Ministry of Water Irrigation and Electricity
Federal Democratic Republic of Ethiopia

THE ROLE OF THE GOVERNMENT IN GEOTHERMAL DEVELOPMENT IN ETHIOPIA

Global Geothermal Development Plan 3rd Roundtable

April 2016

Reykjavik

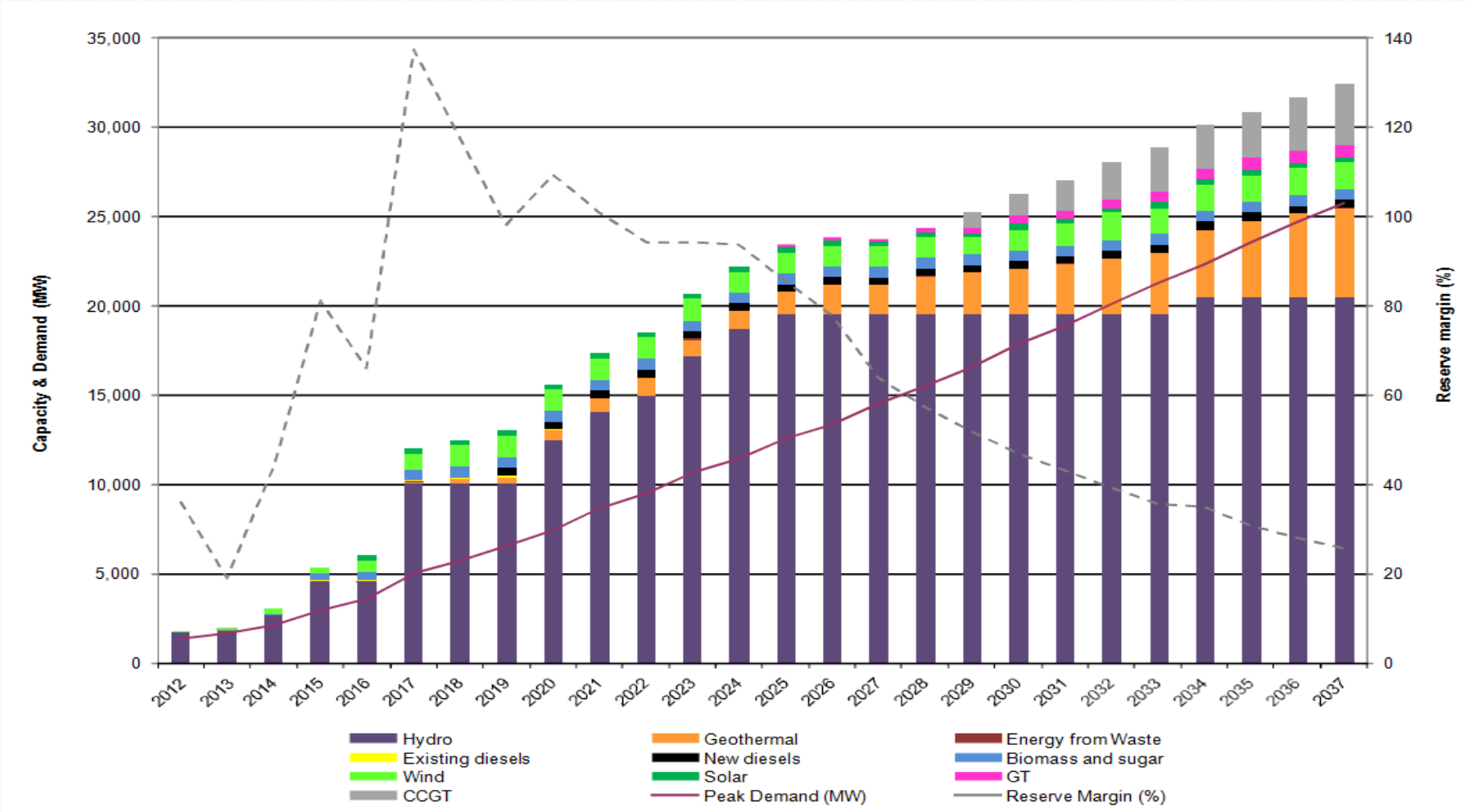
ENERGY RESOURCES

- Hydropower potential 45,000 MW
- **Geothermal potential ~ 4200 to 10,800 MW**
- Solar energy potential 5.5 kWh /sq. m/day – annual average daily irradiation
- Average wind speed > 7 meter/second at 50 m above ground level – 1,350 GW
- Wood – 1,120 million tonnes (annually exploitable)
- Agro-waste – 15 to 20 million tonnes (annually exploitable)
- Natural gas - 4 TCF (113 billion m^3)
- Coal > 300 million tonnes.
- Oil shale – 253 million tonnes

