



ClimDev-Africa

INTEGRATING RENEWABLE ENERGY AND CLIMATE CHANGE POLICIES: Exploring Policy Options for Africa

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Outline

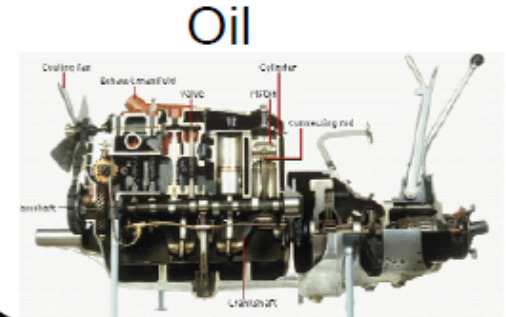
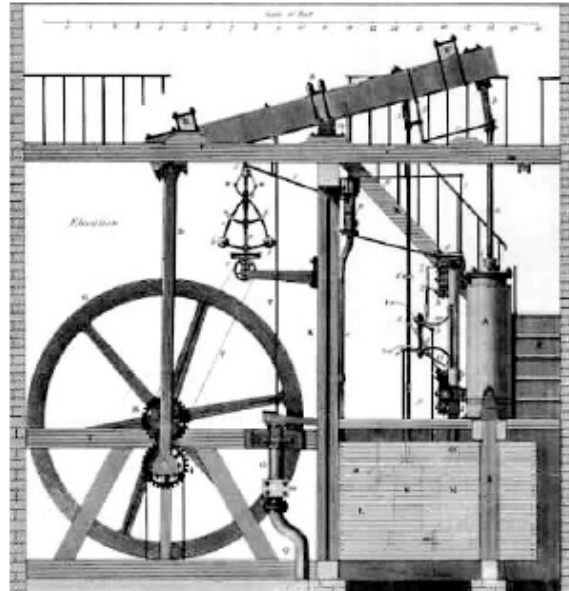
This presentation covers:

- Context
- Opportunities
- Building the case for RES
- Policy Recommendations



Energy Transitions

20+ fold increase in global energy use since 1800



- Declining availability (deforestation)
- Higher quality (higher energy density, easier storage, greater flexibility)
- Lower cost

Entering a new phase, which calls for a paradigm shift that deals with the issue of a carbon constrained world – higher level of innovation at energy supply/demand

And dealing with this paradox of carbon intensive consumption and under-consumption



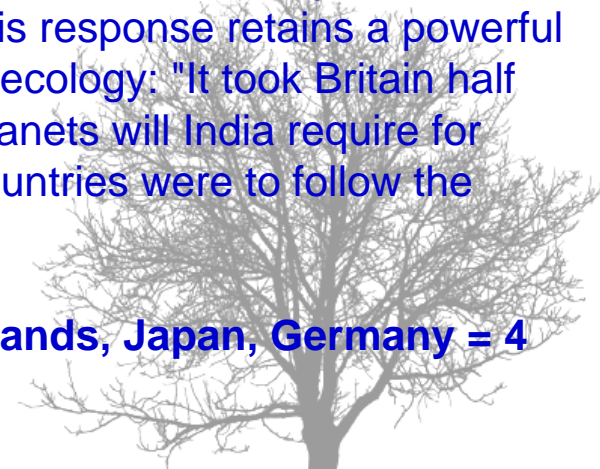
Decarbonize on the one end/ and increase access in a climate sensitive manner

How Many Planets Do We Need?

