



GGDP ROUNDTABLE

THE HAGUE, NOVEMBER 19-20, 2013

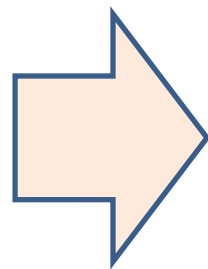
Global Geothermal Development Plan

Pierre AUDINET, PhD, Clean Energy Program Team Leader, ESMAP – World Bank



Geothermal Energy Market

2011 (TWh)	2035 (TWh)		
	Scenarios		
Actual	No new Policies	New Policies	450 Scenario
69	142	299	436
CAAGR (%)	+4.9	+6.3	+8.0
0.3% of world supply		0.8% of world supply	



Source: IEA, *World Energy Outlook 2013*.

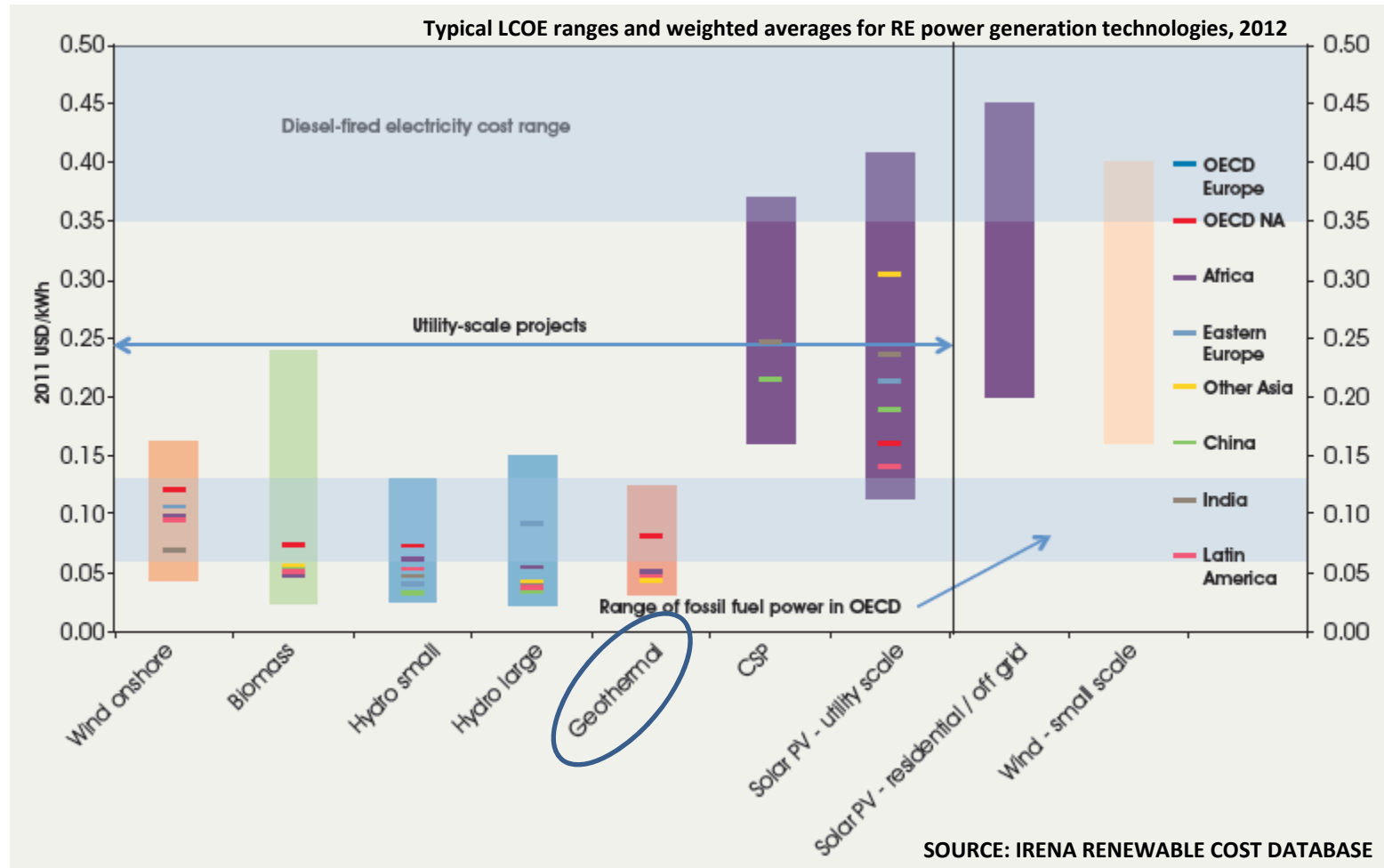
Geothermal electricity generation projected to almost triple (when total electricity generation does not even double) reflects change in sector priorities:

