Karl Gawell, Executive Director

Geothermal Energy Association;

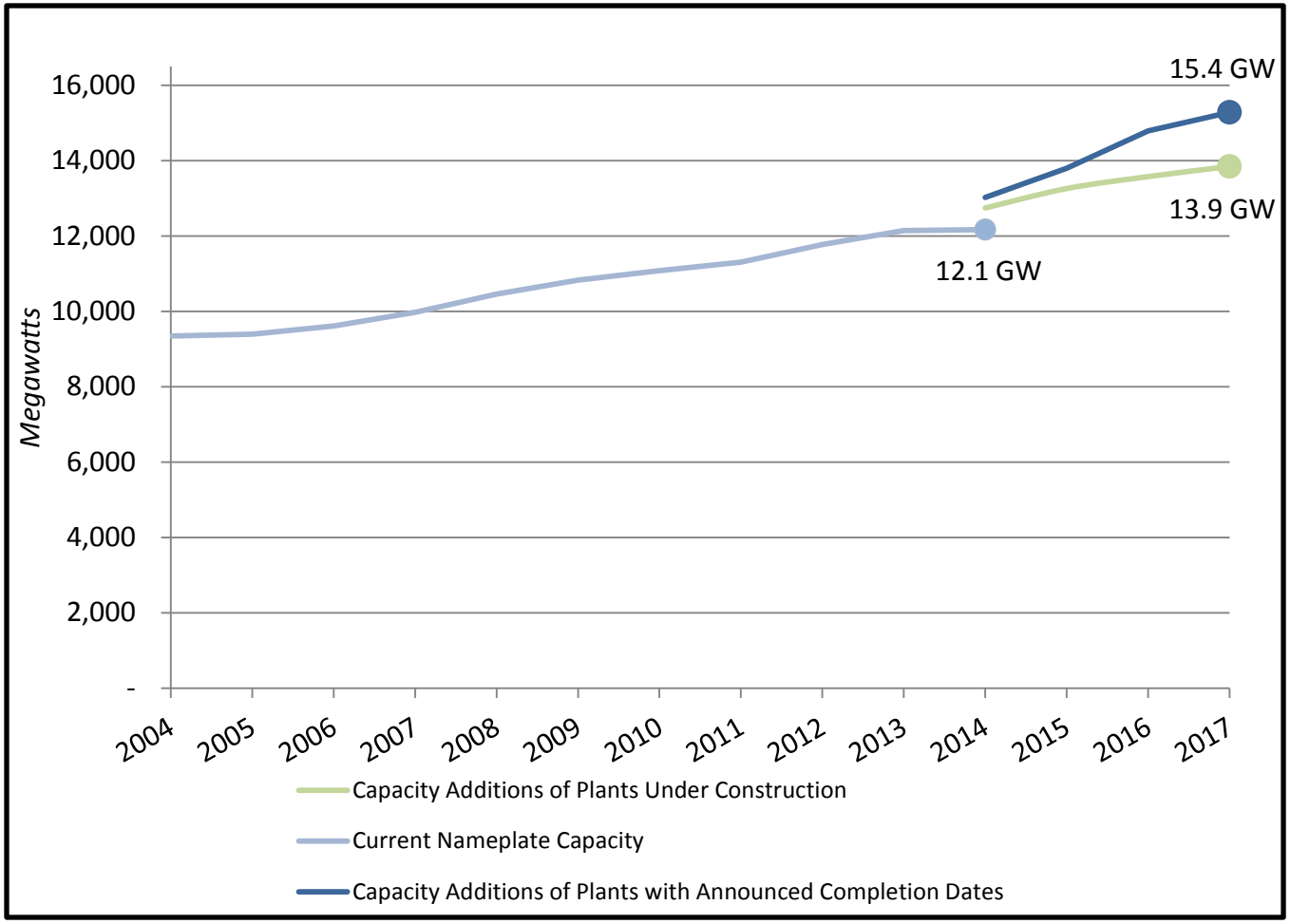
October 2014

Global Geothermal Development Plan – Roundtable 2

Copenhagen, Oct 23-24, 2014

Geothermal power continues sustained growth internationally

International Geothermal Power Nameplate Capacity (MW), Forecast Based on Plants Under Construction



Note: pilot plants are not included in the above time series. Gap in lines at year 2014 represents plant still yet to be completed this year.
Source: GEA, EIA

