



Introducing BP Biofuels

a growing alternative

Future Fuels Pathway : Bob Saunders
31th October 2006

Drivers for Change



Key drivers in moving towards sustainable mobility solutions

- Security of supply & energy diversification
- Climate change issues
- Biofuels address both these issues.



BP Biofuels a growing alternative



Security of Supply and Energy Diversification



- Geological evidence proves we are not running out of crude oil
- Biofuels will help governments achieve their energy security goals and reduce dependence on imported oil
- Biofuels have the added benefit of helping the agriculture sector

Imported Energy Dependency Profile

Transport	2004	2020
N America	53%	64%
EU	81%	89%
China	47%	72%
India	66%	84%



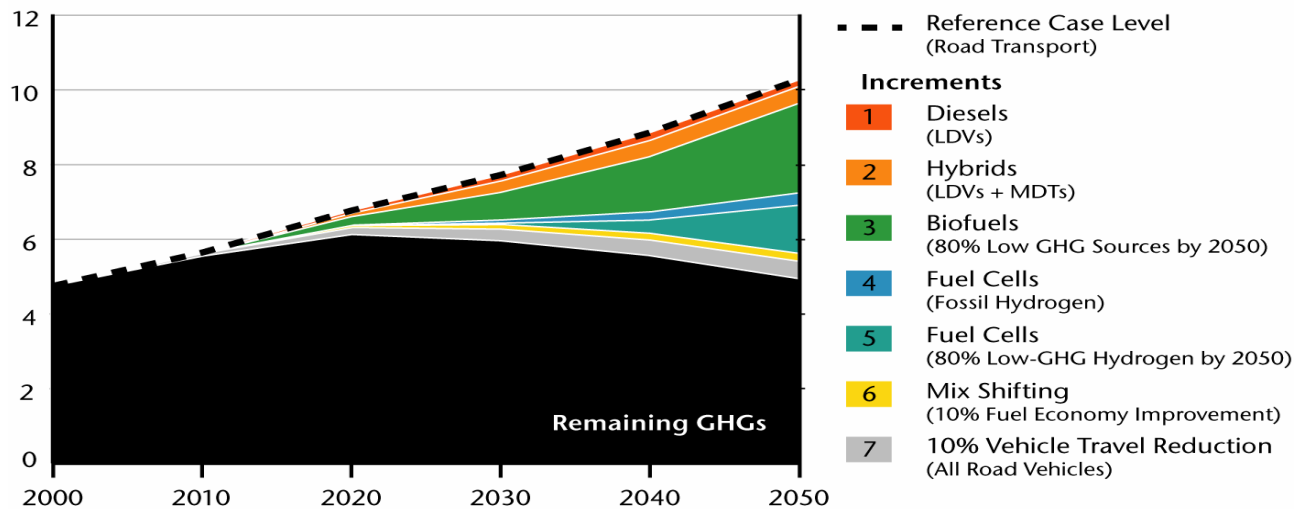


Greenhouse Gas Emissions Reduction

- Transport energy demand is projected to double by 2050
- Transport comprises 21% of CO2 emissions
- A variety of technologies can reduce GHG emissions in the future
 - Vehicle efficiency
 - Biofuels and other renewable fuels
 - Demand reduction

