



# Global Geothermal Development Plan

## De-Risking Exploration to Scale-up Geothermal Energy

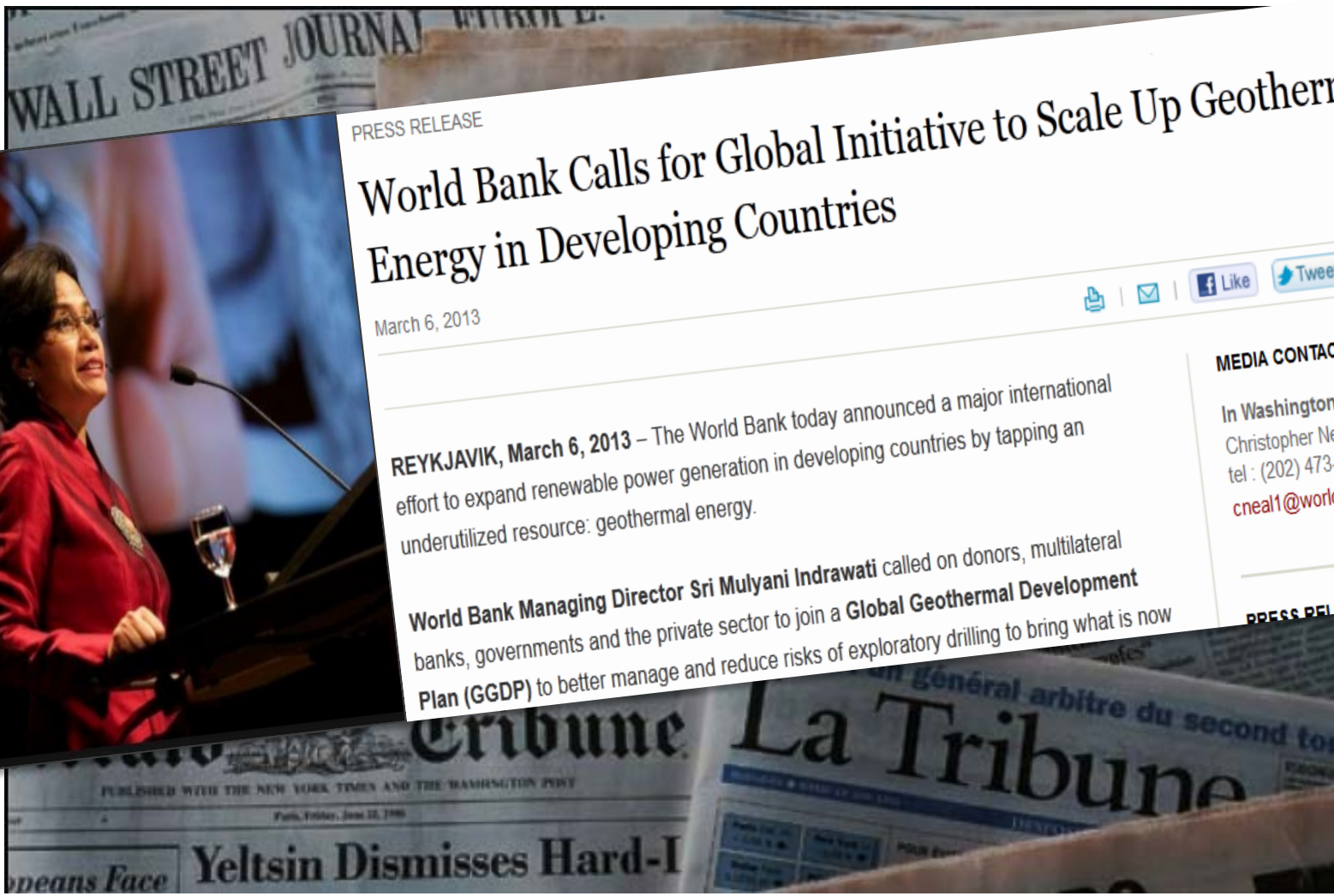
### Roundtable 3, Reykjavik, April 25-26, 2016

Pierre AUDINET, PhD  
*ESMAP*





# THE **GLOBAL GEOTHERMAL DEVELOPMENT PLAN** IS BORN, TO HELP DEVELOP GEOTHERMAL ENERGY, A LOW COST, DISPATCHABLE SOURCE OF ELECTRICITY



PRESS RELEASE

## World Bank Calls for Global Initiative to Scale Up Geothermal Energy in Developing Countries

March 6, 2013



REYKJAVIK, March 6, 2013 – The World Bank today announced a major international effort to expand renewable power generation in developing countries by tapping an underutilized resource: geothermal energy.

