



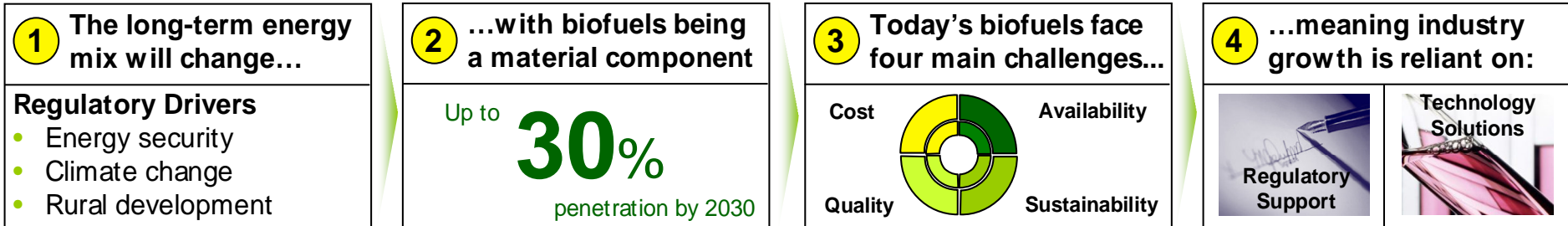
# World Market for Biofuels

## An acceptable and positive impact

BP Biofuels  
a growing alternative

Philip New – President, BP Biofuels  
27<sup>th</sup> March 2007

# Introduction



**BP Biofuels**  
a growing alternative

- ▶ Shaper of an emerging industry
- ▶ Leadership position in the industry



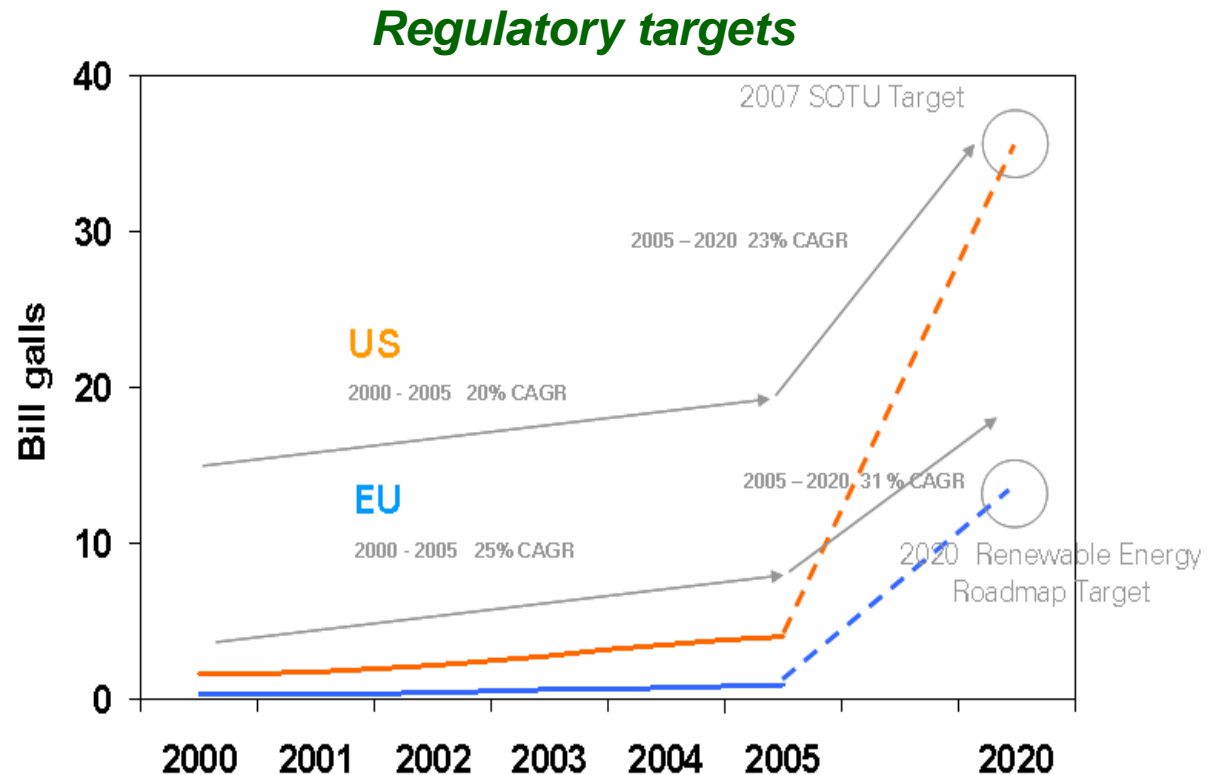
# The long term energy mix will change

## Enduring nature of regulatory drivers



- Greenhouse gas reduction
- Energy security
- Rural development

Global in nature



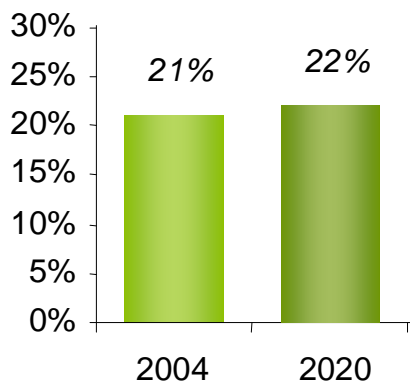


...with biofuels being a material component

Up to **30%**  
penetration by 2030

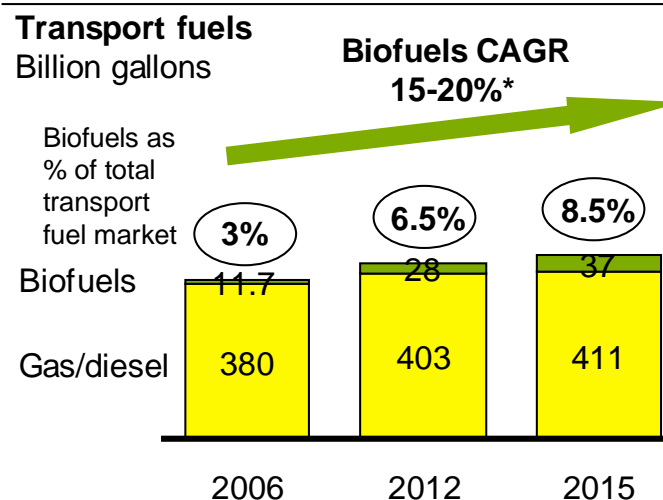
