

# Knowledge Exchange Forum

## Global Geothermal Development Plan: Roundtable 2

UN CITY / COPENHAGEN



/ OCTOBER 23–24 / 2014



# GLOBAL GEOTHERMAL DEVELOPMENT PLAN: ROUNDTABLE 2

**The Global Geothermal Development Plan (GGDP)** is an initiative led by ESMAP in collaboration with bilateral and multilateral funding institutions to develop a series of investments and to mobilize concessional funding for exploratory drilling and scale-up geothermal energy development for power generation.

Following-up on the First GGDP Roundtable held in The Hague in November 2013, this Second GGDP Roundtable provides a platform for representatives of governments, development institutions, industry, public and private developers, and sector experts to discuss challenges and solutions for developing geothermal projects, with a focus on the exploration phase.

The GGDP Roundtable 2 will explore specific topics such as best practices in geothermal exploration data management and will discuss lessons learnt from various geothermal risk mitigation options. The Roundtable 2 will also host the Geothermal Energy Dialogue, a one-day session organized by the Climate Investment Funds with the Climate Policy Initiative to explore financing options for geothermal investments, through specific case studies.

The Roundtable 2 is organized by ESMAP in partnership with the Climate Investment Funds and the Climate Policy Initiative, and with the support of UNEP-DTU and the Danish Ministry of Foreign Affairs.

## ESMAP MISSION

The Energy Sector Management Assistance Program (ESMAP) is a global knowledge and technical assistance program administered by the World Bank. It provides analytical and advisory services to low- and middle-income countries to increase their know-how and institutional capacity to achieve environmentally sustainable energy solutions for poverty reduction and economic growth. ESMAP is funded by Australia, Austria, Denmark, Finland, France, Germany, Iceland, Lithuania, the Netherlands, Norway, Sweden, and the United Kingdom, as well as the World Bank.



TIME	SESSION	PARTICIPANTS
08:00	REGISTRATION	
09:00	WELCOME ADDRESS	Ministry of Foreign Affairs, Denmark
09:15	OPENING REMARKS Global Geothermal Development Plan: Where Do We Stand?	<b>Anita M. George</b> , Sr. Director, World Bank Group
09:30	SESSION 1   PANEL DISCUSSION <b>ACCELERATING GEOTHERMAL DEVELOPMENT AND MITIGATING RESOURCE RISK WITH BETTER DATA</b> Drilling Success Rates Based on International Experience  Developing Global Standards for Classifying Geothermal Resources  Early-Stage Data Acquisition as a Factor in Resource Risk	<i>Moderator</i>   <b>Mitsunori Motohashi</b> , Sr. Energy Specialist, World Bank Group  <b>Dr. Subir K. Sanyal</b> , President and Manager, Reservoir Engineering Services, GeothermEx, USA  <b>Prof. Dr. Horst Rüter</b> , Managing Director, International Geothermal Association Service GmbH, Germany  <b>Richard Zehner</b> , Chief Geologist Geothermal Development Associates, USA
10:30	COFFEE BREAK	
10:45	SESSION 1   PANEL DISCUSSION CONTINUED Geothermal Data Repository and Geothermal Resource Assessment and Exploration  Geothermal Data Management Systems  Experience in East Africa and the Need for Global Classifications and Reporting Standards	<b>Prof. Jan Diederik van Wees</b> , Professor, Utrecht University, and Principal Scientist, TNO Geological Survey of the Netherlands  <b>Mario Gonzalez Barbosa</b> , Director Geothermal Energy, Ministry of Energy and Mines, Nicaragua  <b>Dr. Horst Kreuter</b> , Director Geothermal Power Tanzania
11:45	SESSION 2   HARD TALK Geothermal Market Trends	<b>Karl Gawell</b> , Executive Director, Geothermal Energy Association, USA
12:30	LUNCH	
14:30	SESSION 3   PANEL DISCUSSION <b>RESOURCE RISK MITIGATION MECHANISMS</b> Global Survey and Comparative Analysis of Geothermal Resource Risk Mitigation Individual Support to Private Developers  Cost-Sharing Mechanisms in East Africa and Latin America  Risk-Sharing with Private Developers	<i>Moderator</i>   <b>Peter Johansen</b> , Sr. Energy Specialist, World Bank Group  <b>Dr. Subir K. Sanyal</b> , President and Manager, Reservoir Engineering Services, GeothermEx, USA  <b>Tom Harding-Newman</b> , Operations Officer, World Bank Group  <b>Matthias Tönnis</b> , Underwriter, Munich RE, Germany  <b>Jens Wirth</b> , Project Manager Energy and Financial Sector of the Latin America & the Caribbean, KfW Development Bank, Germany  <b>Mrs. Yael Taranto</b> , Manager-Senior Economist, Turkish Industrial Development Bank  <b>Enrique Nieto</b> , Director Sustainable Projects, Nacional Financiera, Mexico  <b>Freddy Saragih</b> , Director of Risk Management, Ministry of Finance, Indonesia  <b>Ernesto Martinez Tiffer</b> , President of Nicaraguan Electricity Company (ENEL)
16:15	COFFEE BREAK	
16:45	SESSION 4   PRESENTATIONS <b>UTILIZING LOW-ENTHALPY GEOTHERMAL RESOURCES</b> Binary Technologies for Electricity Production	<b>Thora Hlin Thorsdottir</b> , Mechanical Engineer, Verkis Consulting Engineers, Iceland  <b>Nachman Isaac</b> , Vice President, Project Finance and Development, Ormat Technologies, USA
17:45	CONCLUDING REMARKS	<b>Dr. Pierre Audinet</b> , ESMAP Clean Energy Program Team Leader, World Bank Group