World Bank Managing Director Sri Mulyani Indrawati called on donors, multilateral banks, governments and the private sector to join a **Global Geothermal Development Plan (GGDP)** to better manage and reduce risks of exploratory drilling to bring what is now

### MEDIA CONTACTS

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PRESS RELEASE NO:



# GLOBAL GEOTHERMAL DEVELOPMENT PLAN ADDRESSED A MARKET FAILURE, UNLEASHING INVESTMENT

1

**GLOBAL  
RECOGNITION  
OF PUBLIC  
FUNDING'S  
IMPORTANCE**

2

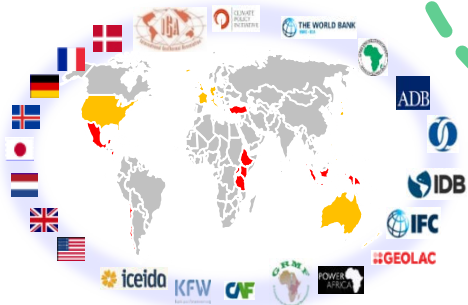
**LENDING  
OPERATIONS  
AND ASSISTANCE  
TO ALL MAJOR  
GEOTHERMAL  
DEVELOPING  
COUNTRIES**



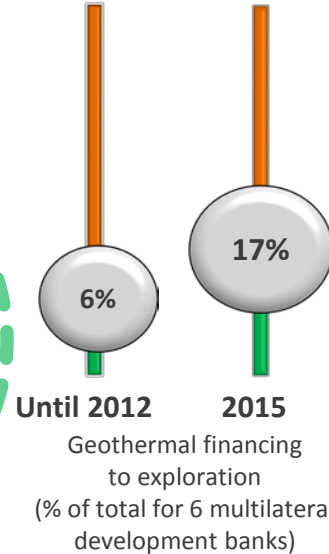
\$250 million concessional finance raised

>\$1.5 billion public and private capital leveraged

\*minimum estimate



Tripling in share of multilateral financing



**Investments:**  
*Armenia  
 Djibouti  
 Chile  
 Colombia  
 Dominica  
 Fiji  
 Indonesia  
 Kenya  
 Mexico  
 Nicaragua  
 St Lucia  
 Tanzania  
 Turkey*

### Partnerships for Investment and Knowledge Dissemination

- Reducing Drilling Risk course (World Geothermal Conference 2015)
- Definition of Global Standards for Geothermal Resource Classification
- Geothermal Resource Risk Mitigation Mechanisms report
- Greenhouse Gases and Geothermal Utilization guidance note
- Global Geothermal Development Plan Roundtables (The Hague, Copenhagen, Reykjavik)





# LESSONS FROM THE GLOBAL GEOTHERMAL DEVELOPMENT PLAN

- **Lessons #1:** *Scaling-up geothermal energy requires **long term commitment** from all stakeholders, no quick gains*
- **Lesson #2:** *Geothermal energy development requires **public intervention** to absorb part of the resource risk*
- **Lesson #3:** *There are different ways of structuring this public intervention, but some ways are better than others at **scaling-up** geothermal energy*
  - Cost sharing of geothermal exploration drilling
  - Initial public investments in exploration drilling

# Annex slides

**1950-2015: +13 GW installed globally, in 65 years**

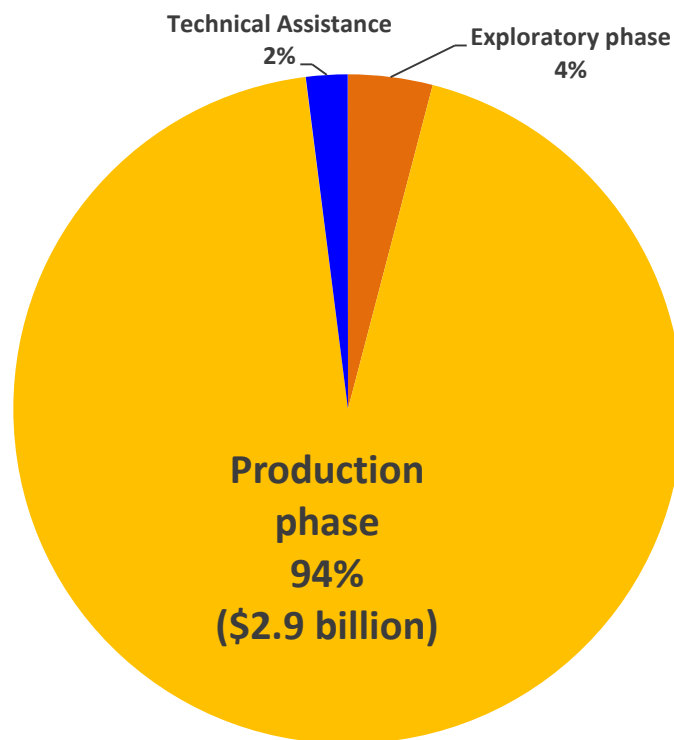
**Scaling up geothermal energy requires a different approach**

Current (2015)	Scenarios	2020 TWh (GW)	2040 TWh (GW)	2015-2040 Increment (GW)
73.5 TWh (12.5 GW)	Current Policies	113 (17)	378 (42)	<b>+30</b>
	New Policies	120 (18)	378 (56)	<b>+43</b>
	450 Scenario	121 (18)	557 (81)	<b>+68</b>

