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THE ROLES OF INDONESIAN GEOTHERMAL ASSOCIATION (INAGA) IN THE IMPLEMENTATION OF POWER SECTOR RESTRUCTURING IN INDONESIA

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ABSTRACT

Indonesia has the largest resources of geothermal energy in the world, amounting to approximately 20,000 to 30,000 megawatts. Over the last five-year, a number of geothermal electricity generation plants have been built by private enterprises, adding total installed capacity of approximately 525 megawatts to date. There was approximately 1,200 megawatts of new geothermal power plant capacity planned up to year 2003 in six locations in Indonesia.

The Government of Indonesia has launched a Power Sector Restructuring Policy aimed at creating competitive electricity market commencing by year 2004. The vision behind the policy is to create a power sector, which is able to grow rapidly, provides high quality and efficient electricity supply for the benefit of consumers, and be financially independent and self-reliant.

This paper discusses the role of The Indonesian Geothermal Association (INAGA) in the implementation of Indonesia Power Sector Restructuring. INAGA believes that this power reform creates many opportunities for geothermal industry in Indonesia. INAGA's vision is to make geothermal resources become energy of choice in the expanding Indonesia energy market by virtue of its natural environmental benefits and its potential opportunities to add value in support of Indonesia's sustainable national development. The mission is our focal point in the development of national goals and realize important opportunities in three areas: enhancing energy security; strengthening economic competitiveness; and addressing concerns on environment.

1. INTRODUCTION

Indonesia today is utilizing about 525 megawatts of electric power generation from geothermal energy, or about 6 percent of nation-wide installed power plant capacity. For Indonesia, the use of renewable geothermal energy would eliminate the dependency on a single source of fossil fuels to generate electricity and meet Indonesia' growing energy demand. Indonesia has the biggest geothermal energy potential in the world, with approximately 20,000 megawatts (9-12 Billion BOE) or 40% of the world geothermal energy reserves, and stands to benefit from developing its abundant and indigenous geothermal resources to provide for its domestic needs (Fig. 1). In addition, this obviously will enable Indonesia to export its more portable fuels for much-needed hard currency.

Underlying Indonesian energy mix sector that are based on the General Energy Policy ("KUBE"), issued in February 1998, and Prof. DR. Zuhal MSc EE announcement in Petrominer, December 1997, the INAGA faces the challenges to ensure that its organization model supports the set Vision and Mission. This general energy policy aimed at reducing the use of fossil fuels for generating electricity by increasing the use of renewable energy should be implemented. The multi-buyer and multi-seller aspect of renewable energy requires the pooling of geothermal projects. Geothermal players should be invited to make competitive bids so as to have the lowest price of electricity. The main message of the power restructuring is that there should be room for geothermal energy development in the future energy business opportunities.

In the era of global business and competition, a strong motivation and high quality organization with clear vision, mission and strategy is required to support the geothermal energy utilization and development. Asosiasi Panas Bumi Indonesia (API), in its English translation as Indonesian Geothermal Association or abbreviated to INAGA, in an effort to anticipate this turbulent global competition has integrated work quality and management processes into its organization strategy. As a professional organization, INAGA (Indonesian Geothermal Association) continues focusing its long-term commitment and efforts to help bridge Indonesia' energy policy with a strong foundation of energy mix.

INAGA recognized the change through Continuous Quality Improvement concept would be necessary all over the organization approaches for the association such INAGA to remain resourceful and successful to the nation. This includes how to manage the highest output that the member needs in promoting the renewable energy-geothermal resources as energy of choice in Indonesia are satisfying.

Geothermal energy development has to compete to go to attract investment capital from its Shareholders by reducing risk, advancing the technology, and its economic parameter. In order to cope with geothermal industry challenges mentioned above, INAGA has set a vision that by the year 2010, geothermal resources become energy of choice in the expanding energy market by virtue of its natural environmental benefits and its potential opportunities to add value in support of Indonesia's sustainable national development.