- Access
- Dispatchability
- Energy security
- Environment

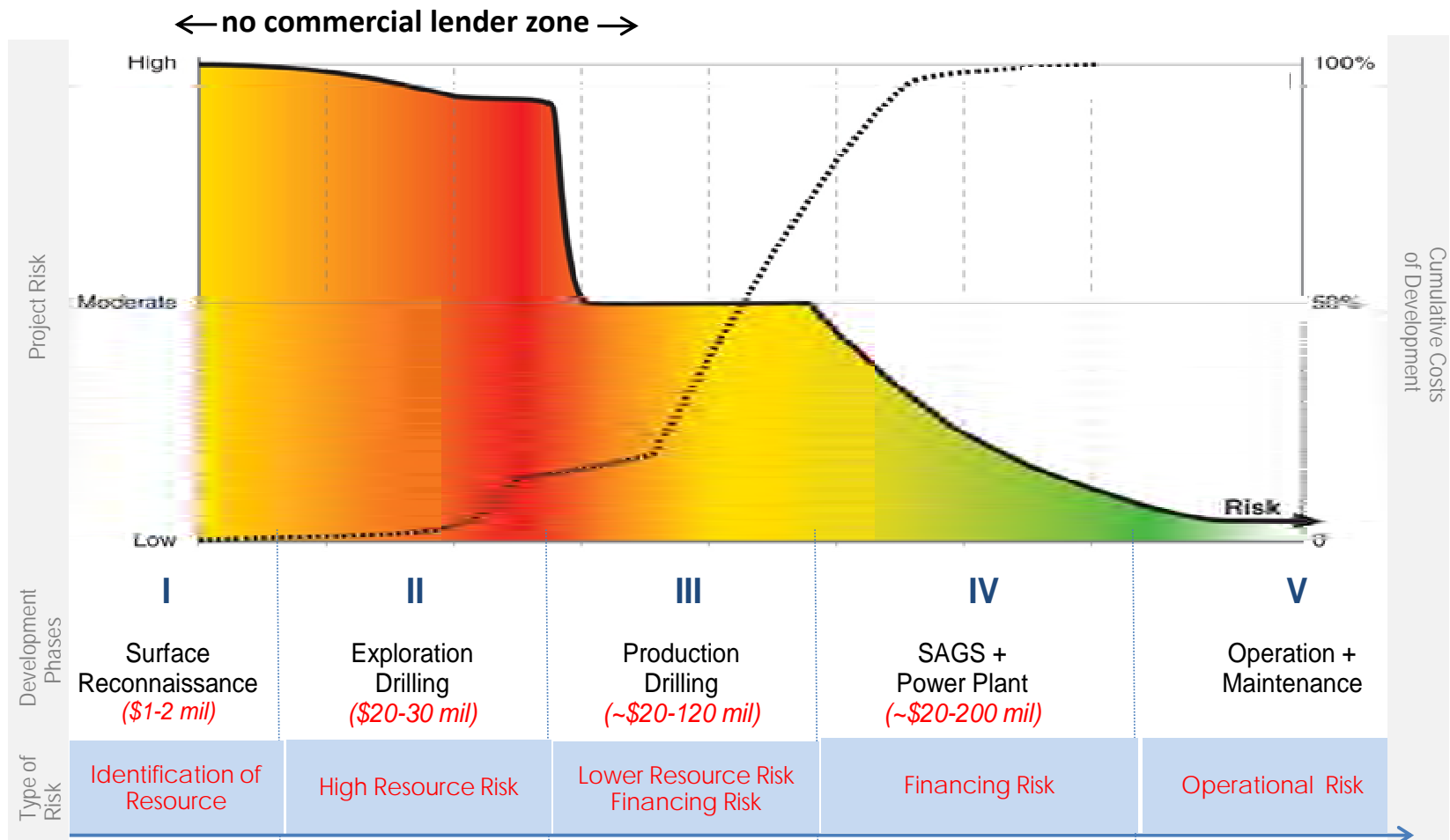
Today: 11GW

Additional Capacity 2013-2035 (GW)	+42
OECD	+24
NON-OECD	+18
Eastern Europe / Eurasia	+3
Asia	+11
Africa	+2
Latin America & Caribbean	+2