Sources: IEA, *World Energy Outlook 2014*; R. Bertani, *WGC 2015*

# 1977-2012: Multilateral Development Banks financed geothermal but focused disproportionately on above the ground infrastructure

**\$3 billion lending over 1977-2012**  
**94% for above-the-ground geothermal infrastructure**



# ARMENIA



## *Geothermal Exploratory Drilling Project*

**Project Name:** *Geothermal Exploratory Drilling Project*

**Site:** Karkar

**Volume of financing:** US\$10.7 million (SREP through World Bank, Government of Armenia)

### **Type of intervention:**

- Exploratory drilling of 1 or 2 wells
- Transaction support

### **Progress/timeline:**

- Effective in Q3 2015
- Preparation of access road and drill site underway
- Procurement of drilling contractor in final stages
- Drilling scheduled to take place in summer 2016



# CHILE

## *TA for Sustainable Geothermal Development (WB) Geothermal Risk Mitigation Program (IADB)*



**Site:** Not site specific

**Volume of financing:** US\$53 million (CTF and World Bank-ESMAP)

### **Type of intervention:**

- TA: (i) Improve policy framework and strengthen management capabilities for mobilizing investments in geothermal, and (ii) Enhance market conditions for promoting sustainable development of the sector
- IL: concessional risk mitigation support for projects that have completed some exploration drilling to advance with additional drilling and plant construction before they can access commercial debt financing

### **Progress/timeline:**

- TA: CTF Board approval expected in Q2 CY16
- IL: Under implementation

# DJIBOUTI

## *Geothermal Power Generation Project*



**Site:** Lake Assal

**Volume of financing:** US\$31.2 million (World Bank along with 7 co-financiers)

### **Type of intervention:**

- Exploration drilling of 4 wells
- Technical Assistance

### **Progress/timeline:**

- All tenders for large procurement packages have been launched and are in advanced stages of completion, e.g. steel materials (wellheads and casing) and civil works
- Pre-qualification for Drilling Service Company (DSC) contract has been completed and the bidding documents will be launched shortly
- Drilling is expected to start by end of 2016.

# INDONESIA



## *Geothermal Energy Upstream Development Project*

**Site:** Eastern Indonesia

**Volume of financing:** Plan for US\$104 million for Phase 1 (Government of Indonesia through PT Sarana Multi Infrastructure, CTF, GEF); potential \$300 million for Phase 2 (IBRD)

### **Type of intervention:**

- Revolving Risk Sharing Mechanism for exploration drilling (funds to flow back from developers that have secured financing for post-exploration drilling)
- Technical assistance and capacity building for exploration and tendering program
- Phase 2: financing for steam field development

### **Progress/timeline:**

- CTF support of \$49 million approved by CTF Board on March 8, 2016. GEF and WB approvals expected before end of 2016
- Implementation expected to start in early 2017

# NICARAGUA



## *Geothermal Resource Risk Mitigation Project*

**Site:** Casita-San Cristobal

**Volume of financing:** Plan for US\$115.5 million (World Bank-IDA and SREP together with private financing)

### **Type of intervention:**

- Public Support to leverage private risk capital for Exploration Drilling and Resource Confirmation
- Facilitate and speed up financial closure for development of steam field and power plant (35 MW)

### **Progress/timeline:**

- Under preparation
- Implementation expected to start Q2 2017

# ST LUCIA

## *Geothermal Resource Development Project*



**Site:** Soufriere

**Volume of financing:** US\$3.4 million (GEF, SIDS-DOCK)

### **Type of intervention:**

- Upstream geothermal development preparation and project management
- Transaction and regulatory support to Ministry of Sustainable Development, Energy, Science & Technology

### **Progress/timeline:**

- Under implementation since Q3 2014
- MT tests completed, LiDAR Survey contract awarded
- Technical Coordinator contracted; selection of Global Expert underway
- Transaction support ongoing

# TURKEY



## *Geothermal Development Project*

**Site:** Not site specific

**Volume of financing:** Plan for US\$352 million (CTF and World Bank, along with Turkish Banks)

### **Type of intervention:**

- Risk Sharing Mechanism for Resource Confirmation implemented by Ministry of Energy and Natural Resources. Partial cost coverage for failed confirmation wells.
- Loan Facility for Resource Development. Credit lines for two local banks to finance capacity drilling and power plant construction

### **Progress/timeline:**

- Under preparation
- Implementation expected to start in second half 2016



# GGDP TECHNICAL ASSISTANCE



## KENYA

Preparation of National Geothermal Strategy



## TANZANIA

Planning of Exploration Drilling Planning and Safeguards Work at Ngozi



## FIJI

Pre-feasibility study and roadmap for development of geothermal power in Vanua Levu

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Thank You.

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