TIME	SESSION	PARTICIPANTS
08:30	<b>REGISTRATION</b>	
<b>EFFECTIVE FINANCING OF GEOTHERMAL DEVELOPMENT: WHAT HAVE WE LEARNED?</b>		
09:00	<b>WELCOME TO THE GEOTHERMAL DIALOGUE</b>	<b>Thomas C. Heller</b> , Executive Director, Climate Policy Initiative
	This session revisits the purpose and objectives of the Geothermal Dialogues, and introduces focal themes and questions to guide our discussions. A tour de table will introduce all participants and identify priority areas of interest.	
9:30	<b>SESSION 5   THE GEOTHERMAL LANDSCAPE: SETTING THE SCENE</b>	Opening Presentation: <ul style="list-style-type: none"> <li>▪ <b>Valerio Micale</b>, Analyst, Climate Policy Initiative</li> </ul> Opening Comments: <ul style="list-style-type: none"> <li>▪ <b>Paul K. Ngugi</b>, Chief Manager, Business Development, Geothermal Development Corporation, Kenya</li> <li>▪ <b>Dina Irvina</b>, Acting Head of State Owned Enterprises Risk Division, Fiscal Policy Office, Ministry of Finance, Indonesia</li> <li>▪ <b>Tamara Babayan</b>, Director of the Renewable Resources and Energy Efficiency Fund (R2E2), Armenia</li> </ul>
	This session sets the scene for discussing the current state of geothermal based on an ESMAP background paper. The paper describes the current landscape of geothermal development financing, including technology, financial models, and the roles of policies and public investment in driving progress. Representatives of countries engaged in geothermal development will also share their perspectives for investing in this energy source.	
	<i>Chair</i>   <b>Shaanti Kapila</b> , Global Support Program Coordinator, Administrative Unit, Climate Investment Funds	
10:45	<b>COFFEE BREAK</b>	
11:15	<b>SESSION 6   ROUNDTABLE DISCUSSION</b> <b>FINANCING GEOTHERMAL DEVELOPMENT: THE ROLES OF THE PUBLIC AND PRIVATE SECTOR IN THE GUMUSKOY GEOTHERMAL POWER PLANT PROJECT</b>	Overview Presentation: <ul style="list-style-type: none"> <li>▪ <b>Pdraig Oliver</b>, Analyst, Climate Policy Initiative</li> </ul> Opening Comments: <ul style="list-style-type: none"> <li>▪ <b>Dr. Adonai Herrera-Martinez</b>, Principal Manager, European Bank for Reconstruction and Development</li> <li>▪ <b>Tom Harding-Newman</b>, Operations Officer, World Bank Group</li> <li>▪ <b>Deniz Yurtsever</b>, Project Manager, MWH Global</li> </ul>
	This session discusses the Gumuskoy Geothermal Power Plant Project by BM Holding Group in Turkey. This small-scale project was entirely developed by the private sector, providing significant lessons for the expansion of the sector in Turkey and globally. Financiers and experts from Turkey will comment on the roles of the public sector and the private sector.	
	<i>Chair</i>   <b>Dr. Pierre Audinet</b> , ESMAP Clean Energy Program Team Leader, World Bank Group	
13:00	<b>LUNCH</b>	
14:15	<b>SESSION 7   ROUNDTABLE DISCUSSION</b> <b>FINANCING GEOTHERMAL DEVELOPMENT: PERSPECTIVES FROM PROJECT DEVELOPERS AND FINANCIERS</b>	Panelists: <ul style="list-style-type: none"> <li>▪ <b>Nachman Isaac</b>, Vice President for Project Finance, Ormat, USA</li> <li>▪ <b>Gunnar Örn Gunnarsson</b>, Chief Operating Officer, Reykjavik Geothermal, Iceland</li> <li>▪ <b>Ahmet Tohma</b>, Manager Energy Finance, Garanti Bank, Turkey</li> <li>▪ <b>Enrique Nieto</b>, Director Sustainable Projects, Nacional Financiera (NAFIN), Mexico</li> </ul>
	This session focuses on recent financing developments, with insights from projects developers, technology providers, and public and private investors. Panelists will share experiences and explore how existing geothermal projects can identify viable financing and policy options to mitigate exploration risks, achieve economies of scale, reduce costs, and close the competitiveness gaps.	
	<i>Chair</i>   <b>Thomas C. Heller</b> , Executive Director, Climate Policy Initiative	
15:45	<b>COFFEE BREAK</b>	
16:15	<b>SESSION 8   STOCKTAKING</b> <b>WHAT HAVE WE LEARNED?</b>	
	This session invites a broad discussion amongst participants to highlight future priorities. The aim is to draw preliminary lessons and highlight key issues that require further attention to render geothermal financing effective.	
	<i>Moderation &amp; Wrap Up</i>   <b>Barbara Buchner</b> , Senior Director, Climate Policy Initiative	
17:00	<b>CONCLUSION AND NEXT STEPS</b>	
	<i>Chair</i>   <b>Rohit Khanna</b> , Program Manager, ESMAP, World Bank Group	

