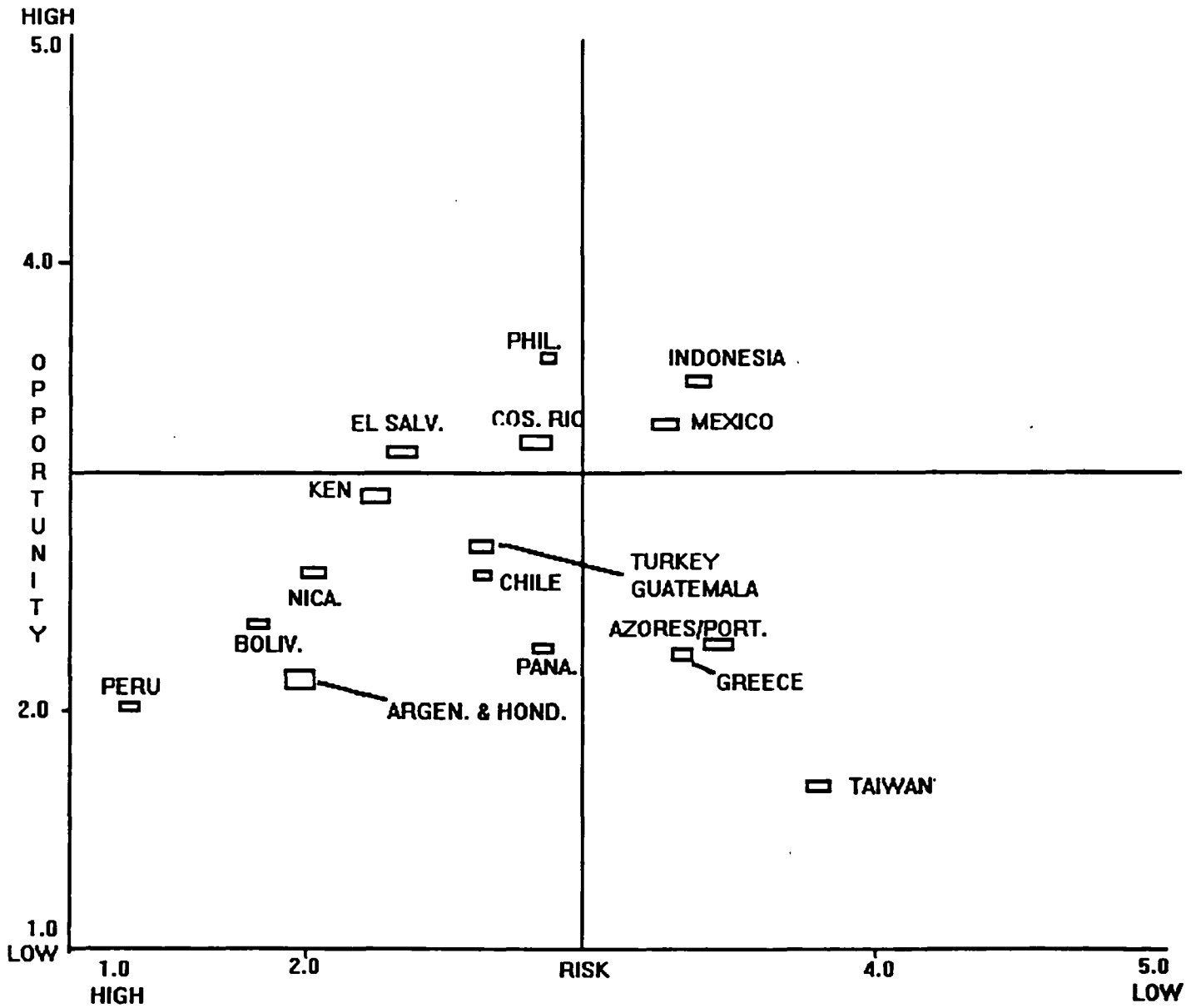
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***Please send this survey questionnaire and any comments on the model as presented to:***

**California Energy Commission  
1816 Ninth Street, MS-45 Attn: Linda Joy DeBoard  
Sacramento, California 95814**

***If you have any questions, feel free to call Export Program Manager Tim Olson at (916)324-3449 or International Trade Specialist Linda Joy DeBoard at (916)324-3453.***

# DRAFT



**Note:**

(1) Countries are ranked on opportunity and risk scales. High opportunity is equated with a score of 5 and low opportunity with a score of 1. High risk is equated with the number 1 and low risk with the value of 5.

(2) These data do not include scores for EXIM data on the risk scale. The scores are in the process of being developed.

## Preliminary Country Rankings

### Opportunity Scores

Philippines	3.6
Indonesia	3.5
Mexico	3.3
Costa Rica	3.2
El Salvador	3.1
Kenya	2.9
Turkey	2.8
Guatemala	2.8
Chile	2.7
Nicaragua*	2.7
Bolivia	2.5
Azores/Port.	2.5
Panama	2.4
Greece	2.4
Honduras	2.3
Argentina	2.2
Peru	2.0
Taiwan*	1.9

### Risk Scores

Taiwan*	3.8
Azores/Port.	3.5
Indonesia	3.4
Greece	3.3
Mexico	3.2
Costa Rica	2.9
Philippines	2.9
Panama	2.9
Chile	2.7
Turkey	2.7
Guatemala	2.6
Kenya	2.3
El Salvador	2.1
Argentina	2.0
Nicaragua*	2.0
Honduras	1.9
Bolivia	1.7
Peru	1.3

\* Data for Taiwan and Nicaragua are incomplete.

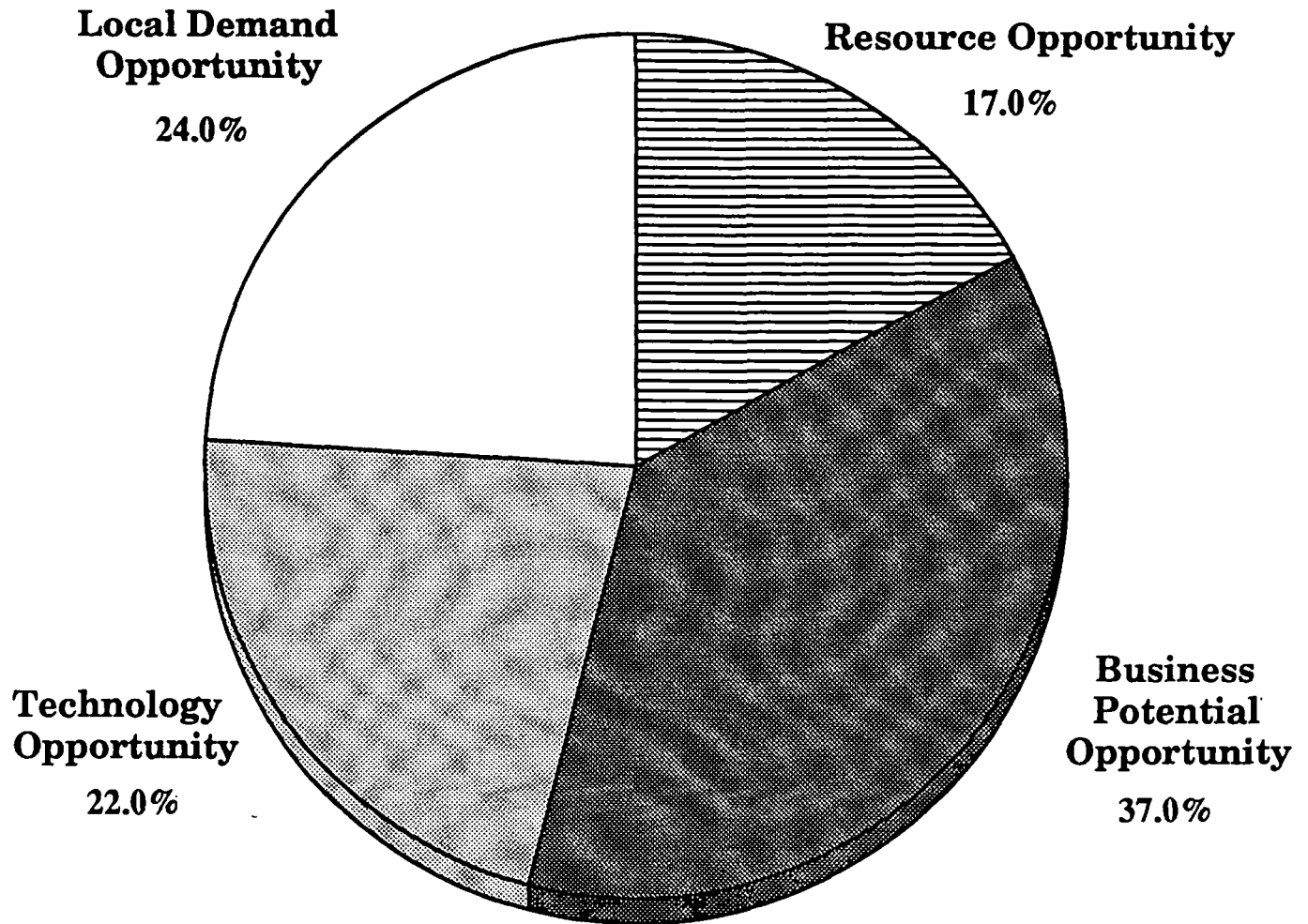
Note: (1) Opportunity and Risk scores are ranked 1 to 5.  
Opportunity Score 5 = High Opportunity, Opportunity Score 1 = Low Opportunity.  
Risk Score 5 = Low Risk, Risk Score 1 = High Risk.

(2) Does not include scores for EXIM data since scales need to be developed.

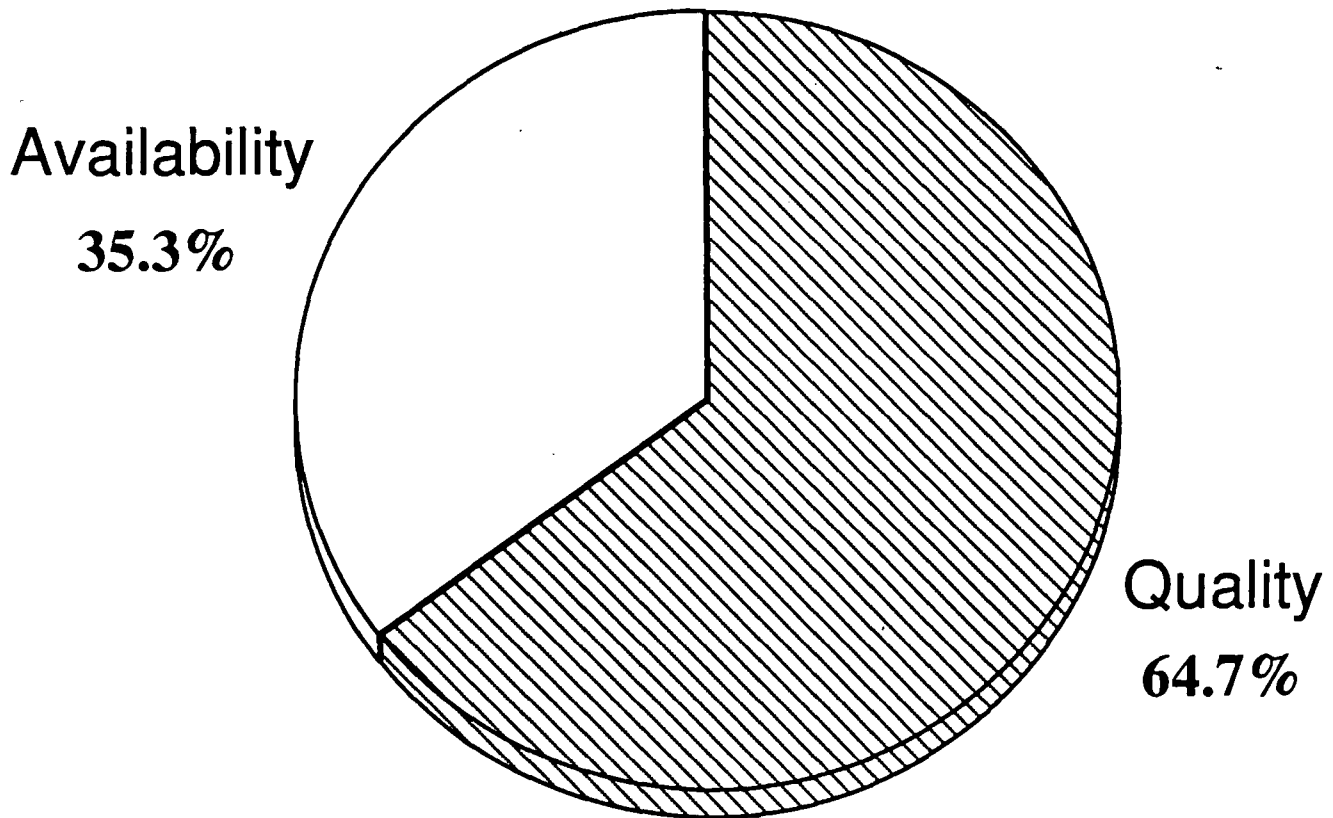
(3) Dominica and Puerto Rico have been omitted because data are insufficient and because Puerto Rico is not a country.

**DATA FOR**  
**COUNTRY-TECHNOLOGY INDEX OPPORTUNITY ASSESSMENT**

# Opportunity Analysis Variables



# Resource Opportunity Variables



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Weighting: 17% of Total Opportunity.

Availability	.06
Quality	.11



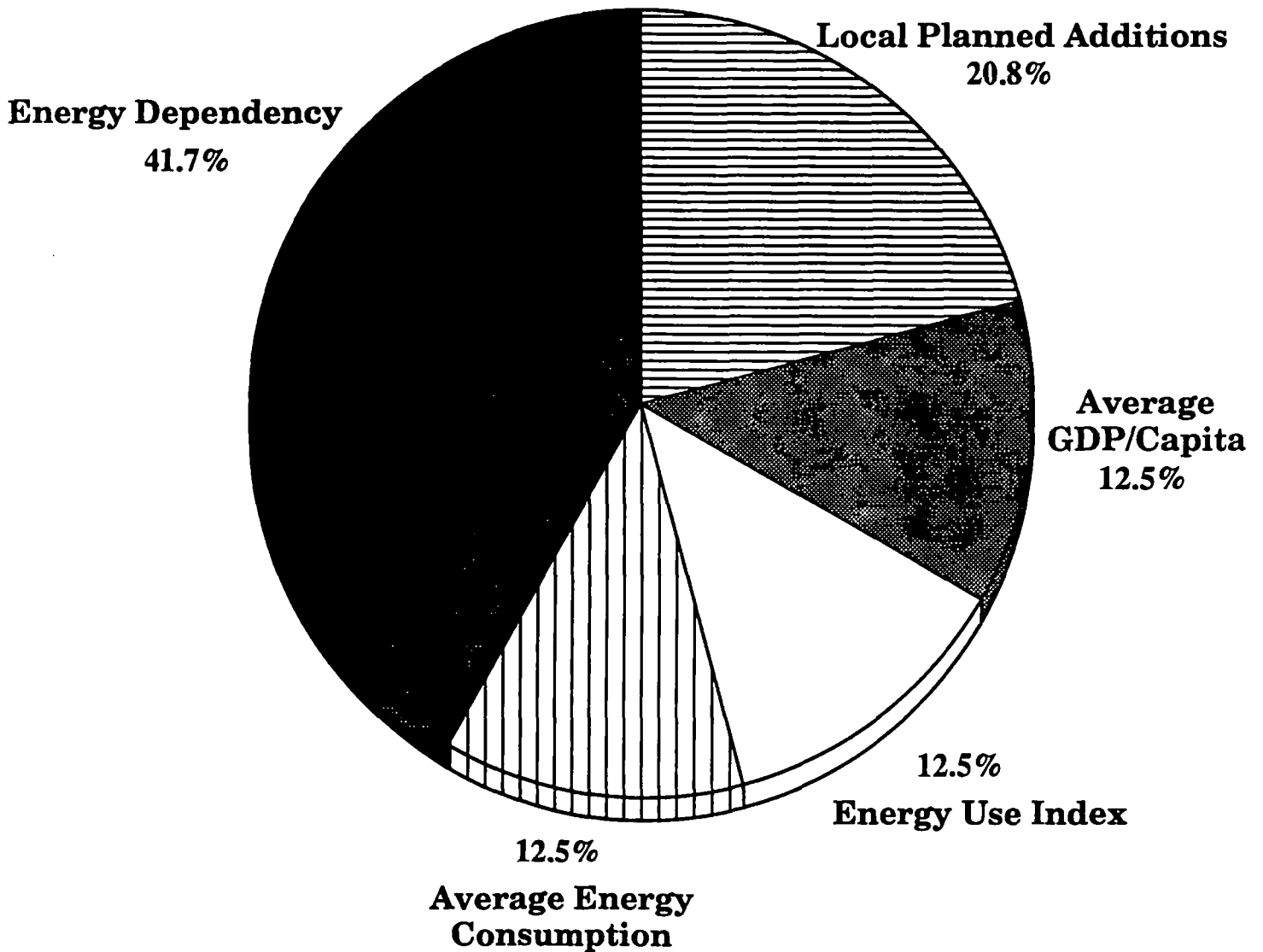
Table 1. Resource Opportunity

COUNTRY	RESOURCE AVAILABILITY (1) (GTOE)	RESOURCE QUALITY (2) (in percents)	INSTALLED CAPACITY (3) (MWe)	PLANNED ADDITIONS (4) (MWe)
DOMINICA	NR	NR	0.0	10.0
INDONESIA	79625.0	61.0	363.0	1272.0
GUATEMALA	3513.0	35.0	15.0	50.0
COSTA RICA	2300.0	69.0	55.0	80.0
MEXICO	58782.0	23.0	1025.0	1290.0
PHILIPPINES	9766.0	36.0	1042.0	2266.0
CHILE	22319.0	28.0	Favorable	180.0
KENYA	17934.0	25.0	45.0	120.0
EL SALVADOR	953.0	69.0	170.0	175.0
HONDURAS	3302.0	20.0	Study in prog.	0.0
TAIWAN	1126.0	33.0	3.3	11.0
ARGENTINA	72131.0	10.0	0.6	50.0
PERU	42389.0	37.0	Limited potenti.	0.0
NICARAGUA	4239.0	36.0	70.0	180.0
BOLIVIA	33489.0	26.0	Favrble studies	30.0
PANAMA	2482.0	36.0	Some potential	marginal
AZORES/PORTGL	2220.0	2.0	3.0	13.0
TURKEY	25761.0	41.0	26.0	130.0
PUERTO RICO	NR	NR	0.0	NR
GREECE	2740.0	21.0	2.8	65.0

NR - Not reported

1. California Energy Commission, Energy Technology Export Program, "Renewable Energy Resources of the World: An Overview", 1987. (GTOE = Gigatons of oil equivalents).
2. California Energy Commission, Energy Technology Export Program, "Renewable Energy Resources of the World: An Overview", 1987. (Presented is the percent of the available resource convertible to electric power production.)
3. Data for installed capacity and data/expectations for planned additions from the World Energy Conference, "1989 Survey of Energy Resources," (1989), United Kingdom; and the Geothermal Resources Council, Bulletin, July/August Vol. 19, No. 7 1990.
4. Data for installed capacity and data/expectations for planned additions from the World Energy Conference, "1989 Survey of Energy Resources," (1989), United Kingdom; and the Geothermal Resources Council, Bulletin, July/August Vol. 19, No. 7 1990.

# Demand Opportunity Variables




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Weighting: 24% of Total Opportunity

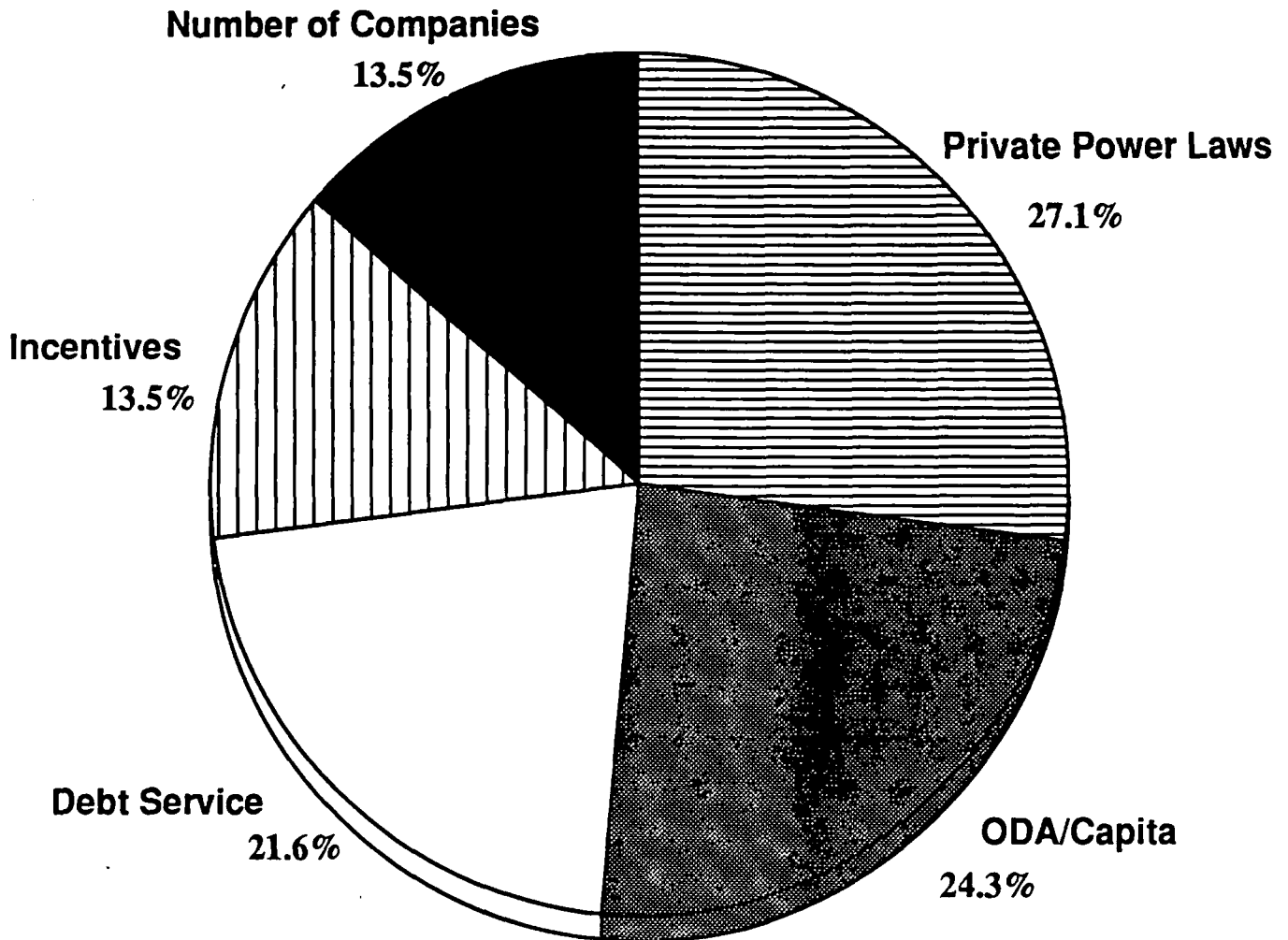
Average Energy Consumption	.03
Average GDP/Capital	.03
Planned Additions	.05
Energy Dependency	.10
Energy Use Index	.03

**Table 2. Demand Opportunity**

COUNTRY	AVG. CHANGE IN GDP PER CAPITA 1984 - 1988 (5) (% GROWTH)	ENERGY DEPENDENCY (6)
DOMINICA	4.6	0.0
INDONESIA	-5.0	2.8
GUATEMALA	-6.0	0.3
COSTA RICA	9.0	0.3
MEXICO	-4.0	1.8
PHILIPPINES	-1.0	0.2
CHILE	1.0	0.5
KENYA	5.0	0.2
EL SALVADOR	7.0	0.2
HONDURAS	5.0	0.1
TAIWAN	NR	3.0
ARGENTINA	3.0	1.9
PERU	7.0	1.2
NICARAGUA	NR	0.1
BOLIVIA	1.0	2.3
PANAMA	2.0	0.2
AZORES/PORTGL	17.0	0.1
TURKEY	2.0	0.5
PUERTO RICO	NR	0.0
GREECE	6.0	0.4

5. Percentage growth in GDP per capita from 1984-1988, from the World Bank, "World Development Report, 1990".
6. United Nations Statistical Office, Energy Statistics Yearbook, 1988. (Presented is the production to consumption ratio of energy use. A high number means that a countries energy production is outpacing its consumption. A very low number means that consumption exceeds that of production and energy development is needed.)

