Efficiency of Lighting and Appliances

Residential

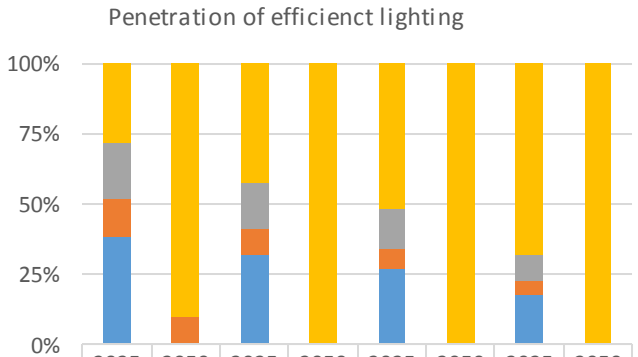
Level 1

Level 1 assumes that although incandescent lamps will be phased out by 2050, CFLs will continue to be used. Penetration of LED will increase to 29% by 2025 and thereafter increases gradually to reach 90% level in 2050. Remaining 10% will energy efficient tube lights. In 2050, 98% of appliances are assumed to be of low efficiency, 1% are of medium efficiency, and 1% are of high efficiency.

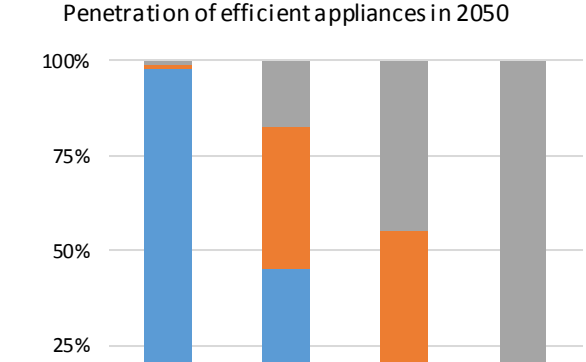
Level 2

Level 2 assumes that penetration of bulbs will reduce to 32% by 2025. By 2040, all incandescent bulbs and CFLs will be replaced by LEDs. In case of other appliances, 45% have low efficiency while 38% have medium efficiency in 2050.

As per the load research study report, residential sector contributes to 23% of system peak demand. Major end use component includes residential lighting, fans, refrigerators, air conditioners and other appliances like washing machine, geysers, computers, televisions, etc. The state government has implemented Domestic Efficient Lighting Programme (DELP) for increasing penetration of LED based among residential and commercial consumers. In addition to this state is also implementing energy efficient fan and air-conditioner programme also. The World Bank report, *'India's State Level Energy Efficiency Implementation Readiness',* Andhra Pradesh has been ranked number one in terms of the state most prepared for implementation of energy efficiency programmes and schemes. This lever captures the impact of increasing penetration of energy efficient appliances in total electricity demand of residential sector.



	2025	2050	2025	2050	2025	2050	2025	2050
	Level 1		Level 2		Level 3		Level 4	
LED	29%	90%	42%	100%	52%	100%	68%	100%
CFL	20%	0%	16%	0%	14%	0%	9%	0%
Tubelight	14%	10%	9%	0%	8%	0%	5%	0%
Bulb	38%	0%	32%	0%	27%	0%	18%	0%



	2050 L-1	2050 L-2	2050 L-3	2050 L-3
High	1%	18%	45%	80%
Medium	1%	38%	42%	17%
Low	98%	45%	13%	3%

Level 3

Level 3 assumes that there can be increase in awareness among consumers about benefits of energy efficient appliances, which will result in increasing penetration of high efficiency appliances to 45% in 2050, while 42% would be medium efficiency and remaining 13% would be of low efficient appliances. The lighting demand decreases substantially due to 100% penetration of LED by 2035.

Level 4

Level 4 is the optimistic scenario which assumes that energy efficiency ratio of air conditioners improves, which can be due to usage of variable speed compressors, advanced technology like BLDC which will improve energy efficiency of fans. Penetration of these high efficient appliances also increase to 80% by 2050. Further, in case of lighting 100% penetration of LED would be achieved by 2030.

Efficiency of Lighting and Appliances

Commercial

Level 1

Level 1 assumes that there is no significant improvement in efficiency. This could be because of increasing life cycle cost, lack of required policy and decrease in prices of electricity which remains a major obstacle to penetration of best available technologies.

Level 2

Level 2 assumes considerable improvement in penetration of efficient appliances. By 2050, 30% of demand is met by the best available technologies, remaining 50% and 20% of demand is met by medium efficiency and low efficiency appliances, respectively. The penetration of high efficiency appliances is limited, which could be due to high capital cost and low awareness, especially in rural areas.

As per the Power for All report, commercial sector in the state of Andhra Pradesh accounted for nearly 7% of the total energy consumption of which nearly 50% is in the organized sector in buildings having connected load greater than 100 kW or with contract demand of 120 kVA or more. Energy consumption in commercial buildings depends on a combination of type of appliances used and building envelope. This lever presents change in energy consumption of commercial buildings under scenarios of penetration of energy efficient appliances. Change in energy requirement due to building envelop optimization has been dealt separately.

Level 3

Level 3 assumes that penetration of high efficient appliances improves significantly. This could be due to policy measures like mandatory use of best available technology in new buildings, tax rebates, etc. In 2050, 50% of energy demand is met through high efficiency appliances, and balance 40% and 10% is met through medium efficiency and low efficiency appliances, respectively.

Level 4

Level 4 is the optimistic scenario which assumes that low efficiency appliances will completely be eliminated by 2050. This may be supported by government initiatives like tax rebates, mandatory use of high efficiency technology, and decrease in prices of best available technology. In 2050, 80% of energy demand will be by high efficient appliances and remaining 20% by medium efficiency appliances.