This vision statement is realistic and consistent with Indonesia' laws and policies (Fig. 2), such as:

- Law No. 24/1992 on Space Allocation
- Law No. 6/1994 on Climate Change Convention
- Law No. 23/1997 on Environmental Management
- Law No. 20/1982 on the State Defense Principles
- General Energy Policy (KUBE) – Feb. 1998.

Because of its renewable characteristics, environmentally sound, and economically attractive options to meet increasing demand of Indonesia' energy market, INAGA proactively positions geothermal energy at competitive edge for the benefit of its stakeholders.

In order to achieve this vision, it is important for the Government of Indonesia to work in partnership with INAGA in promoting geothermal energy as a sustainable, environmentally sound, economically competitive contributor to the Indonesia energy supply through the technology, business, and regulatory strategies.

2. REACHING HEARTS FROM THE START

INAGA members are concerned that unless existing government policies and regulations are reformed to provide certainty of law in support of geothermal energy development, the vision will not be attainable. Intensive public relation campaign is required to share the vision and to promote understanding of Indonesia's potential geothermal energy resources and its economic value. Additionally, the campaign should bring up better awareness of the multiple benefits, which can be generated by the abundant, clean geothermal energy resource to supply domestic power needs.

Geothermal energy has been perceived as a high priced energy source by virtue of its high exploratory risk and remote locations from its consumers. Improved technology, enhanced human resource expertise, and emphasis on research and development are of utmost important to make geothermal resource an affordable energy of choice, not only to generate electricity but also for other direct utilization.

Coordinated efforts by industry, government, educational and research institutions as well as a sense of urgency on Indonesia's need to improve environmental conditions are required to achieve the vision.

2.1 Barriers to Growth

INAGA members identify the following barriers to the growth of Indonesia geothermal industry:

- Competitiveness of Geothermal Energy Price;
- Continuing Subsidy of Fossil Fuel Price;
- Lack of Political Will to Intensify Geothermal Energy Utilization;
- Shortage of Competent Human Resources;
- Absence of Technology, and Research & Development Support;
- Inconsistency of Laws, Regulations and Government Policies;
- Lack of Transparency;
- Lack of Risk Appreciation and Mitigation Efforts;
- Absence of Integrated Energy Planning;
- Lack of Information and Publicity on Indonesia's Geothermal Potential and Benefits; and
- Low Environmental Awareness.

INAGA is taking appropriate initiatives within its capacity to overcome these hurdles and help create a favorable business climate that will ensure the growth of geothermal industry.

2.2 Government and State Enterprise Roles

INAGA views the Government role in developing the utilization of Indonesia' geothermal energy potential, in principle, is to create favorable environment which will be conducive to attract investment in geothermal industry and stimulate the growth of the industry under increasing global competitive condition, environmental concern and market oriented economy.

This role can be carried out by:

- Developing appropriate energy policies – responsive to changing environment, transparent, fair, competitive, environmentally driven, support sustainable development and energy mix to optimize added value;
- Establishing the legal framework to provide certainty of laws and regulations and attract investment for geothermal and/or renewable energy industry;
- Restructuring geothermal institutions to improve efficiency and effectiveness of geothermal energy development;
- Enforcing compliance to applicable law and regulations;
- Committing to make Indonesia the center of excellence for geothermal energy applications by supporting geothermal education, research and development and publicity.

2.3 The Restructuring of the Electric Power Sector

PT. PLN, the National Power Company, is a government-owned corporation for electricity sale and distribution to various consumers. To make a financial recovery, PLN needs to be divided according to geographical and functional entities so as to improve its efficiency and response capability and to promote its competitiveness. Fiscal assistance from the government, new tariff to recover cost with the exemption of the subsidised groups, and other efforts including low cost and improving efficiency are the major targets to accomplish the near future objective.

