

Solar Energy Development (As Growth Driver)

Ethiopia 2050: Challenges and Opportunities
Addis Ababa, Ethiopia

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December 20, 2019

Key Country Data

Country Economic Situation	
GDP (2018)	\$83.84 billion
GDP per Capita (2018)	\$890.57
Population (2018)	110 million appx.
Energy Data	
Access to Electricity (2018)	44%
Power consumption per capita	77 kwh/m2/day
Hydropower generation (2018)	4,500 MW
Wind power generation (2018)	324 MW
Total PV capacity (2018)	18 MW
Geothermal power	7.5MW

Typical energy per capita of countries

Country	kWh per capita
SSA countries	
Sudan	269
Kenya	164
Eritrea	89
Ethiopia	77
South Sudan	44
SSA average (excl. high income)	484
Others	
Egypt	1,510
China	4,475
India	1,122
South Africa	3,904
UAE	16,195

- IEA recommended energy per capita : Rural - 250 kWh
Urban - 500 kWh

Energy Resources Potential - Ethiopia / Africa

Resources	Unit	Exploitable Reserve	% Utilized	Exploitable Resources of Africa
Hydropower	GW	45	<11%	350
Solar	GW	2X10 ⁶	<<<1%	-
Wind	GW	10	<1%	110
Geothermal	GW	10	<1%	15
Natural Gas	BCM	113	0%	-
Coal	MT	300	0%	-
Oil Shale	MT	253	0%	-

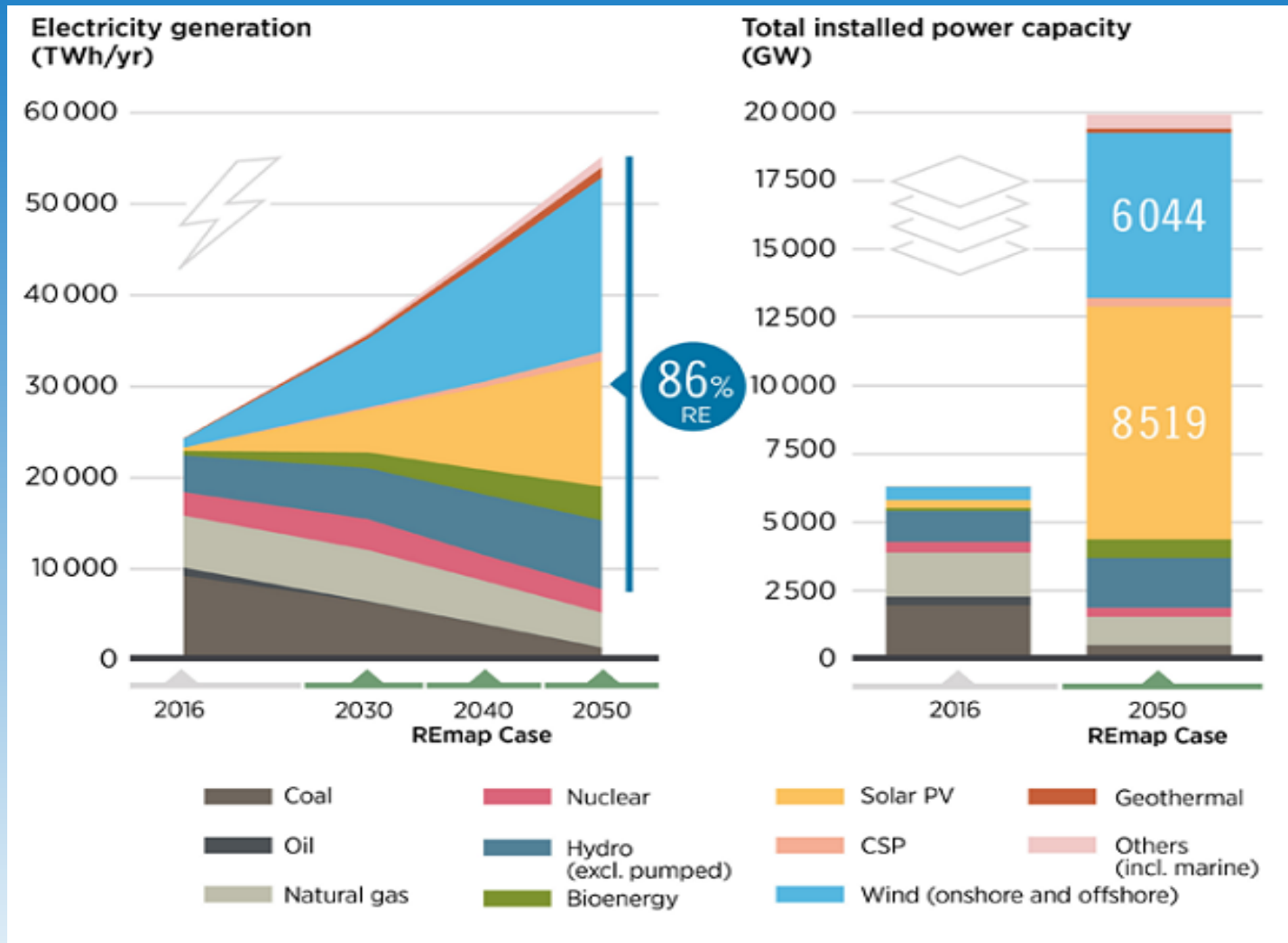
Notes:

