EV GRID INTEGRATION

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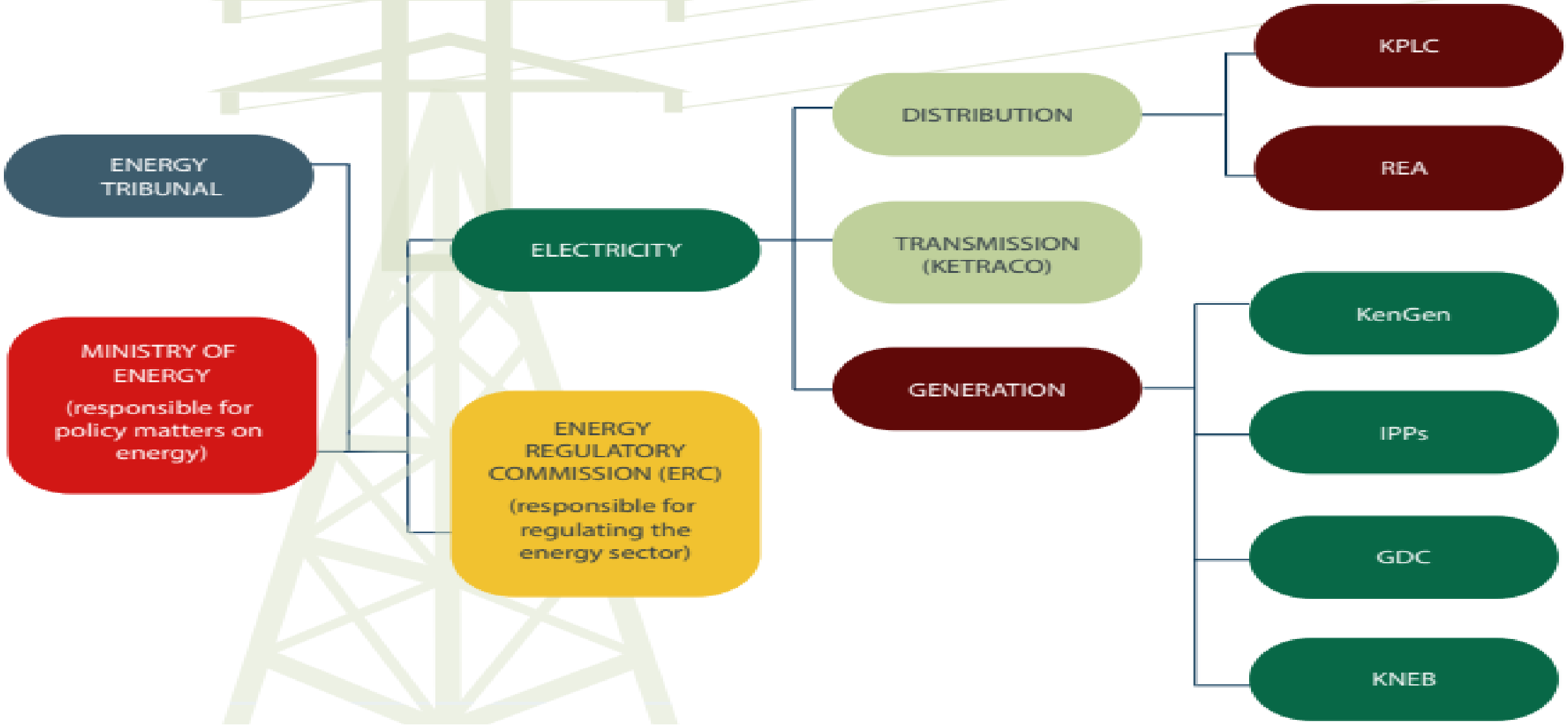
Kenya Power

TUNZA CUSTOMER

KPLC BUSINESS SUMMARY

TUNZA CUSTOMER

POWER SECTOR PLAYERS



KPLC Mandate

Our Vision:
Energy Solution Provider of Choice

Our Mission :

Powering people for better lives by innovatively securing business sustainability

