Investment Opportunities in Kerala- Energy & Aviation

Reliable market with Assured returns

Focus Areas

Power Sector

- Small Hydro projects
- Wind power projects
- Energy storage solutions
  - Battery Energy Storage Solutions (BESS)
  - Pumped Storage Plant (PSP)

Aviation Sector

- Sea Planes
- Flight Training Academy
- Flight Simulators
- Maintenance, Repair, and Overhaul (MRO) Training

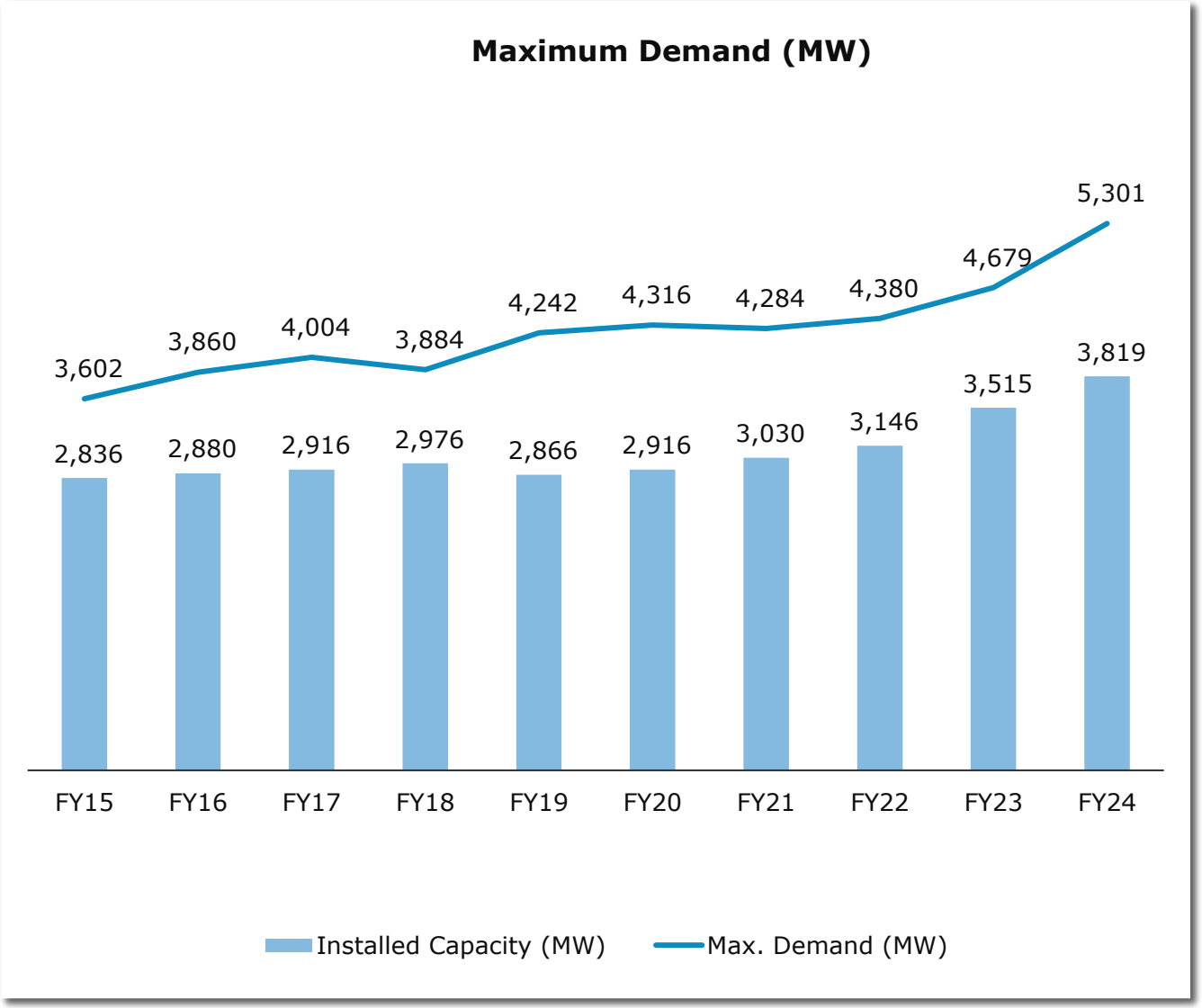
Transport Sector

- Electric Vehicle charging infrastructure- Recharge and Refresh

Power position in Kerala

**Figures as on 31 March 2024*

Source	Installed Capacity (MW)*
Hydro	1,938
Small Hydro	245
Solar	1,027
Thermal	537
Wind	71
Total	**3,819**