- More than 44,444 times solar potential than that of hydropower on 1% land area coverage
- Effective wind speed for wind turbine: 3-25 m/s
- Wind speed in Ethiopia: 7-9m/s

Energy Development Initiatives

Initiatives	Target
GTP II - based on CRGE	17.3 GW (2020) and 25GW (2025)
National Electrification Program (NEP) ET and WB	35% population by off-grid (2025)
Ethiopian Electrification Program (ELEAP) – ET and WB	1 Mil HH connection and capacity building
Power Africa Initiatives (USAID)	Part of establishing 30 GW energy generation capacity across Africa and 4 Mil on-grid and 660 K off-grid connections by 2020
East African Power Pool (EAPP)	Cross border grid connections
Public-Private Partnership (PPP) Projects supported by AfDB and WB	‘Scaling Solar’ program – 500MW new solar capacity (priority)
GE Power	11HV substations S & SW Ethiopia
Electricity Network Reinforcement & Expansion Project (ENREP) - WB	Working Capital Loan to Private Companies and MFIs for Rural House Hold Solar Systems Distribution

Global Energy Transformation – A Road Map to 2050



- Solar PV would have the largest installed capacity expansion by 2050

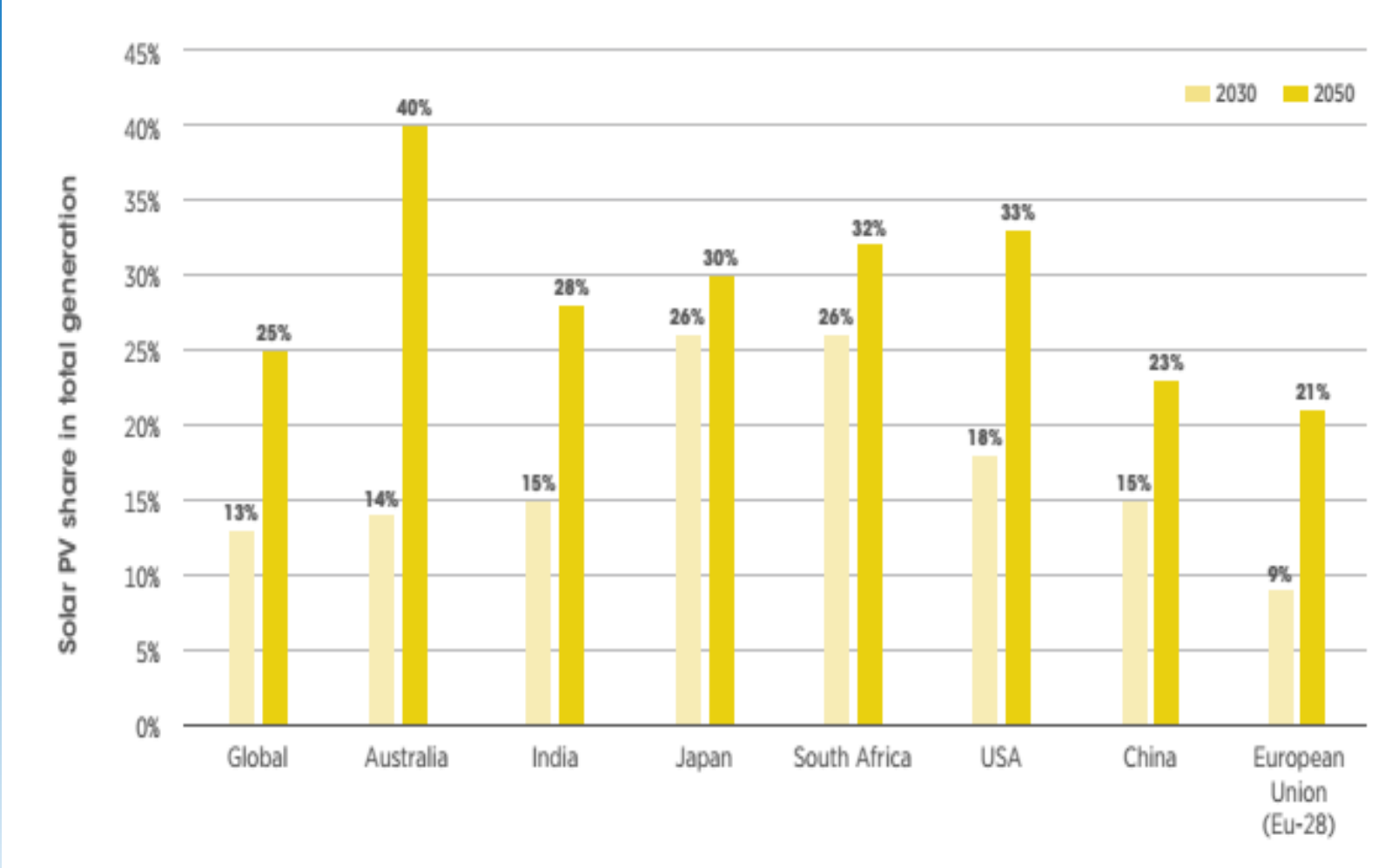
Global Comparative Weighted Average LCOE Trend

Resources	Average LCOE (USD/kWh)			
	2010	2018	2030	2050
Solar PV	0.110	0.085	0.050	0.032
Onshore Wind	0.085	0.056	0.040	0.025
Hydropower	0.036	0.047	0.050	0.050
Offshore Wind	0.159	0.127	0.080	0.052
Fossil Fuel	0.110	0.110	0.110	0.110

Notes:

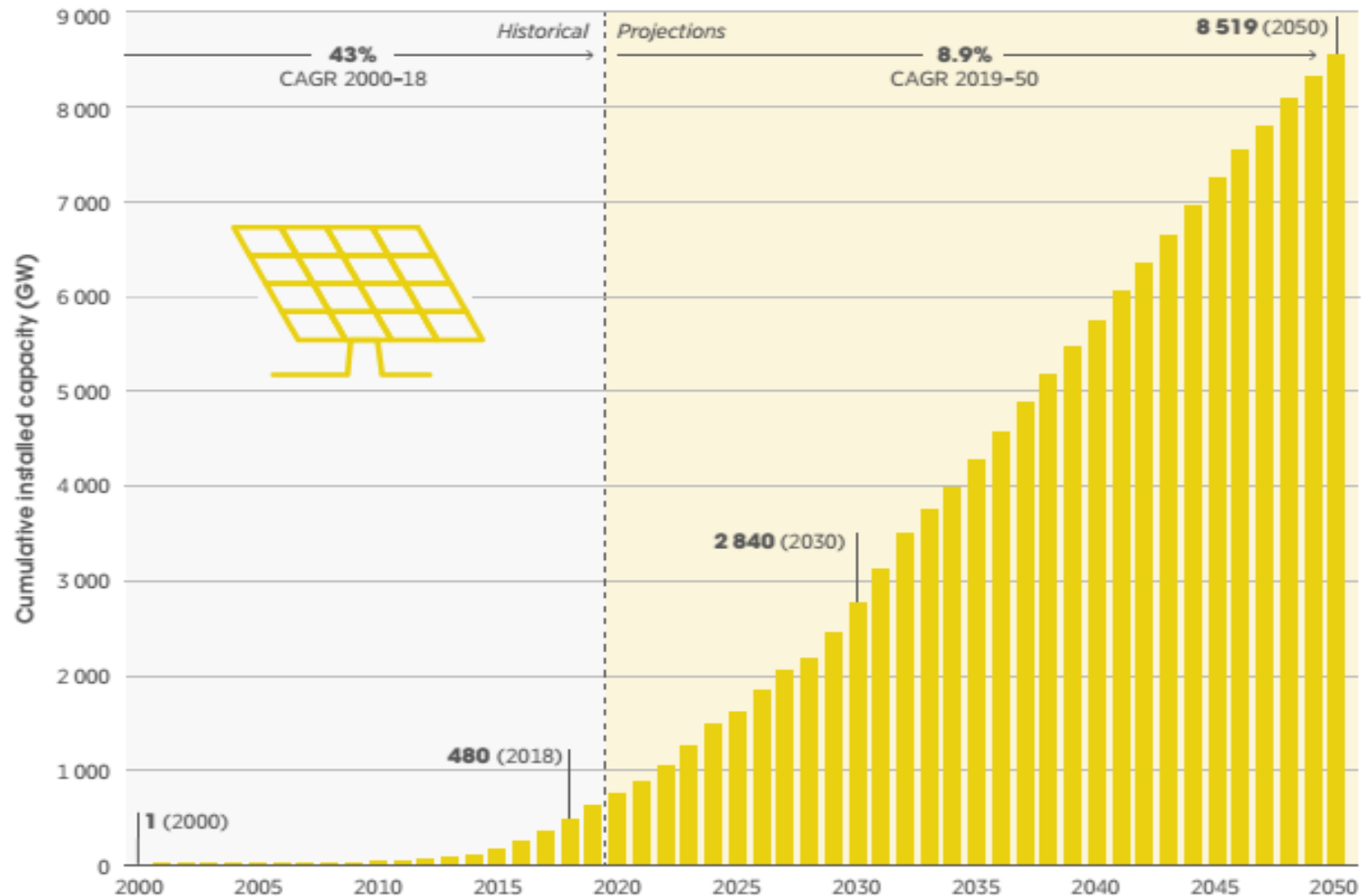
1. Solar PV generation capacity trend : 2018:2030:2050- 480:2840:8510 GW
2. The above cost is based LCOE data base. The cost based on Auction data base shall be lower than the above
3. LCOE for fossil fuel technologies refers to new capacity / new deployment
4. The LCOE of solar PV is already competitive now compared to all generation sources (including fossil fuels)
5. In the REmap analysis 100% electricity access is foreseen by 2030 in line with SDGs

Global Solar PV share penetration



A higher penetration of solar power in electricity grids is foreseen in various countries by 2030 and 2050