Combined Technology Case

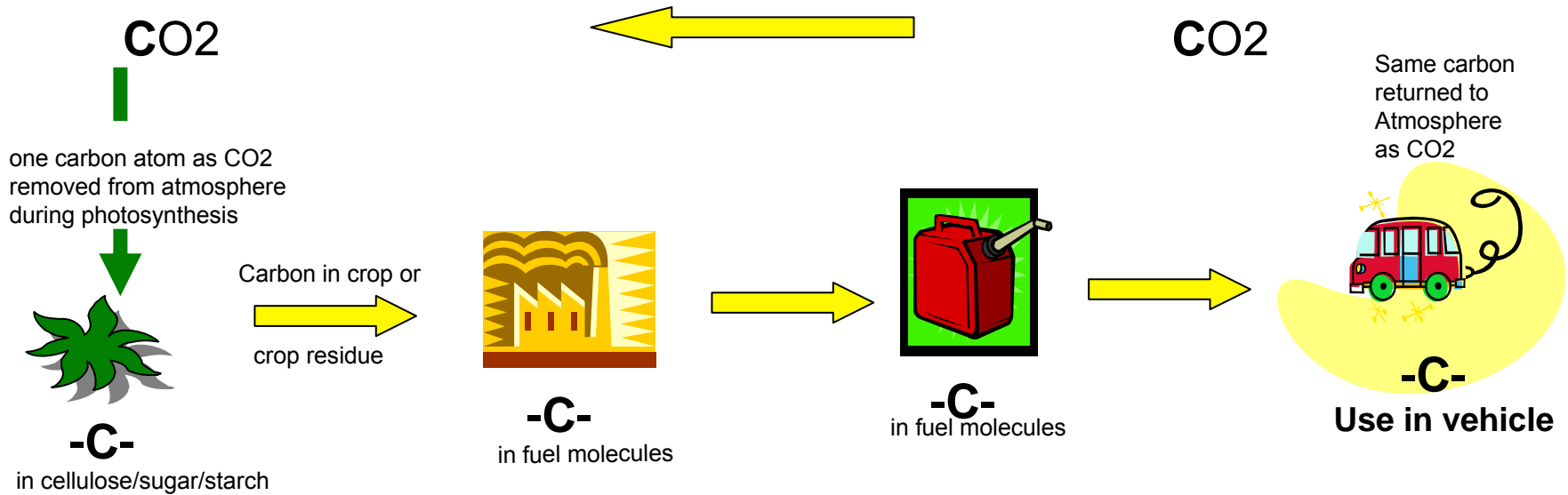
Gigatonnes CO₂-Equivalent GHGs



BP Biofuels a growing alternative



Biofuels Overview - the carbon cycle



Fossil Energy Inputs

Biomass growth



External energy and associated GHG emissions for farming (eg from fertiliser use)

+

Processing to produce biofuel



External energy and emissions for fuel production process

+

Biofuel



External energy for distribution & transportation

=

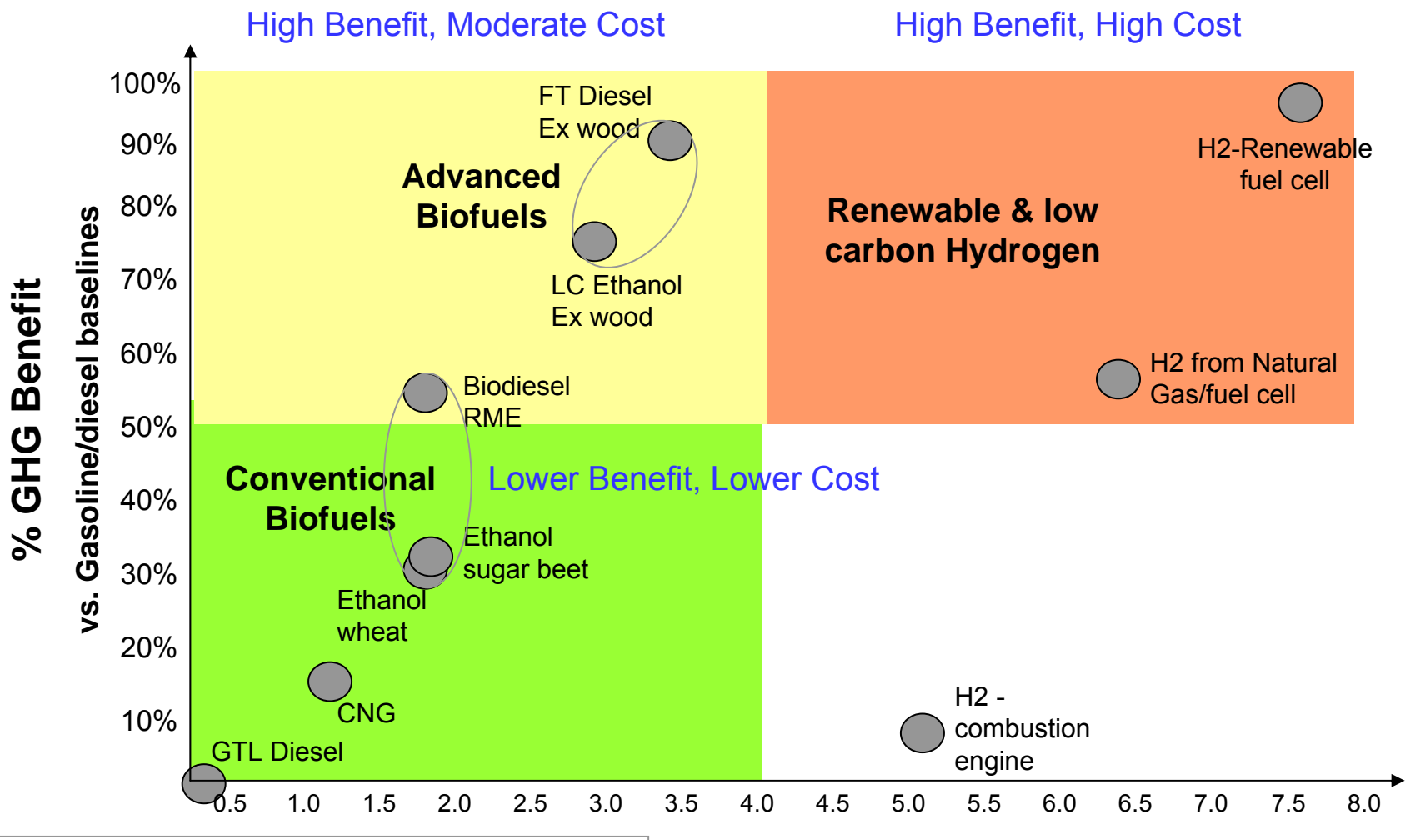
WTW GHG emission result for biomass pathways. Contribution from above closed cycle is zero