Purchasing bulk electricity supply (Single buyer)

Power dispatch & System operator

Build & maintain a robust power network

Retail of electricity

Customer Service

Business Summary

50.1% Share ownership by GoK

Presence in **8** Administrative Regions & **49** Counties

~ **10,131** Total work force

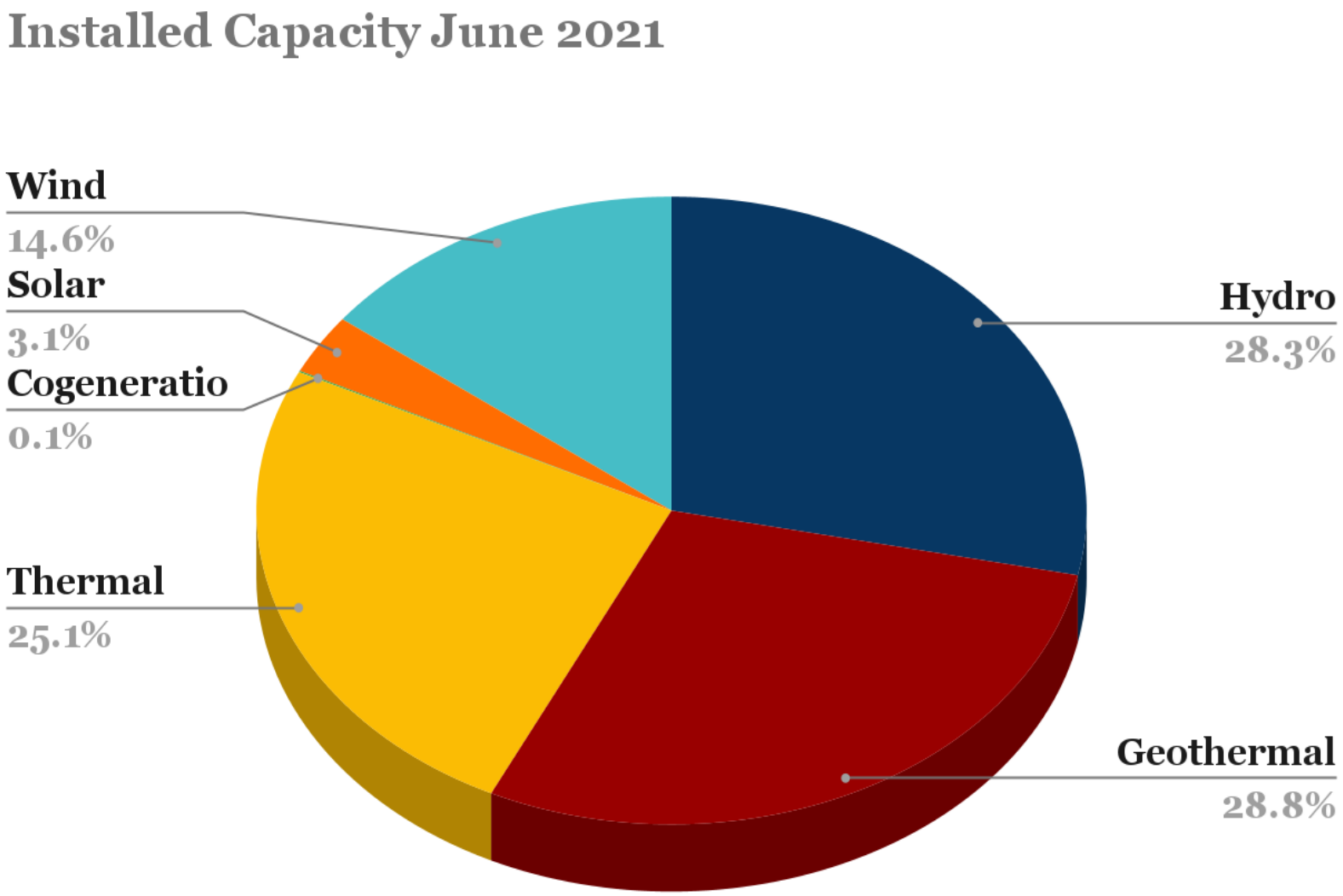
Total Customers **over 8.3 million**
~ **6 Million** Prepaid Customers

