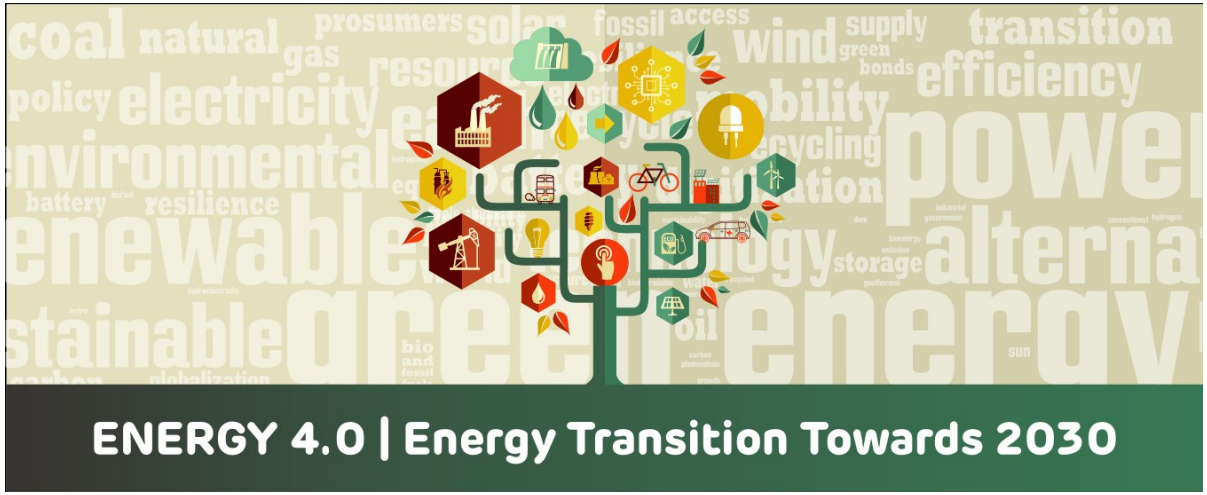


Variable Renewable Energy Integration

WORLD ENERGY COUNCIL INDIA

7th INDIA ENERGY CONGRESS

ENERGY 4.0: ENERGY TRANSITION TOWARDS 2030

1-2 FEBRUARY 2018 | NEW DELHI, INDIA

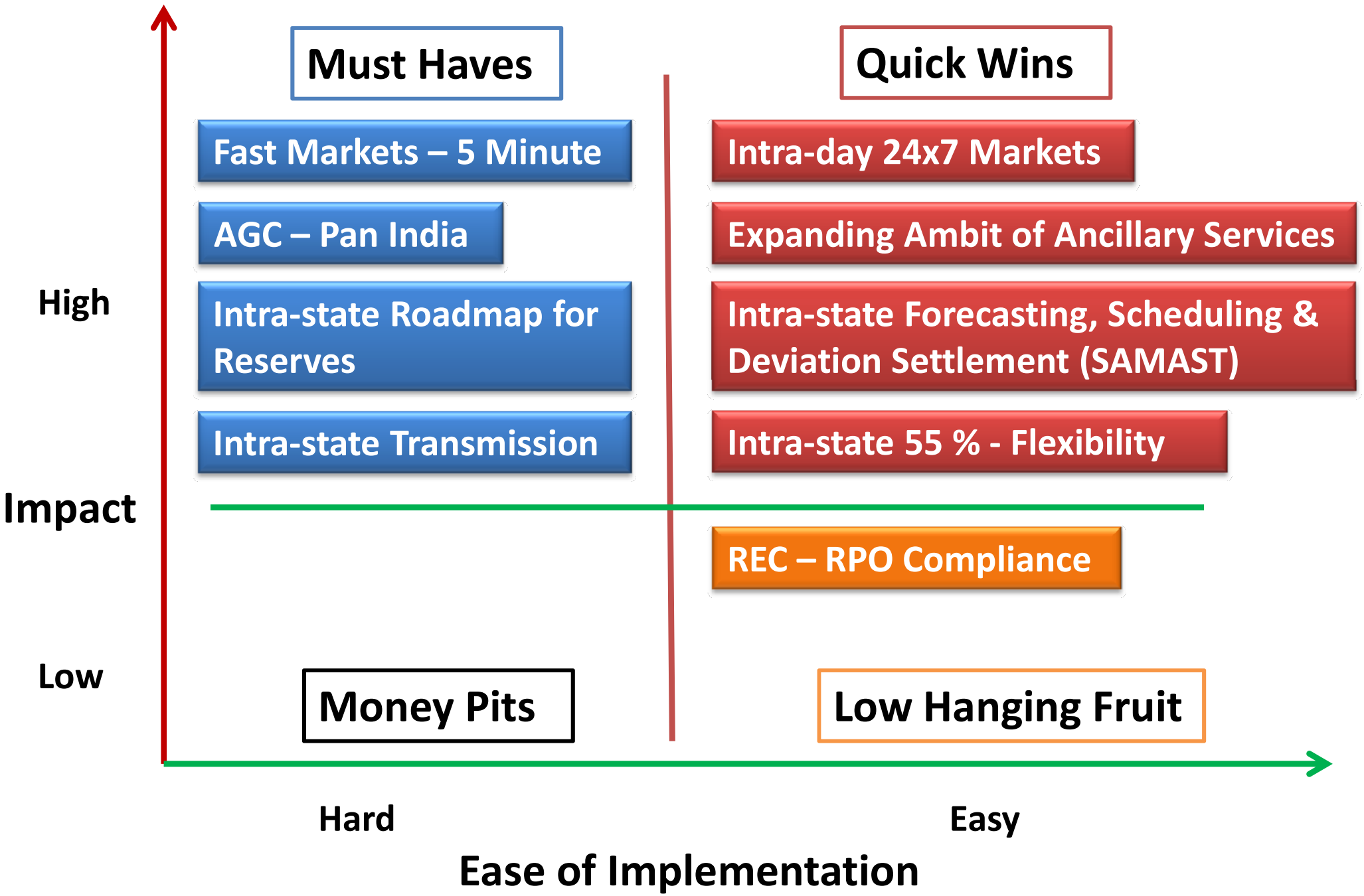
K V S Baba

CMD, POSOCO

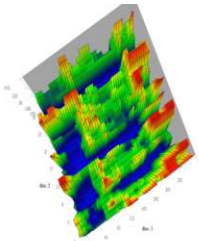
Actions Taken for RE Integration

Actions	Inter-state	Intra-State
Load Forecasting, RE Forecasting	🙂	😐
Balanced Portfolio		😐
Scheduling, Metering, Accounting, Settlement & Imbalance Handling Mechanism	🙂	😐
Reserves, Ancillary Services	🙂	☹️
Technical Standards for Connectivity	😐	😐
Market Design – Frequent clearing, Aggregators (Qualified Coordinating Agency)	😐	😐
Communication in Power Sector	😐	😐
Renewable Energy Management Centres (REMCs)	🙂	🙂
Flexibility in Conventional Generation	🙂	☹️
Capacity Building	🙂	😐