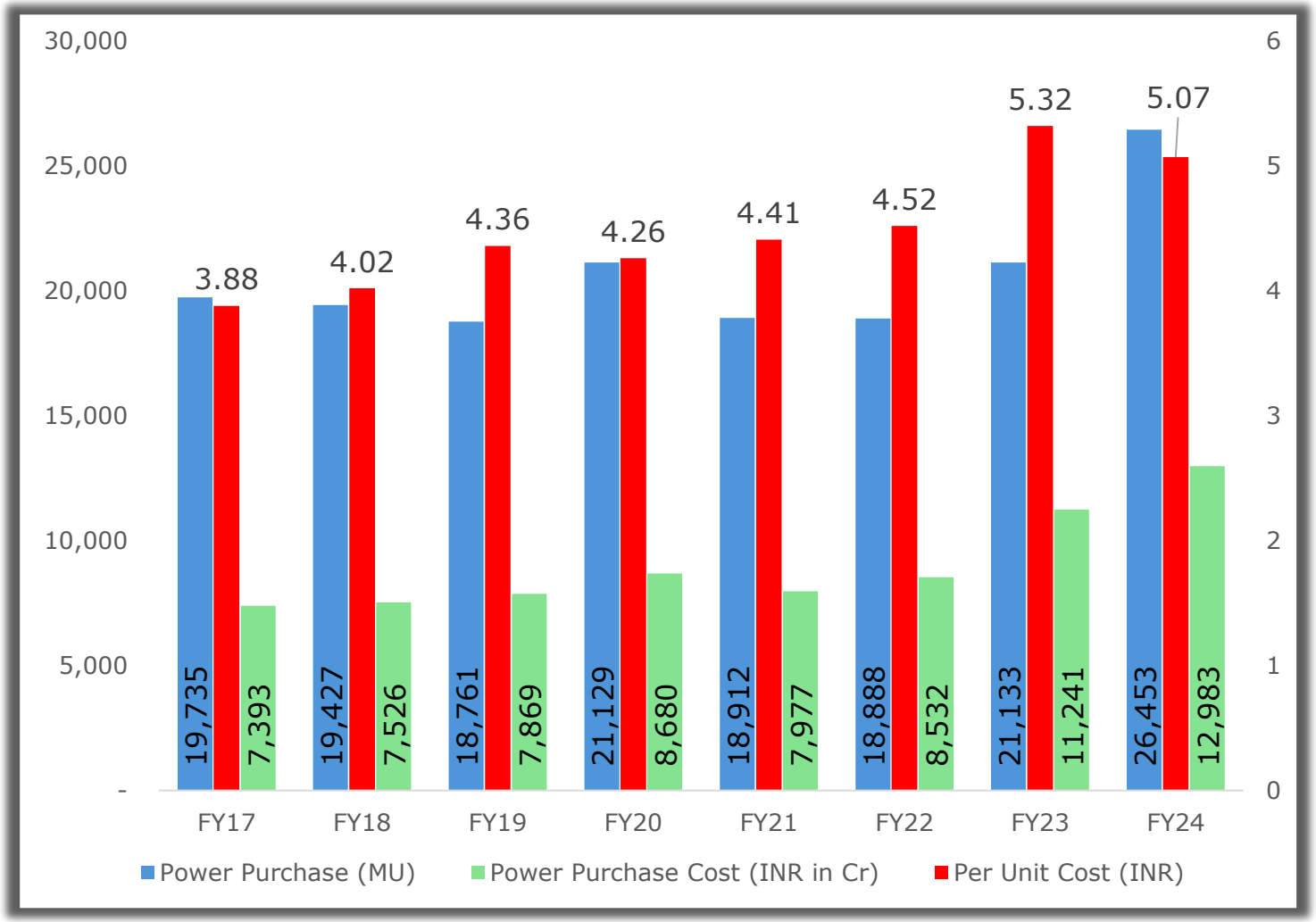


Power position in Kerala

*Figures as on 31 March 2024

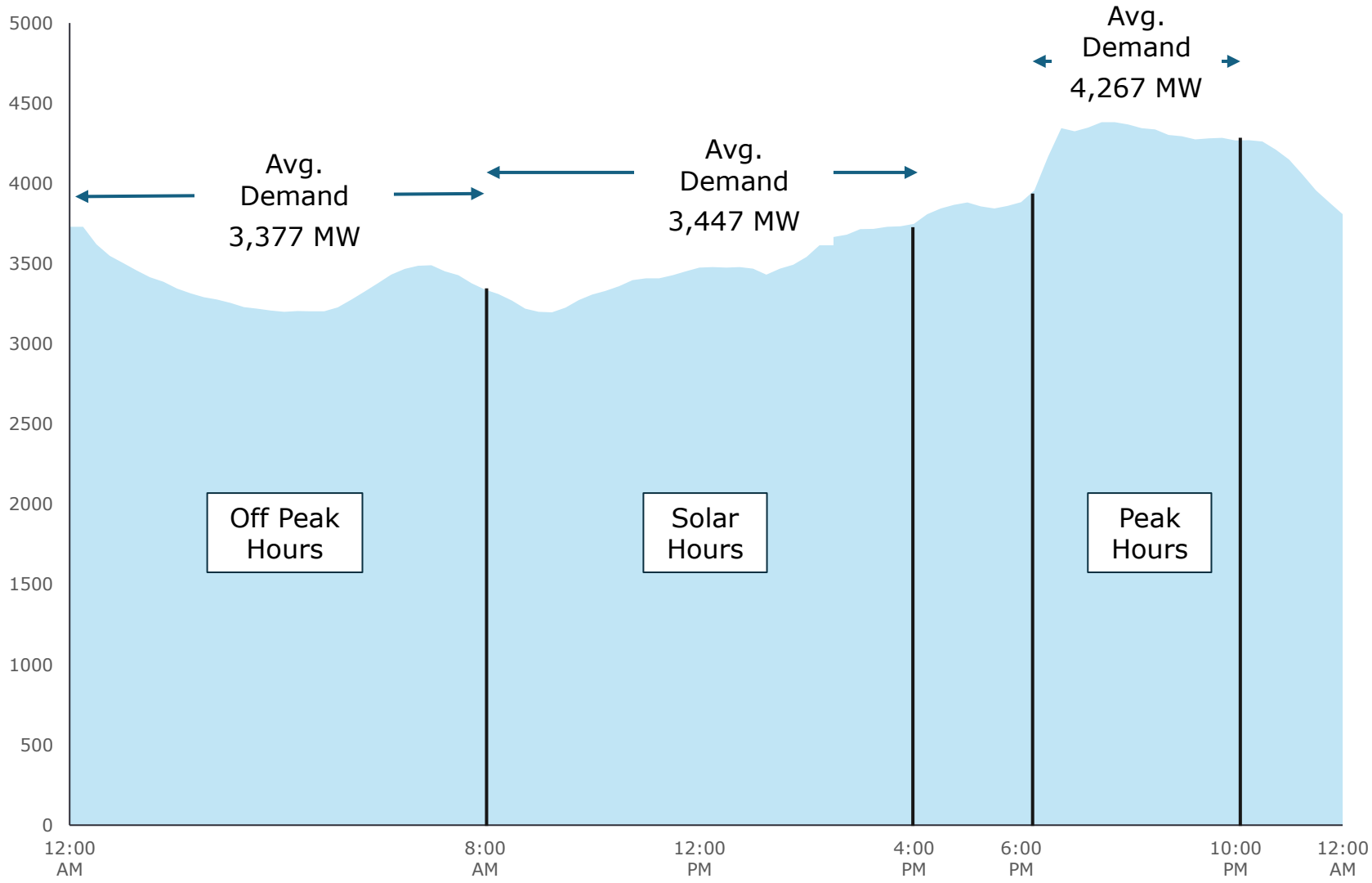
The power purchase quantum has grown at a CAGR of 4% from FY17 to FY24

Long Term PPAs	Contracted Capacity (MW)*
CGS	1,537
LTA (IPPs)	750
LTA (RE IPPs)	575
Total	**2,862**

