

# Regional Bioenergy from Cane Vision

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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



1/3 Juice

1/3 Bagasse

1/3 Tops & Trash



Sugar



Ethanol Fuel



Electricity

Molasses

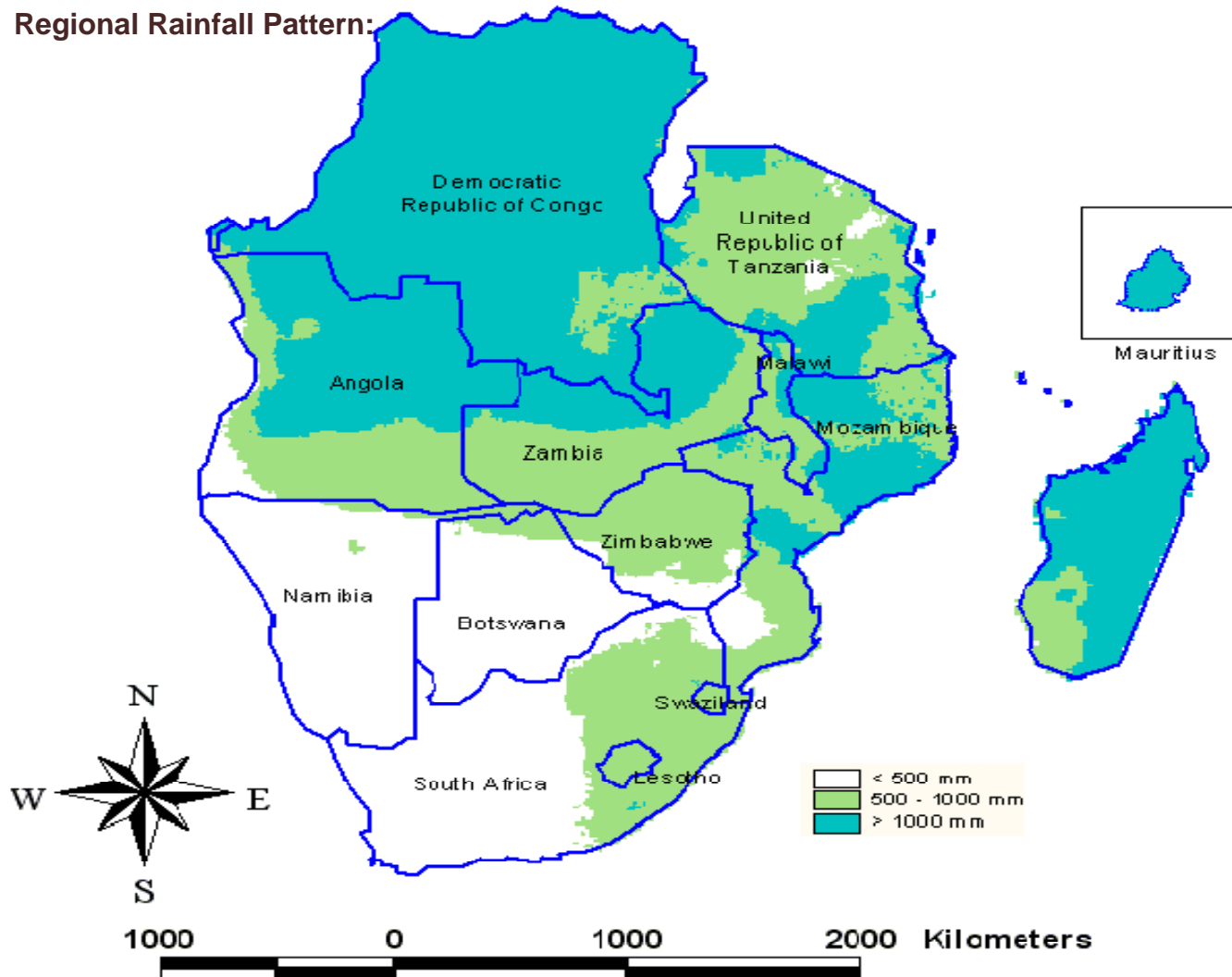
Beverage, Plastics, Hydrocarbons

## One ton of sugarcane:

- Requires 100 m<sup>2</sup> 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*

