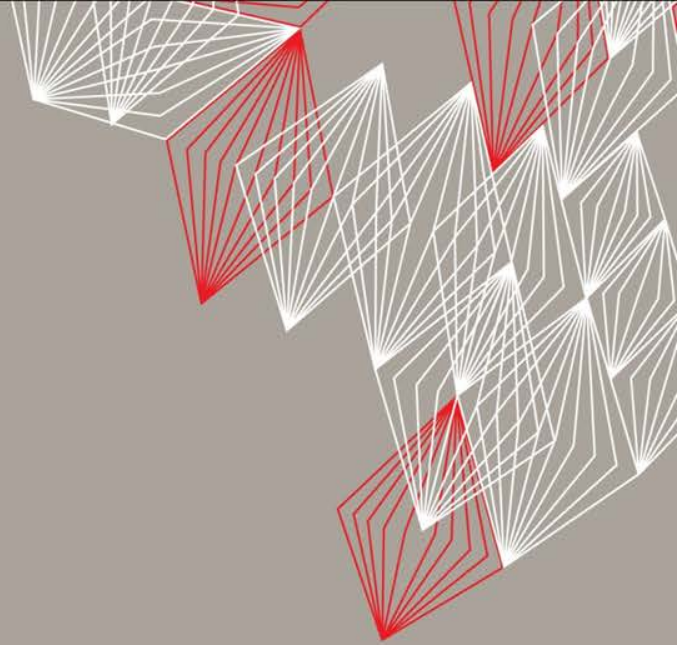
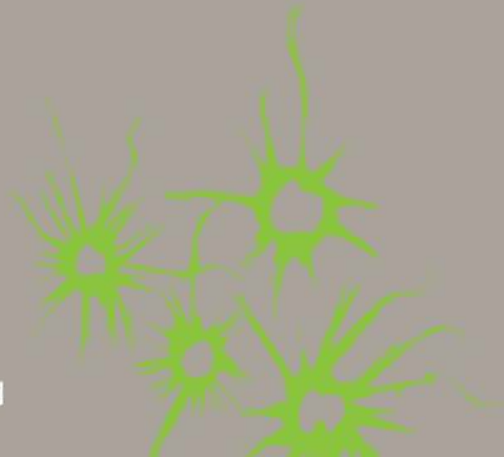


UNIVERSITY OF TWENTE.



FIRST MEETING AND WORKSHOP: GEOTHERMAL CONSORTIUM



FACULTY OF GEO-INFORMATION SCIENCE AND EARTH OBSERVATION



AGENDA

MORNING SESSION

- 9:00 – 9:15 The road to NGCBP and the activities/deliverables in the inception phase
- 9:15 – 10:15 Corporate presentations (max. 10 min per partner)
 - ITC (+Delft University of Technology)
 - ITB
 - Pertamina Geothermal Exploration
 - INAGA
 - If Technology (including WEP, DIAS)
 - FUGRO
 - TNO (including Utrecht University)
 - KEMA
- 10:15 – 10:45 break
- 10:45 – 11:15 Request from BAPPENAS and NGCBP: overview
- 11:15 – 12:00 Detailed discussion on work packages as described in PID



AGENDA

AFTERNOON SESSION

- 13:00 – 15:00 Detailed discussions on work packages as described in PID; cont.
- 15:00 – 16:00 Management structure NGCBP (based on a number of alternative scenarios)
- 16:00 – 17:00 Discussion on specific questions raised by the Netherlands Embassy
- 17:00 any other business
- 17:30 closing

TOWARD THE NATIONAL GEOTHERMAL CAPACITY
BUILDING PROGRAMME





REQUEST FROM BAPPENAS TO NETH. EMBASSY

THE NATIONAL DEVELOPMENT PLANNING AGENCY - BAPPENAS

Proposed Technical Assistance

National Geothermal Capacity Building Program

Directorate for Energy, Mineral Resources, and Mining

14 October 2011

The program objective is to increase the capacity of Indonesia's Ministries, Local Government Agencies, Public and Private Companies and Knowledge Institutions in developing, exploring and utilization of geothermal energy sources, and to assess and monitor its impact on the economy and the environment.



RESPONSE TO THE REQUEST

Project Description - National Geothermal Capacity Building Program

List of Acronyms and Abbreviations

- 1 Introduction
 - 1.1 Background
 - 1.2 Institutional Structure
 - 1.3 Broader context of the project

- 2 The Consortium
 - 2.1 Indonesian Partners
 - 2.2 Dutch partners
 - 2.3 Consortium organization
(including organization, communication, administrative arrangements)

- 3 Objectives and Expected Outputs



SOME CHRONOLOGY

- Visit NL delegation to Indonesia 2009, workshop in NL
- Summer 2011: ITC coordinator role
- November 2011: PID submitted
- Discussion with Netherlands Embassy and Ministry Foreign Affairs
- First part 2012: crises in Netherlands Parliament, elections
- Fall 2012: fine tuning
- 4 April 2013: 'beschikking', contract issued
- Inception phase: 1 September 2013 – report to be submitted
- 3.5 year program



