

Regional Bioenergy from Cane Vision

Wolfgang Fechter



Renewable Energy

Tongaat Hulett

An integrated Agriculture and Agric-processing Business

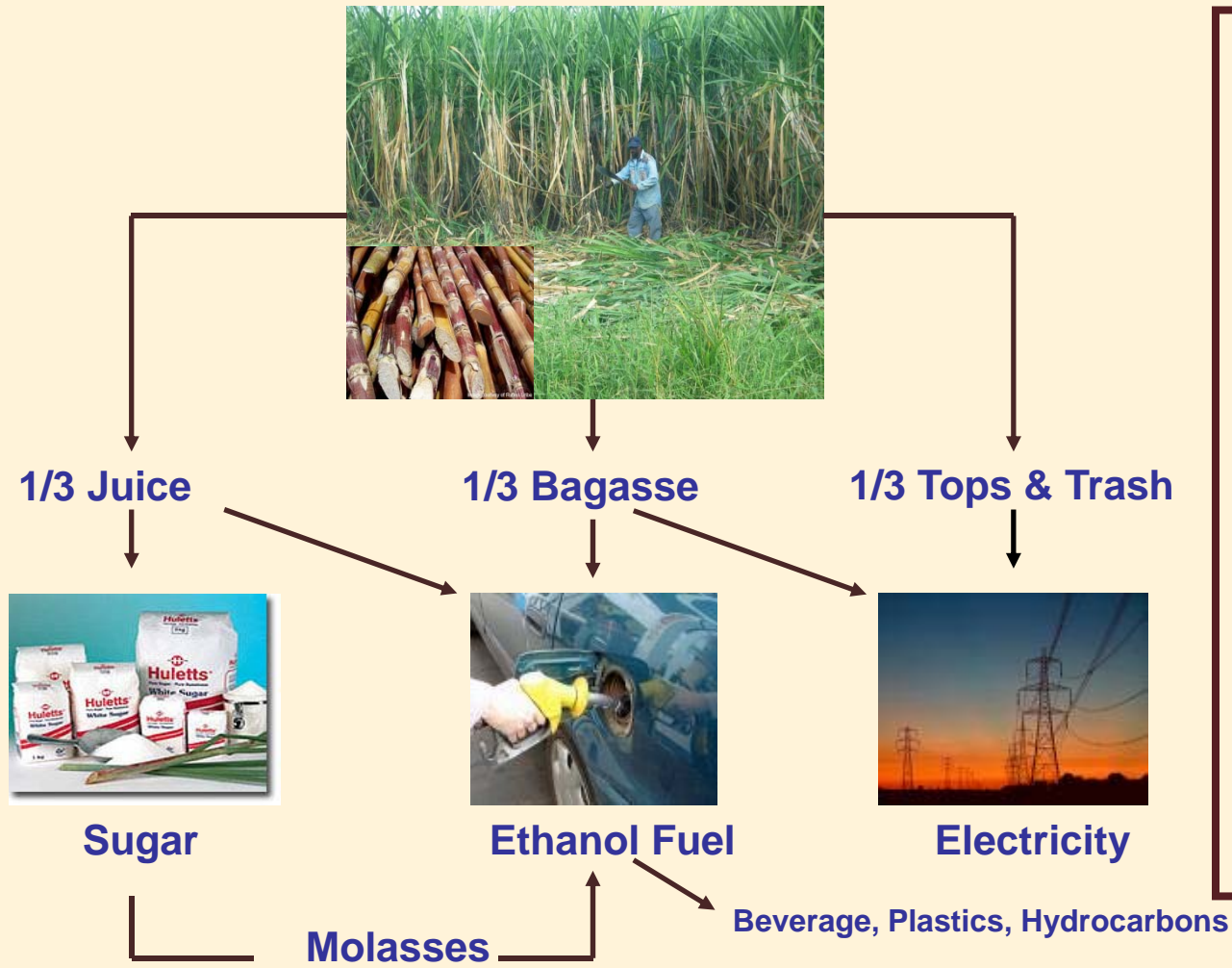


- **Land and Water**

Tongaat Hulett > 264 000 hectares

- Under cane > 65 000 hectares
- Urban expansion > 13 900 hectares
- Eco-tourism > 80 000 hectares
- **Regional integration**