Geothermal electricity is often economically viable

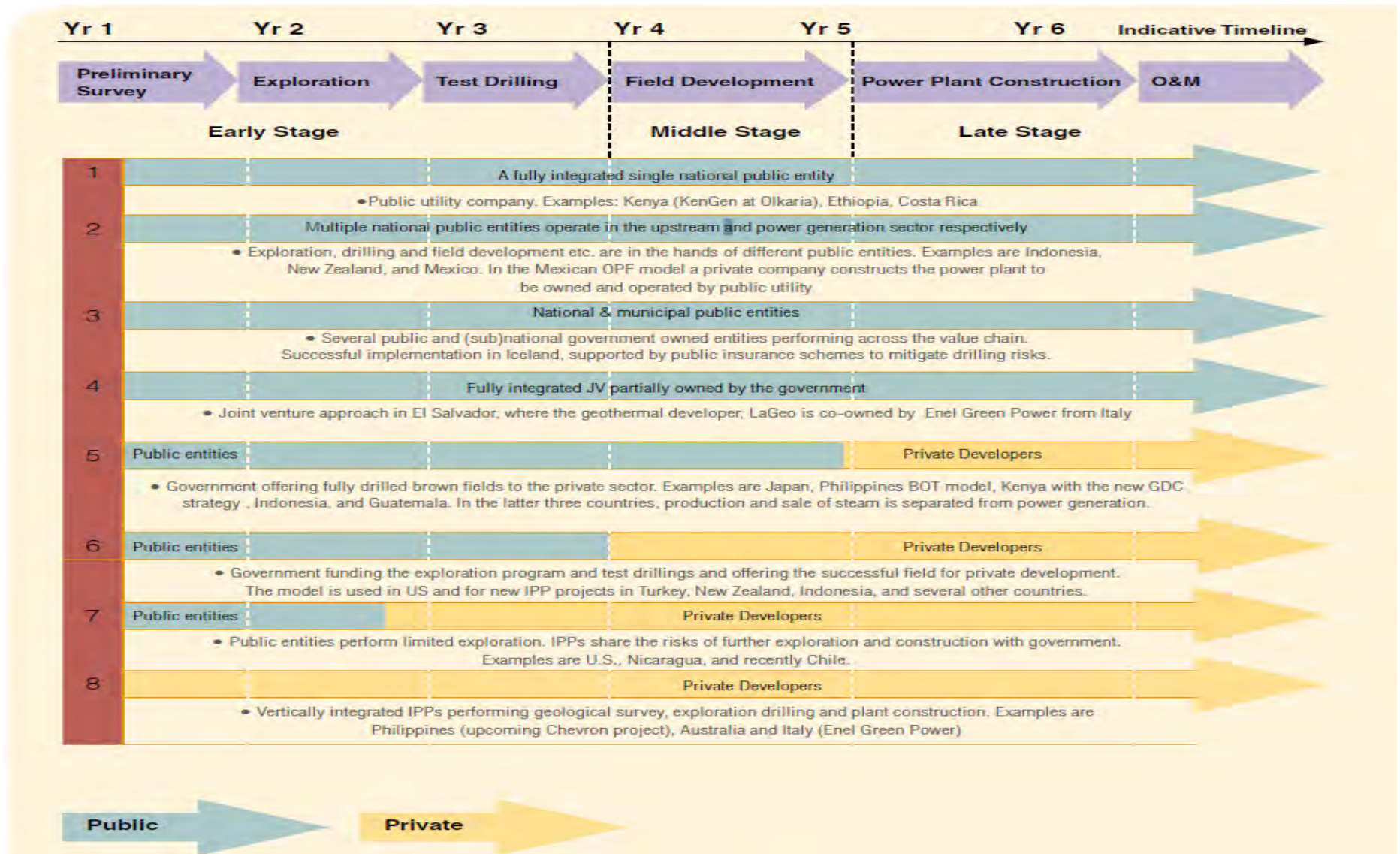


Geothermal has a unique risk profile



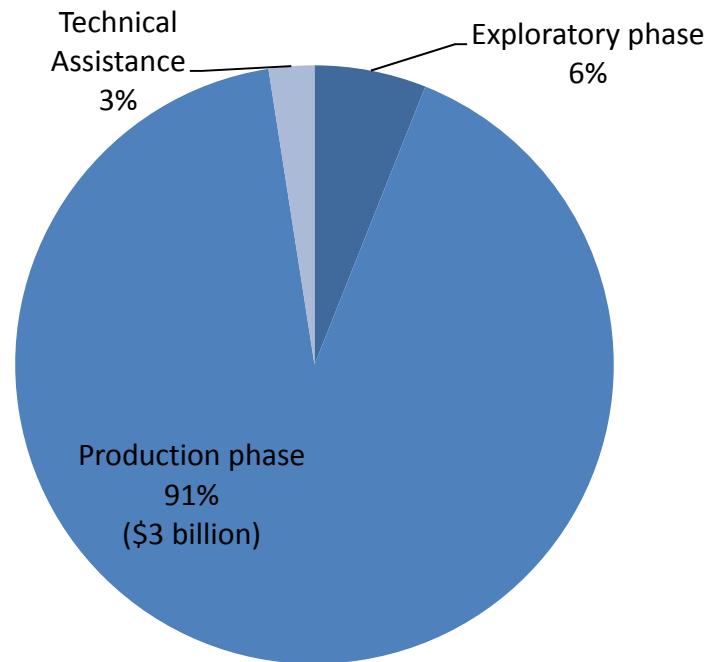
From Capital Ownership to Regulatory Incentives

Strong Role of Governments to Share Risk



Multilateral Development Banks have not traditionally focused on mitigating resource risk

CUMULATIVE MDB LENDING FOR GEOTHERMAL DEVELOPMENT
(1977 – present)



Global Geothermal Development Plan

- Bring together donors and multilateral lenders around an investment plan to scale up geothermal power in the developing world.
- The Plan focuses on mitigating the resource risk through support to exploratory test drilling
 1. Knowledge dissemination
 2. Concessional capital mobilization
 3. Project pipeline development