Other Works in Progress…



Storage and Electric Vehicles



Pumped Storage

- Variable Speed
- Tariff & Incentive
- Other Technologies

GtG Study

- Low impact in 15-minute time scale
- Further studies needed

R & D

- Need for Pilots, Academia Industry Partnership

Grid Scale Storage

Regulatory Framework

Ancillary Services

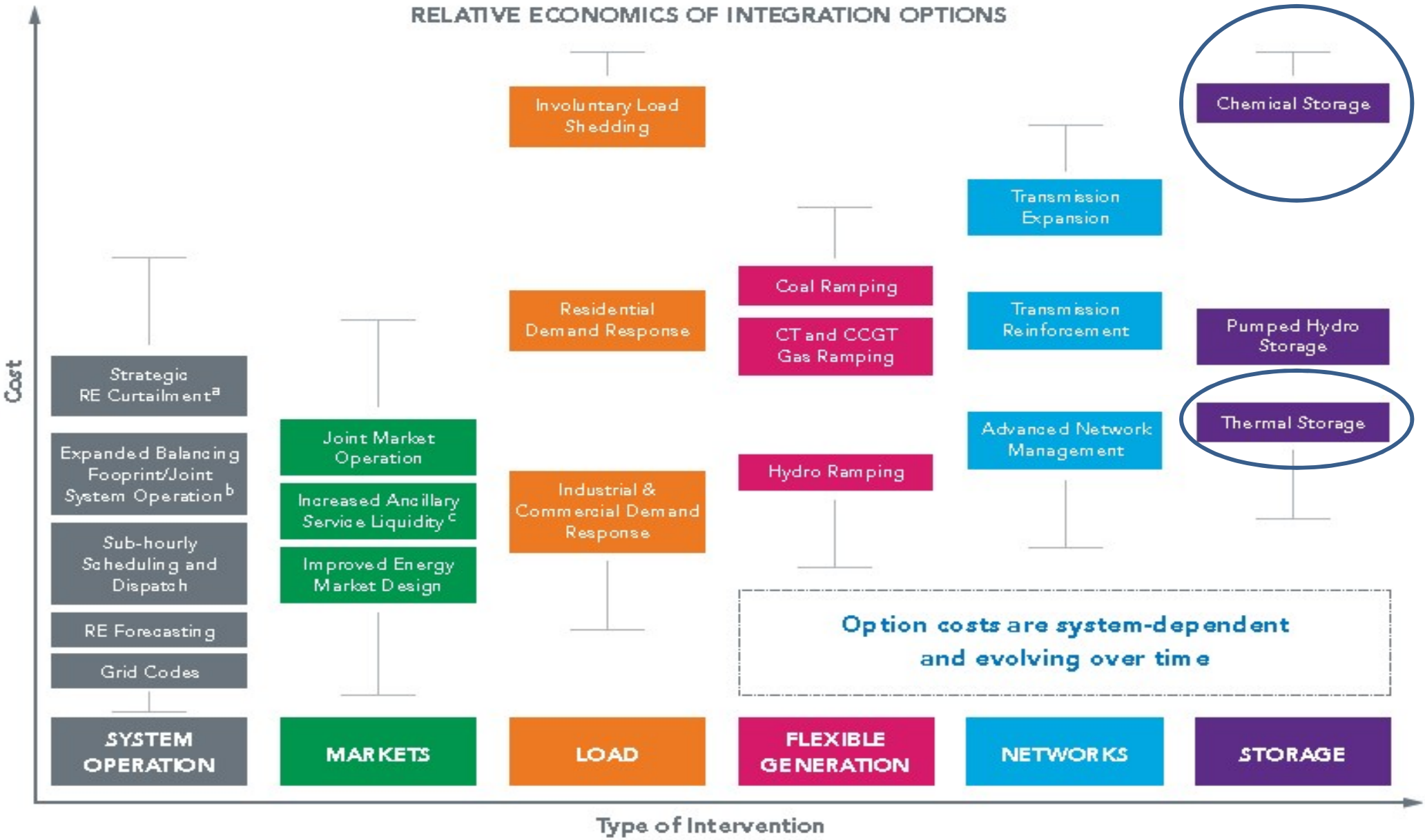
R & D

Impact on Demand

Infrastructure and Aggregators

Electric Vehicles

Relative Economics of Integration Options



Source: NREL Report on Flexibility in 21st Century Power Systems
https://www.nrel.gov/docs/fy14osti/61721.pdf

