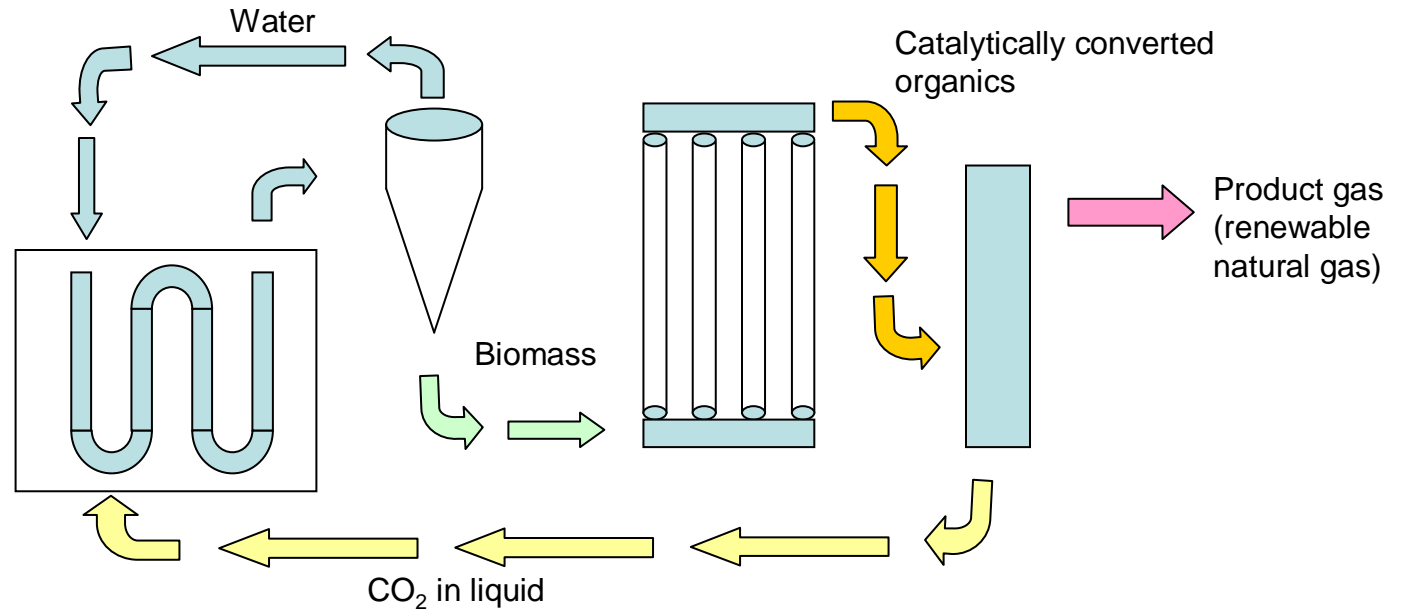


**FIGURE 1**  
**CATALYTIC GASIFICATION OF AQUATIC BIOMASS**  
**WITH RECYCLING OF CO<sub>2</sub> (NO GHG EMISSION)**



**Growth**

Growth troughs, ponds, or reactors

**Biomass Separator**

Concentrator gives 15-20% solids; concentrator type depends on species in biomass