INCEPTION PHASE: DELIVERABLES

- For inception: final report, activity overview, budgeting.
- Workplan for the PPP Geothermal Alliance NGCBP adjusted
- Inventory of the capacity needed
- Sustainability after the program duration



INCEPTION PHASE: ACTIVITIES

- End April: Tom Loran visits all partners in Indonesia
- 14 June: INAGA geothermal conference, first workshop
- First week July: writing session in Netherlands
- Last week August (tentative): Second workshop

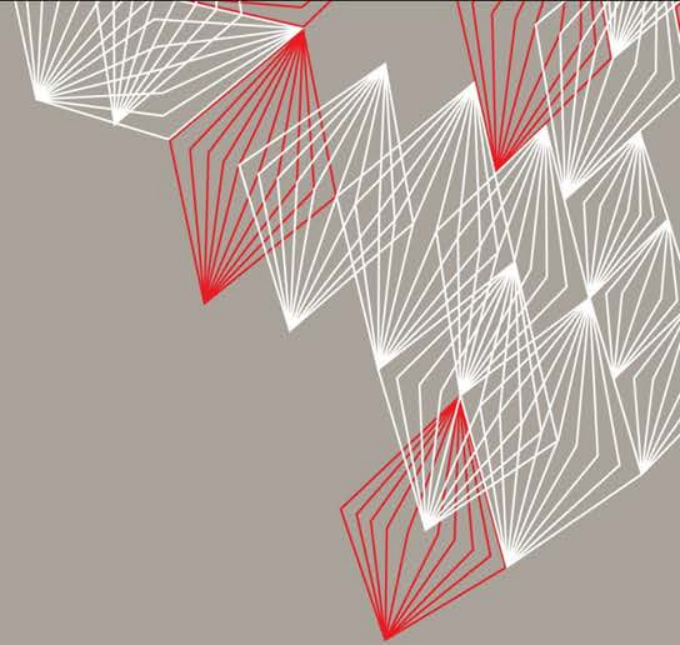


PERFORMANCE INDICATORS: EMBASSY

- The PPP geothermal alliance and the program has to be useful for Indonesia, and
 - it has to fulfill a real and critical need, and
 - there has to be a realistic assessment of the capacity needed,
 - center on the specific added value of the Netherlands expertise
 - sustainable on the longer (post funded) term
 - and beneficial to the Netherlands private sector.
-
- (consider also environmental issues, climate issues etc)
-
- (source: discussion at Royal Netherlands Embassy, 13-6-13)



WORKPLAN NGCBP





NATIONAL GEOTHERMAL CAPACITY BUILDING PROGRAM

Objective of NGCBP:

increase the capacity of Indonesian Ministries, Local Government, Agencies, Public and Private Companies, and Knowledge Institutions in developing, exploring and utilization of geothermal energy resources and to assess and monitor its impact on the economy and the environment

- Required Training Capacity
- Required Research Capacity





MAIN OBJECTIVE NGCBP REQUEST

- Increase capacity of
 - Government (national, local)
 - Companies
 - Knowledge institutions
- to develop, explore, utilize Geothermal Energy Resources
- to monitor impact on
 - economy
 - environment



DRIVERS

- Gov of Ind: Fast Track Energy Program
 - 3.9 GW new geothermal by 2015 (plan: Sep 2010)
 - Through 30% State-owned, 70% private investment
- MEMR “More Energy, less Carbon” initiative
 - 3.9 GW = 24 Mt CO₂
 - 26% less CO₂ than current 2020 predictions
- Indonesia Energy Council: Geothermal 2050 vision (2011)
 - 40% (276 GW) of energy renewable sources by 2050
- 70 staff per MW => 70,000 trained staff per year (based on Fast Track Program plans)



WHAT IS NEEDED?

1) Training Material

- Course and case study material (95 topics)
 - Exploration
 - Exploitation
 - Management
 - Environmental / hazards
- to be used by: Ministries, local government, universities, private sector
- Digital learning environments, APPs



WHAT IS NEEDED? (CONT'D)

2) Research capacity

- Techno-economic risk assessment
- Reservoir modeling
- Drilling data logging and analysis
- Improved exploration methods
- EGS (fracturing and acidization)
- Power plant efficiency



WHAT IS NEEDED? (CONT'D)