The potential of sugarcane

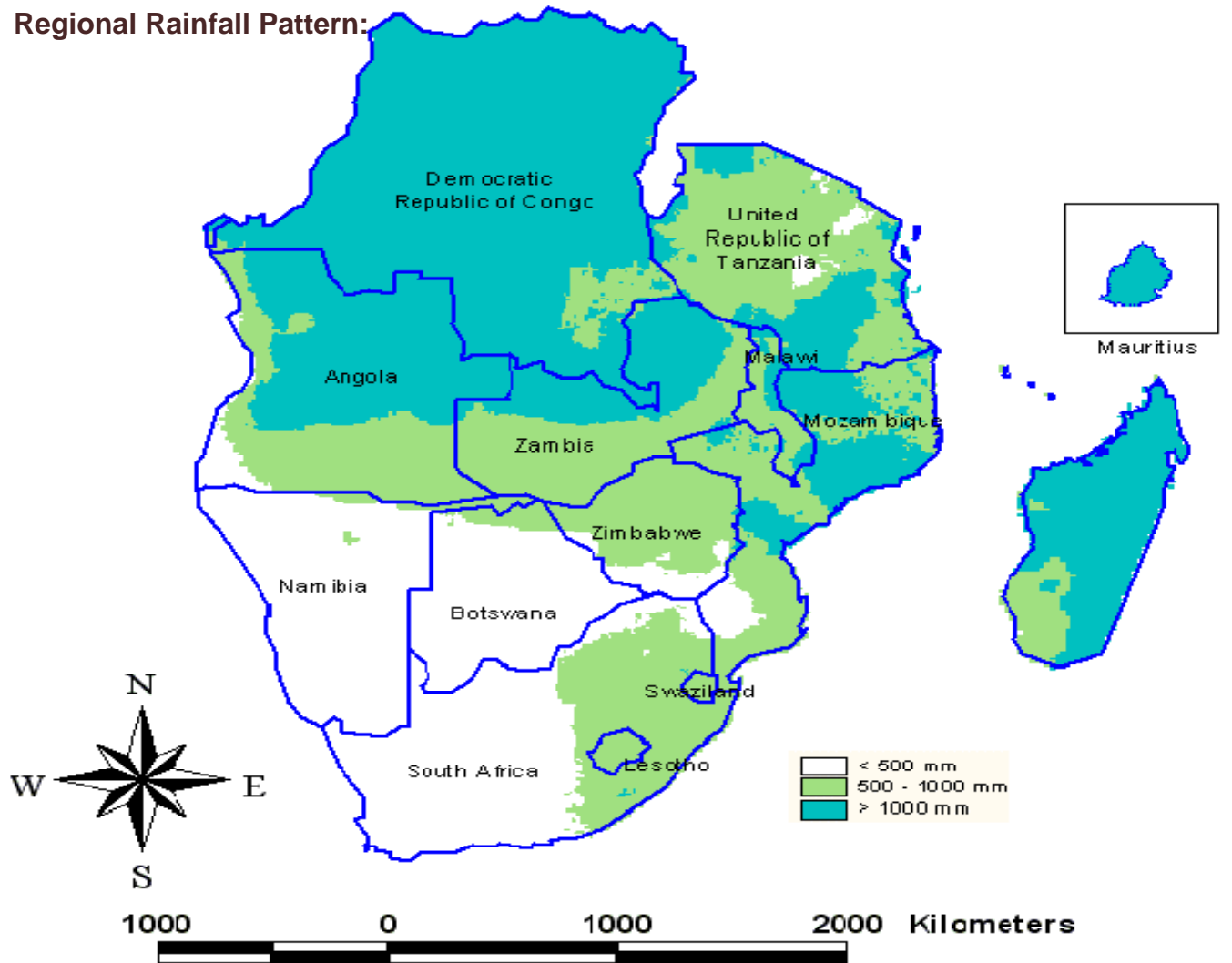


One ton of sugarcane:

- Requires 100 m² of land – size of an average house
- Produces 80 litres of ethanol
 - *Equivalent to 1.2 barrels of oil*
- Generates more than 200 kWh of electricity into the grid
 - *Equivalent to 40 kg of coal*
 - *Will keep five 60-Watt light bulbs burning for a year*

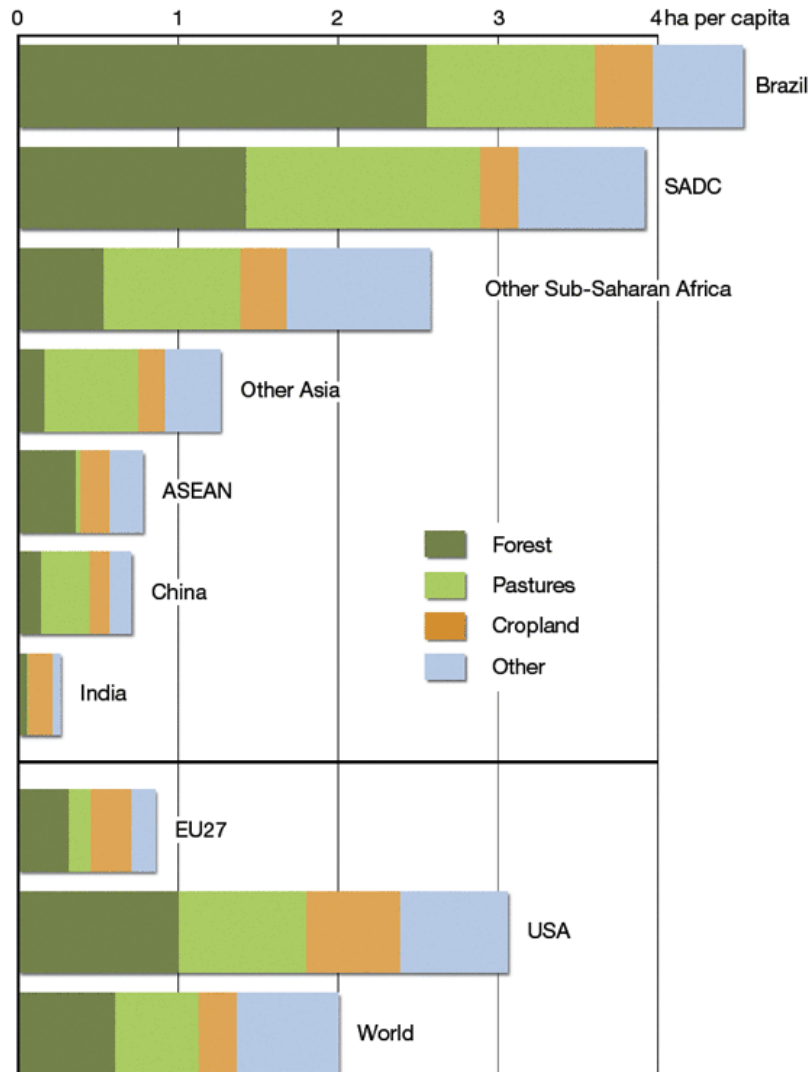
Fresh water supply comparison

Regional Rainfall Pattern:



Billion liters		
South Africa	SADC	Brazil
50	2 500	8 000

Land availability comparison

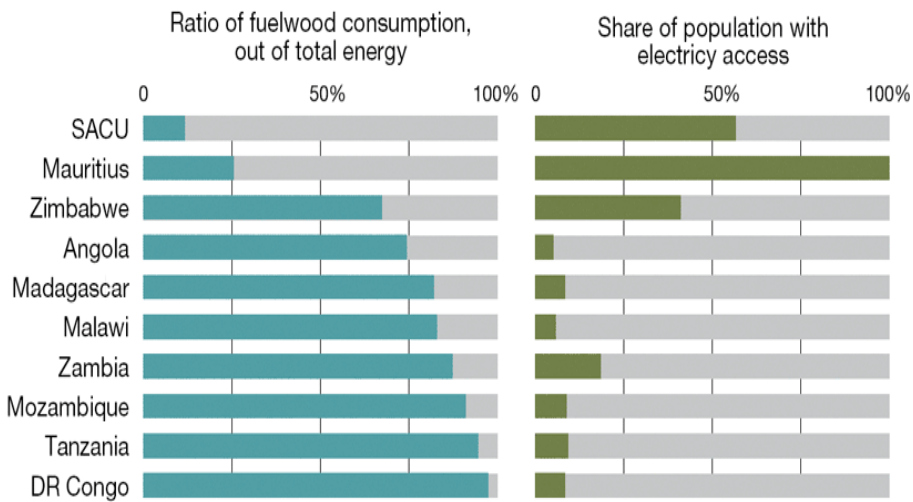


Source: FAOSTAT 2008

	South Africa	SADC	Brazil
	Million hectares		
Forest area	10	370	480
Pasture	40	340	190
Cropland Potential	<10	60 - 120	60-100
Other	60	200	110
Total	120	970	850