Total Energy Purchased: **12,101 Gwh**
Total sales: 9,202 GWh 2020/21

KEY STATISTICS CT'D

No	Statistic	June 2021
1	Installed Capacity (MW)	2,984
2	Effective Capacity (MW)	2,852
3	Effective Interconnected Capacity MW	2,828
4	Peak Demand (MW)	2,036
5	Reserve Margin %	7%
6	Energy Purchased 2020/21 (GWh)	12,101
7	Number of Customers	8,283,461
8	Transmission and Distribution Lines, Circuit Length in Kilometers (11kV - 400kV) 2020/21	86,986

INSTALLED CAPACITY

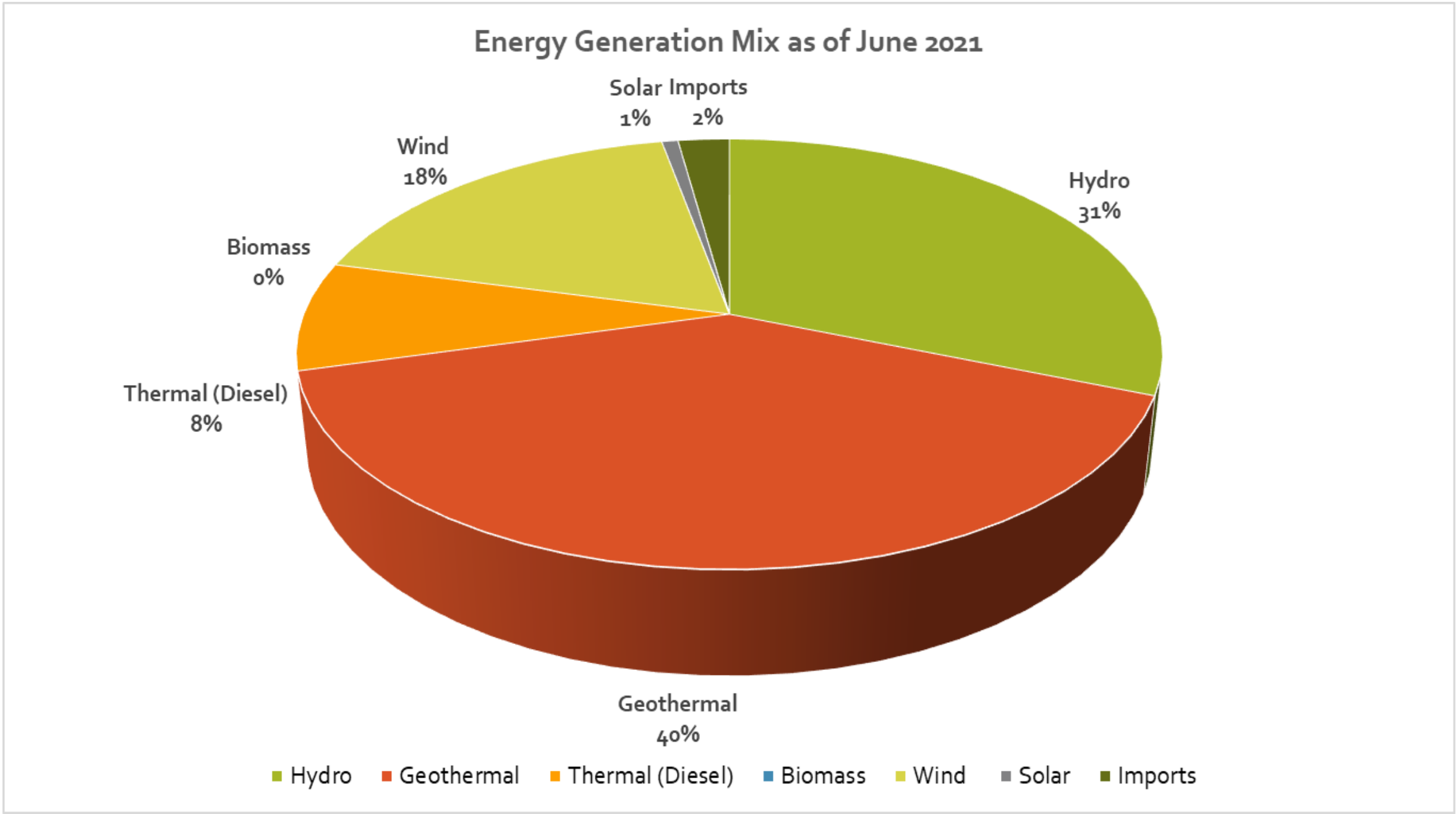


Installed Capacity

	Installed (MW)	Effective / Contracted (MW)	% Installed	% effective
