



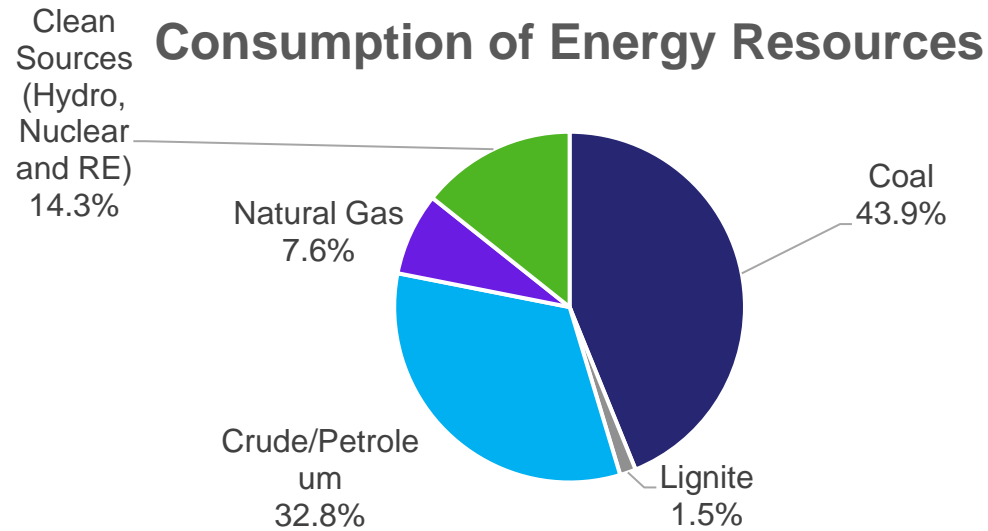
Advanced solar thermal technologies to address the challenges of Indian markets

Delegation of The European Union to India

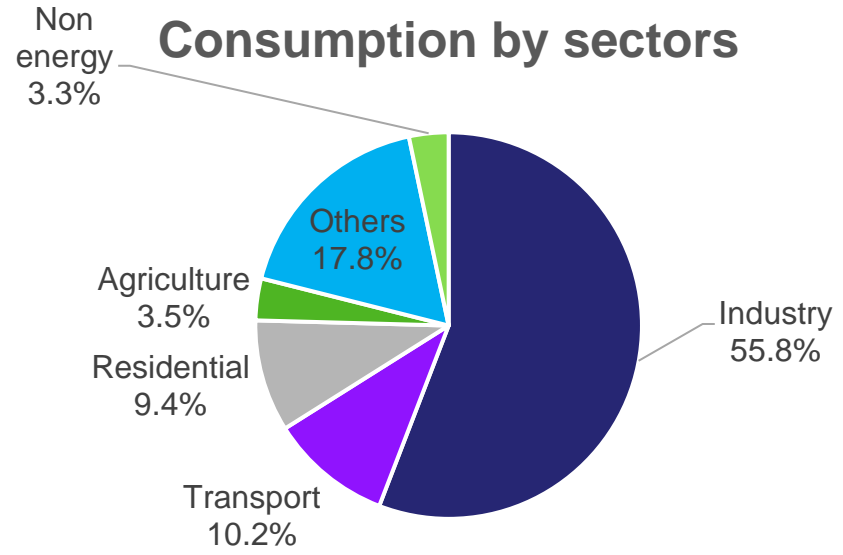


Energy consumption in India and relevance of solar thermal

India is one of the largest consumers of Energy and the consumption stood at 32,514 PJ in FY20



Industrial sector is largest consumer of energy in India using more than half, i.e., 55.85% of the total energy consumption.