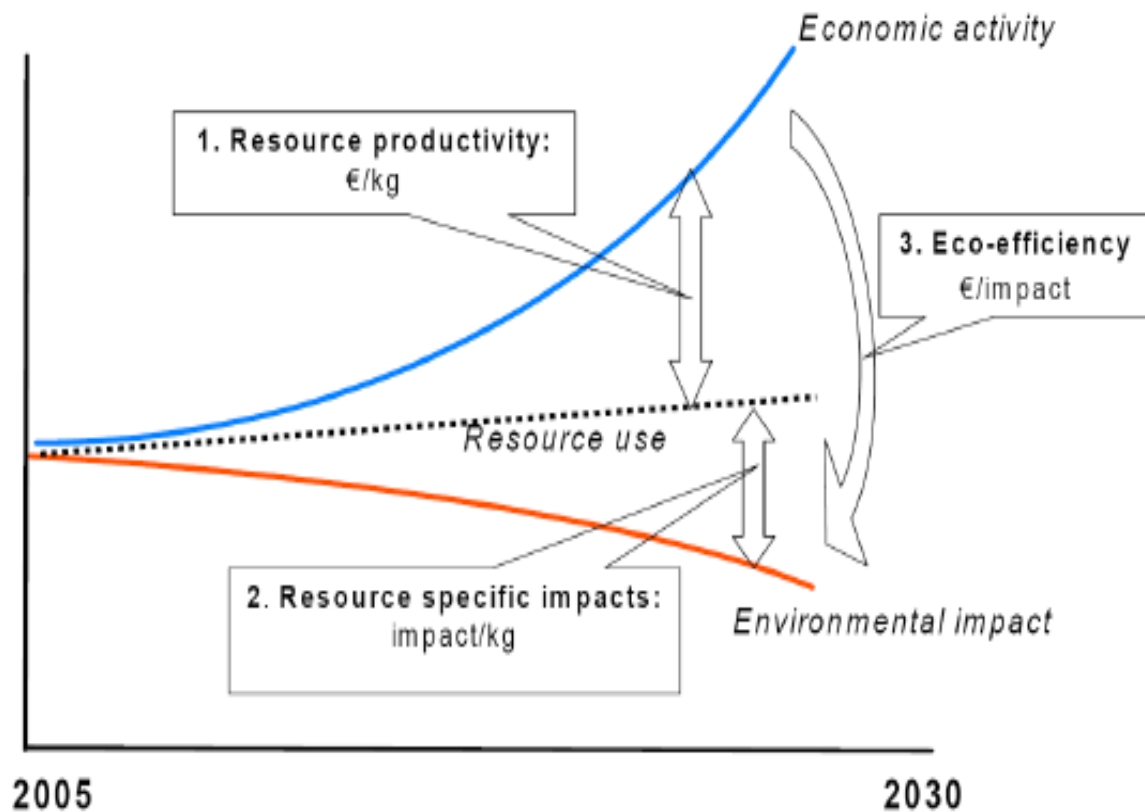


On the eve of India's independence, Mahatma Gandhi was asked whether he thought the country could follow the British model of industrial development. His response retains a powerful resonance in a world that has to redefine its relation to the earth's ecology: "It took Britain half the resources of this planet to achieve its prosperity. How many planets will India require for development?" How many planets would we need if developing countries were to follow the example of these countries?

US and Canada = 9 planets; Australia = 7 planets; UK, Netherlands, Japan, Germany = 4 planets; France, Italy, Spain = 3 planets



- **Decoupling:** - Delinking rates of economic growth from rates of resource use and environmental impacts, including CO₂ emissions.