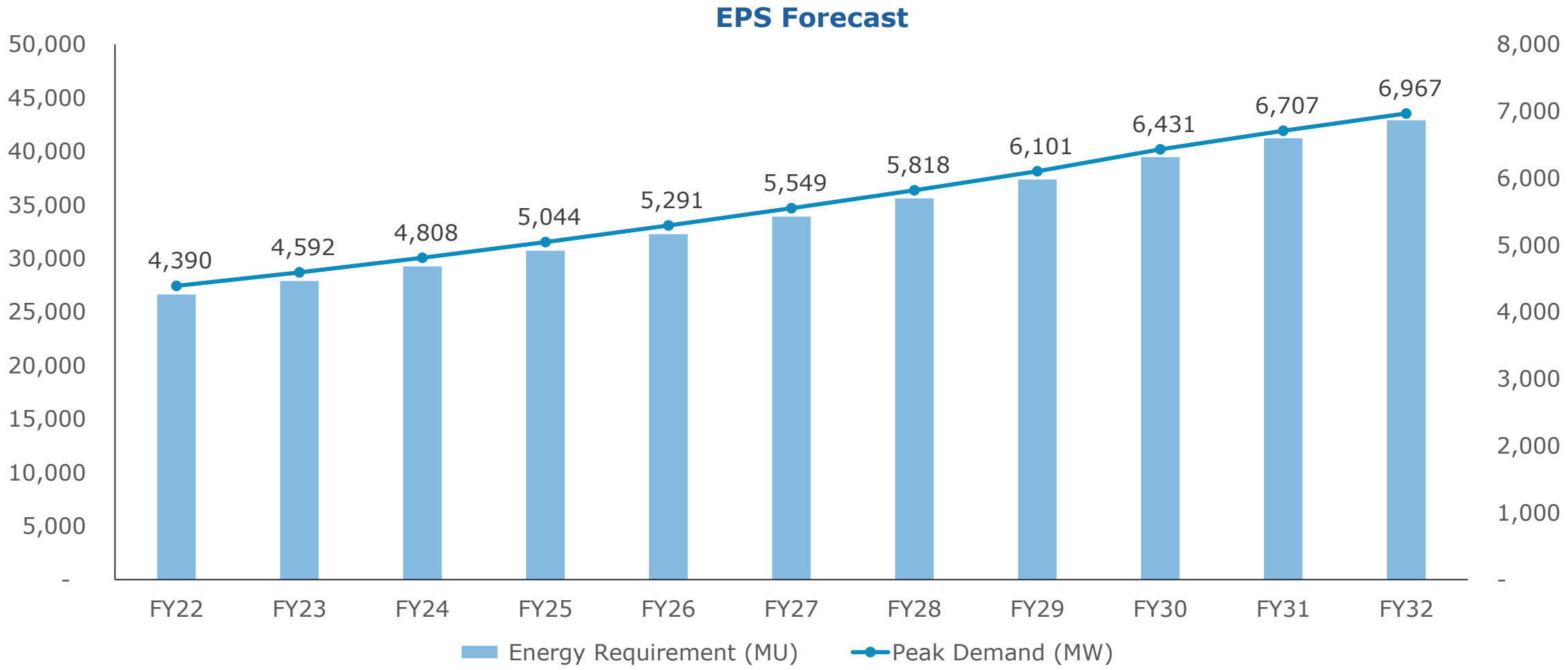


Demand Curve – A typical day snapshot

- Difference in average demand solar and peak hours upto 800 MW
- Summer months, expected peak demand ~5,700 MW
- Difference of average demand between solar and peak hours over ~1,000 MW
- Met through purchases from outside the state



Power position in Kerala – EPS Forecast



Source: REPORT ON TWENTIETH ELECTRIC POWER SURVEY OF INDIA (VOLUME-I)

KSEB Power Vision 2030

KSEB aims for 10,000 MW own installed capacity by 2030

Proposed additions in pipeline

New solar projects

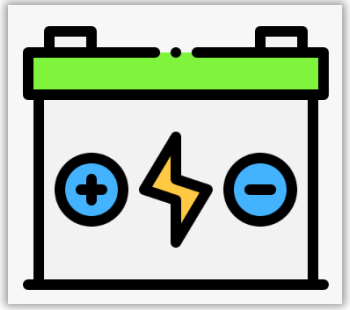
500 MW

New hydro projects

1,500 MW

New wind projects

530 MW



Battery Energy Storage

750 MW
for 4 Hrs

Pumped Storage

2,000 MW
for 6 Hrs

Wind energy

- Already 72 MW Generation in Kerala
- Very liberalized approach
- Single window at KSEB
- Invest in KSEB land/ own land
- KSEB to give INR 4.09/unit (proposed)
- Life period of wind project is 25 years
- Ideal location: Palakkad
- GoI Industrial Corridor coming up
- Investment: INR 6-8 Cr./MW

Wind Power in Kerala

Potential

- 1,200 MW at 120 m hub height
- 2,600 MW at 150 m hub height
- 17 locations in Palakkad, Idukki and Trivandrum identified for high wind speed

Projects

- 370 MW projects currently planned
- Locations: Ramakkalmedu Attappady, Mankuthimedu and Pappanpara and Ponmudi

Battery Energy Storage System (BESS)

- 1,200 MW installed capacity only during solar hours
- Surplus power from Rooftop Solar
- Solar power from outside at low cost
- Need to store energy during daytime
- Discharge at night (peak hours)
- 270 MW/540 MWh sanctioned by GoI with INR 135 Cr subsidy
- SPV by KSEB
- Investment opportunity as equity partner