Given an increasing global energy demand, biofuels are the best supply side option for ground transportation

Transport's Contribution to Total CO<sub>2</sub>



Source: IEA World Energy Outlook, 2004

Biofuels represent ~40% of the predicted global growth in transport fuels



\* Biofuels could reach 30% of the fuel pool by 2030  
Source: Tecknon 2006, Team analysis

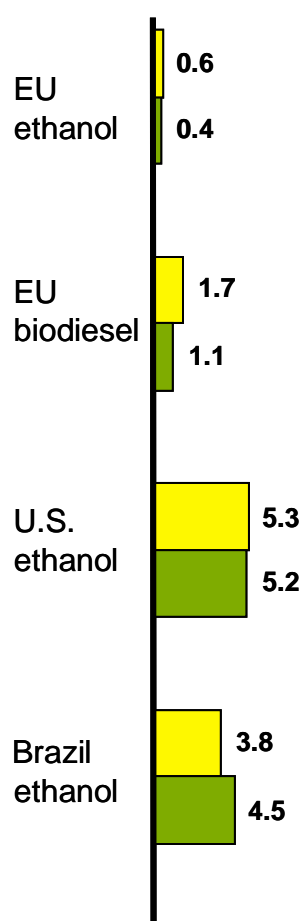
- Energy dependency and climate change will remain primary motivators for pursuing alternative and renewable transport fuels
- For ground transportation, biofuels are the best supply side option to meet both challenges in a material way by 2030. They also support rural development.



