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**2061-11**

**Joint ICTP/IAEA Workshop on Alternative Response Actions to  
Climate Change and Energy Options**

*5 - 9 October 2009*

**Challenges and Opportunities for Energy Sector in Developing Countries Under  
Climate Change Control Regimes**

Jejel EZZINE

*DG International Cooperation  
Ministry of Higher Education  
Scientific Research and Technology  
Tunisia*

Joint ICTP/IAEA Workshop on  
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5-9 October 2009  
ICTP, Miramare, Trieste

***Challenges and opportunities  
for energy sector  
in developing countries  
under climate change control regimes***

**Prof. Jelel EZZINE,**

**DG International Cooperation  
Ministry of Higher Education,  
Scientific Research and Technology, Tunisia**

# **A Wide Spectrum of: Problematiques, Issues, and Open Questions**

- What challenges and what opportunities ?
- For what kind of energy and which sector?
- Which developing countries?
- And what about least developed countries?

And last but not least

- under WHICH climate change control regimes?
- etc.

# Google's Search!

- CC, DC, Opportunities:
  - 3 350 K (Jul. 16th), 3 720 K (Oct. 3rd)
- CC, DC, Threats:
  - 1 060 K (Jul. 16th), 1 340 K (Oct. 3rd)
- Manual fishing: (155 entries)
  - <http://ezzinescc.blogspot.com/>

# ClimateChange & Developing Countries!

**Friday, October 2, 2009**

## Why we need to "Seal the Deal" in Copenhagen

**Why we need to "Seal the Deal" in Copenhagen:** "Why we need to "Seal the Deal" in Copenhagen

Saturday, 12 September 2009 00:00

Attention: open in a new window. PDFPrintE-mail

Summit on Climate Change banner

On 7 December 2009, representatives from 193 Parties will convene in Copenhagen seeking to seal the deal on a fair, comprehensive and scientifically rigorous climate agreement for the post-2012 period.

This year, we have the opportunity to choose a new path. Copenhagen offers the chance to retool our global economy – to invest in clean energy, boost prosperity and lift millions out of poverty. By sealing the deal in Copenhagen, we can provide a more livable planet for our children and generations to come."

Posted by Prof. Jelel Ezzine at **11:40 AM** **0 comments**



## World Bank Says India Right In Resisting Mandatory Emission Reductions : Red, Green, and Blue

**World Bank Says India Right In Resisting Mandatory Emission Reductions : Red, Green, and Blue:** "World Bank Says India Right In Resisting Mandatory Emission Reductions

Written by Mridul Chadha

Published on May 9th, 2009

3 Comments

Posted in Climate Change, Energy, World

## About Me



Prof. Jelel Ezzine

Jelel Ezzine received his B.S. degree from ENIT, the MSEE degree from UAH, and the Ph.D. degree from GT, in 1989. He is currently a

Professor of Systems Theory and Control at the university of Tunis El Manar. Currently, he is the Director General of International Cooperation at the Tunisian Ministry of Higher Education, Scientific Research and Technology (MHESRT).

[View my complete profile](#)



## More ...

- ◆ [Next Generation.](#)
- ◆ [rpayne.blogspot](#)



## What is it for Developing Countries?

[Climate change developing countries](#)

[Climate-Change Complacency](#)

Washington Post

The Oct. 1 editorial "The Senate Climate Bill" applauded the legislation's plan to cut our country's greenhouse

## The challenge

is not merely **providing** a country with the needed **energy**, rather providing it with the adequate mix of energy all along

a **desired glocal sustainable development path.**

# Shifting Toward a Low Carbon Society!

# I have two pens



Montblanc

Sundance



# The Montblanc Pen



- I use it for writing.
- It is made from platinum and precious resin.
- It cost about US \$350.

# The Sundance Pen



- I use it for writing.
- It is made from wood, plastic, and recycled cardboard.
- It cost about US \$1.00.

# Which pen is more sustainable?

- Everyone who thinks the Montblanc pen is more sustainable raise your hand.
- Thank you. Now put down your hand.
- Everyone who thinks the Sundance pen is more sustainable raise your hand.
- Thank you. Now put down your hand.

# More Information

- I never take the Montblanc pen out of my office, so I will use it the rest of my life.
- I lose the Sundance pen almost every time I take it away from my home, so I have to buy many dozens of them each year.
- When the Montblanc pen ink cartridge becomes empty, I buy a refill.
- If I still have the Sundance pen when its ink cartridge becomes empty, I will throw the pen away and get a new one.

# I will ask again: Which pen is more sustainable?

- Everyone who thinks the Montblanc pen is more sustainable raise your hand.
- Thank you. Now put down your hand.
- Everyone who thinks the Sundance pen is more sustainable raise your hand.
- Thank you. Now put down your hand.

# Main Lessons

- Many votes changed after the new information.
- The new information did not describe the technology of the pens; it described my relationship and attitude toward the pens.
- Sustainability is not mainly in the physical characteristics of the tool, it is in our relationship to the tool.
- Achieving sustainability does require new technologies; but more important will be for society to develop new relationships and attitudes to the technologies it has.