# Business Potential Opportunity Variables

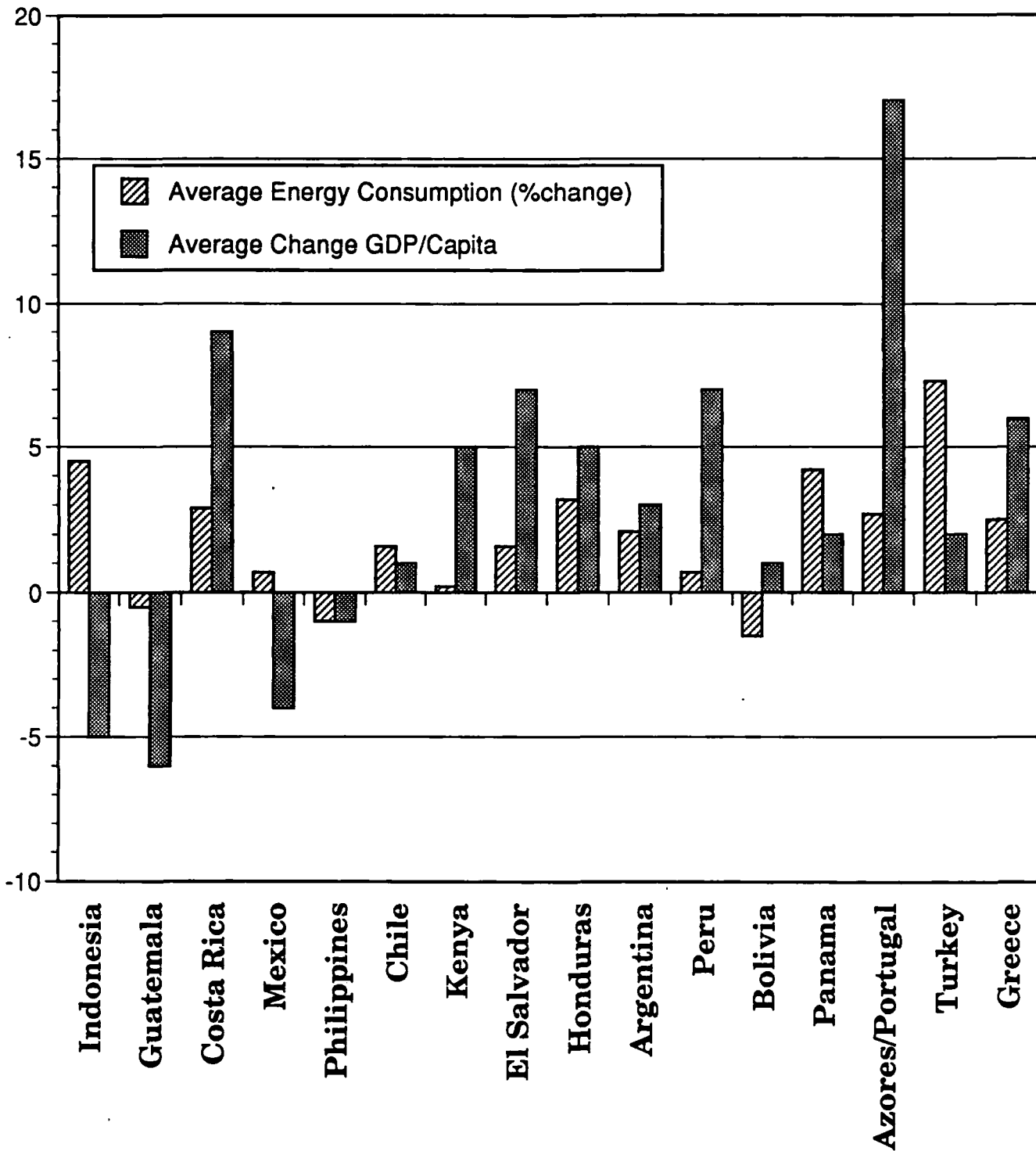


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Weighting: 37% of Total Opportunity.

Private Power Laws	.10
ODA/Capita	.09
Debt Service	.08
Number of Companies	.05
Incentives	.05

# Average Energy Consumption Average Change GDP/Capita

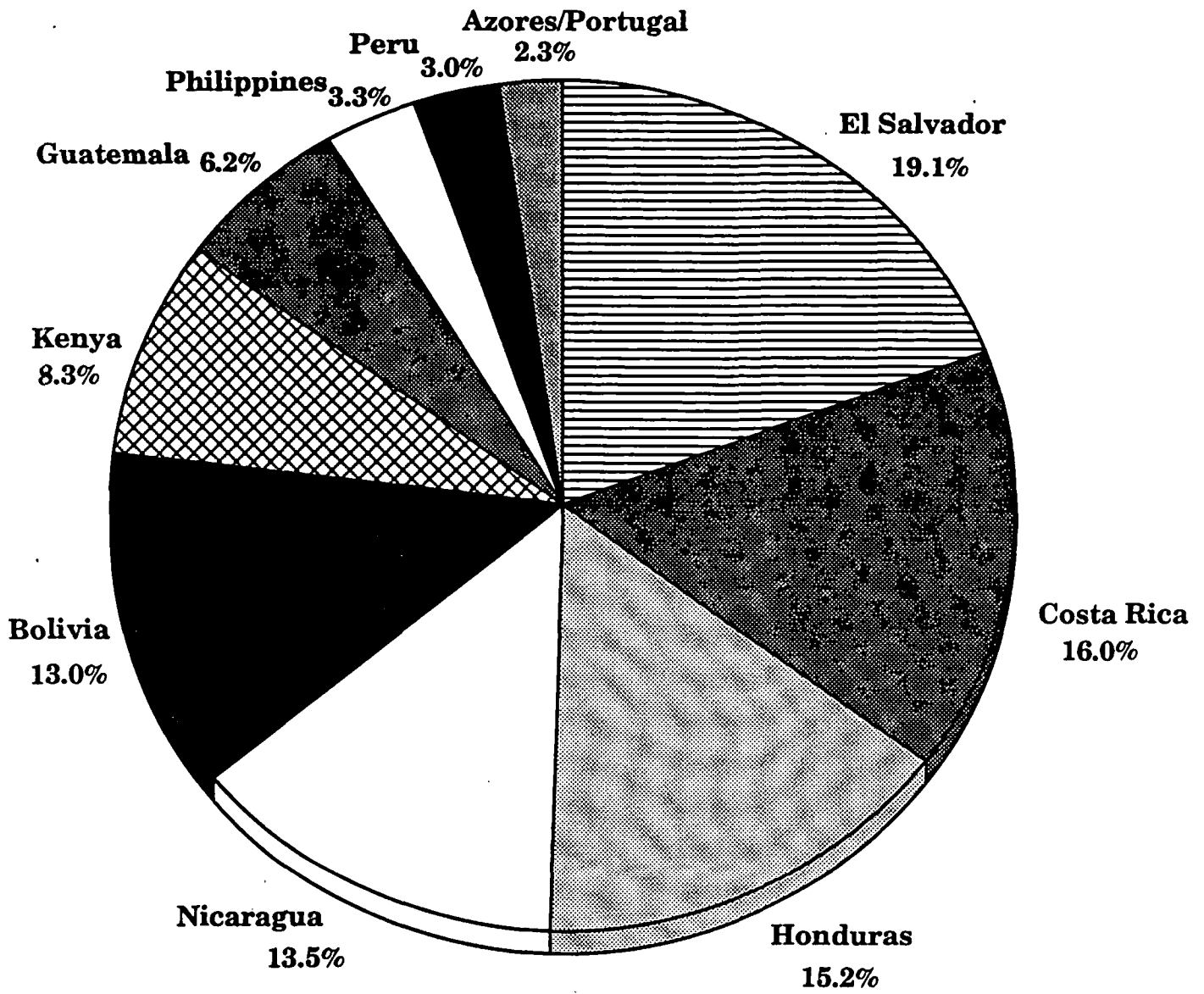


**Table 3. Business Potential**

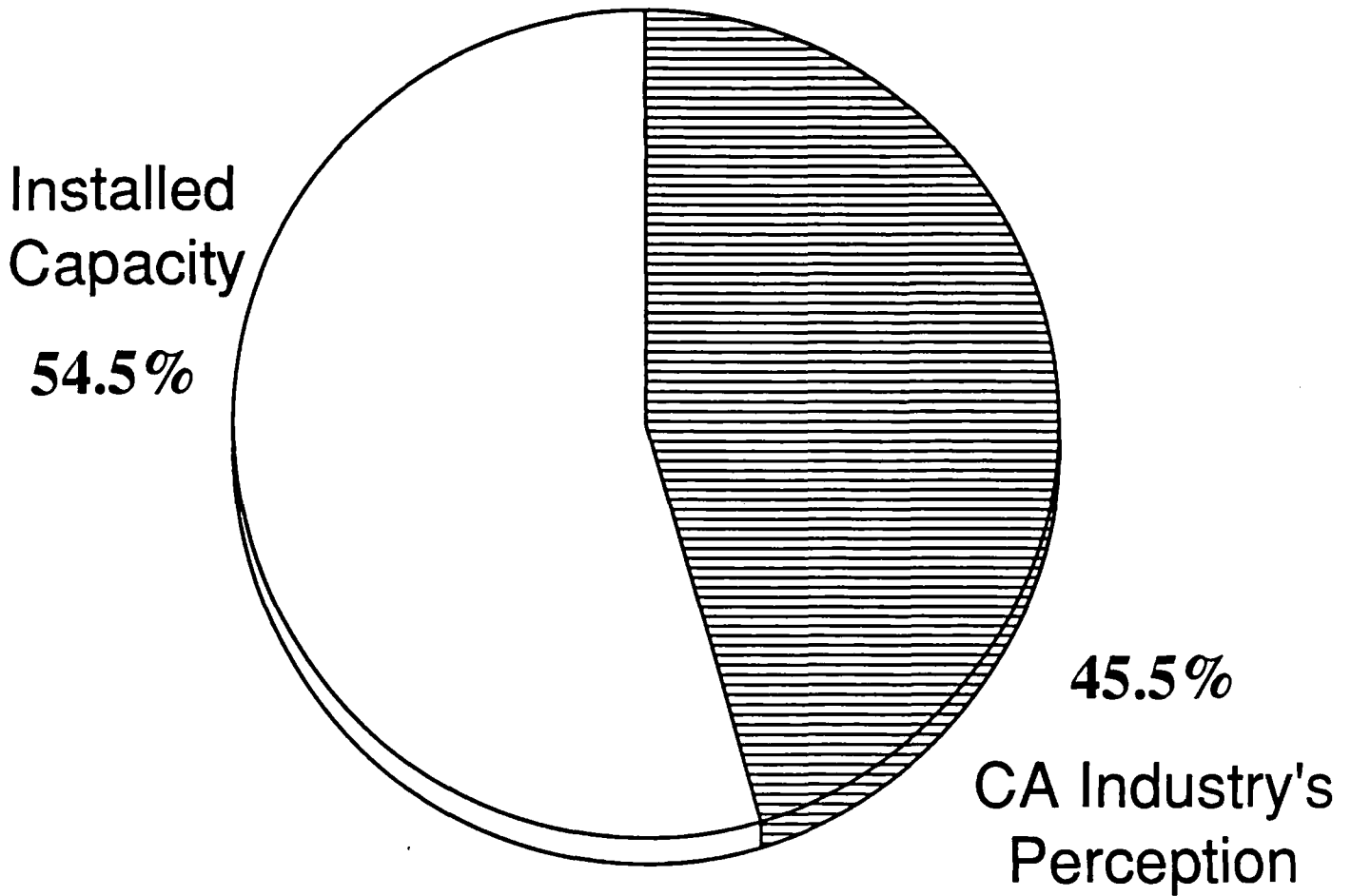
COUNTRY	OOA/CAPITA (7)	DEBT SERVICE (8) (L-T DEBT/GNP)	PRIVATE POWER LAW (9)	INCENTIVES (10)
DOMINICA	NR	NR	NR	NR
INDONESIA	9.3	11.5	4.5	4.4
GUATEMALA	27.0	4.5	3.0	1.5
COSTA RICA	69.9	7.7	2.0	4.0
MEXICO	2.1	8.2	3.2	3.5
PHILIPPINES	14.3	7.6	4.0	1.0
CHILE	3.4	7.9	2.8	4.5
KENYA	36.0	5.7	2.9	2.0
EL SALVADOR	83.4	3.3	1.0	1.0
HONDURAS	66.4	7.2	1.0	1.0
TAIWAN	NR	NR	4.0	5.0
ARGENTINA	4.8	4.9	2.0	2.0
PERU	13.2	1.3	1.0	1.0
NICARAGUA	58.8	NR	1.0	3.0
BOLIVIA	56.7	5.6	3.5	1.5
PANAMA	9.3	0.2	1.0	4.0
AZORES/PORTGL	9.9	11.0	4.5	4.0
TURKEY	5.7	9.1	3.0	3.0
PUERTO RICO	NR	NR	5.0	NR
GREECE	3.5	7.0	2.5	3.0

7. **The World Bank, "World Development Report", 1990. The number indicates the ability of the country to attract development assistance.**
8. **The World Bank, "World Development Report", 1990. Total longterm debt service as a percentage of GNP.**
9. **Empirically derived from information provided by the National Geothermal Association, National Geothermal Association Trade Mission to Central America: June 1989. Business International, Investing, Licensing, and Trading Conditions Abroad, (1 = no opportunity for private power and no supporting legislation to 5 = enabling laws.**
10. **Business International Corporation, "Central American Common Market," Financing Foreign Operations", (1989). Uses a 1 to 5 scale with 1 = to abundant discentives to 5 = to no investment discentives.**

# ODA Per Capita



# Technology Opportunity Variables



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Weighting: 22% of Total Opportunity.

Installed Capacity	.10
CA Industry's Perception	.12



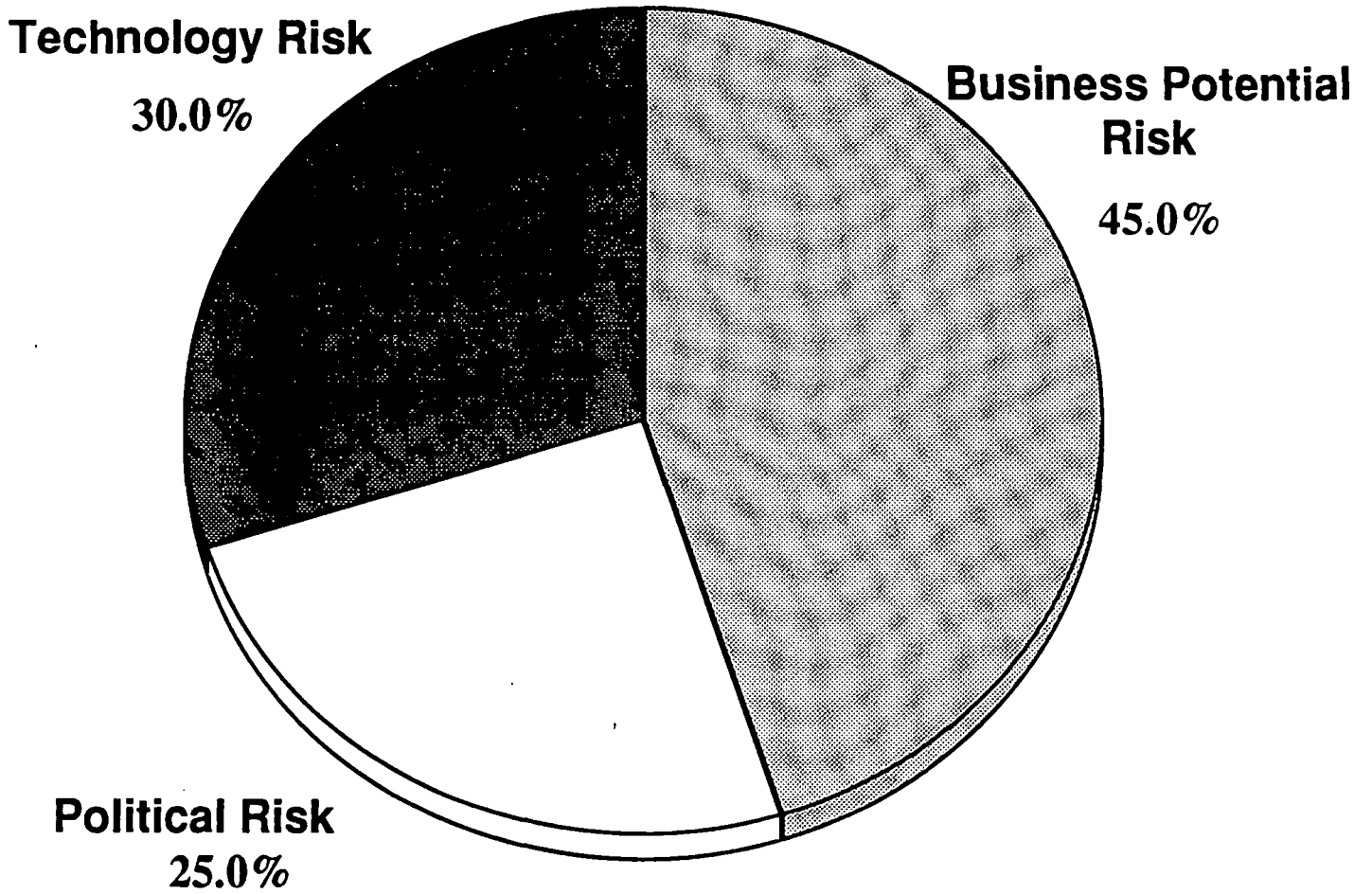
**Table 4. California Geothermal Industry Perspective**

COUNTRY	CA INDUSTRY PERCEPTION (11)	NUMBER OF COMPANIES (12)
DOMINICA	1.0	0
INDONESIA	3.0	5
GUATEMALA	5.0	4
COSTA RICA	6.0	4
MEXICO	2.0	7
PHILIPPINES	2.0	7
CHILE	8.0	2
KENYA	4.0	3
EL SALVADOR	6.0	3
HONDURAS	8.0	3
TAIWAN	5.0	2
ARGENTINA	6.0	2
PERU	7.0	2
NICARAGUA	8.0	1
BOLIVIA	8.0	2
PANAMA	8.0	2
AZORES/PORTGL	9.0	0
TURKEY	8.0	2
PUERTO RICO	10.0	1
GREECE	10.0	1

11. Mail and telephone survey results of California Energy Commission staff and consultant support in 1987 and again in 1990. In these surveys, geothermal companies were asked to rank selected countries as to the market potential a particular country offered. Countries were ranked on a scale of 1 to 10 with 1 providing the best expected opportunity for a country and 10 the lowest or not expected to be as good of an opportunity.
12. "California Energy Commission, Energy Technology Export Program, 1990 Industry Survey and Program Evaluation". Number of geothermal firms with actual experience or plans to do business in the country.

**DATA FOR**  
**COUNTRY-TECHNOLOGY INDEX RISK ASSESSMENT**

# Risk Analysis Variables



### Table 5. Risk Data

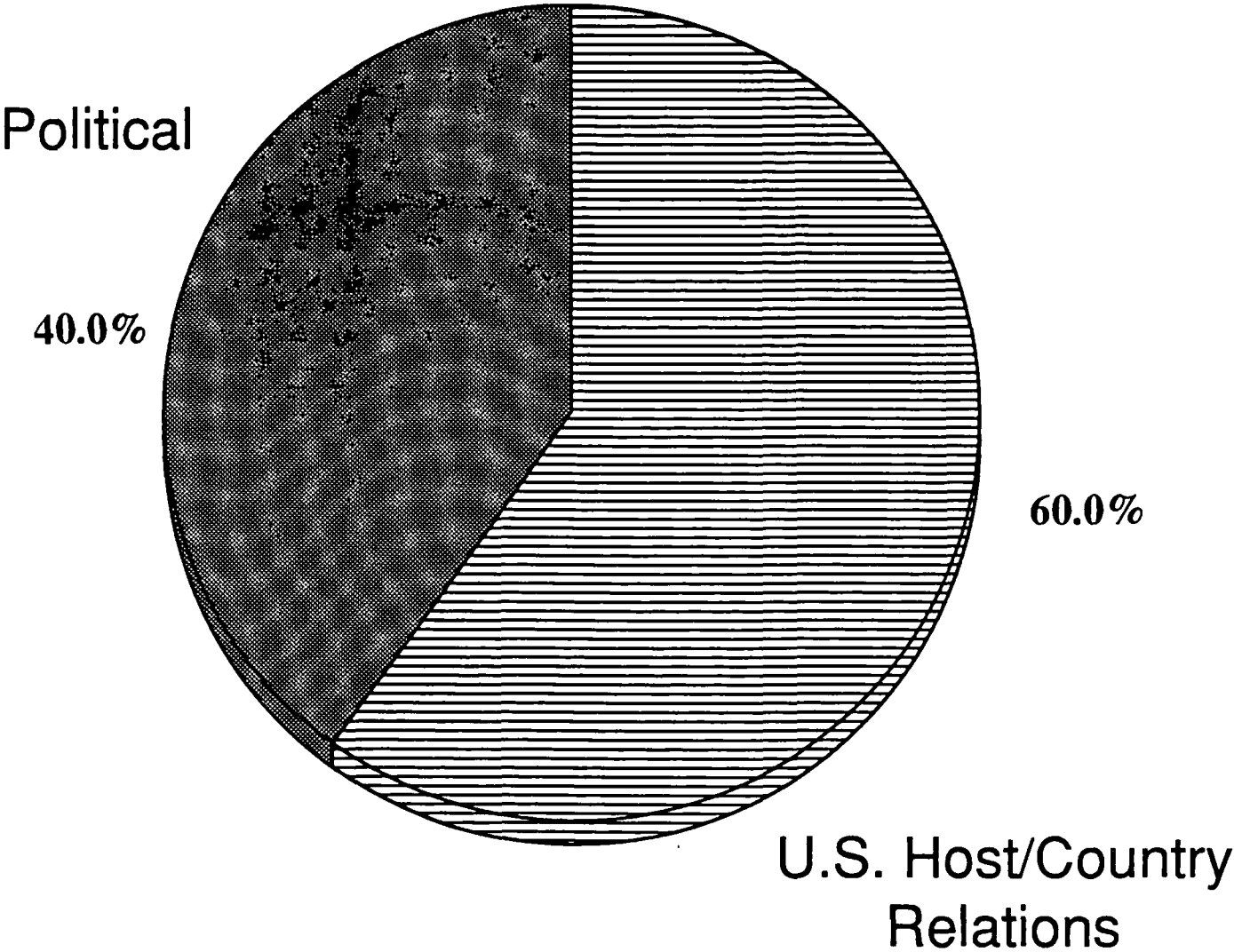
COUNTRY	POLITICAL CLIMATE (1)	BUSINESS CLIMATE U.S. - HOST COUNTRY (2)	TECHNOLOGY VIABILITY (3)	TRADE BARRIERS (4)	EXPORT RISK (5)	CREDIT RISK (6)	BUSINESS RISK (7)	EXIM DATA (8)	REPATRIATION (9)
DOMINICA	NR	4.5	2.5	NR	NR	NR	NR	2.70	NR
INDONESIA	4.5	4.4	4.9	2.2	B+	48.0	65.6	2.25	4.0
GUATEMALA	3.0	4.3	3.0	2.0	B	16.5	26.6	4.05	2.0
COSTA RICA	5.0	4.4	3.2	2.0	A+	21.1	35.9	Off cover	1.0
MEXICO	4.0	4.0	3.8	2.8	B	35.0	57.1	2.70	1.9
PHILIPPINES	4.0	4.4	4.7	2.0	C	25.9	42.4	3.38	2.0
CHILE	3.5	4.2	4.9	3.0	B-	37.6	54.7	2.70	2.0
KENYA	2.0	4.3	2.0	1.5	C	31.5	44.2	2.25	NR
EL SALVADOR	1.0	4.5	4.0	1.5	C+	10.9	26.1	6.08	1.0
HONDURAS	2.0	3.8	4.5	1.5	C	13.8	26.4	Off cover	1.3
TAIWAN	3.5	4.4	2.3	4.8	A+	77.6	80.0	1.00	3.0
ARGENTINA	1.5	3.7	4.0	1.5	C+	18.3	34.0	Off cover	1.3
PERU	1.0	1.5	3.1	1.0	C-	11.1	29.3	Off cover	1.5
NICARAGUA	2.7	2.9	2.0	1.4	C+	5.9	14.5	Off cover	1.0
BOLIVIA	1.5	3.7	4.0	1.4	C+	13.2	28.3	Off cover	1.0
PANAMA	2.9	4.2	2.5	4.0	B	18.0	51.2	Off cover	4.5
AZORES/PORTG	3.8	4.3	2.6	4.0	A-	65.2	79.9	1.50	3.5
TURKEY	3.0	3.0	3.0	1.5	C+	41.4	66.0	2.25	2.5
PUERTO RICO	NR	5.0	4.3	NR	A+	NR	NR	NR	NR
GREECE	4.5	3.3	3.0	4.0	B+	47.8	65.5	2.25	3.8

## SOURCES FOR RISK DATA

NR - Not reported

1. This is a measure of estimated turmoil within the country over the next 18 months. The source of the data is Political Risk Services a respected analytical private sector group. 1 = potentially high chance of turmoil while 5 = little chance of significant turmoil during the time period.
2. Source of this data is a composite score of foreign desk officers and data published by the U.S. government and 1991 Country Marketing Plans which show the U.S. as a favored trading partner. 1 = poor country relations and 5 = excellent business/political relations.
3. Source of this data is a composite score of information obtained from the Geothermal Research Council, and other professionals (which includes scientists and engineers who have worked in the country). 1 = the technology will not play a role in the near or long term and 5 = geothermal is a preferred option in a particular country.
4. UNCTAD data from Geneva Switzerland. A scale was developed to interpret these data. The scale ranges from 1 = prohibition of geothermal goods to 5 = low trade barriers.
5. Export risk as measured by Political Risk Services. D- = high tariff and deteriorating trade conditions to A+ = low trade barriers and little chance that good trade conditions will deteriorate.
6. Institutional Investor, 1990. Country credit ratings with 1 = to the lowest rating (4.3) and 5 = to the highest (94.5).
7. Euromoney's country risk index is provided Country Risk Index, for business is provided prior to the Iraq invasion with an emphasis on the longterm.
8. Export-Import data are provided. These data reflect a financial and commercial consideration of business risk. 5.06 is high dollar risk while 1.00 is a low value of risk. Off cover means that the risk is so high that they do not assign a value to it.
9. This measure is an empirical which estimates the potential to repatriate profits from any business activity for \$5 mm to \$20 mm. The scale equates to 1 = unable to repatriate to 5 = able to freely to repatriate.