BP Biofuels a growing alternative





WTW GHG benefit vs cost



Reference-WTW Analysis of Future Automotive Fuels & Powertrains in the European Context-Version 2a, December 2005. Concawe/European Council for Automotive R&D /European Commission Joint Research Centre

Cost for Substitution

€/100km

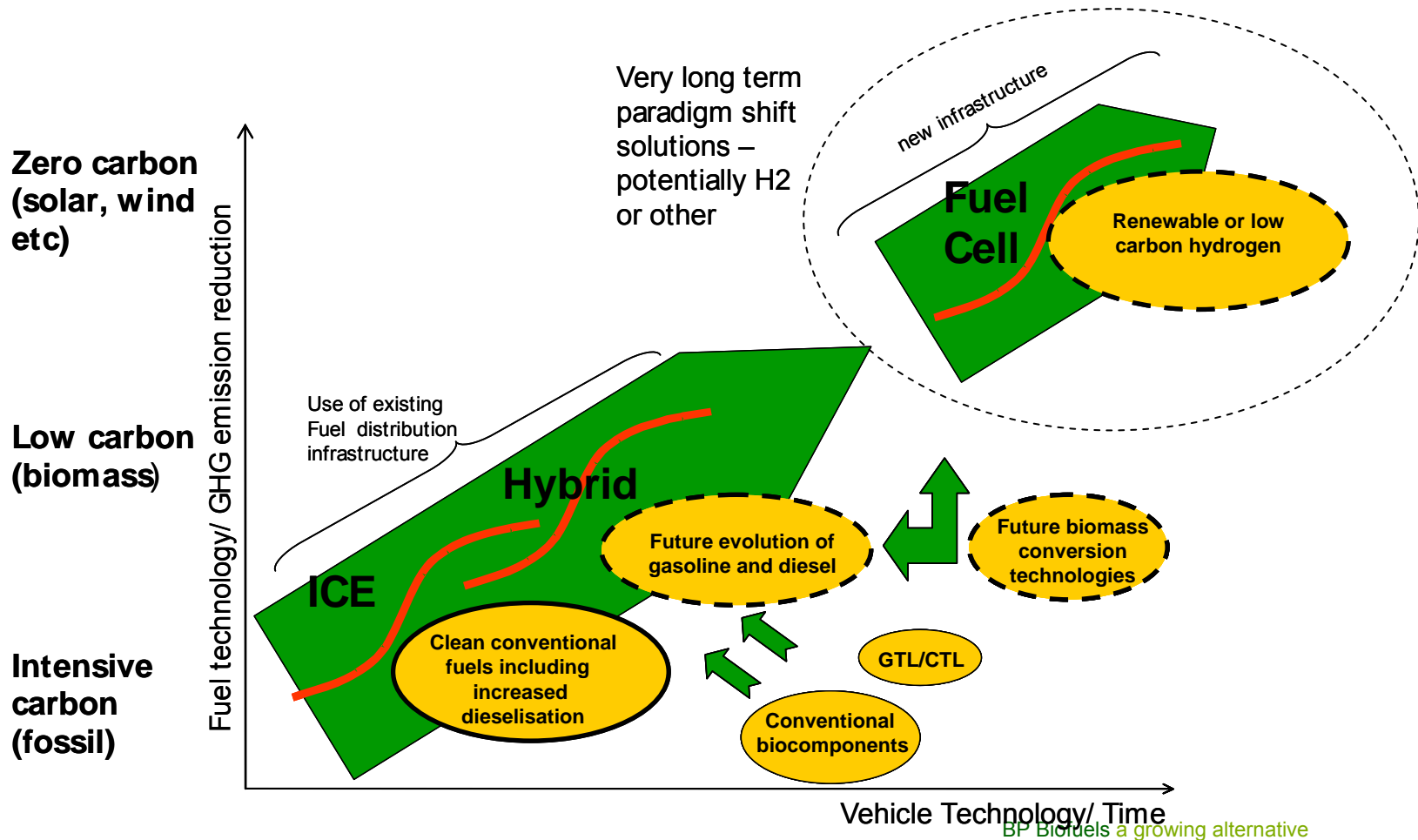
BP Biofuels a growing alternative



BP strategy: The future fuels pathway



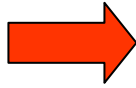
Biofuels is a critical and timely step in the future fuels pathway and will help deliver goals towards security of supply and GHG emission reduction



BP Biofuels a growing alternative



“Conventional” bio-components



Ethanol for
gasoline



Esters for
Diesel (FAME)

sugar & starch crops

oil crops

- Conventional biofuels are a positive first step in use of biomass
- GHG reductions modest, not all biofuels are equal
- Benefit rural economy
- Limitations :
 - Competing land use issues – food vs power generation
 - Not ideal fuel molecules: OEMs limit blending; handling/quality issues
- Ethanol issues:
 - Significant additional infrastructure costs
 - Success at scale requires ‘whole of market’ introduction



Agricultural and Rural Economy



- Extremely large quantity of biomass needed to meet transport requirement as well as heat and power
- Diversification of crop types and markets
- Different farming practices
- Risks - locked to energy / transport markets
- Opportunities - utilize low value land and agricultural residue





Environmental and Social considerations

Standards being developed through Low Carbon vehicle partnership

- GHG Certification
 - Not all biofuels equal on GHG basis
 - LowCvp study showed ethanol can vary between 7 – 87% GHG savings