# The Ecological Footprint: Creating Measurable Success for a Sustainable Future

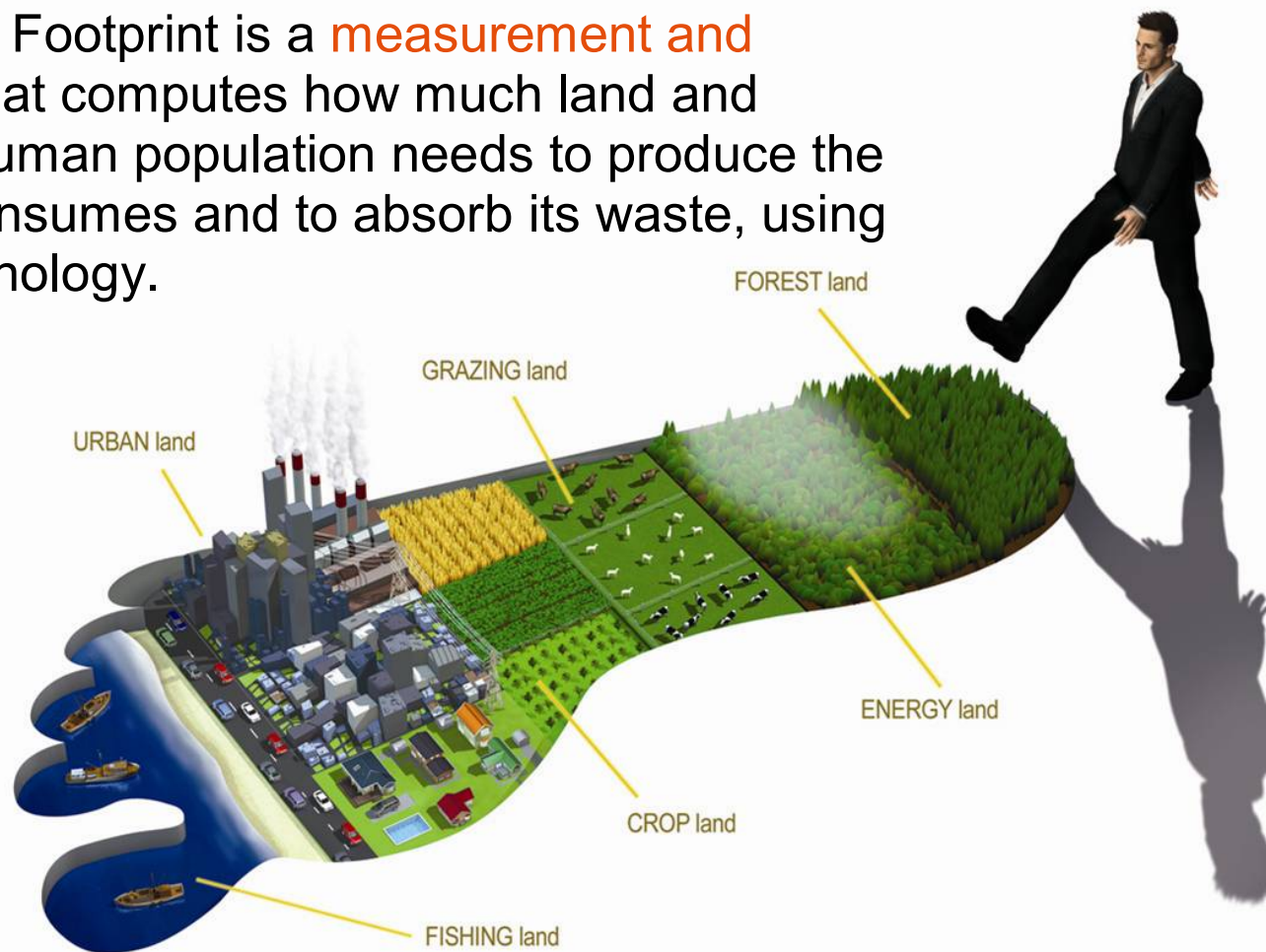
# Human Development

- **Goal:** For all to live fulfilling lives, within the means of planet Earth.
- **Monitoring Tools:** Two leading indicators have identified how we can get there:
  - **Ecological Footprint** data tells us that, given current population and available biocapacity, an Ecological Footprint of less than **2.1** global hectares per person makes a country's resource demands globally replicable.
  - The United Nations' **Human Development Index (HDI)** — which measures a country's average achievements in longevity, literacy and income. An HDI higher than **0.8** is considered “high human development.”