# Political Risk

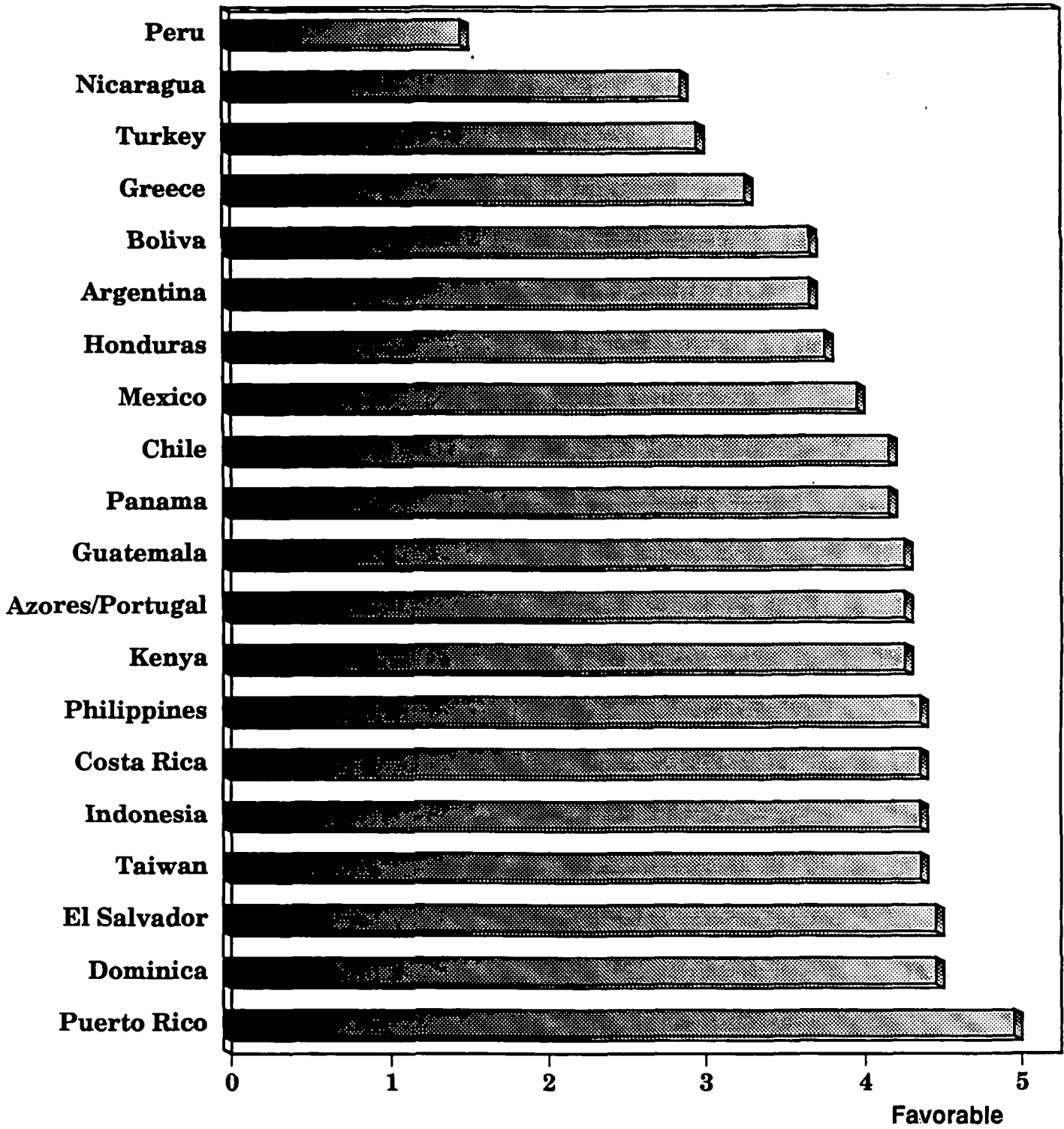


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Weighting: 25% of Total Risk

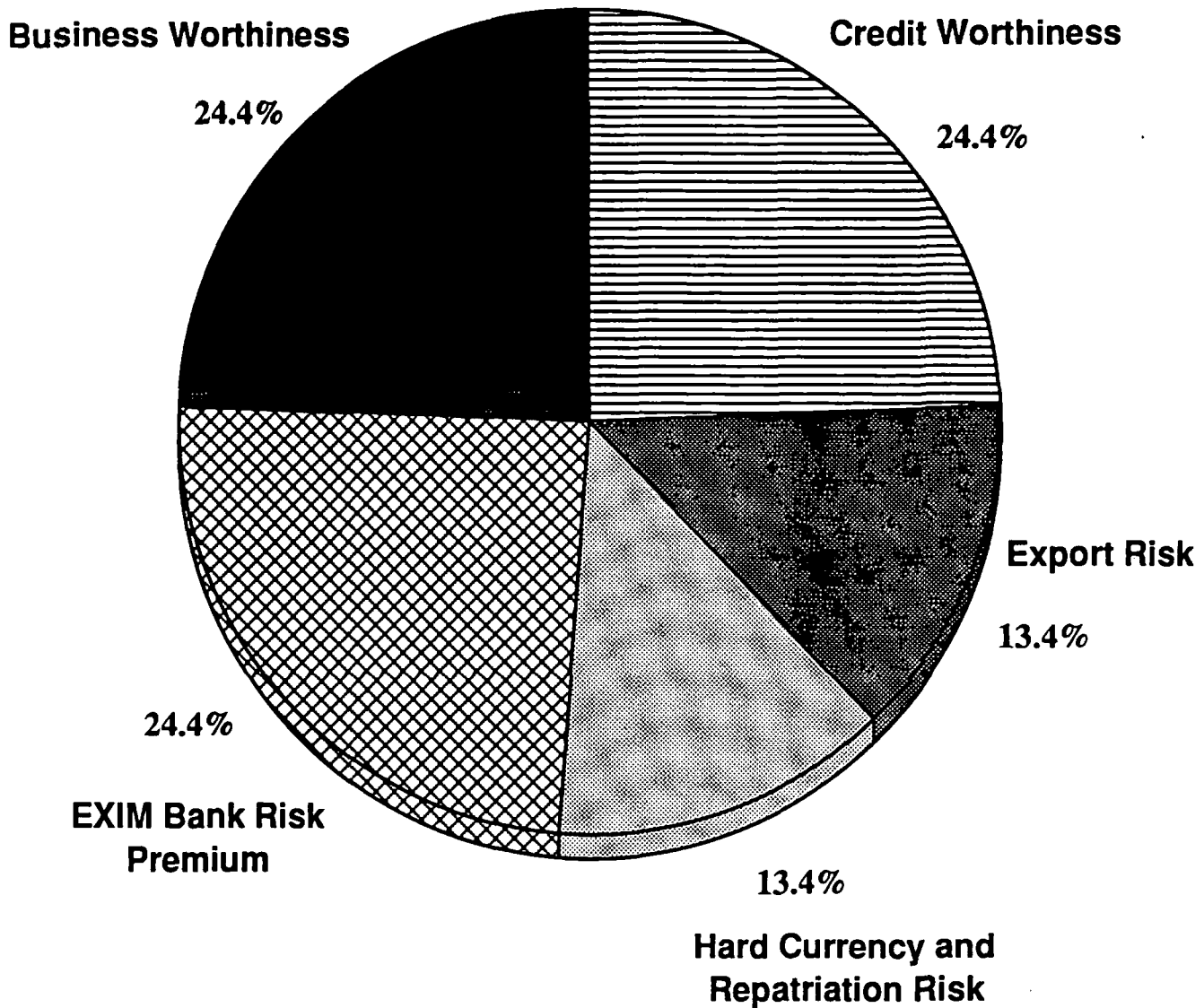
Political	.15
U.S./Host Country Relations	.10

# Host Country/U.S. Relations



Scaled Scores

# Business Potential Risk



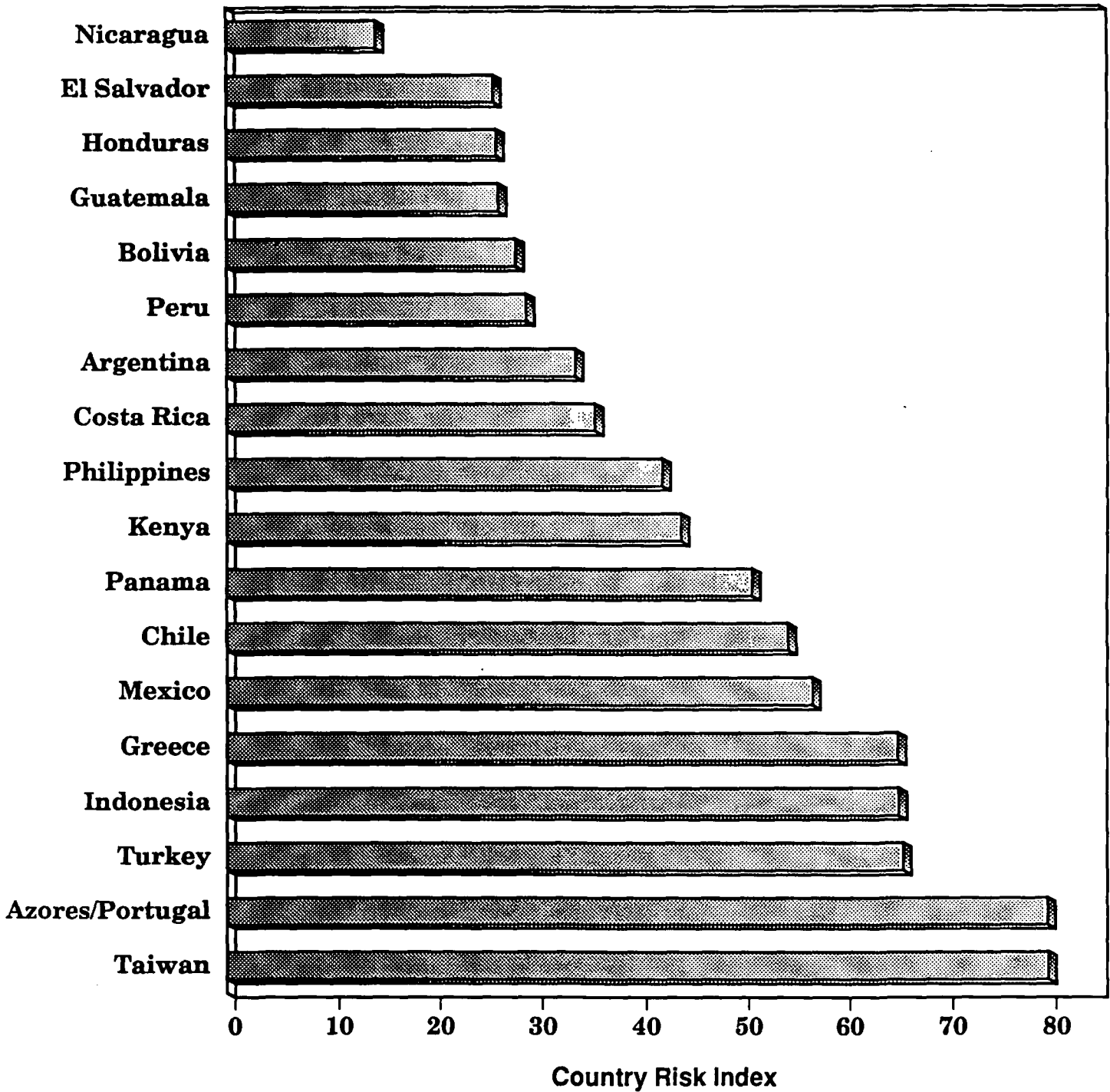
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Weighting: 45% of Total Risk

Export Risk	.06
Credit Worthiness	.11
EXIM Bank	.11
Business Worthiness	.11
Repatriation	.06



# Business Risk

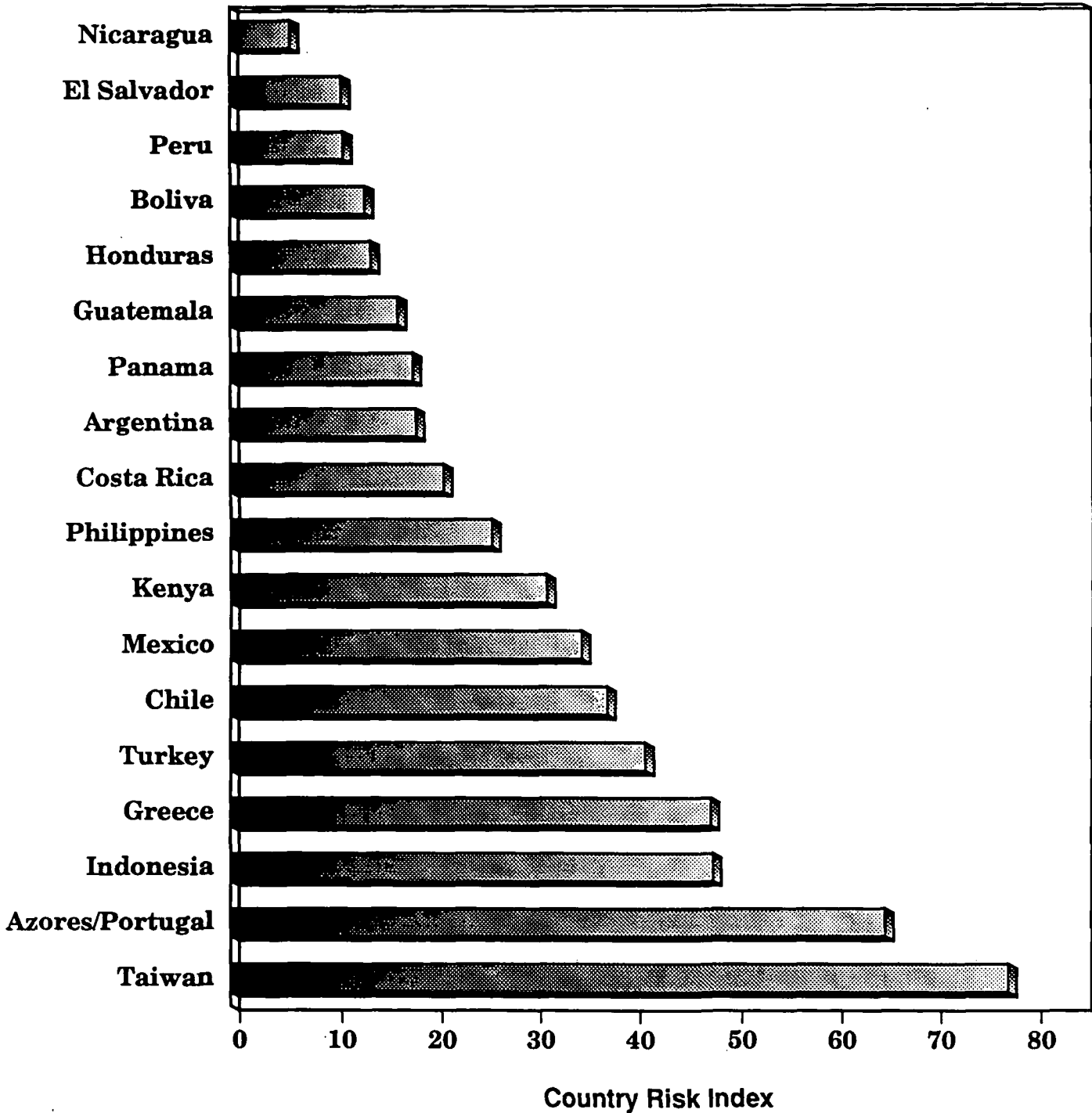


Source: *Euromoney*.

The lower the raw score the higher the business risk.

The 1 to 100 scale is a rating system where the higher number reflects a more favorable rating.

# Credit Risk

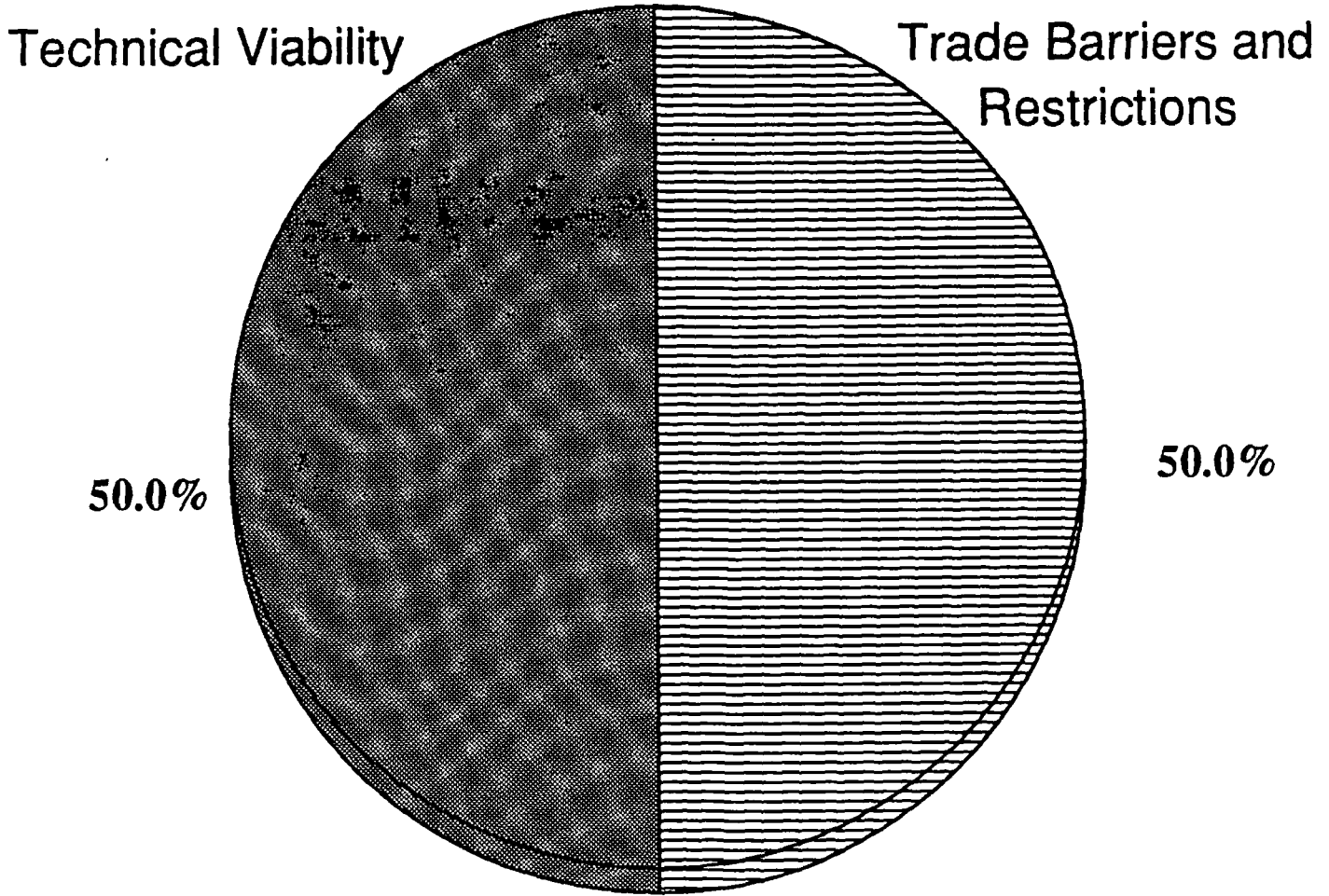


Source: *Institutional Investor*.

The lower the raw score the higher the credit risk premiums.

The 1 to 100 scale is a rating system used by the Institutional Investor.

# Technology Risk



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Weighting: 30% of Total Risk

Technical Viability	.15
Trade Barriers	.15

**DRAFT**

**RESEARCH APPROACH AND**

**DEVELOPMENT OF TECHNOLOGY-COUNTRY INDEX**

**Guatemala: A Case Study**

*Contract No. 500-89-092*

*Work Authorization 4 Task 1*

**March 14, 1991**

***BCS, Incorporated***

*(with assistance from Morse Agri-Energy Associates)*

**DRAFT**  
**RESEARCH APPROACH AND DEVELOPMENT OF**  
**TECHNOLOGY - COUNTRY INDEX**

**INTRODUCTION**

In 1987, the California Energy Commission, Energy Technology Export Program (EETEP) hired consultants to develop a method to identify energy technology market opportunities in developing countries and rank the countries. A limited group of experts was brought together in an EETEP round table meeting. These experts were presented with specific country facts and asked to rank countries based on their personal knowledge and facts presented at the meeting. While this effort was useful for initial target marketing objectives of the CEC, it was not specific to a technology nor was it objectively derived. CEC has tasked BCS, Incorporated with the assistance of Morse Agri-Energy Associates to develop a new more objective and analytically sound approach to analyze and portray risk and opportunity measures for specific energy technologies in various countries.

A technology evaluation and ranking method (TERM) has been developed and designed for this project. TERM provides a decision-analysis approach to estimate the opportunity and associated risks for a specific technology and related services within specific countries. The method is the result of a contract team meeting held on October 2, 1990 and a follow up meeting held on October 16, 1990. The Contractor team and EETEP agreed to develop a scoring approach based on a number of quantitative and empirically derived factors which incorporates California industry inputs. In order to test the approach, a specific country (Guatemala) was selected. Data series were collected to specifically measure risk/opportunity for geothermal exports from California geothermal companies to Guatemala. These measures are brought together in an evaluation matrix which facilitates summation of individual variable scores specifically to obtain an overall measure of risk and opportunity for a country-technology evaluation.

The remainder of this paper provides a brief overview of the approach, the data, transformation of the data into scales, and weighing of variables; and a presentation of the approach using Guatemala as the example to show the strengths and weaknesses of the approach.

**Conceptual Method**

The scoring approach consists of identifying a set of variables that can account for the opportunity and risks to California geothermal companies when exporting to various countries. Data for each variable was obtained from the most recent and reliable sources for as many countries as data are currently available. Data for each variable were transformed into a five-point scoring scale that range from low to high. The scale was developed with low and high representing the extremes of the data provided for all countries in the data range for a particular variable. Raw data falling between the extremes is scaled or calibrated so that the data approximates a normal distribution. That is with 25% of the responses falling in the tails of

a normal distribution curve and 50% surrounding the middle point. For example, a country's score for a particular variable will be based on where that country's raw data falls in the range of raw data for all countries after the range of data has been transformed to a 1 to 5 scoring scale. Thus, the scores provide a relative positioning of one country as compared to another for each of the variables within the one to five scale. The use of a numerical, and understood scale, enables the different parts of a complex situation such as export risk/opportunity to be looked at, both separately and as a whole, in a manner that would not otherwise be possible. The definition of the scale is further described in the discussion which follows. Also, a weighing process is suggested for the variables. The weights can be used to reduce the bias in the analysis depending on how those weights are derived. To develop the technology-country indices, a summation of the weighted scores is used to obtain a separate average score for opportunity and risk for each country.

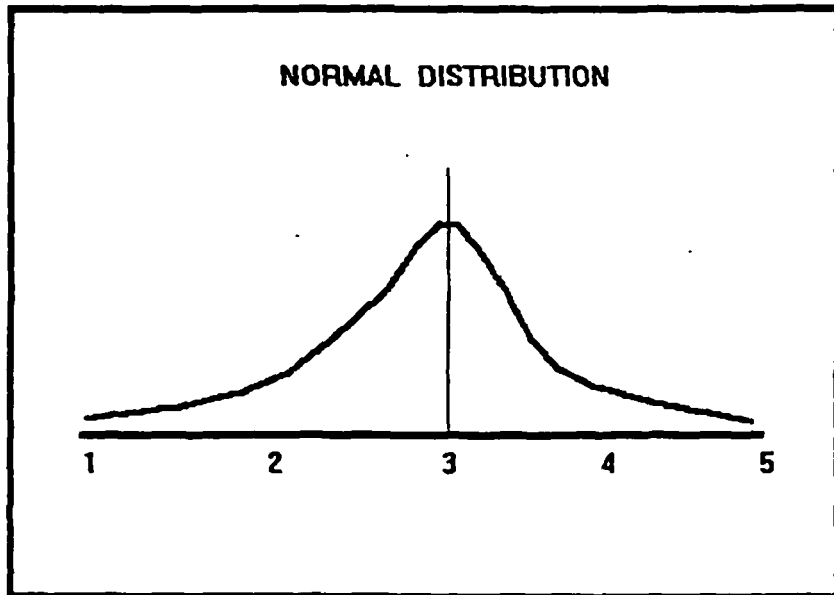
### Scoring Method

For each variable identified, a data range table will be developed and a corresponding scoring-scale going from 1 to 5 will also be developed. For example, after reviewing the data for "resource quality" variable, which is defined as the percent of the total resource useable for electric power, the data range table spans 0% to 100% of the resource available for electric power. All of the countries in the world fall somewhere in that range. Similar ranges will be developed for each variable used. In order to develop scores for the raw data a corresponding five point scale is developed where the number 1 corresponds to the lowest number in the range and 5 to the highest. Using resource quality variable as an example, the country of Guatemala would have a variable score of about 3.8 for the geothermal resource quality variable. Similarly, all of the raw data collected for a country will be converted to a score on the five point scale. Scores will be rounded to the nearest tenth since scores are used in a relative positioning sense and not in an absolute one. This conversion or transformation of the variables will be very important. Also, note that to create an even distribution of countries in a scale, the median of the distributed data is used to correspond with the midpoint. In the case stated above, a score of 3 would be equal to about 16% of the available resource as opposed to 50% since most of the raw data are skewed to the lower end of the range. Because data for most variables tend to be skewed by country due to population sizes, GNP, and other anomalies, median distributions are used to create the normal distribution. Medians tend to more accurately portray the relationship of one country's data to another for purposes of this evaluation.

To develop the model we collected raw data for each variable and converted these data to a normalized measure on a five point scale -- with 1 being equal to the lowest number of the raw data and 5 being the highest. A five point scale will be developed for each variable and each country will receive a score for each variable used in the analysis.

The reason for using a 5 point scale (or Likert-type scale) is that this scale provides the ability to combine a variety of data in an analysis by creating normal distributions, whether it be

numerical, using a variety of different measurement units, or subjective data for a variable. On the basis of experimental evidence and results of other statisticians, it seems justifiable for research purposes to assume these data are distributed fairly normally and to use this assumption as the basis for combining the different types of data used in this analysis. The 5 point scale has had repetitive validity in social science research for creating normal distributions. A normal distribution means that the data are evenly distributed with 50% of the respondents falling below the score of 3 and the other half above that score.



### Weighing Process

The purpose of using variable weights is to give importance to one variable score versus another variable score. To provide weights, assumes a priori knowledge of which variables are more important in the decision process than others. In addition, by providing appropriate weights, some of the uncertainty in the decision process, due to inadequate or incomplete data/information, may be reduced. A number of methods have been derived to develop variable weights. These include:

- Simple rank ordering using numerical weights
- Paired comparisons and Mini-Max Regret functions
- Others which include regression and step-wise functions

The first relies on expert judgement to ascertain the importance of one variable than another. The paired comparison method looks at the expected loss of making the wrong decision relative to the variable scores. This method provides some objectivity to the selection of weights. The third uses regression analysis and assesses the relative importance of variables based on their explanatory value or contribution to a dependent variable. In independent testing situations, it has been found that fairly similar results are achieved using the different methods but the ranking method is by far the easiest to use (Eckenrode, 1965; Schimpler, 1967; Pessimier and Baker, 1971). For this analysis, the rank ordering method is used to develop weights for the variables to assign relative importance. A first cut will be applied by the authors of this paper and is based on professional judgements and common indicators used in the international trade decisions.

### Summation Procedure

Group data using a summation technique has proven to yield reliable results as high as those obtained using more complicated techniques. Two sets of variables are being developed for this analysis. Data variables are grouped for risk and opportunity. By summing the weighted variable score products for each set of opportunity and risk variables, separate weighted-average scores can be developed for risk and opportunity for each country.