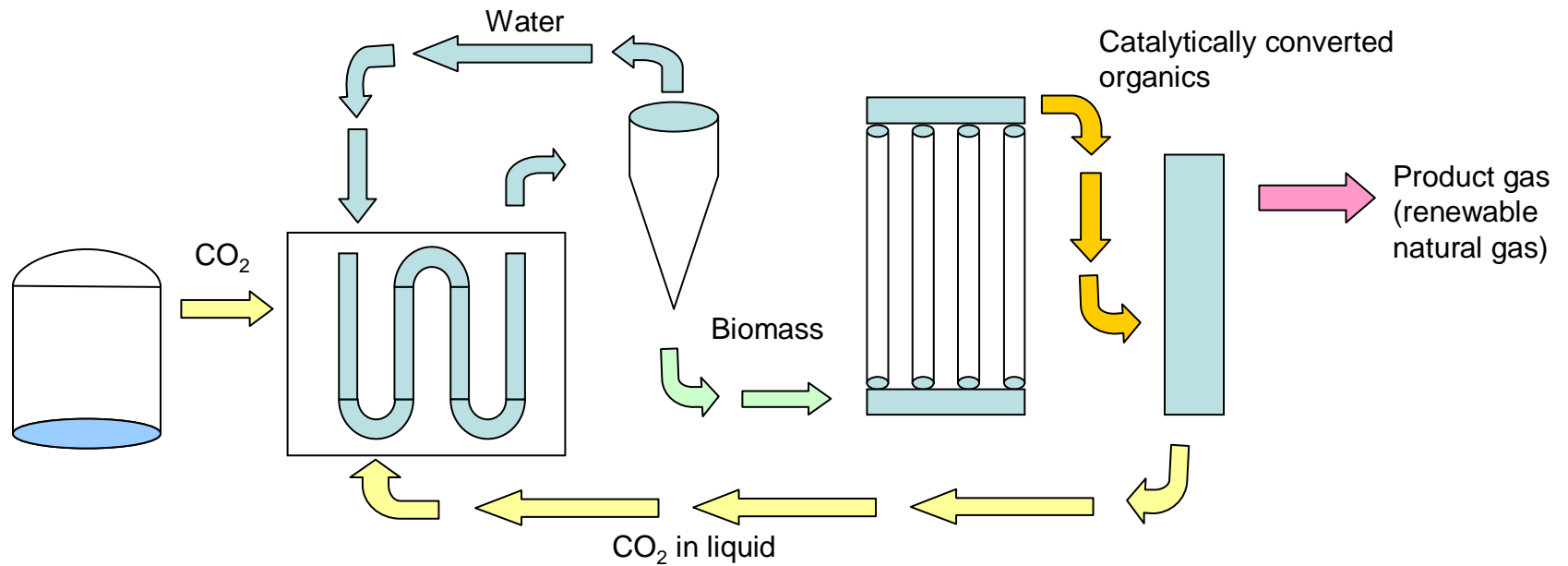
**Gasifier**

Catalytic gasifier converts biomass to renewable natural gas and carbon dioxide

**Product Gas Separator**

Separator yields product gas plus CO<sub>2</sub> dissolved in condensate for recycling to growth medium

**FIGURE 2**  
**CAPTURE OF CO<sub>2</sub> FROM FERMENTERS AS ADDITIONAL SOURCE**  
**OF CO<sub>2</sub> FOR GROWTH OF AQUATIC BIOMASS**



**Fermenter**

CO<sub>2</sub> from fermentation (ethanol)

**Growth**

Growth troughs, ponds, or reactors

**Biomass Separator**

Concentrator gives 15-20% solids; concentrator type depends on species in biomass

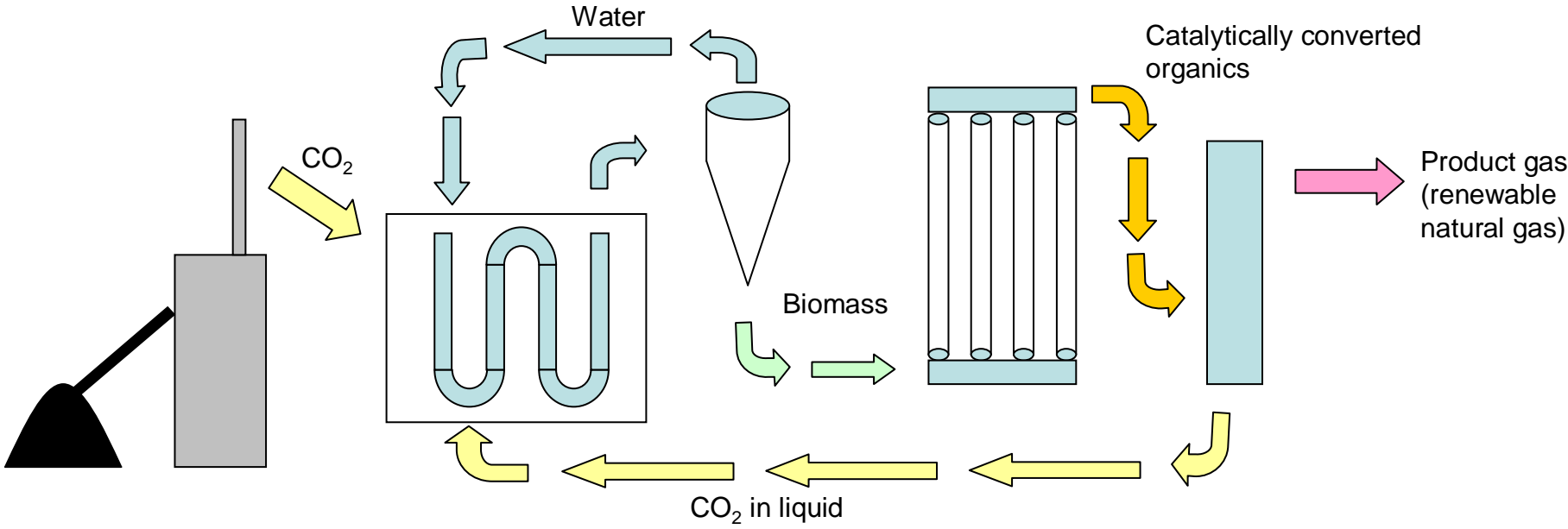
**Gasifier**

Catalytic gasifier converts biomass to renewable natural gas and carbon dioxide

**Product Gas Separator**

Separator yields product gas plus CO<sub>2</sub> dissolved in condensate for recycling to growth medium

**FIGURE 3**  
**CAPTURE OF CO<sub>2</sub> FROM COAL-FIRED POWER PLANT AS ADDITIONAL SOURCE**  
**OF CO<sub>2</sub> FOR GROWTH OF AQUATIC BIOMASS**



**Coal-fired Power Plant**

CO<sub>2</sub> from combustion

**Growth**

Growth troughs, ponds, or reactors

**Biomass Separator**

Concentrator gives 15-20% solids; concentrator type depends on species in biomass

**Gasifier**

Catalytic gasifier converts biomass to renewable natural gas and carbon dioxide

**Product Gas Separator**

Separator yields product gas plus CO<sub>2</sub> dissolved in condensate for recycling to growth medium