

바이오에너지 생산기술

바이오매스 원료 형태

- 당
- 전분
- 셀룰로우스
- Oil seeds, 지방

당과 전분에서 미국의 에탄올 생산량

-원료: 옥수수에서 84%, 11%는 기타
곡물, 5%는 음식폐기물

-에탄올 생산량

-134개 공장 가동

-4.4 billion gal/yr

바이오디젤 생산량

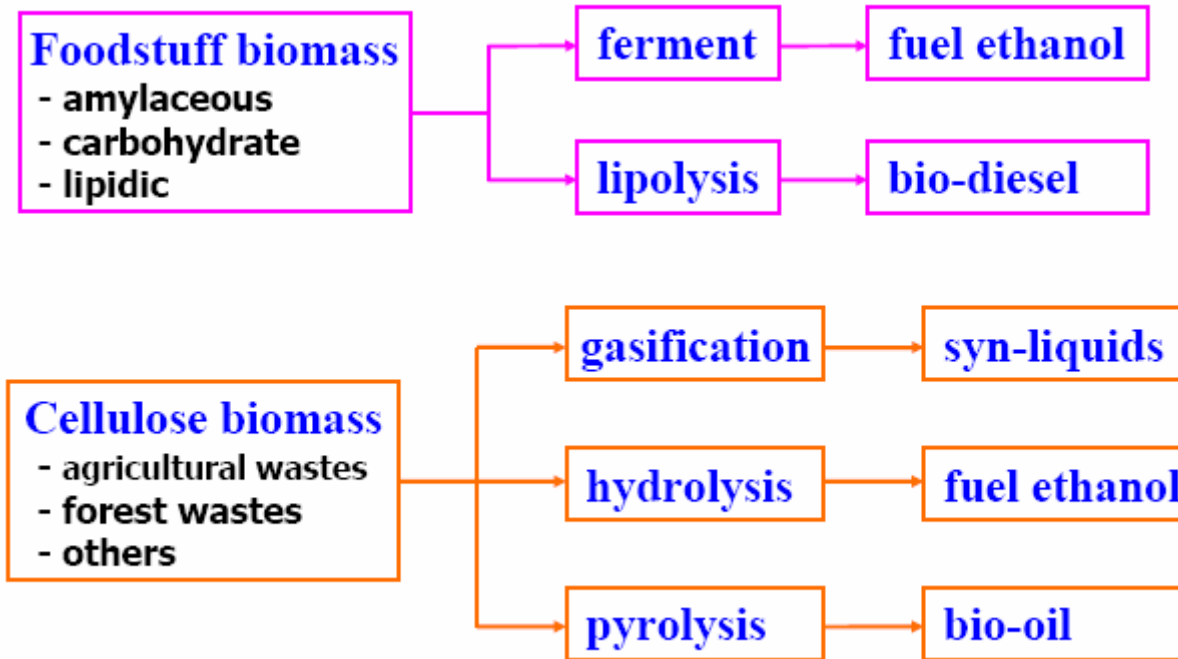
-원료: 콩기름 54%, 32%는 혼합원료,
8% 식용유, 6% 미지, 2% tallow

-바이오디젤 생산량

-65개 공장 가동

-377 million gal/yr

에탄올 생산량





DIESEL FUEL

- US diesel consumption = 56 billion gal/yr
- 20% of US transportation fuel
- 95% of power to move US freight
- 95% of US buses and heavy machinery use diesel
- Current Biodiesel production = 377 million gal/yr
- Biodiesel production under construction = 30+ million gal/yr



US BIOFUELS POTENTIAL

- 1.3 billion tons biomass/yr available in 2030
- Could displace 1/3 of current US petroleum demand by 2030

Source: Biomass as a Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a 1 Billion Ton Annual Supply, ORNL/TM-2005/66

셀룰로오스/당/전분

- 1.3 billion tons biomass/yr available
- Only 76 million tons/yr from grains = 6% of total
- Thus limited potential for starch/sugar ethanol and Biodiesel
- The real potential is from cellulose!

셀룰로오스 원료

- Very long chain molecules
- Different chemical bonding
- Encased in lignin
- Contain a variety of sugars
 - Different sugars require different microbes for fermentation

Annual Crop의 장점

- Lower production costs
- Drought resistance
- Flood resistance
- Can take advantage of CRP

바이오리파이너리

- Can accept multiple feedstocks
- Produces multiple products
- Optimizes value-added products
- Minimizes residue production
- Maximizes revenues

미래의 바이오연료

- Ethanol-from-cellulose
- Gasification and Fisher Tropsch
- Thermal Depolymerization-Fast Pyrolysis

셀룰로오스에서 바이오에탄올 생산기술

- Biological (Fermentation)
 - Concentrated acid
 - Dilute acid
 - Enzymatic with dilute acid pretreatment
- Thermochemical gasification
 - With catalytic conversion of gas to Etoh
- Hybrid
 - Thermochemical gasification with fermentation of gas to Etoh

열화학적 기술

- Processes
 - Fast Pyrolysis
 - Liquefaction
 - Gasification/FT
- Common Pretreatment
 - Particle size reduction
 - Drying

디젤/가솔린 생산