The summation formula used is presented below.



The sum formula used will be:

$$\text{Country Score} = \sum_{j=1}^n P_j X_j$$

where,

$P_j$  = Variable Weight for each variable by country

$X_j$  = Variable score for each variable by country

and

$$\sum_{j=1}^n P_j = 1, \quad P_j \geq 0$$

The country risk and opportunity scores may then be plotted in scatter graphs such as the one presented at the end of this paper. This scatter graph scoring method will also be used for the final country/technology market assessment determination. These risk and opportunity scores and points can help to target countries that have differing prospects for a technology ranging from a high risk low risk opportunity prospect to a low risk high opportunity prospect (the optimum).

Raw data can be used for alternative analytical situations, bar charts can be developed with the software capabilities of the Contractor and (ETEP should they so wish) to compare the raw data of specific variables for a group of countries. This comparative analysis of the raw data may prove to be more interesting, revealing and even useful, of one country's situation versus another's, than the relative overall country scoring of information developed above.

The final deliverable will be a well supported and documented list of the countries best suited to buy California energy technologies. This will be useful for justifying market promotion efforts and for energy policy development.

In addition, this analysis will determine the countries that fall within the high risk and high opportunity quadrant. Such data may indicate a need for policy development efforts to minimize identifiable risks in these countries. Countries found in the other quadrants will likely have lesser appeal for CEC efforts.

## **APPLICATION OF THE SCORING MODEL TO GUATEMALA**

This section provides an application of the model and variables as to how they would be used to develop an opportunity and risk score for a particular country. A summary of the opportunity score and the risk score for Guatemala is presented at the end of this paper. As shown these scores are 3.00 and 2.60, respectively. These overall or summary scores should be used solely for purposes of comparison or relative ranking of one country to another as a potential market prospect for California's Geothermal industry. To make specific conclusions with regard to these scores, the analyst needs to look at the individual scores and the rationale for that score. A review of the rationale for the individual opportunity and risk scores follows.

### **Opportunity**

#### **Resource Variable Scores**

Availability: 2.7

Quality: 3.8

Guatemala, when compared with all countries on the basis of total resources, falls just in the lower half of all countries. However, one must keep in mind that by this measure Guatemala is being compared with the United States and other countries that have significantly more resource than Guatemala.

With regard to the quality of the resource, Guatemala has a significant portion of their resource (about 35%) which can be used for electric power. Los Alamos Laboratories and others have studied 23 areas within Guatemala. Guatemala has 35 volcanoes and an intense amount of volcanic activity. Geothermal resources have been estimated to have reservoir temperatures of 140 degrees Centigrade to 300 degrees Centigrade. The geothermal areas at Zunil, to the west and Amatitlan to the South of Guatemala City have been drilled for electrical utilization of the resources. The geothermal industry reports that sites at Moyuta and Tecuamburro have also been studied with encouraging results.

#### **Technology Variable Scores**

Installed Capacity: 2.5

Planned Additions: 2.9

Guatemala has under construction the first 15 MWe built at Zunil by 1993 and to have a second 15 MWe, at Zunil II or Amatitlan, available by 1999. This is a substantial amount of power.

## California Industry Perspective

California Industry	
Perception:	3.0
No. of Companies:	3.0

Based on California industry survey data, the industry views Guatemala as a very good market opportunity based on both the country's commitment to geothermal technology and on the perception that geothermal direct use and electrical use in the country will grow throughout this decade and the next.

## Demand Variable Scores

Average GDP/Capita:	1.7
Energy Independence:	3.3

Currently, energy consumption and economic growth variables, two indicators of demand, are relatively low compared to those of other countries. However, the ability to grow is based on having secure and accessible energy supplies. Thus, a country without domestic energy supplies has significant handcuffs on economic growth. Guatemala is caught in these circumstances as indicated by its energy independence score. Guatemala consumes about 4 times more energy than it produces. Both production and consumption levels have remained steady with no growth and sometimes declining growth. Also, Guatemala energy-use rate/capita is low when compared with other countries in the region. The energy use rate is relatively low for most developing countries (who do not have significant growth potential) and industrialized countries who have learned to curb energy use through conservation measures. The conclusion drawn from these data is that while consumption is currently low for Guatemala, there is a significant need for indigenous sources of energy such as geothermal to spur economic growth which will lead to even greater energy use.

## Business Potential Variable Scores

ODA/Capita:	2.2
Debt Service Ratio:	3.2
Private Power Law:	3.0
Incentives:	1.5

The good news is that Guatemala has been relatively successful in attracting development funding as measured on a per capita basis as compared to other countries. In 1987, the

Overseas Private Investment Corporation rated Guatemala a promising site for U.S. investment and in 1989 increased from \$500 thousand to \$2 million the amount for which it was will to insure for political risk. In 1989, the Export-Import Bank also increased its financing to Guatemala, both the AID-reinsured Trade Credit Insurance Program and the Foreign Credit Insurance Association. The bank also removed the 10 million per transaction limit on new loans to Guatemala and issued over \$100 million dollars preliminary financing commitments to U.S. telecommunication firms in 1989 and 1990. Also, while Guatemala's debt service ratio is not that good (4.5%), it is relatively better than most countries of that region. The U.S. is one of Guatemala's best trading partners purchasing 35% of exports. Also, When asked, California geothermal companies indicated that they plan or have conducted business in this country more so than other countries. However, this business optimism needs to be tempered by the fact that Guatemala offers few direct incentives for U.S. energy businesses.

Guatemala's private power score is an optimistic 3.0 because as the resource shows the nation has a private geothermal development law, Decree No.. 126-85 but lacks experience and infrastructure. As a result it appears unclear as to whether electricity could be sold to INDE for a profitable price, a critical component of raising capital for private power. Indeed the government is reluctant to raise the price of electricity because of experience with civil unrest in prior attempts. Currently INDE sells electricity below cost.

Guatemala has severe restrictions of doing business in the private power sector even though it has a well-known liberal foreign investment law in the resource development aspect. The problem is that it has a law prohibiting private investment in power plants. There have been violence in the streets as a result of raising the price of electricity which has forced the government to continue to subsidize electricity and sell at uneconomic rates. Foreign exchange is dear and has been subject to intercompany bidding for access to international liquidity when something needs to be purchased. All repatriation of capital is subject to foreign exchange availability. Note that some 50% of counter-trade proposals are approved. They must not have key export earning products in them such as coffee, sugar, meat, cotton, cardamom.

## Risk

### Political

Political Risk: 3.0  
US-Host country Relations: 4.3

Political Services rates Guatemala as a high risk of turmoil. In addition, the Eximbank restricted material confirms the country as constantly on the verge of insurrection. Thus, its score of 3.0 appears a logical and validated score.

With regard to the US relations with Guatemala, it is found that they have never been better. With the recent and peaceful change of government to a more private sector oriented President, the near term continuance and enhancement of these relations are reported by desk officers at the Commerce and State Departments to be excellent particularly when compared to other countries of Central and South America.

### Technology

Technology Viability: 3.2  
Trade Barriers: 2.0

In terms of geothermal's viability compared with other technologies, the Department of Commerce reports that geothermal appears to be one of several good alternatives to provide electrical power for Guatemala. For on line capacity, when shortages of electric power have existed INDE has been known to by power from private power developers as well. In addition, INDE has been known to purchase power to extend service to areas not yet covered by the national electrification program. However, during times of real or perceived excess capacity INDE does not purchase private power. The preferred private sector fuels have been petroleum, bagasse, coffee husks and hydro power. However since the mid-1980's the government has made substantial investments into geothermal and it has been stated that geothermal power generation is now gaining in the government as a grid-connected power source to be controlled by INDE.

This rating was done based on the trade barriers data for the Central American Common Market which has a common external tariff. Products included in the research are: Structural steel, drilling mud, drilling bits, drilling tools, wellhead components, gate valves, pipe, flanges, control valves, butterfly valves, hydraulic controls, turbines, oil pumps, water pumps, tubing. For the purpose of the model generators, electrical controls, transformers, and transmission line were left out due to time it takes to concord these others. Should this variable be judged satisfactory by the CEC, the other data will be filled in for the final geothermal report. In general, of the data studied, UNCTAD database reports import duties between 5% and 35% but more importantly there is a non-tariff barrier to all goods going into geothermal development in the form of a quantitative restriction. Through this 1983 limitation, non-energy ministry officials such

as finance ministry officials, security officials, the military, and others can eclipse the work of an exporter and the energy ministry by discouraging the customs authority from approving a licence, which is necessary, to enter under the quota. Consequently, even though OPIC is active in Guatemala sponsoring U.S. investment there which would oftentimes require U.S. goods to follow U.S. investment monies, there is a regulatory structure to easily prevent U.S. exporters from making a sale even though they had won a bid and signed a contract with the energy ministry. However, this does not say that the import licence to import under the quota will be withheld. It only says that an import control mechanism is in place to institutionalize the rejection of U.S. imports if that is the will of the President or his customs officials.

### **Business Potential**

Export Risk:	3.5
Exim Bank Fees:	2.0
Credit Worthiness:	1.8
Business Worthiness:	1.8
Money Availability:	2.0

In the near term Guatemala, has been determined to be of moderate export risk when compared to 85 countries. Political Risk Services categorizes the export risk of Guatemala as some protectionist sentiment and a poor foreign exchange position with moderate tariff and non-tariff barriers to trade; modest delays in payment and some chance that the business climate will deteriorate over the next year.

Guatemala ranks poorly in Eximbank's view. When considering that Eximbank does not approve items at point 1 on the scale, it is likely that there would be significant apprehension upon consideration of an application for an export credit supported by Guatemala's sovereign ability to pay. It is possible that the guarantee would not be approved at all.

By referring to the data it can be determined that Guatemala has improved from a dismal 14.5 to the current 16.9. It ranks number 91 out of 112 countries in the survey and is thus seen by banks as generally uncreditworthy. By normalizing the data and converting to the scale, the variable becomes 1.8.

By referring to the data, Guatemala's rating in August, once Kuwait had been invaded by Iraq, was 26.0 which when normalized and converted to the scale results in a variable score of 1.8. It ranks number 110 out of 133 countries and thus is considered a highly risky country in which to do business.

Since the country basically does not have credit abroad and the only form of investment is an insured investment, Guatemala does not rate very well on repatriation. As Business International reports: "There are not formal controls on most registered capital, but

repatriation is contingent upon the availability of foreign exchange and may be held up by red tape. Cash transfers into the country may be withdrawn only after a minimum of 90 days." that is the situation is so bad that they have to penalize any incoming funds 90 days in escrow before the owner can have access to it.

## **CONCLUSIONS**

There are several conclusions emanating from this document which include:

1. The general approach of using a scoring technique is found to be a valid method to develop a ranking of a number of countries. It is easy to use and has shown to produce results comparable to those of more complex, more time consuming, and more costly approaches.
2. A normal scale is useful to take data that would not be comparable and make them comparable for evaluation purposes and decision analysis.
3. A ranking of countries by technology can yield interesting analyses when assessed on a risk and opportunity scale.
4. All country scores can be presented on a single chart which will show how each country compares against one another. An example is presented in Exhibit 4.

## END NOTES

- Eckenrode, Robert T., "Weighing Multiple Criteria," Management Science, Vol. 12 (No. 3), 1965.
- Howard, Ron, "The Evolution of Decision Analysis," Department of Engineering-Economic Systems, Stanford University, 1983.
- Jackson, Byron, "Decision Methods for Evaluating R&D Projects", Research Management, 1983.
- Kmietowicz, A.D., "Estimated Payoff Matrix", Decision Theory and Incomplete Knowledge, University of Leeds, Gower, England 1981.
- Maranell, G. M., Scaling, Chicago, Aldine Pub. Co., 1974.
- Moore, P. G. Risk, Risk in Business Decision, New York, Wiley, 1973.
- Moore, J., and Baker, N. R., "An Analytical Approach to Scoring Model Design-Application to Research and Development Project Selection," IEEE Transaction on Engineering Management, Vol. EM-16 (No. 3), 1969.
- Pessimier, Edgar A. and Baker, Norman, R., "Project and Program Decisions in Research and Development," R&D Management, Vol. 2, (No. 1), 1971.
- Raiffa, Howard, Decision Analysis: Introduction Lectures on Choices Under Uncertainty, Reading, MA, 1968.
- Raiffa, Howard, Applied Statistical Decision Theory, Cambridge, Mass., M.I.T. Press, 1968.
- Schimpler, C. C., "Criteria Weighing: An Urban Application," 1967.



## SCORES FOR COUNTRY-TECHNOLOGY INDEX OPPORTUNITY ASSESSMENT

COUNTRY	RESOURCE		TECHNOLOGY		CA INDUSTRY PERSPECTIVE		DEMAND		BUSINESS POTENTIAL					OPPORTUNITY SCORE
	Avail. (GTOE)	Quality (GTOE)	Installed Cap. (MW)	Planned Additions (MW)	CA Industry Perception	No. of Companies	Average GDP/CAPITA	Energy Demand.	ODA/Capita	Debt Service	Priv. Pur. Law	Incentives	Incentives	Tot. Weight
Weights	0.06	0.11	0.1	0.07	0.12	0.05	0.03	0.1	0.1	0.08	0.1	0.08	0.08	1.00
Guatemala	2.7	3.8	2.5	2.9	3.0	3.0	1.7	3.3	2.2	3.2	3.0	1.5	1.5	2.97
wt. score:	0.162	0.418	0.25	0.203	0.36	0.15	0.051	0.33	0.22	0.256	0.3	0.12	0.12	2.82

**SCORES FOR  
COUNTRY-TECHNOLOGY INDEX RISK ASSESSMENT**

COUNTRY	POLITICAL		TECHNOLOGY			BUSINESS POTENTIAL				RISK SCORE
	Political Country (10)	US-Host Country (10)	Tech. Viability (10)	Trade Barriers (11)	Export Risk (12)	Eximbank (13)	Credit Risk (14)	Business Risk (15)	Repatriation (16)	Tot. Weight
Weights	0.15	0.1	0.15	0.15	0.06	0.11	0.11	0.11	0.06	1.00
Guatemala score:	3.0	4.3	3.2	2.0	3.5	2.0	1.8	1.8	2.0	2.6
wt. score:	0.45	0.43	0.48	0.3	0.21	0.22	0.198	0.198	0.12	2.6

**SCORES FOR  
COUNTRY-TECHNOLOGY INDEX OPPORTUNITY ASSESSMENT**

Table 1. Resource Opportunity

COUNTRY	RESOURCE		TECHNOLOGY	
	Avail. (GTOE)	Quality (GTOE)	Installed Cap. (MWe)	Planned Additions (MWe)
Weights	0.06	0.11	0.1	0.07
Dominica				
score:	0	0	1	2.1
wt. score:	0	0	0.1	0.147
Indonesia				
score:	4.2	4.3	4	4.3
wt. score:	0.252	0.473	0.4	0.301
Guatemala				
score:	2.7	3.8	2.5	2.9
wt. score:	0.162	0.418	0.25	0.203
Costa Rica				
score:	2.4	4.5	3.1	3.2
wt. score:	0.144	0.495	0.31	0.224
Mexico				
score:	3.1	3.3	4.3	4.3
wt. score:	0.186	0.363	0.43	0.301
Philippines				
score:	3.4	3.8	4.3	4.7
wt. score:	0.204	0.418	0.43	0.329
Chile				
score:	4	3.5	1	3.9
wt. score:	0.24	0.385	0.1	0.273
Kenya				
score:	4	3.4	3.1	3.4
wt. score:	0.24	0.374	0.31	0.238
El Salvador				
score:	2	4.5	3.5	3.8
wt. score:	0.12	0.495	0.35	0.266
Honduras				
score:	2.7	3.2	1	1
wt. score:	0.162	0.352	0.1	0.07
Taiwan				
score:	2.1	3.7	2.1	1.2
wt. score:	0.126	0.407	0.21	0.084
Argentina				
score:	4.1	2.6	1.5	2.9
wt. score:	0.246	0.286	0.15	0.203
Peru				
score:	4.1	3.8	1	1
wt. score:	0.246	0.418	0.1	0.07
Nicaragua				
score:	2.9	3.8	3.1	3.9
wt. score:	0.174	0.418	0.31	0.273
Bolivia				
score:	4	3.4	1	2.5
wt. score:	0.24	0.374	0.1	0.175
Panama				
score:	2.5	3.8	1	1
wt. score:	0.15	0.418	0.1	0.07
Azores/Port				
score:	2.4	1.2	2.1	2.2
wt. score:	0.144	0.132	0.21	0.154
Turkey				
score:	4.6	4	2.8	3.5
wt. score:	0.276	0.44	0.28	0.245
Puerto Rico				
score:	0	0	0	0
wt. score:	0	0	0	0
Greece				
score:	2.5	3.1	2.1	3.1
wt. score:	0.15	0.341	0.21	0.217

Table 2. Demand Opportunity

COUNTRY	DEMAND	
	Average GDP/CAPITA	Energy Depend.
Weights	0.03	0.1
Dominica		
score:	0	5
wt. sco	0	0.5
Indonesia		
score:	1.8	2
wt. sco	0.054	0.2
Guatemala		
score:	1.7	3.3
wt. sco	0.051	0.33
Costa Ric		
score:	4.2	3.3
wt. sco	0.126	0.33
Mexico		
score:	1.7	2
wt. sco	0.051	0.2
Philippin		
score:	2	3.7
wt. sco	0.06	0.37
Chile		
score:	2.2	2.8
wt. sco	0.066	0.28
Kenya		
score:	3.3	3.7
wt. sco	0.099	0.37
El Salvad		
score:	4	3.6
wt. sco	0.12	0.36
Honduras		
score:	3.3	3.8
wt. sco	0.099	0.38
Taiwan		
score:	0	0
wt. sco	0	0
Argentina		
score:	2.8	2.1
wt. sco	0.084	0.21
Peru		
score:	4	2
wt. sco	0.12	0.2
Nicaragua		
score:	0	4
wt. sco	0	0.4
Bolivia		
score:	2.4	2
wt. sco	0.072	0.2
Panama		
score:	2.6	3.6
wt. sco	0.078	0.36
Azores/Po		
score:	4.8	3.9
wt. sco	0.144	0.39
Turkey		
score:	2.6	2.9
wt. sco	0.078	0.29
Puerto Ri		
score:	0	5
wt. sco	0	0.5
Greece		
score:	3.7	3.1
wt. sco	0.111	0.31

Table 3. California Geothermal Industry Perspective

COUNTRY	CA INDUSTRY PERSPECTIVE	
	CA Industry Perception	No. of Companies
Weights	0.12	0.05
Dominica		
score:	5.0	1.0
wt. score:	0.6	0.05
Indonesia		
score:	4.0	4.0
wt. score:	0.48	0.2
Guatemala		
score:	3.0	3.0
wt. score:	0.36	0.15
Costa Rica		
score:	3.0	3.0
wt. score:	0.36	0.15
Mexico		
score:	5.0	5.0
wt. score:	0.6	0.25
Philippines		
score:	5.0	5.0
wt. score:	0.6	0.25
Chile		
score:	2.0	2.0
wt. score:	0.24	0.1
Kenya		
score:	1.0	3.0
wt. score:	0.12	0.15
El Salvador		
score:	3.0	3.0
wt. score:	0.36	0.15
Honduras		
score:	2.0	3.0
wt. score:	0.24	0.15
Taiwan		
score:	1.0	2.0
wt. score:	0.12	0.1
Argentina		
score:	1.0	2.0
wt. score:	0.12	0.1
Peru		
score:	1.0	2.0
wt. score:	0.12	0.1
Nicaragua		
score:	2.0	2.0
wt. score:	0.24	0.1
Bolivia		
score:	1.0	2.0
wt. score:	0.12	0.1
Panama		
score:	1.0	2.0
wt. score:	0.12	0.1
Azores/Port		
score:	1.0	1.0
wt. score:	0.12	0.05
Turkey		
score:	2.0	2.0
wt. score:	0.24	0.1
Puerto Rico		
score:	0.0	2.0
wt. score:	0	0.1
Greece		
score:	1.0	2.0
wt. score:	0.12	0.1

Table 4. Business Potential

COUNTRY	BUSINESS POTENTIAL				OPPORTUNITY SCORE
	ODA/ Capita	Debt Service	Priv. Pwr, Law	Incentives	Tot. Weight
Weights	0.1	0.08	0.1	0.08	1.00
Dominica					
score:	0	0	0.0	0	2.82
wt. score	0	0	0	0	1.40
Indonesia					
score:	2.1	1.7	4.5	4.4	3.44
wt. score	0.21	0.136	0.45	0.352	3.51
Guatemala					
score:	2.2	3.2	3.0	1.5	2.73
wt. score	0.22	0.256	0.3	0.12	2.82
Costa Rica					
score:	4.1	2	2.0	4	3.23
wt. score	0.41	0.16	0.2	0.32	3.23
Mexico					
score:	1.7	2	3.2	3.5	3.26
wt. score	0.17	0.16	0.32	0.28	3.31
Philippines					
score:	2.5	2	4.0	1	3.45
wt. score	0.25	0.16	0.4	0.08	3.55
Chile					
score:	1.8	2	2.8	4.5	2.71
wt. score	0.18	0.16	0.28	0.36	2.66
Kenya					
score:	3.5	2.7	2.9	2	3.00
wt. score	0.35	0.216	0.29	0.16	2.92
El Salvador					
score:	4.2	3.7	1.0	1	3.11
wt. score	0.42	0.296	0.1	0.08	3.12
Honduras					
score:	4.1	2.2	1.0	1	2.36
wt. score	0.41	0.176	0.1	0.08	2.32
Taiwan					
score:	0	0	4.0	5	3.01
wt. score	0	0	0.4	0.4	1.85
Argentina					
score:	1.9	3	2.0	2	2.33
wt. score	0.19	0.24	0.2	0.16	2.19
Peru					
score:	1.3	4.5	1.0	1	2.23
wt. score	0.13	0.36	0.1	0.08	2.04
Nicaragua					
score:	4	0	1.0	3	3.30
wt. score	0.4	0	0.1	0.24	2.66
Bolivia					
score:	4	2.8	3.5	1.5	2.51
wt. score	0.4	0.224	0.35	0.12	2.48
Panama					
score:	2.2	5	1.0	4	2.48
wt. score	0.22	0.4	0.1	0.32	2.44
Azores/Port					
score:	2.2	1.7	4.5	4	2.58
wt. score	0.22	0.136	0.45	0.32	2.47
Turkey					
score:	1.9	1.9	3.0	3	2.85
wt. score	0.19	0.152	0.3	0.24	2.83
Puerto Rico					
score:	0	0	5.0	0	6.00
wt. score	0	0	0.5	0	1.10
Greece					
score:	1.8	2.2	2.5	3.00	2.51
wt. score	0.18	0.176	0.25	0.24	2.41

**SCORES FOR  
COUNTRY-TECHNOLOGY INDEX RISK ASSESSMENT**



Table 1. Political/Technology Risk

COUNTRY	POLITICAL		TECHNOLOGY	
	Political	US-Host Country	Tech. Viability	Trade Barriers
Weights	0.15	0.1	0.15	0.15
Dominica				
score:	0.0	4.5	2.5	2.2
wt. score:	0	0.45	0.375	0.33
Indonesia				
score:	4.5	4.4	4.9	2.0
wt. score:	0.675	0.44	0.735	0.3
Guatemala				
score:	3.0	4.3	3.2	2.0
wt. score:	0.45	0.43	0.48	0.3
Costa Rica				
score:	5.0	4.4	3.8	2.0
wt. score:	0.75	0.44	0.57	0.3
Mexico				
score:	4.0	4.0	4.7	2.8
wt. score:	0.6	0.4	0.705	0.42
Philippines				
score:	4.0	4.4	4.9	2.0
wt. score:	0.6	0.44	0.735	0.3
Chile				
score:	3.5	4.2	2.0	3.0
wt. score:	0.525	0.42	0.3	0.45
Kenya				
score:	2.0	4.3	4.0	1.5
wt. score:	0.3	0.43	0.6	0.225
El Salvador				
score:	1.0	4.5	4.5	1.5
wt. score:	0.15	0.45	0.675	0.225
Honduras				
score:	2.0	3.8	2.3	1.5
wt. score:	0.3	0.38	0.345	0.225
Taiwan				
score:	3.5	4.4	4.0	4.8
wt. score:	0.525	0.44	0.6	0.72
Argentina				
score:	1.5	3.7	3.1	1.5
wt. score:	0.225	0.37	0.465	0.225
Peru				
score:	1.0	1.5	2.0	1.0
wt. score:	0.15	0.15	0.3	0.15
Nicaragua				
score:	2.7	2.9	4.0	1.4
wt. score:	0.405	0.29	0.6	0.21
Bolivia				
score:	1.5	3.7	2.5	1.4
wt. score:	0.225	0.37	0.375	0.21
Panama				
score:	2.9	4.2	2.6	4.0
wt. score:	0.435	0.42	0.39	0.6
Azores/Port.				
score:	3.8	4.3	3.0	4.0
wt. score:	0.57	0.43	0.45	0.6
Turkey				
score:	3.0	3.0	4.3	1.5
wt. score:	0.45	0.3	0.645	0.225
Puerto Rico				
score:	0.0	5.0	0.0	0.0
wt. score:	0	0.5	0	0
Greece				
score:	4.5	3.3	3.0	4.0
wt. score:	0.675	0.33	0.45	0.6

Table 2. Financial/Business Risk

COUNTRY	BUSINESS POTENTIAL					RISK SCORE
	Export Risk	Eximbank	Credit Risk	Business Risk	Repatriation	Tot. Weight
Weights	0.06	0.11	0.11	0.11	0.06	1.00
Dominica						
score:	0.0	0.0	0.0	0.0	0.0	3.1
wt. score:	0	0	0	0	0	1.2
Indonesia						
score:	3.5	0.0	3.6	3.9	4.0	3.9
wt. score:	0.21	0	0.396	0.429	0.24	3.4
Guatemala						
score:	3.5	2.0	1.8	1.8	2.0	3.0
wt. score:	0.21	0.22	0.198	0.198	0.12	2.6
Costa Rica						
score:	5.0	0.0	2.1	2.4	1.0	3.2
wt. score:	0.3	0	0.231	0.264	0.06	2.9
Mexico						
score:	3.5	0.0	3.1	3.5	1.9	3.4
wt. score:	0.21	0	0.341	0.385	0.114	3.2
Philippines						
score:	2.5	0.0	2.5	2.7	2.0	3.1
wt. score:	0.15	0	0.275	0.297	0.12	2.9
Chile						
score:	3.0	0.0	3.2	3.3	2.0	3.0
wt. score:	0.18	0	0.352	0.363	0.12	2.7
Kenya						
score:	2.5	0.0	3.0	2.8	0.0	2.5
wt. score:	0.15	0	0.33	0.308	0	2.3
El Salvador						
score:	3.0	0.0	1.4	1.8	1.0	2.3
wt. score:	0.18	0	0.154	0.198	0.06	2.1
Honduras						
score:	2.5	0.0	1.6	1.8	1.3	2.1
wt. score:	0.15	0	0.176	0.198	0.078	1.9
Taiwan						
score:	5.0	0.0	4.5	4.5	3.0	4.2
wt. score:	0.3	0	0.495	0.495	0.18	3.8
Argentina						
score:	3.0	0.0	1.9	2.2	1.3	2.3
wt. score:	0.18	0	0.209	0.242	0.078	2.0
Peru						
score:	2.0	0.0	1.4	2.0	1.5	1.6
wt. score:	0.12	0	0.154	0.22	0.09	1.3
Nicaragua						
score:	3.0	0.0	1.1	1.1	1.0	2.2
wt. score:	0.18	0	0.121	0.121	0.06	2.0
Bolivia						
score:	3.0	0.0	1.6	1.0	1.0	2.0
wt. score:	0.18	0	0.176	0.11	0.06	1.7
Panama						
score:	3.5	0.0	1.9	3.2	4.5	3.4
wt. score:	0.21	0	0.209	0.352	0.27	2.9
Azores/Port.						
score:	4.0	0.0	4.2	4.5	3.5	3.9
wt. score:	0.24	0	0.462	0.495	0.21	3.5
Turkey						
score:	3.0	0.0	3.3	3.9	2.5	3.1
wt. score:	0.18	0	0.363	0.429	0.15	2.7
Puerto Rico						
score:	5.0	0.0	0.0	0.0	0.0	5.0
wt. score:	0.3	0	0	0	0	0.8
Greece						
score:	4.0	0.0	3.6	3.9	3.8	3.8
wt. score:	0.24	0	0.396	0.429	0.228	3.3

## FACTORS INHIBITING EXPORT OF U.S. GEOTHERMAL DEVELOPMENT

U.S. geothermal companies are at a disadvantage in the competitive world market for geothermal development. Other countries, such as Japan, Italy, France, and New Zealand, support their geothermal industries with tied aid and other unfair trade practices.