Source: GEA

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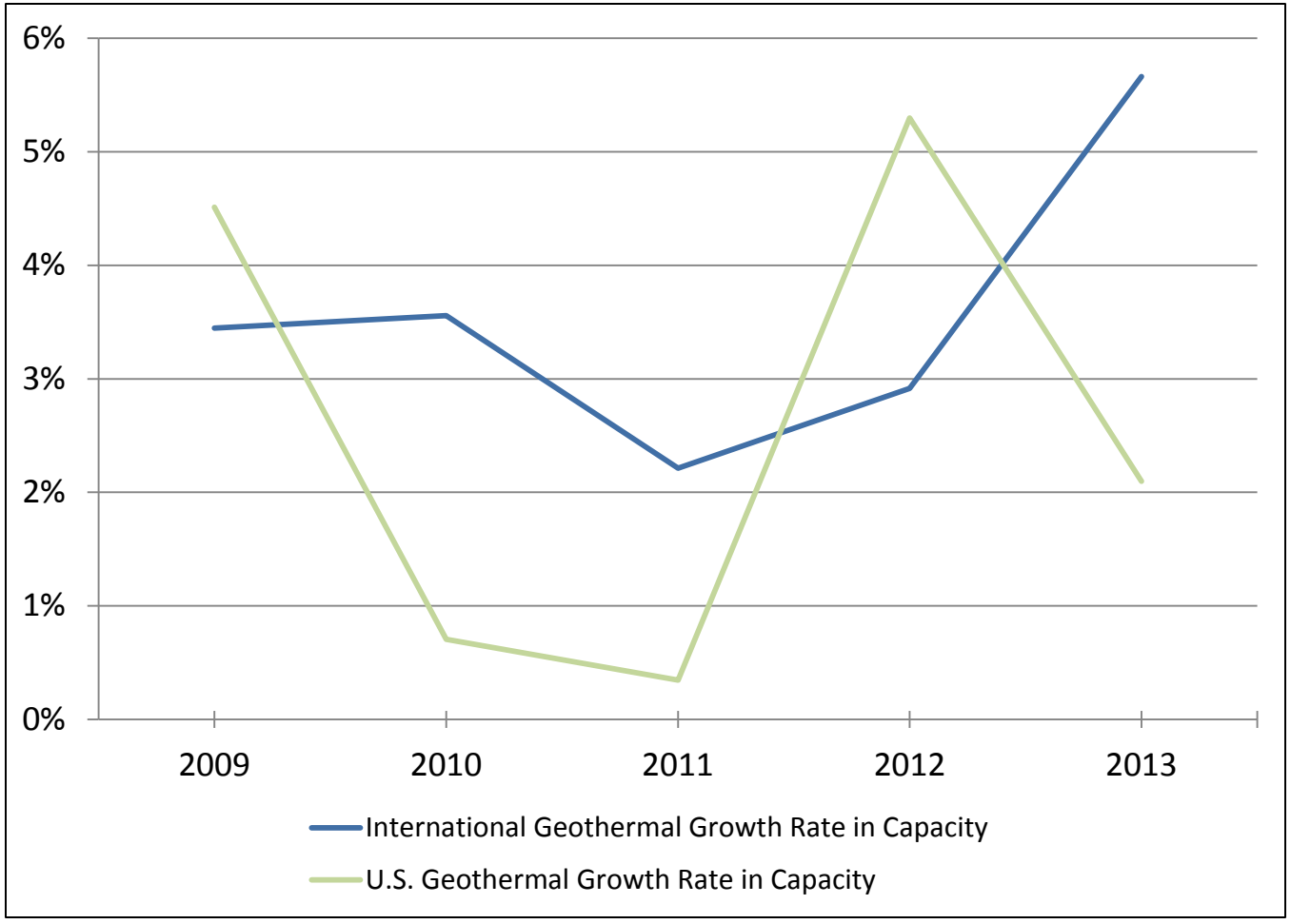
The U.S. and the Global Market Growth Rates Over the Last 5 Years