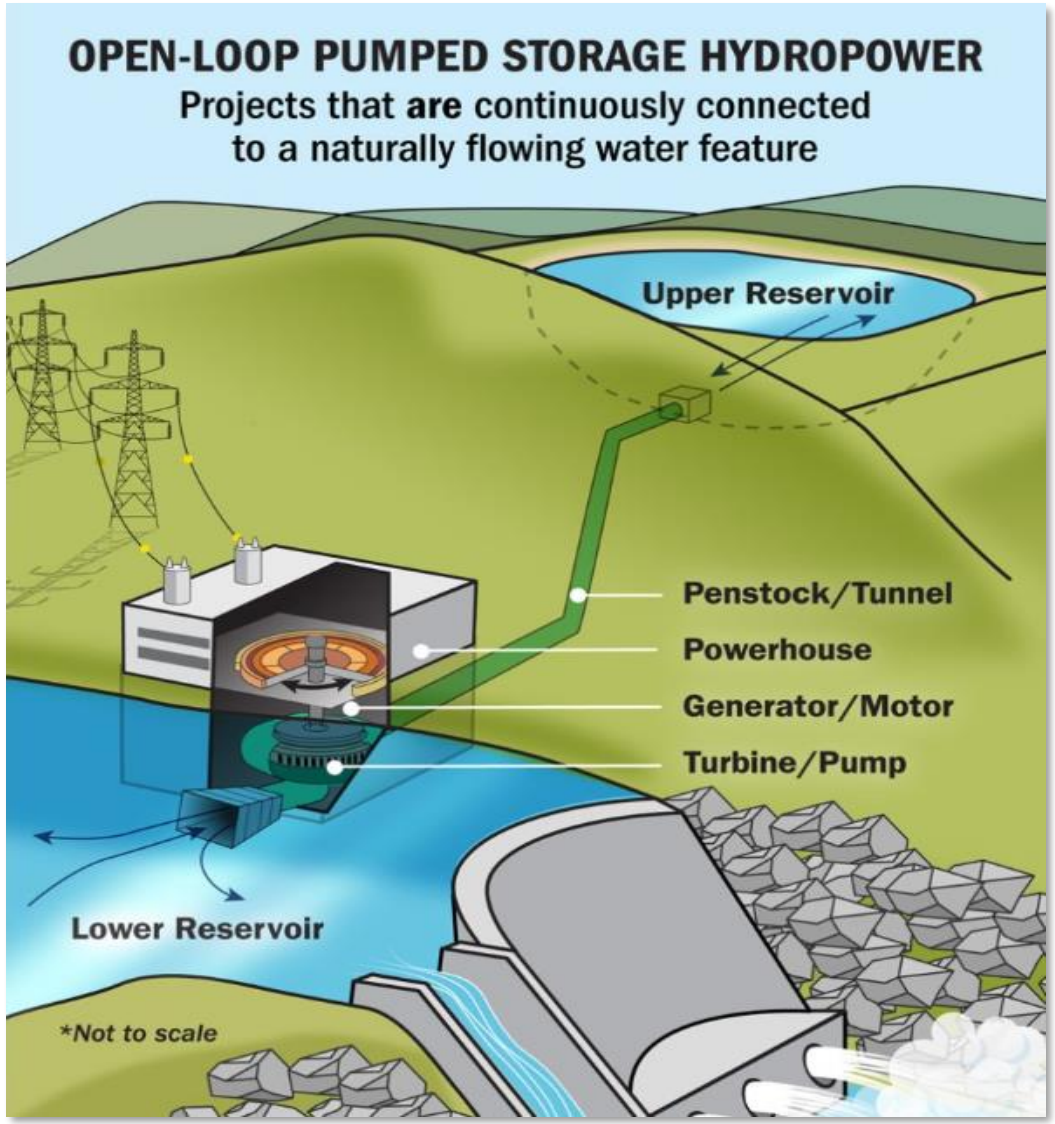
Battery Energy Storage System (BESS)

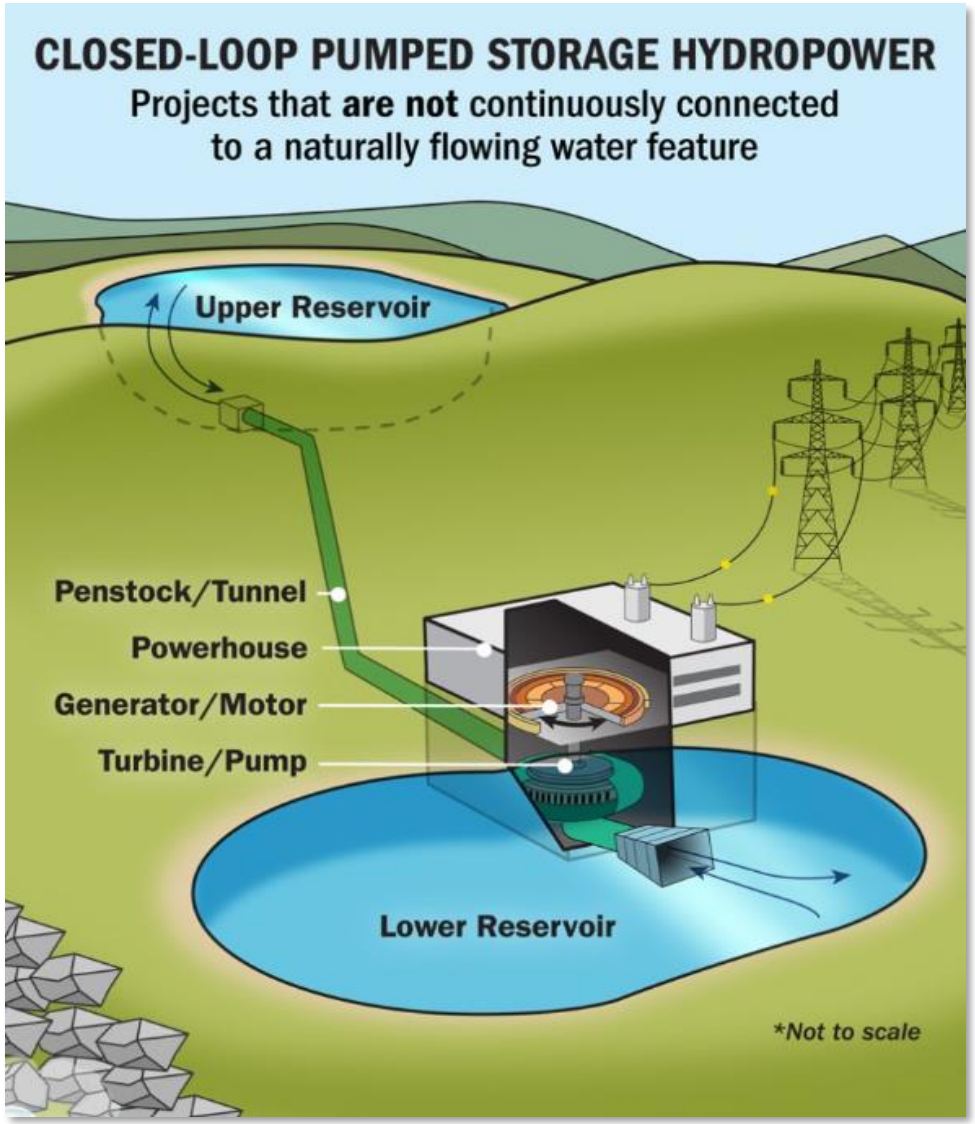
- Power Purchase ~ INR 5/unit for peak hours by KSEB
- 30% of the VGF offered by GoI
- KSEB to offer VGF to investors to add 3,000 MWh BESS
- Proposed locations near substations
- The proposed plans do not require separate power evacuation facility
- BESS Parks with private land near power evacuation also planned

Pumped Storage

- Capital cost around INR 9 Cr./MW
- Pump to upper reservoir using cheap power during day @ INR 1-3/unit
- Discharges during peak hours when price from INR 6/unit to 10/unit
- Existing Dams/ Hydel Projects can be used
- Quarries could be converted easily

Pumped Storage





Potential PSP projects in Kerala- Investment requirement of INR 30,000 Cr.