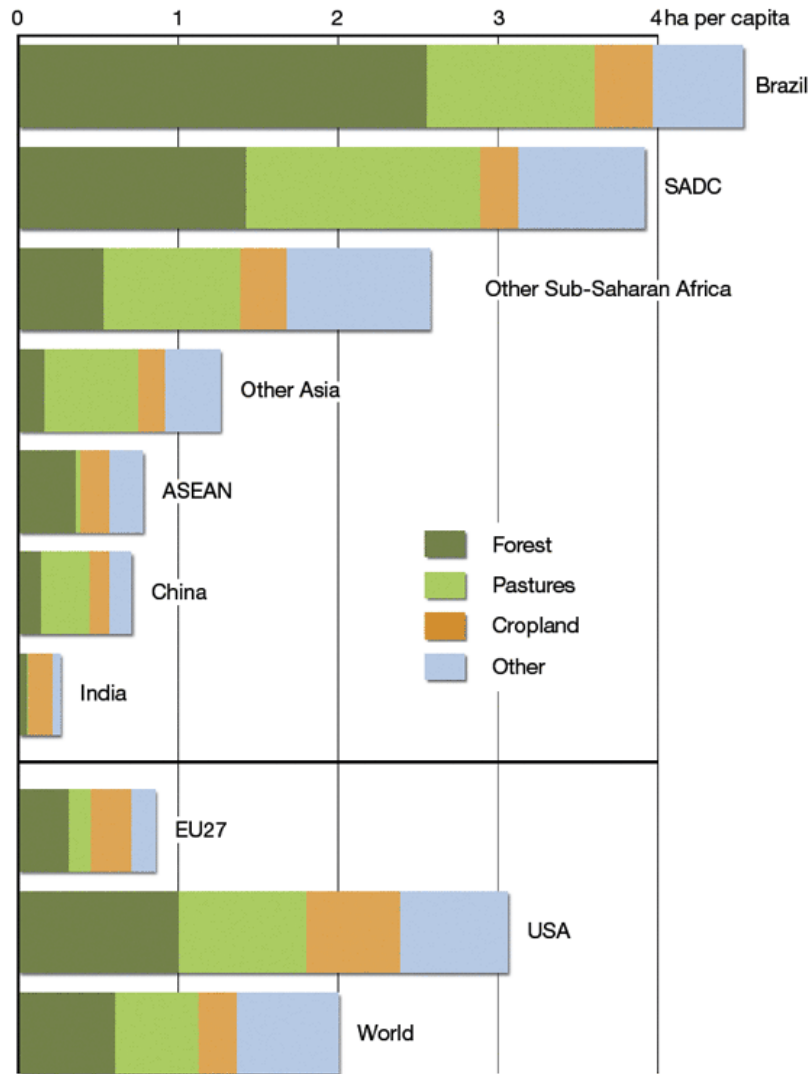
# Fresh water supply comparison

Regional Rainfall Pattern:



Billion liters		
South Africa	SADC	Brazil
50	2 500	8 000

# Land availability comparison

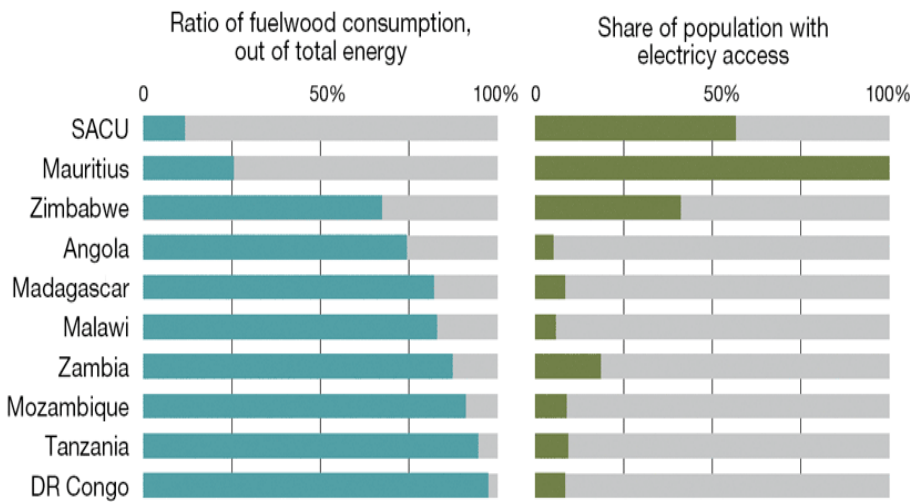


Source: FAOSTAT 2008

	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**

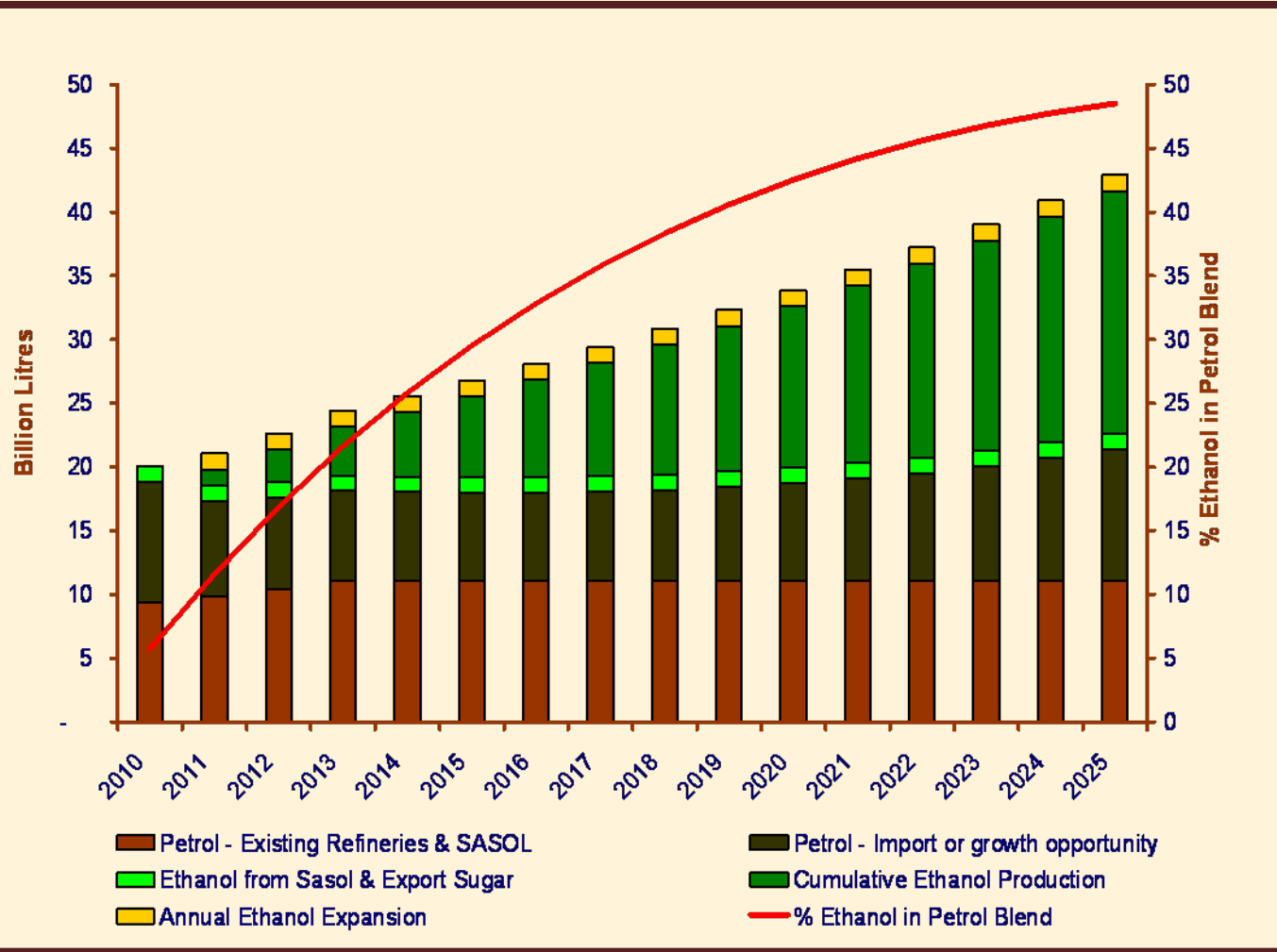
**South Africa consumed 13 billion litres in 2008**

