INTERNATIONAL COOPERATION IN GEORESOURCES DEVELOPMENT IN INDONESIA

Cooperation and Program Division
Center For Geological Resources
Geological Agency
Ministry of Energy and Mineral Resources
Republic of Indonesia
Outline

- The Organization
- Strategic Plans
- International Technical Cooperation for Enhancing Georesources Development
- Current Status and Challenge
ORGANIZATION STRUCTURE OF
MINISTRY OF ENERGY AND MINERAL RESOURCES
REPUBLIC OF INDONESIA

MINISTER

EXPERT STAFFS

INSPECTORATE GENERAL

SECRETARIAT GENERAL

DIRECTORATE GENERAL OF OIL AND GAS

DIRECTORATE GENERAL OF ELECTRICITY AND ENERGY USAGE

DIRECTORATE GENERAL OF MINERAL, COAL AND GEOTHERMAL

GEOLOGICAL AGENCY

AGENCY FOR RESEARCH & DEVELOPMENT

AGENCY FOR EDUCATION & TRAINING

CENTER OF DATA AND INFORMATION OF ENERGY AND MINERAL RESOURCES

Expert Staffs:
1. Expert in Human Resources and Technology
2. Expert in Economy and Finance
3. Expert in Information and Communication
4. Expert in Regions and Environment
5. Expert in Community and Institutions
GEOLOGICAL AGENCY

TASKS

To implement research and services in geology sector

FUNCTIONS

• To formulate policy in geology sector
• To formulate plan and program in research and services
• To organize and execute research and services
• To perform services in geological survey, and execute research and services in area of geological resources, volcanology, geological hazards mitigation, and environmental geology
• To recommend and provide information of results of the survey, research and services
• To evaluate the implementation of research and services in geology sector
CENTER FOR GEOLOGICAL RESOURCES

TASKS:
To carry out research, investigation, and services in the field of geological resources (oil & gas, coal, peat, oil shale, geothermal and minerals)

FUNCTIONS
• To inventory and explore prospective areas of oil and gas, minerals, coal, peat, oil shale, and geothermal resources
• To carry out research and investigation, thematic mapping, geological modeling and management of lab and survey facilities
• To compose annual balance sheet of geological resources and reserves and provide recommendation for utilization of geological resources
• To develop and manage database and information of geological resources
AREA OF ACTIVITIES OF CGR

• Inventory and thematic mapping of oil and gas, mineral, coal, peat, solid bitumen, and geothermal potential
• Exploration of oil and gas, mineral, coal, peat, solid bitumen, and geothermal
• Production of mineral, coal, and geothermal resources and reserves balance sheet
• Providing recommendation for utilization of georesources potential
• Development and management of database and information in georesources
Mission

• Enhancing inventory of georesources potential
• Improving services on data and information of georesources potential for supporting investment and land use planning
• Encouraging exploration for finding new prospective areas of georesources for sustainable supply of energy and minerals
• Maintaining and developing international cooperation for improvement of knowledge and transfer of technology
• Improving competency of geoscientist through technical training, workshops and exchange of scientist
<table>
<thead>
<tr>
<th>NO</th>
<th>INSTITUTION</th>
<th>AREA OF COOPERATION</th>
<th>PERIOD</th>
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<tr>
<td>1</td>
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<td>2008 - 2013</td>
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<td>BRGM</td>
<td>Geothermal, oil shale and mineral exploration</td>
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<td>CSIRO</td>
<td>Hydrocarbon and CBM Exploration</td>
<td>2008 - 2013</td>
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International Technical Cooperation for Enhancing Georesources Development

Current Status and Challenge
Indonesia-Japan Georesources Cooperation

GA - NEDO : Joint Study on Evaluation of Coal Resources and Reserves in Indonesia (2004 - 2008)

Main Purpose :

- To evaluate Indonesian coal resources and reserves based on unified standard effectively and precisely → Making of reliable digital database and GIS system
- To develop system to utilize the available data in various view points → Development of system which supports from data management to evaluation / utilization stages
# Project Schedule

<table>
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<th>Year</th>
<th>2004</th>
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<td>Coal Data in Kalimantan 110,000Km²</td>
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<td><strong>System Development</strong></td>
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<td>System 2</td>
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Working Flow