Source: COM (2005) 670

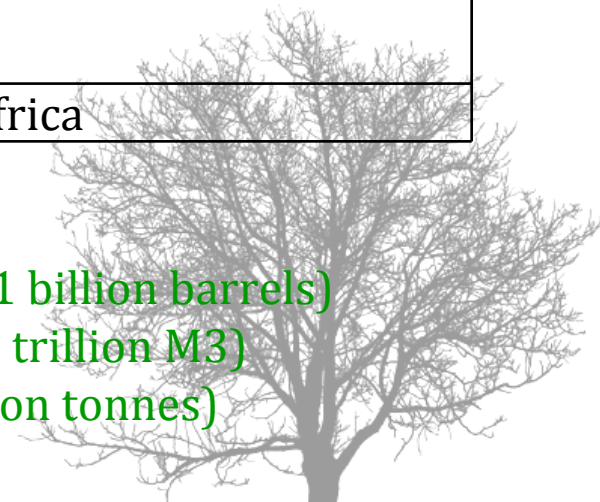


The Opportunity: Energy Resource Potential of Africa

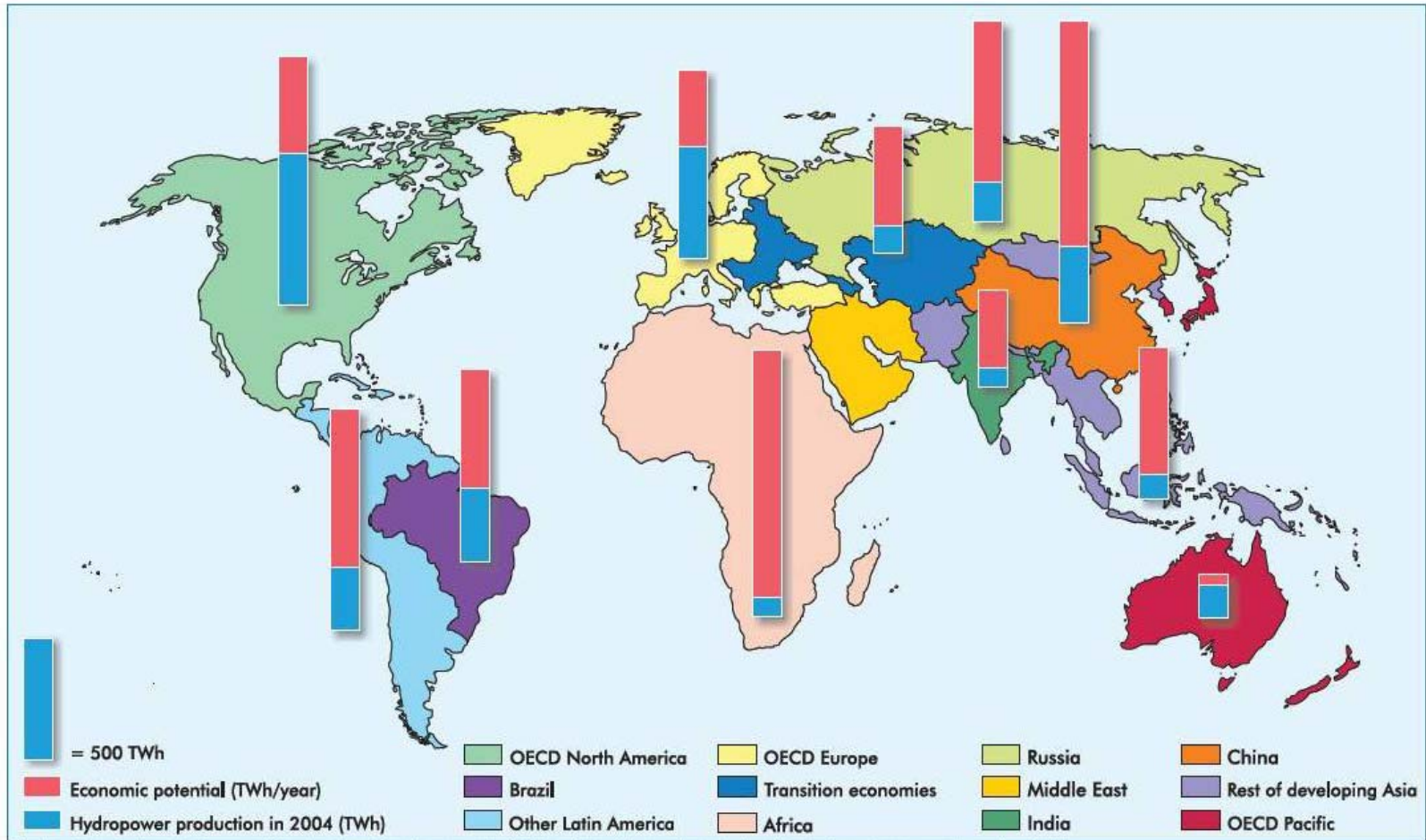
Energy Type	Reserves	Regional Distribution
Hydro	1,834 TWh/yr	Central Africa: 57% Eastern Africa: 32% Other Africa: 11%
Biomass	Woody biomass: 70 billion tonnes	All regions
Solar	Solar insolation: 1800 – 2850 kWh/m ² .a	Most of Africa
Wind	Wind speeds: Southern Africa (6 – m/s) Northern Africa (5 – 8.5 m/s)	Most attractive sites in the Northern and Southern coasts.
Geothermal	9,000 MW	Eastern Africa