## SPEAKER BIOS

DAY 1 | THURSDAY, OCTOBER 23, 2014

### OPENING REMARKS

#### ANITA M. GEORGE, Sr. Director, World Bank Group

Ms. George is Senior Director of the World Bank Group's Global Practice on Energy and Extractive Industries. In this position, she provides leadership and strategic direction to the Global Practice that fosters partnerships with key clients through lending, advisory and knowledge services. Before assuming this position on July 1, 2014, Ms. George was the Asia Pacific Regional Director for Infrastructure and Natural Resources at the International Finance Corporation (IFC). She has played several roles in the World Bank Group working in Asia, Africa, Middle East and Latin America. Besides her work with the Bank Group, she has headed Siemens Financial Services in India covering the telecommunications, power and transportation sectors, and has also served in management positions with the Steel Authority of India. Ms. George holds a dual Masters' degree in Business Administration and Economic Policy from Boston University. She is married and the mother of two children.



### SESSION 1

#### DR. SUBIR K. SANYAL, President and Manager of Reservoir Engineering Services, GeothermEx

Dr. Sanyal is Senior Advisor (formerly President and Manager of Reservoir Engineering Services) for GeothermEx, Inc., a California-based geothermal resource consulting and services company that has been in business since 1973, and has participated in the exploration, development, operations and financing for hundreds of geothermal projects in 56 countries.

Under his leadership, GeothermEx facilitated the financing of more than 7,000 MW of geothermal power, the total financed amount exceeding US\$12 billion. In addition to his renowned expertise in geothermal reservoir engineering and operations, Dr. Sanyal has taken a leading role in the industry to analyze and reduce geothermal resource risk, thus increasing the amount of geothermal power produced worldwide. He has led teams undertaking complete geothermal resource analyses in support of solving specific resource problems, making decisions about expansions, and obtaining project finance.

He has authored more than 100 technical publications, and has been an expert witness in numerous litigations and arbitrations. Dr. Sanyal has a Master's degree from Birmingham University (England) and a Ph.D. from Stanford University (California), both in Petroleum Engineering.



#### PROF. DR. HORST RÜTER, Managing Director, IGA Service GmbH, Germany

Prof. Rüter is the principal of HarbourDom GmbH, a geophysical research and consulting company in Dortmund, Germany. He is retired from DMT, the leading German geophysical contractor where he headed the geosciences department and introduced professional exploration in the German coal industry.

Prof. Rüter has published more than 50 scientific papers including text books. He is vice-president of the German Geothermal Association and director of the IGA Service Company. He has received several international awards including SEG's Special Commendation Award and EAEG's Schlumberger Award for his contribution to the development of 3D seismic methods. Mr. Rüter is a part time lecturer at the Ruhr University and the University of Applied Science in Bochum, Germany.