The electric power sector should acquire competitiveness to attain more reasonable costs, to share profit between consumer and producer, and to share risk with a reduced government burden to perform the planning and controlling

function. To achieve this ideal objective, PLN should be broken down into several entities to foster competition in the generation and retail side and establish a fair rule for all players in this sector.

Currently, the electric power sector lacks transparency. This leads to confusion, bureaucracy, inefficiency and suspicion. To improve transparency, the government should reduce its involvement in this sector , strengthen its role in the regulatory function, and separate the commercial and social missions.

The private sector participation is becoming very important due to limited funds from the Government. Private sector participation will result in project investment, more transparency and competitive price. When Indonesia's autonomous district regulation is enacted, more private sector participation would be needed to ensure an efficient future electrical power market in Indonesia.

3. CREATING COMPETITIVENESS

An understanding of Indonesian energy market competition is critical. The INAGA will recognize what it takes to deliver the right energy, at the right price, and the right terms to make a difference for geothermal by focusing its core activities on Business, Technical and Regulatory Challenges.

3.1 Lower the Costs and Risks of Developing Geothermal Resources

New investment should be competitive and transparent and regulated by the planning and competitive tendering code to lower the cost. Efforts should be made to use funds from local sources.

Geothermal power development is a capital-intensive business undertaking, with the major expenses being incurred well before the plant begins to produce revenues. Today, capital costs for a typical geothermal power project average about $ 1,600 - $ 2,400 per installed kilowatt. The highest cost components of the project include the reconnaissance works, drilling of exploratory, production and injection wells, and plant equipment and construction.

The primary risk in a geothermal project is confirmation of a viable reservoir, and this step requires extensive drilling and well testing to identify productive areas of the field. To reduce the primary risk in geothermal development, a better understanding is needed of the regional geologic conditions associated with hydrothermal systems. If the costs of drilling and testing wells can be substantially reduced, much of the 'risk' is mitigated. The other high risk in the geothermal project is a country risk including institutional, legal, policy, political, and economic problems. Therefore, risk sharing by government in the steam field development phase (such provisions exists for geothermal project in other countries) could significantly reduce power prices. Design challenges to minimize capital and operating costs are substantial.

The following strategies illustrate the range of measures that may be taken by the industry to meet these challenges:

- Improve technologies for exploration, detection of fractures and permeable zones, fluid production, and fluid injection;
- Decrease the cost of drilling and completing geothermal wells;
- Improve the cost-effectiveness of energy conversion systems, and reduce plant operation and maintenance costs;
- Decrease the operating time required from exploration to power-on-line;
- Simplify any regulation and permitting issues that have significant impact on the project such as land acquisition and use issues.

3.2 Upgrade the Capability of Efficiently Exploiting the Full Range of Geothermal Resources

Due to technological barriers and the low cost of generating electric power from natural gas, at the present time only the highest grade geothermal resources have been developed for the main Java-Bali grid. High-grade resources are defined as hydrothermal fluids with a combination of high temperature and pressure, low dissolved solids and non-condensable content, and shallow depth. Current economic conditions and shortcomings in technology make it difficult to carry out the exploration required for a continual supply of new high-grade resources.

The following program strategies illustrate the range of measures that may be taken by the industry to meet these challenges:

- Improve the knowledge of the nature and occurrence of Indonesian hydrothermal systems;
- Develop improved geothermal exploration techniques;
- Develop improved techniques for mapping additional high grade resources;
- Update assessments of the geothermal resource base in Indonesia;
- Document exploration successes and failures through case histories;
- Levy polluting industries and use proceeds for geothermal development (pollution tax);
- Involve international lending institutions to support clean energy by setting aside concessional international loans/financing to encourage the geothermal;
- Introduction of appropriate geothermal energy conversion technologies capable of coping with the full range of geothermal resource conditions-e.g. pH modification techniques, binary cycle power plants, and combined cycle power plants.

3. 3 Remove Market Inequities

Significant market inequities exist in developing geothermal energy compared with other forms of energy.

