

Celtic
Renewables

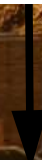




Substrate



**ABE fermentation
Bioconversion**



**Acetone Butanol Ethanol
Animal feed**

Solventogenic clostridia

development of the ABE fermentation

Bacteria that convert carbohydrates into solvents

Acetone Butanol Ethanol (ABE)

Stimulus for mass production - WWI

ACETONE needed as a solvent in explosives manufacture

Global production

UK, USA, France, Canada, India, Japan, Brazil, Egypt...

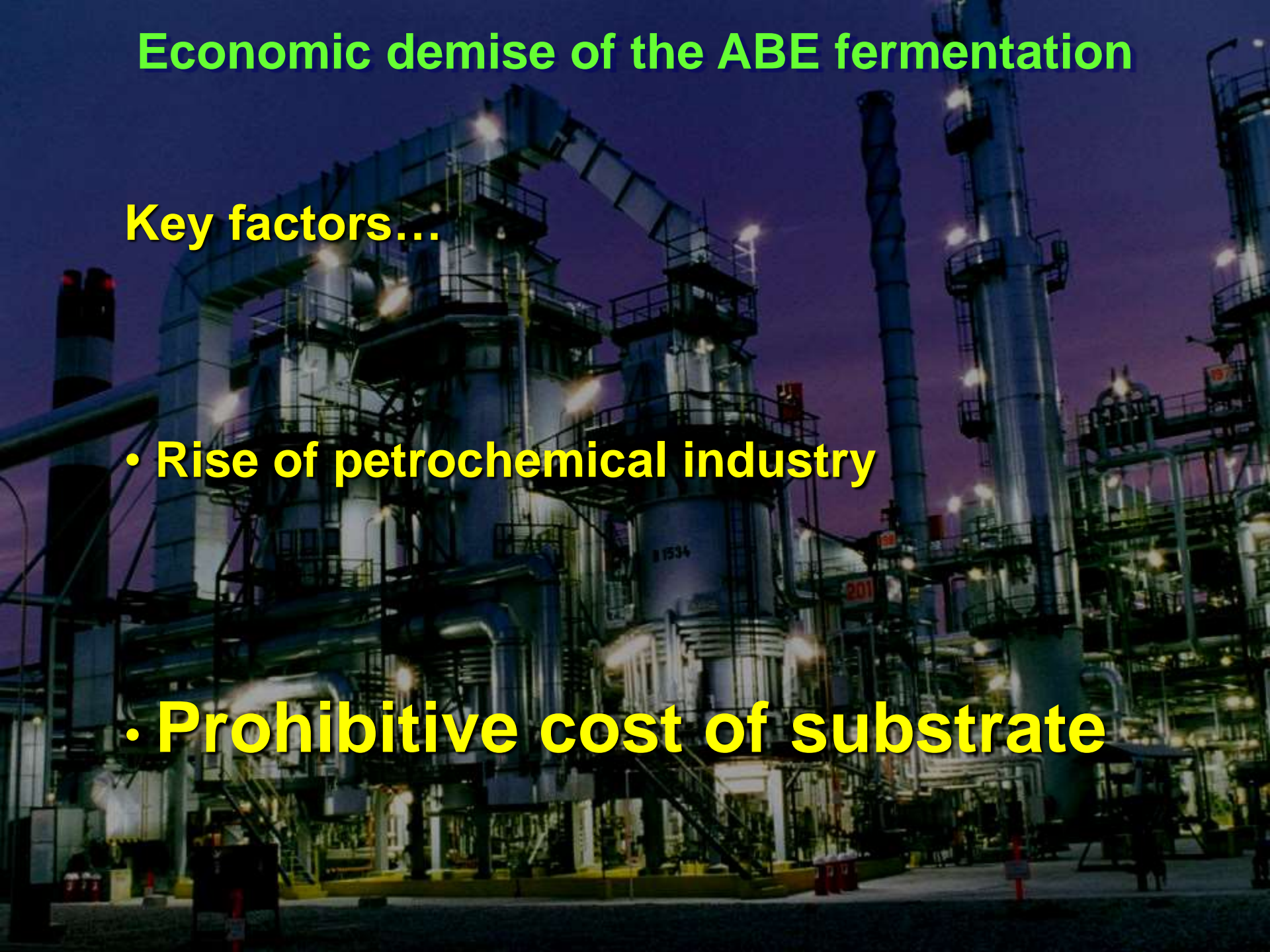
second only to alcohol production by yeast



Economic demise of the ABE fermentation

Key factors...