The nations mentioned above provide support for developing countries through grants or low-interest loans either directly or through the World Bank or the United Nations. This aid is provided with the stipulation that all work will be done by the companies from the donor country, tied aid. Some of the donor countries use quasi-governmental development companies with access to the resources of government agencies. The U.S. companies are unable to bid competitively against this competition because the U.S. government lacks these supports and financing must be obtained at market rates. The U.S. geothermal industry is the best qualified technically, but it is losing out on a geothermal export business that could exceed \$20 billion during the next 20 years.

In Costa Rica, the Japanese government (MITTI) designated Toshiba as the geothermal development company to compete for construction of a 55 megawatt geothermal plant at Mirra Valles. Toshiba put a paid staff member in Costa Rica for two years to familiarize all levels of the Costa Rican government (national utility, national energy ministry, and congress) with the benefits of Toshiba geothermal development. Japan also supported Toshiba with access to 4% loans for the financing of the \$150 million geothermal development project. The Costa Rican Congress voted to accept the Japanese offer of a 4% loan for the project, even though a commercial rate loan and U.S. development company would have been cheaper over the life of the loan.

The influence of these countries on the World Bank and United Nations is more subtle. Feasibility studies are awarded to a company of the donor countries with the assumption that the same company will be the best prepared to bid on the geothermal development project. If several nations have strongly competitive bids, the proposals of the competitors are given to the donor country with an opportunity to modify its proposal. In other cases, the proposal from a strong U.S. company is used to rewrite the solicitation, and all competitors are given the U.S. plan of development.

## INDUSTRY NEEDS

The U.S. must adopt a policy to counter the harmful effects of tied aid, unfair solicitation practices, and predatory pricing procedures in geothermal development world-wide.

- The chief U.S. board member of the World Bank should be

asked to use his major influence to eliminate the corrupt practices in the World Bank and its regional banks.

- The State Department should be enlisted to use the AID Missions and the U.S. Embassies to help establish hospitable legal and regulatory environments in the host countries so that the U.S. geothermal industry can identify and utilize development opportunities.

- The U.S. Export-Import Bank should create the financial process to help the U.S. geothermal industry fund the high-risk stage of exploration and drilling in selected foreign countries. The Ex-Im Bank should establish guarantees and insurance for the prompt repatriation of capital and profits from geothermal development projects in foreign markets.

- The U.S. should establish tax credits for investment in geothermal development projects abroad.

- The Treasury Department should investigate the use of "Debt Swaps" for geothermal development in debtor countries having geothermal resources.

- The Department of Energy should consider cost sharing the development of geothermal turbines to compete in the world market. The advances in design, materials, and construction practices available in the U.S. should be integrated into a technically superior, cost-competitive, low maintenance line of geothermal turbines.

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INFORMATION GUIDE  
FOR PRIVATE INVESTMENT  
IN INTERNATIONAL GEOTHERMAL PROJECTS

September 1992

*Produced under a grant  
from the California Energy Commission*

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## INTRODUCTION

The primary purpose of this guide is to share with the reader insights gained by Trans-Pacific Geothermal Corporation (TGC) as a result of its work under a grant from the California Energy Commission, as well as some other general experience that TGC has gained over the years in its attempts to develop geothermal business in developing countries.

The secondary purpose of this guide is to provide senior managers of electric utilities in developing countries with insights into information requirements by a sophisticated investor prior to making an investment decision.

Unlike operations within the United States, a potential entrepreneur in foreign projects must obtain some very basic information about the country in which he plans to operate. Such questions as whether a mineral or geothermal law are in place, or whether a private entity can own and operate a power project are of great importance.

The following pages discuss a set of parameters which may be utilized as a check list of information that must be gathered as part of the considerations that would affect the feasibility of the project in the given country, or the cost of doing business in it. The list is by no means exhaustive, but could be considered a reasonable starting point. Each country has its own unique conditions which must be studied locally. This guide is only a starting point.

## THE ELECTRIC SYSTEM IN THE COUNTRY

### Sources of Supply

- \* What is the electric system in the country?
- \* What are the main sources of electricity?
- \* What is the total installed capacity and generated capacity in the different regions of the country?
- \* What are the typical daily load curves? The daily load factors?

### The Transmission System

- \* Does the country have an adequate transmission system?
- \* Would the transmission system be able to handle the proposed additional loads created by bringing a proposed project on line?
- \* What are the plans for the expansion of the existing transmission system?
- \* How would such plans relate to the proposed development?

### Growth Projections

- \* What are the alternatives of power supply which the government may consider?
- \* Are renewable power alternatives being considered?
- \* Is geothermal one of them?

### The Avoided Cost of Electricity

In some countries the avoided cost is regularly determined



by some national organization. Recently, the international environmental community has been active in promoting laws that would protect the environment. This may take the form of assigning a cost to air pollution.

#### The Geothermal Power Potential

Prior to embarking on a project in any given country it is necessary to establish that there are sufficient indications of an economically attractive resource in the country.

## FINANCIAL FACTORS

### Balance of Payment

It is vital for a would-be investor or project developer in the country to understand the situations of the country as related to its balance of payments.

- \* Is the country in debt to the developed countries?
- \* Is the currency convertible?
- \* What is the overall state of the economy?
- \* How do international banks view the state of the economy?

### Inflation Factors

- \* What is the current inflation rate in the country?
- \* How does the current inflation rate affect the confidence of the local and international business community in operations in the given country?

### Availability of Debt Swaps

Many developing countries are laden with debt to western countries and especially to the United States.

- \* Is any of that foreign debt available for conversion into local currency by foreign currency investors?
- \* Under what terms and what restrictions would foreign debt be available for conversion?

### Tariffs and Duties on Exploration Equipment

In many countries, exploration equipment that is temporarily imported into the country, such as geophysical equipment, drilling equipment, and the like, is not subject to taxes of any type. However, the importer of this temporary exploration equipment may have to post a bond that the

equipment would be repatriated upon completion of its utilization.

#### Duties on Plant Equipment

Various countries have a differential method of taxation of equipment which is brought in for productive purposes, such as power generation, as opposed to equipment that may be considered as mere consumer oriented equipment. In some cases, some import items such as vehicles, may be subject of dispute as to whether they are consumer oriented or project oriented. Such issues may have to be resolved on a case by case basis.

#### Taxes on Foreign Corporations

Foreign corporation may be taxed on a different basis than domestic corporations. The investor would have to establish advantages to establishing a local corporation, as opposed to operating as a foreign corporation.

#### Repatriation of Investment and Profit

Many countries encourage the reinvestment of funds in the country. Therefore, taxes on profits may be lower for funds left in the country. On the other hand, should the investor choose to extract his profits back to the home country an appropriate tax would be applied.

#### Tax Holidays and Other Investment Incentives

Some countries may provide the foreign investor with certain tax holidays, on which little or no domestic income tax is paid. This is done in order to encourage an investment in the country and to extend its stay in the local economy before repatriation. The existence of tax benefits in any given country would depend upon the specific industry that the country wishes to encourage.

## LEGAL ISSUES

### General Power Supply Laws

- \* What is the national electric utility law?
- \* What are the rights of private utilities?
- \* What are the regulations affecting the operation of private power?

### Legal Issues Related to Resources

- \* What laws and regulations are in existence or in the pipeline that relate to ownership of resource leases or concessions?
- \* What ministry governs these laws?
- \* What regulations exist regarding terms and duration?

### Laws Affecting Investment and Repatriation

- \* What laws exist that govern investment by non-nationals (foreign investors)?

### Requirements of Registration of Investments

Some countries require that an investment must be properly registered with the Ministry of Finance and meet certain legal requirements in order for the investment to be considered accredited, i.e. entitled to the privileges of repatriation of equity and profits in foreign currency without impediment.

## SOURCES OF PROJECT FUNDING

Different sources of funding are available for the pre-feasibility studies development phase, and for acquisition of equipment and services as discussed below:

There are several U.S. and state organizations that may provide funding for pre-feasibility studies and certain other developmental activities.

### State of California

The California Energy Commission Energy Export Program. This program has undergone an number of metamorphoses. Funds of varying amounts are available for pre-feasibility studies under a reimbursement program to be negotiated with the CEC.

### Trade Development Programs (TDP)

The Trade and Development Program (TDP) is an agency of the U.S. government which provides funding for U.S. firms to carry out feasibility studies, consultancies, and other planning services which are related to major projects in developing countries. The TDP promotes economic development through its assistance in project planning and at the same time is helping U.S. firms to become involved in projects that offer significant export opportunities for U.S. companies. TDP provides funding on a non-reimbursable grant basis for consulting services or studies which would determine the technical, economic and financial feasibility of the proposed projects and would provide detail data for making decisions on how to proceed with project implementations. The criteria which TDP has utilized in evaluating project proposals are:

1. The project has sufficient importance that it is likely to be carried out in the country if the feasibility study results are positive.
2. The potential for a U.S. company to benefit from the project or to export goods and services during its life are significant.

3. The project sponsor must arrange for an official request by the country to have the study carried out.

Most TDP grants are in the range of \$150,000 to \$750,000.

TDP funding has been generally reserved for activities carried out by U.S. firms, but on some occasions, and when appropriate, the specified portion of the TDP grant (never more than 20%) may be used for host country sub-contractors.

#### International Bank for Reconstruction and Development (World Bank)

The World Bank finances a variety of capital infrastructure projects such as roads and railways, ports, energy facilities and telecommunications. The World Bank extends loans to stimulate economic growth in developing countries and provides those funds under near-market rate interest rates.

World Bank loans are generally not available to private companies. However, in those cases where the government has a special interest in a given project, the government may request a World Bank loan which would assist it in carrying out specific activities in support of a project. For example, while an individual developer may develop a power project in a given area, the World Bank may be approached by the host country to loan it money to construct a transmission line into the project area.

Some agencies affiliated with the World Bank do interact with the private sector.

#### The International Finance Corporation (IFC)

The International Finance Corporation is an affiliate of the World Bank, created to accelerate economic development in less developed member countries. It does so by promoting the growth of the private sector of the economies in the countries under its aegis. The IFC assists projects which are within the purview of its mandate by mobilizing foreign capital to assist projects developed by private entities. It also

provides assistance by locating sources of domestic capital that might participate in the project. The IFC has also participated in actual investment in projects by purchasing share subscription in the project and by long term loans to private enterprises in developing countries.

#### Inter-American Development Bank (IDB)

The Inter-American Development Bank (IDB) was created primarily by Latin American countries, but also includes non-regional members among its participants. The bank works with the governments of the different countries applying for its services by helping to mobilize investments in socially and economically desirable fields. To date, the IDB has loaned over 30 billion dollars for local industrial and agricultural programs, as well as construction and for reconstruction of the infrastructure of various countries (roads, communications and power projects).

The IDB, like the IFC, has made direct investments in enterprises which it has approved, through direct equity participation, loans or even joint ventures. The bank seeks to foster energy development and energy diversification and to help lessen the dependence of Latin American countries on imported energy. The bank has repeatedly stated its favorable attitude towards domestic renewable energy projects.

#### Export-Import Bank (EximBank)

The EximBank is an agency of the U.S. government. Its goal is to facilitate export of U.S. made products through various financing programs. The bank provides export and working capital loan guarantees, direct credits to overseas foreign buyers and feasibility study financing. Generally, the purpose of the EximBank program is to obtain financing for higher risk export situations which commercial organizations would not fund. As such, the EximBank would supplement private financing, and on occasion would participate to assist a U.S. company to compete with subsidized foreign financing. On occasions the EximBank has provided mixed credit financing (a mix of official export credits and concessionary financing). This is aimed to assist U.S. organizations to compete against foreign competitors that enjoy tied aid

financing or concessionary financing from their host government.

#### Overseas Private Investment Corporation (OPIC)

OPIC assists U.S. businesses in unstable Third World countries by offering insurance of investments, and occasionally by providing capital for participation in specific projects. OPIC provides insurance where specific problems may arise: expropriation of the assets, revolution, insurrection, civil strife and the like. OPIC also provides insurance against non-payment by the host country or other possible impediments to the regular flow of monies to be repatriated. Among other activities, OPIC provides loan guarantees for businesses of all sizes.

#### Committee on Renewable Energy, Commerce and Trade (CORECT)

CORECT was created as an inter-department agency within the U.S. government to coordinate activities of various government agencies in promoting U.S. company activities abroad. Members of CORECT include representatives of the Departments of Energy, Commerce, State and others and are coordinated by the U.S. Department of Energy. CORECT plans to assist individual U.S. company enterprises in Third World countries by channelling inquiries about available support to proper U.S. government agencies, and by following those activities so that they get sufficient attention from the proper departments.

#### Various Financing Sources

A U.S. company attempting to market its services in a Third World country can often join the competition from industrialized countries. This may be done by making arrangements with the supplier of foreign manufactured equipment to bring along with him supplier credit under friendly terms. Supplier credits are typically provided at lower interest rates and require credit support by the project itself without recourse to the sponsor.

On occasions, mixed credit could be made available to a U.S. originated project, especially if the U.S. project sponsors join with a foreign developer to jointly develop a project



in the foreign country.

Guarantees for repayment of principal and interest may be available from the World Bank through its loan insurance program known as MIGA. They are available to projects which the World Bank has funded.

# THE FUTURE OF GEOTHERMAL ENERGY EXPORT OPPORTUNITIES

by

James B. Koenig  
President, GeothermEx, Inc.

## Scope

In a discussion of geothermal export opportunities, there are two aspects to be considered:

1. The sale of goods and services
2. Investment opportunities

This paper is a brief review of the opportunities and risks associated with both aspects.

## Trends

Several trends are evident worldwide:

1. Privatization - the magic word of the nineties. Increasing numbers of countries are now allowing private equity investment in geothermal projects, in varying form and degree: in addition to United States and Japan, Canada, Guatemala, Philippines, Indonesia, Kenya and Mexico, to name some. In most countries, the legal mechanism is a service contract or a joint venture with a national entity, rather than a concessionary grant or lease.
2. Growth of markets - several countries now count on geothermal energy to make up a considerable fraction of their future energy needs over the next decade(s): Kenya, the Philippines and Indonesia are three of these. Many others will incorporate geothermal energy if external financing can be provided.

3. Multilateral financing - the percentage of one-source projects is decreasing, especially for projects of large size; more parties are becoming involved in projects as lenders, guarantors or investors. For example, both Asian Development Bank and World Bank have "private windows" able to co-finance private geothermal projects in both debt and equity, with the investor providing some equity investment, and one or more commercial lenders financing the remainder of the debt. Also likely are such arrangements as an American or New Zealand developer/investor from teaming with a Hong Kong or Taiwanese financier, and with local service companies to co-finance a project.
4. Environmental factors - increasingly of concern to both the host countries and the lenders; on balance these factors tend to favor continued geothermal growth; they offer a new market for specifically geothermal environmental technology.
5. Growth of new strategies for resource utilization - binary cycle, bottoming cycle, wellhead generation, hybrid operations (power plus process heat), heating districts, desalination, mineral extraction, pH modification, directional drilling, air drilling, etc, etc., all offer new opportunities for export and investment. Many of these strategies are not new, but can now rely on improved or new technology.

## Restrictions

Restrictions, as differentiated from risks, fall into three broad categories:

1. Tied aid - vendors are restricted to either (a) the country providing the financing, or (b) to countries which belong to the international lending institution providing the financing. Examples of the former are numerous, but appear to be decreasing, as countries are pressured to open their aid programs to all bidders. Italy, France, New Zealand are examples of countries still having tied aid programs. An example of the latter: Iceland does not belong to the IDB; its nationals cannot bid on IDB contracts.
2. Competitive bidding - depending upon the written specifications for goods and services, bid dates, prequalification requirements, etc., even vendors from eligible countries may be shut out.
3. Lack of enabling legislation/regulations for private investment - only a handful of major geothermal countries will allow direct investment in a geothermal resource project, although that number is growing. This indirectly also affects the sales of goods and services.

## **Financing**

In a very general sense, opportunities for sales or investment are available in most of these countries in any given year, providing that the vendor/investor can provide his own financing.

Once it is determined that external financing is required, the opportunities shrink significantly. Several of the countries on these lists lack foreign exchange to pay for imports, or are in significant economic or political difficulties.

Financing can be subdivided conveniently into three broad categories:

1. Short-term financing for the sale of goods and services - typically provided by lines of credit from the vendor's commercial banks, or by the project's international financier, with or without guarantees of payment from a national government or international financing agency.
2. Financing for project construction - sometimes provided by international agencies in the form of project loans to a borrowing government; sometimes provided by some combination of commercial lenders and national governments, backed by guarantees from the national government.
3. Long-term project financing - difficult for investors to obtain for projects outside of the United States and one or two other investment-friendly countries; probably will involve multilateral commercial-government-international agency sources.

## Risks and Mitigation

Nothing is risk-free. Geothermal project risks fall into broad categories:

1. Resource is inadequate - affects both sales of goods and services and private development projects. Requires critically careful resource assessment, at multiple stages. Resource insurance may be available.
2. Nationalization - the next swing of the pendulum could be away from privatization and back towards national control. Payment guarantees and loan insurance are essential, if available.
3. Death by regulation - tax policy, banking and currency regulations, "local content" rules, employment laws, etc. can make a project unprofitable, and can prevent the legitimate flow of revenue from sales and investments. Negotiation of exemption from specific regulations is essential, as are guarantees and insurance, if available.
4. Force Majeure - some years ago, the Philippines ran low on foreign exchange, and a major geothermal developer/investor could not be paid in an export hard currency to pay for goods or services or to service debt. This went on for several months. A smaller investor might have been placed in default or wiped out. Again, insurance, coupled with reserve financial capability, are required.

All of these major risks can be avoided to some degree by a careful analysis of the project, and the economic and political history and climate of the country in which the sales/investment is to be made, prior to making a commitment.

Certain countries are associated with specific external financiers for most or all of their geothermal projects: for example, Costa Rica with the Inter-American Development Bank, and Kenya with the World Bank.

Other countries rely on a mixed bag of external financing: for example, Indonesia has obtained geothermal financing from Asian Development Bank, World Bank, Government of France, Government of Italy, Government of New Zealand, and private investors, who in turn obtain their financing from other specific sources, including internal financing.

Projects in other countries typically obtain all (or nearly all) of their financing from domestic sources, including self-financing: Mexico, Japan, United States, among the major geothermal nations.



For comparison, the relative size of the geothermal industry in the top dozen of these countries, as measured by installed and currently programmed geothermal generating capacity, is:

United States

Philippines

Mexico

Italy

Japan

New Zealand

Indonesia

El Salvador

(Nicaragua)

(Iceland)

Kenya

Costa Rica

The two countries shown in brackets are not seen as strong potential markets in today's climate. This, of course, may change.

## Market Characteristics

The strongest markets worldwide, in terms of total annual expenditure for geothermal exploration, development and operations are:

1. Japan
2. United States
3. Indonesia
4. Mexico
5. Philippines

possibly in that order.

Other strong or growing markets are:

El Salvador  
Costa Rica  
Guatemala  
China

Specific opportunities may exist in a number of other countries, including (in random order) Kenya, Greece, Italy, Hungary, Djibouti, France, Portugal (Azores), Turkey, New Zealand, some of the Caribbean island nations, and several states of the former USSR.

## **Pricing**

In competitive bids for goods and services, prices of course must be competitive for the goods and services offered; American goods and services are not always competitive, especially regarding the financing terms offered.

In direct investment projects, the prices of steam, electricity and by-products must in most cases be negotiated with an arm of the national government. Many governments continue to subsidize the price of electricity to their citizens; this often prevents the national electric agency from earning a return on its investments, and constrains the prices offered to private developers. The concept of avoided cost is not well accepted, or understood in the same terms as in the United States.

United States General Accounting Office  
Report to Congressional Requesters

GAO

# EXPORT PROMOTION

## Federal Efforts to Increase Exports of Renewable Energy Technologies

December 1997





United States  
General Accounting Office  
Washington, D.C. 20548

General Government Division

B-251279

December 30, 1992

The Honorable Gus Yatron, Chairman  
The Honorable Doug Bereuter, Ranking Minority Member  
Subcommittee on Human Rights  
and International Organizations  
Committee on Foreign Affairs  
House of Representatives

As you requested, we have reviewed the efforts of the federal Committee on Renewable Energy, Commerce and Trade (CORECT) to promote the export of U.S. renewable energy technologies. This report addresses what activities CORECT has undertaken to increase exports of U.S. renewable energy technologies; what guidelines CORECT has recommended for financing such exports, including simplifying the application process for seeking export assistance; how it recommended specific markets in the Caribbean Basin and the Pacific Rim and its identification of future export markets; and whether it has followed through on trade opportunities in selected countries.

Copies are being sent to the Secretary of Energy and other interested congressional committees. Copies will also be made available to others on request. Please contact me at (202) 275-4812 if you or your staff have any questions concerning this report. The major contributors to this report are listed in appendix I.

Allan I. Mendelowitz, Director  
International Trade and Finance Issues

# Executive Summary

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## Purpose

To promote the export of U.S. renewable energy technologies, Congress in 1984 created the Committee on Renewable Energy, Commerce and Trade (CORECT). CORECT's goal is to bolster U.S. international competitiveness by gathering and disseminating information to U.S. manufacturers on potential overseas business opportunities; organizing trade missions, fairs, and conferences; and coordinating export assistance programs.

The Chairman and the Ranking Minority Member, Subcommittee on Human Rights and International Organizations, House Committee on Foreign Affairs, asked GAO to review CORECT's efforts to promote the export of U.S. renewable energy technologies. Specifically, in this report GAO (1) discusses what activities CORECT has undertaken to increase exports of U.S. renewable energy technologies; (2) describes guidelines recommended by CORECT for financing such exports, including simplifying the application process for seeking export assistance; (3) provides information on how CORECT recommended specific markets in the Caribbean Basin and the Pacific Rim and its identification of future export markets; and (4) discusses CORECT's efforts to follow through on trade opportunities in selected countries.

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## Background

Under the Renewable Energy Industry Development Act of 1983 (P.L. 98-370) Congress created CORECT, an interagency working group. CORECT's goal is to help coordinate federal activities affecting worldwide commerce in renewable energy technologies. Renewable energy technologies generate electricity and/or heat through the use of renewable resources, such as sunlight (photovoltaics), heat from the sun (solar thermal), wind, naturally occurring underground steam and heat (geothermal energy), plant matter and animal waste (biomass), and water (hydropower).

CORECT's role was expanded under the Renewable Energy and Energy Efficiency Technology Competitiveness Act of 1989 (P.L. 101-218). The 1989 act requires establishing a plan to increase renewable energy technology exports and submitting an annual report to Congress describing exports that have occurred as a result of CORECT activities. The plan was to be presented no later than in CORECT's 1991 annual report, and subsequent reports are to describe any modifications to the plan and the progress in implementing it. The act also requires CORECT to recommend guidelines for financing renewable energy technology exports, to simplify the application process for U.S. renewable energy firms seeking export financing assistance, and to recommend specific markets for renewable energy technologies.

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CORECT is chaired by the Department of Energy and includes representatives from 14 federal agencies. It is funded through the Department, with a 1991 fiscal year budget of just under \$1.5 million. CORECT works closely with the U.S. Export Council for Renewable Energy, a consortium of nine U.S. renewable energy trade associations. Approximately 30 percent of CORECT's budget for 1991 went to this consortium.

In 1990, to further the goal of coordinating and streamlining all the government's export promotion programs, the President created the interagency Trade Promotion Coordinating Committee. On October 21st of this year the Committee received a legal mandate when the President signed the Export Enhancement Act of 1992 (P.L. 102-429). The Secretary of Commerce chairs the Committee, in which over 12 federal agencies participate, including most of the same agencies represented on CORECT.

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## Results in Brief

CORECT has not yet completed a formal plan in consultation with representatives of affected industries for increasing exports of renewable energy technologies. However, CORECT member agencies have engaged in a number of activities that could form the basis of a plan. These activities include identifying barriers to U.S. renewable energy technology exports, commissioning studies of potential markets and educational materials about renewable energy, and sponsoring trade promotion events.