Digitalization

Table Data
- Borehole
- Outcrop
- Analysis

Vector Data
- Topography
- Seam Contour

General Data
- Geology
- Mining Concession
- Nature Reserves
- General Data

Basic Database

Table Database
- Borehole
- Outcrop
- Analysis

Vector Database
- Topography
- Seam Contour

General Database
- Geology
- Mining Concession
- Nature Reserves
- General Data

Geological Modeling

Grid Database
- Topography
- Seam Contour
- Isopach

Grid Model
- Coal Thickness
- Ash
- Total Sulphur
- Moisture
- Calorific Value

Evaluation
- Geological Complexity

Calculation
- Resources
- Reserves

Final Database
- Borehole Location
- Borehole Lithology
- Outcrop Location
- Outcrop Lithology
- Quality Analysis
- Correlation Chart
- Topographic Map
- Geological Map
- 3D Bird Eye View
- Seam Contour
- Isopach
- Coal Thickness
- Ash
- Total Sulphur
- Moisture
- Calorific Value
- Resources
- Reserves
- Area Summary
- Data Source
- General Data
Coal Resources and Reserves
(Joint Study, 20 areas, 2007)

- Coal Resources
  - Minable Resources 37,612 M ton
  - Restricted Resources 3,061 M ton
  - Total 40,673 M ton

- Tentative Coal Reserves
  - Open Cut Reserves; (Above SL -100m) 16,546 M ton
  - Underground Reserves; (Below SL -100m) 9,614 M ton
  - Total 26,160 M ton

(20 Areas in South Sumatra Province)
Hard Copy of the Database

Hard Copies of the Sigoyang Benuang Area

Hard Copies of the Database (20 Areas)
Indonesia-Korea Georesources Cooperation

1. GA - KNOC :
   Joint Research on Evaluation of Hydrocarbon Potential in Indonesia

2. GA - KIGAM :
   The Development of GIS for Mineral Potential Mapping in Eastern Indonesia
GA-KNOC Joint Research on Evaluation of Hydrocarbon Potential in Indonesia

History

- The 1st Indonesia-Korea Energy Forum; 25 July 2007
- Concluded MoU; 2 November 2007
- Screened and Selected Research Areas by KNOC and GA; June 2008
- Signing of Joint Research Arrangement; 8 July 2008
Objectives

- Evaluate prospect and hydrocarbon potential in the joint research areas
- Exchange of knowledge and information between KNOC and GA (CGR) through co-research
- Build a capacity of the human resources for understanding hydrocarbon exploration
- Use outcomes for the future potential business projects
WORK PROCESS

Data Gathering

Exploration Data Interpretation

Evaluation of Prospect and Potential

Compiling & Integration of Evaluation

Presentation & Final Report
Research Areas

**WNS1 Area**

- Area: 8,375 Km²
- Location: Offshore
  (West Natuna Sea Basin)

**CSB4 Area**

- Area: 7,120 Km²
- Location: Onshore
  (Central Sumatra Basin)
# Plan of Joint Research (2008~2009)

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<th>Contents</th>
<th>Specifications</th>
<th>Research Schedule (05.1~09.12)</th>
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<td>Collection of G&amp;G Data and Materials (Paper, reports, online service, etc.)</td>
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<td>Purchase of G&amp;G Exploration Data (Seismic &amp; well data, reports, etc.)</td>
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<td>Geophysical Analysis</td>
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<td>Data combined Interpretation</td>
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<td>Structural and Play analysis</td>
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<td>Evaluation of Petroleum System (Source, reservoir, trap, timing, etc.)</td>
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<td>CSB 4</td>
<td>Collection of G&amp;G Data and Materials (Paper, reports, online service, etc.)</td>
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<td>Geophysical Analysis</td>
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<td>Evaluation of Petroleum System (Source, reservoir, trap, timing, etc.)</td>
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<td>Compile and Integration of Evaluation</td>
<td>Developing Prospects and Leads</td>
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<td>Economic Analysis</td>
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<td>Mid-term and Final Reports</td>
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* Work Plan can be adjusted or changed depending on the situations.
Current Situation

Data Gathering

- Regional data
- All the available data from service company system
- Geological, Geochemical and Geophysical reports
- Field work: Central Sumatra Basin (23-30 Oct 2008)
- Laboratory analysis
GA-KIGAM Joint Research on The Development of GIS for Mineral Potential Mapping in Eastern Indonesia

History

- Cooperation research proposed by KIGAM (Dr. Saro Lee) on *The Creation of Mineral Potential Map in Eastern Indonesia* ; September 2006
- The 22nd Meeting of the Indonesia-Korea Joint Committee for Mineral Resources and Energy Cooperation ; Dec. 2006
- Concluded MoU ; September 2007
- Screened and selected research areas by KIGAM and GA/CGR ; September 2007
- Signing of MoU ; 1 April 2008
Objectives

- Conduct activities in the fields of Geographic Information System for mineral potential mapping on the basis of equality, reciprocity and mutual benefit which is enable a two-way flow of knowledge, information and collaboration research.
- Evaluate mineral potential in the Eastern Indonesia using GIS technology by evaluating the spatial relationship between various datasets and generating a mineral potential occurrence map using probability, statistical and data mining models in pilot study areas.
- Produce metallic mineral potential maps in the digital (GIS) based maps for the eastern part of Indonesia, as a guide for next mineral exploration planning.
Scope of Work