#### RICHARD ZEHNER, Chief Geologist, Geothermal Development Associates, USA

After receiving his Master's Degree, Mr. Zehner worked as an exploration geologist in western North America, focusing on epithermal precious metal deposits (i.e., fossil geothermal systems).

After joining the Great Basin Center for Geothermal Energy (part of UNR) as a Research Scientist, he managed the Center's spatial data and helped develop early-stage exploration tools. Mr. Zehner left UNR in 2010 to form Caldera Geothermal, a small geothermal exploration start-up company. In 2013 he was hired by Geothermal Development Associates as Chief Geologist, where he is currently employed.

In 1999 he completed coursework at the University of Nevada, Reno (UNR) that included Geographic Information Systems, relational database design, and information technology.

Mr. Zehner obtained his B.S. in Earth Science at the University of California at Santa Cruz and his M.S. in Geology at the University of Montana. He spent 4 years working for the U.S. Geological Survey mapping tectonostratigraphic terranes in the central Alaska Range and southern Sierra Nevada mountains.



**PROF. JAN DIEDERIK VAN WEES, Professor at Utrecht University and Principal Scientist at TNO Geological Survey of the Netherlands**

Prof. van WEES is Principal Scientist Geothermal Researcher at TNO, and is extra-ordinary professor at Utrecht University. TNO (Netherlands Organization for Applied Scientific Research) is the largest research and development organization in the Netherlands.

Prof. Van Wees serves as sub-program manager (exploration) in the Joint Program on Geothermal Energy of the European Energy Research Alliance (EERA), and is member of the European Regional Branch Forum of the IGA.

Van Wees has published over 60 papers in leading international journals. His current research expertise focuses towards enhanced geothermal systems (EGS) and direct use applications in Europe

Under the leadership of Van Wees, TNO has developed various state-of-the-art geothermal information systems and performance assessment methodologies, including thermo GIS for geothermal aquifers in the Netherlands, European assessment of EGS potential, and a world geothermal aquifer viewer developed in the framework of EERA.



**MARIO GONZALEZ BARBOSA, Director Geothermal Energy, Ministry of Energy and Mines, Nicaragua**

Mr. Gonzalez is an academic civil engineer working as Director of Geothermal Technologies in the Ministry of Energy and Mines, Nicaragua. His responsibilities include the formulation, coordination and execution of the Strategic Plan and Public Policy of the Energy Sector, Geological Resources, Mining Resources, Geothermal, and Hydroelectric as well as the management of the operation and administration of all state owned enterprises.

His experience in geothermal energy began in the 80s; at Momotombo, the first geothermal site in Nicaragua. Subsequently he was part of the first explorations at the San Jacinto-Tizate geothermal site. His work focused on geothermal reservoir production and supervision.

Mr. Gonzalez received further studies in Mexico, Iceland and Japan in advanced geothermal energy.



**DR. HORST KREUTER, Director, Geothermal Power Tanzania (GPT)**

Dr. Kreuter is a geologist and holds a PhD in Soil and Rock Mechanics from Karlsruhe University in Germany. He spent a year as an exchange student at the University of Texas at Austin and worked in Canada in a nickel mine as a geologist. He then began his work as a Geotechnical Engineer, with projects in Germany, Tanzania and the Caribbean.

His geothermal career started as a co-founder of the first geothermal development company, HotRock GmbH in Germany in 1999, developing geothermal projects in Germany. He later founded GeoThermal Engineering GmbH (GeoT) in Germany, a team of consulting and developing projects experts. Since 2011 Dr. Kreuter has been the Director of Geothermal Power Tanzania Ltd. in Dar es Salaam, developing geothermal resources. As a developer and consultant GeoT extends its activities into Rwanda, Burundi and Uganda.

Dr. Kreuter was a member of the board of the International Geothermal Association (IGA) and is now the Chairman of the European Regional Branch. In his former role as Vice President of the German Geothermal Association (GtV), he helped develop funding and risk mitigation schemes to promote geothermal development. GeoT has helped structuring and introducing geothermal risk mitigation facilities in East Africa.



**SESSION 2**

**KARL GAWELL, Executive Director, Geothermal Energy Association, USA**

Mr. Gawell, is an Executive Director at Geothermal Energy Association (GEA) since 1997. He previously worked as the Director of Government Affairs for the American Wind Energy Association. He recently served as a member of the U.S. Department of Commerce's Renewable Energy and Energy Efficiency Advisory Committee. He has worked in several positions in the U.S. Congress, including Associate Staff of the House Appropriations Committee, Legislative Director for Representative David Skaggs (D-Colo) and Legislative Assistant to Senator Paul Wellstone (D-Minn).