Sl.	Name	Capacity (MW)	Head (meter)	District	Investment (INR Cr.)
1	Kakkayam	800	700	Kozhikode	7,200
2	Idukki	700	562	Idukki	6,300
3	Pallivasal	600	445	Idukki	5,400
4	Upper Chaliyar	360	600	Malappuram	3,240
5	Amruth Pamba	300	400	Pathanamthitta	2,700
6	Idamalayar	180	194	Ernakulam	1,620
7	Marayoor	160	250	Idukki	1,440
8	Mudirappuzha	100	140	Idukki	900
9	Poringalkuthu	100	160	Thrissur	900
10	Manjappara	30	147	Wayanad	270
Total					**29,970**

Investment @ INR 9 Cr./MW

RPCKL – Renewable Power Corporation of Kerala Ltd.

Aerial view of 50 MW solar plant at Kasargod under RPCKL

- 3000 MWh BESS in 4 years
- 750 MW each for 4 hours
- Total investment required is INR 10,500 Cr. (@ INR 3.5 Cr./MW)
- 30% GoI subsidy
- 20% by KSEB
- 40% to be brought in by developers
- Investment as Equity/ Bonds, etc., through RPCKL

Small Hydro Electric Projects (SHEP)

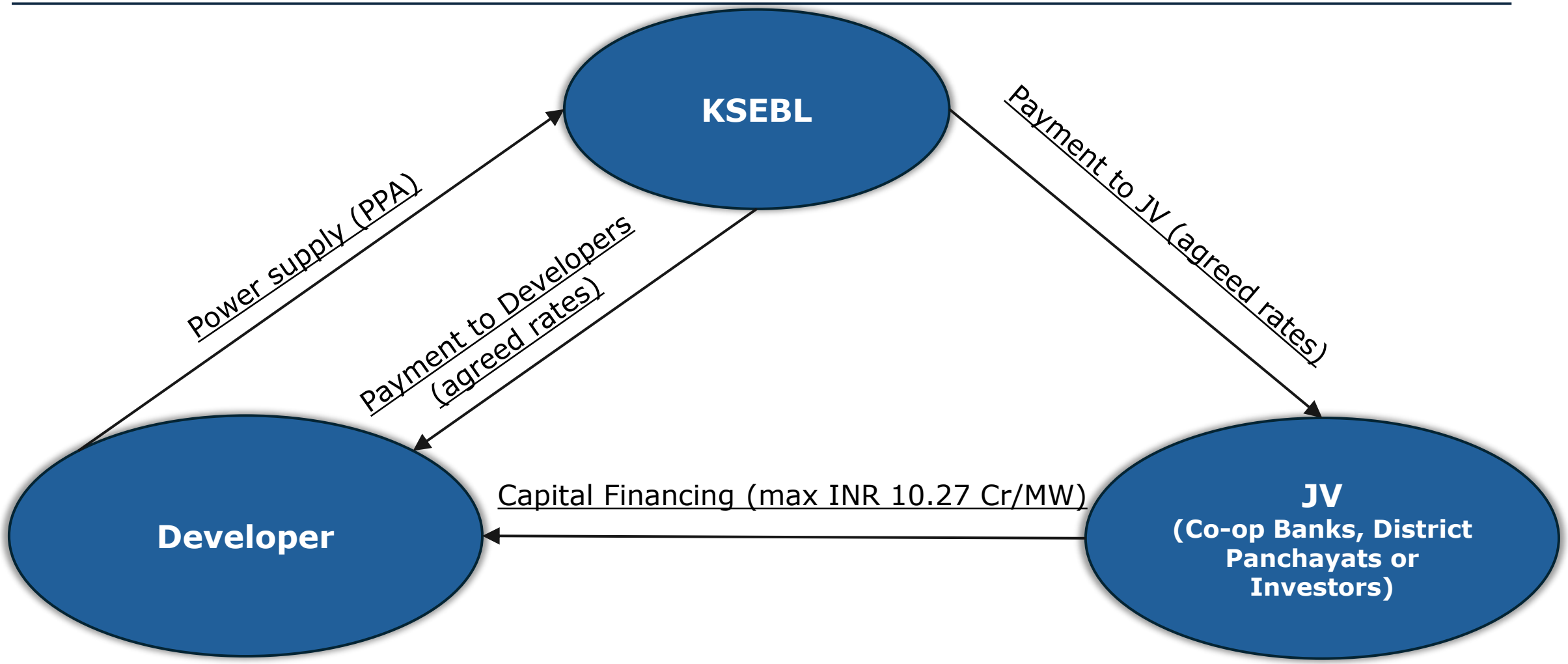
- Small hydro-electric projects <25 MW
- 19 identified SHEP in 9 districts
- Cumulative capacity of proposed SHEP ~92.8 MW
- Several locations could be ideal
- Mukkudam is a crowd funded project by fresh graduates

District	No of Projects	Cumulative capacity of projects (MW)
Kozhikode	7	34.1
Idukki	5	25
Pathanamthitta	1	8
Kottayam	1	7
Malappuram	1	6.5
Kollam	1	4
Palakkad	1	3.5
Wayanad	1	3.2
Kannur	1	1.5
Total	**19**	**92.80**

Mukkudam SHEP- 4MW

- First self-identified SHEP in Kerala as per Kerala SHEP 2012 Policy
- It is a crowd funded project
- Promoters were classmates at engineering college
- Total Capital Expenditure of the Project: INR 29.81 Cr., i.e., INR 7.45 Cr./MW
- Estimated Annual Power Generation: 11.09 Million Units
- Estimated annual revenue @ INR 4.25/unit: INR 4.71 Cr
- IRR around 20%; Payback Period- ~6 years
- Revenue for 25-50 years without capital investment

SHEP Transaction Model



KSEB guarantees timely payment to developer and investor

Kerala EV Strategy - Growth Projections

Kerala leads India in electric passenger vehicle adoption

EV charging stations with amenities for refreshment and relaxation hold high potential

Existing infrastructure	
1,169	Pole mounted slow chargers
63	Fast charging stations

Increased EV usage necessitates robust charging infrastructure

Business models can merge EV charging with dining, leisure, and retail services

Common charging infrastructure for all the vehicles

Kerala's evolving travel dynamics and transport growth present opportunities for integrated refreshment centres

Recharge & Refresh

- Investment opportunity around INR 50 lakhs
- Minimum 4 vehicles to charge
- Restaurant/Teashop + Toilets (add on)
- Advertisement Facility / LED Wall
- Illumination board as per R&R Design
- Rate of Charging shall be displayed (TOD)
- Also possible in wayside private land
- No app/ No prepaid wallet/ QR code-based payment