☐ Africa also accounts for:

- ☐ 9.5% of proven crude oil reserves in the world (132.1 billion barrels)
- ☐ 8% of proven natural gas reserves in the world (14.7 trillion M3)
- ☐ 4% of proven coal reserves in the world (31,696 billion tonnes)



Africa is has a huge hydro-power potential... but still untapped

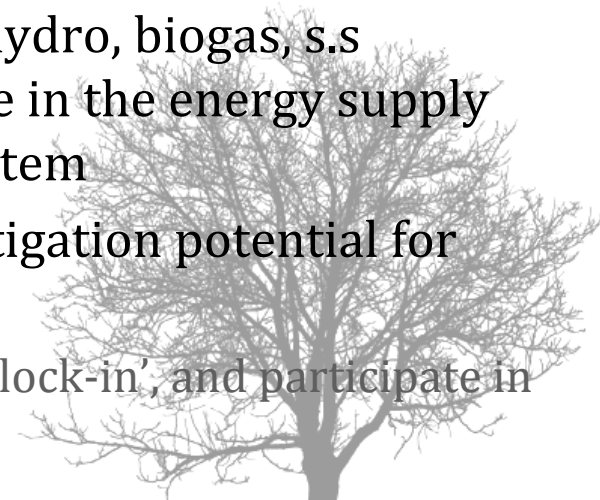


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Clean Energy and Climate Change

The case for renewables:

- ❑ Renewables (especially small-scale renewables) characterized by their modularity - capable of providing modern energy access at relatively lower costs
- ❑ Availability of renewable energy sources at national and local levels
 - ❑ Energy security and decentralized systems to poor and remote areas
- ❑ Renewable energy systems offer the opportunity to reduce the dependence on increasingly expensive (and imported) fossil fuels (B.Faso, Senegal)
 - ❑ 39/54 countries are net oil-importers
- ❑ Renewable energy systems (such as biomass, small hydro, biogas, s.s biofuels) provide opportunity to include more people in the energy supply chain as producers/and consumers in the energy system
- ❑ Renewable energy systems offer considerable CC mitigation potential for Africa
 - ❑ Could mean financial resource flow, avoid technology 'lock-in', and participate in S&T innovation





Africa could try to do better in the pursuit of its development

Clean energy options could deliver better outcomes to both that both global and local benefits



Clean Energy and Climate Change – The Mitigation Potential

□ The carbon emission implicit social cost per kWh energy supply shows the tremendous potential of non-combustive renewable energy generation