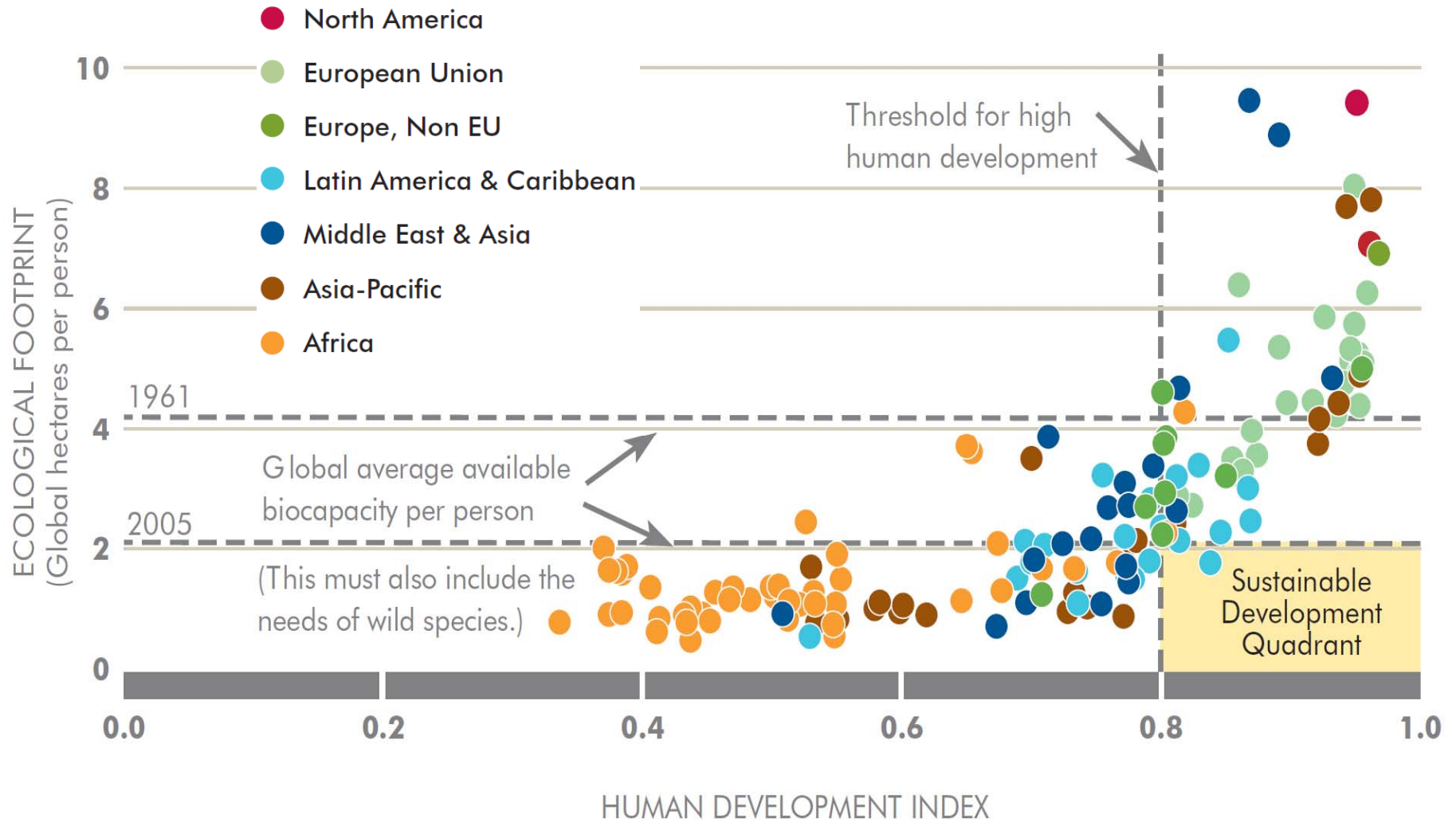


# What is the Ecological Footprint?

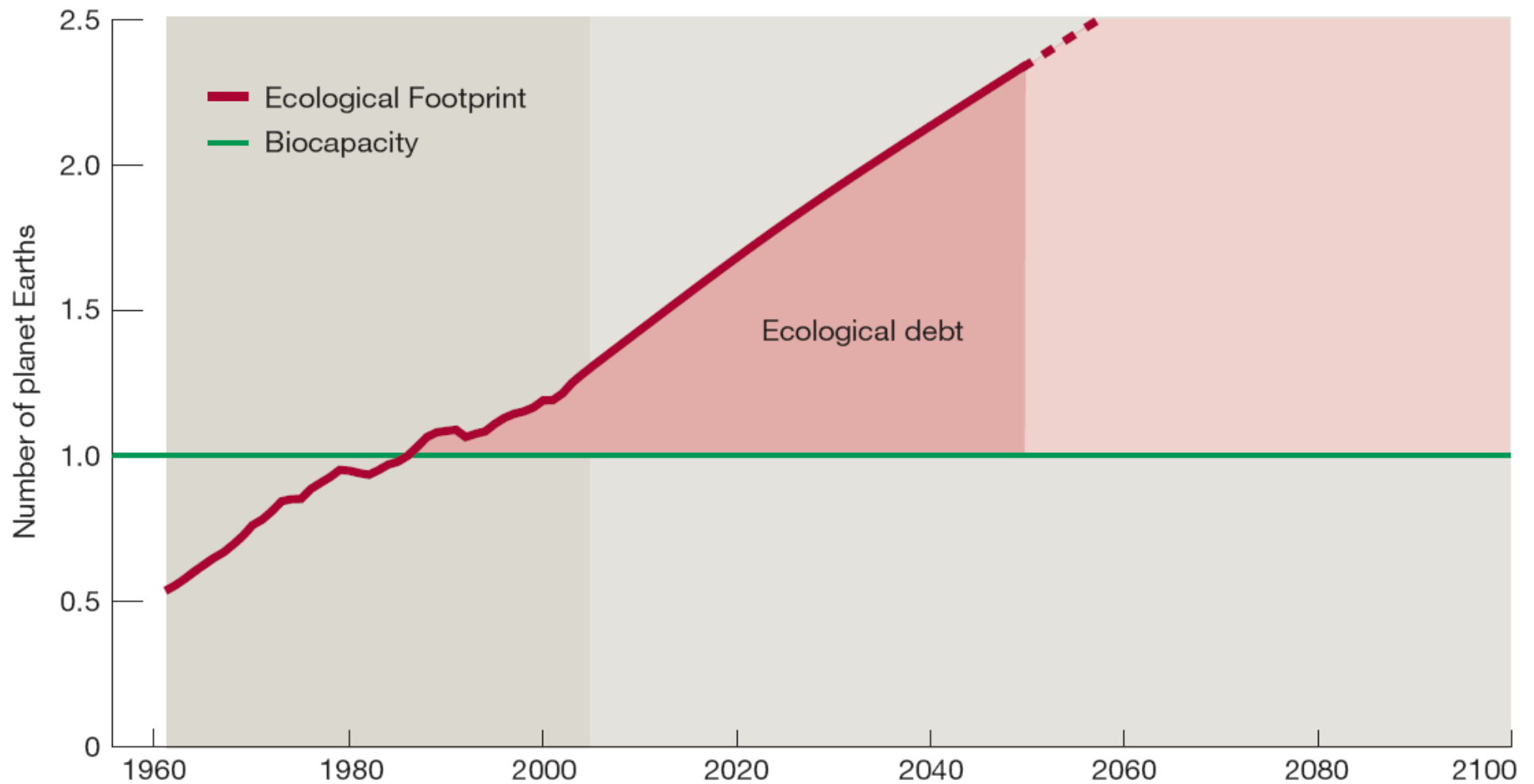
The Ecological Footprint is a **measurement and decision tool** that computes how much land and water area a human population needs to produce the resources it consumes and to absorb its waste, using prevailing technology.



# Human Development Index and the Ecological Footprint of Nations



# Conventional thinking is becoming a liability: Translating UN's Most Moderate Scenario into Footprint shows unviable path