Business case of EV charging

- KSEBL is the State Nodal Agency for EV Charging Infrastructure
- KSEBL has installed 63 Fast Charging Stations in Kerala
- The stations are heavily underutilized due to
  - Outdated chargers
  - No refreshment facilities
  - No toilet facilities

Corporation	17 Locations
Municipality	17 Locations
Panchayat	29 Locations

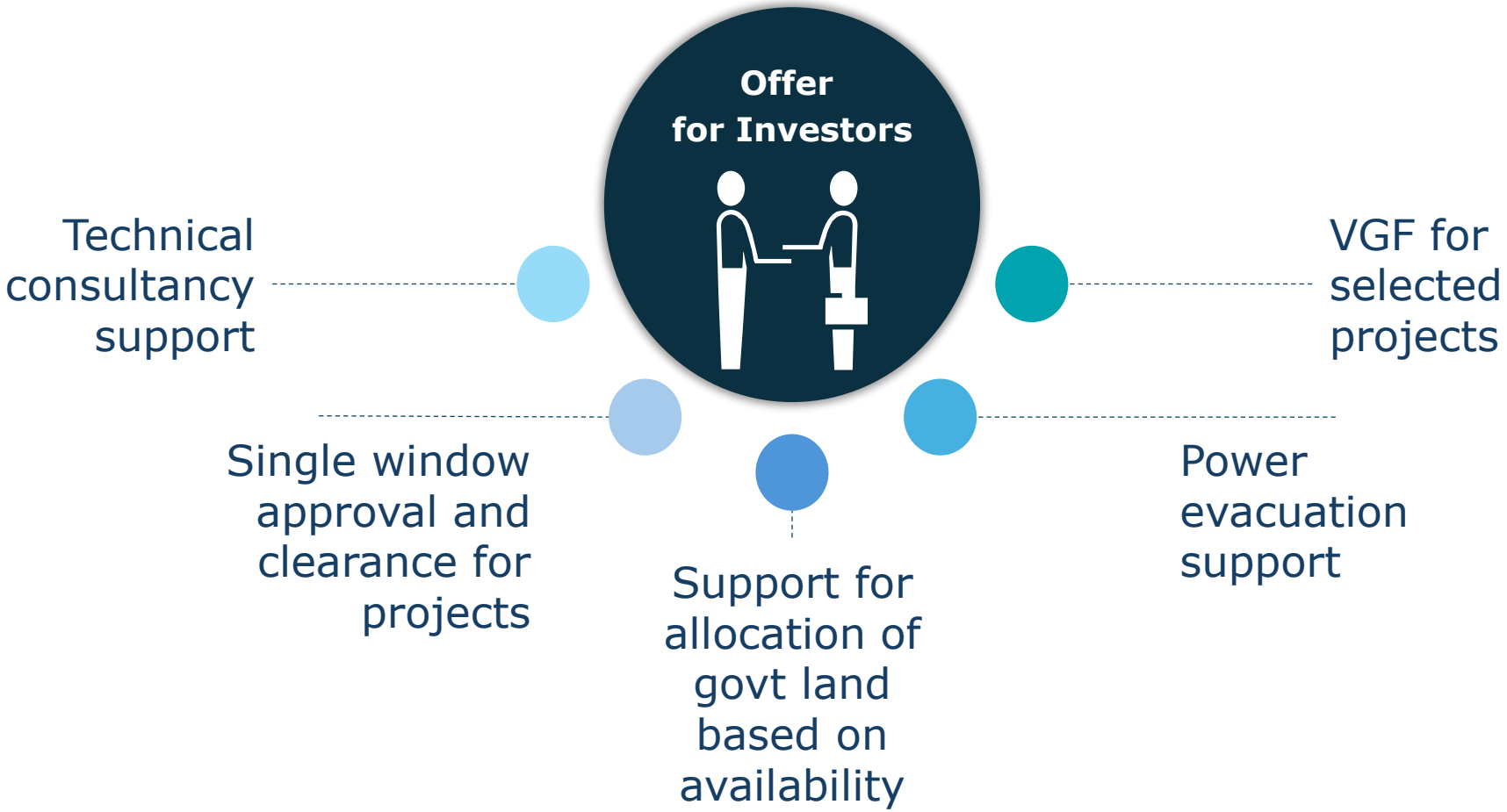
Present (Just EV Charging) v/s Proposed (Recharge & Refresh)