	South Africa	SADC	Brazil
	Million people		
Population	50	250	200

Energy and economic comparison



SACU = Southern African Customs Union: Botswana, Lesotho, Namibia, South Africa and Swaziland

Brazil: 98% of population have access to electricity

	South Africa	SADC	Brazil
GDP per capita (PPP US\$)	10 000	4 500	10 000
GDP (\$Billion-2008)	300	500	1 600
Balance of payments (\$Billion-2008)	-20	-5	-25
Unemployment (% in 2008)	20	30	10
Oil consumption (million barrels per day)	0.5	0.7	2.4

SADC consumed 18 billion litres of petrol in 2008

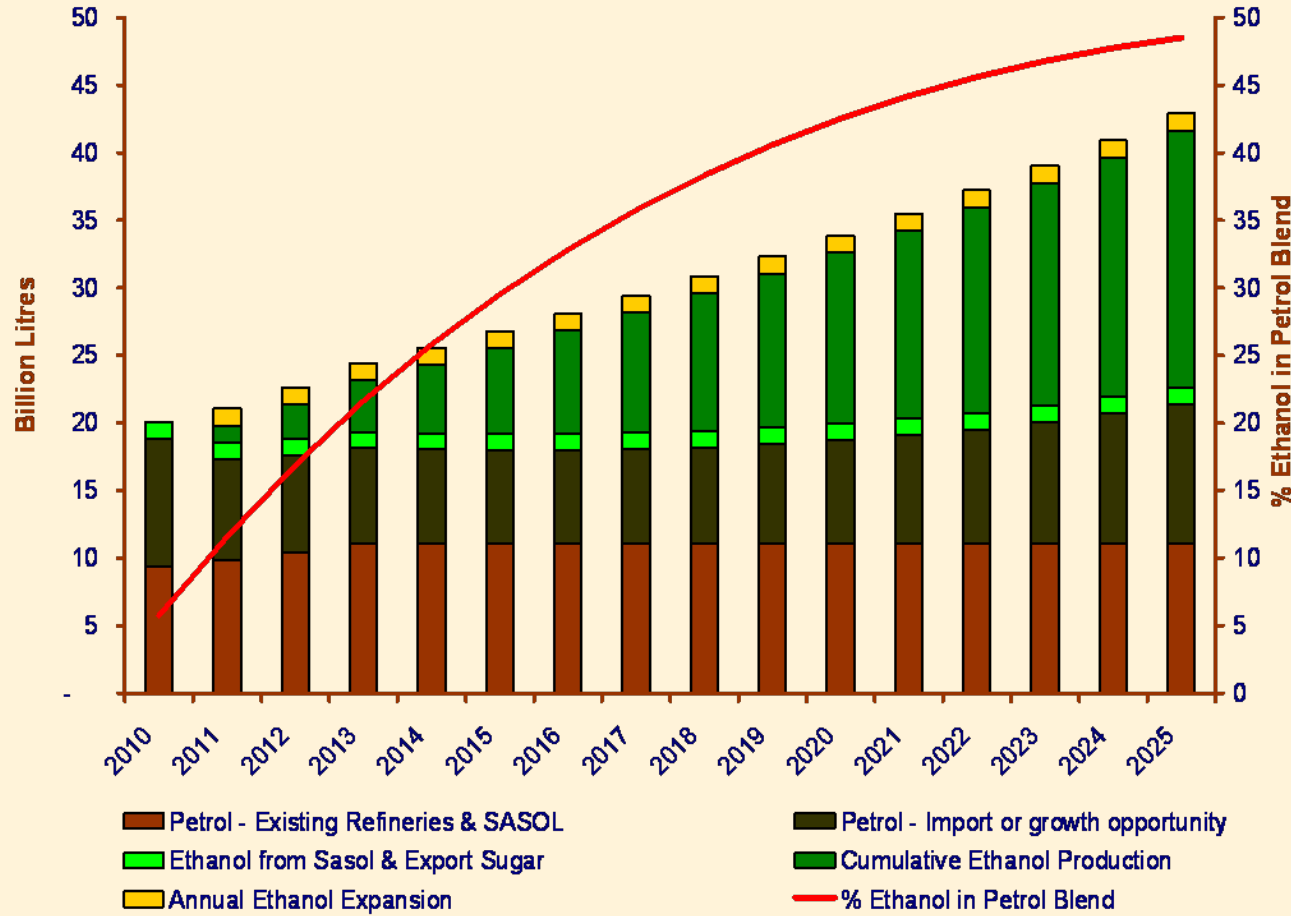
South Africa consumed 13 billion litres in 2008

Brazil maximizing the potential of sugarcane

Brazilian sugarcane sector data (2008/9)		
Turnover (2008)	\$Billion	25
Foreign revenue	\$Billion	10
Direct investments	\$Billion(2006-2009)	>20
Composition	Number of plants	380
Sugar cane growers		70 000
Direct employment		850 000
Indirect employment		> 1 500 000
Participation in Brazil energy matrix	%	20
Sugar cane production	Million tons	560
Ethanol production (E50)	Billion litres	30
Avoided CO ₂ emissions	Million tons since 2003	50