Hydro	839	810	28.1%	28.5%
Geothermal	863	791	28.9%	27.8%
Thermal	646	622	21.9%	21.6%
Wind	436	426	14.6%	15.0%
Biomass	2	2	0.1%	0.1%
Solar	170	170	5.7%	6.0%
Interconnected System	**2,956**	**2,821**	**98.8%**	**99.2%**
Off grid thermal	32	21	1.1%	0.7%
Off-grid Solar	2	1.9	0.1%	0.1%
Off-grid Wind	1	0.0	0.0%	0.0%
Total Off-grid	**35**	**23**	**1.1%**	**0.8%**
Total Capacity	**2,991**	**2,845**	**100.0%**	**100.0%**

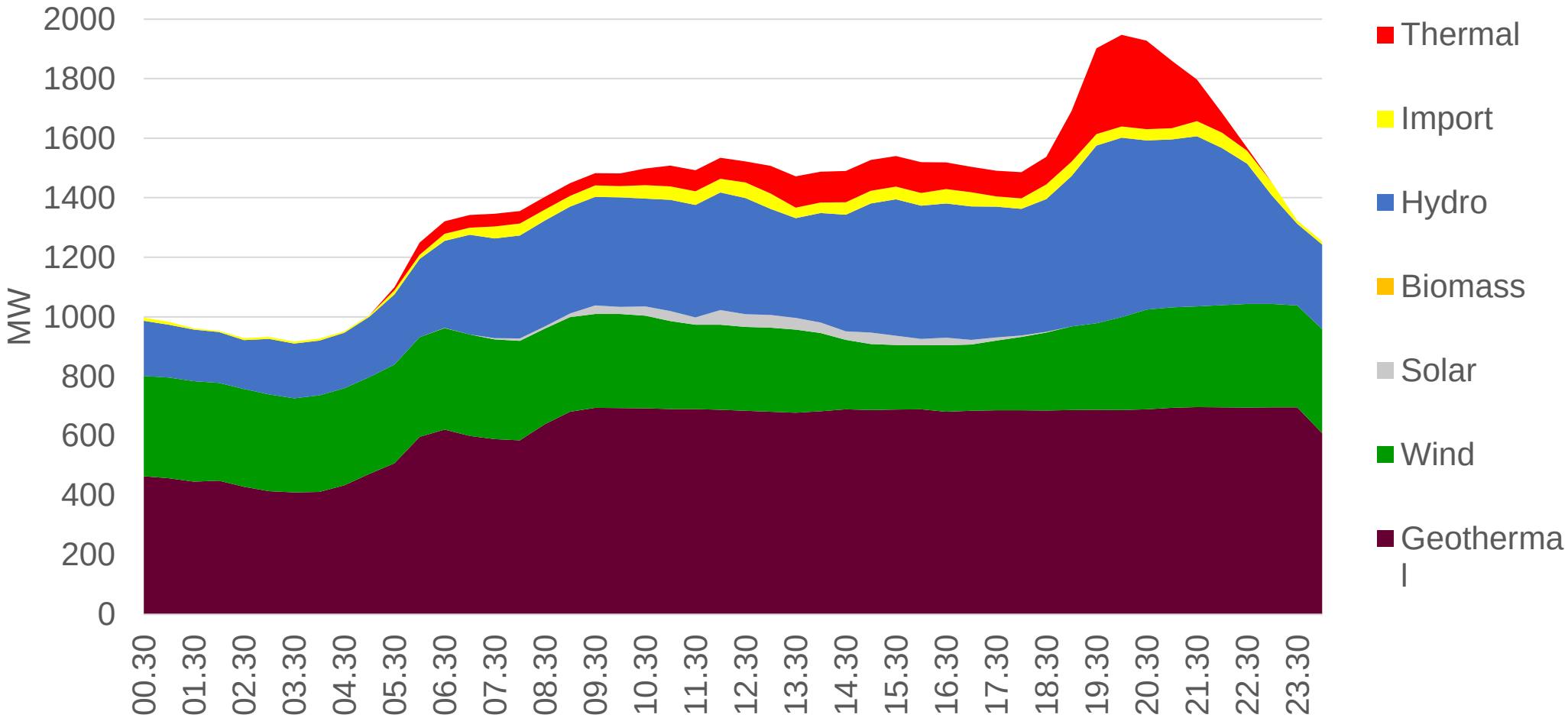
Peak Demand = 2,036 MW; Availability about 2,200 MW; Off-peak demand: 1000-1,200 MW