22

The investment opportunities in ESS and RE projects

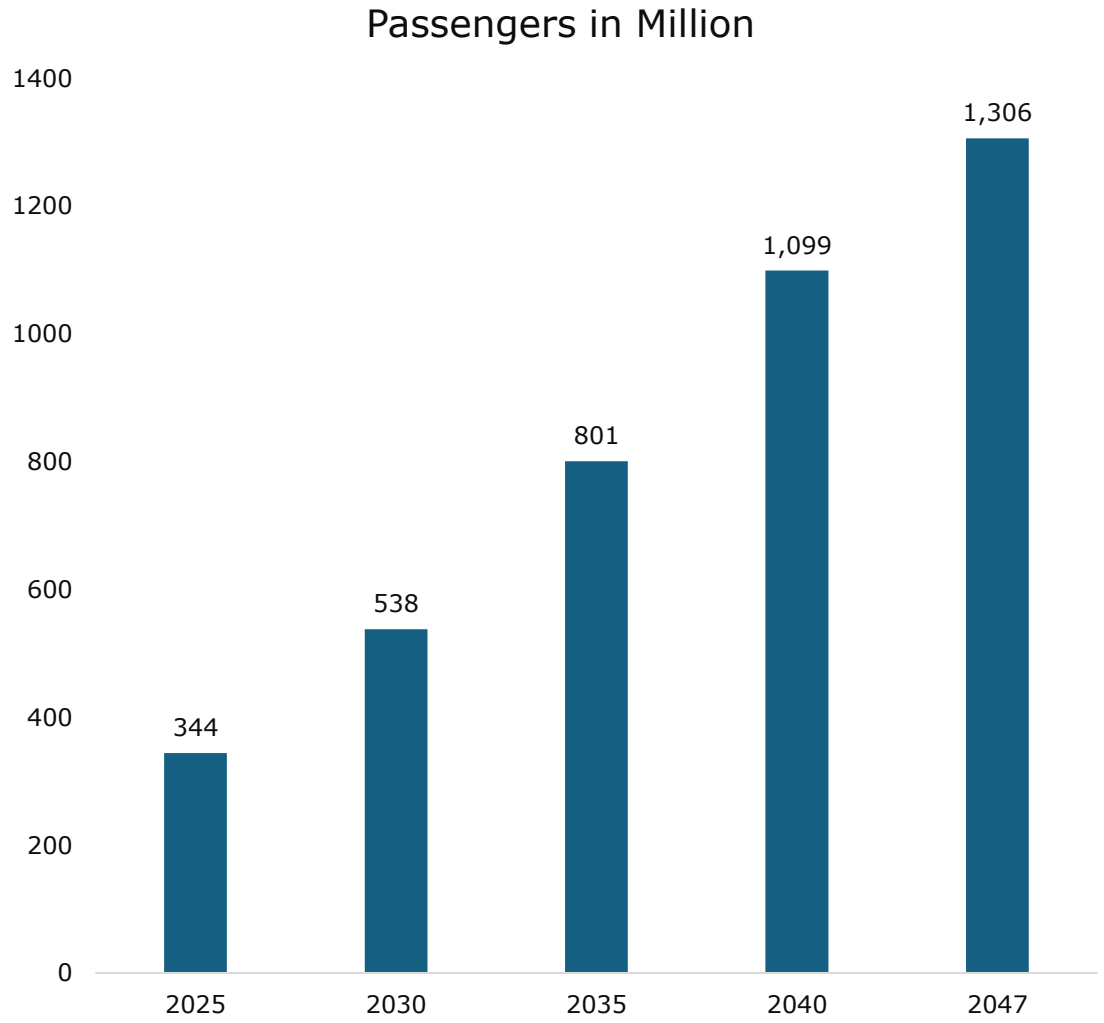
Direct Investment Opportunity	▸ Investors can directly fund energy storage and renewable energy projects ▸ Projects can be established as Independent Power Producers (IPPs) with guaranteed Power Purchase Agreements with KSEB ▸ KSEB will provide technical expertise and project consultancy to support investors ▸ KSEB ensures access to Viability Gap Funding (VGF) to improve project viability and secure assured returns, minimizing financial risks for investors
Deferred Annuity	▸ Investors can opt for a deferred annuity model, where they fund the project upfront and receive a fixed income over a period post-completion, providing a long-term, stable revenue stream
Integrated business models for EV Charging	▸ KSEB will provide technical and consultancy support to for investments in EV charging infrastructure to integrate with other commercial activities.

What will KSEB offer for investors?



Aviation Sector

- Indian aviation sector showing substantial growth on year-on-year increase in total air passenger traffic.
- 258 additional airports will be required by 2047
- 30 largest cities will be requiring a new airport
- ~41,000 pilots and ~47,000 technical staff in the next 20 years*
- Air cargo is expected to grow by ~6-fold to 21 MMT by year 2047 from 2023 levels
- India has potential to be a leader in MRO catering to ~90% of India's demand for MRO services locally within the country by 2047



*Source: SETTING THE STAGE FOR INDIAN CIVIL AVIATION @2047- FICCI, *Wings India Conclave 2024*

Aviation Sector- Kerala Ecosystem

- 4 International Airports
- Infrequent connectivity
- Largest number of 5-star hotels
- High number of resorts
- Rooms of star hotels with rates upto INR

  1,50,000 (presidential suite)
- House boats even have rates upto INR

  70,000 night
- Large number of lakes/dams
- Rivers also ideal during non-monsoon days

Sea Planes

Objective

- To create an intra-state amphibious air service in Kerala to connect the major airports and lakes
- To boost tourism and last-mile connectivity
- Generate employment and promote overall prosperity

Technical Milestones

- **Techno-feasibility study of waterbodies**
- **Comprehensive seaplane infra setup on land-side and water-side**
- **Licensing protocols and test flights for DGCA approval for water-dromes**
- **Launch, operate & maintain the amphibious service and the water-dromes**

Launch within 120 days from '*Go Ahead*' by investors

Sea Planes

Technical Requirements

- Feasibility survey of all proposed waterbodies
- Create and maintain the seaplane and passenger infrastructure
- Training of dock/jetty handlers and safety & security staff
- Securing water drome license from the DGCA
- Launch of service

Sea Planes

Pre-Operative Expenses (one time investment)

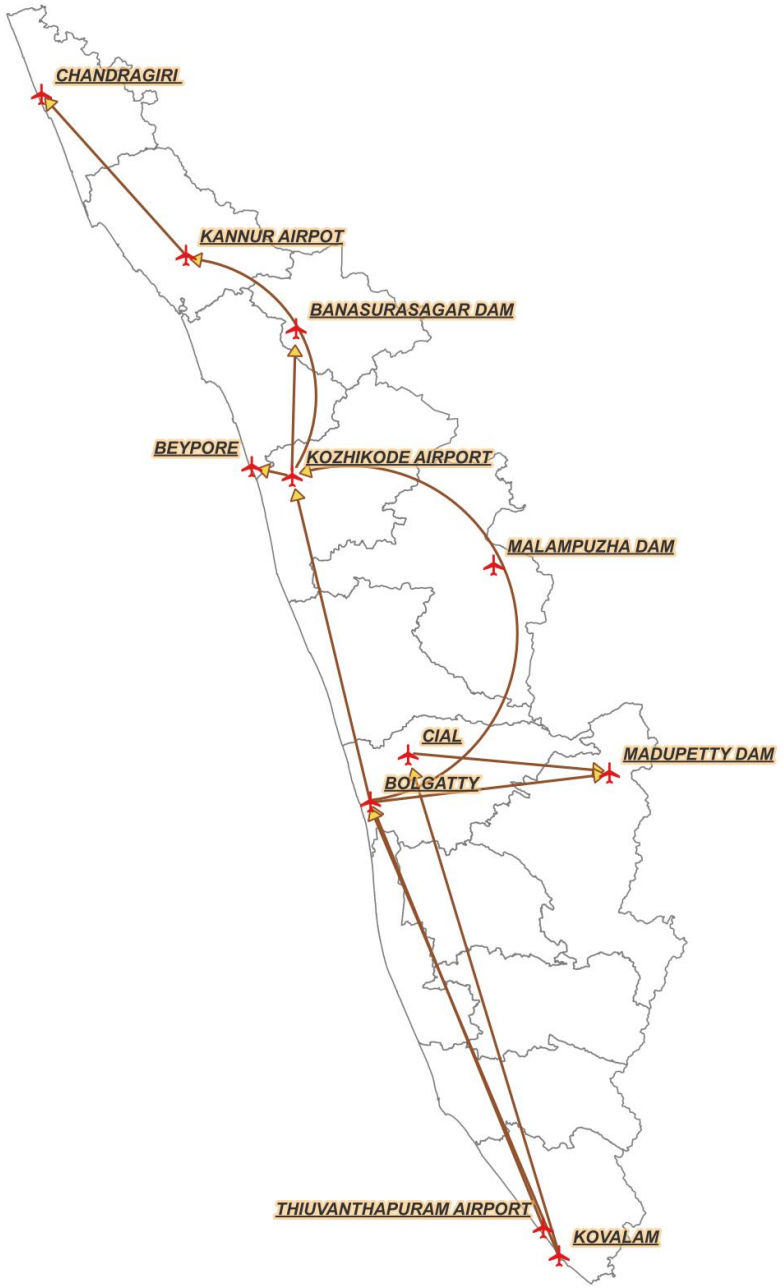
Particulars	INR
Aircraft Pre-buy Technical Audit	8,50,000
Ferry Flight to India	68,00,000
Customs Duty GST	63,75,000
DGCA Fee	8,50,000
GPU and Ground Equipment	25,50,000
P&W Initial Sign in to PBH	42,50,000
Initial Spares upto 600 hours Check	25,50,000
Three Months Working Capital	5,94,43,923
Add Lease Deposit of Aircraft	1,57,50,000
Total Funds Required	**9,94,18,923**