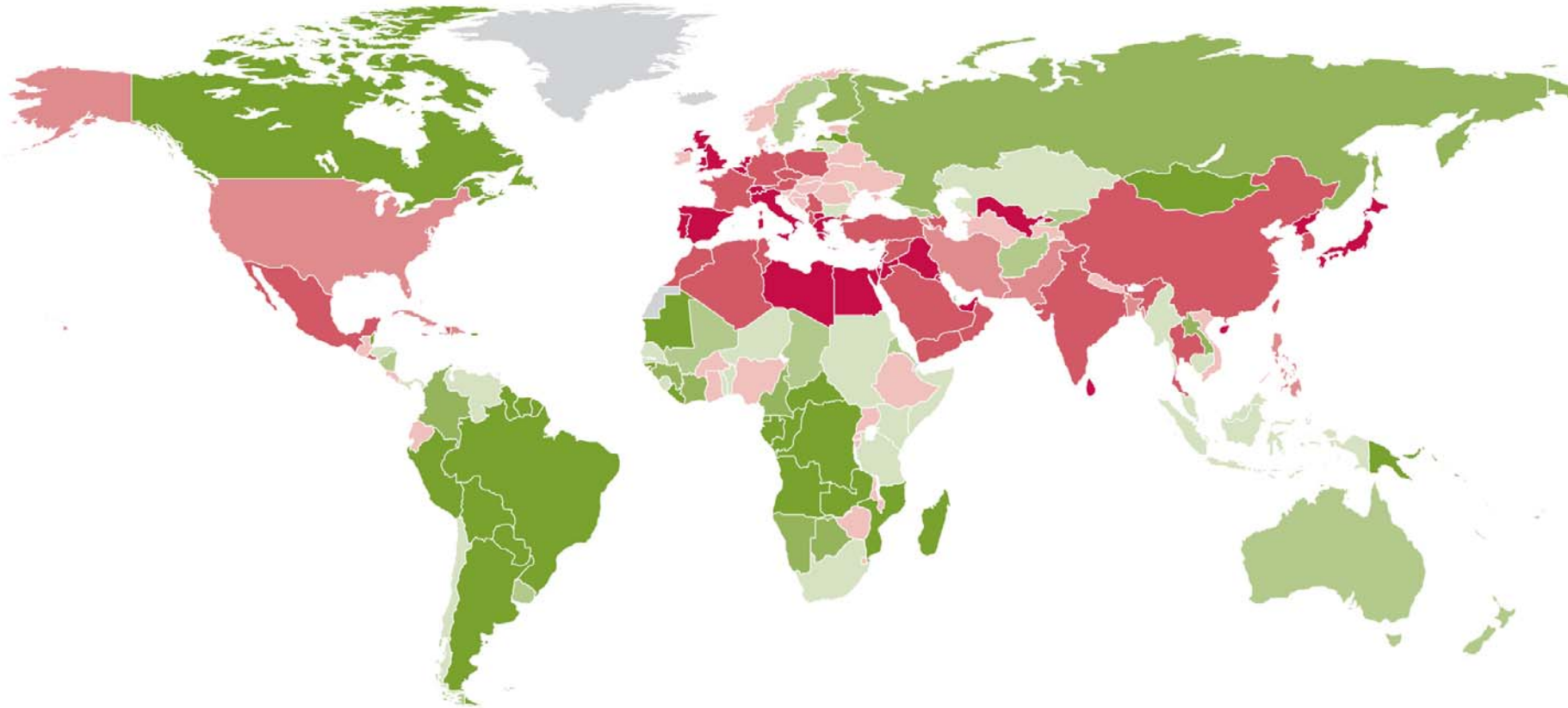


## Initiatives and Campaigns: **Ecological Creditors and Debtors Initiative**

**Goal:** To convene nations to initiate a dialogue on the growing significance of biocapacity. We believe the geopolitical lines will begin to shift from that between “developing” and “developed” countries to the line dividing ecological creditors and ecological debtors.

- **Ecological Creditors:** Residents of ecological creditor countries use less ecological services than are available within their national borders, and therefore are endowed with a reserve of natural assets. This reserve, in an increasingly resource-constrained world, empowers these countries and strengthens their strategic positions.
- **Ecological Debtors:** In contrast, countries with ecological deficits depend on net imports of such resources or on liquidating their ecological assets.

# ECOLOGICAL CREDITORS AND DEBTORS



As global overshoot increases, the geopolitical line will shift from “developing” and “developed” countries to a distinction between ecological creditors – countries that have more biocapacity than they use – and ecological debtors – those using more biocapacity than they have. Today, 80 percent of the world’s people live in countries that are ecological debtors.



**ECOLOGICAL CREDITORS**  
BIOCAPACITY GREATER THAN FOOTPRINT

- 0-50% larger
- 50-100% larger
- 100-150% larger
- 150% larger

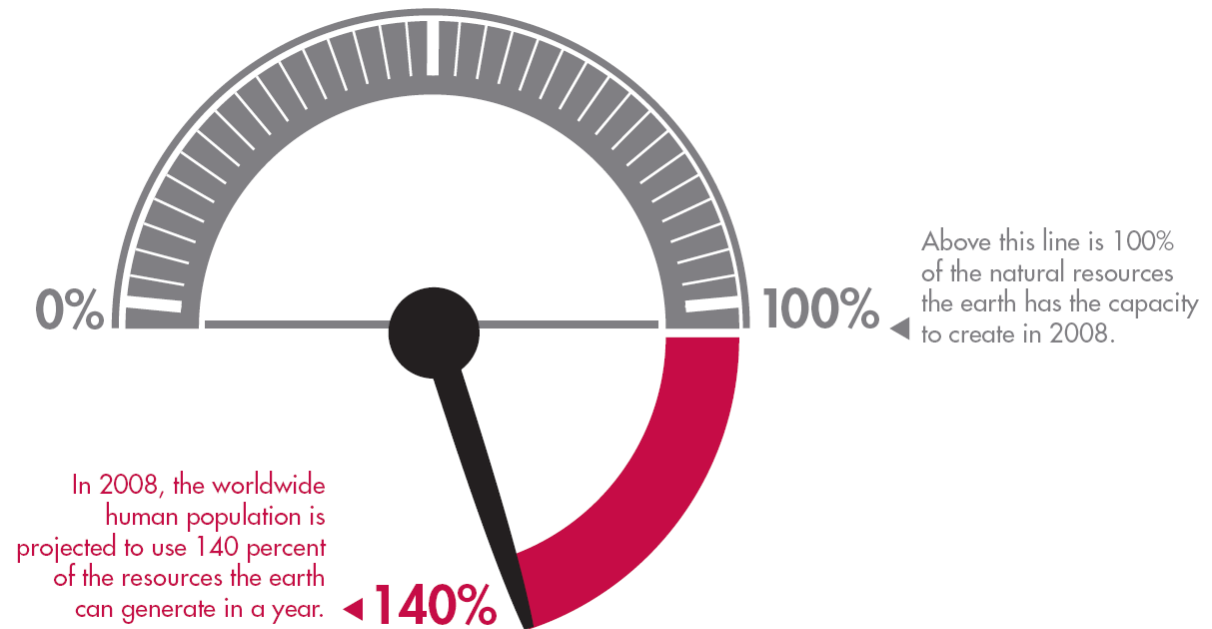
**ECOLOGICAL DEBTORS**  
FOOTPRINT GREATER THAN BIOCAPACITY

- 150% larger
- 100-150% larger
- 50-100% larger
- 0-50% larger

Based on 2005 Global Footprint Network data

## Initiatives and Campaigns: Earth Overshoot Day

Earth Overshoot Day 2009 will fall on **September 25**. This is the day in the year on which humanity, in net-terms, will have used all the resources and services nature will be able to regenerate in 2009. **For the rest of the year, humanity will be living beyond its ecological means.**