Furthermore, the marketplace gives no credit for non-polluting "green" energy sources. If energy markets truly reflected the value of geothermal energy to society, many more geothermal projects could be carried out economically today, using available technology. Environmental degradation due to energy development and use will continue until energy markets offer equitable credit for non-polluting sources.

The following program strategies illustrate the range of measures that may be taken by the industry to meet this challenge:

- Support tax equity for geothermal projects;
- Include environmental and social externalities in the economics of energy projects with possible emissions
- Broaden the industry base by attracting more companies to geothermal development;
- Encourage a renewable portfolio standard applicable to all generators of electricity;
- Levy polluting industries and use proceeds for geothermal (pollution tax);
- Involve International lending institutions to support clean energy by making available concessional International loans/financing to encourage geothermal.

The strategy is in agreement with the restructuring program to separate the government role of ownership, policy maker and controller to boost transparency while at the same time strengthen the controlling function. The role of ownership, which is in the hand of the State Minister for the Empowerment of State Enterprise, is beginning to be taken over by the newly established Directorate of Electricity Business Supervision. The establishment of an Independent Regulatory Body which will report to the Minister of Mines and Energy but separate from the Director General of Electricity and Energy Development will take place in a following step.

The objective of this new legal framework is to foster:

- The unbundling process;
- Competitiveness among the players;
- Functioning of the Regulatory Body;
- Use of permits as the main controlling instrument;
- The basic principle to determine tariffs and other regulations.

4. STRATEGIC INTENTS

In order to remain competitive in today's business environment and prosper in the future, INAGA is building committed empowered teams to accomplish API mission based on prescribed values.

The organization improves knowledge and expertise through effective networking with companies, government/non-governmental agencies, educational institutions, and professional organizations.

In addition, INAGA facilitates creative business, technology and regulatory solutions that add value in improving the attractiveness and competitiveness of geothermal industry to meet our national goals and to realize opportunities in four key areas:

- Strengthening Indonesia's economic competitiveness;
- Seizing power sector restructuring opportunities;
- Enhancing Indonesia's energy security;
- Protecting the environment for the benefit of our children.

5. PROGESSING TOGETHER WITH THOSE AROUND US

To implement the strategic plan, INAGA has developed four empowered teams: Campaign Team, Information Team, Fund Team, and Core Team. Each Team as an "Empowered Team" has developed and executed its own Team Charter which spells out the objectives, processes, deliverables, measures and action plan.

By implementing INAGA work program around team based approach, INAGA has become the pacesetter within the professional organizations in Indonesia. Other organizations look at INAGA to learn how to integrate quality, people, business, technology and regulatory management processes.

5.1 Campaign Team

In March 30, 1999, the Campaign Team conducted a team building session to ensure team dynamics and strong relationships by defining the team vision, mission, and objectives, and identifying deliverables.

The mission of the team is to effectively campaign on the benefits and the advantages of utilizing the prolific geothermal resource that Indonesia is blessed with. This is to build a public awareness that, if it is properly managed, the geothermal energy is an economically attractive option to meet increasing electricity demand of Indonesia' energy market.

The team understands that dissemination of specific, consistent and reliable information is a key to the campaign success. The products will therefore be based on the results of a thorough review of the available resource data, existing and future government regulations, and business experiences. The information products will mainly serve as a tool to educate public about the geothermal energy.

INAGA thorough the Campaign Team also provides a positive look at the future energy policy that is needed to encourage the development of the geothermal energy. The geothermal energy is not uneconomic to develop and in fact could lead to the setting of reasonable goals for the government and industry to attain. Consequently, it is important to educate the public on the benefits of geothermal energy for future generations.

By working with other teams, Core Team and Info Team, INAGA compiles a list of benefits from the geothermal projects, which include economic benefits for utilizing indigenous non-exportable fuels, and environmentally benign fuel.