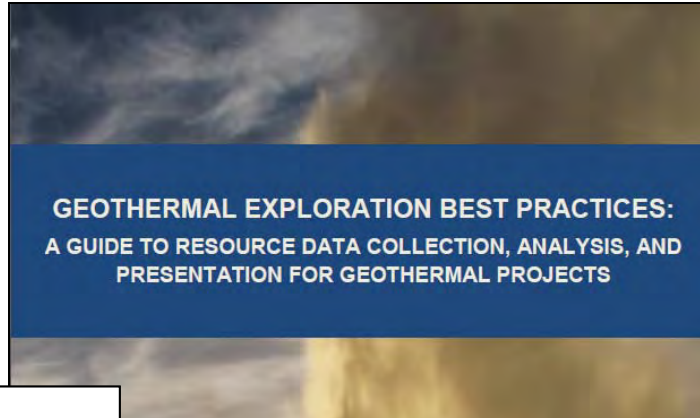


TECHNICAL REPORT 002/12

GEOHERMAL HANDBOOK: PLANNING AND FINANCING POWER GENERATION

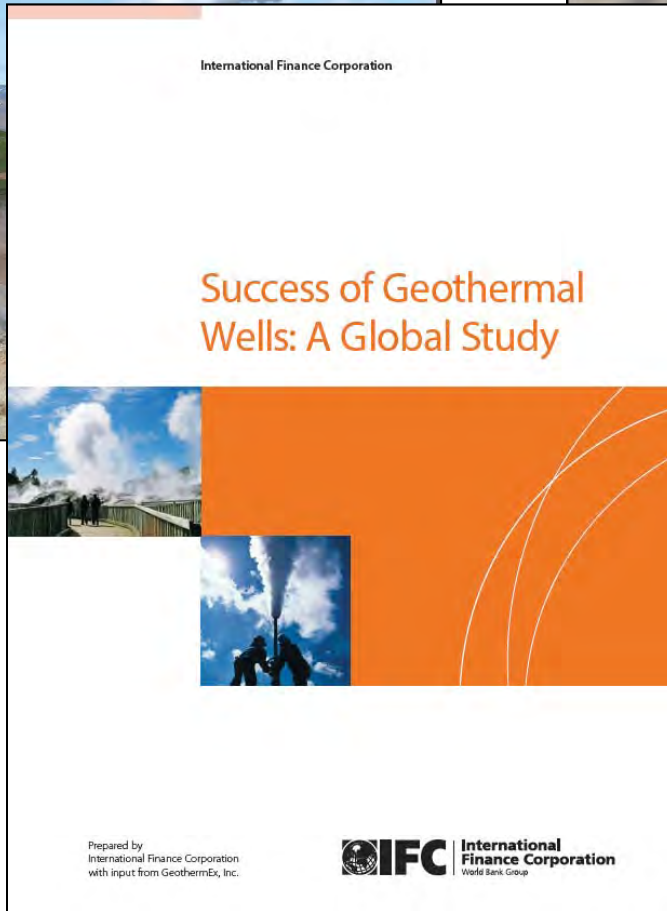


GEOHERMAL EXPLORATION BEST PRACTICES: A GUIDE TO RESOURCE DATA COLLECTION, ANALYSIS, AND PRESENTATION FOR GEOHERMAL PROJECTS



International Finance Corporation

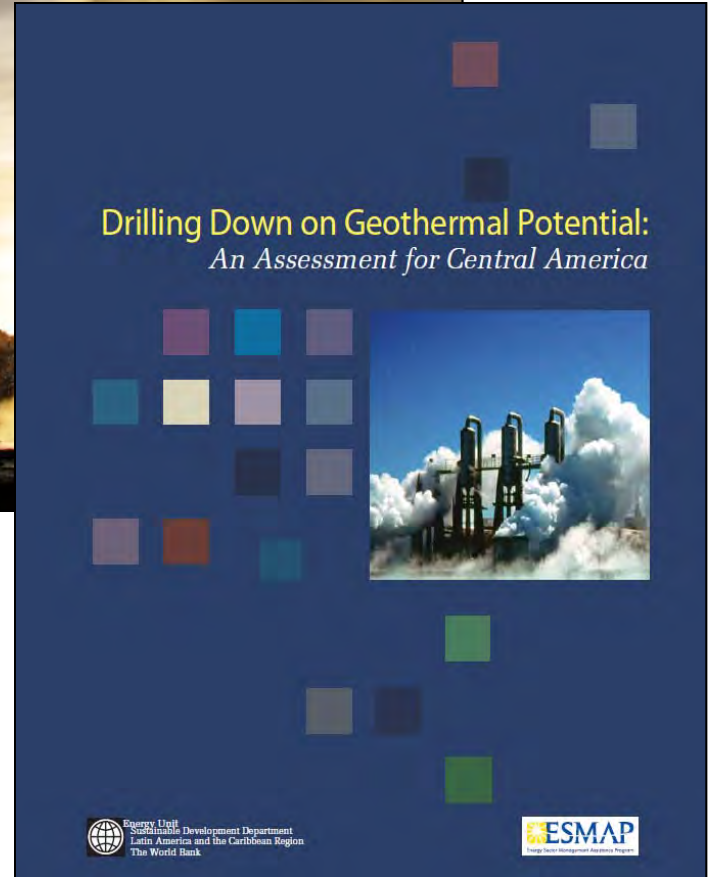
Success of Geothermal Wells: A Global Study



Prepared by
International Finance Corporation
with input from GeothermEx, Inc.