**Need 2 Additional  
Worlds by 2030**

Here the story line

When we look at carbon in isolation, the problem appears as a “tragedy of the commons” (we pollute our collective atmosphere in order to advance our individual/national wealth.) But the picture changes when we see the carbon problem as part of an overall resource crunch – a symptom of human pressure on resources reaching a critical tipping point. The concentration of carbon in our atmosphere may be the most prominent resource issue we face – but it is by no means the only one. Access to energy, freshwater resources, food security, forest resources, biodiversity, oil – all of these are under threat. We are entering an era of “peak everything.”



Ironically, rather than being overwhelming, the “peak everything” perspective actually makes the problem easier to solve because it presents a clear self-interest motive for unilateral government action, at country, state, and city level.

Some governments understand the impending resource crunch. The governments of China and Saudi Arabia have bought up huge tracts of land in Africa to ensure continued food security. But governments can act much more in their long-term interest by reducing their overall metabolism of resources -- including their carbon emissions (or dependency of fossil fuel, which in itself is also running into severe limitations).

From a Footprint perspective, it becomes clear: aggressive sustainability policies are not a romantic gift to Mother Nature or to an abstract humanity that come at the expense of the local sustainability hero's quality of life. In fact they are the only way a local high quality of life can be secured. As human pressure on resources escalates, those cities with the most resource-efficient economies will flourish, while those requiring cheap and plentiful access to ecological services will become extremely vulnerable and will lose out. Also, those countries that run largest deficits will feel far more of an economic burden than those who have adequate access to resources.

Is this useful?

Warmest wishes, Mathis









**Energy Justice – Energy Security for All**

**Global Cataclysmic Implications ... just a couple of illustrations!**



## Captured on camera: 50 years of climate change in the Himalayas

Series of before and after panoramas of Imja glacier taken five decades apart highlights dramatic reduction of Himalayan ice ([guardian.co.uk](http://guardian.co.uk), Thursday 4 June 2009)



A very deep layer of ice covered the Imja glacier in the 1950s (top photo). Over the next 50 years, small meltwater ponds continued to grow and merge, and by the mid 1970s had formed the Imja lake. By 2007, the lake had grown to around 1km long. Photograph: Erwin Schneider/Alton Byers/The Mountain Institute





Dust blows across the Mediterranean from North Africa and across Sicily to western Greece. Dust blown from the Sahara desert reaches north of the Alps approximately once a month, according to the World Meteorological Organisation  
Photograph: Goddard Space Flight Center/NASA

5 Oct. 2009

ICTP/IAEA Workshop, Trieste

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## Dust storms around the world



A dust cloud envelops the Saudi Arabian capital, Riyadh, in March 2009. This week meteorologists predicted that many more major dust storms would occur if climate change leads, as expected, to deeper droughts

Photograph: AFP

5 Oct. 2009

ICTP/IAEA Workshop, Trieste

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## Dust storms spread deadly diseases worldwide

Dust storms like the one that plagued Sydney are blowing bacteria to all corners of the globe, with viruses that will attack the human body. Yet these scourges can also help mitigate climate change ([The Observer](#), Sunday 27 September 2009)



A dust storm blankets Sydney's iconic Opera House at sunrise.  
Photograph: Tim Wimborne/Reuters



An young Afghan refugee hides behind a tent from a dust storm in Kabul on in October, 2008. Photograph: Manpreet Romana/AFP



## Philippines rescue workers step up search for storm survivors

Government declares 'state of calamity' after tropical storm Ketsana brings worst flooding for four decades ([guardian.co.uk](http://guardian.co.uk), Sunday 27 September 2009)



A Filipino boy is carried to safety through floodwaters in Manila.  
Photograph: Jay Directo/AFP