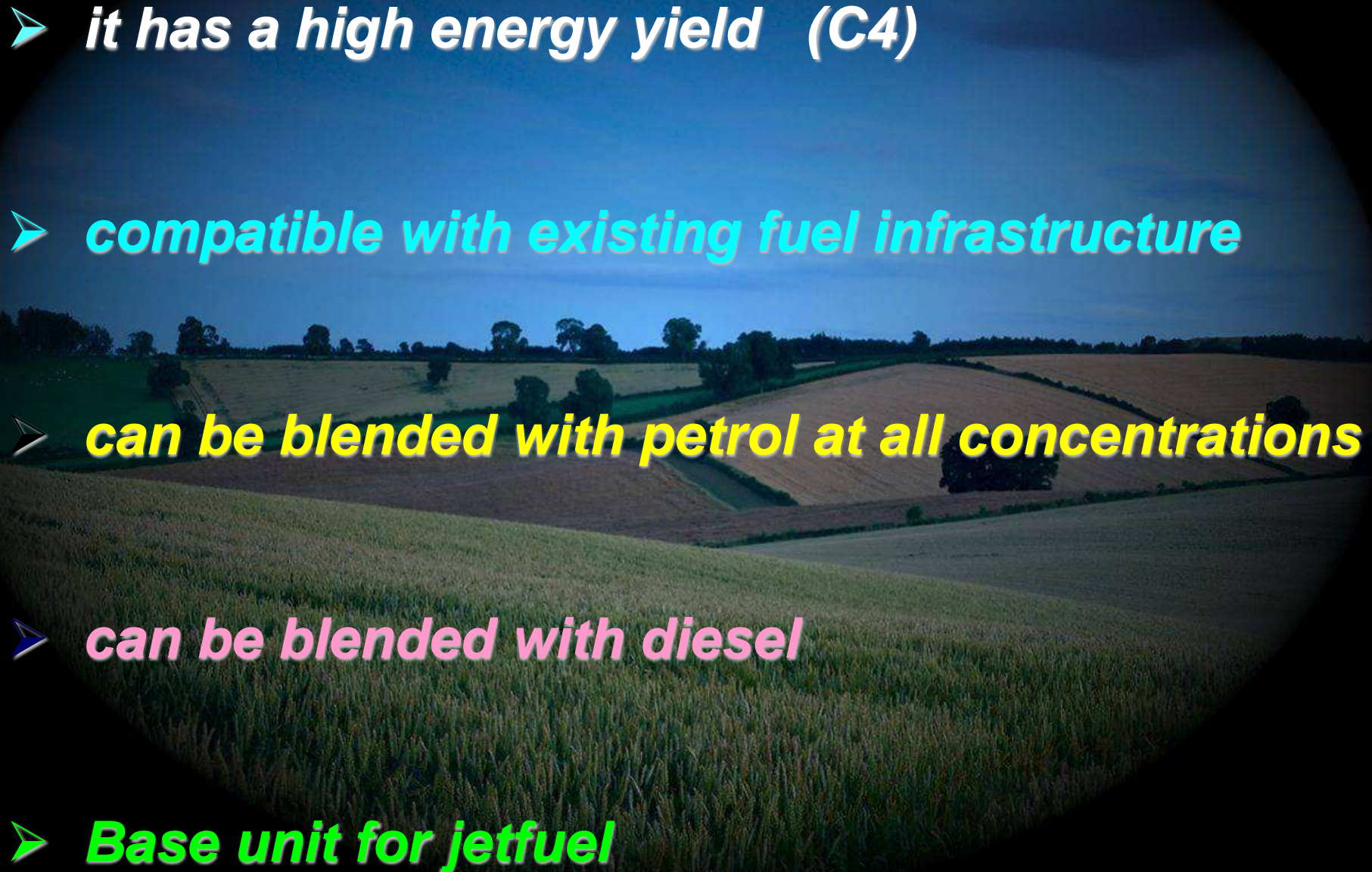
- Rise of petrochemical industry
- Prohibitive cost of substrate



Summer 2005...