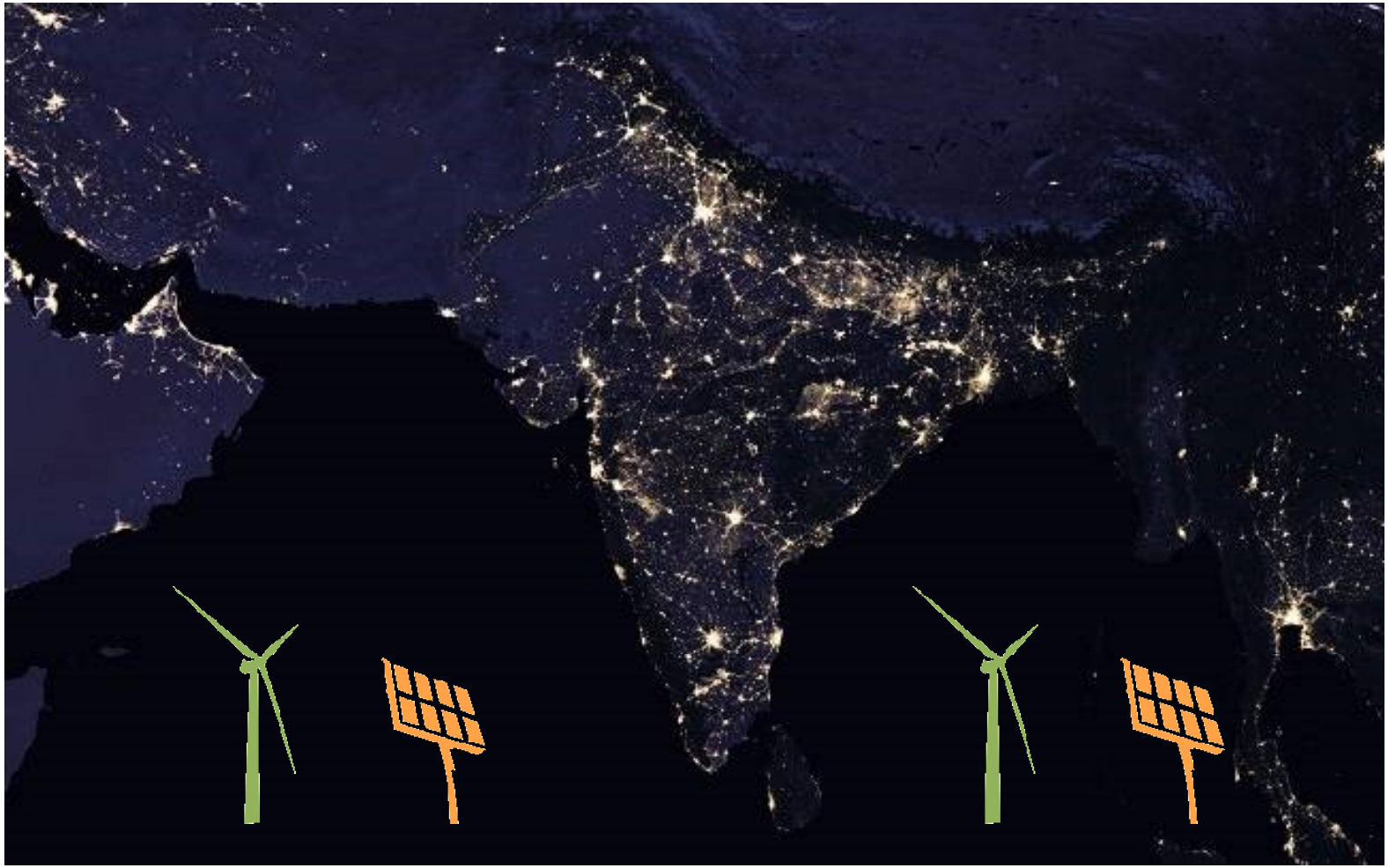
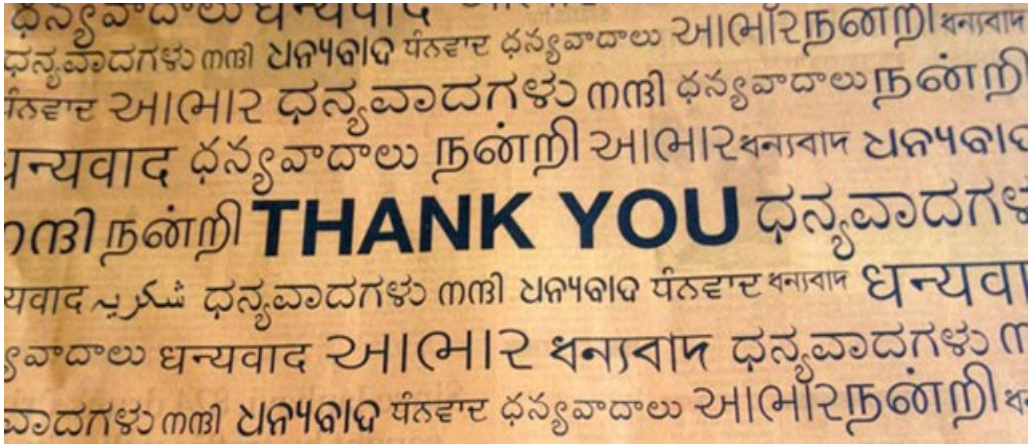



Image Credit: NASA