Availability: biofuels currently represent 2-3% of the transport fuel pool. Today, feedstocks limit penetration to around 5-7%

### 2006 current demand and production capacity (bn galls)

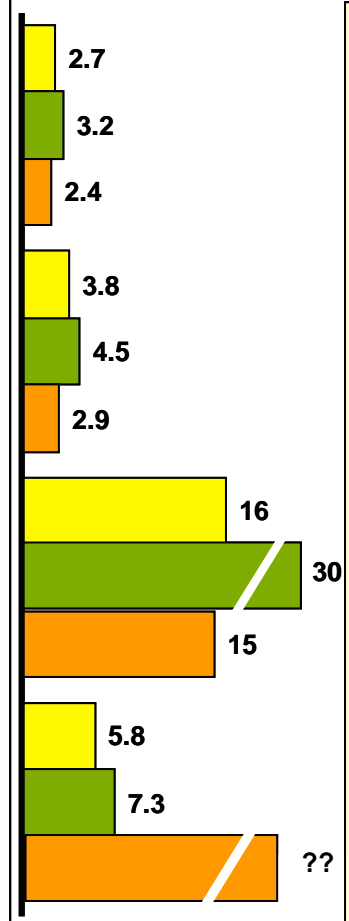
■ Demand ■ Supply Conventional feedstock



- 2006 to 2011**
- Europe constraints**
- **Distribution** – need ethanol infrastructure for distribution, blending and retail
  - **Ethanol** – max feedstock limit reached with 5.75% target.
  - **Bio-diesel** – max limit from rapeseed will be 1.1bn galls short of target; B5 will limit further penetration
- US constraints**
- **Distribution** - rail car production capacity backlog of ~3 years
  - **Growth** – limited by construction
  - **Economics** – Increasing corn price will erode margin and limit growth to RFS and mandate volumes
- Brazil constraints**
- **Distribution** - Trucking is primary method, despite long distances and limited capacity resulting in high costs; limited port facilities
  - **Risk management** – lack of paper market for hedging will limit exports

### 2011 predicted demand and maximum conventional feedstock supply (bn galls)

■ Demand ■ Announced Capacity ■ Feedstock Limit



- 2011 forward**
- Europe constraints**
- **Feedstock** – Limits include use of 50% set aside land and crop optimisation; Potential for 1.2 bn gall ethanol if cereal exports used; then LC required; increasing imports of veg oils for biodiesel
  - **Capacity** – insufficient indigenous feedstock for announced capacity
  - **Ethanol demand** beyond 10% - will require FFVs and E85 distribution
- US constraints**
- **Corn supply** – max 15-17 gallons then LC technology needed
  - **Distribution** – river barge limited reach, ageing infrastructure
  - **E85/FFVs** – to exceed 15 bn galls (10% vol) will require E85 distribution priced at energy parity and FFVs
- Brazil constraints**
- **Trade Policy** – Tariffs in demand markets will limit investment in exports
  - **Domestic markets** – rapid growth in FFV's limit export volumes

# Implications of market growth to 155bn litres by 2015

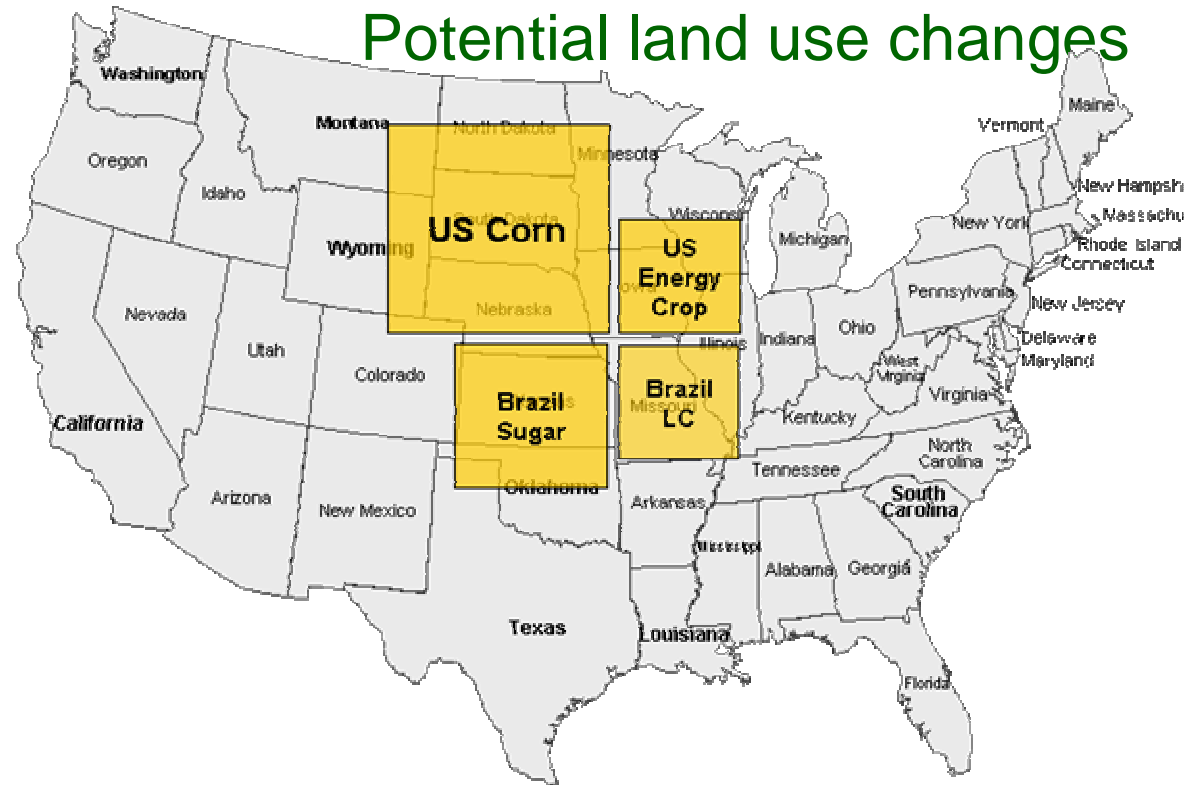
## What does such growth mean in practice?



