Energy Security through Innovative Technologies in the context of Indian needs and circumstances

Dr. Ajay Mathur

Bureau of Energy Efficiency

Energy Use in India

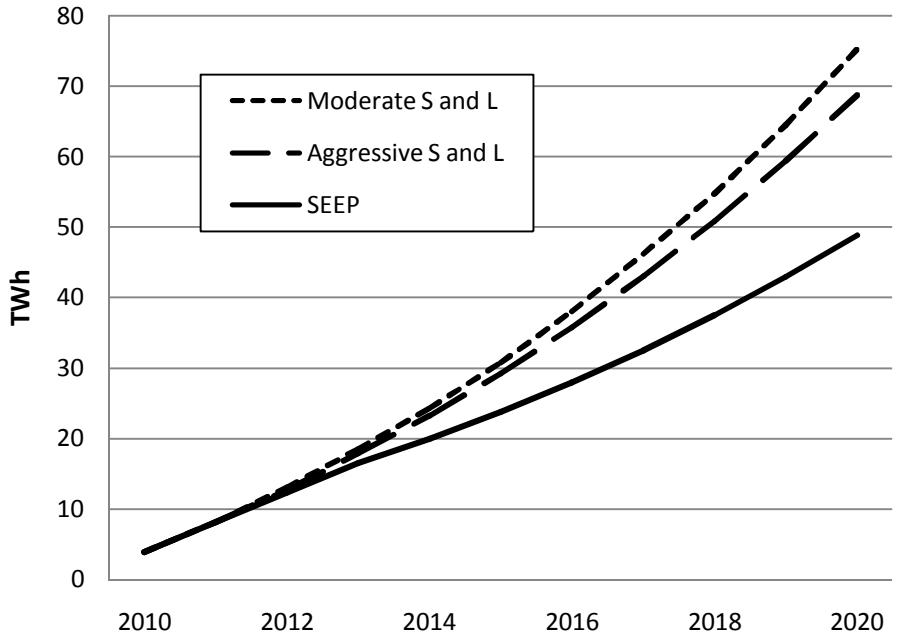
	Fuels	*Electricity*
Primary Energy Supply	670 million toe	200 GWh
After Conversion	290 million toe	1000 GWh
Final Energy	290 million toe	750 GWh

Potential Areas for Innovation

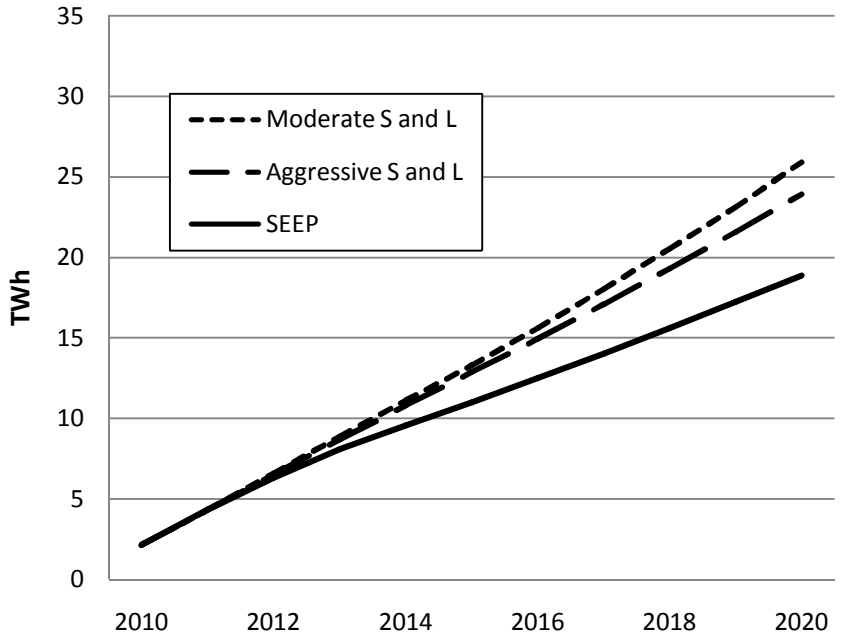
- Thermal Power Plant: Doubling of coal use in past 8 years
  - 200 of 280 million toe is lost in conversion
- Industry : Doubling of fossil fuel use in past 12 years
  - 20 of 100 million toe of coal and oil exhausted as waste heat in 120-160°C range
- Vehicles: Doubling of fuel use in past 8 years
  - 45 of 60 million toe is not passed to the wheels
- Agriculture: Doubling of electricity use in last 15 years
  - 120 GWh of 170 GWh is not converted into pumping energy in agricultural pumps
- Lighting in Buildings: Doubling of use in past 8 years
  - 30 GWh of 60 GWh is not converted into light in lighting fixtures
- Space Cooling: Doubling of use in past 5 years
  - Fans: 2 GWh of 3 GWh is not transferred to air by fans
  - Air Conditioning: 18 of 24 GWh are thermodynamic losses in air conditioning

Areas	Base technology	Target Technology	Challenge
Thermal Power Plant	Sub Critical η ≈ 33-35% Super Critical η≈ 38-42%	Ultra Super Critical η≈ 42-46% Adv. Ultra Super Critical η ≈ 48-50%	Materials development & Plant engineering
Industry	Low grade waste heat (120-160 Deg C) wasted	ORC : Waste heat to electricity η ≈ 10%	Cost competitiveness
Agricultural Pumps	η ≈ 25-30 %	η ≈ 60% 5-year reliability	Reliability and cost competitiveness
Transport	Fuel Eff. Of 6.09 liter/100 km (2009)	Fuel Eff. of 5.5 liter/100km by 2015 4.78 liter /100km by 2020	Cost competitiveness
Buildings			
AC	EER 1Star 2.5 5 star 3.3	EER/SEER >6.0	Engineering & Cost competitiveness
Lighting	60/15 W	8-10 W	Cost competitiveness
Fans	70-80 W	35 W	Cost competitiveness

Saving Potential



Air Conditioner



Ceiling Fans

Source: Prayas Energy Group

Realization….

- Instruments to product Development and Adaptation of Advance Technologies
  - Mission mode
    - Development from first principle (e.g. material development) - AUSC technology
  - Super Efficient Equipment Program (SEEP) model
    - Product introduction in the market - Upstream incentivization
  - Energy Efficiency Innovation Support Program (EE-ISP)
    - Support for product incubation, risk aversion and market creation