

# CO2 Removal & Gases: Bio-Conversion with CCS

This lever controls the sub-levers listed in the table, and ambition levels are for the end year shown on the right-hand side.

The conversion of biogenic resources into different fuels requires energy and so results in CO2 emissions. Carbon is present in the biomass and waste resources used in biomethane and biofuel production; some of this remains in the biomethane and liquid biofuel (and is released on combustion of these products), but a portion of this is released during the transformation process. Direct combustion of waste to produce electricity also releases CO2.

By applying carbon capture and storage (CCS) to bio transformations, there is the potential to remove CO2 from the atmosphere resulting in negative emissions. This happens because biomass contains CO2 absorbed during its growth (removal of CO2). Ordinarily this is released back into the atmosphere during conversion to biofuels (net zero CO2). If these emissions are captured, they are prevented from re-entering the atmosphere (removal of CO2).

Bio-Conversion processes suitable for CCS:

- Biomass gasification to produce biomethane;
- Liquid biofuel production from used cooking oil, wet waste, and solid biomass;

- Energy-from-waste involving direct conversion to electricity by incinerating waste products (dry/wet waste, used cooking oil, landfill gas)

In the case of liquid biofuels production, CO2 emissions are fairly small, but emissions of nitrous oxide (a greenhouse gas) as a result of biomass processing may be more significant. Currently, there is no CCS applied to bio-methane, biofuel or energy from waste plants.

### Key Interaction

This lever controls how much CCS is applied across bio-conversion processes. The amount of CO2 captured and stored is dependent on the capture rate (CCS Capture Rate lever) and the demand for biomethane (biomethane gas grid share lever) and liquid biofuels (transport biofuel levers).

#### Level 1

No CCS is applied to bio transformation processes.

#### Level 2

One third of bio-conversion processes have CCS applied.

#### Level 3

Two-thirds of bio-conversion processes have CCS applied.

#### Level 4

All bio transformation processes have CCS applied.

Default Timing Start year: 2025, End year: 2050

Share of bio-conversion processes with CCS

Sub-Lever	Units	2015	Level 1	Level 2	Level 3	Level 4
Biomass Gasification	share	0%	0%	33%	67%	100%
Bio Liquid Production	share	0%	0%	33%	67%	100%
Energy from Waste	share	0%	0%	33%	67%	100%