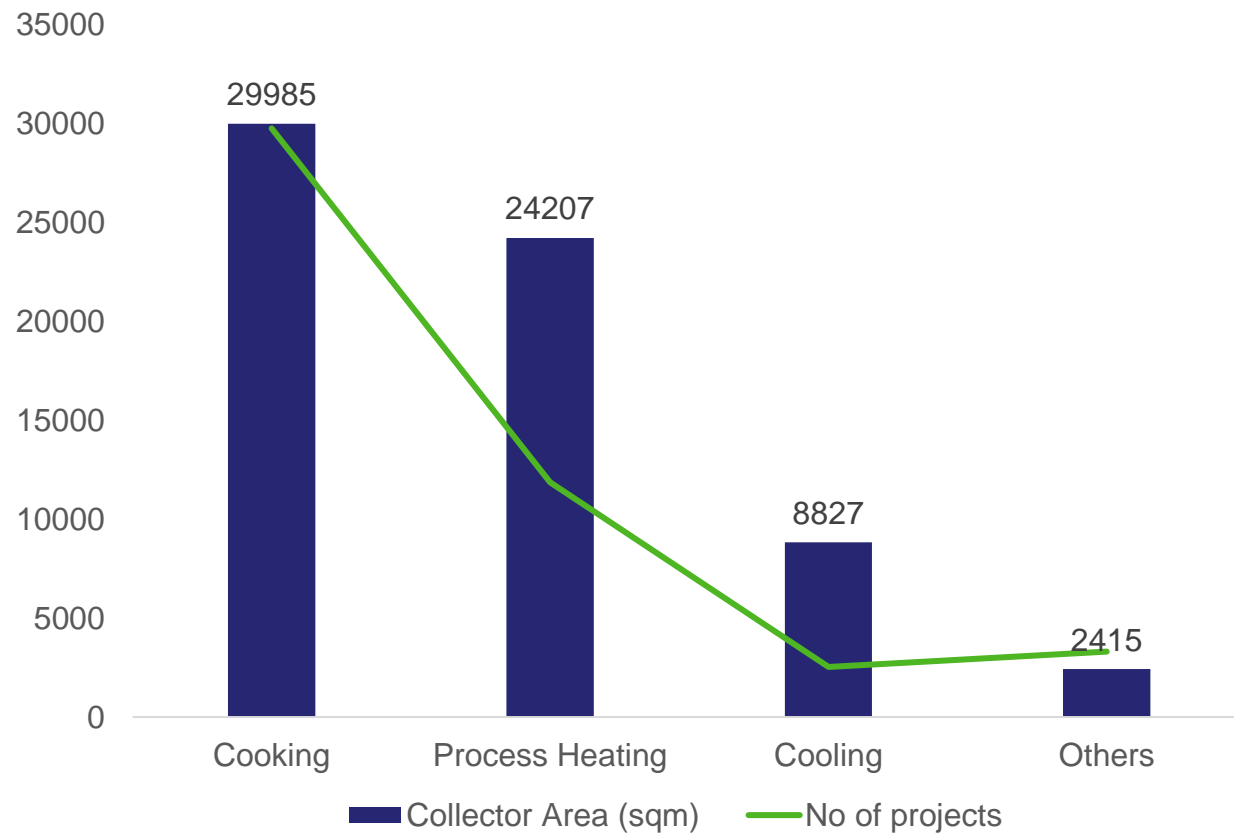
Key Industrial sectors	Textile
	Automotive and other Transport
	Food Processing
	Breweries
	Chemical
	Dairy
	Pulp and Paper
	Iron and Steel
	Petroleum refineries
	Pharmaceuticals
	Rubber
	Cement

- Solar thermal finds application in residential areas, hospitals, commercial establishments (hotels, shopping malls, restaurants) and industrial processes, which require less than 100 °C of temperature.
- In Industries, the systems are used for drying, cleaning, cooking, evaporation, space heating/cooling and process heating