Power station type	Carbon emissions (g C/kWh)	Emission savings (g C/kWh)	Generating costs (U Sc/kWh)	\$/t carbon avoided	Reduction potential to 2010/2020 (Mt C/year)
Pulverized coal – as base case	229	0	4.9	0	
Integrated gasification combined cycle (IGCC) – coal	190-198	31-40	3.6-6.0	-10-40	49/140
Pulverized coal + CO2 capture	40-50	179-189	7.4-10.6	136-165	10/100
Combined cycle gas turbine (CCGT) – natural gas	103-122	107-126	4.9-6.9	0-156	38/240
CCGT gas + CO2 capture	14-18	211-215	6.4-8.4	71-165	Uncertain
Hydro	0	229	4.2-7.8	-31-127	26/92
Bioenergy IGCC – wood wastes	0	229	2.8-7.6	-92-117	14/90
Wind – good to medium sites	0	229	3.0-8.0	-82-135	63/173
Solar thermal and solar PV	0	229	8.7-40.0	175-1400	2.5/28

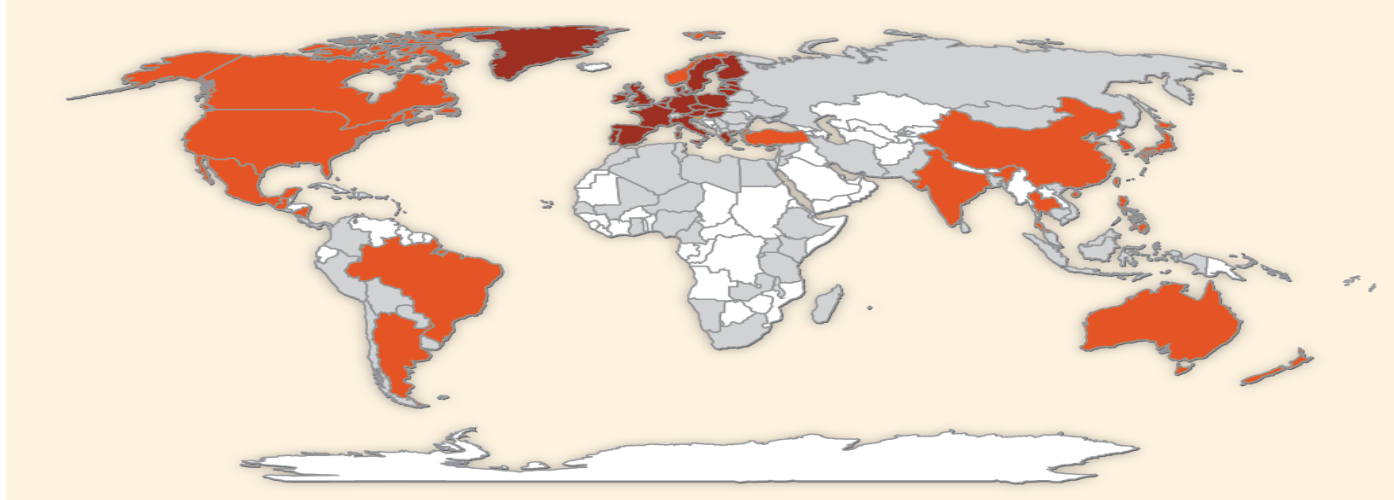
□ The joint environment and economic benefits of these technologies, coupled with scale flexibilities allowing grid and off-grid applications, should intensify policy interest