He was Business Manager for the Rockford Corporation in Charlottesville Virginia and an analyst and Project Manager for the U.S. Solar Energy Research Institute (now the National Renewable Energy Laboratory.) He recently served on the Renewable Energy Advisory Board of the US Export-Import Bank, and has been an advisor to the US EPA, and Congressional Office of Technology Assessment. Mr. Gawell, together with co-author Dr. P.M. Wright, was awarded the President's Certificate for Excellence by the American Association of Petroleum Geologists for their presentation "International Geothermal Development" in 1998. He holds a Bachelor of Science in Foreign Service from Georgetown University and studied in the Department of Economics at the University of Nottingham in England.





## SESSION 3

**DR. SUBIR K. SANYAL, President and Manager of Reservoir Engineering Services, GeothermEx**  
(see aforementioned)

**TOM HARDING-NEWMAN, Operations Officer, World Bank Group**

Mr. Harding-Newman joined IFC in 2010 as an Energy Specialist. He leads the GeoFund Turkey project, working with the private sector to develop and pilot geothermal exploration risk mitigation products in the country. He also supports the Government of Ethiopia in developing a strategy to engage the private sector in the development of the country's geothermal resources.

Mr. Harding-Newman previously worked in strategy consulting in the clean technology and financial services sectors based in London. He also worked for various charities in logistics and power management in Liberia, Mozambique, and (South) Sudan. He holds a Master's degree in engineering from Cambridge University, UK.



**MR. MATTHIAS TÖNNIS, Munich RE**

Mr. Tönnis joined Munich Re in 2010 as a geologist and underwriter. He is part of the geothermal team which provides the Exploration Risk Insurance (ERI) for geothermal projects worldwide.

He previously spent 13 years in the drilling industry as a Project Manager, Rig-Manager and Tool pusher, and two years as project manager for a plant manufacturer.



**JENS WIRTH, Project Manager, Energy and Financial Sector of the Latin America & the Caribbean, KfW Development Bank, Germany**

Mr. Wirth is KfW's Lead Geothermal Specialist for Latin America and has among else lead the structuring of the Geothermal Development Facility (GDF) for Latin America as the first multi-donor initiative to promote geothermal energy on a regional level.

He has worked on a variety of Geothermal, Wind, Solar PV and Concentrated Solar Thermal (CSP) Projects across South America, South Africa, India and the MENA region.

His previous work experience includes working as an Energy Analyst for the World Bank's Global CSP Program and as a Consultant for the Energy Sector in the IDB's Mexico office. Mr. Wirth holds a Master's Degree in Economics and Finance from Johns-Hopkins University SAIS in Washington, DC and a Master's Degree in Politics and Economics from Freie Universität Berlin.



**HASAN HEPKAYA, Group Manager, Turkish Industrial Development Bank (TSKB), Turkey**

Mr. Hepkaya is the Department Head of Project Finance at the Industrial Development Bank of Turkey (TSKB), Turkey's first private development and investment bank where he began his career in 2005.

He worked in the Corporate Loans Department before moving to the Project Finance Department in 2009. His practice focuses on project finance, public-private partnerships, infrastructure development, secured lending and structured finance.

He has participated in numerous energy, infrastructure, real estate development and acquisition finance endeavours. He is also a Board Member of TSKB Real Estate Appraisal Company. Mr. Hepkaya graduated from Hacettepe University, Faculty of Business Administration and began his professional career as a specialist in Garanti Leasing



**ENRIQUE NIETO, Director Sustainable Projects, Nacional Financiera, Mexico**

Mr. Nieto has worked for Nacional Financiera (Mexico's governmental development bank) for more than 25 years. During this time, Mr. Nieto has accumulated a wealth of experience in the areas of international corporate and project finance, specializing in environmental, infrastructure and venture capital. From 2007, Mr. Nieto held the position of International Director of the Investment & International Banking Division and is currently Director for Sustainable Projects specializing in finance for renewable energy projects and has participated in financing projects for more than 2.0 GW in Mexico.

In 1994, Mr. Nieto was posted to London, England, where he collaborated in establishing Nacional Financiera's London branch, heading up the team for treasury operations, developing money market, investment and funding activities and took over as General Manager from 1999-2005.

Mr. Nieto graduated in Industrial and Systems Engineering from ITESM, Mexico. He holds the U.K.'s Securities and Futures Authority's certificates in Securities and Futures and Options Representative, as well as a diploma from the London Business School's Investment Management Program.