Campaign Team together with Info Team has designed an attractive and educational video to explain the benefits of geothermal energy to the public.

5.2 Funds Raising Team

Teamwork meetings kicked-off with a brainstorming session to develop a process list on April 5, 1999. The mission of the team is to gather and manage funds needed for implementing the INAGA work program set for the period 1998-2001. The team vision is to develop an integrated and visible funds raising system, which supplements INAGA assets with external opportunities. The team was not only designed to gather and manage funds but also to develop a fund management system that is transparent, sustainable, accepted, and accessible to all INAGA members.

Similar to Campaign Team, Fund Raising Team works with other teams to inventory INAGA assets that may be useful for INAGA HomePage, Media INAGA, affiliation to IGA, database, and the INAGA members expertise and experience in the industry.

Funds Raising team works to identify potential business and define the fund raising programs from projects specific to the INAGA financial affairs in the three years work program. The team furthermore proactively identifies outside opportunities the organization may exploit in the future.

5.3 Info Team

Info Team kicked-off meeting was held on April 6, 1999. The team, which has a related work objective with the Campaign Team, develops and implements the communication system to all members and external constituents. The team's main mission is to provide INAGA members with utilization of database--information through Internet, HomePage, Website, tape, VCD, magazine/media, bulletin, etc.

Today, there are about two hundred forty (240) geothermal indications of low, medium, and high enthalpy across the country from Sabang (west) to Merauke (east) as indicated by Directorate of Geothermal Survey. To update, deliver, and communicate to the public about Indonesian geothermal resource potential , the team works in synergy together with other teams and external organizations . This team has also improved a compliance information system that supports the other three teams with all members and external community. For educational publications, Info Team together with other three teams disseminates the results through media INAGA published quarterly, Homepage, seminars, and exhibitions of geothermal technology.

5.4 Core Team

Finally, the Core Team that was initiated on the same day as the Funds Raising Team on April 5, 1999, has its main objective to establish geothermal energy as the energy of choice, by optimizing its intrinsic benefits, and proactively provides inputs to Government of Indonesia on the strategic positioning of geothermal development in Indonesia.

The team deliverables include:

- Comprehensive and quantifiable analysis on the intrinsic benefits of geothermal energy (1999 - 2001),
- Comprehensive review of the existing geothermal development legal frame work,
- Draft Government Policy on Geothermal Energy Development & Utilization (1999) – Draft Geothermal Energy Law (2001) – Outline of Draft Government Regulation or Implementation Guidelines (2001),
- Workshop on the geothermal energy positioning in the multi buyer - multi seller era (1999), and
- Benchmarking on the level playing field of total cost of generating power in Indonesia (1999-2000).

This is a long-term program that requires continuous improvement process.

In moving to the next millennium competitive global market place, INAGA operates using a flexible organizational model. The model allows the organization to perform self-evaluation through SWOT analysis, focuses on value delivery system and accountability based on the concept of empowered teams, and ensures every one is involved in goal setting and action planning.

The demand for clean, environmentally friendly and competitive energy is steadily rising after the economic recovery. Geothermal energy is recognized as a choice for energy diversification and for generating electricity in Indonesia. Thus, the development 4,000 megawatts of geothermal electricity by the year 2020 has been proclaimed by the Government, and is being pursued as INAGA target.

6. CONCLUSION

The economic contraction and monetary crisis have placed Indonesia's energy sector, and the electrical power sector in particular, in an extremely difficult situation. The geothermal development in Indonesia has to follow this crossroad of uncertainty through the next few years. The INAGA with all members' support will never give up to remove the barriers through dialogue with all parties. By thinking creatively and encouraging creativity in others, INAGA looks for the "breakthrough" efforts that will propel us ahead to the vision.