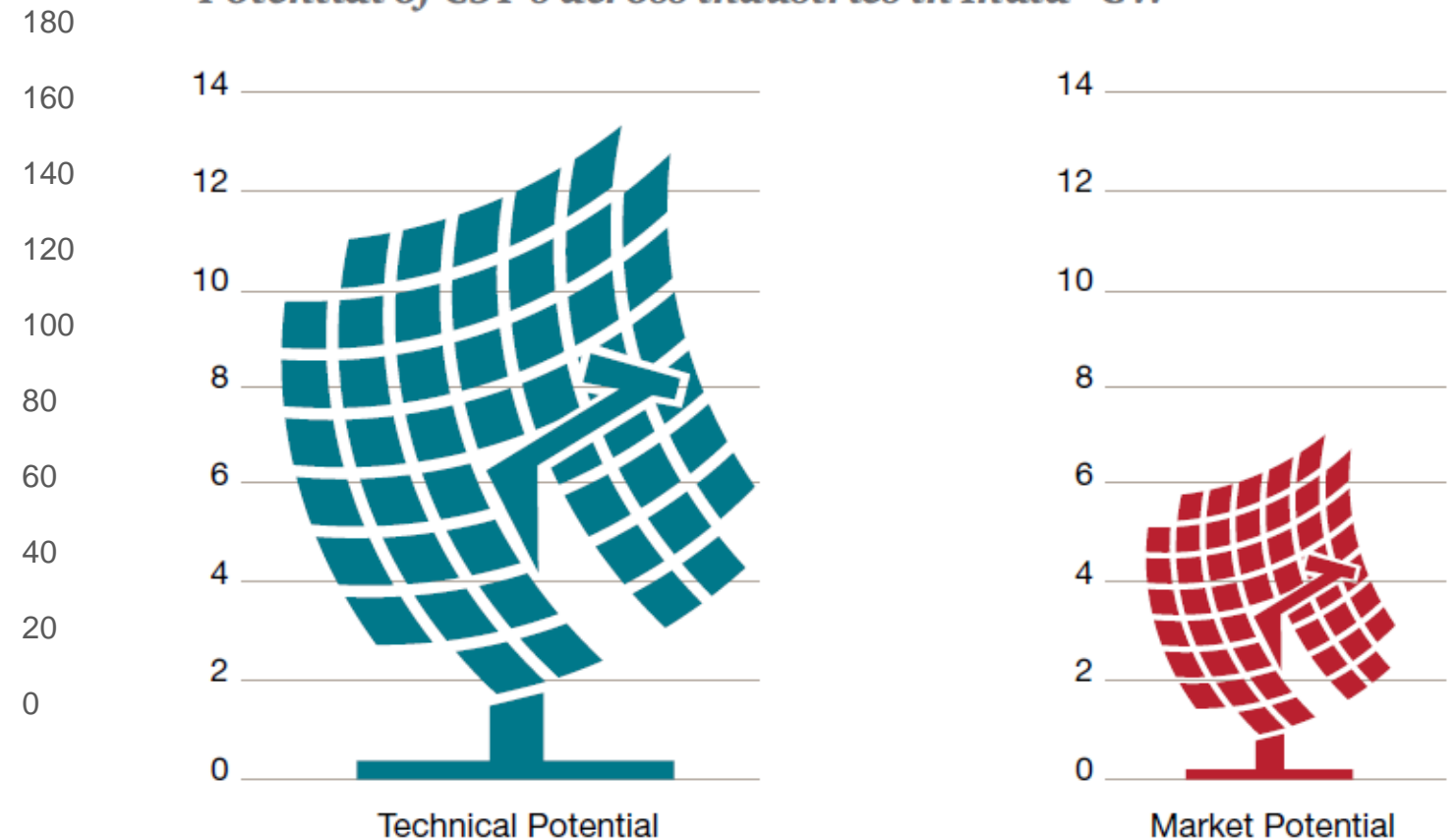
Potential for solar thermal and policy targets

- The National Mission targeted deployment of 20 million sq. m. solar thermal collector area by 2022 and current installed capacity is ~ 70,000 sq. m.
- Current installations ~49 MWth constitute less than 1% of the estimated potential (6.45 GWth)

Application and collector area mapping (sq. metre)



Potential of CST's across industries in India - GWth



Focus areas for R&I in Solar thermal

- *Thermal energy storage*
- *Improvements in collector design*
- *Digitization and performance monitoring*
- *Cost reduction measures*



Relevance for Research and Innovation in Solar Thermal

- Current installations (~49 MWth) constitute less than 1% of the estimated potential (6.45 GWth)
- No significant tie-ups/technical support partnerships established between Indian players and foreign stakeholders that may result in investment to increase the scale of operations of Indian players or enhance their capacity
- Research and innovation (R&I) forms an essential target segment, which has not garnered much traction but has the capacity to uplift the entire segment by contributing to the following key avenues