Drilling Down on Geothermal Potential: *An Assessment for Central America*



Energy Unit
Sustainable Development Department
Latin America and the Caribbean Region
The World Bank



Concessional Funding Mobilization

CTF Dedicated Private Sector Program for Utility-Scale Renewable Energy

Technology

GEOHERMAL

Funding

\$115 million

Focus

Addressing resource risk by supporting drilling and other resource validation expenditures by facilitating private sector engagement in early development phases

Eligible countries

CTF – Turkey, Chile, Mexico, Indonesia (based on readiness)

Additional countries

Depending on additional pledges by donors – possible expansion to other CIF countries

APPROVED
Oct. 28, 2013

Indicative List of Geothermal Fields Technically Ready for Exploratory Drillings

	<i>Country</i>	<i>Sound surface exploration but no exploration drilling</i>		<i>Country</i>	<i>Resource confirmed by exploration drilling</i>
1	Kenya	Longonot	1	Kenya	Olkaria
2	Kenya	Silali	2	Ethiopia	Aluto-Langano
3	Ethiopia	Corbetti	3	Argentina	Copahue-Caviahue
4	Colombia	Volcan macizo ruiz	4	Bolivia	Sur Lopez/Sol de Mañana / Laguna Colorada
5	Guatemala	Zúnil II	5	Chile	Puchuldiza
6	Mexico	Nuevo Leon Ejido	6	Chile	Tinguiririca
7	Nicaragua	Volcan Telica - El Najo	7	Chile	Laguna del Maule
8	Nicaragua	Volcan Casita - San Cristobal	8	Chile	Tolhuaca
9	Montserrat	Soufrière Hill	9	Costa Rica	Borinquen
10	Turkey	Aydin-Umurlu	10	El Salvador	Chinameca
11	Turkey	Denizli-Tekke Hamam	11	Guatemala	Cerro Blanco
12	Turkey	Manisa-Salihli	12	Dominica	Wotten Waven
13	Indonesia	Tulehu	13	Saint Kitts & Nevis	Charlestown
14	Indonesia	Sokoria Flores Island	14	Turkey	Manisa-Alasehir
16	Philippines	Batong-Buhay, Kalinga	15	Indonesia	Matalako Flores Island
17	Philippines	Mabini, Batangas	16	Philippines	Mt. Cagua-Baua, Cagayan
18	Philippines	Montelago, Mindoro Oriental	17	Philippines	Daklan, Benguet
			18	Philippines	Mt. Natib, Battan
			19	Philippines	Mt. Labo, Camarines Norte
			20	Philippines	So. Leyte
Africa					
Latin America and the Caribbean					
Eastern and Central Europe					
Southeast Asia					

