



# SOUTHERN AFRICAN POWER POOL

## POTENTIAL FOR COMMERCIAL WIND FARMS IN SAPP

Cape Town, SOUTH AFRICA  
12-14 May 2010



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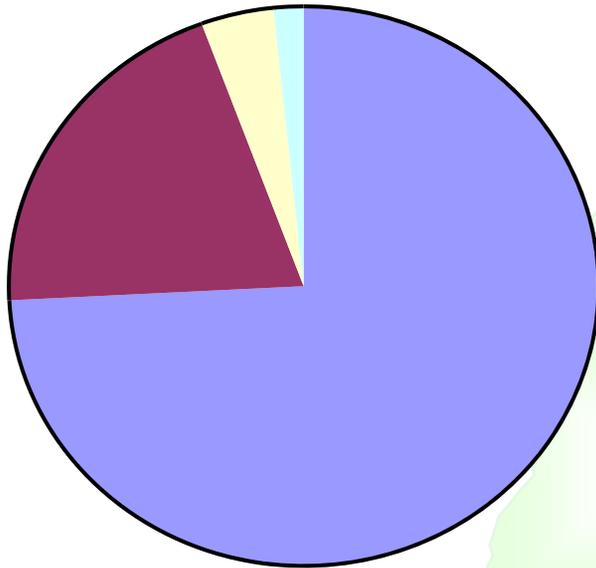
1. Installed and Available Capacity
2. Power situation in SAPP
3. Generation options available
4. Wind Power Potential in SAPP

# INSTALLED & AVAILABLE CAPACITY

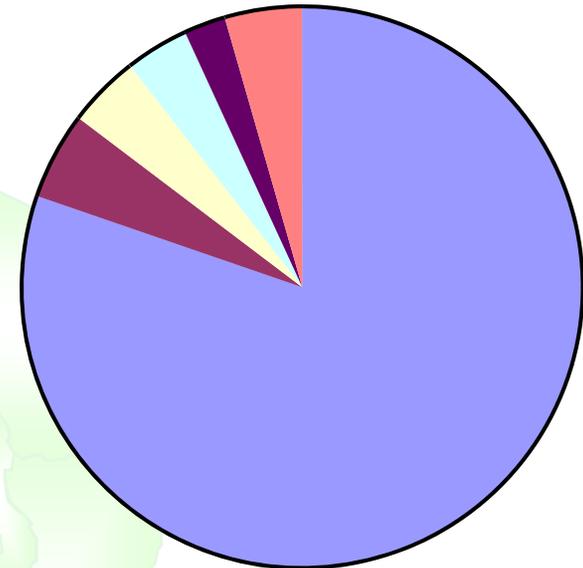
No.	Country	Utility	Installed Capacity [MW] As at April 2010	Available Capacity [MW] April 2010	Installed minus Available [MW]	2009 Peak Demand [MW]	Capacity Required [MW] 10.2% Reserve	Surplus (MW)
1	Angola	ENE	1,187	930	257	724		
2	Botswana	BPC	202	190	12	553		
3	DRC	SNEL	2,442	1,170	1,272	1,028		
4	Lesotho	LEC	72	70	2	116		
5	Malawi	ESCOM	287	267	20	260		
6	Mozambique	EDM	233	174	59	435		
		HCB	2,075	2,075	-			
7	Namibia	NamPower	393	360	33	451		
8	South Africa	Eskom	44,170	40,483	3,687	35,850		
9	Swaziland	SEC	70	70	-	204		
10	Tanzania	TANESCO	1008	780	228	705		
11	Zambia	ZESCO	1,812	1,200	612	1,604		
12	Zimbabwe	ZESA	2,045	1,080	965	1,714		
TOTAL SAPP			55,996	48,849	7,147	43,644	48,096	753
Total Interconnected SAPP			53,514	46,872	6,642	41,955	46,235	637