Geothermal Resource Assessment

Site No.		Occurrence Probability 80%	Most likely (mode)	Occurrence Probability 20%
19	Corbetti	480	960	2400
16	Abaya	390	790	1900
13	Tulu Moye	202	390	1100
18	Boseti	160	320	800
21	Tendaho-1	140	290	660
4	Damali	120	230	760
7	Meteka	61	130	290
2	Tendaho-3	64	120	320
17	Fantale	64	120	320
14	Aluto-2	58	110	290
22	Tendaho-2	47	100	230
3	Boina	56	100	350
20	Aluto-1	49	91	180
7-1	Meteka-Amoissa	28	89	150
9	Dofan	41	86	200
7-2	Meteka-Ayehu	47	53	250
15	Aluto-3	23	50	110
1	Dallol	23	44	120
12	Gedemsa	20	37	100
11	Nazreth	17	33	100
23	Butajira	6	16	30
10	Kone	7	14	42
6	Danab	6	11	30
5	Teo	4	9	23
8	Arabi	4	7	36
	total	2114	4200	10791

ELECTRICITY DEMAND AND SUPPLY UP TO 2037



Power System Expansion Plan 2014

GEOTHERMAL TARGETS

- Geothermal in the long term power development
  - 2,500 MW by 2030
  - 5,000 MW by 2037
- By 2037 - 30% of energy generated in the grid
  - Around 40,000 GWh
  - Capital cost 4,000,000 $/MW
  - 20 billion $ in 25 years

GEOTHERMAL CURRENT DEVELOPMENTS

- Geothermal projects (public)
  - Aluto Langano geothermal expansion – 70 MW
    - GoE, WB, SREP, GoJ, ICEIDA
  - Tendaho Alalobeda 1st phase – 25 MW
    - GoE, WB, ICEIDA
  - Tendaho Dubti shallow reservoir – 12 MW
    - GoE, AFD, EU ITF
- Geothermal projects (private)
  - Exploration licenses issued to private developers
  - Corbetti Geothermal Power 1st phase– PPA for 500 MW

CHALLENGES AND OPPORTUNITIES

- Challenges / weaknesses
  - Large financial requirement
  - Resource and other risks
  - Long gestation period
  - Lack of institutional capacity
  - Shortage of professional skills (scientific, technical, commercial, legal)
  - Sub optimal legal and regulatory framework (upstream mineral – downstream energy/power)

CHALLENGES AND OPPORTUNITIES

- Opportunities / strengths
  - Large resource (considerable detailed investigations and test drillings done/ongoing)
  - Strong policy commitment (cost competitive, base load, renewable, heat as well as electricity, indigenous, energy security and climate resilience)
  - Possibilities of private sector participation
  - Availability of regional risk mitigation facilities

MODELS OF GEOTHERMAL DEVELOPMENT

	Preliminary survey	Surface exploration	Test drilling	Production drilling / field development	Power plant construction	Operation and maintenance	
Model A	Public / Private	Private	Private	Private	Private	Private	Fully private
Model B	Public	Public	Private	Private	Private	Private	PPP
Model C	Public	Public	Public	Private	Private	Private	PPP
Model D	Public	Public	Public	Public	Private	Private	PPP
Model E	Public	Public	Public	Public	Public	Public	Fully public

REVISION OF GEOTHERMAL LEGAL, REGULATORY AND INSTITUTIONAL FRAMEWORK

- Geothermal draft proclamation – overarching legal framework
- Detailed regulations and codes being drafted
  - Licensing
  - Bidding
  - Permitting
  - Drilling, health, safety
- New institution being considered to lead geothermal development


THANK YOU