 - Methodology to quantify supply chains in process of development
- Environmental Sustainability
 - 6 principles with 25 criteria as well as enhanced criteria
 - RSPO an example of environmental sustainability standard
- Social and Ethical
 - ILO worker standards
 - Moving indigenous populations
 - Child labour





Next generation Biofuels

- Advanced biofuels respond to all drivers - deliver on GHG, security of supply & support agriculture sector
- Bio-butanol has a number of attractive properties:
 - Easily blended into gasoline
 - Can use existing fuel infrastructure without major modification
 - Potential to be used at higher blend concentrations than ethanol in unmodified vehicles
 - Energy content closer to that of gasoline than ethanol – reducing the impact on fuel economy for the consumer
- Bio-butanol is complementary to ethanol and can enhance the performance of ethanol blends in gasoline
- Second generation biofuels are expected to be even less carbon intensive because they will be manufactured using non-food crops (lignocellulosic) and with a different processing technology



BP's New Biofuels Business



- Formed a new Biofuels business in June
- Announced plans to invest \$500 M in new Energy Biosciences Institute to provide a pipeline of biofuels technology for the business
- Will partner with science company DuPont to develop advanced biofuels-the first introduction is bio-butanol.
- BP & DuPont collaborating with British Sugar on introduction of bio-butanol into UK
- Launched “targetneutral” in the UK as a consumer education, non-profit programme that gives motorists the chance to ‘neutralise’ the CO₂ emissions from their driving