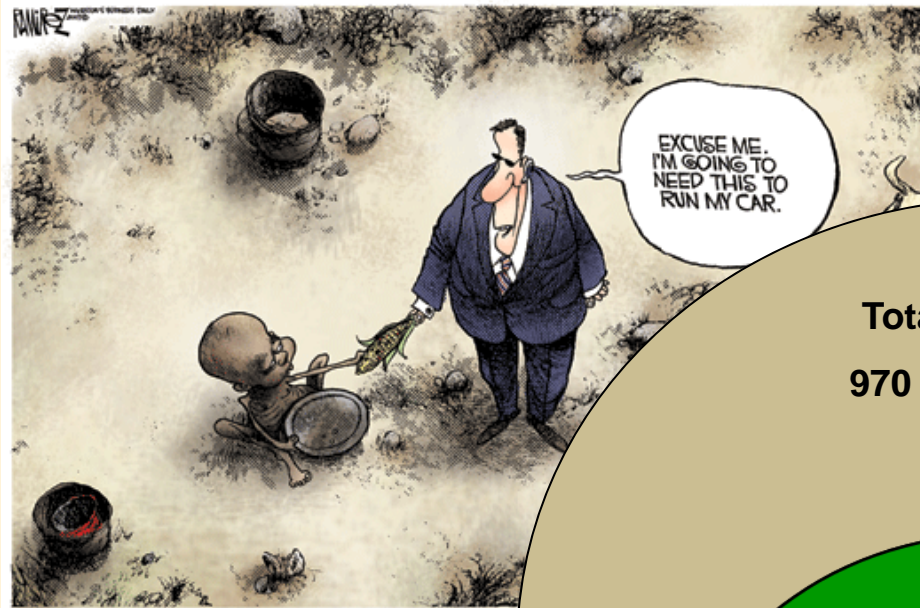
SADC has similar potential as Brazil



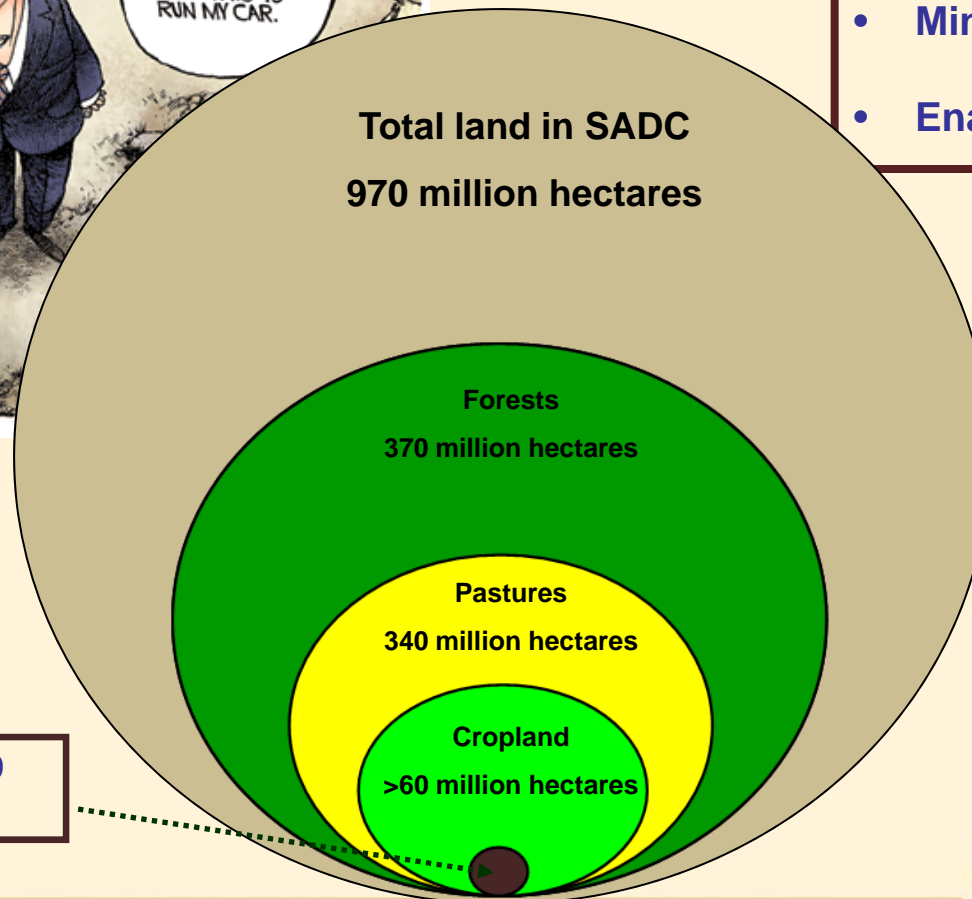
- Plentiful land, water and labour
- All future demand growth in petrol can be met with ethanol
- Rateable investment/ learning curve principle
- 15 years to achieve E50
- \$10 billion annual turnover
- >2 million new jobs
 - 1 million living wage jobs in SA
- 20 billion litres of ethanol
 - 250 000 barrels oil per day
- Electricity generation
 - 5 000 MW (bagasse)
 - 10 000 MW (straw)
 - 20 000 MW (BIGCC)

Medupi power station = 4800 MW

Food versus Fuel and Indirect Land Use Change



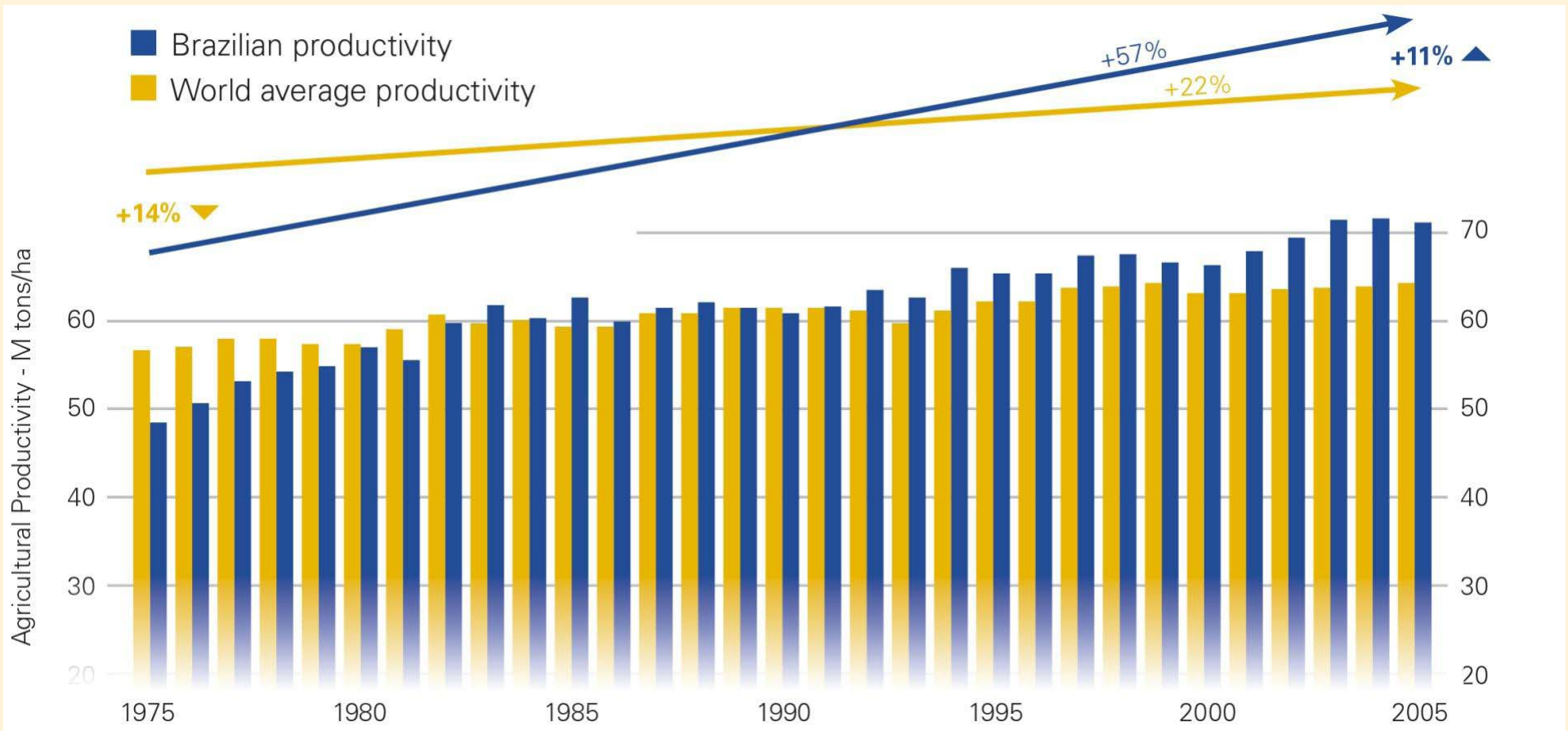
- No impact on food supply
- No deforestation
- No bio-diversity threats
- Minimal ILUC
- Enables agriculture