Source: GEA, EIA

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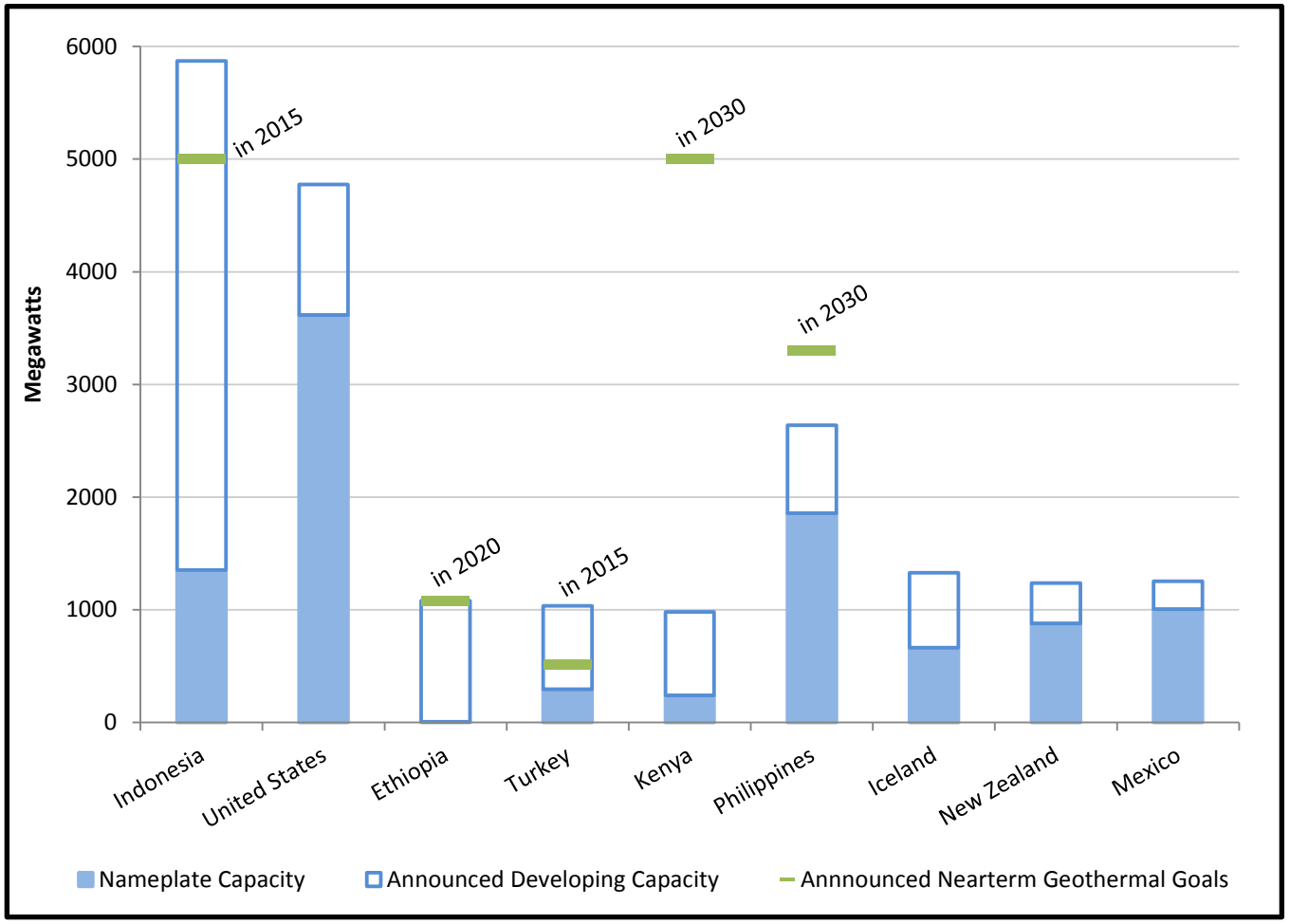
Indonesia is leading in developing capacity and could surpass the U.S. in installed capacity in the future

Established Geothermal Power Markets Nameplate Capacity (MW)



Source: GEA, EIA

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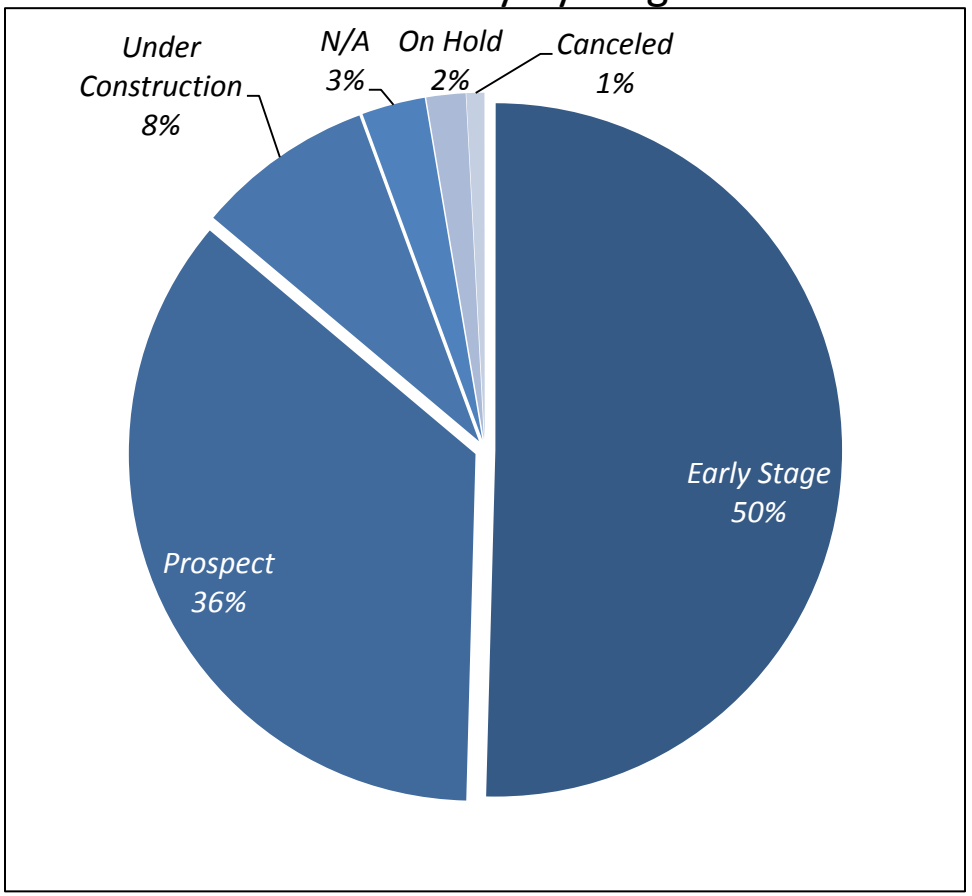
About a tenth of global sites are already under construction with about a half of global sites approaching that stage.