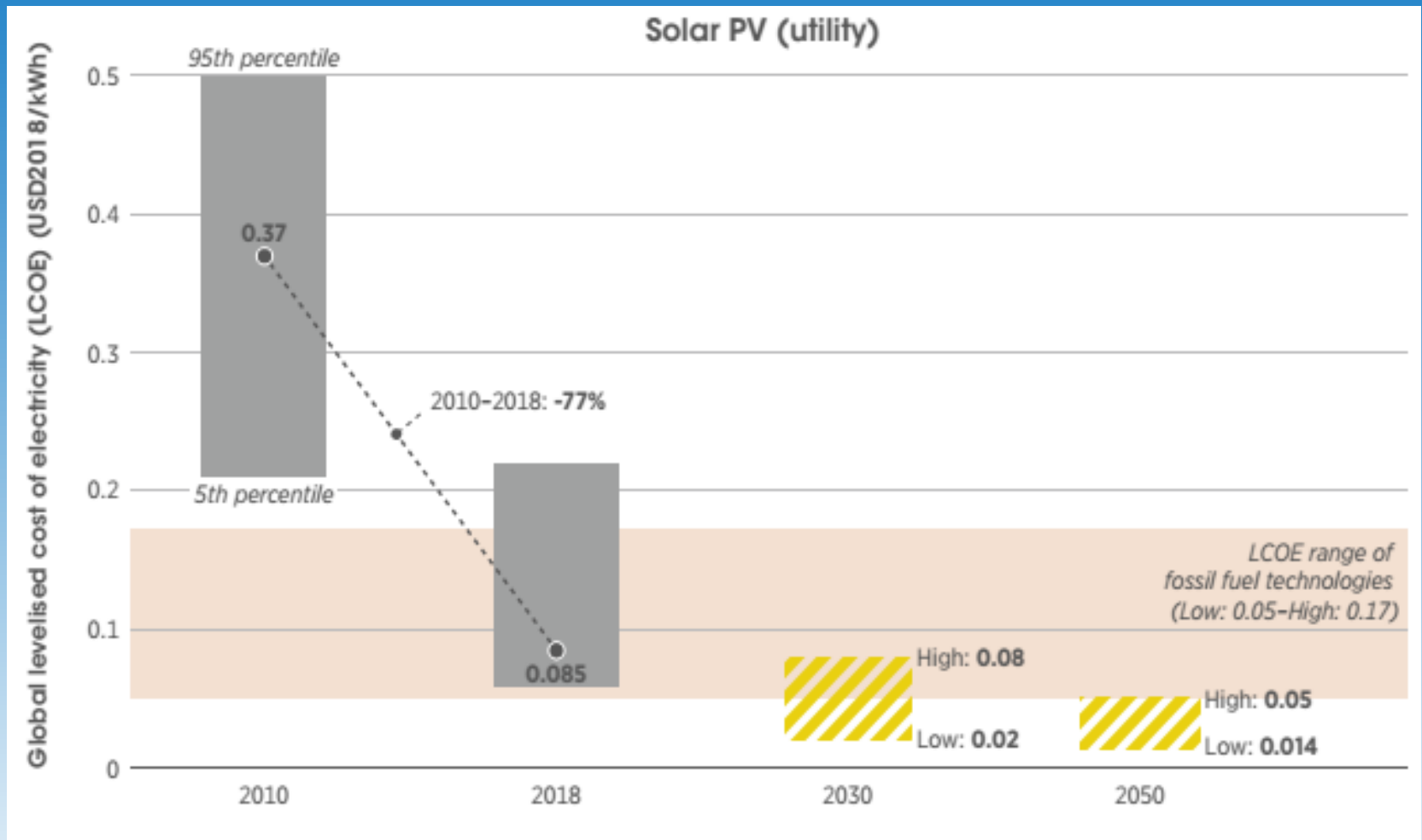
Global Solar PV Growth Trend



Sources: Historical values based on IRENA's renewable energy statistics (IRENA, 2019c) and future projections based on IRENA's analysis (2019a).