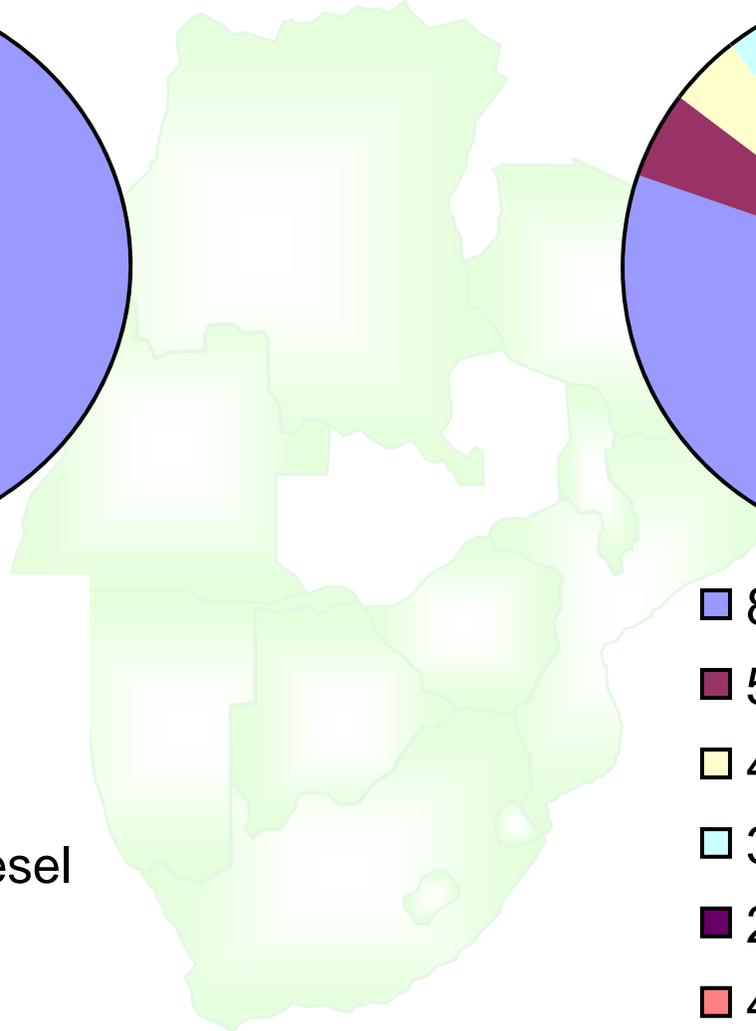
# Generation Mix & Contributions – Year 2009



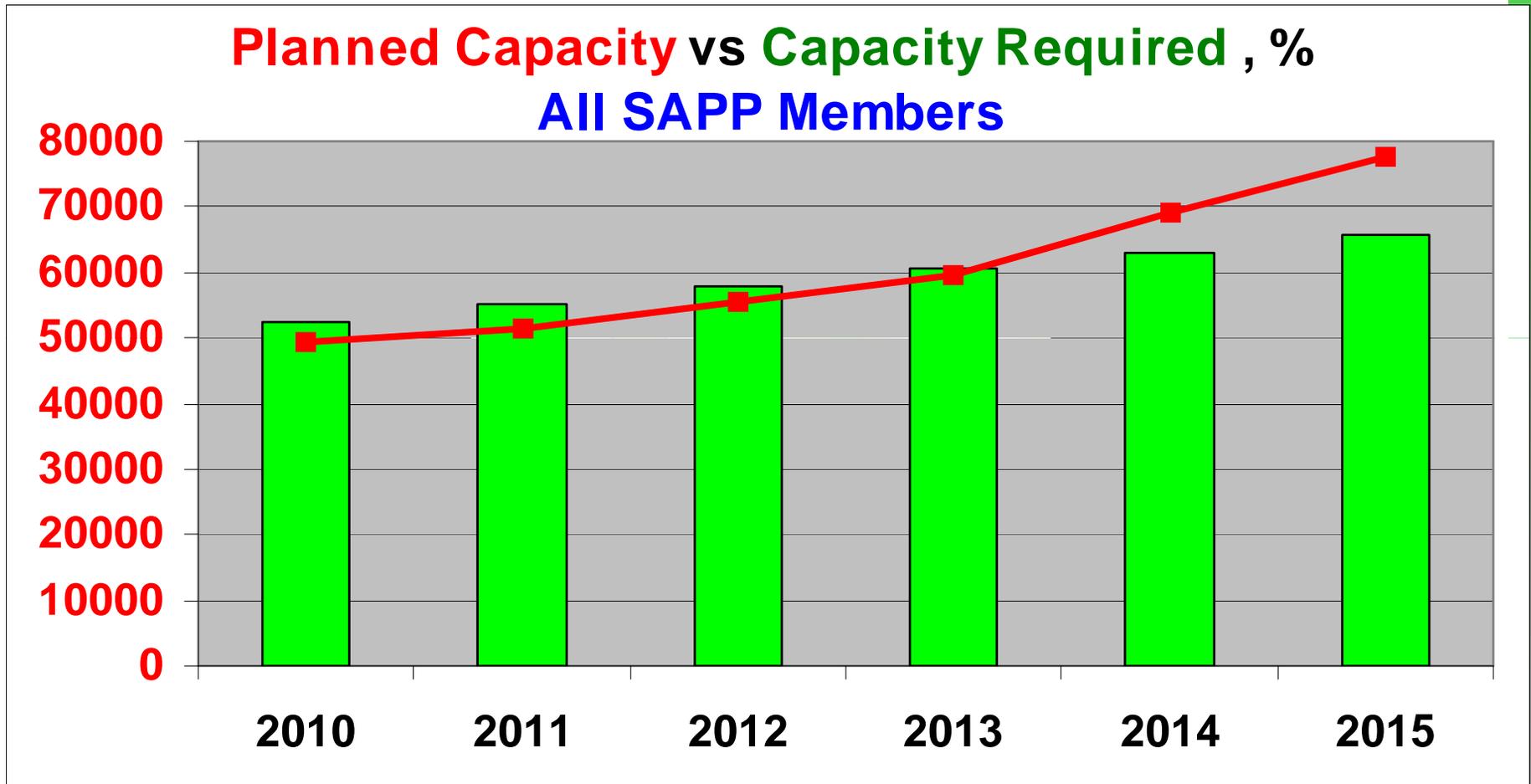
- 74.3% Coal
- 20.1% Hydro
- 4.0% Nuclear
- 1.6% Gas/Diesel