Many of geothermal areas along Sumatra, Java, Bali, Little Sunda Islands, Sulawesi and Maluku Islands are covered by fertile soil from volcanic activities but they are undeveloped due to remoteness from urban cities and lack of a supporting infrastructure. Once the infrastructure is developed, people will move in to search for a better life. In fact, geothermal resource development brings multiple benefits not only to the community such as job opportunities, better infrastructure and growth of local economy and welfare but also to the nation's goals of clean environment in the third millennium.

The basic principles of supply and demand suggest that world prices for dwindling fossil fuels will significantly increase in the coming decades. When a region becomes too dependent on fossil fuel, an abrupt change in electricity price due to elimination of subsidy for fossil fuel prices, for example, can cause a significant impact on the entire economy. Therefore, Indonesia needs to have an energy mix to benefit from the clean geothermal energy. Diversification of fuel is a must to assure a stable and economically priced electric power.

INAGA Strategic and Organization Process has a good impact on geothermal members working in the global marketplace. INAGA has integrated modern concepts and total quality management approach to link members' objectives to the National goals. Human resources with proper organizational model are most important factor in sustaining the organization's objectives. In view of the foregoing, INAGA' Vision, Mission, and Values - the set of fundamental principles – INAGA adds value and builds on the right process to strengthen its organization system in enhancing energy security, strengthening economic competitiveness, and addressing concerns on environment.

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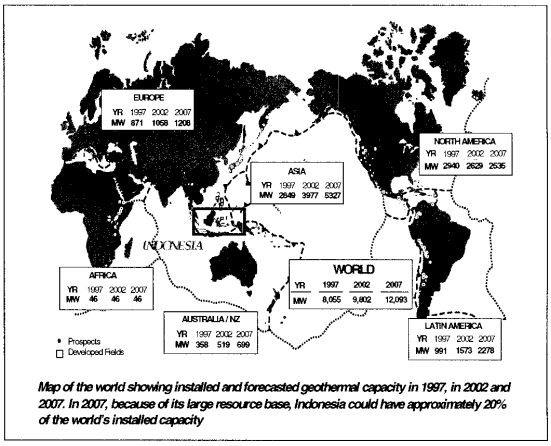
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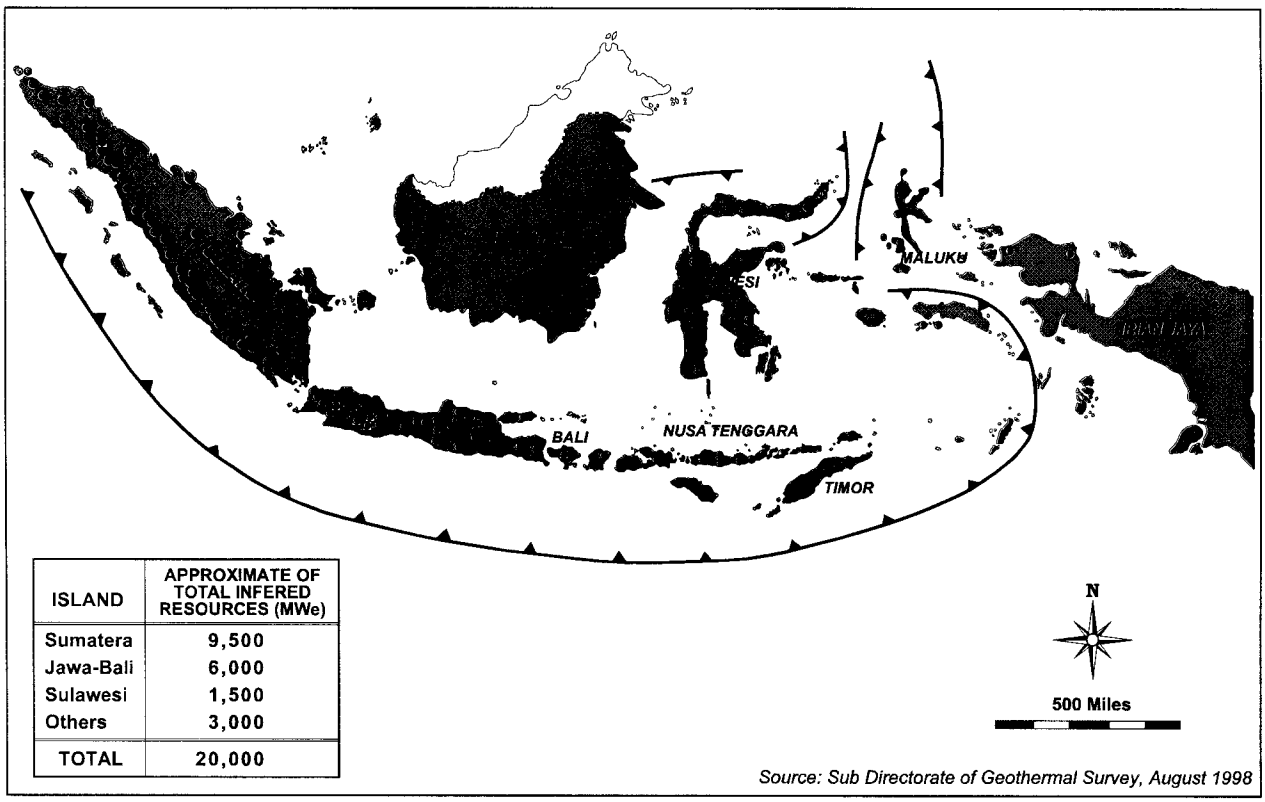
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Figure 1. Worldwide Geothermal Capacity & Indonesia Geothermal Potential