**FREDDY SARAGIH, Director of Risk Management at Ministry of Finance, Indonesia**

Mr. Saragih, serves as Head of the Center for Fiscal Risk Management at the Fiscal Policy Office in the Ministry of Finance of the Republic of Indonesia. In 2011, he led the development of a Geothermal Facility Fund (GFF) to provide funding for the acquisition of data to mitigate exploration risks. Mr. Saragih has devoted and worked for nearly 25 years in the capital market sector. Mr. Saragih previously served as Director of Research and Information Technology at the Capital Market Supervisory Agency and Financial Institution. He holds a Masters in Professional Accounting (MPAcc.) from the University of Austin, Texas.



**ERNESTO MARTINEZ TIFFER, Executive President, National Electricity Company of Nicaragua (ENEL)**

**SESSION 4**

**MS. THORA HLIN THORSOTTIR, Mechanical Engineer, Verkis, Iceland**

Ms. Hlin is a Mechanical Engineer at Verkis Consulting Engineers in Iceland. Since joining the company's energy department, she has been primarily involved in utilization of low temperature resources and binary power plant development.

Among projects she has worked on are: comparisons of different technical solutions and financial feasibility studies of projects in low temperature geothermal areas in Kazakhstan, Chechnya and Chile. Ms. Hlin has also worked on energy process design, implementation of technical solutions and preparation of tender document for multiple projects in China, Germany, Turkey and others. Ms. Hlin is the main author of a comprehensive summary report on electricity production using binary technology, technical and financial feasibility for ICEIDA.

Ms. Hlin graduated from Reykjavik University with B.Sc. in Mechatronic Engineering (2010). She then worked for The National Energy Authority on multiple projects in their geothermal department. She graduated with M.Sc. in Mechanical Engineering from the University of Iceland (2013) with special emphasis on geothermal utilization in 2012.



**NACHMAN ISAAC, Vice President, Project Finance, Development, Ormat Technologies**

Mr. Isaac joined Ormat in 2001, in the Marketing and Business Development group, where his responsibilities included development and structuring of geothermal power projects in North and Latin America, Asia and New Zealand. Since 2007, Mr. Isaac heads Ormat's Project Finance Department. He oversees project financing, procurement of political risk insurance, economic feasibility assessment, M&A activities, and carbon credits commercialization for Ormat's global portfolio projects. Ormat is a leading geothermal company and the only vertically integrated company solely engaged in geothermal and recovered energy generation in the U.S., Latin America, Africa and South East Asia.

Mr. Isaac holds a degree in Economics and Business Administration, as well as an MBA from the Hebrew University in Jerusalem.



**CONCLUSION**

**DR. PIERRE AUDINET, Senior Energy Economist, ESMAP, The World Bank Group**

Dr. Audinet leads the Clean Energy Program Team of the Energy Sector Management Assistance Program of the World Bank (ESMAP) since 2011. He joined the World Bank in 2004 to manage energy sector dialogues and to develop a range of investment operations, first in the Middle East & North Africa and then in the Caribbean. Acknowledged for pragmatic and innovative solutions, his experience goes from financing the world's first hybrid gas / concentrated solar thermal plant in Morocco, creating and launching the Global Geothermal Development Plan, to helping set up new renewable and energy efficiency legislation in Morocco, to reforming energy prices subsidies in Yemen. Prior to joining the Bank, Dr. Audinet was with the International Energy Agency and the French Ministry of Foreign Affairs. Pierre holds a Ph.D. in Economics from the School of Advanced Social Science Studies (Paris, France), a Master's in Philosophy and a Master's of Science in Economics from Paris University. He was a visiting Ph.D. fellow at the Indian Institute of Management of Ahmedabad (India) and at the School of Engineering's Energy Planning Programme of the Federal University of Rio de Janeiro (Brazil).

WELCOME TO THE GEOTHERMAL DIALOGUE

**THOMAS C. HELLER, Executive Director, Climate Policy Initiative**

Mr. Heller is the founder and Executive Director of Climate Policy Initiative (CPI). He spent 30 years as a professor at Stanford University; Shelton Professor of International Legal Studies; Senior Fellow at the Stanford Freeman Spogli Institute for International Studies; and Senior Fellow at the Woods Institute for the Environment. An expert in law, economic development, and the performance of legal institutions, he has focused his research on the rule of law, international climate control, global energy use, and the interaction of government and nongovernmental organizations in establishing legal structures in the developing world.