As of Fall 2014:

- ~730 Global Sites – Prospects and Projects
- Located in nearly 80 countries

Percent of Global Activity by Stage*



*Source: GEA, EIA

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Of the ~730 sites about 15% have announced completion dates and one-third have advanced to the stage where they can report specific project or resource estimates

Out of 730 sites with activity:

~120 Projects have announced completion dates- most have not, a completion date is normally announced in conjunction with a PPA or MOU between IPP and local government

~265 Projects Report Developing Capacity Estimates-

- 12 GW of Developing Projects reported
- 30 GW of Developing Resource reported

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Terms and Definitions

- "Prospects" are defined as areas in which little exploration has taken place, and the country's government has tendered the property to a private company, government agency or contractor to conduct further exploration. Although geophysical features or prior exploration might indicate the presence of a geothermal resource at the site, it is not proven and past exploration may not have determined the economic feasibility of a geothermal power plant at the property tendered.
- "Early Stage" are projects where some aspects of a resource is identified and the initial stages of explorations and pre-construction are underway. This could mean but is not limited to, the first exploration wells drilled, project funded, and/or significant knowledge of the geothermal resource attained.
- "Under Construction" are projects where physical work to build the actual power plant has begun. This includes the drilling of successful injection and production wells.
- "Developing Project" is a site where geothermal potential and development has occurred led by a private company, government agency or contractor, IPP, or third party with the eventual goal of building a power plant.
- "Developing Resource" is the estimated total sustainable potential of a geothermal resource being utilized by one or more projects.

Many Countries Developing Geothermal Are Emerging Economies

- 22 of these identified geothermal countries are World Bank Low-income economies & Lower-middle-income economies
- Another 22 of these identified countries are World Bank Upper-Middle income economies
- About Half of the current geothermal countries are countries that need development assistance
- Definitions of these categories are available http://data.worldbank.org/about/country-and-lending-groups

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Projects by Stage for Emerging Economies				
Central America	*Prospects*	*Early Stage*	*Under Construction*	*Operational*
Costa Rica	X	X	X	X
El Salvador	X	X	X	X
Guatemala	X	X	X	X
Honduras	X	X		
Nicaragua	X	X	X	X
Panama	X			
East Africa	*Prospects*	*Early Stage*	*Under Construction*	*Operational*
Kenya	X	X	X	X
Djibouti	X	X		
Rwanda	X	X		
Ethiopia	X	X		X
Tanzania	X			
Uganda	X	X		
Comoros Island		X		
Caribbean	*Prospects*	*Early Stage*	*Under Construction*	*Operational*
Dominica		X	X	
Grenada	X	X		
Guadeloupe		X		X
Jamaica	X			
Martinique	X			
Montserrat			X	
Nevis		X		
Saba		X		
St. Lucia		X		
St. Vincent and Grenadines		X		
Developing South Pacific	*Prospects*	*Early Stage*	*Under Construction*	*Operational*
Northern Mariana	X			
Indonesia	X	X	X	X
Philippines	X	X	X	X
Republic of Vanuatu	X	X		
Solomon Islands		X		

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Geothermal Power Industry Highlights for 2014

- Slow growth in US market
- Sustained growth in world market
- Technology continues to evolve: mineral recovery, EGS demonstrations, new drilling capabilities, lower temperature power systems, etc…
- Some key global barriers . . .
  - Still considered small market for major energy companies
  - Risk considered too high for commercial investors
  - Knowledge of resource is often uncertain
  - Need laws/regulations and PPAs in place that support development, financing and construction – US phenomenon or new bottleneck?