- 80.4% South Africa
- 5.0% Mozambique
- 4.1% Zimbabwe
- 3.6% Zambia
- 2.6% DRC
- 4.4% Rest



# Forecast Demand Vs Supply All SAPP Members [2010 - 2015]



Deficit in supply until 2013

- ❑ SADC region currently has an available capacity equivalent to **48,849 MW**.
- ❑ This gives annual shortfall of **1,248MW** for **2010**.

Year	Demand Forecast	Annual Increase in Demand	Available Capacity	Annual Increase in Supply	Annual Power Shortfall
	MW	MW	MW	MW	MW
2010	49897	1801	48649	933	-1248
2011	52098	2201	49582	1616	-2516
2012	53996	1898	51198	3905	-2798
2013	55520	1524	55103	4189	-417
2014	56969	1449	59292	7990	2323

- ❑ Power shortfall will persist until **2013** provided that:
  - ✓ Generation projects under construction are **completed** and **commissioned** as planned.

## COMMISSIONED PROJECTS IN 2009

No	Utility	Country	Name	Type	Units	Capacity [MW]
1	SNEL	DRC	Inga 1 Rehab	Hydro	1	55
2	SNEL	DRC	Inga 2 Rehab	Hydro	1	160
3	ENE	Angola	Lobito	Thermal	1	83
4	Eskom	South Africa	OCGT	Gas	4	1050
5	Eskom	South Africa	Grootvlei	Thermal	1	565
6	Eskom	South Africa	Komati	Thermal	1	114
7	ZESA	Zimbabwe	Hwange	Thermal	1	100
8	ZESCO	Zambia	Kariba North	Hydro	1	15
9	TANESCO	Tanzania	Tegeta	Gas	3	45
					<b>TOTAL</b>	<b>2,187</b>

- ❑ SAPP is adequately prepared and will provide a dependable & reliable supply in 2010.
- ❑ Demand Side Management being implemented in 2010.

# WIND GENERATION EXISTING IN 2010

## ❑ South Africa

✓ Klipheuwel – 3.2 MW

✓ Darling IPP – 5.2 MW

## ❑ Mozambique

✓ Chicumbane – 10 MW – Pilot Project

❑ Malawi – (various 21 kW wind /solar hybrids)

❑ Zimbabwe – various small sizes

## GENERATION PROJECTS COMMISSIONED IN 2010

No	Utility	Country	Name	Type	Capacity [MW]
1	IPP	Botswana	Emergency	DIESEL	70

## GENERATION PROJECTS TO BE COMMISSIONED IN 2010

No	Utility	Country	Name	Type	Capacity [MW]
1	Eskom	South Africa	Co-generation	Gas	282
2	Eskom	South Africa	Komati	Thermal	316
3	ENE	Angola	Gove	Hydro	60
4	ENE	Angola	Lobito	Hydro	60
5	ZESCO	Zambia	Kariba North	Hydro	15
6	SNEL	DRC	Inga2	Hydro	160
7	BPC	Botswana	Orapa	Diesel	90
					983