Furthermore, CORECT does not have the export information necessary to assess its progress. It does not keep track of exports associated with CORECT activities; moreover, the industry, due to concerns over confidentiality, does not provide it with the information needed to measure whether exports have increased. In addition, CORECT does not use publicly available data because such data are incomplete.

CORECT has recommended and begun to help implement guidelines for financing exports of renewable energy technologies. These guidelines include obtaining funds from U.S. and multilateral sources, helping develop new financing mechanisms, and setting a minimum funding goal. It has also simplified the application process for U.S. renewable energy technology firms seeking export financing assistance. However, it continues to face two key problems: It has limited influence over how much funding member agencies, such as the Agency for International Development, provide for renewable energy activities; and it cannot match the level of government subsidies available to foreign competitors.

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Using criteria that it has developed, CORECT has recommended four countries in the Caribbean Basin and two in the Pacific Rim as potential markets for the export of U.S. renewable energy technologies. It has identified Eastern Europe and Mexico as future export markets.

In the past, CORECT did not have a system for following through on trade opportunities that it identified. However, CORECT has now helped develop a promising mechanism for financing and monitoring opportunities in Indonesia and other Pacific Rim countries. In the Caribbean Basin, opportunities identified in the Dominican Republic were lost due to a lack of available credit.

CORECT represents an early attempt to coordinate one type of export promotion effort on a governmentwide basis. This effort has been superseded to a certain extent by the creation of the Trade Promotion Coordinating Committee. However, there is currently little coordination between CORECT and this Committee.

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## Principal Findings

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### CORECT Has Engaged in Key Activities but Has No Formal Plan

Among other provisions, the 1989 act requires CORECT to establish a joint government-industry plan to increase U.S. exports of renewable energy technologies, to report to Congress on any modifications to the plan and progress in implementing it, and to describe exports resulting from CORECT activities. To date, CORECT has carried out several key activities, but has not produced or submitted a formal plan.

As one of its first activities, CORECT identified four major barriers to U.S. exports of renewable energy technologies: (1) inadequate financing, (2) little awareness of such technologies on the part of potential end-users, (3) poor coordination of existing federal export assistance programs, and (4) trade practices by foreign countries that put the U.S. industry at a competitive disadvantage (see p. 17). According to CORECT and industry spokesmen, CORECT continues to face barriers to the dissemination and use of renewable energy technologies. These barriers involve a lack of experience with renewable technologies on the part of U.S. and multilateral agencies responsible for carrying out energy projects in the markets recommended by CORECT (see p. 18).



In addition to identifying barriers, CORECT or its member agencies have commissioned at least 2 dozen studies between 1985 and 1991. These studies produced an energy resource data base on 160 countries; comparisons of U.S. and foreign government policies on renewable energy and U.S. and foreign company approaches to exporting renewable energy technologies; overviews of U.S. and multilateral sources of export assistance; and reports on market conditions in 20 countries and specific trade opportunities in 6 nations. Under CORECT's coordination, the Agency for International Development and the Department of Energy have also commissioned several educational booklets on renewable energy technologies. Additionally, CORECT has helped fund three types of trade promotion events for the U.S. renewable energy technology industry: trade missions, reverse trade missions (to bring foreign officials to the United States), and conferences held in conjunction with trade shows.

Although identifying barriers, conducting studies, and supporting trade promotion events are activities that may be included in a plan, CORECT has not finalized a plan nor does it maintain export or market share data that could be used to update or monitor the implementation of a plan. Moreover, it does not have a systematic way of recording export sales stemming from its activities. CORECT has not utilized government data, which are open to the public, because these data cover only a few types of renewable technology exports. Industry groups, which collect information on exports of renewable energy technologies, have not provided this information to CORECT. According to an industry spokesman, making such information available would reveal proprietary data, thereby giving foreign competitors an advantage over U.S. exporters. However, the industry consortium gave GAO a summary of export information that shows an increase in exports of U.S. renewable energy equipment and services from 1990 to 1992 (see p. 21). These data represent "best guess estimates" from industry sources.

### **CORECT Has Recommended Financing Guidelines and Simplified the Application Process**

CORECT is required to recommend guidelines for financing U.S. exports of renewable energy technologies. CORECT is currently in the process of getting federal, international, and private organizations to contribute funds for training, trade promotion events, technical studies, and other activities. It is also helping develop new financing mechanisms for the Pacific Rim and other markets. One such mechanism is being set up to channel funds from large multilateral donors to small-scale renewable energy projects in Indonesia, Malaysia, the Philippines, and Thailand. Another was created to support travel to trade promotion events, to finance preliminary project

studies, and to provide information on renewable energy technologies to multilateral financing institutions. CORECT, in cooperation with the U.S. Export-Import Bank, has also set a minimum funding goal for renewable energy projects.

Additionally, the 1989 act requires CORECT to simplify the application process for seeking export assistance. In February 1992 CORECT released a streamlined application form that allows renewable energy companies to apply for assistance from several agencies with this single form (see p. 26).

However, CORECT's efforts to develop internationally competitive financing options are hindered by two obstacles. First, CORECT has little influence over the activities that member agencies, such as the Agency for International Development, undertake. For example, this agency's funding for renewable energy projects has fallen sharply in recent years (see pp. 31-32). Second, CORECT's efforts have limited impact because U.S. exporters of renewable energy technologies must compete with foreign companies whose renewable energy projects are financed in part through government subsidies (see pp. 29-31).

### CORECT Has Recommended Six Specific Markets

The 1989 act states that CORECT is to recommend markets that federal export loan programs, development programs, and programs for assisting the private sector should target. CORECT has identified four countries in the Caribbean Basin—Barbados, the Dominican Republic, Guatemala, and Jamaica—and two countries in the Pacific Rim—Indonesia and the Philippines—as markets in which U.S. renewable energy technologies could be useful. It did so based on each country's availability of renewable energy resources, the amount of U.S. and multilateral development assistance given to the country, and other criteria. CORECT plans to focus on Eastern Europe and Mexico as future markets for U.S. renewable energy technologies.

CORECT helped identify and disseminate renewable energy export opportunities in Indonesia, but no one tracked the results of export opportunities that were developed in that country (see pp. 36-38). GAO believes CORECT did not adequately delegate to one or more of its member agencies responsibility for follow-up. On a more positive note, in working to formulate new financing mechanisms, CORECT has helped develop a new, multilateral approach that can now be used to monitor how renewable energy projects are carried out in Indonesia and other Pacific Rim countries. This approach is being coordinated by an office at the World

Bank that was created specifically to oversee small-scale renewable energy projects (see p. 38). In the Dominican Republic projects were not developed because credit was difficult to obtain.

CORECT is a first attempt to coordinate governmentwide export promotion efforts as they apply to one narrowly defined industry. Since CORECT's creation, the President formed the interagency Trade Promotion Coordinating Committee, which was recently established by law. This Committee is mandated to do for all U.S. industries what CORECT is attempting to do for the renewable energy technology industry. Consequently, CORECT, which does not work closely with the Committee, now coexists with this broader effort.

## Recommendations

To help promote the export of U.S. renewable energy technologies, GAO recommends that the Secretary of Energy work with other CORECT member agencies and the U.S. renewable energy technology industry to

- establish a deadline for completing the government-industry plan to increase exports of renewable energy technologies;
- maintain consistent export or market share data that could be used to help update a plan and monitor its implementation;
- develop a way, through the CORECT mechanism, to assign responsibility for tracking member agency activities, including trade opportunities identified by these agencies in recommended markets, and for documenting, to the extent possible, any exports associated with such activities; and
- work with the Trade Promotion Coordinating Committee to define the way in which CORECT's mandate and activities can be integrated into the overall U.S. export plan the Committee is developing.

## Agency Comments

GAO discussed the information presented in the report with responsible officials from CORECT and representatives from the renewable energy technology industry. These officials and representatives did not disagree with the facts presented in the report. Nevertheless, some suggested that the report's main focus should be on (1) the government-subsidized financing available to foreign competitors and (2) the difficulties experienced in financing renewable energy projects through the Agency for International Development. Others disagreed with GAO's assessment of CORECT's follow-up efforts, saying CORECT has done all that could be expected of an interagency body with a small budget of just over

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\$1 million. GAO believes that, even though CORECT's budget is limited, CORECT should be accountable for the public resources it spends.

These officials and representatives also commented on two of the four recommendations made in the report. With respect to GAO's recommendation that CORECT establish a deadline for completing a plan, they said that CORECT is currently in the process of drafting a plan. As for GAO's recommendation that CORECT work with the Trade Promotion Coordinating Committee, the Executive Director of the industry consortium expressed doubt that the Committee would be effective in promoting exports of renewable energy technologies. He responded that CORECT works because it represents an ongoing industry-government collaboration. He added that if the Committee undertakes such collaboration, it, too, may work. Their comments have been incorporated into the report where appropriate.

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**Abbreviations**

<b>AID</b>	<b>Agency for International Development</b>
<b>CORECT</b>	<b>Committee on Renewable Energy, Commerce and Trade</b>
<b>DOE</b>	<b>Department of Energy</b>
<b>ECRE</b>	<b>U.S. Export Council for Renewable Energy</b>
<b>Eximbank</b>	<b>U.S. Export-Import Bank</b>
<b>FINESSE</b>	<b>Financing Energy Services for Small-Scale Energy Users</b>
<b>GAO</b>	<b>General Accounting Office</b>
<b>HTS</b>	<b>Harmonized Tariff System</b>
<b>IFREE</b>	<b>International Fund for Renewable Energy and Efficiency</b>
<b>TDP</b>	<b>Trade and Development Program</b>
<b>TPCC</b>	<b>Trade Promotion Coordinating Committee</b>

# Introduction

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The decade of the 1980s began with oil shortages, rising oil prices, and the expectation that energy prices would continue to rise. This situation created a strategic interest in alternative sources of energy generated by using renewable energy technologies.<sup>1</sup> The subsequent decline in oil prices, however, led to a decreased economic incentive for pursuing renewable energy options. Moreover, countries with abundant natural gas and coal reserves and the transportation infrastructure to make them readily available have been less likely to invest in renewable energy technologies.

Nevertheless, there are certain conditions under which renewable energy technologies are economically attractive. These conditions are present in countries lacking large fossil fuel deposits and adequate infrastructure. Specifically, they are present in remote areas that are not connected to an electricity grid and have plentiful renewable energy resources. They are also present in less remote areas served by a poorly functioning electricity grid. Such conditions exist in many developing countries, where use of diesel generators by households and businesses is commonplace. Although renewable energy systems often have higher up-front costs than diesel generators, their long-term costs are much lower. Fuel costs are negligible and maintenance costs are minimal. In addition, renewable energy systems can be more reliable and require less routine maintenance. Experience with diesel generators in developing countries has often been extremely poor due to severe maintenance and repair problems.

Renewable energy systems connected to a properly functioning power grid can also be competitive with fossil fuel-fired plants in areas with good renewable energy resources and poor or expensive access to fossil fuel resources, particularly if there is an opportunity to cogenerate power using biomass.

To emphasize its concern with promoting the U.S. renewable energy technology industry, in 1984 Congress established an interagency working group called the Committee on Renewable Energy, Commerce and Trade (CORECT).<sup>2</sup> At first, CORECT's aim was to coordinate federal activities affecting worldwide commerce in technologies involving renewable energy. However, CORECT's role was expanded in 1989, with passage of the

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<sup>1</sup>Renewable energy technologies generate electricity and/or heat by using sunlight (photovoltaics), heat from the sun (solar thermal), wind, naturally occurring underground steam or heat (geothermal energy), plant matter and animal waste (biomass), and water (hydropower).

<sup>2</sup>The act creating the committee was the Renewable Energy Industry Development Act of 1983 (P.L. 98-370). Congress approved the act on July 18, 1984.

Renewable Energy and Energy Efficiency Technology Competitiveness Act (P.L. 101-218). Currently, CORECT has a mandate to (1) develop a plan to increase U.S. exports of renewable energy technologies, (2) come up with guidelines for financing these exports, (3) make it easier for U.S. firms engaged in exporting renewable technologies to apply for funds, and (4) recommend suitable export markets to these firms. The act also states that CORECT must submit an annual report to Congress that includes a description of exports resulting from CORECT member agency activities. The plan was to be released no later than CORECT's 1991 annual report, with reports in succeeding years explaining any changes to the plan and how it is being carried out.

CORECT works closely with a consortium of nine U.S. renewable energy trade associations, called the U.S. Export Council for Renewable Energy (ECRE). Before CORECT was established, ECRE conceived of the idea of developing an interagency body composed of the federal agencies and entities involved in renewable energy, export promotion, financing, and overseas development programs. ECRE was concerned that foreign governments were doing a better job of coordinating and supporting their renewable energy industries than the United States. Consequently, the United States was losing world market share. ECRE was also concerned about the long-term prospects for sustaining the renewable energy technology industry in the United States. It determined that the best way to sustain the industry is to focus on exporting because the most viable markets for renewable energy technologies currently exist in the developing world.

The context in which CORECT operates was changed in 1990, when the President created the Trade Promotion Coordinating Committee (TPCC), an interagency committee assigned to unify and streamline the government's export promotion programs. The TPCC's role was strengthened on October 21 when the President signed the Export Enhancement Act of 1992 (P.L. 102-429), which provided a statutory basis for TPCC. Over 12 executive branch agencies serve on TPCC. The TPCC's recent activities include establishing working groups for specific geographic and industry areas, setting up export facilitation conferences for the U.S. business community, and developing a trade resource center to provide information on federal assistance available to exporters. CORECT has engaged in similar activities by bringing officials in industry and trade promotion together across agency lines, conducting trade promotion events, and developing a streamlined application form for export financing assistance.



## CORECT's Composition and Budget

CORECT is chaired by the Department of Energy (DOE) and includes representatives from 13 other federal agencies. These agencies are the Agency for International Development (AID), the Department of Commerce, the Department of Defense, the Department of the Interior, the Department of State, the Department of the Treasury, the Environmental Protection Agency, the Export-Import Bank of the United States (Eximbank), the Overseas Private Investment Corporation, the Small Business Administration, the U.S. Trade and Development Program (TDP), the U.S. Information Agency, and the Office of the U.S. Trade Representative.

CORECT has four subcommittees and a task force. These entities are responsible for the following specific activities:

- The Education Subcommittee, chaired by AID, develops promotional materials and brochures and conducts seminars;
- The Market Development Assistance Subcommittee, chaired by the Commerce Department, examines potential export markets for U.S. renewable energy technologies and assists the industry in developing trade strategies;
- The Technical Competitiveness Subcommittee, chaired by DOE, develops training materials for installing and operating renewable energy technologies, studies the feasibility of various renewable energy technology applications, and assesses renewable energy resources around the world;
- The Trade Policy Subcommittee, chaired by the U.S. Trade Representative, responds to industry reports of trade barriers; and
- The Financing Task Force, chaired by DOE, develops financing options for exporters of U.S. renewable energy technologies.

The full CORECT group meets twice a year to evaluate past activities and develop new plans. The subcommittees and task force meet periodically throughout the year to draw up in-depth plans.

CORECT has no staff of its own, although it has had a series of designated managers from DOE who are also responsible for issues unrelated to CORECT. Matters pertaining to CORECT are currently referred to two individuals, the Office Director for Technical Assistance under DOE's Assistant Secretary for Conservation and Renewable Energy, and DOE's Deputy Assistant Secretary for Export Assistance under the Assistant Secretary for Domestic and International Energy Policy. A third individual, a DOE staffer in the Office of Technical Assistance, was assigned in 1991 to work with CORECT on a full-time basis. CORECT's administrative work,

annual reports, and many of the studies it helps support are done by private contractors.

Table 1.1 shows the amount of fiscal year funding for CORECT's activities since its inception in 1984. DOE funds CORECT.

Table 1.1: CORECT Funding, Fiscal Years 1984-1991

Fiscal year	Amount
1984	\$125,000
1985	250,000
1986	500,000
1987	750,000
1988	750,000
1989	1,000,000
1990	1,028,000
1991	1,484,000

Source: DOE.

In 1991, 53 percent of CORECT's budget funded technical assistance to renewable energy projects around the world; 35 percent went toward market development activities; and 12 percent supported education, training, and administrative activities. ECRE received the largest single sum, \$449,000, primarily for market development activities, and Sandia National Laboratory's Design Assistance Center received the second largest, \$415,000, primarily for technical assistance.

## Objectives, Scope, and Methodology

The Chairman and the Ranking Minority Member, Subcommittee on Human Rights and International Organizations, House Committee on Foreign Affairs, asked us to review CORECT's efforts to promote the export of U.S. renewable energy technologies. Specifically, in this report we (1) discuss what activities CORECT has undertaken to increase exports of U.S. renewable energy technologies; (2) describe guidelines recommended by CORECT for financing such exports, including simplifying the application process for seeking export assistance; (3) provide information on how CORECT recommended specific markets in the Caribbean Basin and the Pacific Rim and its identification of future export markets; and (4) discuss CORECT's efforts to follow through on trade opportunities in selected countries.

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**Chapter 1**  
**Introduction**

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To achieve our first three objectives, we obtained documents from and interviewed CORECT member agency officials and contractors. We also obtained information from and interviewed U.S. and foreign renewable energy industry representatives and World Bank, Inter-American Development Bank, and Asian Development Bank representatives. In addition, we obtained publicly available data from government and industry sources.

To discuss CORECT's efforts to follow through on trade opportunities in selected countries, we visited the Dominican Republic and Indonesia, where we (1) interviewed officials from the U.S. embassy and AID mission, host government ministries and utilities, and private companies, and (2) visited renewable energy project sites. In addition, we visited U.S. renewable energy companies in the United States and attended CORECT's 1991 Pacific Rim conference and trade show in Los Angeles, California.

We did our work between January 1991 and August 1992 in accordance with generally accepted government auditing standards.

We gave CORECT and industry officials an opportunity to comment on the information presented in the report. These officials' responses have been included where appropriate throughout the report.

# CORECT's Activities to Increase Exports of U.S. Renewable Energy Technologies

To date, CORECT member agencies have focused on three activities: identifying barriers to U.S. renewable energy technology exports, commissioning studies and educational materials, and sponsoring trade promotion events. Although the 1989 legislation requires CORECT to develop a government-industry plan to increase exports of U.S. renewable energy technologies, CORECT has not yet produced or submitted such a plan.

The 1989 legislation also stipulates that CORECT report to Congress any changes to the plan, how it is being implemented, and any exports resulting from CORECT member agency activities. However, CORECT does not monitor statistics on exports or market share that could help it update a plan and evaluate how the plan is being carried out. In addition, it does not systematically record export sales associated with its member agency activities. Although export data are available from public sources, CORECT cannot use these data because they are insufficient. Moreover, although CORECT has supported the renewable energy industry with one-eighth to one-half of its annual budget over the past 5 years, industry groups have not provided CORECT with any of the export information they collect. ECRE, which represents virtually all U.S. exporters, claims that giving export or market share data to a public government body would reveal proprietary information and in so doing put the U.S. industry at a disadvantage vis-a-vis foreign competitors. However, ECRE did provide us with a summary of export data based on "best guess estimates" from industry sources. According to these estimates, U.S. exports of renewable energy equipment and services have gone up over the past 3 years.

## Barriers Identified

In 1984 CORECT identified four main barriers to exporting renewable energy technologies:

- inadequate financing for purchasing U.S. renewable energy equipment, particularly by developing country customers;
- little awareness by potential end-users about renewable energy technology performance, applications, and cost compared with conventional energy options;
- poor coordination of existing federal export assistance programs that could help exporters of renewable energy technologies; and
- trade barriers imposed by foreign countries that could inhibit U.S. renewable energy equipment sales and put the U.S. industry at a competitive disadvantage in overseas markets.

During its second year of operation (1985-1986) CORECT established a Financing Task Force to develop strategies for alleviating the first barrier. The strategies being developed by the Task Force are discussed in chapter 3. CORECT is attempting to address the second barrier through educational brochures and trade promotion events, discussed in the following sections. In order to combat the third, it developed a streamlined application form for exporters of renewable energy technologies. (For a description of the form, see chap. 3.) With regard to the fourth barrier, a questionnaire distributed by the U.S. renewable energy industry found no evidence of tariffs or other trade barriers that are specific to imports of renewable energy technologies. However, CORECT member agency officials and industry representatives agree that government-subsidized financing by foreign competitors remains an obstacle. A U.S. government effort to address this issue as it pertains to four broad industry groups, including energy, is discussed in chapter 3.

These officials also cited specific institutional barriers that include

- a lack of information on and training in renewable energy technologies on the part of U.S. government agency officials, multilateral donor agency officials, and officials from developing countries;
- a lack of infrastructure within the targeted countries for distributing and maintaining renewable energy technologies;
- an emphasis by U.S. development agencies and multilateral development banks on supporting large-scale, centralized fossil fuel energy projects, together with what CORECT and industry spokesmen describe as a lack of consideration for the environmental and social costs of such projects; and
- an emphasis by both the public and private sector on keeping short-term costs low; these costs are likely to be higher for renewable energy systems.

CORECT and industry officials say that other institutional barriers include government-subsidized prices for electricity and fossil fuels and a lack of laws, regulations, or incentives allowing private power producers to sell to utilities or other customers.

CORECT member agencies are making some attempts to deal with these barriers. For example, AID is working with developing countries to design private power legislation, and the Financing Task Force has gotten the World Bank to set up a special program for small-scale projects involving renewable energy technologies. This program is described in chapter 3.

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## Commissioned Studies and Educational Materials

Between 1984 and 1991, CORECT commissioned close to 2 dozen studies that were prepared by ECRE, the Commerce Department, and consultants. Two of the earliest studies compared the policies of the United States and other countries toward renewable energy and the strategies of U.S. and foreign companies for exporting renewable energy technologies. The first study concluded that U.S. renewable energy programs are not well coordinated relative to those of the Europeans, Japanese, and others. It stated that the United States does not do a good job of following through, from research and development of the technology to maintaining or increasing worldwide market share. The second study found that establishing a local presence in targeted markets is critical to an exporter's success. It also found that government support for research and development, export financing, and other activities is extremely important in developing a successful competitor.

Another study supplied data on energy resources, population, and economic indicators in 160 nations. Others provided information on U.S. and multilateral sources of export financing assistance, as well as market conditions in various countries. The market studies described the power generation sector in 11 Caribbean Basin countries; export opportunities in the Dominican Republic, Greece, India, and the Philippines; and trade and investment regulations in 10 countries.<sup>1</sup> In addition, ECRE reported on specific opportunities for the application of renewable energy technologies in the Caribbean Basin and the Pacific Rim.

Working together with AID, DOE, and ECRE, CORECT has also helped fund several educational booklets and brochures, including a treatise on renewable energy applications in agriculture and health, and a directory of vendors of U.S. renewable energy technologies.

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## Trade Promotion Events

To promote the export of U.S. renewable energy technologies, CORECT's Market Development Assistance Subcommittee has sponsored three main types of trade promotion events. These events are (1) trade missions, in which representatives of the U.S. renewable energy industry travel abroad to show their wares; (2) reverse trade missions, in which foreign public and private sector officials are invited to the United States to meet with U.S. industry representatives and tour U.S. facilities; and (3) conferences and trade shows, where U.S. and foreign government and industry officials

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<sup>1</sup>The 10 countries were the Dominican Republic, Greece, India, Jamaica, Kenya, Mexico, Nigeria, the Philippines, Spain, and Thailand.

gather to hear presentations on U.S. technologies and view exhibits of U.S. products.

In 1988 CORECT sponsored a biomass trade mission to the Caribbean Basin, and in 1989 it sponsored a geothermal trade mission to the region. CORECT focused on biomass and geothermal technologies in part because its Technical Competitiveness Subcommittee found plentiful biomass and geothermal resources in this region. According to CORECT's annual reports for 1988 and 1989, CORECT spent \$50,000 on a biomass industry brochure in 1988 and gave \$50,000 to the Geothermal Resources Council in 1989.

✂ In 1987 CORECT provided \$50,000 to the Geothermal Resources Council for a reverse trade mission in which officials from Guatemala, the Pacific Rim, and other regions met with U.S. geothermal industry representatives. In 1988 it spent \$50,000 on a wind energy reverse trade mission involving officials from these same regions. The following year, DOE, together with other agencies, sponsored two geothermal reverse trade missions for representatives from around the world. In 1990 CORECT provided \$43,000 to the American Wind Energy Association for another reverse trade mission on wind energy for officials from the Caribbean Basin, the Pacific Rim, and other regions.

In 1989 CORECT held a Caribbean Basin/Latin America-focused conference and trade show. Two years later, it held a Pacific Rim conference and trade show. The two events are described in greater detail in chapter 4.

Numerous U.S. government and private sector officials say that these conferences, together with CORECT's regular meetings and the other trade promotion events that CORECT has helped bring about, have been useful. Specifically, the officials say that these events have increased communication and coordination among agencies and between government and industry by providing a forum in which participants can exchange ideas.

One CORECT official cautioned, however, that "you can put a buyer and seller together [e.g., at a trade promotion event], but you can't guarantee a sale." He added that successful results can be difficult to attribute to CORECT. For example, he said that a \$2-million contract with Indonesia negotiated with the help of the Commerce Department's U.S. and Foreign Commercial Service and Eximbank—agencies that participate in CORECT—probably would have taken place even if CORECT did not exist.

## CORECT DOES Not Keep Track of Exports

CORECT does not solicit or maintain export or market share data that could help revise a plan and check its progress. For example, CORECT does not periodically obtain or assess such data, compare them to a baseline, or document sales resulting from member agency activities. It therefore cannot determine to what extent, if any, exports have increased.

When we asked CORECT officials for export statistics, they suggested we speak to ECRE. These officials, together with ECRE representatives, acknowledge that CORECT does not gather such information. The industry consortium, which has received a significant amount of CORECT's budget over the past 5 years,<sup>2</sup> does collect export information. However, ECRE declined to provide us with detailed statistics on exports or market share. ECRE contends that public dissemination of such information, which it considers proprietary, would reveal the U.S. industry's position in world markets and thus help foreign competitors gain market share at the expense of U.S. exporters.

Nevertheless, ECRE submitted to us a summary of export data (see table 2.1). This summary, which shows "best guess estimates" of U.S. exports of renewable energy equipment and services for the period 1990-1992, is based on information obtained from ECRE's member associations.