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Regional Highlights for 2014

- Central America
- East Africa
- Caribbean
- South Asian Pacific

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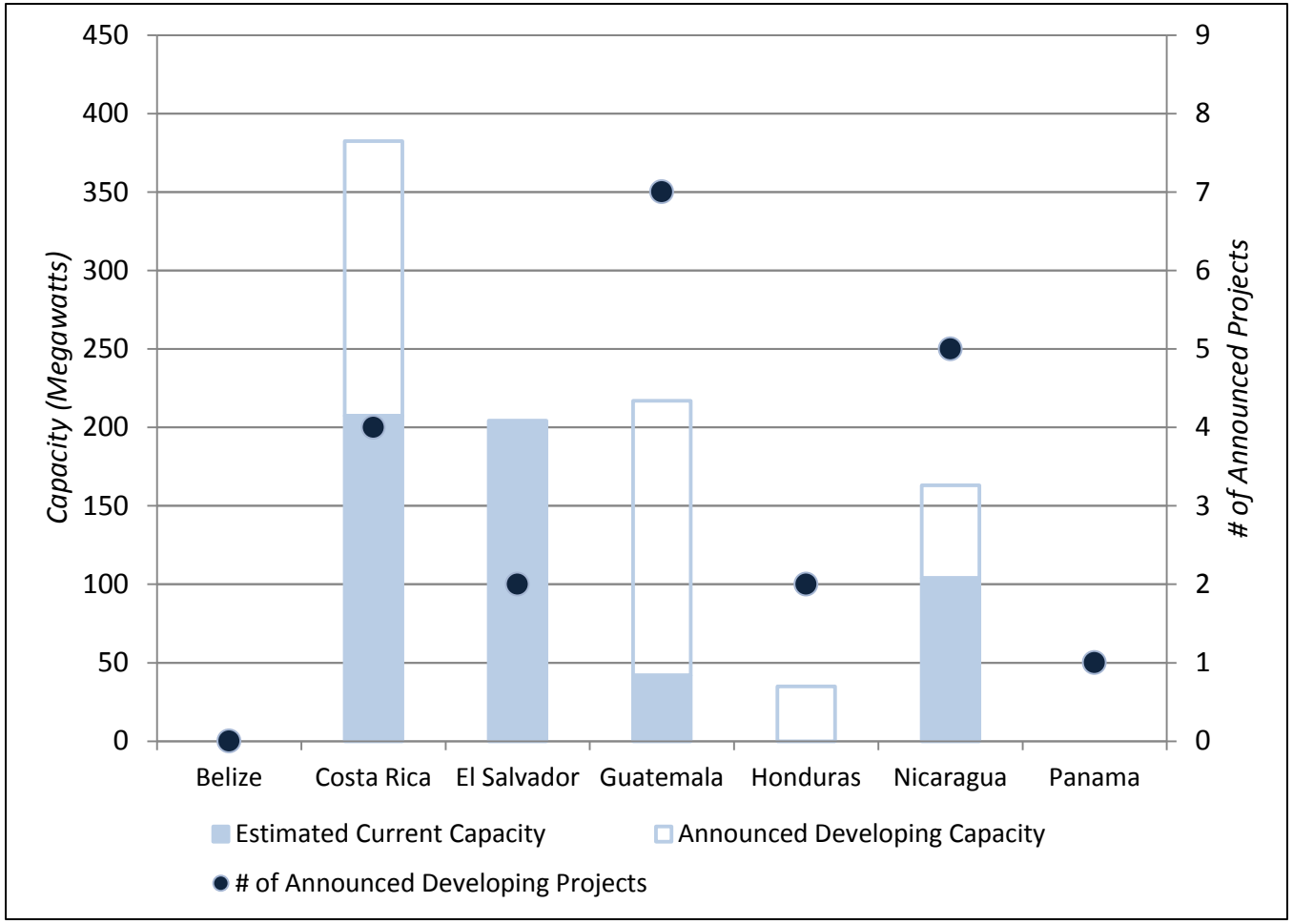
The Future Central American Geothermal Market



Source: GEA

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Central American Highlights

- Costa Rica received from JICA a $550 million loan that will go towards financing three geothermal plants - Pailas II, Borinquen I, and Borinquen II- each planned for a 55 MW of potential capacity additions
- El Salvador obtains 25% of its electricity from geothermal energy with an aim to achieve 40% in the near future
- A plan proposed in July 2014 aims to supply 90% of Nicaragua's energy from renewable resources by 2020