BUTANOL as a BIOFUEL

- *it has a high energy yield (C4)*
 - *compatible with existing fuel infrastructure*
 - *can be blended with petrol at all concentrations*
 - *can be blended with diesel*
 - *Base unit for jetfuel*
- 

Solventogenic clostridia

RE-development of the butanol fermentation

"Delivering solutions that reduce the world's reliance on fossil fuels is a global imperative. **Biobutanol** holds tremendous potential for delivering solutions in the near term."

- Charles O. Holliday, Jr., DuPont Chairman & CEO

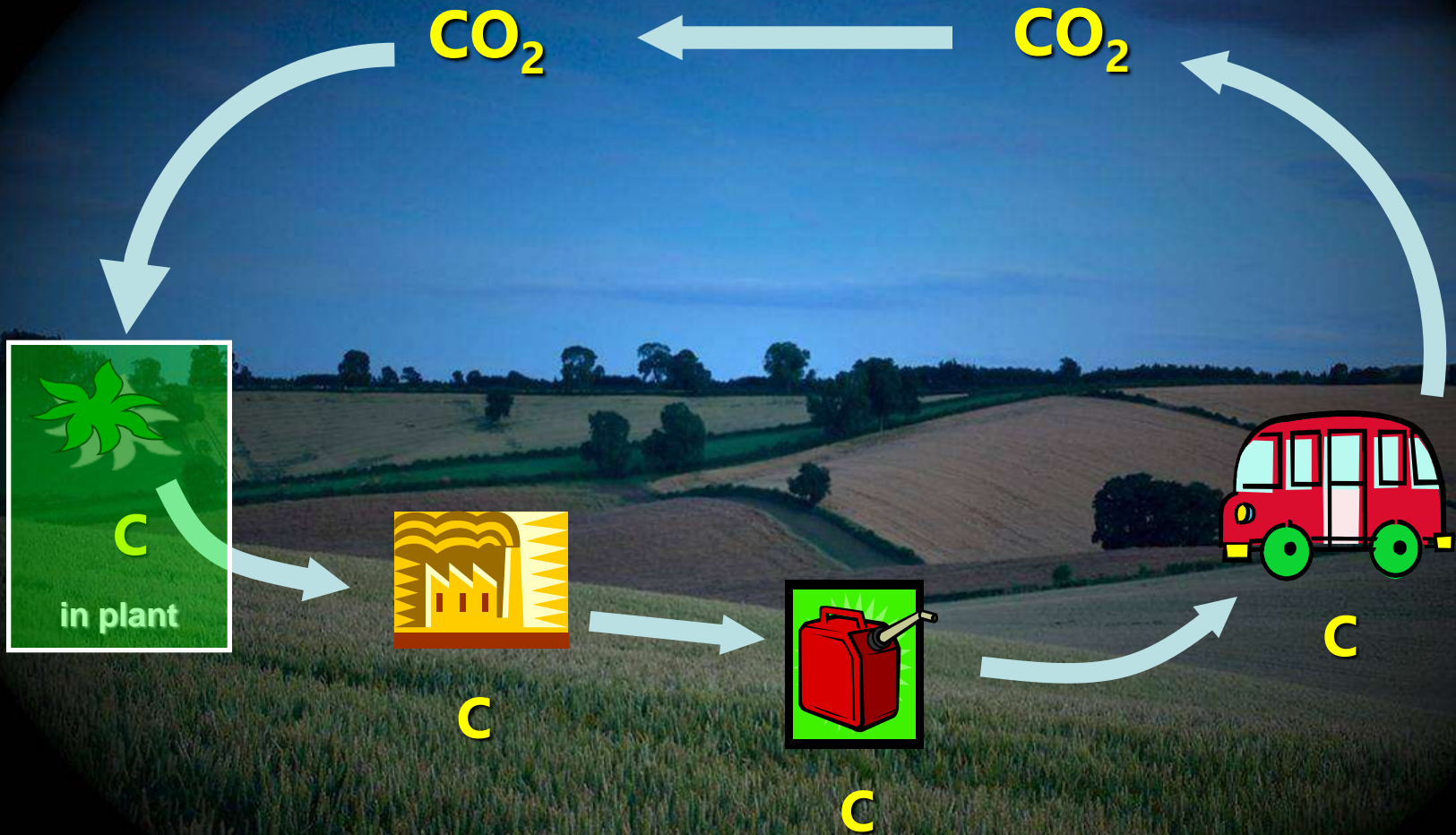


Butafuel™ is an advanced transportation biofuel based on



Sustainable biofuel

Renewable Sustainable Substrates



ABE bacteria can use many different carbon sources to make butanol