GENERATION MIX



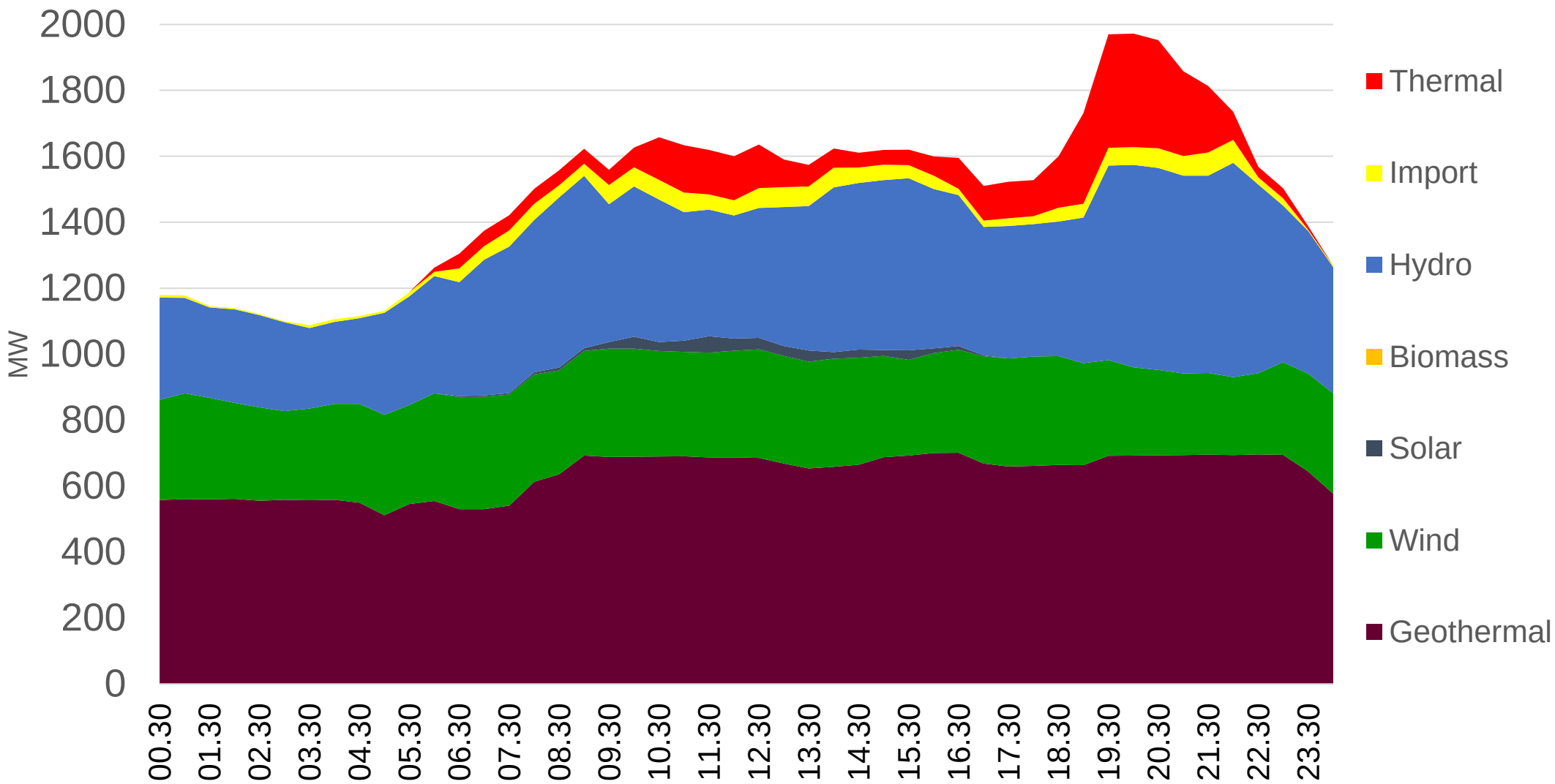
Typical Daily Dispatch

Monday

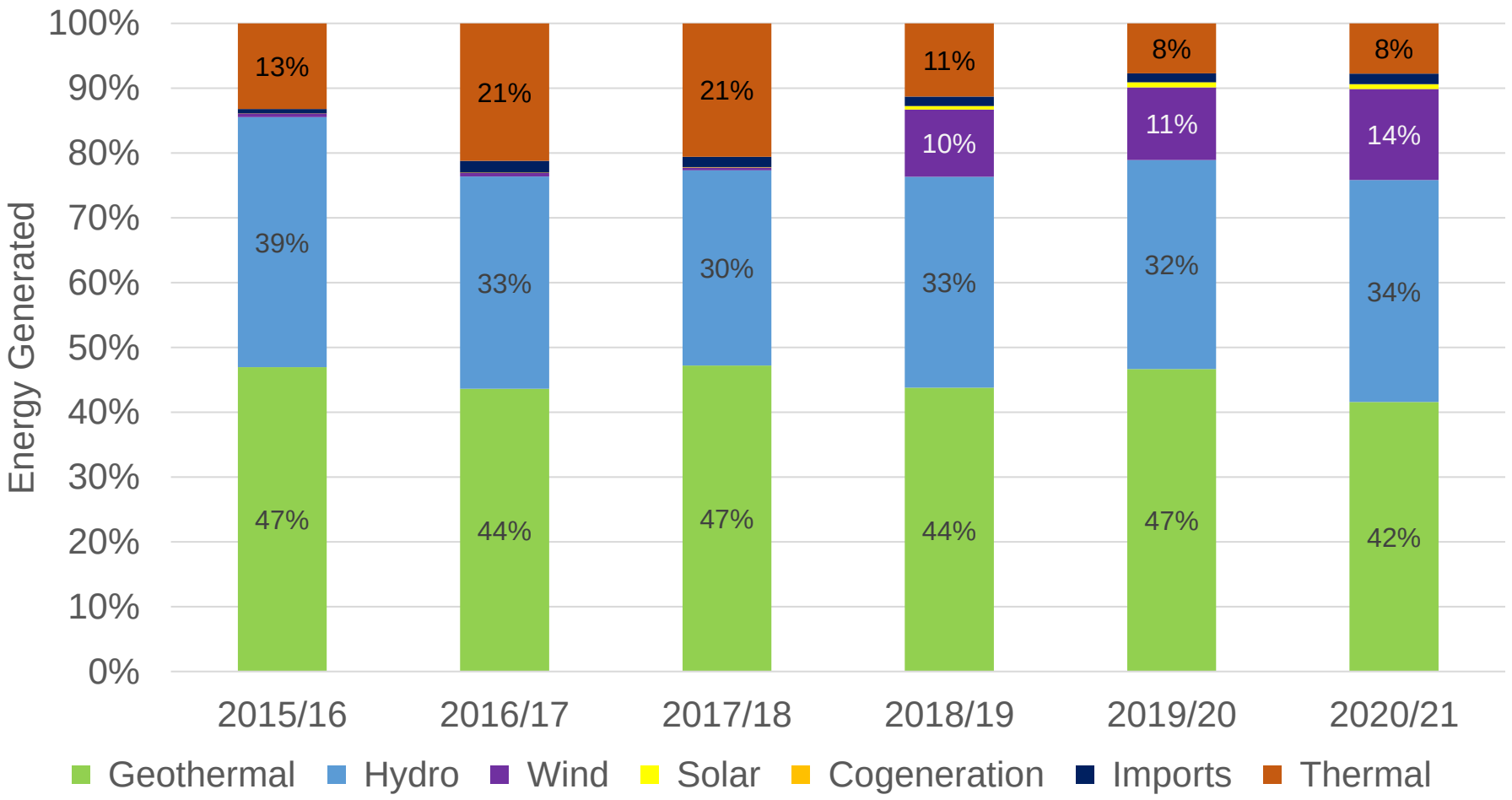


Typical Daily Dispatch

Tuesday

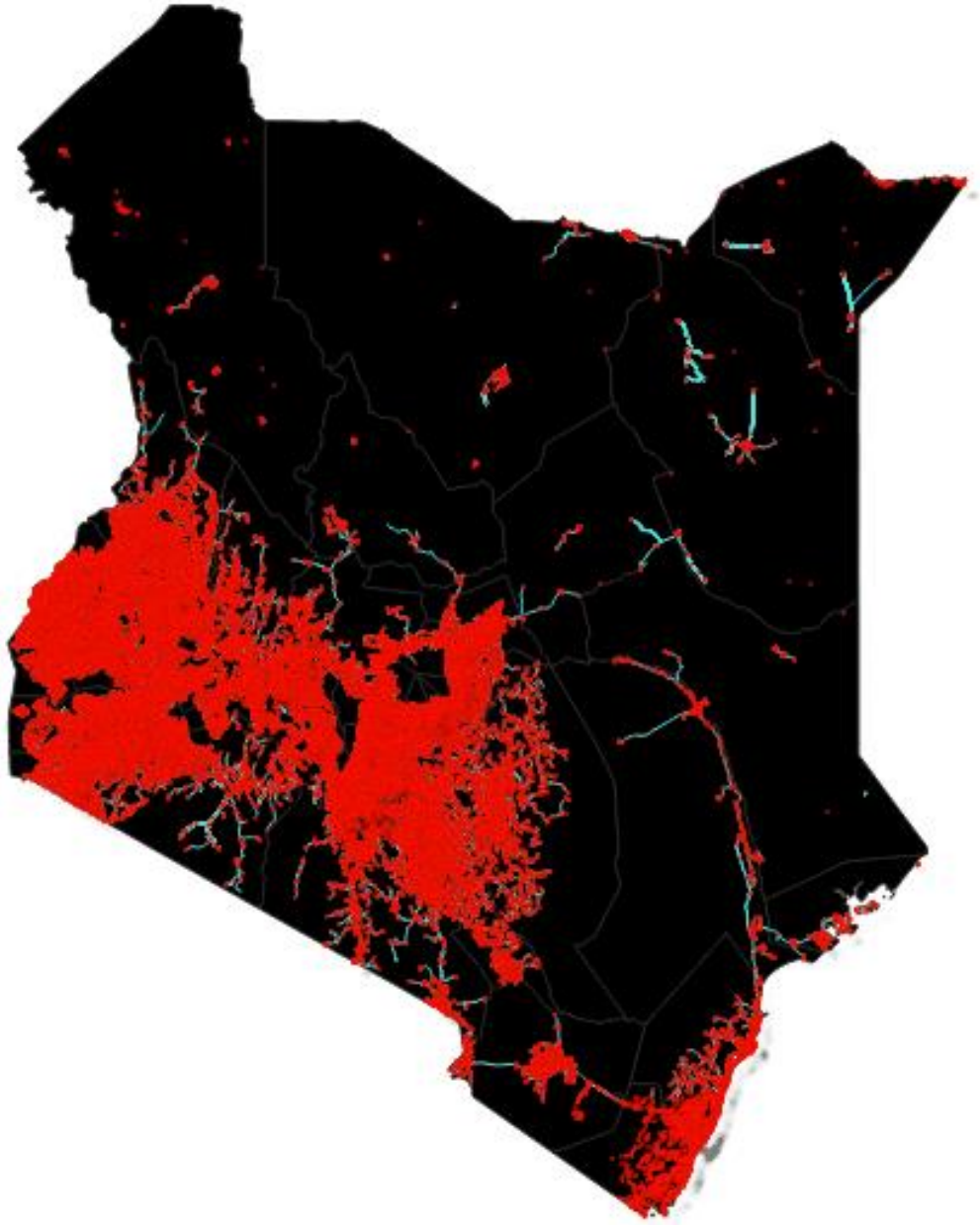


Annual Energy Generation Mix



TYPICAL SYSTEM PERFORMANCE DATA			
MONTH	SAIFI	CAIDI	SAIDI
Jul-20	1.645	3.778	6.216
Aug-20	1.904	5.024	9.568
Sep-20	2.154	4.894	10.542
Oct-20	2.134	4.643	9.905
Nov-20	2.136	4.166	8.9
Dec-20	1.727	4.138	7.148
Jan-21	1.624	4.195	6.815
Feb-21	2.525	4.02	10.152
Mar-21	3.595	3.409	12.255
Apr-21	3.535	3.863	13.658
May-21	3.671	3.823	14.034
Jun-21	2.641	3.31	8.741
	29.291	4.0263	117.934

Kenya 33kV Network & Distribution Transformers



Grid access available on major transport corridors