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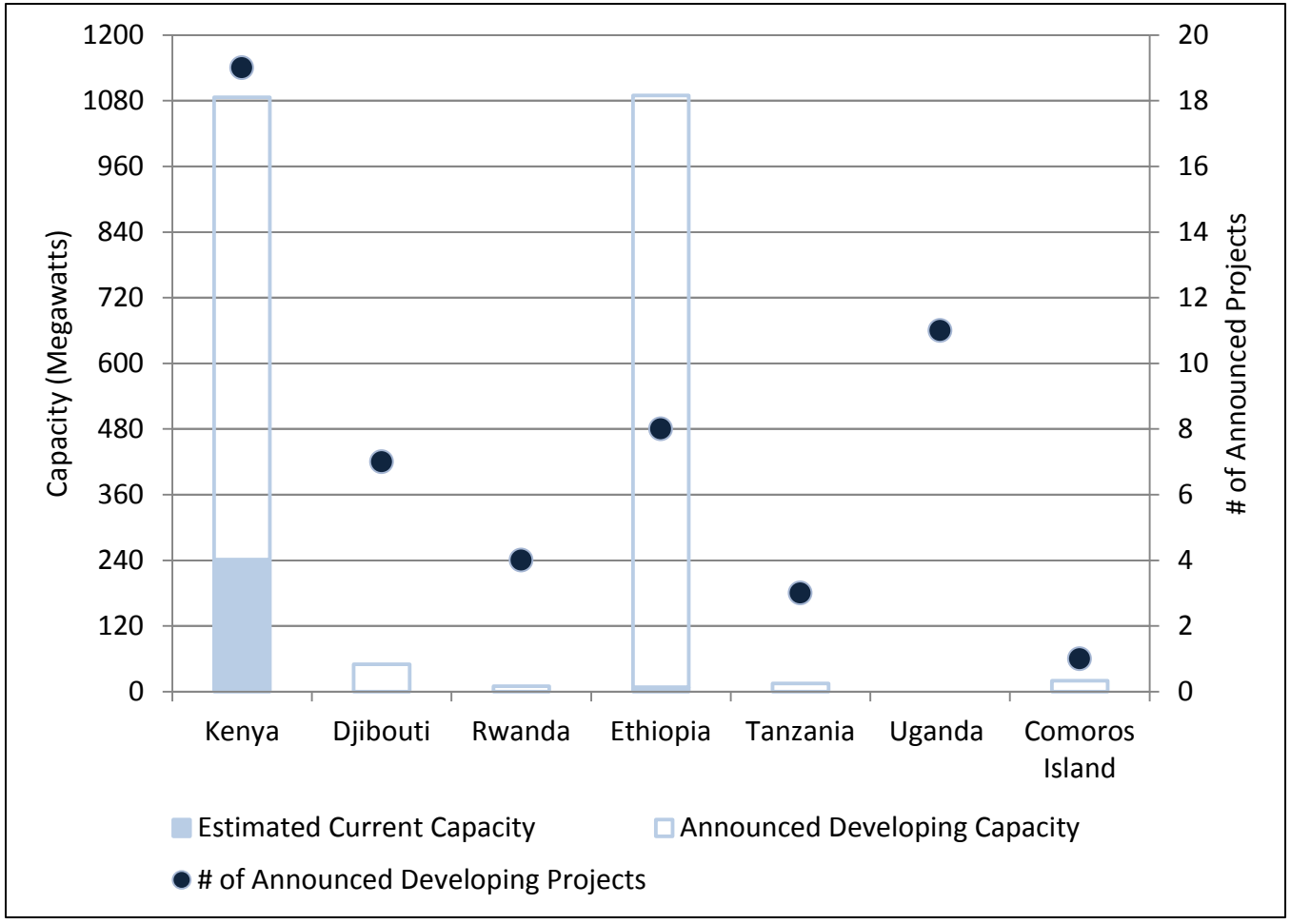
The Future East African Geothermal Market



Source: GEA

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East African Highlights

- The Ethiopian government is working with the World Bank to expand electricity access, with the goal to reach 75% of towns and add four million more people to the grid in the next five years
- The Menengai project in Kenya will be among the fastest greenfield development in the world to produce electricity in just less than five years
- The Government of Uganda recently created the Geothermal Resources Department to help with further studies and the overall development of geothermal power