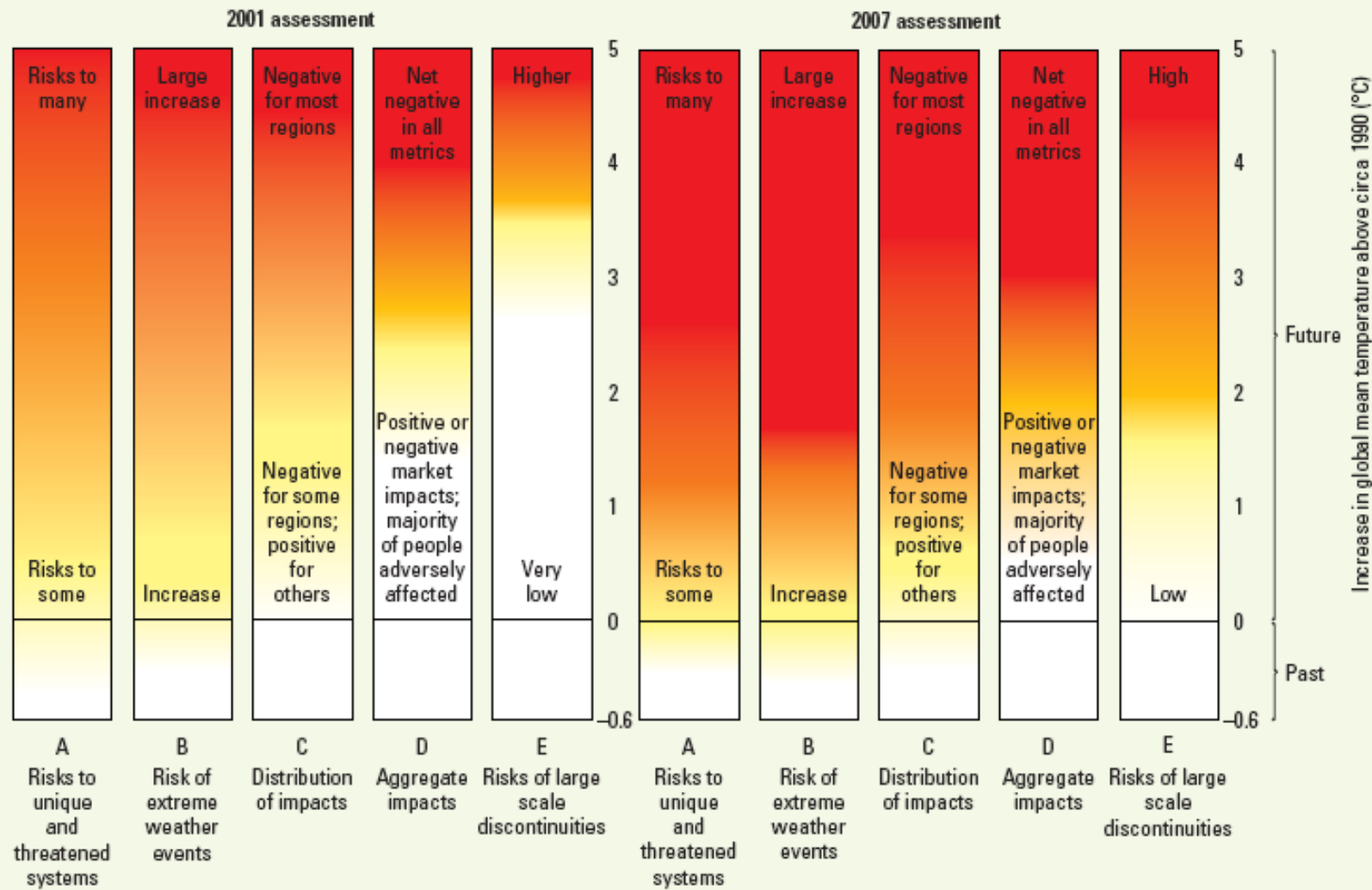
## Manila Hit Over Aid Delay After Storm Kills 140

**Date:** 29-Sep-09. **Country:** PHILIPPINES. **Author:** Rosemarie Francisco



Rescuers assist residents from floodwaters caused by Typhoon Ondoy as they board a rubber boat in Cainta Rizal east of Manila September 27, 2009.  
Photo: Erik de Castro

Figure FA.5 Embers burning hotter: Assessment of risks and damages has increased from 2001 and 2007



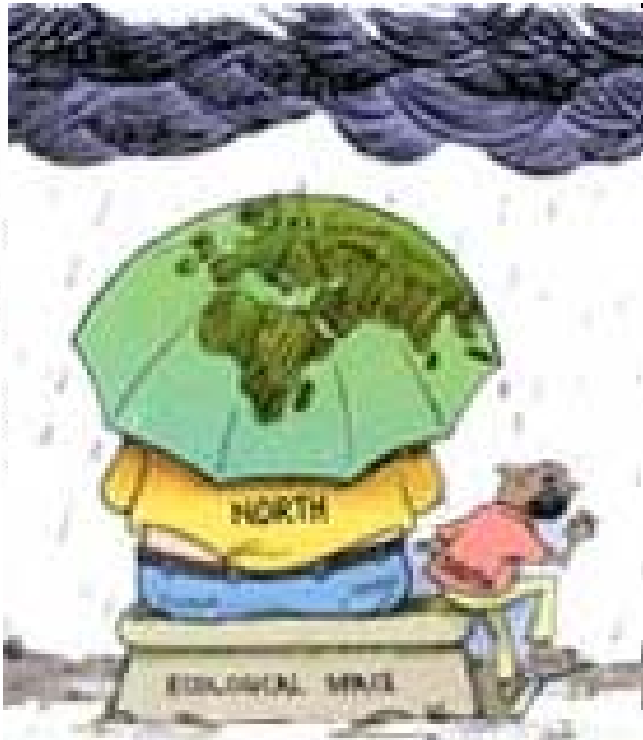


search ID: knin279

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**pre-Kyoto & Kyoto ...**

**post-Kyoto!**



**pre-Copenhagen ... !**



Stk:07

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# **Development First for Developing Countries: General Introduction**