Since 1991, he has been engaged in applied policy studies in energy and climate, with a focus on China, India, Mexico, and Brazil. In 2008, he became a core team member of Project Catalyst—an analysis-based project that supported the Copenhagen Climate process. Since 2010, he has acted as the Vice-Chair of the Governing Board of the Global Green Growth Institute, with headquarters in Seoul, Korea. Mr. Heller holds a B.A. from Princeton University and an L.L.B. from Yale Law School.



SESSION 5

**VALERIO MICALE, Analyst, Climate Policy Initiative**

Mr. Micale works as an Analyst in the CPI Europe office, focusing on risk analysis and green finance. Prior to joining CPI, he was a researcher at Bocconi University, where he worked on various projects related to sustainability and corporate environmental accountability.

In 2008, Mr. Micale was employed at First Climate Zurich, where he was involved in risk management of carbon assets. He is a graduate in Business Economics (MC) and holds a Master's Degree in Environmental Management and Economics at Bocconi University in Milan.



**PAUL NGUGI, Chief Manager, Business Development, Geothermal Development Corporation, Kenya**

Mr. Ngugi is the Chief Manager for Business Development at the Geothermal Development Company Limited (GDC). GDC is a Kenyan company owned by the Government of Kenya whose principal purpose is to prospect, explore, assess and develop geothermal resources in Kenya. He is currently responsible for the development of corporate business plans, strategy, planning and execution of projects, fund raising, environmental management and direct uses of geothermal resources. Previously he worked with Kenya Electricity Generation Company Limited (KenGen) responsible for geothermal planning. He also served as a drilling engineer. Mr. Ngugi has over 23 years of experience in geothermal development.

Ngugi is a holder of BSc. in mechanical engineering from the University of Nairobi, a postgraduate diploma in geothermal energy technology from the University of Auckland and a certificate in drilling technology from the United Nations University, Iceland. Currently he is pursuing a master's degree in business administration majoring in finance at the University of Nairobi.



**DINA IRVINA, Acting Head of State Owned Enterprises Risk Division, Fiscal Policy Office, Ministry of Finance, Indonesia**

**TAMARA BABYAN, Director of the R2E2 Fund, Armenia**

SESSION 6

**PADRAIG OLIVER, Analyst, Climate Policy Initiative**

Mr. Padraig has worked in climate policy in China and Europe since 2006. In China, he worked for Development Solutions on capacity building projects for the Clean Development Mechanism (CDM) before moving on to conduct research for Ecofys on post-2012 regimes in China, financing of renewable energy and energy efficiency, and CDM market analysis. In 2011, he joined the Climate Bonds Initiative.

Work included pinpointing bond investor requirements for low-carbon projects, designing a Climate Bond Standard to help define what green criteria, publishing regular market updates for how many bonds are already used for climate solutions, and outlining policy frameworks to help grow a green bond market. Mr. Padraig holds a M.Sc. in Environmental Technology from Imperial College London.



### CAGLAN KUYUMCU, Vice Chairman, BM Holding

Mr. Kuyumcu joined BM Group, a family-owned large-scale construction contracting group in 2001 and worked in various positions. He is currently the Vice Chairman of the Board of BM Holding Inc. Until 2004, he managed various construction projects including the construction of Turkey's highest dam, the Ermenek Dam and the HEPP Project, Doyduk Dam Project, Abu Dhabi's first multistory underground car parks and the land reclamation and dredging works for Abu Dhabi's New Corniche Road.

In 2004, he began directing the group's investments in land development, geothermal exploration and power generation, natural gas exploration, biogas and hydropower, geothermal heated horticulture, manufacture of oil drilling rigs and machinery, drilling contracting and well services. Under his management, he oversaw the construction and commissioning of a total of 100MW hydropower and 13.2MW geothermal installed power capacity in a total of 8 power projects, of 51da of geothermal heated greenhouse facilities, the discovery of 11 proven geothermal reservoirs with over 60MW estimated installed power capacity and foundation of Turkey's largest biogas initiative comprising 1 million tons per annum organic waste.

Mr. Kuyumcu graduated from Middle East Technical University (METU), Department of Civil Engineering in 1998 and from Massachusetts Institute of Technology (MIT), Department of Civil and Environmental Engineering, M.Eng. program in 1999.