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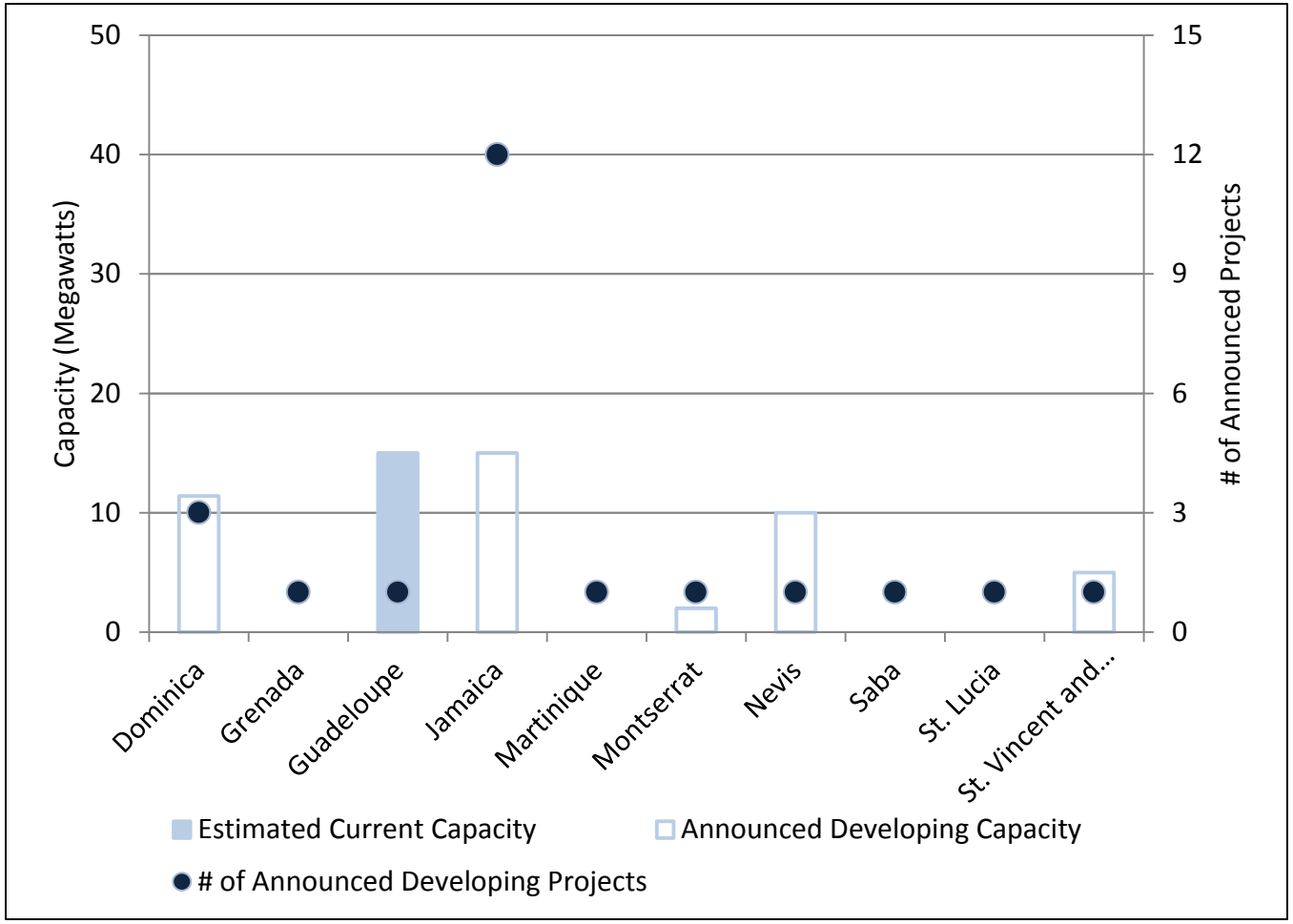
The Future Caribbean Geothermal Market



Source: GEA

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Caribbean Highlights

- The development of geothermal energy in the Caribbean will help to lower energy prices, reduce energy independence, increase competitiveness, encourage economic growth, and reduce poverty while providing a baseload source of energy
- Saint Lucia wants to generate 35% of their energy from renewable resources by 2020
- As of September 2014, St Vincent and the Grenadines announced plans for a potential small geothermal power plant. Surface exploration indicates high geothermal potential near Mount Soufriere