# 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 <sub>2</sub> emissions	Million tons since 2003	50



# SADC has similar potential as Brazil



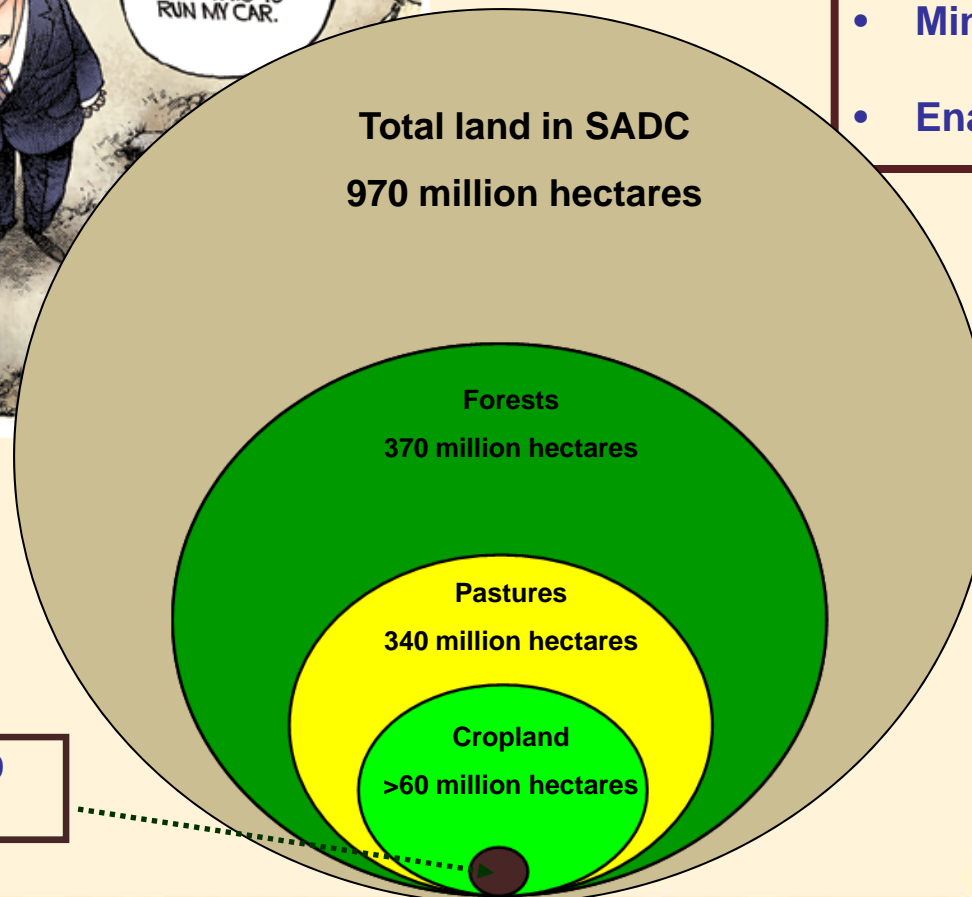
- Plentiful land, water and labour
- All future demand growth in petrol can be met with ethanol
- Rateable investment/ learning curve principle
- 15 years to achieve E50
- \$10 billion annual turnover
- >2 million new jobs
  - 1 million living wage jobs in SA
- 20 billion litres of ethanol
  - 250 000 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