### ADONAI HERRERA-MARTINEZ, Principal Manager, European Bank for Reconstruction and Development

Mr. Adonai Herrera-Martínez has been the Energy Efficiency and Climate Change Principal Manager at the European Bank for Reconstruction and Development in Turkey since 2009. Until 2008, he worked as a consultant in Capacity Building for Energy Systems for a year at United Nations Development Programme, in HQ and West Africa. His worked included regional policy advice to governments on costs and benefits of different energy for poverty reduction programmes.

From 2000 to 2007, Mr. Herrera-Martínez worked at the Emerging Energy Technologies group at the European Laboratory for Nuclear Research (CERN).

In 2004, he obtained his Ph.D. in Nuclear Engineering from the University of Cambridge (UK), in the topic of Transmutation of Nuclear Waste in Accelerator-Driven Systems. His interests focus on strategic and technical solutions to develop sustainable energy systems for emerging and developing countries. He also holds a MBA degree from INSEAD.



## SESSION 7

### NACHMAN ISAAC, VP for Project Finance, Ormat (see aforementioned)

### GUNNNAR ÖRN GUNNARSSON, COO, Reykjavik Geothermal, Iceland

Mr. Gunnarsson is a Board Member and COO of Reykjavik Geothermal (RG). He was also one of the founders of RG in 2008. Mr. Gunnarsson has been in a leadership position in several industrial companies in Iceland, focusing mainly on manufacturing, and been a board member in many small and middle size companies.

Mr. Gunnarsson represented the Government of Iceland on the negotiating team with Alcoa to secure its 340 tpa aluminium smelter. For the last eight years, he has been working in the power sector in Business Development specializing in operational, contracting and financial matters; first with the National Power Company, the biggest electrical power producer in Iceland.

Mr. Gunnarsson was responsible for researching new business opportunities of medium and large power users. Later he joined Reykjavik Energy, one of the biggest operating geothermal companies in the world. His role at Reykjavik Energy was Managing Director of Business Development of foreign projects in Africa and Asia. Mr. Gunnarsson holds a Master's Degree in Mechanical Engineering from Danmark Techniske Universitet.



### AHMET TOHMA, Manger Energy Finance, Garanti Bank

Mr. Tohma is a Manager in Project and Acquisition Finance Garanti Bank. He possesses a total of 11 years in banking, five as a Project and Acquisition Finance Banker. He is currently responsible of originating, structuring and executing deals in Energy on behalf of Garanti. His experience includes landmark deals such as the first privatization of electricity generation assets, the first merchant gas fired power plant and the first limited recourse electricity distribution privatization.

Mr. Tohma holds a Bachelor of Science Degree in industrial engineering from Middle East Technical University, Turkey.



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**BARBARA BUCHNER, Senior Director, Climate Policy Initiative**

Ms. Buchner is Senior Director of Climate Policy Initiative and head of CPI Europe. She leads CPI's workstream on global climate finance and the Secretariat of the Global Innovation Lab for Climate Finance focusing on international climate finance.

Ms. Buchner has served as a Senior Energy and Environment Analyst at the International Energy Agency. She has been a Senior Researcher at the Fondazione Eni Enrico Mattei; and a Visiting Scholar at the Massachusetts Institute of Technology within its Joint Program on the Science and Policy of Global Change & Centre for Energy and Environmental Policy Research.

Ms. Buchner serves on the Advisory Board of the Barilla Center for Food & Nutrition (BCFN). She is lead author of CPI's Climate Finance Landscape Report and has published a number of articles in peer-reviewed journals as well as in books. Ms. Buchner holds a Ph.D. in Economics from the University of Graz and a Master Degree in Economics within the Economics/Environmental Sciences Joint Program at the University of Graz and University of Technology of Graz.

**CONCLUSION****ROHIT KHANNA, Program Manager, ESMAP, The World Bank Group**

Rohit Khanna is Program Manager of the Energy Sector Management Assistance Program (ESMAP) at the World Bank. In this role, he oversees a portfolio of analytical and advisory activities in the energy sector. Mr. Khanna, an Indian national, joined the World Bank in 2000. Prior to assuming his current position, Mr. Khanna worked on the Global Environment Facility (GEF) and Clean Technology Fund (CTF) at the World Bank. He has had country experience with the Bank in Cambodia, Ghana, Uganda, Mozambique, Thailand, and South Africa, and was part of the team that developed the CTF investment program for Concentrating Solar Power in the Middle East and North Africa. Before joining the Bank in 2000, he was a Programme Officer in the United Nations Environment Program and worked for Save the Children Federation in its Bhutan Field Office. Mr. Khanna is a graduate of the University of Delhi and has a Master of Public Administration degree from American University in Washington, DC.