Policy Experiments in Africa – RE Policies

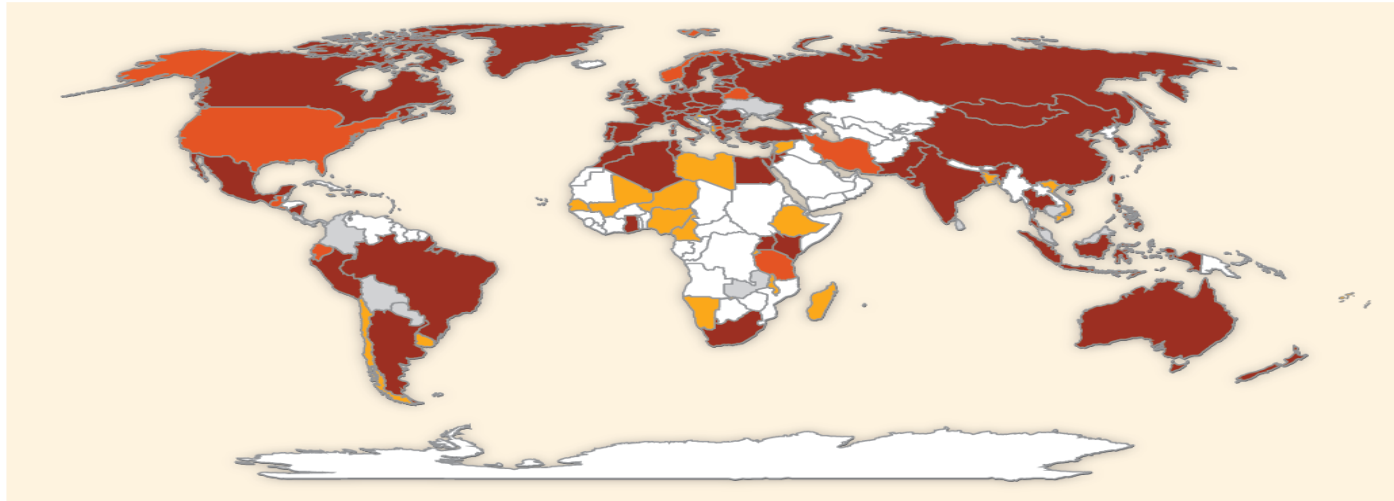
Country	REGULATOR POLICIES			FISCAL INCENTIVES				PUBLIC FINANCING	
	Feed-in tariff	Biofuels obligation, mandate	Heat obligation, mandate	Tradable renewable energy credits	Capital subsidy, grant or rebate	Investment, production tax credits	Reductions in sales, energy, VAT or other taxes	Public investment, loans or financing	Public competitive bidding
Algeria	X								
Botswana							X		
Egypt					X		X	X	X
Ethiopia		X					X	X	
Gambia							X		
Ghana				X			X		
Kenya	X						X		
Mali							X		
Mozambique		X						X	
Morocco								X	
Rwanda							X	X	
South Africa	X			X	X				X
Tanzania	X				X		X		
Tunisia					X		X	X	
Uganda	X				X		X		
Zambia							X		

Countries with RE targets and/or two or more RE policies, mid-2005 and early 2010

MID-2005

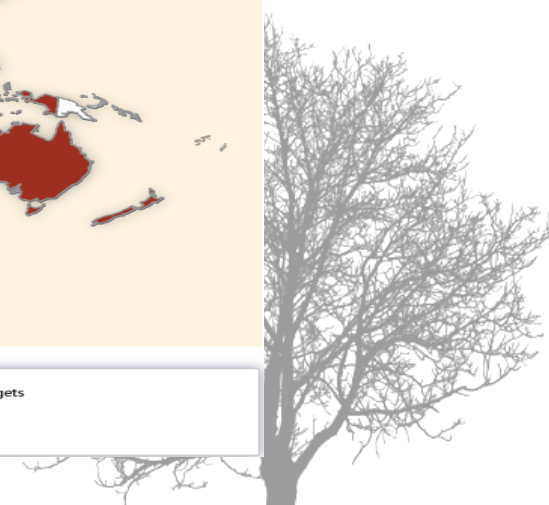


2009/early 2010



■ Countries with TWO OR MORE RE policy mechanisms and RE Targets
■ Countries with TWO OR MORE RE policy mechanisms
■ Countries with RE Targets

■ Countries without RE policy mechanisms and RE Targets
■ No Data



Integrating RE and CC Policies - Recommendations

Recommendation #1: establish clear, consistent and achievable targets for energy development and environmental stewardship. (EU example)

Presence of clear and consistent energy policy that sets a target for share of renewables into the future is an essential first step

Recommendation #2: design and implement a broad range of renewable energy development-inducing policies and demonstrate GHG mitigation outcomes.