Land required to grow an E50 market: **2.5 million hectares**

Synergy between Food and Fuel

Biofuels should accelerate productivity gains –Brazilian sugarcane productivity has increased at more than twice the global rate.



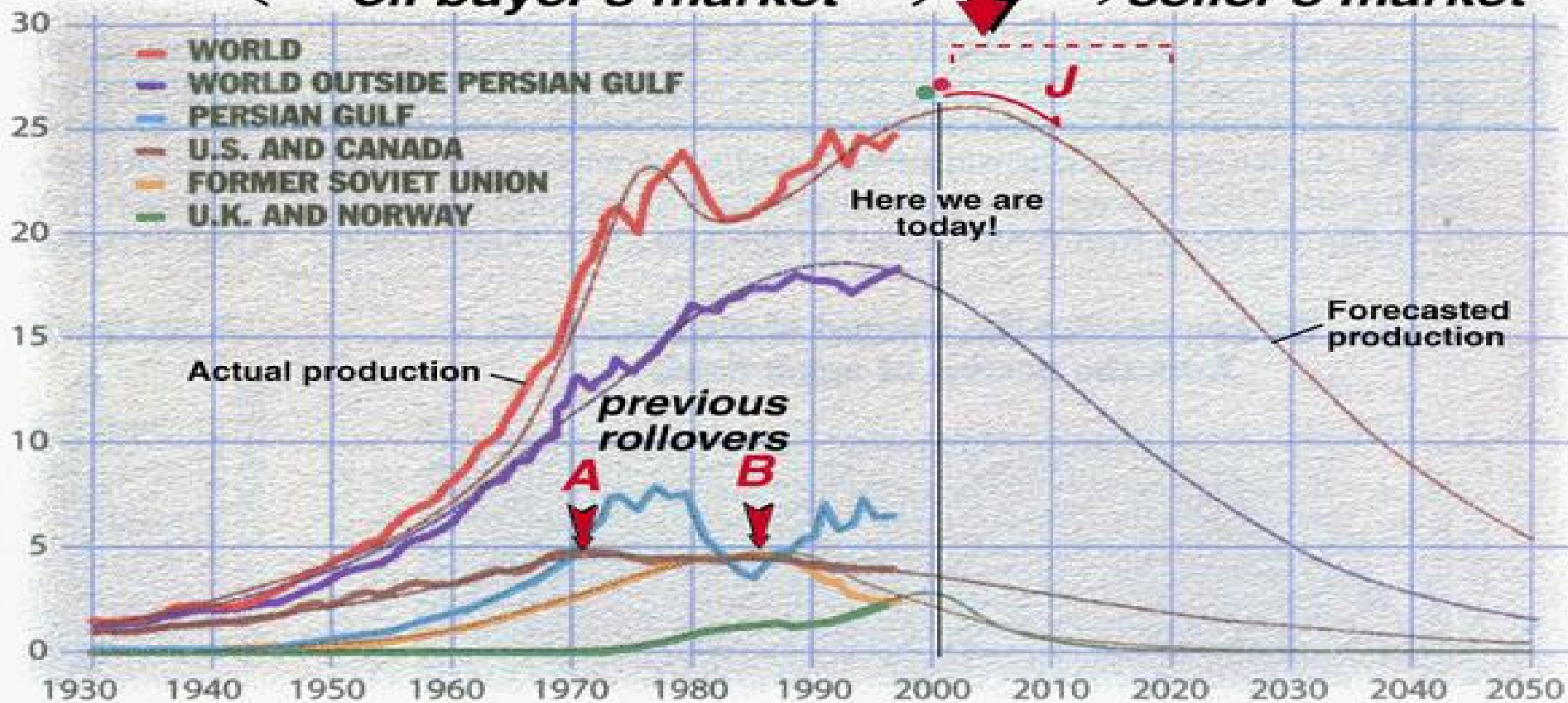
ENERGY SECURITY

FOSSIL FUEL

THE BIG ROLLOVER

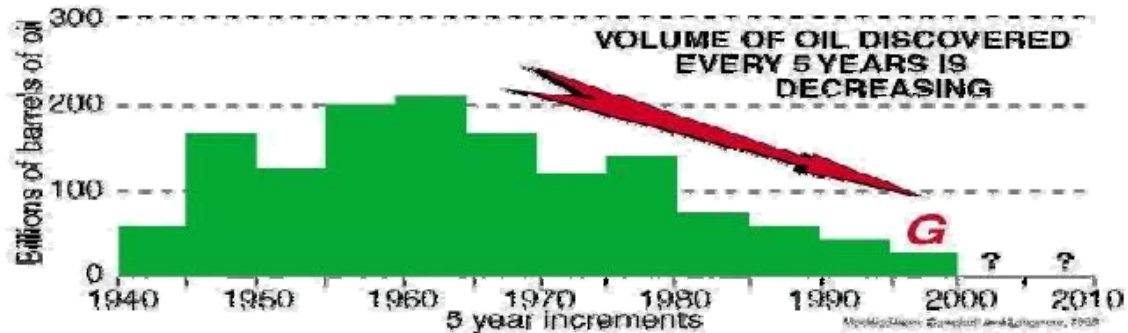
← *oil buyer's market* → **↓** → *seller's market* **C**