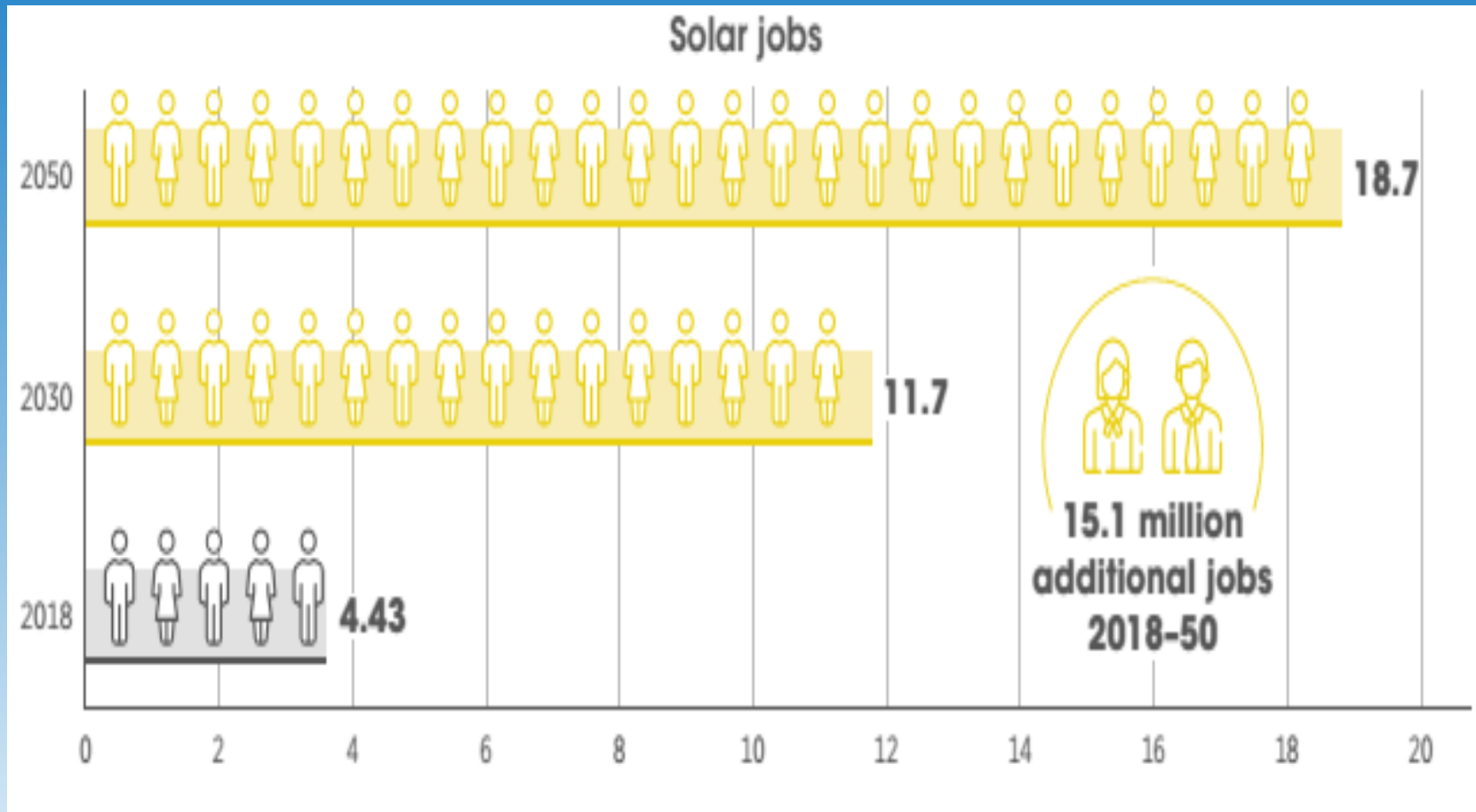
Compared to 2018 levels, cumulative solar PV capacity is expected to grow sixfold by 2030, with a CAGR of nearly 9% up to 2050

Global Solar PV LCOE cost trend



The levelized cost of electricity (LCOE) for solar PV is already competitive now compared to all fossil fuel generation sources and would be fully competitive in a few years.

Global employment opportunities through Solar PV



The solar industry employed 4.3 million people worldwide in 2018 and this number is expected to rise further to 18.7 million people by 2050 in the REmap case

Why Solar PV ?

- Immensely abundant resource
- Significant emission reduction is achievable
- Modular and distributed nature makes it adaptable to off-grid application and local conditions
- Rapidly changing innovations on solar PV value chain
- Increasingly competitive due to faster decline of installation costs
- Flexibility to effectively manage large scale variable renewable energy (VRE) sources
- High job creation potential with combined array of skills
- Easier transportation of equipment compared to other renewable solutions
- Faster implementation (e.g. 100 MW in 9-12 months)



Floating solar pump on Omo river (1,500m³/day)



Dire Dawa Village water supply
One Borehole (200m³/day, 18.5kw) and 3Boosters

Recommendations

- Should align our energy development plans with that of Global trend. Increase solar penetration of minimum 25 % energy mix.
- Conducive policy environment (such as feed-in tariffs and incentives) should be in place.
- Professionally led implementing institutions.
- Engage technical colleges in research, development and production of solar PV components.
- Attract investments in local manufacturing so as to take advantage of technology transfer and employment opportunities on value chain.

Responsible, transparent (zero corruption) and visionary leadership can make vision 2050 happen !!

References

- IRENA (2019), Renewable Power Generation Costs in 2018.
- IRENA (2018), Global Energy Transformation, A Roadmap to 2050.
- <https://www.usaid.gov/powerafrica/ethiopia>
- <https://eep.gov.et>
- <https://www.mowie.gov.et/rural-electrification> program
- <https://www.worldbank.org>

THANK YOU !!