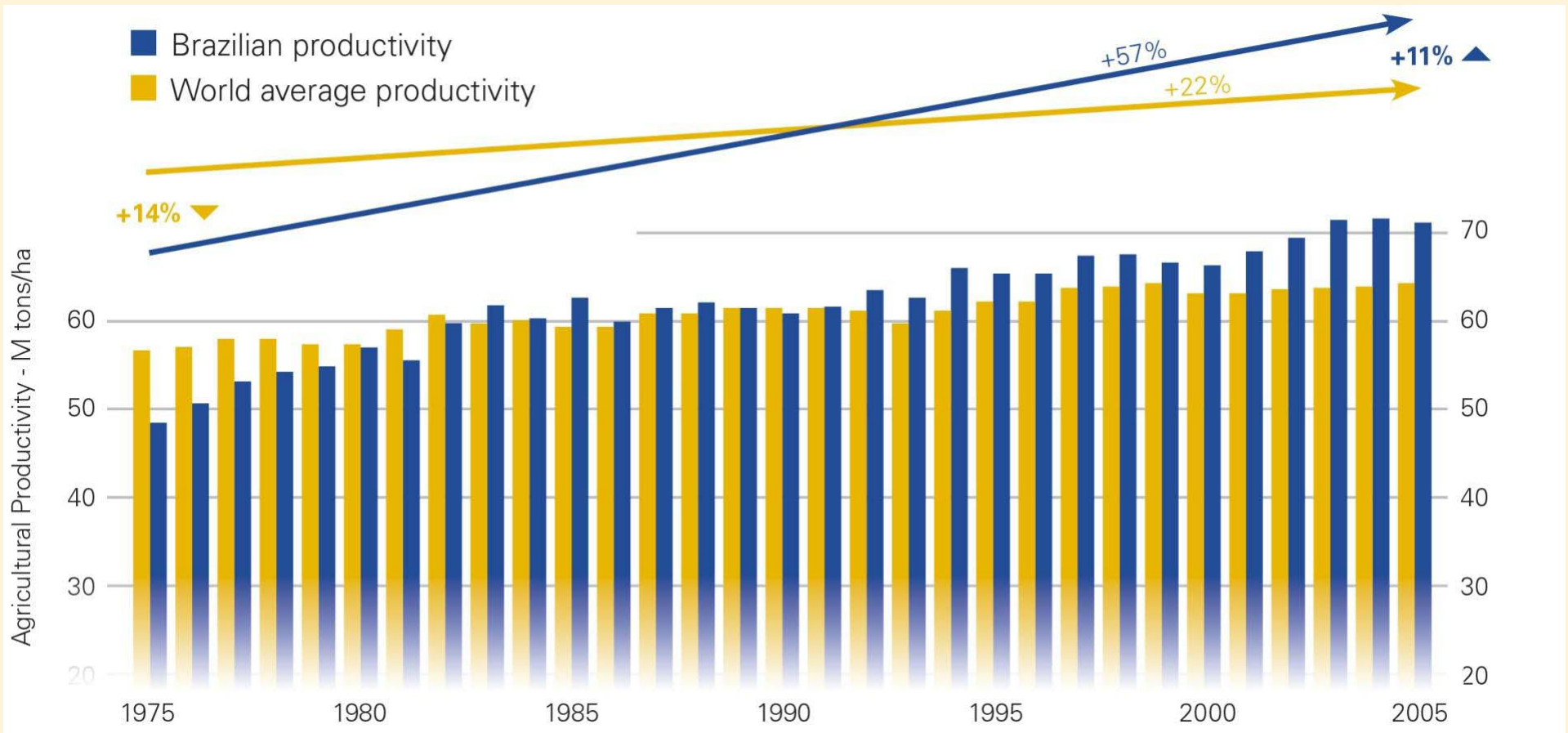
- No impact on food supply
- No deforestation
- No bio-diversity threats
- Minimal ILUC
- Enables agriculture