ANNUAL OIL PRODUCTION (BILLIONS OF BARRELS)

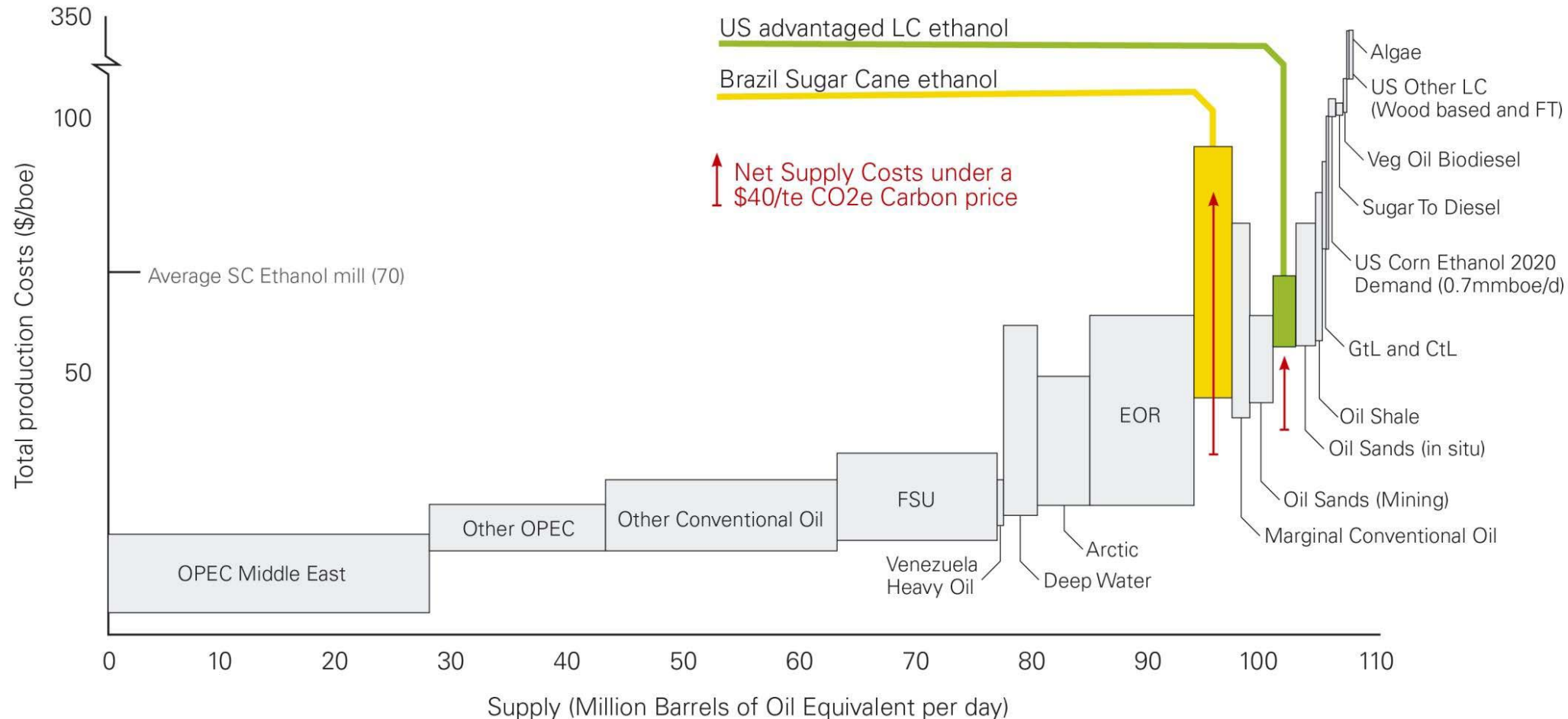


LAURIE GRACE SOURCE: JEAN H. LAHERRE

Year of THE BIG ROLLOVER	FORECASTER
2003	Campbell, 1998
2004	Bartlett, 2000
2007	Duncan and Youngquist, 1999
2019	Bartlett, 2000
2020	Edwards, 1997
2010-2020	International Energy Agency, 1998



Transportation Fuels Supply Curve -2020



Source: adapted from Booz Allen Hamilton analysis based on information from IEA, DOE and interviews with super majors; IBGE, UNICA, Conab, CGEE, Unicamp, CTC, , BP Biofuels Team

Ethanol competitiveness with petrol

	Oil Refinery	GTL	Ethanol Plant
	Capital Cost in Rands per litre		
Plant and equipment costs	15	40	10
Infrastructure costs	4	4	5
Exploration	15	10	0
Agriculture	0	0	5
Total costs	30	50	20

	South Africa/SADC		Brazil	
	Rands per litre			
	Gate Price	Pump Price	Gate Price	Pump Price
Petrol	4.35	8.00	4.35	10.20
Anhydrous ethanol	?	?	3.80	8.80
Hydrous ethanol	?	?	3.00	5.80

- Ethanol has lower capital cost requirement.
 - High cash costs – needs protection against volatility
- Ethanol requires own distribution network
 - Conversion to butanol saves costs
- Room for improving ethanol costs
 - Learning curve principle/cellulosic
- Sustainable supply
 - Crude oil is a limited resource