An *incremental*

- **10 billion litres every year**
- **17 000 sq km every year** (based on sugar cane ethanol)

### Potential land use changes

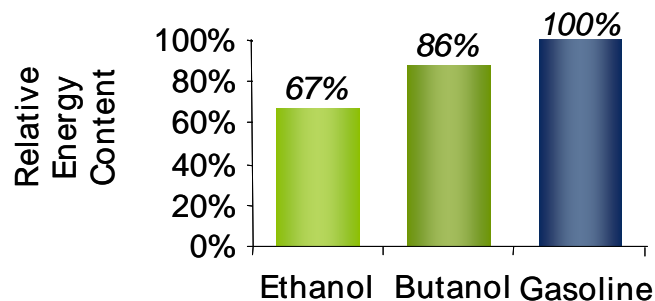


# Sustainable growth requirements

## Technology development & regulatory support

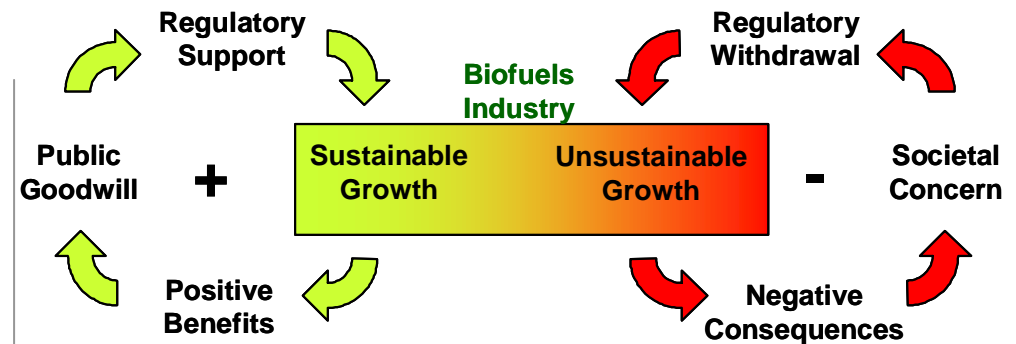


### Technology development



- **Advanced molecules** – improving efficiency of product
- **Energy crops** – low water usage, crops on low-grade soils
- **Lignocellulosic** - economic conversion processes

### Regulatory support



- **Market based** – balancing environmental, energy security and development goals
- **Encouraging innovation** – and applying equally to all – so stimulating solutions
- **Geared to emissions reductions** - stimulating quantity of fossil fuel energy replaced, not specific volumes
- **Supporting guidelines** – regulating sustainable and responsible production