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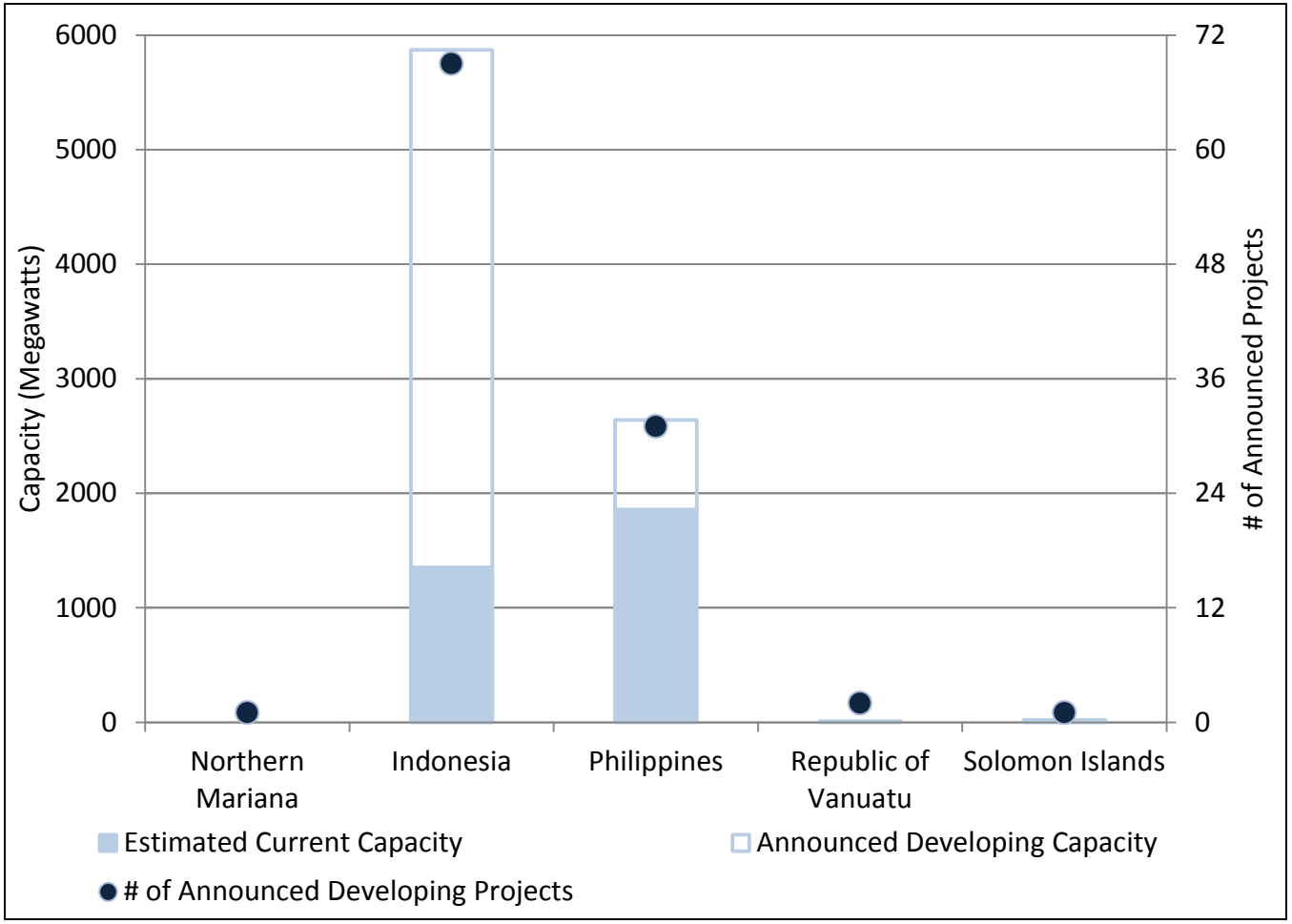
The South Asian Pacific Geothermal Market



Source: GEA

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South Asian Pacific Highlights

- In Indonesia a long-awaited law passed on August 26, 2014, declassifies geothermal as a mining operation and allows geothermal development in forested areas
- The Indonesian Geothermal Association (API) predicts geothermal development in the country, will reach 2,000 MW by 2020
- By 2030, the Philippines' Energy department announced plans to increase installed capacity of geothermal power to 3.3 GW

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Appendix I: About GEA data collection

- For U.S. data GEA surveys our project developers annually. GEA then syncs this data with Department of Energy, Department of Commerce, REN21, IEA and other energy industry stakeholders throughout the year.
- For international data, GEA collects information based on press releases, news stories, presentations from events, and direct discussions with our member companies working on international projects.
- For a complete explanation of GEA's Terms and Definition see our:
  - Geothermal Reporting Terms and Definitions
  - 2014 Annual U.S. & Global Geothermal Power Production Report

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Appendix II: Data from Slide 4

Megawatts			
Country	*Nameplate Capacity*	*Announced Developing Capacity*	*Announced Near-term Geothermal Goals*
Indonesia	1353	4520	5000
United States	3617	1158	N/A
Ethiopia	8	1075	1075
Turkey	295	742	515
Kenya	241	742	5000
Philippines	1857	782	3300
Iceland	664	665	N/A
New Zealand	880	356	N/A
Mexico	1005	250	N/A

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Appendix III: Data from Country Slides

Emerging Economy Geothermal Country Data (MW)			
Central America			
Country	Estimated Current Capacity	Announced Developing Capacity	# of Announced Developing Projects
Belize	0	0	0
Costa Rica	208	175	4
El Salvador	204	0	2
Guatemala	42	175	7
Honduras	0	35	2
Nicaragua	104	59	5
Panama	0	0	1
East Africa			
	Estimated Current Capacity	Announced Developing Capacity	# of Announced Developing Projects
Kenya	241.1	845	19
Djibouti	0	50	7
Rwanda	0	10	4
Ethiopia	7.5	1075	8
Tanzania	0	15	3
Uganda	0	0	11
Comoros Island	0	20	1
Caribbean			
	Estimated Current Capacity	Announced Developing Capacity	# of Announced Developing Projects
Dominica	0	11.4	3
Grenada	0	0	1
Guadeloupe	15	0	1
Jamaica	0	15	12
Martinique	0	0	1
Montserrat	0	2	1
Nevis	0	10	1
Saba	0	0	1
St. Lucia	0	0	1
St. Vincent and Grenadines	0	5	1
Developing Asian South Pacific			
	Estimated Current Capacity	Announced Developing Capacity	# of Announced Developing Projects
Northern Mariana	0	0	1
Indonesia	1353	4520	69
Philippines	1857	782	31
Republic of Vanuatu	0	10	2
Solomon Islands	0	20	1

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