Carbon Market – Under Construction

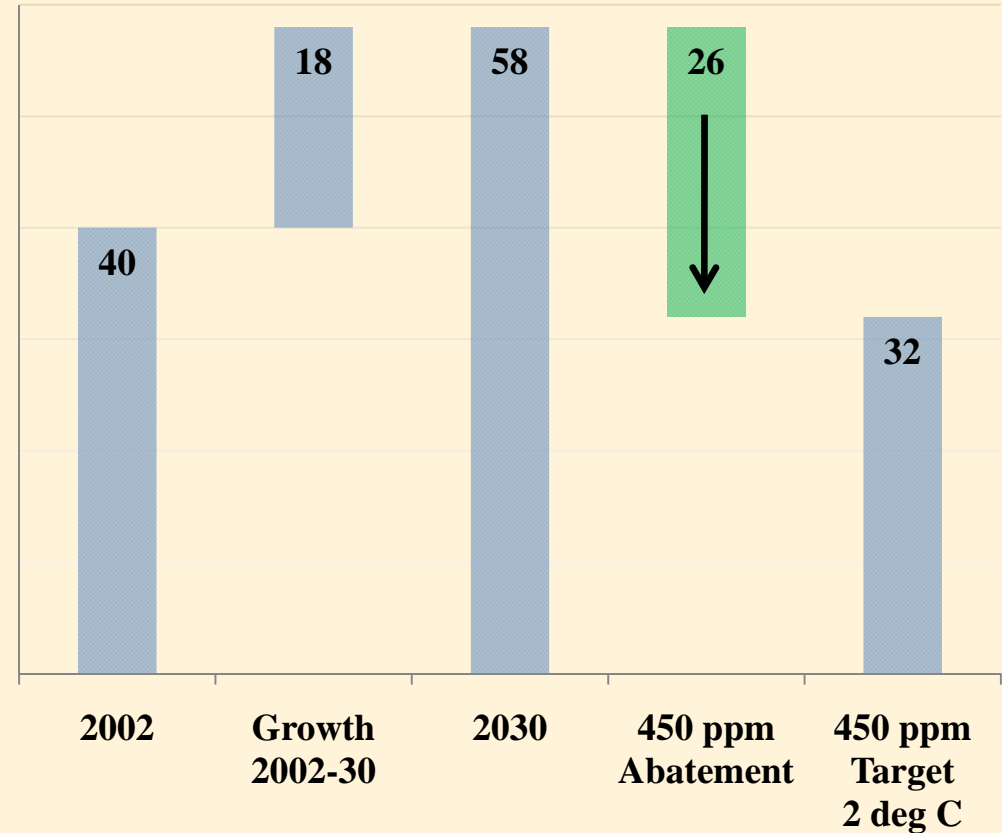
Early CO₂ emission reduction targets

	2020 Target	Baseline
EU	20%	1990
USA	17%	2005
South Africa	34%*	“Business as usual” 2020

Limit global temperature to 2°C
45% deviation below the “business as usual” emissions growth trajectory by 2030

'Business-as-usual' greenhouse gas emissions, CO₂e per year, gigaton

Abatement demand at 2°C, CO₂e per year, gigaton, 2030

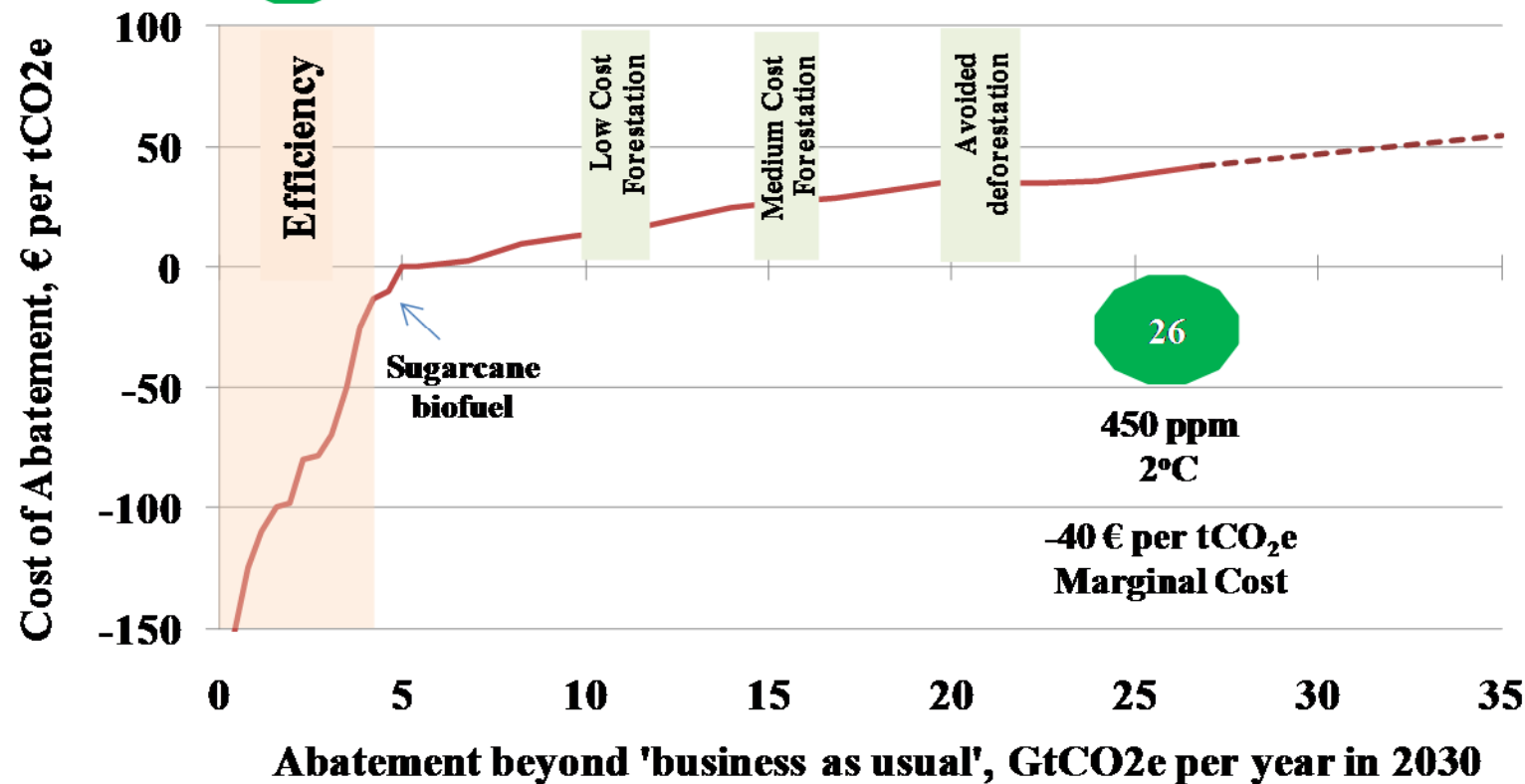


* conditional

Carbon Market – Under Construction

Global Greenhouse Gas Abatement Cost Curve

Approximate Abatement required beyond 'business as usual' by 2030 to stay below 2°C, greenhouse gases measured in GtCO₂e