- Construction of GIS based database related to mineral occurrences
- Collection and interpretation of satellite images
- Application of probability, statistical and data mining models for creation of GIS based mineral potential maps
- Verification of mineral potential maps for the pilot study areas
- Technical transfer of knowledge through workshops and training
Study Area

Location:
- Gorontalo
- North Sulawesi
Plan of Work

1st Phase (Jan 2008 - Dec 2010)
- Construction of GIS-based database related to mineral occurrences for the pilot study areas
- Collection and interpretation of the satellite images for the pilot study areas
- Application of probability, statistical and data mining models for creation GIS based mineral potential map for the pilot study areas;
- Technical transfer through workshop and training.

2nd Phase (Jan 2011 - Dec 2012)
- Application of probability, statistical and data mining models for creation GIS based mineral potential map for the pilot study areas;
- Verification of the mineral potential map for the pilot study areas;
- Technical transfer through workshop and training;
- Writing report and paper (in English).
Work Flow

Selection of Research Areas

Sulawesi Utara, Gorontalo

Exploring the location of mineral deposits

Secondary data analysis

Creating database based on geochemistry and geophysics maps

Probability Methods
- Likelihood ratio
- Weight of evidence

Statistic Methods
- Logistic regression

Artificial Neural Network Methods

Mineral Potential Map Analysis

GIS

Mineral Potential Mapping

Comparing and verifying mineral potential map and mineral deposit location

Result
Achievement of Project

- A set of database of geology and related data in pilot areas in Indonesia and Korea
- A set of various satellite images of study areas
- Mineral potential map of the pilot areas
- Scientific report and publishing works (in English)
**Current Status**

- Capacity building: GIS training in Korea for 2 GA/CGR staff on 21-26 April 2008
- Transferring and implementing results of training for GA/CGR team; 16-18 June 2008
- Data gathering, extraction, and evaluation; June – September 2008
- GA-KIGAM joint meeting, discussion and training in Bandung, Indonesia; 14-17 October 2008
- Development of GIS database for geological, geochemical and geophysical data, and statistical modelling for making web-based mineral potential maps (June – December 2008)
Indonesia-Australia Georesources Cooperation


- The fields of research will be in the areas of coal bed methane and hydrocarbon resources in Indonesia, in particular, the Ombilin Basin, West Sumatra.

- Main Purpose:
  Advance the understanding of geological processes in the Ombilin basin, in particular with the formation of the tertiary coal bed methane and oil shale resources

- Signing of MoU in CSIRO Sydney, 9 July 2008
METHOD OF STUDY

- Secondary data gathering
- Collection of data and information related to CBM and oil shale on Ombilin area
- Evaluation of data by 2 parties (CGR and CSIRO)
- Primary data gathering
  - Geological field investigation
  - Drilling and geophysical measurement
  - Gas content measurement
  - Laboratory analysis
  - Evaluation
Indonesia-France Georesources Cooperation


- Main Purpose:
  Study on Non-Volcanic Hosted Geothermal System, Lateritic Nickel of the Ophiolite Hosted and Oil Shale Resources in pilot study areas (Sulawesi)

- Signing of MoU in BRGM France, 24 November 2008
Indonesia-Malaysia Georesources Cooperation

GA - JMG : Joint Research on the Investigation of Geological Resources in the Border Areas of Indonesia (Kalimantan) and Malaysia (Sarawak- Sabah) (2008 – 2013)

Main Purpose :

- To conduct evaluation, research and exploration of geological resources in the border pilot study areas between Indonesia and Malaysia
- To develop shared expertise in the identified areas of cooperation

Meeting on Technical Cooperation between JMG Malaysia and GA Indonesia, 17-19 November 2008 in Kuching, Malaysia

- Discussion on the draft of MoU and Arrangement
Indonesia-Japan Georesources Cooperation

GA - JICA : Master Plan Study For Geothermal Power Development In The Republic of Indonesia

Objectives:
- Formulation of the Master Plan for Geothermal power development criteria/priority and plan of each project
- Construction of the Database on geothermal power development: resources, environment and power sector
- Capacity development for the counterpart personnel and experts concerned in Geothermal development
Indonesia-China Georesources Cooperation

Project Formulation:

Visiting China Geological Survey
(24 – 29 November 2008)
- Discuss draft of MoU
- Discuss possible cooperation interest:
  geochemical mapping, digital mapping,
  geodatabase development, applied
  geophysical methods for mineral exploration
CGR to be the leading institute in research, investigation and services in georesources data and information in Indonesia