A total of 1093 MW expected in 2010

# REHABILITATION & NEW PROJECTS

No	Country	REHABILITATION AND NEW PROJECTS					TOTAL
		2010	2011	2012	2013	2014	
1	Angola	120		260		260	640
2	Botswana	160		600		-	760
3	DRC	160	55	60	80	160	515
4	Lesotho		25	-		110	135
5	Malawi			64			64
6	Mozambique		-		450		450
7	Namibia	-	20	123		400	543
8	South Africa	598	1,411	2,283	2,639	4,800	11,731
9	Swaziland			-			-
10	Tanzania		160		540		700
11	Zambia	15		360		120	495
12	Zimbabwe					300	300
	<b>TOTAL</b>	<b>1,053</b>	<b>1,671</b>	<b>3,750</b>	<b>3,709</b>	<b>6,150</b>	<b>16,333</b>

## GENERATION PROJECTS -2011 TARGET

No	Utility	Country	Name	Type	Capacity [MW]
1	LEC	Lesotho	Lesotho Highlands	Wind	25
2	Namibia	NamPower	Anixas	Distillate	20
3	Eskom	South Africa	Komati	Thermal	329
4	Eskom	South Africa	Co- generation	Thermal	282
5	IPP	South Africa	OCGT	Gas	800
6	TANESCO	Tanzania	Mwanza	HFO	60
7	TANESCO	Tanzania	Ubungo	Gas	100
8	SNEL	DRC	Inga 1	Hydro	55
<b>TOTAL</b>					<b>1671</b>

1.5% of new generation is wind power in 2011

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# Planned Generation Projects - 2012

No	Utility	Country	Name	Type	Capacity [MW]
1	ENE	Angola	Cambambe II	Hydro	260
2	BPC	Botswana	Morupule	Thermal	600
3	DRC	SNEL	Inga 1	Hydro	55
4	DRC	SNEL	Inga 2	Hydro	160
5	Malawi	ESCOM	Kapichira	Hydro	64
6	Namibia	NamPower	Ruacana	Hydro	83
7	Eskom	South Africa	Medupi	Thermal	800
8	Eskom	South Africa	Ingula	Hydro	333
9	IPP	South Africa	OCGT	Gas	1050
10	IPP	South Africa	Eskom South	Wind	100
11	ZESCO	Zambia	Kariba North	Hydro	360
12	IPP	Namibia	Luderitz	Wind	40
					3905