3) Geothermal 2050

- Build research capacity
- Joint research
- Joint PhD supervision

4) Low enthalpy

- Potential mapping
- Development planning

5) National geothermal database

- Framework for subsurface data
- Integrate existing DB



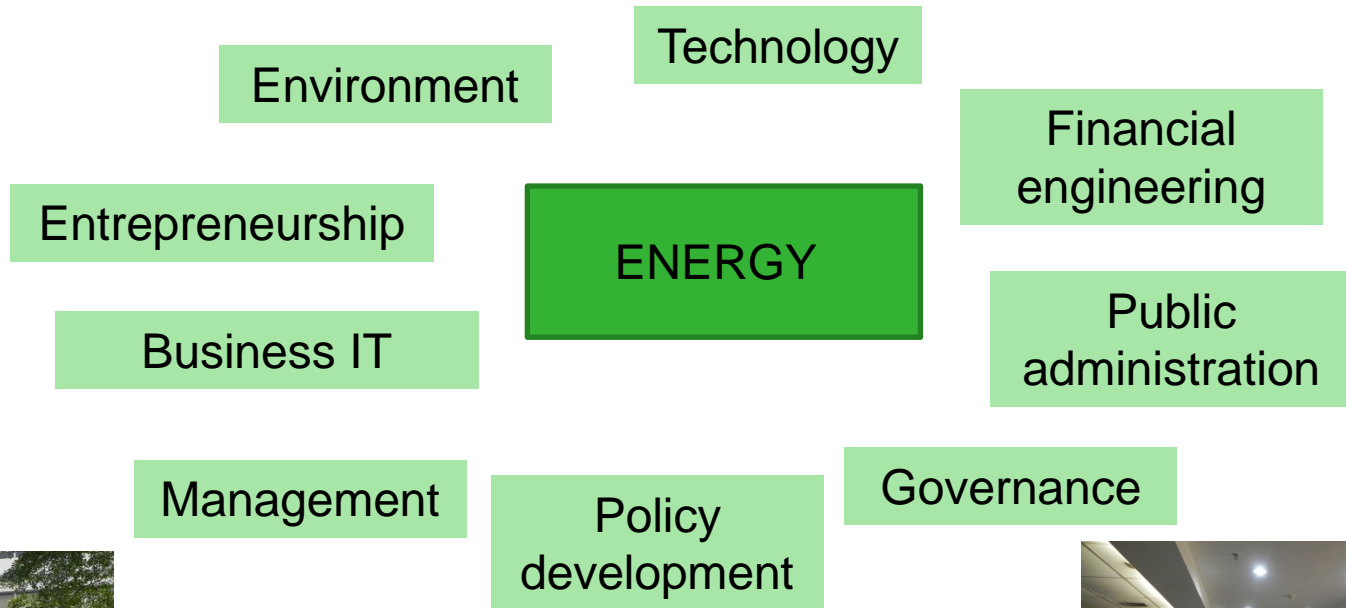
WORK PACKAGES

No	WP Title
WP0	Inception period
WP1	Training
WP2	Techno-Economic Risk
	Assessment
WP3	Geo-Mechanics and Reservoir
	Modeling
WP4	Advanced Geothermal Drilling
	Improvement of Exploration
WP5	Concepts
WP6	Hydro-Fracturing and Acidizing
WP7	Geothermal Power Plant Efficiency
WP8	Efficient Learning
WP9	Geothermal 2050
WP10	Direct Use
	Geothermal Database
WP11	Integration
WP12	Management and Organization



ENERGY

The theme of New and Renewable Energy is looked at from a variety of angles because it is not a technology issue alone



SPECIFIC QUESTIONS RAISED BY THE
NETHERLANDS EMBASSY



SPECIFIC QUESTIONS RAISED BY THE NETHERLANDS EMBASSY

- What and how much capacity is needed?
- How to manage the program?
- How can we involve 17 universities in an effective way?



FTE PER MW GTE

Table 2 : Number of professional personnel (only with a university degree) in the high enthalpy and deep geothermal sector reported in European countries (Bertani, 2010).

Person/year of professional personnel	2000 industry	2000 other	2000 TOTAL	2005 industry	2005 other	2005 TOTAL	2010 industry	2010 other	2010 TOTAL
Albania							11	13	24
Austria				4	1	5	5	2	7
Belarus					3	3			
Bosnia							2	1	3
Croatia	12	6	18	15	3	18	18	4	22
Czech	12	8	20						
Georgia							16	15	31
Greece	30	6	36						
Hungary	17	3	20	27	2	29	38	10	48
Iceland	74	38	112	78	39	117	130	81	211
Irish				10	3	13	30	15	45
Italy	110	55	165	88	25	113	62	25	87
Lithuania	9	6	15	19	9	28	30	9	39
Norway				1	4	5	10	2	12
Poland	12	5	17	65	25	90	50	25	75
Portugal				5	10	15	15	11	26
Romania	25	12	37	21	14	35	30	14	44
Russia	75	80	155						
Serbia					2	2	1	3	4
Slovak	12	4	16	13	4	17	20	9	29
Slovenia	7	1	8	8	2	10	12	1	13
Spain				4	3	7	8	2	10
Sweden							2	5	7
Switzerland	6	6	12	8	5	13	18	6	24
Turkey	50	70	120	62	83	145	37	46	83
United Kingdom				5	1	6			
TOTAL	451	300	751	433	238	671	545	299	844

Iceland: 400MWe = 0.5 academic personnel FTE per MWe.