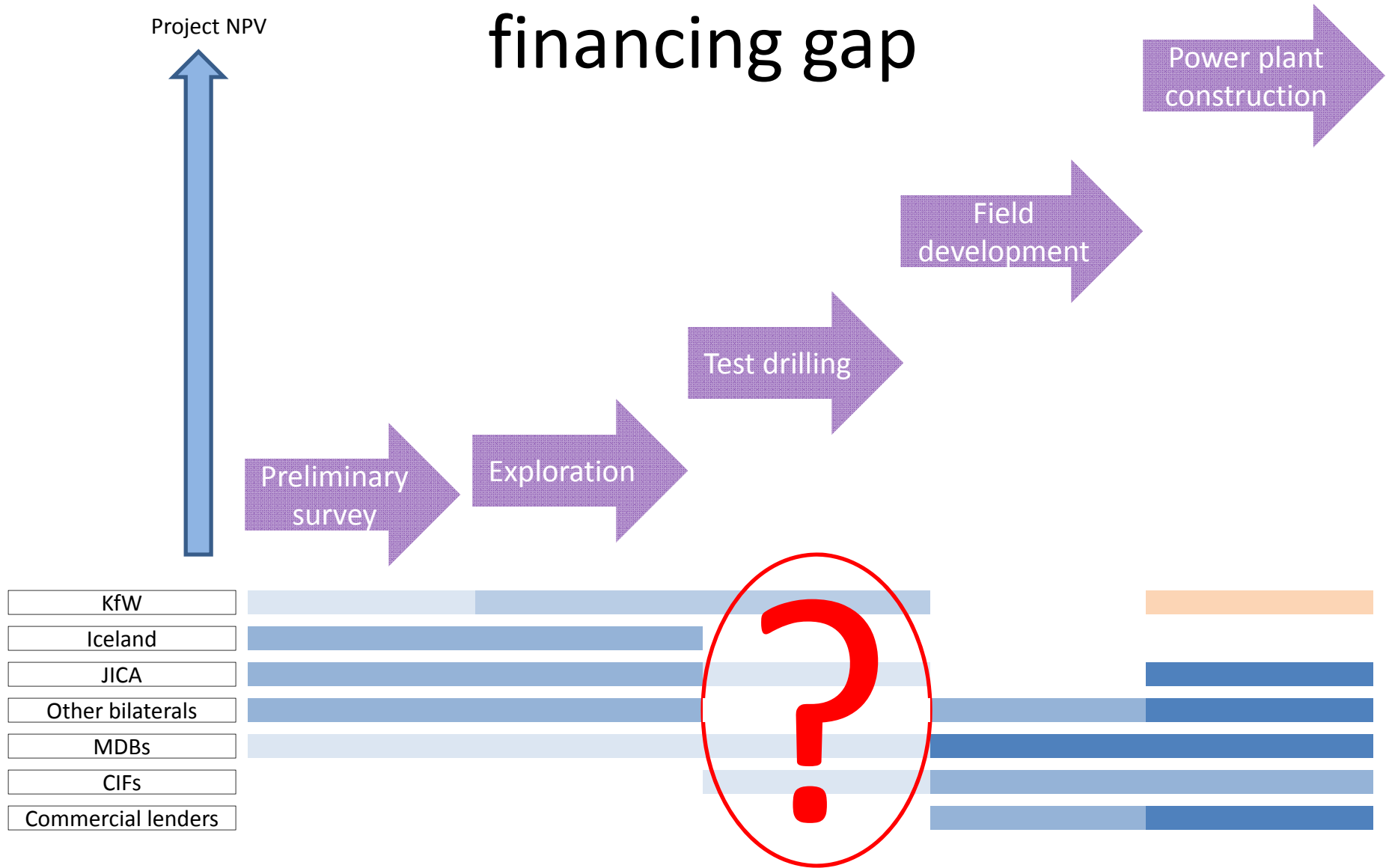
Source: ISOR for ESMAP, 2013

ESMAP Technical Assistance for GGDP (Pipeline Development)

Region	Country	Scope of support
Latin America	Regional	<ul style="list-style-type: none"> Activities to raise overall awareness regarding geothermal resource risks and the challenges related to early stage development Project identification and preparation (2-3 projects)
Eastern Europe and Central Asia	Armenia	<ul style="list-style-type: none"> Recommendations for design of potential test drilling project at the Karkar geothermal site (well location, well design, costing, contract management structure, tender documents)
	Turkey	<ul style="list-style-type: none"> Recommendation of options for scaling-up geothermal test drilling activities Identification of options for new support by international financing institutions to the GoT and geothermal concessions' title holders to accelerate test drilling activities
Africa	Ethiopia, Kenya, Tanzania, Rwanda	<ul style="list-style-type: none"> Scoping out options for support to governments or private sector to enhance commercial viability of geothermal prospects