Utilizing a broad range of policies that will enhance the development of clean energy should be considered

Recommendation #3: engage in regional and continental initiatives to establish a climate change policy vision for Africa and enable the energy sector to meet some policy targets.

Establishing regional and continental goals can help shape the development path of countries towards sustainability

Recommendation #4: encourage small-scale renewable energy adoption and leverage scaling-up opportunities offered by energy technologies

Not all areas will have grid-type electrification Small-scale technologies can offer feasible energy solutions



Integrating RE and CC Policies - Recommendations

Recommendation #5: create conducive environments for public-private partnerships in clean energy development.

Private sector engagement will accelerate energy development by mitigating public finance shortfalls and encouraging deployment of energy technologies.

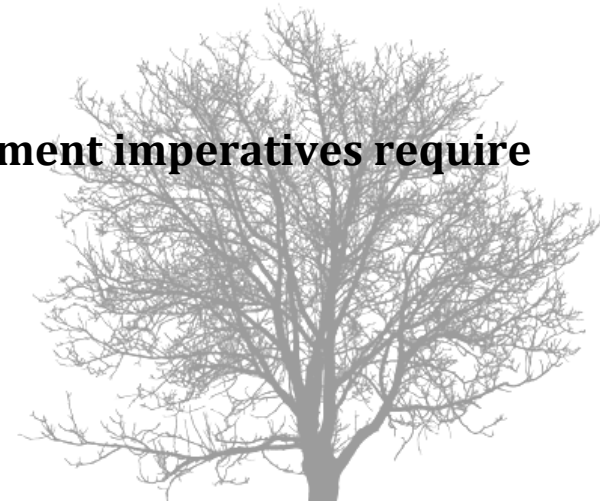
Recommendation #6: utilize existing international policy frameworks and funding sources to promote renewable energy development.

Already existing policies such as the Clean Development Mechanism (CDM) aim at stimulating sustainable development in developing countries.

Recommendation #7: recognizing the potential impacts of climate change on energy security, implement energy portfolio diversification strategies.

Diversified energy development strategy offers solid foundation for enhancing energy security.

The potential of RES is considerable, the climate and development imperatives require it, it needs ambition and aggressive policies to realize it





United Nations
Economic Commission for Africa

Thank you

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A grey silhouette of the African continent is located in the bottom left corner. Overlaid on the map is the text "Climate Change Meets Policy" in green and grey.

Climate
Change

Meets
Policy



Clean Energy and Climate Change – the Nexus

- ❑ Energy generation, distribution and use is directly related to carbon emissions
 - ❑ From 2000 to 2008, Africa's real GDP per capita, population, and CO₂ emissions per capita grew by 21.97%, 20.7 %, and 7.88%.
- ❑ Africa's carbon intensity grew by 11.9% between 2000 and 2008
 - ❑ The average for Africa without South Africa is lower than the world average
- ❑ Review of emission levels from 1971 to 2008 reveals that emissions have increased significantly in all regions in Africa
 - ❑ The shares of Sub-Saharan Africa countries increased from 18% in 1971 to 20% in 2008.
 - ❑ The major shift is in the decline of the share of South Africa (which alone accounted for 38% of emissions in 2008), and the rise of shares from North African countries

Year	Total (million metric tones)			Percentage			
	Africa	North Africa	South Africa	Sub-Saharan Africa	North Africa	South Africa	Sub-Saharan Africa
1971	265.66	43.34	173.82	48.49	16.32	65.43	18.25
1980	408.35	111.07	214.52	82.76	27.20	52.53	20.27
1990	545.61	189.96	254.67	100.99	34.81	46.68	18.51
1995	598.19	214.28	276.91	107.00	35.82	46.29	17.89
2000	686.34	258.66	298.50	129.18	37.69	43.49	18.82
2005	823.43	331.08	330.90	161.45	40.21	40.19	19.61
2008	889.93	369.81	337.42	182.70	41.55	37.92	20.53