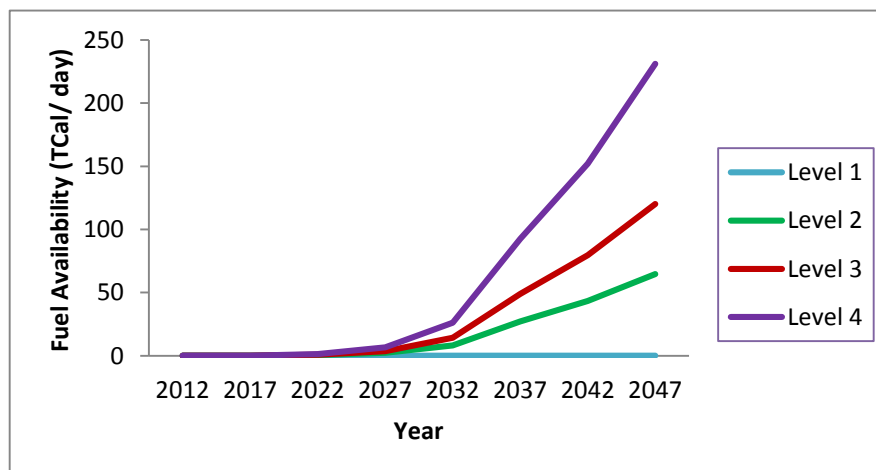
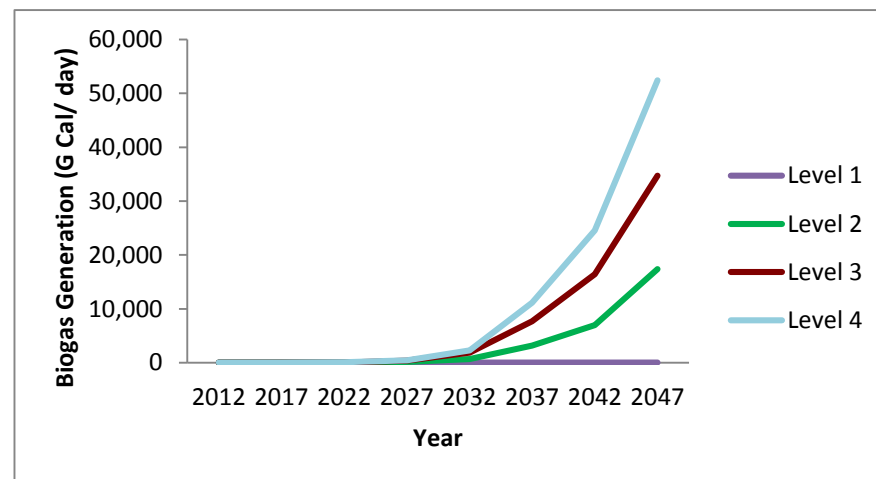


Municipal Solid Waste (MSW) based Waste to Energy (WtE)

Waste to Energy (WtE) projects based on Municipal Solid Waste (MSW), installed in the country as of 31st March 2015 is just 154 MW. MSW is a heterogeneous mix of combustibles, organic matter, inerts and moisture. Energy generation through biochemical conversion or combustion will depend on the levels of segregation and collection efficiency of MSW. This is a key focus area of Ministry of Urban Development as well as Urban local bodies (ULBs) across the country and hence it is assumed under all scenarios that by 2047:

- Urban areas will have MSW collection efficiency of approx. 100% and segregation levels of approx. 90%.
- Rural areas will have MSW collection efficiency of approx. 100% and segregation levels of approx. 70%.



LEVEL 1

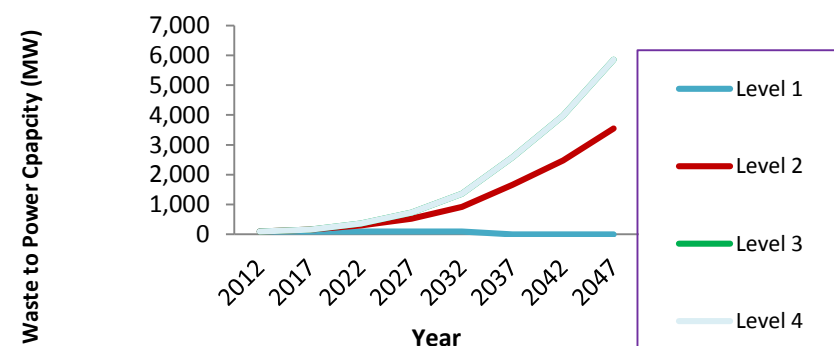
Level 1 assumes that there will be no capacity additions and hence MSW based WtE capacity will remain at a level of 96MW. There will be no capacity additions even beyond 2017, primarily due to lack of inter agency coordination and favourable policies. Other key adverse factor will be limited understanding of technical issues involved in construction, operational and environmental aspects of MSW based WtE projects. Once these projects have lived their life, there will be no MSW based WtE projects, by 2037.

LEVEL 3

Level 3 assumes that Government and ULBs emphasize on MSW based WtE as a key resource recovery option. The policies and incentives get aligned. Rural areas adopt organic MSW based gas as a key energy option. However in urban areas, evolving technologies like combined heat and power still does not get any traction. By 2047:

- 50% of segregated urban organic MSW will yield 0.72 Mtoe of biogas
- 40% of segregated rural organic MSW will yield 0.55Mtoe of biogas
- 30% of total 'waste to electricity generation' potential will be realized resulting in approx. 5,850MW installed power generation capacity

32% of segregated urban combustibles will be used as fuel yielding 4.4Mtoe of thermal energy.



LEVEL 2

Level 2 assumes that the capacity addition happen in line with 12th plan targets resulting in 153MW installed capacity by end of 12th Plan. Most of it will still be based on mixed MSW. With improving segregation levels and Government's focus on WtE, by 2047:

- 25% of segregated urban organic MSW will yield 0.36 Mtoe of biogas
- 20% of segregated rural organic MSW will yield 0.28Mtoe of biogas
- 18% of total 'waste to electricity generation' potential will be realized resulting in approx. 3,550MW installed power generation capacity.

18% of segregated urban combustibles will be used as fuel yielding 2.36Mtoe of thermal energy.

LEVEL 4

In this scenario, there are absolutely no barrier (economic, social or technical) to the growth of MSW based WtE. Inter agency conflicts are also resolved. WtE gets enhanced attention coupled with significant increases in fossil fuel prices, especially coal. Fossil fuel externalities are priced. Energy security is consciously factored in energy planning. In this level, by 2047:

- 75% of segregated urban organic MSW will yield 1.09 Mtoe of biogas
- 60% of segregated rural organic MSW will yield 0.83Mtoe of biogas
- 30% of total 'waste to electricity generation' potential will be realized resulting in approx. 5,850MW installed power generation capacity
- 63% of segregated urban combustibles will be used as fuel yielding 8.44Mtoe of thermal energy.

30% of combustible urban waste will be used for combined heat and power applications yielding 4.35 Mtoe of energy.