**Table 2.1: U.S. Exports of Renewable  
 Energy Equipment and Services,  
 1990-1992**

Dollars in millions			
Technology	1990	1991	1992
Biomass-direct combustion <sup>b</sup>	\$1.5	\$2.4	\$4.
Geothermal <sup>c</sup>	3.0	5.0	12.
Photovoltaics <sup>d</sup>	133.5	195.0	210.
Solar thermal power <sup>d</sup>	1.0	1.0	2.
Solar water heating <sup>d</sup>	8.0	10.0	12.
Wind <sup>e</sup>	1.8	3.4	4.

<sup>a</sup> expected

<sup>b</sup> Source: National Wood Energy Association.

<sup>c</sup> Source: National Geothermal Association.

<sup>d</sup> Source: Solar Energy Industries Association.

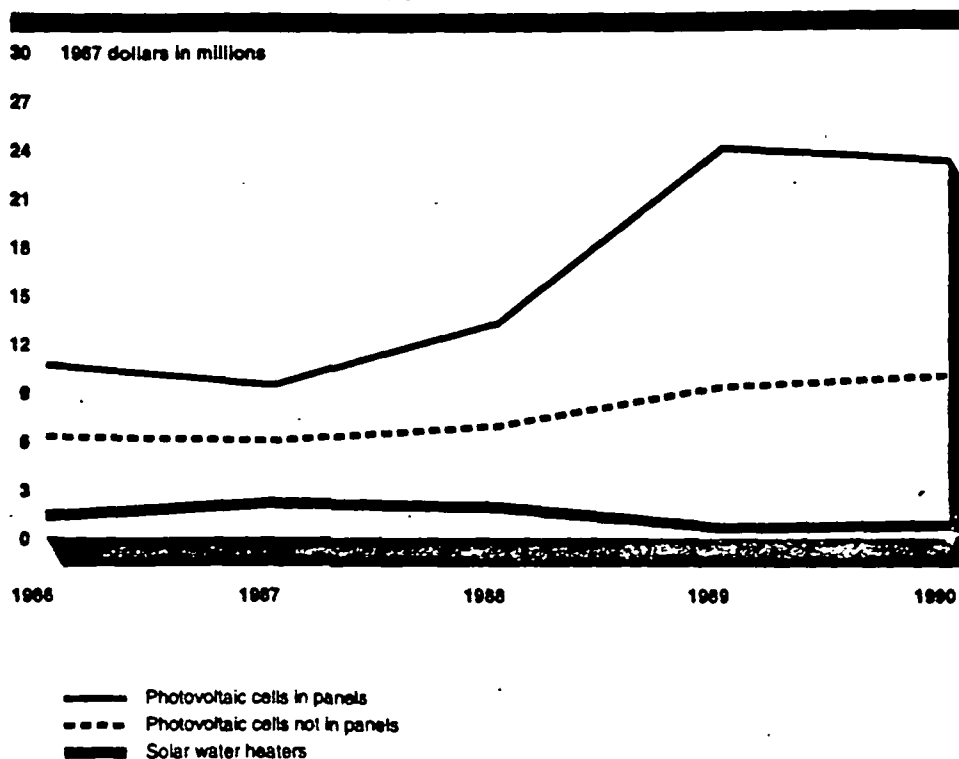
<sup>e</sup> Source: American Wind Energy Association.

<sup>2</sup>In 1991 ECRE and its member organizations received \$499,000, or 34 percent, of CORECT's budget for that year. In 1990 the figure was \$227,000, or 22 percent. In 1989 it was \$375,000 (38 percent), and in 1988 it was \$390,000 (52 percent). In 1987 the industry received \$100,000, or 13 percent, of CORECT's budget.



Information from public sources on some exports of U.S. renewable energy technologies does exist. For example, in our limited survey of government data we found that the Commerce Department tracks the annual dollar value of U.S. exports of photovoltaic cells assembled in panels (photovoltaic panels), photovoltaic cells not assembled in panels (photovoltaic cells), and solar water heaters for 1986-1990 (see fig. 2.1). Exports of photovoltaic cells in panels reached a high in 1989 and 1990 of over \$23 million (in constant 1987 dollars). Exports of photovoltaic cells alone came to a high of just under \$10 million in 1990. Exports of solar water heaters dipped from \$1,337,000 in 1986 to \$746,000 in 1990. These data differ from the information provided by ECRE on exports of photovoltaics and solar water heaters because the ECRE data include both goods and services and were arrived at using "best guess estimates."

Figure 2.1: U.S. Exports of Solar Energy Equipment, 1986-1990



Notes: Due to a change in the tariff code system, the Commerce Department used some estimation in correlating data from the old system to the new, Harmonized Tariff System (HTS). HTS is a series of codes used by the United States and other governments to track imports and exports of specific products.

Exports are valued as "free along side," which means free of charges before being loaded onto the ship. Exports so designated include only the domestic freight in getting the goods to port, but no ship loading charges, ocean freight, or insurance fees.

The dollar values in the figure have been adjusted to factor out inflation.

Sources: Department of Commerce, Bureau of the Census, National Trade Data Bank, and Economic Report of the President, 1992.

Several caveats to these data should be noted, however. First, U.S. exports of renewable energy technologies are determined by a number of key economic variables, including the prices of competing technologies (e.g., oil prices) and fluctuations in exchange rates. In addition, the Commerce Department's publicly available data do not include information on

exports of biomass, geothermal, hydropower, or wind energy technologies because there are currently no tariff codes specific to these technologies.<sup>3</sup>

Other caveats have to do with the destination of exports shown by the Commerce Department's statistics. For example, these statistics indicate that the leading export destinations in 1986-1990 for photovoltaic panels were the United Kingdom, Germany, and Mexico. The leading destinations during this period for photovoltaic cells were Japan and Mexico, and the leading destinations for solar water heaters were Canada, West Germany, South Korea, and Chile.

CORECT and industry officials say, however, that these data are inconclusive because (1) they cover only photovoltaics and solar water heaters and (2) they do not necessarily indicate the product's final destination, since items may be reassembled or repackaged in one country and then shipped to another. In addition, according to a CORECT spokesman, the leading export markets for U.S. renewable energy technology firms have changed from year to year.

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## Conclusions

CORECT has focused its efforts on helping conduct studies of potential markets for renewable energy technologies. In addition, it has identified barriers that hinder exports of these technologies and sponsored trade promotion events. However, CORECT has not kept consistent records on export or market share data useful for updating a plan and monitoring its implementation. In addition, CORECT has not yet established a formal plan for increasing exports of renewable energy technologies.

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## Recommendations

To help promote the export of U.S. renewable energy technologies, we recommend that the Secretary of Energy work with other CORECT member agencies and the U.S. renewable energy technology industry to

- establish a deadline for completing the government-industry plan to increase exports of renewable energy technologies and
- maintain consistent export or market share data that could be used to help update a plan and monitor its implementation.

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<sup>3</sup>The Commerce Department uses 10-digit codes to track exports of specific products. Some products do not have their own codes. These products are incorporated in codes that cover other products as well. It is therefore not possible to readily determine the exports of such products from U.S. government data.

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## **Agency Comments**

CORECT and industry officials commented on the first recommendation, saying that CORECT is now working on a government-industry plan to increase exports of renewable energy technologies. These officials generally did not disagree with the facts presented in the report, although some said the report should focus more on the issues discussed in chapter 3 concerning (1) the government-subsidized financing available to foreign competitors and (2) the difficulties experienced in financing renewable energy projects through AID.

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# CORECT Has Streamlined the Export Financing Application Process and Is Actively Pursuing Other Financing Strategies

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CORECT is required, under the 1989 act, to recommend guidelines for financing U.S. exports of renewable energy technologies. The act also requires CORECT to make it easier for U.S. exporters of renewable energy technologies to apply for funds. In February 1992 CORECT simplified this application process by producing a form that allows exporters to apply for assistance from several federal agencies at once. Additional activities currently being pursued by CORECT include getting other organizations to contribute funds, helping develop new financing mechanisms, and setting a minimum funding goal at Eximbank for renewable energy projects.

Obstacles CORECT faces involve government-subsidized financing by foreign competitors and a sharp drop in renewable energy project funding by AID, even though AID is one of the largest potential sources of federal support for the introduction of U.S. renewable energy technologies in developing countries.

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## CORECT Has Simplified the Export Assistance Application Process

In consultation with ECRE, CORECT has developed a new application form. The form will allow U.S. renewable energy companies, many of which are small businesses unfamiliar with federal government regulations and institutions, to apply for assistance from AID, Eximbank, the Overseas Private Investment Corporation, and TDP at the same time. The form was approved by the Office of Management and Budget in September 1991 and was made available in February 1992.

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## Funding Sources

CORECT is getting a number of sources to help provide funding for renewable energy activities. These sources include the following:

- AID's Office of Energy and Infrastructure, to cover such services as training, planning, developing private sector energy projects, and helping to defray the costs of certain trade promotion events;
- TDP, to help finance prefeasibility studies and trade promotion events; and
- ECRE, to help with certain trade development activities.

CORECT plans to obtain funds from the World Bank's Global Environmental Facility, a 3-year, \$1.5-billion fund recently created to cover major environmental project financing through grants and concessional loans.<sup>1</sup> CORECT also plans to obtain funds from a World Bank-AID cooperative

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<sup>1</sup>Concessional loans are loans offered at below market interest rates with longer terms and grace periods than market loans.

agreement, established in 1990 to fund preinvestment studies and the preparation of projects for the Global Environmental Facility.

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## **New Financing Mechanisms**

According to CORECT and industry spokesmen, one of the most promising mechanisms for funding renewable energy projects is the Financing Energy Services for Small-Scale Energy-Users (FINESSE) program. FINESSE channels funds from multilateral development banks and other donors to small-scale renewable energy projects in four Southeast Asian countries—Indonesia, Malaysia, the Philippines, and Thailand. The program was initially proposed by CORECT at a World Bank meeting in 1988 and was further developed at a workshop in Kuala Lumpur, Malaysia, at the end of October 1991.

FINESSE received funds for activities leading up to the Kuala Lumpur workshop from the U.S. government (\$475,000); the Dutch government (\$250,000); the United Nations' Energy Sector Management Assistance Program (\$85,000); the Rockefeller Foundation (\$45,000); and the Asian Development Bank (\$20,000). These funds were used to create business plans for several proposed projects, to conduct market studies in the four Southeast Asian countries, to pay administrative expenses, and to finance other activities.

Based on information from the Kuala Lumpur workshop, renewable energy and energy efficiency projects in the four countries were identified for potential funding through FINESSE. The anticipated cost of these projects is \$823 million. In the Philippines alone, \$324-million worth of projects were proposed by FINESSE and approved by the Philippine government. The governments of Indonesia, Malaysia, and Thailand have identified other projects for FINESSE funding. The projects are currently being processed by a newly formed office at the World Bank that was set up to administer the FINESSE program. A CORECT spokesman noted that, although the U.S. renewable energy technology industry does not have a "lock" on these projects, it is in a good position to vie for them with foreign competitors.

According to CORECT, the FINESSE mechanism is promising for several reasons. First, the four FINESSE countries have now become planners of renewable energy projects instead of just recipients of aid. Second, a way has been found for the World Bank and other large donor agencies to fund small projects by channeling the funds through local intermediary organizations. Third, a large potential market for U.S. exports of

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**Chapter 8  
CORECT Has Streamlined the Export  
Financing Application Process and Is  
Actively Pursuing Other Financing  
Strategies**

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renewable energy technologies has been identified. Finally, high-level officials from each of the four countries, as well as from the World Bank, have been actively involved in FINESSE.

CORECT officials say that the FINESSE mechanism may be replicated in other parts of the world, such as the Caribbean Basin, Mexico, and India. Public and private sector representatives from these regions attended the workshop in Kuala Lumpur.

The International Fund for Renewable Energy and Efficiency (IFREE) is another mechanism for financing U.S. exports of renewable energy technologies. Funded at \$2.1 million by AID, DOE, the Environmental Protection Agency, and the Rockefeller Foundation, IFREE supports travel for U.S. renewable energy industry representatives and foreign business contacts; prefeasibility and preinvestment studies; and technical assistance to multilateral financing institutions. IFREE is managed by a board consisting of representatives from AID, DOE, the Environmental Protection Agency, ECRE, and the Rockefeller Foundation.

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**An Innovative Financing  
Program in the Dominican  
Republic**

Enersol is a U.S.-based, nonprofit development organization that works with local development organizations and distributors of photovoltaic systems for rural households in the Caribbean Basin and other parts of the world. It has created an innovative model in the Dominican Republic for disseminating and financing photovoltaic technology. The model involves setting up local credit associations that enable villagers to afford solar energy systems for their homes. Enersol identified a demand in the Dominican Republic for small-scale solar energy systems because villagers were meeting lighting and other energy needs with dry cell batteries and kerosene paid for with cash earned from agriculture, tourism, and remittances from relatives in the United States. Enersol introduced the villagers to solar energy, which requires little maintenance and no fuel. Instead of using their cash to buy kerosene, the villagers use it to make payments on the solar energy systems installed in their homes.

Enersol received a grant from CORECT to prepare a case study, which was presented at CORECT's Caribbean Basin/Latin America-focused conference and trade show in 1989. Enersol's Director attended the event, where he arranged an agreement with a company to supply photovoltaic panels to the Dominican Republic.

Enersol has also been assisted in its efforts by the Peace Corps, which has used small grants from AID for setting up revolving credit funds. In addition, the Peace Corps has provided volunteers to help install the photovoltaic systems in villagers' homes and organize the credit associations. The systems installed by Enersol in the Dominican Republic since it began its activities in 1985 now number in the thousands.

AID's Office of Energy and Infrastructure and DOE are currently funding Enersol's efforts to help other countries in the Caribbean Basin replicate its activities in the Dominican Republic. The agencies are also funding a video on Enersol that will be distributed worldwide.

## Eximbank Funding

Eximbank has set a goal of devoting 5 percent of its energy sector financing to renewable energy projects.<sup>2</sup> According to Eximbank, renewable energy projects accounted for 43.8 percent of its energy sector authorizations in fiscal year 1989 and 9.9 percent in fiscal year 1990. Most of these projects involved the export of equipment for large hydropower dams. In fiscal year 1991 Eximbank authorized financing for \$45.3 million of export sales involving geothermal, hydropower, and solar energy technologies. This figure represents a decrease from \$65.2 million of export sales of renewable energy technologies supported by Eximbank in fiscal year 1990 and \$142.9 million in fiscal year 1989. According to Eximbank, renewable energy projects accounted for only 1.6 percent of its energy sector authorizations in fiscal year 1991, falling short of the 5-percent goal. An Eximbank official responsible for renewable energy projects attributed this drop to a marked increase in authorizations for nonrenewable energy projects and insufficient requests received by Eximbank for financing from exporters of renewable energy technologies.

## Funds Available to Foreign Competitors

According to ECRE's Chairman, the most significant barrier to U.S. exports of renewable energy technologies is the tied aid donor programs of the Europeans and the Japanese. "Tied aid" provides low interest financing and/or grants for purchases from the donor country. The Chairman said that such assistance can play a critical role in nurturing the adaptation of commercially viable renewable energy technologies by developing countries.

<sup>2</sup>Section 534(d) of the Foreign Operations, Export Financing, and Related Programs Appropriations Act of 1990 (P.L. 101-167) requires Eximbank to "seek to provide not less than 5 percent" of its energy sector export financing for renewable energy projects. Although this provision was contained in an appropriations act, Eximbank has interpreted it as a permanent requirement and has continued to apply the 5-percent goal to financing in succeeding fiscal years.



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**Chapter 3  
CORECT Has Streamlined the Export  
Financing Application Process and Is  
Actively Pursuing Other Financing  
Strategies**

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To illustrate this point, in June 1991 testimony before the Senate Appropriations Subcommittee on Foreign Operations, the American Wind Energy Association's Director of Government Affairs recounted how U.S. wind energy experts had made a marketing tour of India in 1988. Every potential customer had asked what grants or loans were available from the U.S. government. The answer was "none." The following week the Danes announced a \$25-million tied aid grant to India for Danish wind turbines. Four of the five government-approved technical collaboration projects for wind turbines in India are now with Danish firms.

On May 15, 1990, AID and Eximbank announced the creation of a \$500-million mixed credit (grant, loan, and loan guarantee) facility to combat foreign governments' tied aid practices in the communications, construction, energy, and transportation sectors in two Pacific Rim countries (Indonesia and the Philippines) and two other Asian countries (Pakistan and Thailand). The funding pool was drawn from the Eximbank's tied aid credit fund, Eximbank-guaranteed commercial loans, and AID's Economic Support Funds.

On October 1, 1990, AID and Eximbank authorized a \$125-million tied aid credit facility for the Philippines. On June 14, 1991, \$127.7 million was authorized for Indonesia. Several months later, \$212.4 million was authorized for Thailand and Pakistan, bringing the total mixed credit funds authorized for the four countries to \$465.1 million.

Of the \$465.1 million available, \$50.5 million, or 10.9 percent, was set aside for three renewable energy projects: a \$28.5-million geothermal plant in the Philippines; \$20 million in boiler equipment for cogeneration using biomass at a pulp and paper factory in Thailand; and a \$2-million hybrid power system on an Indonesian island that will use solar energy, wind energy, and diesel fuel. According to an Eximbank spokesman, Eximbank was told that the \$20-million Thai project was lost to a foreign entity due to a more competitive bid.

On October 24th of this year the President signed the Energy Policy Act of 1992 (P.L. 102-486), which mandates CORECT to conduct a study of the "subsidies, incentives, and policies" used by foreign countries to promote exports of renewable energy technologies. The new law also requires the Commerce Department to develop a database and report to Congress on (1) the environmental and energy needs of foreign countries, (2) the U.S. technologies and services that can meet those needs, and (3) the current status of bilateral and multilateral programs for promoting U.S. exports of

renewable energy technologies. No specific funding, however, was authorized for any of these tasks.

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## **AID's Funding for Renewable Energy Programs Has Plummeted**

According to CORECT and industry officials, CORECT has had difficulty promoting renewable energy projects through AID, one of the largest sources of U.S. government funding potentially available for CORECT-related activities. AID has provided erratic funding for renewable energy projects over the years. Its overseas missions, where the bulk of its resources are allocated, spent just under \$5 million on renewable energy projects in the late 1970s. The figure jumped to just under \$30 million in 1982 and 1983, dropped to less than \$10 million in 1988, and fell to close to zero in 1989 and 1990.<sup>3</sup>

According to AID's Washington, D.C.-based Office of Energy and Infrastructure, renewable energy projects must compete with a broad range of overseas programs in the health, agricultural, educational, and other sectors. A 1980s reduction in officers knowledgeable about renewable energy, along with disappointing results from renewable energy projects in the first half of the decade, left renewable energy projects with little support in the field.<sup>4</sup> In addition, AID's efforts to consolidate activities in the field, to concentrate on fewer goals, and to avoid funding new program areas resulted in "the perception of renewable energy as a 'new area' to be avoided," according to an official from AID's Office of Energy and Infrastructure.

ECRE stated that TDP and Edmbank, in contrast to AID, are making a concerted effort to assist the U.S. renewable energy industry.

The Energy Policy Act of 1992 directs DOE to establish several programs through AID that are designed to promote U.S. exports of renewable energy technologies. One program involves training individuals from developing countries in the operation and maintenance of renewable energy equipment. The act authorizes DOE to spend \$6 million annually on this program for fiscal years 1994-1996. Another program involves setting up a

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<sup>3</sup>These figures are reflected in a graph from Daniel Waddle, Robert Perlack, and Michael Jones, "Renewable Energy Projects, Lessons from the Past and Directions for the Future," *Natural Resources Forum* (United Nations: New York City, Nov. 1989). The graph is included in testimony by Michael L. Marvin, Director of Government Affairs for the American Wind Energy Association, before the Senate Appropriations Subcommittee on Foreign Operations, June 28, 1991.

<sup>4</sup>CORECT and industry spokesmen said, however, that these disappointing results were due more to institutional barriers to renewable energy than to the technical performance of U.S. renewable energy equipment or services.

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**Chapter 3  
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mechanism to introduce U.S. renewable energy technologies to these countries. DOE is authorized to fund the program at \$100 million per year for fiscal years 1993-1998.

# CORECT Has Targeted Markets in the Caribbean Basin and the Pacific Rim

The 1989 act requires CORECT to target markets for federal export loan programs, development programs, and programs assisting the private sector. Using criteria that it developed, CORECT targeted four countries in the Caribbean Basin and two countries in the Pacific Rim as good potential markets for the export of U.S. renewable energy technologies. In the future, CORECT plans to focus on Eastern Europe and Mexico.

## Criteria Were Developed

According to the studies commissioned by CORECT, the Pacific Rim offers the best opportunities for increasing exports of U.S. renewable energy technologies, followed by the Caribbean Basin.

CORECT focused on the Caribbean Basin first because of its proximity to the United States. In addition, according to a Commerce Department spokesman, the White House had already established a focus on the region through the Caribbean Basin Initiative, and an interagency working group that included many of the same agencies that now make up CORECT had been set up to run the Initiative.

In 1987 CORECT targeted Barbados, the Dominican Republic, Guatemala, and Jamaica. In 1989 it targeted Indonesia and the Philippines in the Pacific Rim. CORECT and industry spokesmen stated that the following criteria were considered in selecting these countries:

- the availability of renewable energy resources in the countries,
- the amount of U.S. and multilateral development assistance flowing to the countries,
- the energy pricing structure (i.e., which countries offered the highest prices for power generated in remote locations),
- the government's attitude toward using renewable energy,
- the availability of financing and technical infrastructure for renewable energy projects,
- the political and economic stability of the countries, and
- the percentage of the population without access to electricity.

The desire to balance English-speaking countries (e.g., Barbados and Jamaica) with Spanish-speaking ones (e.g., the Dominican Republic and Guatemala) was also a factor in selecting countries in the Caribbean Basin, according to a Commerce Department spokesman.

On several trips in 1987, CORECT identified renewable energy projects in the four Caribbean Basin countries that could be used as vehicles for U.S.

exports. It also sponsored a Caribbean Basin/Latin America-focused conference and trade show in Miami, Florida, in 1989. According to CORECT's 1990 annual report, industry representatives estimated that about \$10 million in sales resulted from the trade show. However, neither CORECT nor ECRE has provided any documentation to verify this figure.

In June and September 1990 CORECT made two trips to each of the two Pacific Rim countries and in early October 1991 held a Pacific Rim conference and trade show in Los Angeles, California. The Guatemalan Energy Minister was one of many foreign guests attending the show, in addition to those from the designated Pacific Rim countries. As a result of the show, according to a Commerce Department official, Guatemala plans to launch a rural electrification program using U.S. renewable energy technologies.

## Federal Export Loan Programs and Development Programs in the Caribbean Basin and the Pacific Rim

Eximbank is the agency responsible for most nonagricultural federal export loan programs. The availability of its export promotion assistance depends on the creditworthiness of the countries to which U.S. goods are to be exported. For example, Eximbank eliminated all medium-term coverage<sup>1</sup> for exports to the Dominican Republic in 1988 and ceased to allow any loans or guarantees for the Dominican Republic in 1990. It did so due to the Dominican Republic's large accumulated debts and the country's poor prospects for repaying any new debts. Despite the Dominican Republic's poor credit rating, there is a market in that country for small-scale purchases of U.S. renewable energy technologies. This market is described in chapter 3. Eximbank maintains less severe restrictions on the financing of exports to Guatemala, Jamaica, and the Philippines, and imposes no restrictions on the financing of exports to Barbados or Indonesia.

AID, and, to a lesser extent, other U.S. government agencies, provide official development assistance to various countries around the world. Unlike Eximbank, which responds to requests from U.S. exporters, AID's funds are allocated based on a country's development needs and U.S. policy considerations. Of the six countries targeted by CORECT, Jamaica received the most dollars per capita in official bilateral development assistance from 1984 (the year CORECT was established) to 1990 (the latest

<sup>1</sup>Medium-term coverage applies to loans equal to or under \$10 million that have a term of 7 years or less.

year for which data are available).<sup>2</sup> In 1986, when CORECT targeted countries in the Caribbean Basin, Jamaica received \$45.73 dollars per person in U.S. official development assistance. Guatemala was next, with \$11.36 per person, followed by the Dominican Republic, with \$7.63 per capita. Barbados received less than \$1 per person. In 1989, when CORECT focused on Indonesia and the Philippines in the Pacific Rim, the Philippines received \$3.51 per capita and Indonesia received \$0.53.

## Future Focus on Eastern Europe and Mexico

Over the next 2 or 3 years CORECT plans to focus on Czechoslovakia, Hungary, Poland, and possibly other countries in Eastern Europe as potential markets for U.S. renewable energy technologies. During fiscal year 1992 it allocated \$160,000 for project identification activities in Eastern Europe. CORECT gave ECRE funds to take an exploratory trip to Czechoslovakia in August 1991, and ECRE is currently negotiating to station a U.S. renewable energy industry representative in Prague. In addition, DOE provided \$20,000 to ECRE to allow representatives of U.S. renewable energy industries to participate in United Nations-sponsored workshops in Europe during the first half of 1992. These workshops will also be attended by East European officials. According to DOE and AID officials, in fiscal year 1991 AID allocated about \$150,000 to assess renewable energy resources in Bulgaria, Czechoslovakia, Hungary, Poland, and possibly Romania.

CORECT also plans to focus on Mexico in response to a Mexican government rural electrification effort involving heavy use of renewable energy technologies. According to CORECT's consultant on Mexico, in 1991 DOE began developing, in cooperation with its Mexican counterparts, a renewable energy program designed to support the rural electrification effort and other renewable energy activities. The consultant stressed that Eximbank has been extremely helpful in promoting financing for U.S. renewable energy technology exports to Mexico to support the program. Eximbank is involved in a broad U.S. effort to help Mexico restructure its economy.<sup>3</sup>

<sup>2</sup>The source for figures on U.S. official bilateral development assistance was the U.S. Department of Commerce, Bureau of Economic Analysis (Washington, D.C.: Apr. 1991). The source for population data was the United Nations Monthly Bulletin of Statistics, as published in the International Monetary Fund's International Financial Statistics Yearbook, 1991 (Washington, D.C.).

<sup>3</sup>For example, the Eximbank's authorizations for loans, guarantees, and medium-term insurance for exports to Mexico grew 10-fold over the last 5 years, jumping from \$335 million in fiscal year 1987 to \$3.5 billion in fiscal year 1991. The 1991 figure represents 48 percent of the Eximbank's authorizations for that year.