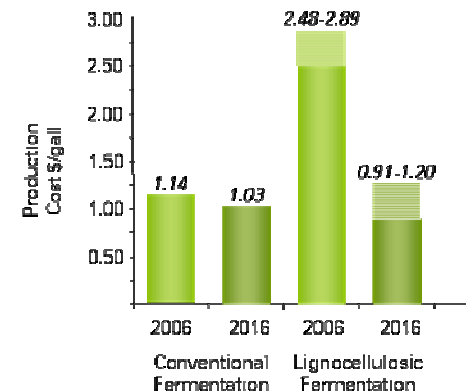
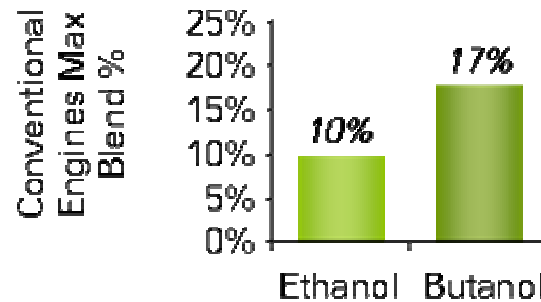
# BP's approach: Build business across the value chain Understand, communicate, regulate impacts



The road to renewal....Learning by doing  
BP's own volumes of ethanol blended into gasoline have increased 25% from 2005 to 2006

## Specific initiatives

- 8000 ha Jatropha project
- Biobutanol
- EBI: Foundations for lignocellulosic business
- First oil industry member of RSPO
- Sourcing guidelines



## Second step: Develop BP's "magnetic north" Guidance for operations across the value chain



### What we seek to do:








- Understand likely environmental and social impact
- Adopt best industry practices in cultivation and process design
- Look for synergies between biofuels and food production, water management and power generation
- Transparent reporting, verification & continuous improvement
- Engage our customers!

### What we seek to avoid:

- Negative life-cycle GHG balances, whether through fuel processing or land change
- Feedstocks from high conservation value areas
- Unsustainable stress on soil or water
- Sourcing from plantations that displace staple foods
- Improper labour practices or community relations



# Conclusion

<p><b>1</b> The long-term energy mix will change...</p> <p><b>Regulatory Drivers</b></p> <ul style="list-style-type: none"> <li>• Energy security</li> <li>• Climate change</li> <li>• Rural development</li> </ul>	<p><b>2</b> ...with biofuels being a material component</p> <p>Up to <b>30%</b> penetration by 2030</p>	<p><b>3</b> Today's biofuels face four main challenges...</p> <p>Cost      Availability</p>  <p>Quality      Sustainability</p>	<p><b>4</b> ...meaning industry growth is reliant on:</p> <table border="1"> <tr> <td data-bbox="1592 496 1805 639">  <p>Regulatory Support</p> </td> <td data-bbox="1816 496 2029 639">  <p>Technology Solutions</p> </td> </tr> </table>	 <p>Regulatory Support</p>	 <p>Technology Solutions</p>
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Thank you



**BP Biofuels a growing alternative**

# First step: sourcing guidelines

## Fundamental to an enduring industry is the avoidance of harmful environmental & social impacts



Issues include:

- stress on the world's limited water resources
- biodiversity
- deforestation – the destruction of High Conservation Value Forest (HCVF)\*
- child and forced labour and other employment abuses
- planting on peat soils
- community conflict issues
- land rights, including economic and physical displacement
- effects of monoculture on local food production and local economies
- pollution and environmental damage (water / soil / air), including related socio-economic impacts
- net greenhouse gas balances resulting from land use change

\* HCVF is technically defined according to principles defined by the WWF

Principles need to be converted into workable tools  
Here are some thoughts, neither definitive nor final



With regard to its investments, BP proposes, for example, to:

- make use of environmental and biodiversity assessments to ensure the effects of the establishment of BP dedicated biofuel feedstock crops on biodiversity are understood and managed appropriately
- BP will expect best practice in crop rotation, pesticide and herbicide application so as to foster biodiversity
- in food short regions, BP will neither grow nor displace the local recognized staple food for fuel use
- in addition to supporting the UN sponsored voluntary initiative on human rights, BP will actively aim to build sustainable advantage through the implementation of inclusive business models that enable local communities to benefit