From The McKinsey Quarterly 2007 Number 1 - A cost curve for greenhouse gas reduction

Impact of ethanol vision on climate change

		<u>SADC Petrol Consumption (2025)</u>			
		“Business as Usual”		“Fuel Ethanol – E50”	
	CO ₂ Emission	E0	CO ₂ Emitted	E50	CO ₂ Emitted
	<i>kg CO₂/1000 liters)</i>	<i>Billion litres/year</i>	<i>Million tons/year</i>	<i>Billion litres/year</i>	<i>Million tons/year</i>
Petrol ex Coal	4,950	20	100	10	50
Petrol ex Crude Oil	2,280	20	50	10	25
Fuel Ethanol	260	0	-	20	5
Total	-	40	150	40	80

LTMS target achieved 10 years sooner

Current policy developments

Policy	Brazil	South Africa/SADC
Market:	60% of fuel pool ethanol	<1% of fuel pool ethanol
1) anhydrous ethanol for existing petrol cars	E20-25	SA – E2 in 2010 ? SA – E10 when ?
2) hydrous ethanol for flex-fuel petrol cars	>90% new cars	SA – not part of policy Malawi – implemented
3) Diesel cars	<u>No</u> light diesel vehicles	SA – growing market share
Pricing	Controlled fuel pump prices consistent with ethanol	Still to be determined
Funding	BNDES – low real rates	Commercial rates
Agriculture Support	Extensive	Limited
Policy co-ordination (energy, agriculture, industrial, funding, rural, environmental)	Extensive and consistent	Starting – IPAP by Economic Cluster
Incubation Support	Extensive and largely phased out	Recognised – no firm commitments

Conclusion

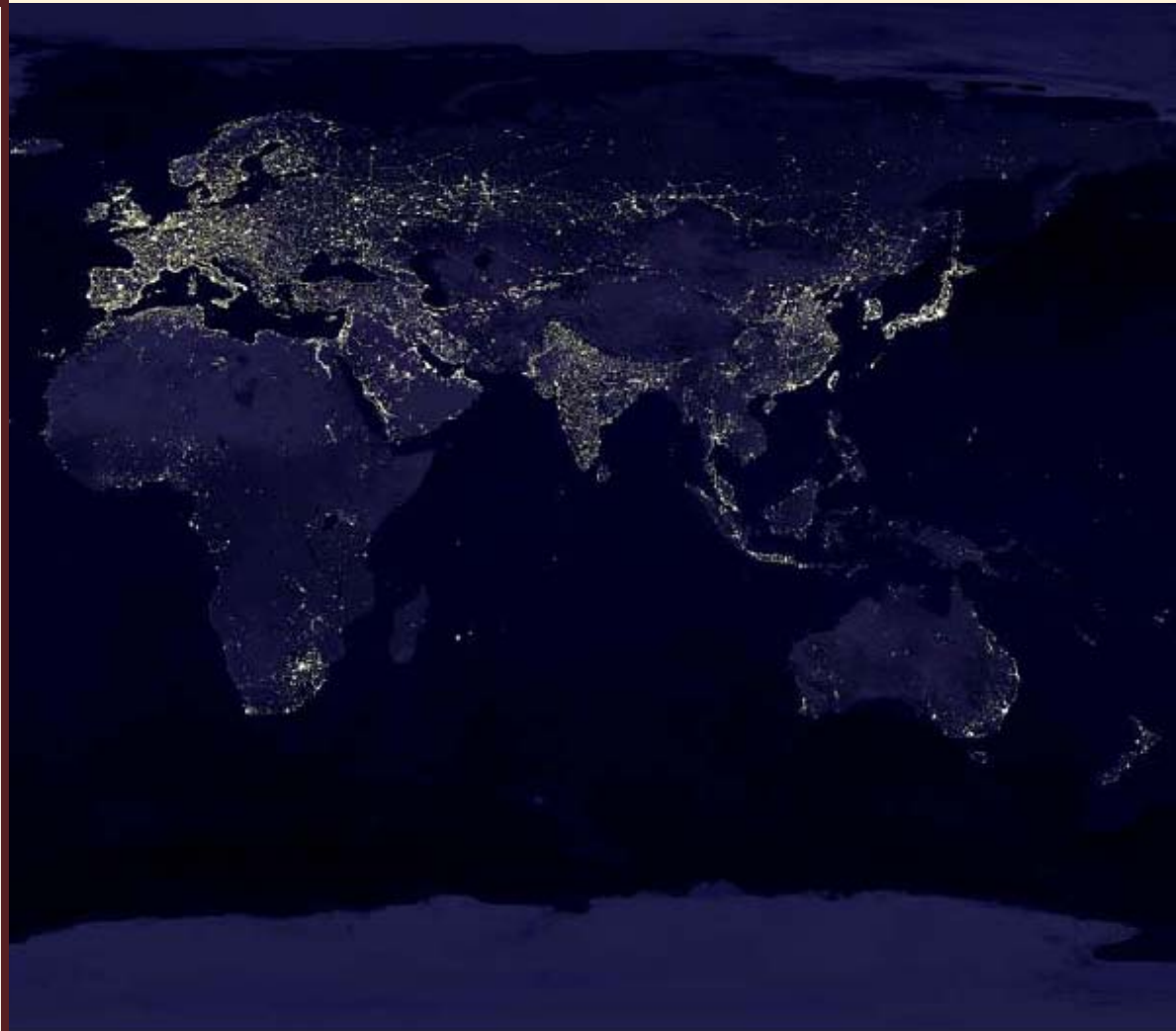
Growing an E50 ethanol market in SADC is:

- Feasible - Market, Land & Water
- Significant – 5% GDP of SADC
- Sustainable
 - Fuel Supply
 - Climate Change
- Cost Effective
- Creates jobs
- Enables agriculture and food
- Increases Energy Security

Southern African countries cannot walk the path alone but as a region there are sufficient resources to

make it happen

Thank you



“I dream of the realization of the unity of Africa, whereby its leaders combine in their efforts to solve the problems of this continent. I dream of our vast deserts, of our forests, of all our great wildernesses.” - Nelson Mandela