# Efforts to Follow Through on Trade Opportunities Are Mixed

Although CORECT helped identify trade opportunities in the Pacific Rim and the Caribbean Basin, it did not assign responsibility for following through on those opportunities. However, FINESSE, the new multilateral financing mechanism created with the help of CORECT (see chap. 3), may be useful in monitoring opportunities in Indonesia and other Pacific Rim countries. In the Dominican Republic, financial problems made it difficult to pursue the opportunities identified in that country. Industry efforts, supported by recent legislation, may make it easier to follow through on trade opportunities.

With the creation of TPCC in 1990, and its codification on October 21, 1992, the task of promoting exports from all U.S. industries was subsumed under one forum. CORECT now coexists with this broader effort, carrying out many of the same activities to advance renewable energy technology exports that TPCC has begun to undertake on behalf of all exports. However, there is currently little coordination between CORECT and TPCC. We believe that the possibility of unnecessary overlap can be minimized if CORECT works in support of the overall TPCC effort.

## Indonesia: A Case Example of Mixed Follow-Through Efforts

Indonesia has the potential to become a major market for U.S. exporters of renewable energy technologies, based on its growth rate and geography. Energy demand is outstripping capacity as the economy expands. Although currently an oil exporter, Indonesia is expected to be a net oil importer by the end of the decade. The Indonesian government is therefore eager to explore new energy options, including renewable energy, to meet the needs of its growing industrial sector and population. With close to 200 million people, Indonesia is the fourth most populous country in the world. According to Indonesia's national utility, however, the electricity grid currently reaches only about 32 percent of the population. The geography of the Indonesian archipelago—66,000 villages spread out over thousands of islands—makes grid extension fueled by large, centralized power plants costly and difficult. Representatives of the U.S. renewable energy industry say that renewable energy systems, many of which are small and decentralized, are better suited to this environment.

In order to strengthen its economy and attract foreign investors, the Indonesian government has recently instituted a series of trade, investment, and price reforms. The trade and investment reforms include simplifying port and customs procedures; lowering some tariffs (although high tariffs remain on imports of photovoltaic panels and wind turbines);

reducing the licensing requirements for manufacturers; improving access to financing for foreign and domestic firms; and establishing duty-free, bonded warehouse zones. The government also introduced new legislation in June 1991 that lowered taxes on business ventures. In addition, in April 1990 it began to implement a 1985 law authorizing private power generation. The government's pricing reforms include revising electricity and diesel fuel prices to better reflect market prices. The reforms thereby encourage contracting with private power suppliers and using alternative energy sources.

During the summer of 1990 CORECT helped sponsor two trips to Indonesia by opportunity identification teams from member agencies and the U.S. renewable energy industry. As of July 1991, approximately a year after the last team returned, there had been little action concerning the trade possibilities identified by the teams. For example, most of the Indonesian public and private sector officials who met with the teams in June and September 1990 said that they have not been contacted since then by U.S. renewable energy industry representatives. In addition, although many of these officials were told by CORECT member agency representatives that they would receive more information on U.S. renewable energy technologies, a majority told us that they had not received such information. It appears, therefore, that CORECT did not adequately assure that an appropriate agency would assume responsibility for tracking the trade opportunities identified on these trips.

Although CORECT released the names of potential customers in Indonesia to industry associations in October 1990, 1 month after the last opportunity identification trip was completed, we found no evidence that this information resulted in the initiation of any renewable energy projects involving U.S. equipment or services. The full report of the opportunity identification teams' findings was released in September 1991, 1 year after the last team returned from the Pacific Rim. CORECT spokesmen said that, given its small budget, CORECT can only provide information to and coordinate the activities of U.S. government agencies, nongovernmental organizations, and industry groups, with the ultimate goal of increasing U.S. exports of renewable energy technologies. They said CORECT cannot assure that any trade opportunities identified will result in export sales.

The AID mission in the Indonesian capital, Jakarta, currently spends less than 1 percent of its \$45 million-\$50 million annual budget on energy. Its main focus is on privatization of the energy industry. The only energy project funded by the mission in the last 6 years was a coal research



project. However, a U.S. wind turbine manufacturer and a contractor to AID's Office of Energy and Infrastructure recently persuaded the mission to cofinance a pilot project involving wind-powered irrigation pumps in conjunction with the mission's agricultural program. The project is being cofinanced by the Japanese government, which has experienced problems with kerosene-powered engine pumps used in its Indonesian irrigation projects.

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### Efforts to Establish Oversight Capabilities

The FINESSE program, discussed in chapter 3, is a new multilateral financing mechanism for small-scale energy users in Indonesia and other Pacific Rim countries. CORECT helped develop the mechanism, which may be an effective vehicle for monitoring trade opportunities identified by CORECT member agencies. The World Bank has established a special office to oversee the implementation of small-scale renewable energy projects, and several U.S. companies are pursuing potentially profitable projects in Indonesia and elsewhere in the Pacific Rim. These projects include establishing wind-powered battery charging stations in Indonesia, manufacturing and installing small photovoltaic power systems in the Philippines, and other activities.

In addition, an AID contractor is currently setting up a Renewable Energy Project Support Office to share the cost of feasibility studies. The office is slated to occupy part of a U.S.-Indonesian Business Center to be set up by the AID mission. Another AID contractor is creating an equity investment mechanism for applying renewable energy technologies. A CORECT spokesman from the Department of Commerce characterized these activities as a step in the right direction, but said that they are not as good as having the U.S. renewable energy industry station a representative in Indonesia.

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### Opportunities in the Dominican Republic Lost Due to Financial Difficulties

According to officials in the Dominican Republic, the government is receptive to renewable energy technologies because the country lacks indigenous fossil fuel resources and the hard currency<sup>1</sup> to import them. It also has a significant unmet demand for electricity. However, financing of projects is a major problem in the Dominican Republic. Unlike Indonesia, the Dominican Republic does not have abundant natural resources that it could export to earn hard currency. For this reason and others, no action has been taken on any of the trade opportunities in renewable energy that

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<sup>1</sup>Hard currency is a medium of exchange that is freely convertible into other currency.

were identified by CORECT member agency teams in 1987. In addition, the AID mission in the Dominican Republic has focused on other efforts.

In discussions with U.S. and Dominican Republic government officials as well as with importers and users of renewable energy technologies, we found no evidence that any of the 11 renewable energy projects identified by CORECT member agencies in the Dominican Republic have been implemented. Four of the projects involved hydropower, three involved biomass, two involved photovoltaics, and two involved wind energy.

We spoke with Dominican Republic government officials and private sector representatives responsible for seven of the projects and were told that they have not acted on any of these projects. In addition, U.S., Dominican Republic, and private sector officials told us that they have seen no indication that the other four projects have been carried out.

These officials attribute the lack of action to difficulties in obtaining financing, saying that few in the Dominican Republic can pay for the equipment and services that U.S. exporters would like to provide. For example, according to a member of the U.S. National Hydropower Association who helped identify the four hydropower projects in the Dominican Republic, these projects were not implemented because the government could not pay for them.

Financial difficulties also hindered an industrial end-user who was involved in two other projects, one using solar energy, the other, biomass. The solar project involved installing photovoltaic panels to power chicken farm ventilation, lighting, refrigeration, battery charging, and water pumping. A company representative explained that the economic situation in the country rendered the project infeasible: interest rates were too high for loan financing, and letters of credit were difficult to obtain.<sup>2</sup> The biomass project involved using poultry manure as a reusable fuel. The company remains eager to use biomass technologies but has been unable to obtain the necessary technical assistance and equipment for this project.

According to a U.S. renewable energy industry representative who helped identify trade opportunities in the Dominican Republic, an additional reason why nothing has been done is that U.S. exporters could not contact potential customers connected with any of the opportunities until the

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<sup>2</sup>A letter of credit is a document issued by a bank guaranteeing the payment of a customer's drafts up to a stated amount for a specified time period. It substitutes the bank's credit for the buyer's and eliminates the seller's risk. Letters of credit are used extensively in international trade.

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**Chapter 5**  
**Efforts to Follow Through on Trade**  
**Opportunities Are Mixed**

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Commerce Department released its report summarizing the findings of several CORECT cosponsored trips to the Caribbean Basin to identify potential projects. He explained that timely follow-through is critical in pursuing business contacts. The report was released in July 1988, over 8 months after the last trip was completed.

Follow-through activities are complicated by the fact that U.S. agencies in the Dominican Republic have provided limited assistance to U.S. exporters of renewable energy technologies. For example, although the Commerce Department's U.S. and Foreign Commercial Service has held local trade shows featuring U.S. renewable energy equipment, it was not able to replace the commercial officer who left the Dominican Republic in June 1991 until 6 months later. Such an officer's responsibility is to help promote exports of U.S. products. According to the Director for the Western Hemisphere for the U.S. and Foreign Commercial Service, the Dominican Republic and other countries in the Caribbean Basin represent relatively poor prospects for U.S. exports and, therefore, have a lower priority.

In addition, promoting U.S. renewable energy technologies is not a priority for the AID mission, according to conversations with mission officials. AID's energy programs in the Dominican Republic have focused on promoting independent power sales to the electricity grid, planting trees for wood fuel, and improving the national electric utility's ability to measure electricity usage and collect revenue. With respect to selling to the electricity grid, for example, only 1 of the 10 independent power projects approved by a newly created private power board involves renewable energy.<sup>3</sup> Moreover, this renewable energy project involves a British, rather than a U.S., firm. However, the Dominican Republic board was set up with legal and technical assistance from AID in accordance with legislation passed in February 1990.<sup>4</sup>

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<sup>3</sup>Of the remaining nine projects, eight involved oil-fired power generation and one involved electricity distribution and transmission line repair.

<sup>4</sup>Established under Dominican Republic Law 14-90, the board is designed to stimulate the country's economic development by providing a regulatory framework for companies involved in generating power.

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## Industry Follow-Through Efforts Funded by CORECT

CORECT has provided funds to ECRE to ascertain how to use existing U.S. and multilateral agency offices in the Caribbean Basin, the Pacific Rim, and Eastern Europe to help the U.S. renewable energy technology industry develop a presence in these markets. Pursuant to this effort, negotiations are under way with organizations in Costa Rica to cover the Caribbean Basin/Latin America; Malaysia to cover the Pacific Rim; and Czechoslovakia to cover Eastern Europe. According to ECRE's Executive Director, DOE and AID's Office of Energy and Infrastructure are providing additional funding of \$325,000 to help support the placement of industry representatives in existing federally funded facilities in these three countries. The recently enacted Energy Policy Act of 1992 mandates CORECT, in cooperation with the Commerce Department, to assign one expert in renewable energy technologies to a U.S. and Foreign Commercial Service Post in the Pacific Rim and another expert in these technologies to a post in the Caribbean Basin. The act authorizes DOE to spend \$500,000 per year for fiscal years 1993 and 1994 for this purpose.

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## CORECT's Role Is Altered by the Creation of TPCC

Six years after CORECT was established by law, the President formed TPCC to undertake many of the same types of activities for all U.S. industries that CORECT has performed for the renewable energy industry. For example, TPCC working groups have issued an interagency calendar of upcoming U.S. trade promotion events and drafted a report that identifies structural impediments faced by U.S. exporters trying to obtain adequate financing. TPCC has also held a series of national export conferences to raise the export awareness of the U.S. business community and set up a Trade Information Center where U.S. firms can obtain information on trade promotion programs and activities. At present, little coordination exists between CORECT and TPCC.

In October TPCC received a legal underpinning when the President signed the Export Enhancement Act of 1992. This act formally mandates TPCC to unify and coordinate federal export promotion and financing efforts, to produce a governmentwide strategic plan for these efforts, and to "prevent unnecessary duplication in federal export promotion and financing activities." We believe that if CORECT's activities are not coordinated with those of TPCC, such a duplication of efforts may occur.

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## Conclusions

We believe that CORECT has not adequately delegated responsibility for following through on member agency activities, particularly trade opportunities identified by these agencies in recommended markets. In

addition, the creation of TPCC has altered the context in which CORECT operates: CORECT is attempting to do for one industry that which TPCC seeks to do in a coordinated manner for all U.S. industries.

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## Recommendations

To help promote U.S. exports of renewable energy technologies, we recommend that the Secretary of Energy, together with the other CORECT member agencies and the U.S. renewable energy technology industry,

- develop a way, through the CORECT mechanism, to assign responsibility for tracking member agency activities, including trade opportunities identified by these agencies in recommended markets, and to document, to the extent possible, any exports associated with such activities; and
- work with TPCC to define the way in which CORECT's mandate and activities can be integrated into the overall U.S. export plan that TPCC is developing.

## Agency Comments

ECRE's Executive Director commented on the second recommendation, saying that he did not think TPCC would be effective in promoting exports of renewable energy technologies. He said CORECT works because it is an industry-government collaboration. But he added that if TPCC undertakes such collaboration it, too, may work. With regard to CORECT's follow-up efforts, CORECT spokesmen said CORECT has done all that could be expected of an interagency body with a small budget of just over \$1 million. We believe that even though CORECT's budget is limited, CORECT should be accountable for the public resources it spends.

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## FOREIGN MARKETING ISSUES

Presented to the  
Geothermal Resources Council Workshop  
to Frame Public Policy on Geothermal Energy  
in the Context of the National Energy Strategy

A. John Armstrong

### A. INTRODUCTION

In the days before the Gulf War dominated the news, when Premier Gorbachev still appeared on the front pages of our newspapers, the press reported a quip he made upon leaving a meeting with his counselors. Gorbachev stated that President Mitterrand is reported to have 100 mistresses, one of them has Aids -- he does not know which one. President Bush has 100 security guards, one of them is a terrorist -- he doesn't know which one. "I [Gorbachev] have 100 economic advisors, one of them is smart -- I don't know which one."

Today those of us in the United States geothermal industry who are concerned with the national energy strategy are similarly situated -- particularly with respect to which of a multitude of competing approaches do we support in order to secure our export position in the markets of the developing countries. In some respects the problems confronting the geothermal industry can be simply stated. The U.S. geothermal industry is the most experienced and technically proficient explorer, developer and



producer of energy in the world. The industry, however, has begun to reach its limits of growth here in the United States, and therefore, to survive, has to look outward to exports. Unfortunately, the industry has not proven competitive in exporting equipment and services. It is:

- ° closed out in the European Economic Community;
- ° closed out in the developed countries of the Pacific Rim; and
- ° not gaining ground in the developing countries.

Why are we not competitive? At the risk of oversimplification I believe there are five reasons for our competitive shortfall:

1. Lack of competitive financing. In developing countries, who will pay for a project determines who will get the project. Who provides the financing irrevocably determines the decision-making process -- not long term financial benefits or technical or environmental considerations.
2. Unlevel playing field. Foreign competitors are not subject to the Foreign Corrupt Practices Act.

3. We are not there. If you are not physically in the country to which you are exporting, you are not in the exporting market. We don't live there, we don't know the language, we don't know the territory. Our competitors do.
  
4. We fight among ourselves. We have never had even the semblance of the sogo shosha -- the Japanese trading houses like Mitsui and Mitsubishi. The English have utilized their trade associations to establish an effective networking system. The Japanese have developed the networking to an art. In Japan, the "old school tie" goes back to kindergarten. The geothermal industry, it may be noted, has made some strides. The NGA has applied for, and been granted, an Export Trading Certificate of Review under the auspices of the National Geothermal Association and has organized itself as an export trading company known as "USGIC" (the U.S. Geothermal Industries Corporation); however, this fledgling organization is just beginning its efforts to cooperate and even collude overseas.

5. Effective Industry/U.S. Government Cooperation. The U.S. Government and U.S. Industry have not yet learned how to work effectively overseas. Industry does not mobilize the full economic and political force of the U.S. government -- its network of commercial and political offices. It does not take full advantage of Eximbank, OPIC, USAID, Commerce, TDP and the legions of potential support. The U.S. government is shy of supporting one U.S. competitor to the alleged disadvantage of another. In contrast, Japanese industry and government work hand in glove -- the private sector is part of the aid process. As a result, industry is well connected in recipient governments. Industry knows the people, tells them what kind of assistance to request, helps them make the request and greases the system in Tokyo to get the projects approved. Adam Smith never went to Japan and the Japanese government considers the private sector an integral and welcomed participant in the aid process.

Thus there are both policy and practical reasons as to why industry is faulting in its efforts to enter the international export market. One of the key issues is the issue of Tied Aid.

B. WHAT IS TIED AID?

One could ask the proverbial 12 bishops or Gorbachev's 100 economic advisers what "Tied Aid" is and you would get 112 different answers. A glossary attached to this paper is an extract from the April 1989 "Report to the U.S. Congress on Tied Aid Credit Practices", published by the Export Import Bank of the United States and is consistent with Public Law 100-418 of the Omnibus Trade and Competitiveness Act of 1988. This material will provide more accurate definitions. However, for the purposes of discussion "Tied Aid" will be used to refer to the practice of providing grants and/or concessional loans, either alone or combined with export credits, linked to procurement from the donor country.

Allow me to offer a concrete example, Eximbank and USAID are currently negotiating concessional financing facilities ("CFF") in the Philippines, Indonesia and Thailand. Each of these facilities will be provided with \$125 million in Tied Aid. The CFF's are structured to provide AID for infrastructure projects in the areas of energy, transportation, telecommunications and construction. Thirty-five percent of the financing will be in the form of a grant provided from USAID funds and the war chest (a \$150 million funded Eximbank facility). Sixty-five percent of the financing will be in the form of a loan guaranteed by Eximbank. "Tied Aid" in the

Philippines therefore means that the U.S. government will provide a 35% grant and a 65% loan guarantee which is linked to procurement of products and services from U.S. industry.

C. THE U.S. POLICY PERSPECTIVE.

U.S. Tied Aid can best be understood in context of the U.S. government's historical policies. In the early 1970s the U.S. intentionally shifted its AID focus away from capital-goods-intensive infrastructure assistance and toward "basic human needs." The 1973 "New Direction" legislation required AID to focus its resources on areas fundamental to a developing society, such as agricultural production and improved health/education programs.

Our major trading competitors did not follow suit. They continued to fund power projects in the developing world at concessional rates, a practice many foreign governments consider a reasonable method by which to support economic development, one consistent with international agreements. As a result, U.S. geothermal exporters have been expressing concern that the lack of project money is shutting them out of important markets in the developing world. They argue that our economic competitors are using their funds as a powerful economic tool to lock in markets

around the globe and to create jobs at home. For example, from 1984 to 1987, Japan, West Germany and France gave over 70% of their economic aid for capital-intensive projects, building the infrastructure of other countries, using goods produced with jobs in their own countries. Less than 7% of U.S. aid during the same period went to capital projects which increased exports of American products.

Another example is our aid to Poland. Recently we gave \$800 million to Poland, mostly in cash with no requirement to buy our products. In contrast, West Germany and Japan gave over \$3 billion, but 83% of it was in the form of credits that could only be used to buy goods produced in their own countries. Senator David L. Boren (Dem., Oklahoma) has argued that "perhaps in 1950 when we had 70% share of world markets, 9 of the 10 largest banks in the world, and no real competitors, we could afford that kind of situation. But now we do not have even one of the top 20 banks in the world. Instead of a 70% share in the world markets, we have an 18% share of world markets and, it is shrinking."<sup>1/</sup>

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<sup>1/</sup> Testimony of Senator David L. Boren (Dem., Oklahoma) before the Senate Foreign Relations Committee on the Boren-Bentsen-Byrd "Aid for Trade Act" (Oct. 2, 1990).

The current market for capital goods transactions which is inaccessible to U.S. exporters because of Tied Aid credit practices of other governments is \$10-12 billion a year, resulting in an estimated \$2.4-4.8 billion annual loss to U.S. exporters. Future U.S. export loss could be far greater.

During the last 15 years, the U.S. government has addressed this issue through multinational negotiations. These negotiations are in context of the so-called "Arrangement on Guidelines for Officially Supported Export Credits" -- an informal agreement among 22 of the 24 Organization for Economic Cooperation and Development ("OECD") countries. In order to eliminate "predatory" financing -- the tying of economic aid to export sales -- the OEDC countries entered into a Tied Aid Credit Agreement. The basic premise of this agreement is that a 35% minimum of "concessionality" -- the grant portion of a deal -- must be reached in order to put forward a Tied-Aid credit package.

It is important to understand that this 35% minimum was designed to make Tied Aid too expensive a proposition for nations to pursue. The theory being that if the threshold was 20% or 25% a government might consider pursuing this kind of deal in order to help out an exporter; 35% was considered to be too expensive -- but the theory has not proved out. The problem is that Tied Aid activity has increased since the 1987 version of the arrangement

*Not clear!*

*to greater*

was put into place, simply because our foreign competitors have been willing to meet the 35% requirement because they are committed to the practice of using Tied Aid to help their exporters. Indeed, the result of the 35% minimum has not achieved the desired U.S. objectives. Competitor governments have not diminished the use of AID in commercial contracts; they have simply redistributed AID funds away from the least developed countries to richer developer countries, and thus toward more trade-distorting, competitive (capital infrastructure) projects.

Such programs as the Eximbank war chest funded with \$150 million and the USAID/Eximbank CFF projects in the Philippines, Thailand and Indonesia, have been supported by Congressional appropriations in order to give muscle and leverage to the OECD negotiating process. These appropriations have always been a temporary necessity used to pursue the objective of reducing the application of AID resources to commercial projects in viable markets. The current "negotiation-with-war chest" approach is designed,<sup>2/</sup> ~~is~~ to ban Tied Aid in certain capital sectors in Asia and North Africa (although un-tied AID would be permitted) and to  
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<sup>2/</sup> In conjunction with the OECD negotiations (expected to be concluded by mid-1991).



maintain Eastern Europe as a "Tied Aid Credit-Free" Zone designed to block trade distorting support by other governments in this area of the world.

Thus the U.S. national strategy is not to use Tied Aid to encourage U.S. exports, but to use expensive Tied Aid to discourage unfair competition from our competitors. } How?

The Assistant Administrator for Program and Policy Coordination of AID (Reginald J. Brown) argues that AID is not an export promotion agency. The Assistant Secretary of State for Economic and Business Affairs (Eugene J. McAllister) argues that shifting AID resources toward capital projects could impair the national ability to address other critical national objectives such as supporting democratization, stabilization and economic reforms in Central America, the Philippines and Eastern Europe. Both AID and the Department of State maintain that a major expansion of Tied Aid is not in the interest of the United States. In weighing national interests, AID and State conclude that continued support for the Middle East process and security of Israel and Egypt remains the highest U.S. priority. These two countries receive 53% of all economic support funds ("ESF"), and 27% of all bilateral economic assistance. Those in charge of our foreign policy argue that their ability to advance objectives in the Middle East, their

ability to support stability with democratic and economic reform in Eastern Europe, the Philippines, Central America and Pakistan, as well as their ability to combat narcotics production and trafficking in South America have a higher national priority than increasing the commercial impact of assistance programs.

U.S. AID policy in other words is geared to vulnerabilities of the recipients; Japanese AID policy, in sharp contrast, is geared to Japan's vulnerabilities -- both political and economic.

D. THE NATIONAL DEBATE (SUMMARY).

The national debate can be summarized as follows:

- ° The United States is running a trade deficit that is out of control.
- ° One of the most effective ways of eliminating our trade deficit is to reach out to U.S. exporters and help them compete on a level playing field.
- ° There are two approaches to achieving the objective of a level playing field:

- (a) We can negotiate with our competitors to establish across-the-board un-tied AID; or, failing that, we can negotiate OECD <sup>E</sup>agreements under which all countries play by the same rules -- rules the U.S. can live with competitively.
  
- (b) We can increase the share of our bilateral economic aid allocated to capital projects, and require that more of our aid be spent on U.S. goods and U.S. services -- with less in the form of "no-strings-attached" cash grants.

E. THE GEOTHERMAL INDUSTRY PERSPECTIVE

I would offer that the U.S. geothermal industry should support the second approach. Our industries have been shut out of many good opportunities and markets because of the over abundant availability of Tied Aid financing support from non-U.S. sources.

- ° We cannot compete with the Italian offers of a 20 year loan with a 4-10 year grace period and a 1.5 to 2% interest rate.

- We cannot compete with French offers of a 29 year loan with a 12 year grace period and an interest rate of 2.1%.
  
- We cannot compete with Japan's OECF rates ranging from 1.0% for lesser developed countries to 2.9% for middle income developing countries.

On the other hand, we must appreciate the fact that Japan, France and Germany have increased their use of Tied Aid to over \$12 billion. Realistically, the U.S. may not be able to appropriate that magnitude of funds earmarked to Tied Aid. If we get into a competitive Tied Aid economic war with our allies and economic competitors, we could lose. However, unless the U.S. government is committed to an aggressive Tied Aid program, U.S. exporters in general and the U.S. geothermal industry specifically, will continue to lose out to their competition in <sup>valuable</sup> overseas markets.

I recommend that while the industry ~~to~~ supports continued U.S. negotiations, the industry also support legislative initiatives to develop a program that help us get back into the game of winning contracts in developing country markets. Senators Kasselbaum, Boren, Bentsen and Lieberman, among others, understand that as the world changes so must our foreign aid change. The U.S.

geothermal industry should get a better understanding of the validity of these Senators' approaches as well as the validity of the competing national interests which have been expressed by the Executive Branch.

The question of budget resources is, of course, extremely difficult in view of the overall fiscal constraints facing our nation. However, I think that a convincing case may be made that the U.S. needs to redirect existing resources in support of disadvantaged U.S. export interests.

We also need to understand how our competition runs their Tied-Aid programs. Japan, for example grants money to the Least Developed Countries and concentrates its Tied Aid in Less Developed Countries who are transitioning into a developed economy. The Japanese Private sector enjoys an increasingly important and integral role in the Japanese AID system as a grantee country graduates into a viable economy. In other words, Japanese AID offers a variety of instruments with a variety of objectives -- not all that bad an approach. The geothermal industry needs to understand the competition so that it can advocate meaningful reforms to the U.S. government.

In conclusion, the U.S. geothermal industry must be informed in this vital area and voice its requirement that the Executive and Legislative branches take a creative approach if we are to use U.S. resources effectively in an era of limited resources and in a world in which exports are being shut out.

1. What do you recommend the policy of NGA be?
2. What is a strategy for accomplishing the policy?
3. Who are key decision makers and how do we influence them?
4. What other groups hold similar views and what are potential alliances?

#### APPENDICES

- (1) Glossary
- (2) Export-Import Bank December 1990 Tied-Aid Report
- (3) Preeg, The Tied Aid Credit Issue (excerpt)