**ALL THE ABOVE OPEN TO DISCUSSION**

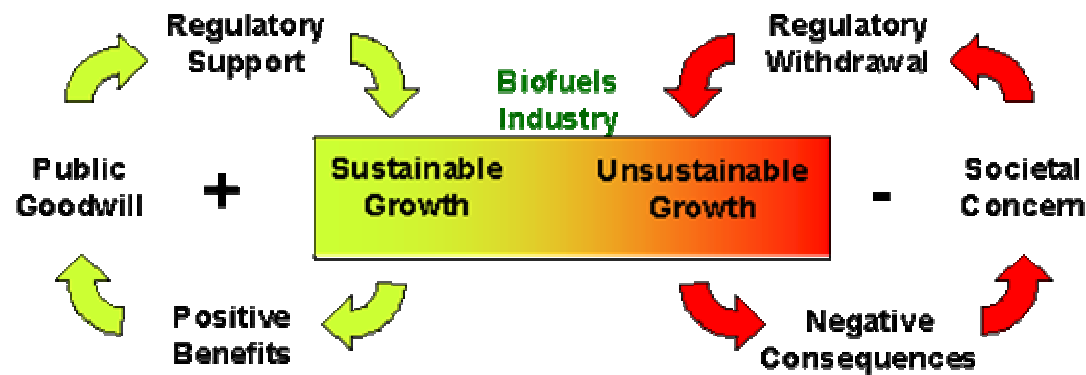
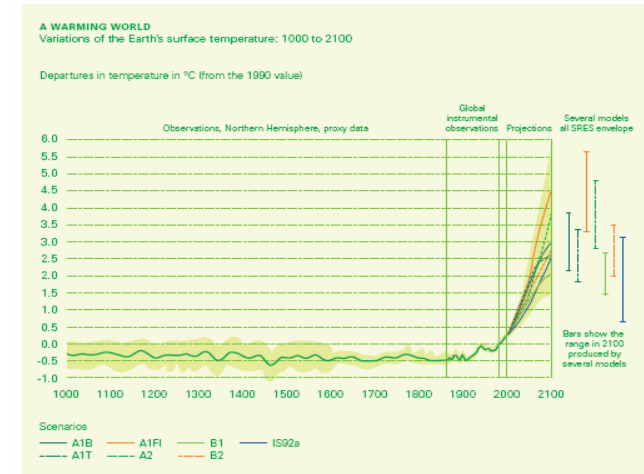
# What we believe the industry needs

## Dialogue about choices, Robust operational tools



Watching and waiting is not an option:

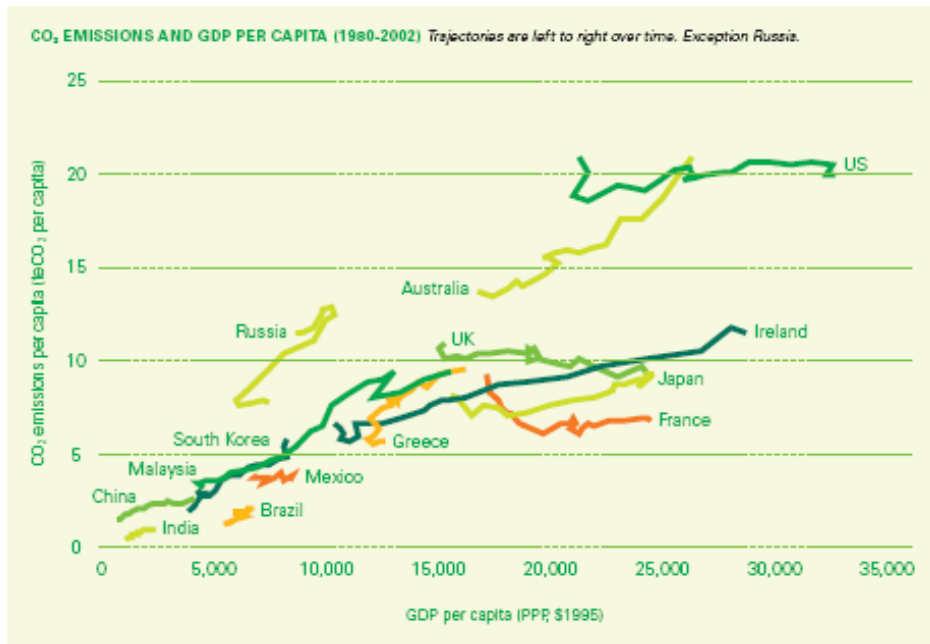
- What are the trade-offs?
- Who is in the debate?
- What are the unintended consequences



What should be in?