Map of the world showing installed and forecasted geothermal capacity in 1997, in 2002 and 2007. In 2007, because of its large resource base, Indonesia could have approximately 20% of the world's installed capacity



ISLAND	APPROXIMATE OF TOTAL INFERED RESOURCES (MWe)
Sumatera	9,500
Jawa-Bali	6,000
Sulawesi	1,500
Others	3,000
TOTAL	20,000

Source: Sub Directorate of Geothermal Survey, August 1998

Figure 2. INAGA Vision Frame Work

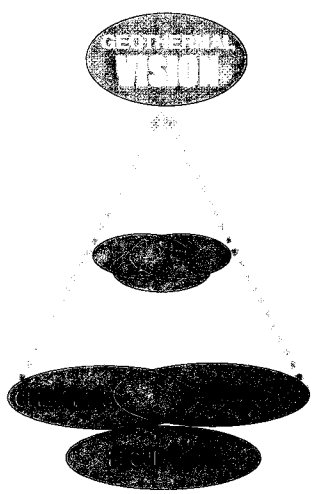
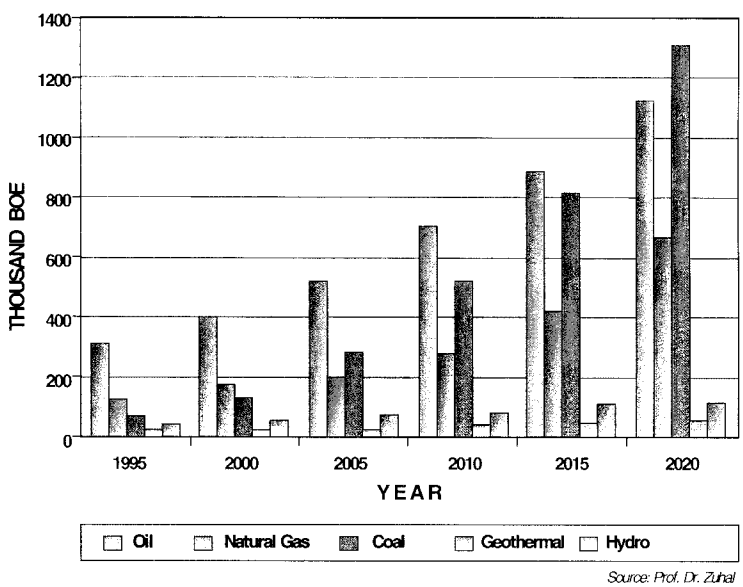