TULLI BRÄNNING & DISTILLERIE
2006
ALAN MC
CASK NO. 53
BLACKFORD

TULLI BRÄNNING & DISTILLERIE
2006
HÄDDOCKS RIVALER
SVERIGEN
CASK NO. 65
BLACKFORD

TULLI BRÄNNING & DISTILLERIE
2006
ROWIE REEKIE
LEEKIE
CASK NO. 562
BLACKFORD

TULLI BRÄNNING & DISTILLERIE
2006
ALEXANDER
CASK NO. 581
BLACKFORD

TULLI BRÄNNING & DISTILLERIE
2006
SANDRA
BURET
CASK NO. 582
BLACKFORD

TULLI BRÄNNING & DISTILLERIE
2006
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BLACKFORD

TULLI BRÄNNING & DISTILLERIE
2005
RIGG & ALEXANDER
HEMELAND
CASK NO. 581
BLACKFORD

TULLI BRÄNNING & DISTILLERIE
2006
SANDRA
BURET
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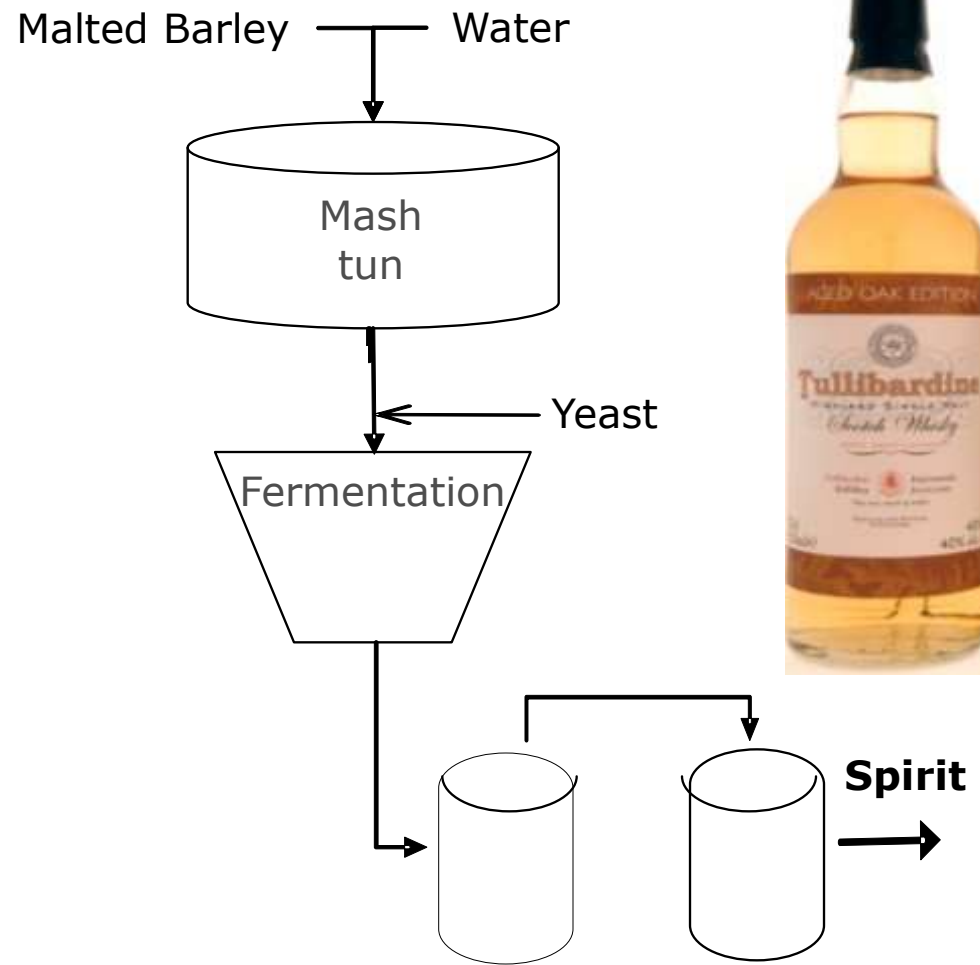