EV-GRID INTEGRATION

TUNZA CUSTOMER

EV INTEGRATION FORESEEN CHALLENGES

- Energy Capacity is not a pressing problem
- System stability : Large charging installations could engender overloading of distribution substations
- Driver habits & culture:
  - Range anxiety could mean dense distribution of charging points
  - High charging load coincidence at early evening (6-7:30PM) could arise due to driver habits
- Domestic Installations: Can these support additional EV loads used simultaneously with domestic appliances?

Vehicle-Grid Integration Key Action Points

- Data-driven geospatial planning and prediction of time and place for EV load
- Management of EV charging cycles to limit significant peak load spikes, without affecting convenience of EV charging
- Aggregation of EVs to provide grid ancillary services, drive demand response
- Considering the enablement of direct use of onsite renewable energy generation for charging.
- Enhancement of renewables at the distribution and transmission level.
- Providing onsite backup power and improve grid resilience.
- Smart charging should be mandated to allow for control of large charging loads
- Vehicle-to-building and vehicle-to-grid setups can allow EV batteries to be intelligently deployed to meet local building and local distribution grid short-term energy needs respectively

KPLC E-MOBILITY CONTEXT - SUMMARY

- Kenya has sufficient installed capacity to support E-mobility growth
- Kenya's generation mix is significantly decarbonized, hence setting a foundation for clean transportation
- Investments in grid infrastructure reinforcement has resulted in a more reliable and resilient power grid; setting the stage for massive rollout of charging infrastructure
- E-mobility promises to not only encourage demand stimulation, but also offers opportunities for demand-side management initiatives
- Retail tariffs are presently regulated
- Flexible electricity retail pricing would have the benefit of encouraging off-peak charging

KPLC'S ROLE

- Connection of E-V players to the grid
- Provision of quality reliable power
- Planning for EV power demand growth

Thank You.

Kenya Power

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