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.**



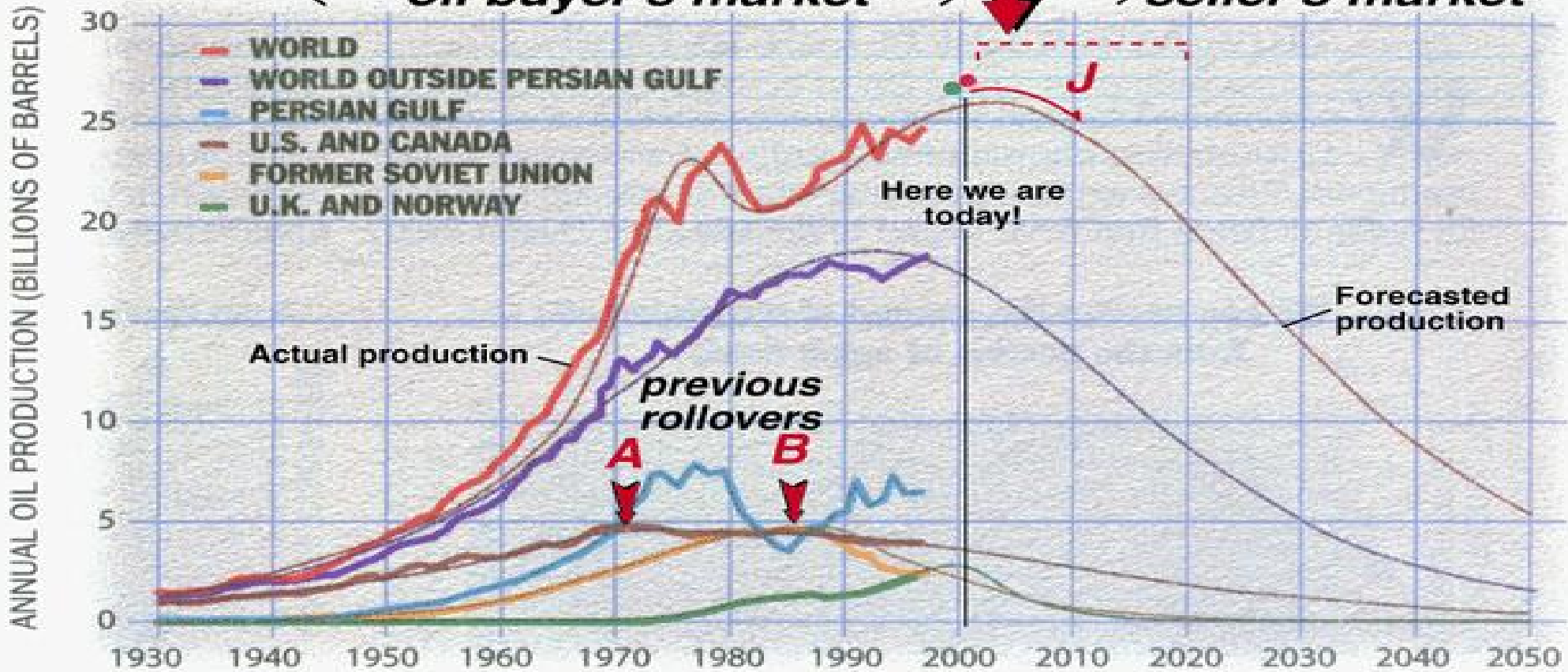
# ENERGY SECURITY FOSSIL FUEL

# THE BIG ROLLOVER

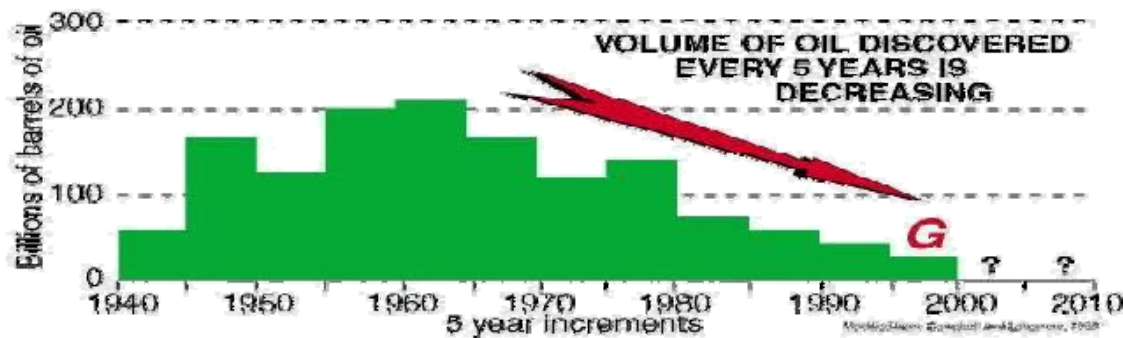
← *oil buyer's market* → **↓** → *seller's market*

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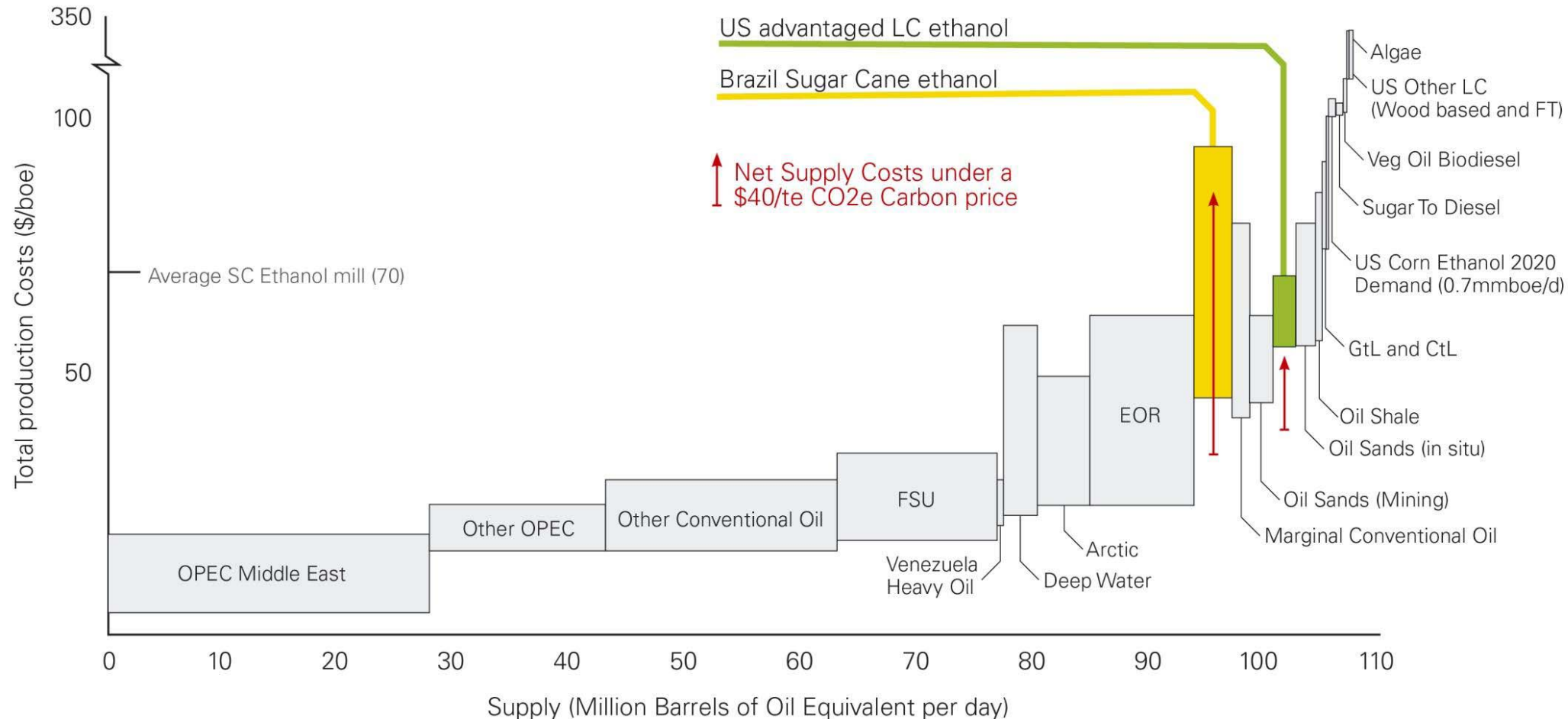
LAURIE GRACE SOURCE: JEAN H. LAHERRÈRE