What should be out?

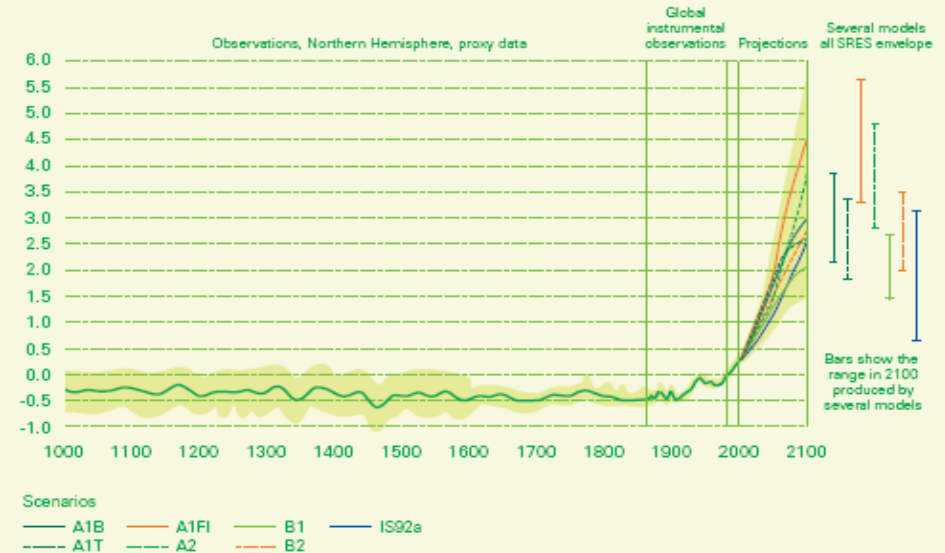
# Energy is at the heart of the world economy. World population growth continues rapidly.



## Energy Use Per Capita

**A WARMING WORLD**  
Variations of the Earth's surface temperature: 1000 to 2100

Departures in temperature in °C (from the 1990 value)



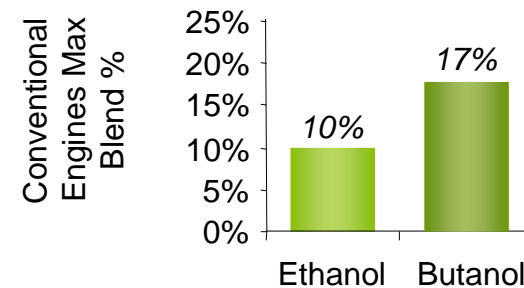
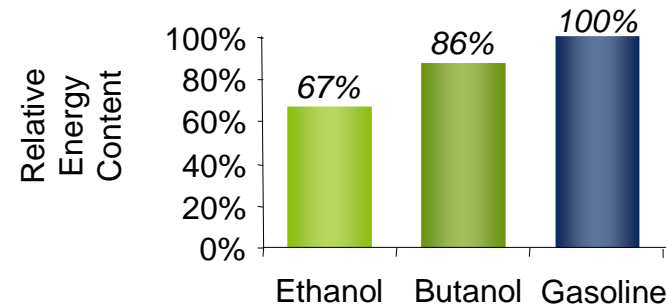
## Temperature Changes

Source: UN IPCC Climate Change 2001; Synthesis Report. Summary for Policymakers

# Advanced conversion: developing better quality molecules



- Next generation biofuels offer advantages over conventional biofuels (e.g. ethanol)
- Benefits:
  - Not corrosive – can use in higher concentrations
  - Low water affinity – no risk of phase separation; can pipeline
  - Easier to blend – no RVP issues
  - Higher energy content – better for the environment; better for the consumer (fewer fills)



# Bioscience: improving economics and addressing sustainability



- Current generation technology can be input intensive e.g.
  - Water usage for plant growth
  - Acid usage in first generation lignocellulosic conversion
- Opportunities:
  - Genetically modified plants which are less thirsty
  - Plant decomposition triggered by UV-light