J JES
JOHN JAMESON & SON
BOW STREET
DUBLIN

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Distillery



DRAFF

750,000+ tonnes per annum

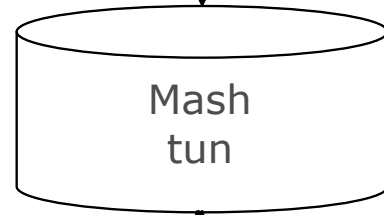


POT ALE

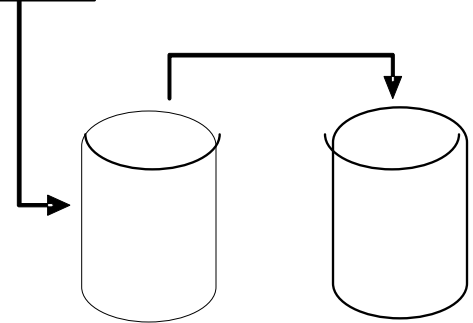
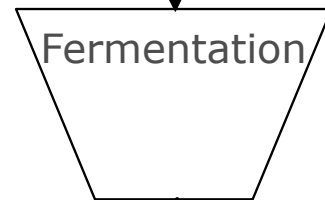




Malted Barley Water



Yeast



Value proposition

- **removal problem alleviated**
- **reduce national carbon emissions**
- **environmental sustainability**
- **provide local solutions**
- **International capability**









POT ALE

DRAFF

Celtic Renewables
Butanol Biofuel

Biobutanol

Biobutanol

STAR Clean



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Tayside and Central Scotland

Whisky-fuelled car makes first journey

Biobutanol, which is intended to be a replacement for petrol and diesel, works in any car.



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Company creates biofuel from whisky residue

Company creates biofuel from whisky residue



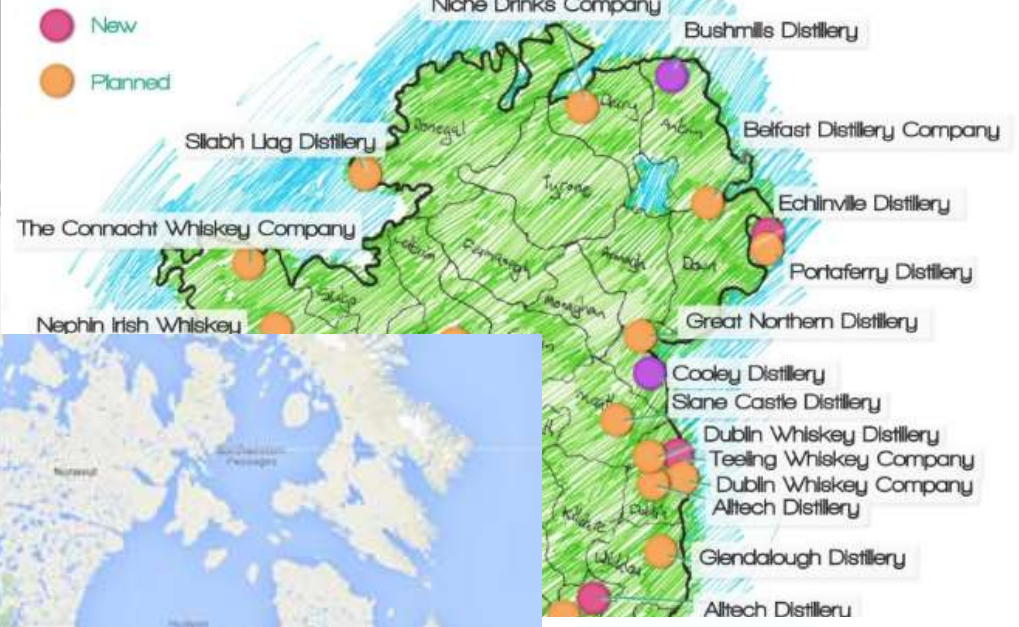


**Most Innovative
European
Biotech SME**

**BIOTECH SME
AWARDS**







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Renewables