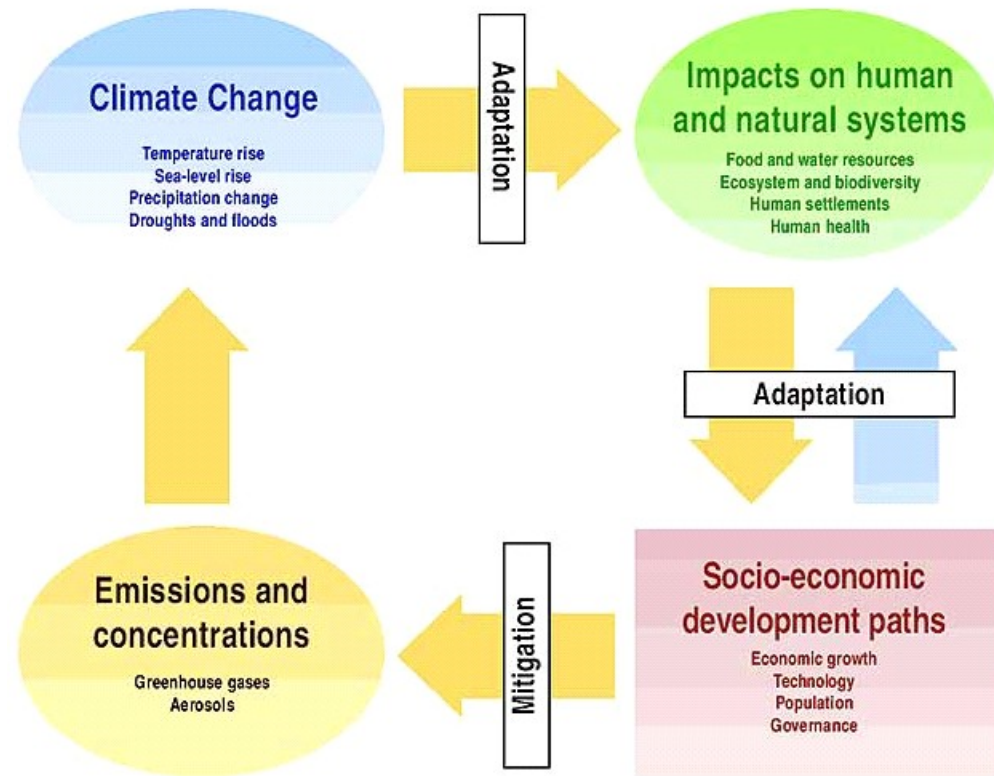
# DEVELOPMENT AND CLIMATE CHANGE

- Development objectives have multidimensional character, representing various economic, social, local and global sustainability dimensions
- The traditional development challenges and newer challenges the world is facing require enduring and global efforts
  - Making development more sustainable
  - Economic growth/stagnation
  - Persistent poverty, illiteracy
  - Food, hunger, malnutrition
  - Energy access/security
  - Water, health, etc.

# Have two way relationship

- Development pathways influence climate change
- Climate change could have significant impacts on development

They can be mutually reinforcing!



# DEVELOPMENT AND CLIMATE CHANGE



Food production needs to double to meet the needs of an additional 3 billion people in the next 30 years



Climate change is projected to decrease agricultural productivity in the tropics and sub-tropics for almost any amount of warming

# DEVELOPMENT AND CLIMATE CHANGE



One third of the world's population is now subject to water scarcity

Population facing water scarcity will more than double over the next 30 years



Climate change is projected to decrease water availability in many arid- and semi-arid regions



# DEVELOPMENT AND CLIMATE CHANGE

Wood fuel is the only source of fuel for one third of the world's population

Wood demand will double in next 50 years

Climate change makes forest management more difficult, due to an increase in pests and fires

Unsustainable wood harvesting will exacerbate climate change





**Biodiversity  
underlies all  
ecological  
goods and  
services**

- **Food and Fiber Production**
- **Provision of Clean and Sufficient Water**
- **Maintenance of Biodiversity**
- **Maintenance of Human Health**
- **Storage and cycling of Carbon, Nitrogen, Phosphorus**

**Climate change will affect the ability of ecological systems to provide a range of essential ecological goods and services**

# DEVELOPMENT AND CLIMATE CHANGE

1.6 billion people are without electricity today

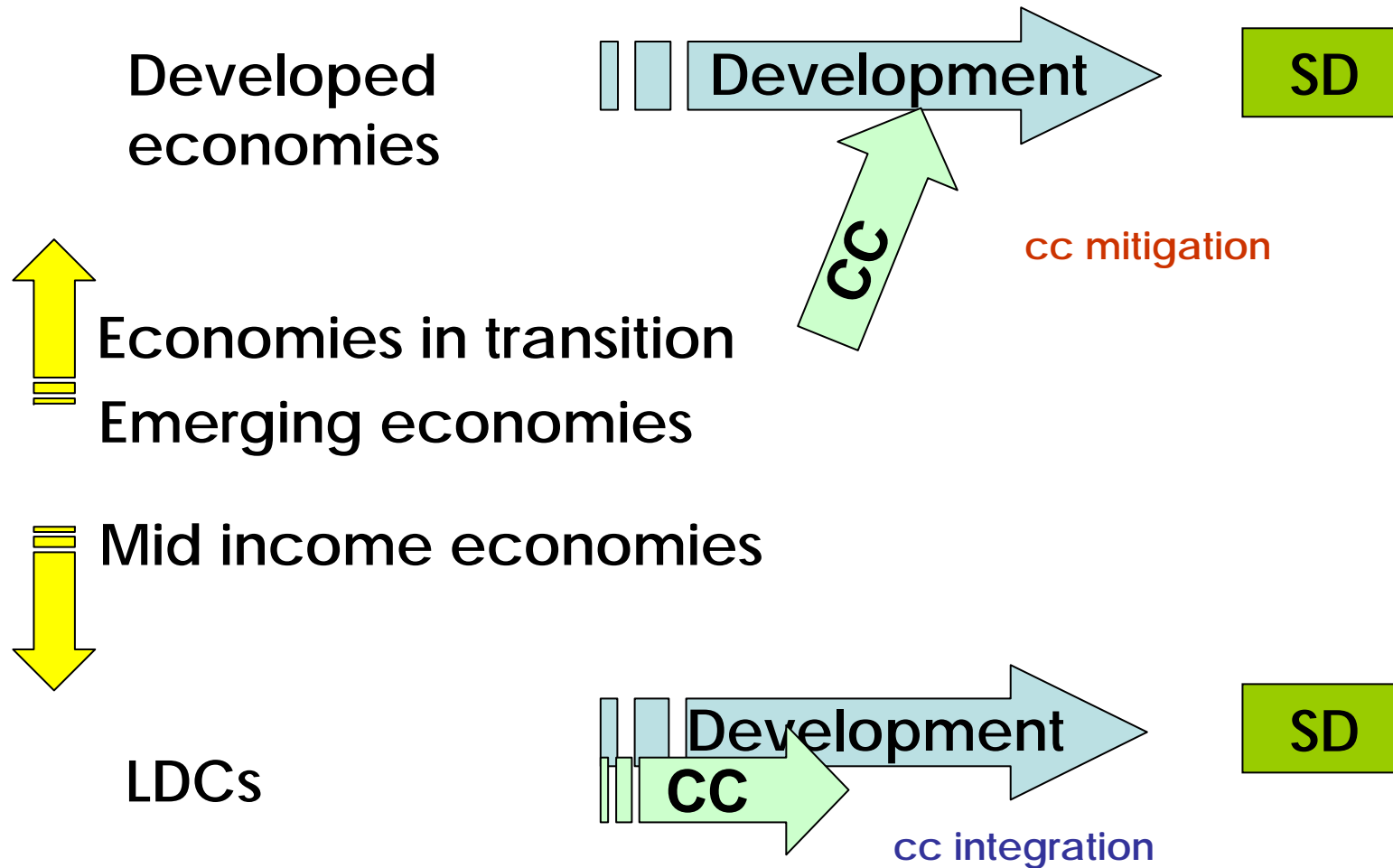
Electricity demand in developing countries will increase 3-5 times over the next 30 years