targetneutral

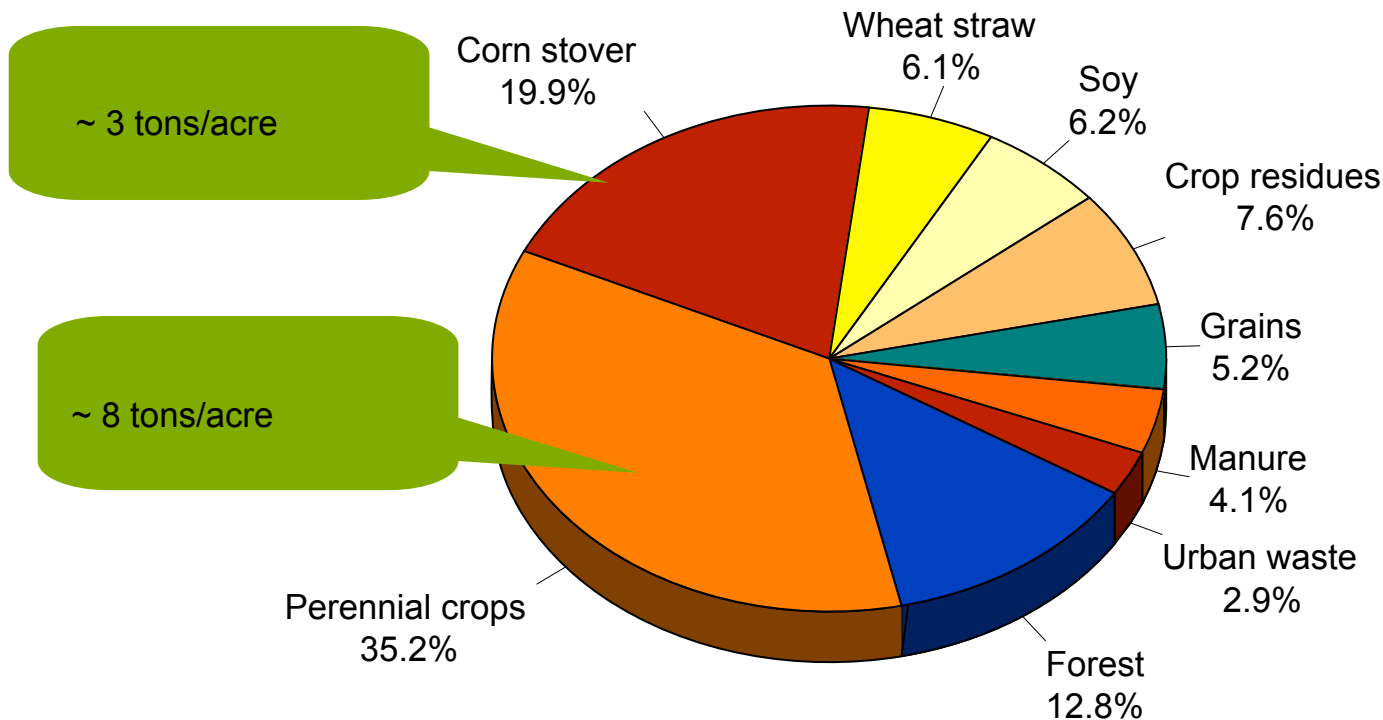
BP Biofuels a growing alternative





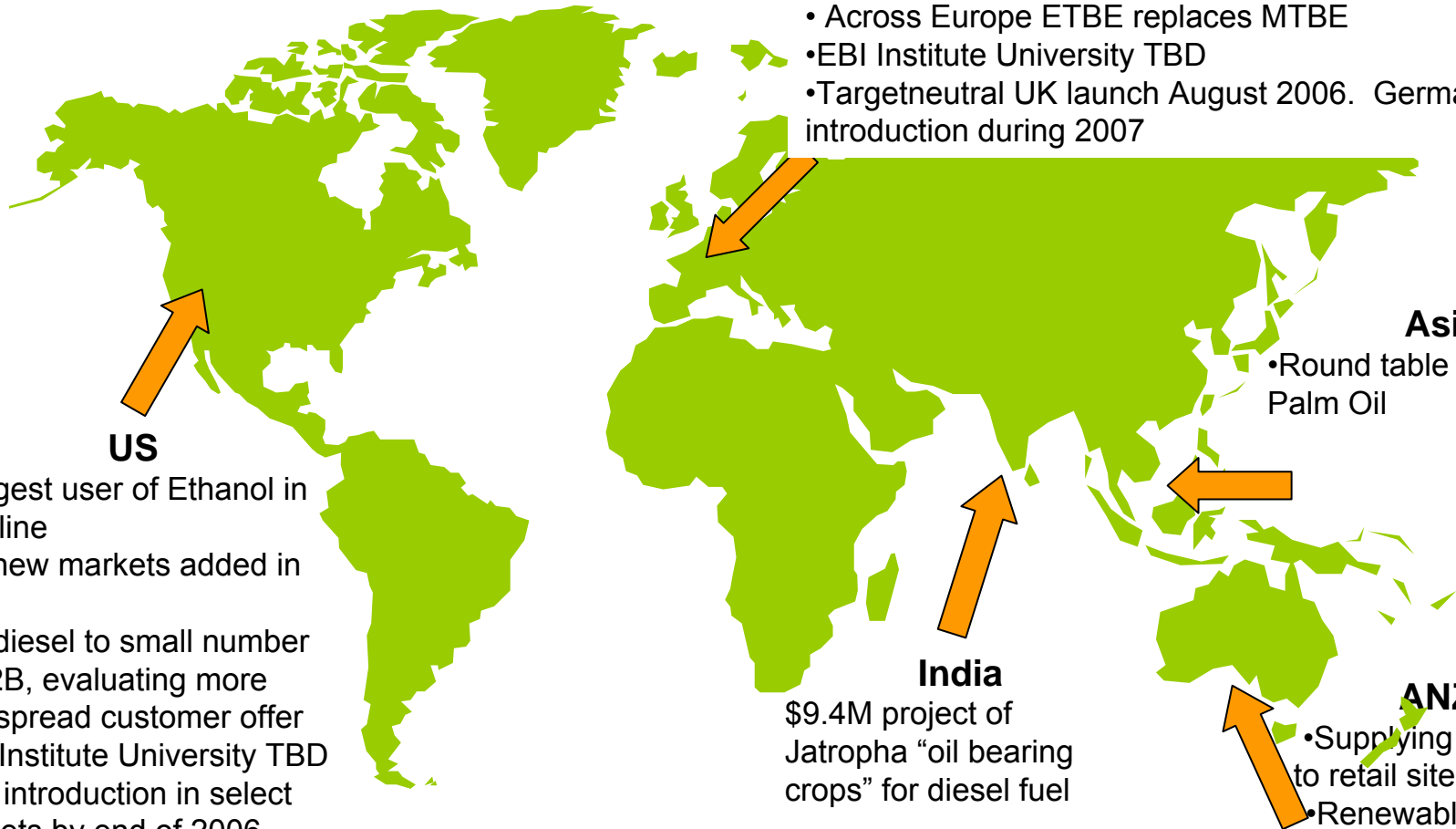
New conversion technologies and feedstocks do offer the potential for significant biofuel penetration

- Lignocellulosics will unlock the potential of many feedstocks
- US biomass potential = 1.3 bn tons
- 1 bn tons x 80 gals/ton = 80 bn gals ethanol = 55 bn gals gasoline = 30%



From: Billion ton Vision, DOE & USDA 2005

BP's biofuels activity



US

- Largest user of Ethanol in gasoline
- 20 new markets added in 2005
- Biodiesel to small number of B2B, evaluating more widespread customer offer
- EBI Institute University TBD
- E85 introduction in select markets by end of 2006
- Targetneutral introduction in CA during 2007

Europe

- First major to introduce 5% FAME blend in Germany
- Across Europe ETBE replaces MTBE
- EBI Institute University TBD
- Targetneutral UK launch August 2006. Germany introduction during 2007

Asia

- Round table sustainable Palm Oil

India

\$9.4M project of Jatropha "oil bearing crops" for diesel fuel

ANZ

- Supplying Ethanol to retail sites in QLD
- Renewable diesel via tallow

BP Biofuels a growing alternative



Developing Commercial Market



- Requires the right regulatory framework
 - Aimed at the right goals
 - Giving long-term certainty
- Industries will react by developing the infrastructure
 - Agricultural
 - Processing
 - Oil
- Currently targets are based on volume or energy content
 - Needs to change to GHG basis – appropriate policy goal
- Customer acceptance and desire





Biofuels – Summary

- Climate change and energy diversification will continue to underpin increased use of biofuels
- Conventional biofuels are a positive first step in use of biomass
 - GHG reductions modest, not all biofuels are equal
 - Land use and competition for food crops are serious issues
- Standards are needed for carbon certification of biofuels and sustainable biomass production
- BP is working in partnerships to develop processes for production of second generation biofuels
- If Biofuels are to make a significant impact on the two key drivers, we will need:
 - Better processes
 - Better feedstocks
 - Better fuel molecules





THANK YOU