Pros



- Proven technology (especially non-concentrated)
- BIS standards available
- CAPEX subsidy and other financial incentives
- Regulatory mandates for non-CST in some regions
- Massive unrealized potential
- High thermal conversion efficiency

Cons



- High upfront CAPEX
- Low awareness levels
- Operations limited by temperature range
- Limited international exposure
- Limited capacity and scale of operators
- Competition from competing RE sources such as solar PV

Improving thermal performance

Improving customer side experience

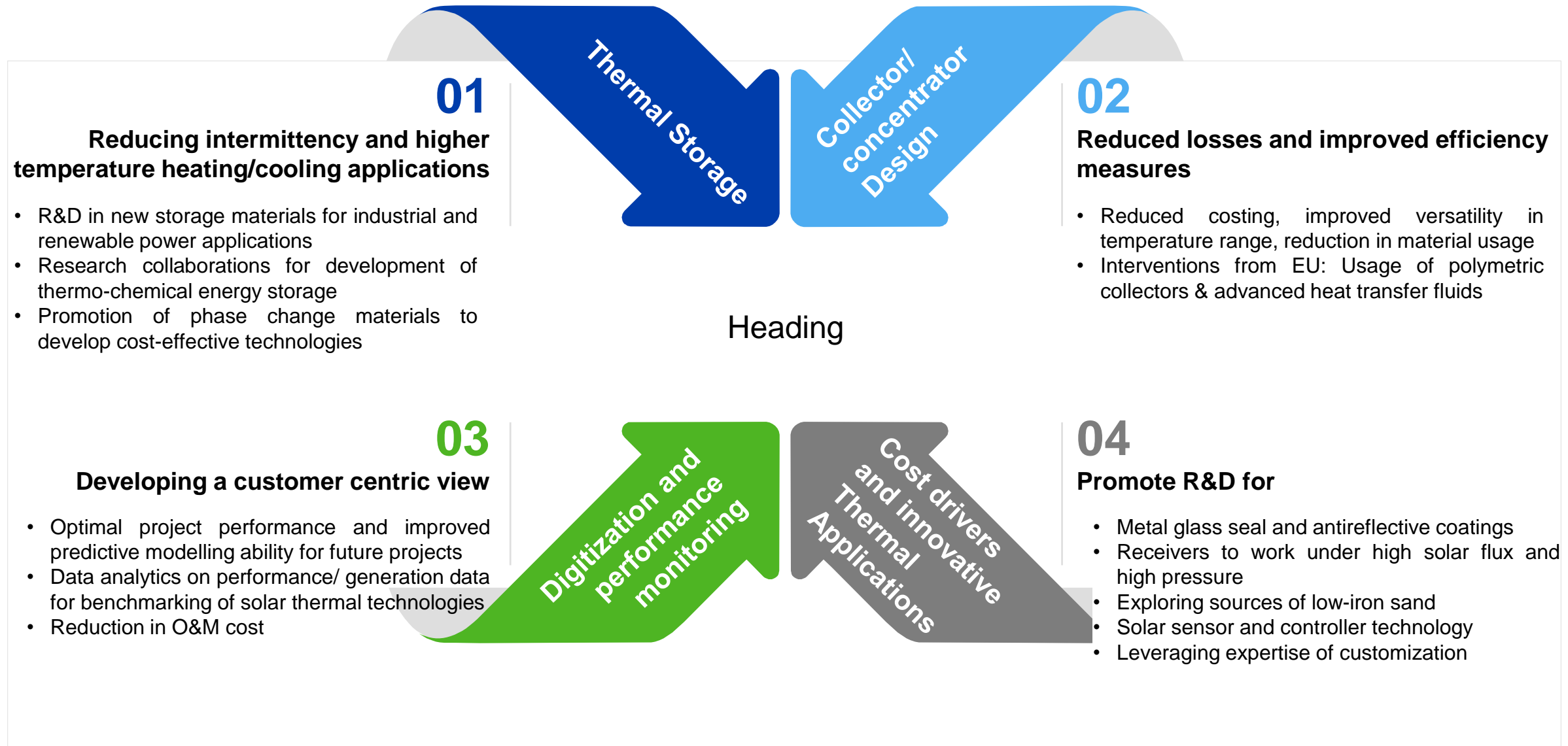
Improving application range

Reduced costing and compact design

Integrating storage

Increasing collaboration in R&I areas can help mainstream solar thermal in Indian markets as an important technology solution for fossil fuel displacement