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

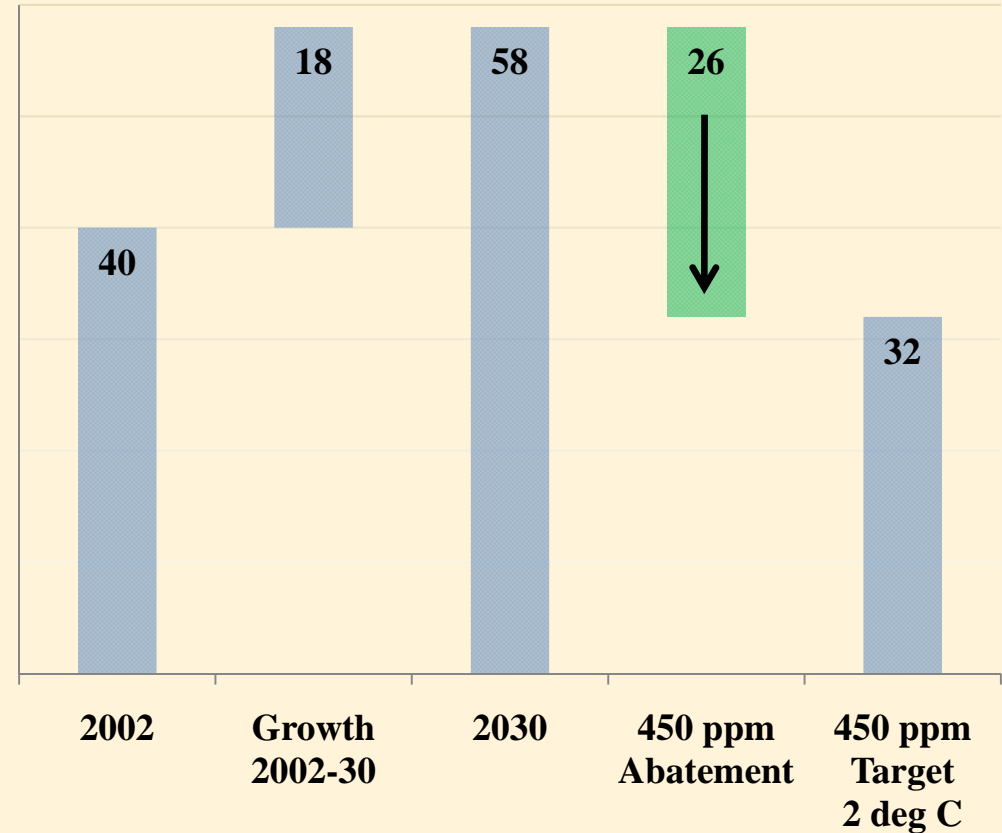
## Early CO<sub>2</sub> emission reduction targets