Figure 3. Energy Mix Projection



Source: Prof. Dr. Zuhal

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Figure 4. INAGA Empowered Teams

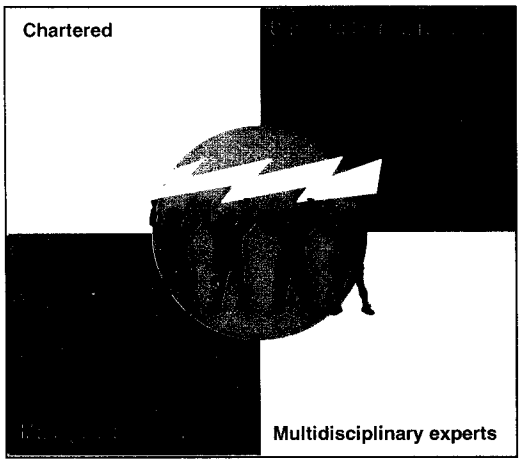
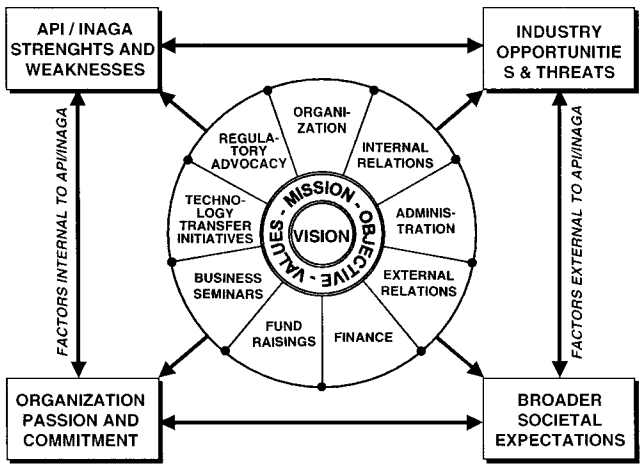
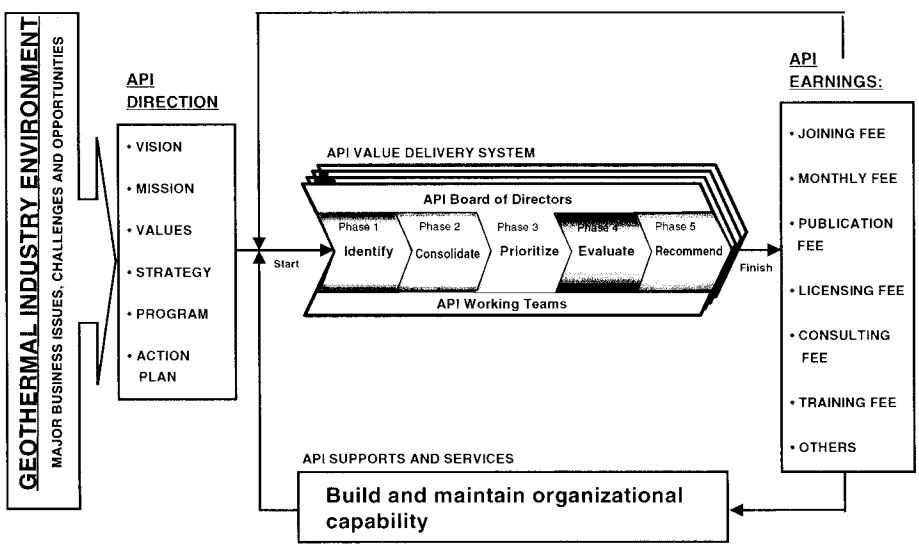


Figure 5. INAGA Organization Model

INAGA Stretegic Model



Work Program Development & Execution Process



How INAGA Top-Down & Bottom-Up Process Works