Operational Expenses

Direct Operating Cost	INR
Fuel and Maintenance; **Total (A)** (For 120 hrs/month)	75,06,576
Fixed Cost p.m.	**INR**
Aircraft (Lease & Insurance)	39,13,525
Employee Salaries & Benefits	52,85,280
Crew (Boarding & Lodging)	10,30,260
Airport & Navigation Expenses	11,82,720
General Administrative Expenses (7 x Bases)	3,88,080
Other Expenses	5,08,200
Total (B)	**1,23,08,065**

Sea Plane - Routes

- 1 A : TVM Airport - Bolgatty
- 1B : Kovalam – Bolgatty
- 1C : Kovalam- CIAL
- 2A : Bolgatty- Kozhikode Airport
- 2B : Bolgatty- Malampuzha Dam- Kozhikode Airport
- 3A : CIAL- Munnar (Maduppetty Dam)
- 3B : Bolgatty- Munnar (Maduppetty Dam)
- 4A : Kozhikode Airport- Wayanad (Banasura Sagar Dam)
- 4B : Kozhikode Airport - Beypore river
- 4C : Kozhikode Airport – Banasura Sagar Dam- Kannur Airport
- 5 : Kannur Airport- Chandragiri River (Kasargod)



30

Sea Planes – Routes & Costing

From	To	Distance	Flying Time	Ticket Cost
Trivandrum Airport	Bolgatty	180 Kms	46 mins	14,066
Kovalam	Bolgatty	195 Kms	51 mins	15,595
Kovalam	CIAL	208 Kms	53 mins	16,206
Bolgatty	Calicut Airport	135 Kms	35 mins	10,702
Bolgatty	Malampuzha Dam	110 Kms	28 mins	8,562
	Calicut Airport	90 Kms	23 mins	7,033
Bolgatty	Munnar	100 Kms	26 mins	7,950
CIAL	Munnar	85 Kms	22 mins	6,727

Aviation Sector-MRO

Snapshot

- The Indian MRO industry at a nascent stage with an estimated market size of $ 1.2 Bn.
- Currently in India MRO remains the 2nd largest operational expense after fuel, at about 12%-15% of total revenues
- India has potential to be a leader in MRO catering to ~90% of India's demand for MRO services locally within the country by 2047

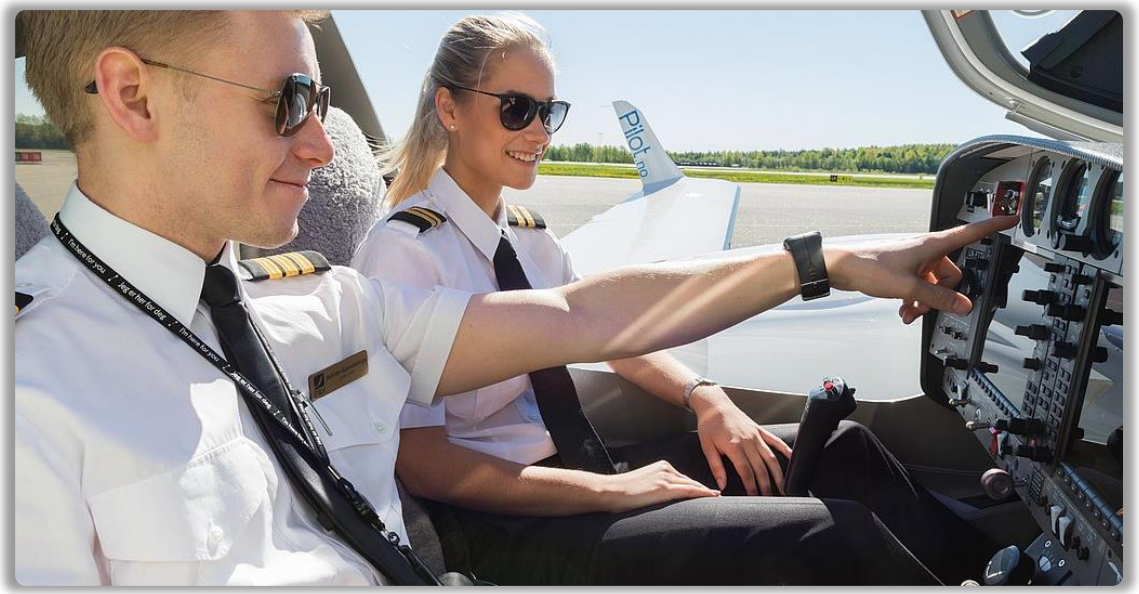
MRO Guidelines (GoI)

- Lowered the GST on domestic MRO services from 18% to 5% with full input tax credit from 1st April 2020
- Exempted Customs Duty on tools and tool kits
- Reduced GST rates on various spare parts, accessories, and consumables
- Simplified clearance processing of parts
- Relaxed restrictions on utilization of duty-free parts from 1 year to 3 years
- Extended stay in India of foreign aircraft for entire duration of MRO work or 6 months, whichever is lesser
- 100% FDI permitted via automatic route for MRO
- Liberalised policy for borrowing and lending in Foreign Currency and Rupees on competitive terms for MROs

Simulator

Flying training academy

- Rajiv Gandhi Academy for Aviation Technology
- Slowly shifting operations to Kannur



Thank you