	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, CO<sub>2</sub>e per year, gigaton

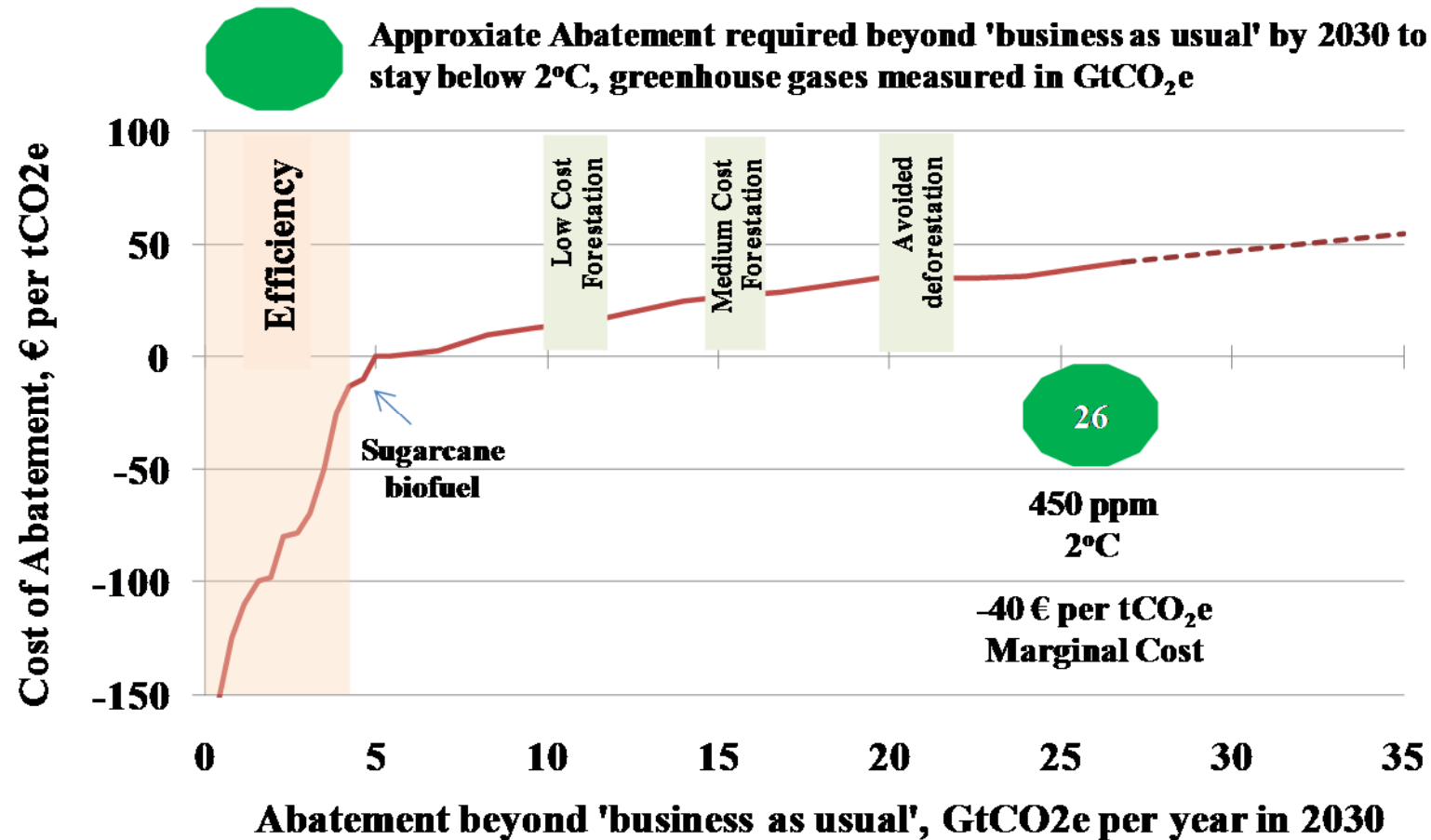
Abatement demand at 2°C, CO<sub>2</sub>e per year, gigaton, 2030



\* conditional

# Carbon Market – Under Construction

## Global Greenhouse Gas Abatement Cost Curve



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 <sub>2</sub> Emission	E0	CO <sub>2</sub> Emitted	E50	CO <sub>2</sub> Emitted
	<i>kg CO<sub>2</sub>/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

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

# 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*