	Djibouti	<ul style="list-style-type: none"> Co-financing for Geothermal Power Generation Project: inspection and testing or reservoir flow rates for 4 test wells in the Fiale Caldera of Lake Assal

+ Capacity Building: support from **Netherlands**

Designing solutions to bridge the financing gap



Examples of Current Donor Support for Exploratory Drilling

Donor	Region/ country	Instrument	\$ million	Status
KfW – GRMF (EU, BMZ)	East Africa	Grants to developers for cost-sharing	71	1 st round of applications
KfW - CAF	Latin America	Multiple (grants for cost-sharing, loans for direct financing, etc.)	?	Concept
WBG (IFC) – Geofund (GEF)	Turkey	Exploration risk insurance	10	Implementation
IDB (CTF)	Mexico	Undefined Risk Mitigation Instrument	34.4	Funding approved - preparation
IDB (CTF)	Chile	Undefined Risk Mitigation Instrument	30	Funding approved - preparation
CTF	Global	Dedicated Private Sector Program – Instruments Undefined	115	Funding approved
WBG (IDA), JICA	Ethiopia – Aluto Langano	Soft loan to government	30	Implementation
AfDB, AFD	Kenya - Menengai	Grant + soft loan	?	Implementation
WBG (IDA), AfDB, OFID, AFD, GEF, ESMAP	Djibouti – Lake Assal	Grant + soft loan	31	Implementation