R&D collaboration between academia & industry (EU and India)



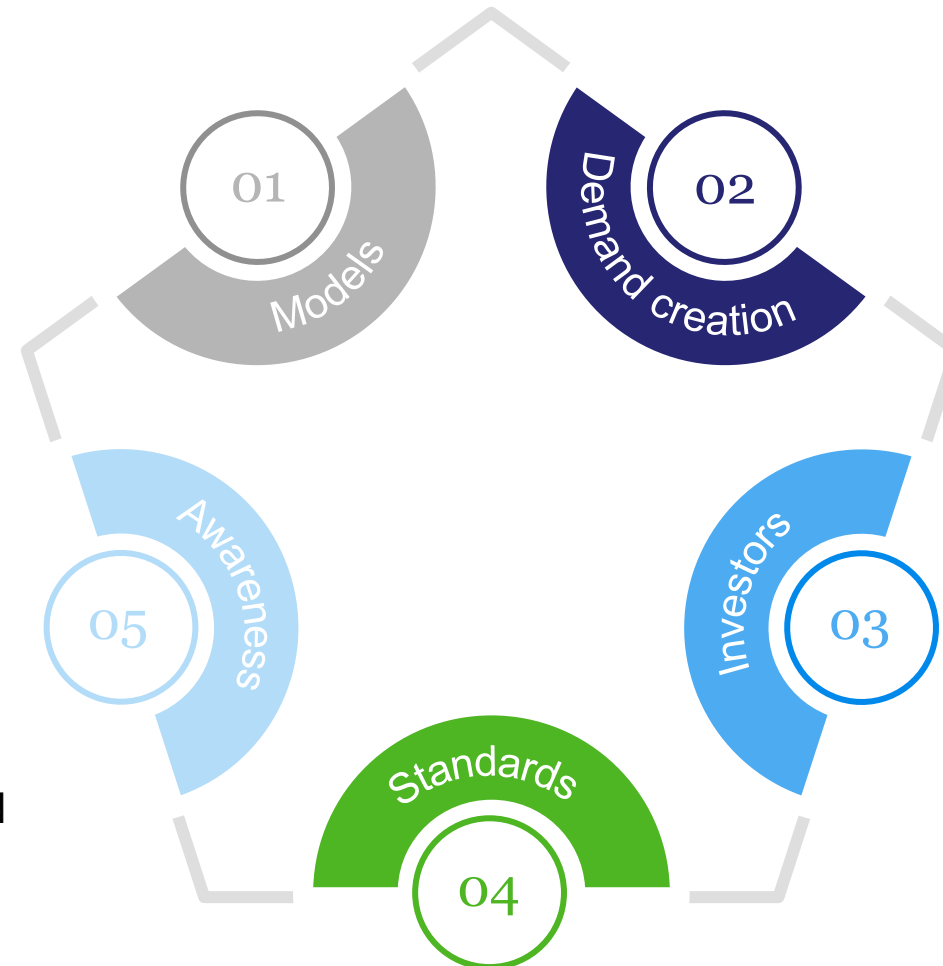
Other recommendations

Financing models

- Possible replication of innovative financing models from the EU in India
- Leasing or contracting with heating/cooling as service

Awareness and Training

- Technical seminars/ workshops/ webinars targeted at skilling
- Manual/Guide on Solar Thermal Project Development
- Partnerships between academia and private industry



Demand Creation

- Possible regulatory mandates, for adoption of solar thermal
- Strategy on Heating and Cooling
- Trajectory beyond 2022

Attracting investors

- Partnership between firms from the EU and India
- Technology partnerships and knowledge transfer agreements

Standardized framework for design and operation of solar thermal technologies

- Physical, technical, mechanical, and legal compliances
- Performance criteria/benchmarking

Thank you