3.6% of new generation is wind power in 2011

## GENERATION PROJECTS -2013 TARGET

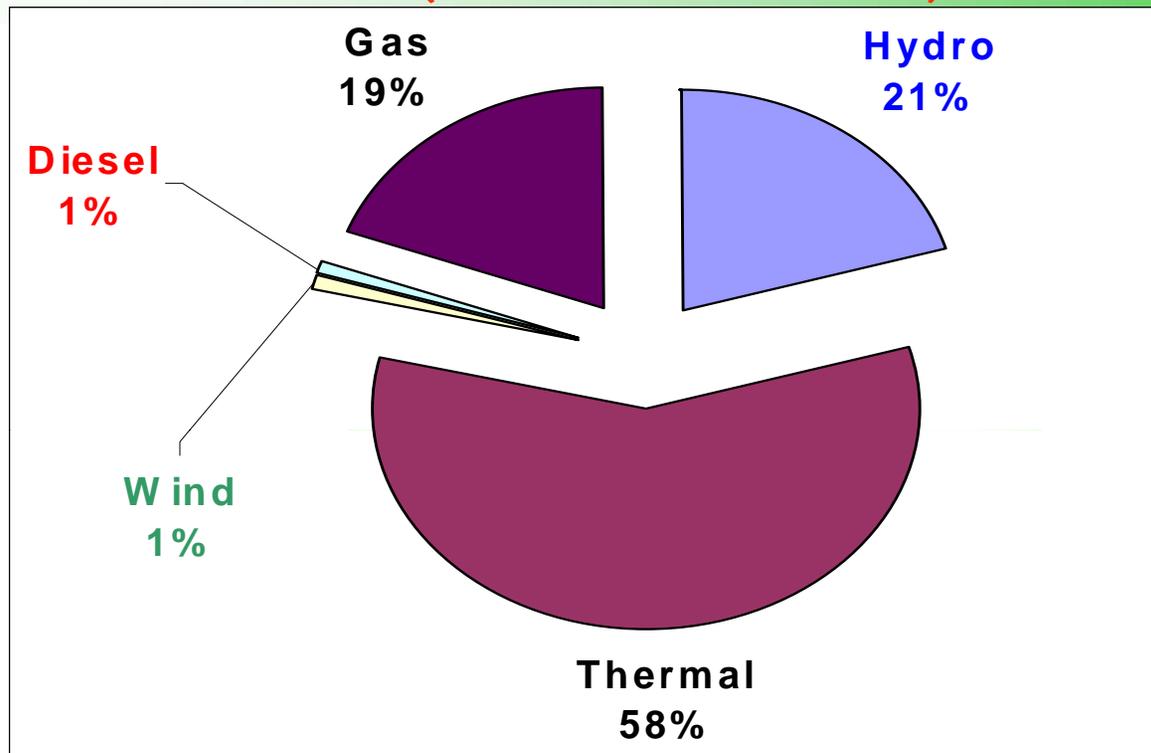
No	Utility	Country	Name	Type	Capacity [MW]
1	TANESCO	Tanzania	Kinyeredzi	Gas	240
2	TANESCO	Tanzania	Mnazi Bay	Gas	300
3	Eskom	South Africa	Medupi	Thermal	1600
4	Eskom	South Africa	Ingula	Hydro	999
5	IPP	Mozambique	Benga /Moatize	Thermal	450
6	IPP	South Africa	Eastern Cape	Wind	40
7	SNEL	DRC	SNEL	Hydro	80
					<b>3709</b>

1% of new generation is wind power in 2013

# Rehabilitation & New Generation Projects, MW

YEAR 2010 TO 2014			
No	Country	Planned Capacity	% installed
1	Angola	640	3.9%
2	Botswana	760	4.7%
3	DRC	515	3.2%
4	Lesotho	135	0.8%
5	Malawi	64	0.4%
6	Mozambique	450	2.8%
7	Namibia	543	3.3%
8	South Africa	11,731	71.8%
9	Swaziland	-	0.0%
10	Tanzania	700	4.3%
11	Zambia	495	3.0%
12	Zimbabwe	300	1.8%
	<b>TOTAL</b>	<b>16,333</b>	<b>100%</b>

# SAPP New Generation Technologies (2010 to 2014)



1.2% of new generation is wind power in 5 years  
205 MW of wind power generation in 5 years

2500 MW of wind power being promoted in South Africa by 2015 – 13 % wind of new Projects in SADC

# WIND GENERATION BENEFITS

- ❑ Reduce carbon dioxide emissions from electricity generation
- ❑ Reduce water consumption associated with electricity generation
- ❑ Opportunity to move power from areas of low cost to high marginal costs

# WIND GENERATION CHALLENGES

- ❑ Carbon emission trading and carbon rights to be investigated in the region
- ❑ Technical barriers exist in some countries
- ❑ Review of interconnection standards – **grid codes**
- ❑ Improved communication between wind generators and system operators (**dispatchers**)
- ❑ Current **single buyer model** exists for Power Purchase Agreements

# WIND GENERATION CHALLENGES

- ❑ Operating reserves: better understanding needed for **improved system operations**
- ❑ Forecasting: **wind patterns** and generation integration
- ❑ **Non dispatchable** nature of wind generation due to **variability** and **uncertainty**

# WIND GENERATION - ISSUES

- ❑ Simulation tools needed to evaluate the impact of wind power on **security of supply** and **load balancing in real time**.
- ❑ There is need to **prioritize** renewable energy.
- ❑ Wind capacity additions driven by **government policies**.

# WIND GENERATION POTENTIAL

- Average wind speeds pattern and potential
  - ✓ Mozambique – 7 m/s ( 10 x 10 MW) farms in coastal areas in Southern Mozambique
  - ✓ South Africa – 1 - 7 m/s
  - ✓ Zimbabwe – 3 - 5 m/s
  - ✓ Namibia – 6 -7 m/s
  - ✓ Tanzania – 8 m/s ( Singida 200 MW & Makambako 200 MW potential)
  - ✓ Malawi – No wind farms

SADC Renewable Energy Target – 20 % by 2025

Wind Energy Potential is massive - Governments

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Thank You