

BIOENERGY: BIOMASS RESIDUE PRODUCTION AND END-USAGE

The components that presently make up bioenergy production in India are agricultural residue, forest residue, sugarcane molasses-based bioethanol, Jatropha biodiesel and biogas. 99% of the present bioenergy production relates to agriculture residue and forestry residue (214 and 150 million tons/year). Bioenergy production is already estimated to be about 1843 TWhr/year (25% of the total energy consumption of India). A large part of biomass residue is used for cooking. Part of agri-residue (about 16 million tons/yr) is used for power generation (2.5 GW). The agri-residue that accounts for bioenergy is 67% of the residue that is not used as animal fodder and the other 33% is used for other applications. This split is maintained in future as well for all the four levels. The agri-residue productivity is projected to increase from 0 to 0.75% (annual) across the four levels. As for forestry residue, 180-200 million tons/year is rated to be the sustainable limit for recovery from forests and it is extended across the four levels accordingly.

LEVEL 1

The split of non-fodder agri-residue for household cooking decreases from 46% to 25% by 2027 and to 3% by 2047. The agri-residue split for power generation is increased from the present 5% to 16%. This relates to power generation increasing from the present 2.5 GW to 7.8 GW by 2047. Liquid transportation fuel from agri-residue begins to be produced commercially from 2027 and the split reaches 6% by 2047. This leaves the proportion for other miscellaneous energy applications to change from the present 16% to 42% by 2047.

LEVEL 2

0.25% annual growth rate is considered for the agri-residue productivity. The forestry residue is projected to increase to 174 million tons/year. The split of non-fodder agri-residue for household cooking decreases to 18% by 2027 and to 3% by 2047. The agri-residue split for power generation is increased from the present 5% to 27. This results in power generation increasing from the present 2.5 GW to 20 GW by 2047. Liquid transportation fuel from agri-residue begins to be produced commercially from 2022 and the split reaches 12% by 2047. This leaves the other energy applications split to increase to 25% by 2047.

LEVEL 3

The agri-residue productivity is projected to increase at an annual growth rate of 0.5%. The forestry residue is projected to increase to 190 million tons/year. The split of non-fodder agri-residue for household cooking decreases to 12% by 2027 and to 2% by 2047. The agri-residue split for power generation is increased from the present 5% to 43. This relates to power generation increasing from the present 2.5 GW to 42 GW by 2047. Liquid transportation fuel from agri-residue begins to be produced commercially from 2020 and the split reaches 22% by 2047. This leaves the other energy applications split to increase to 30% by 2027 and decrease to 0.5% by 2047.

LEVEL 4

The agri-residue productivity is projected to increase at an annual growth rate of 0.75%. The forestry residue is projected to increase to 200 million tons/year. The split of non-fodder agri-residue for household cooking decreases to 8% by 2027 and to 1% by 2047. The agri-residue split for power generation increases from the present 5% to a maximum of 45 by 2032-37 and decreases to 36% by 2047 as the conversion to liquid fuels become more pronounced. Liquid transportation fuel from agri-residue begins to be produced commercially from 2017 and the split increases to 30% by 2047.

Projection of Agri-Residue and End-Usage