Fossil fuel based electricity production will exacerbate climate change





# Development choices and trajectories are key determinant of climate outcomes and sustainability



# FROM LOCAL, NATIONAL TO REGIONAL

- A wide range of development initiatives are climate friendly
  - Energy policy instruments, energy sector restructuring, energy efficiency improvement;
  - Integrated rural development programs;
  - Agricultural soil protection and water management;
  - Sustainable forestry management and conservation;
  - Disaster preparedness actions, etc.
- Integrating development and climate is receiving increasing attention and interest in research and policy making since the last few years

- Potential for integrating climate change issues into development policies is considerable
- Scaling up remains a challenge
- Regional cooperation provides opportunities
- Various divides require bridging
- Strong stakeholder involvement and policy issues are key
- Considering both mitigation and adaptation is essential
- The 'non-climate' route for international policy making is important

- Strong and inclusive global cooperation is needed to realize deep reduction in GHG emissions and to adapt to adverse impacts of climate change
- This will requires long term and enduring actions at local, national, regional and global levels
- Only “**Development First**” approach i.e. starting from development priorities can stimulate such cooperation

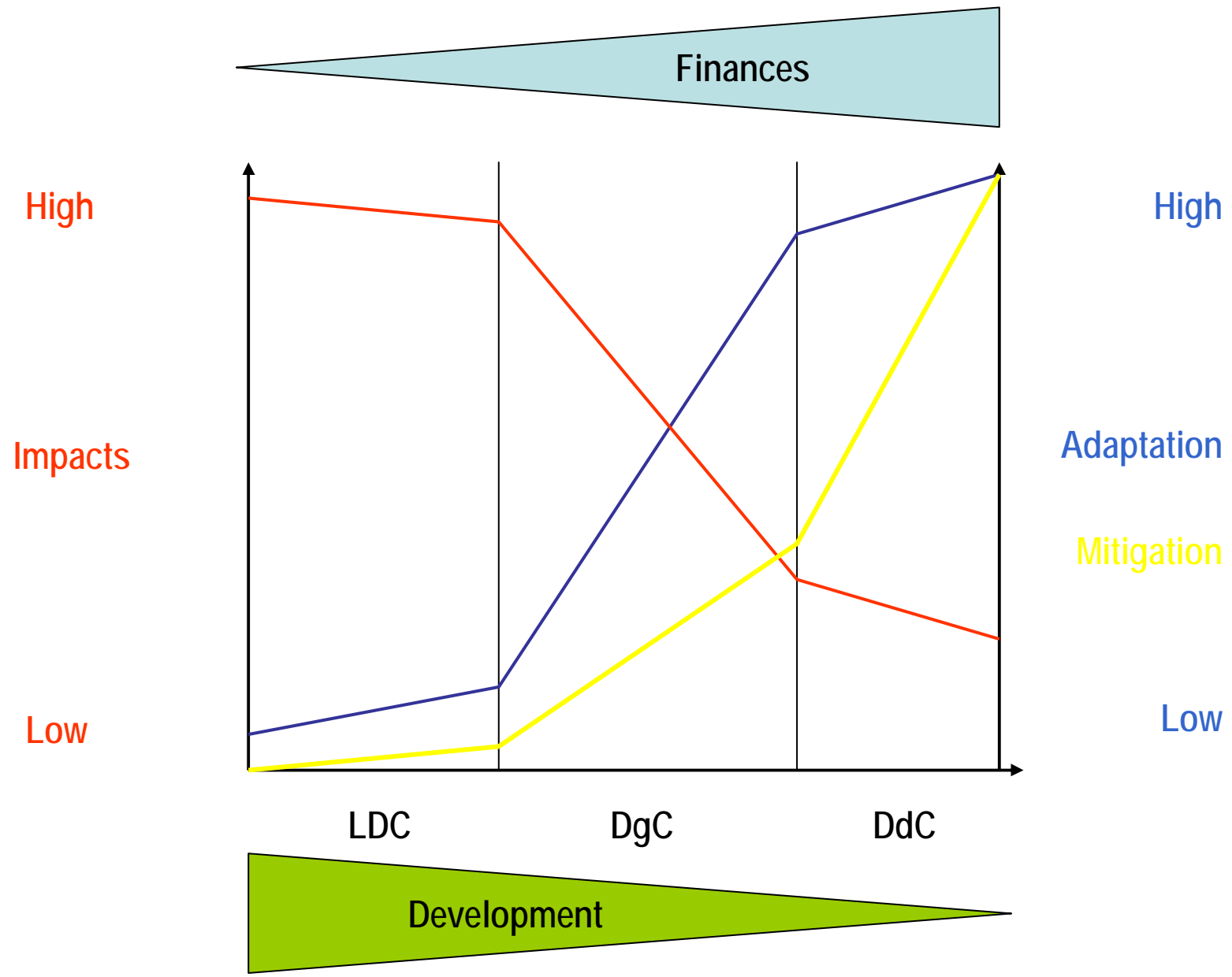
- **Development and climate**
- **North and south**
- **Mitigation and adaptation**
- **Global, national and local**
- **Sustainable and economic development**
- **Climate change and climate variability**

- **Climate change = threat to development**
- **Start from development priorities, not from climate change (“Development First”)**
- **Objectives of development / poverty eradication must be met, but with ..**
- **Development strategies that aim for:**
  - *climate safe development, i.e. development that leads to low vulnerability to climate change*
  - *climate friendly development, i.e. development that leads to low GHG emissions*
- **Build international agreements and collaboration to support these national strategies**



## QUESTIONS TO BE ADDRESSED

- What lessons can be learned from national policies that deliver positive development and climate outcomes?
- How can promising options for national/sectoral/regional policies be scaled-up through international initiatives to enhance their impacts?
- How can international policy frameworks create the conditions for integrated development and climate policies?



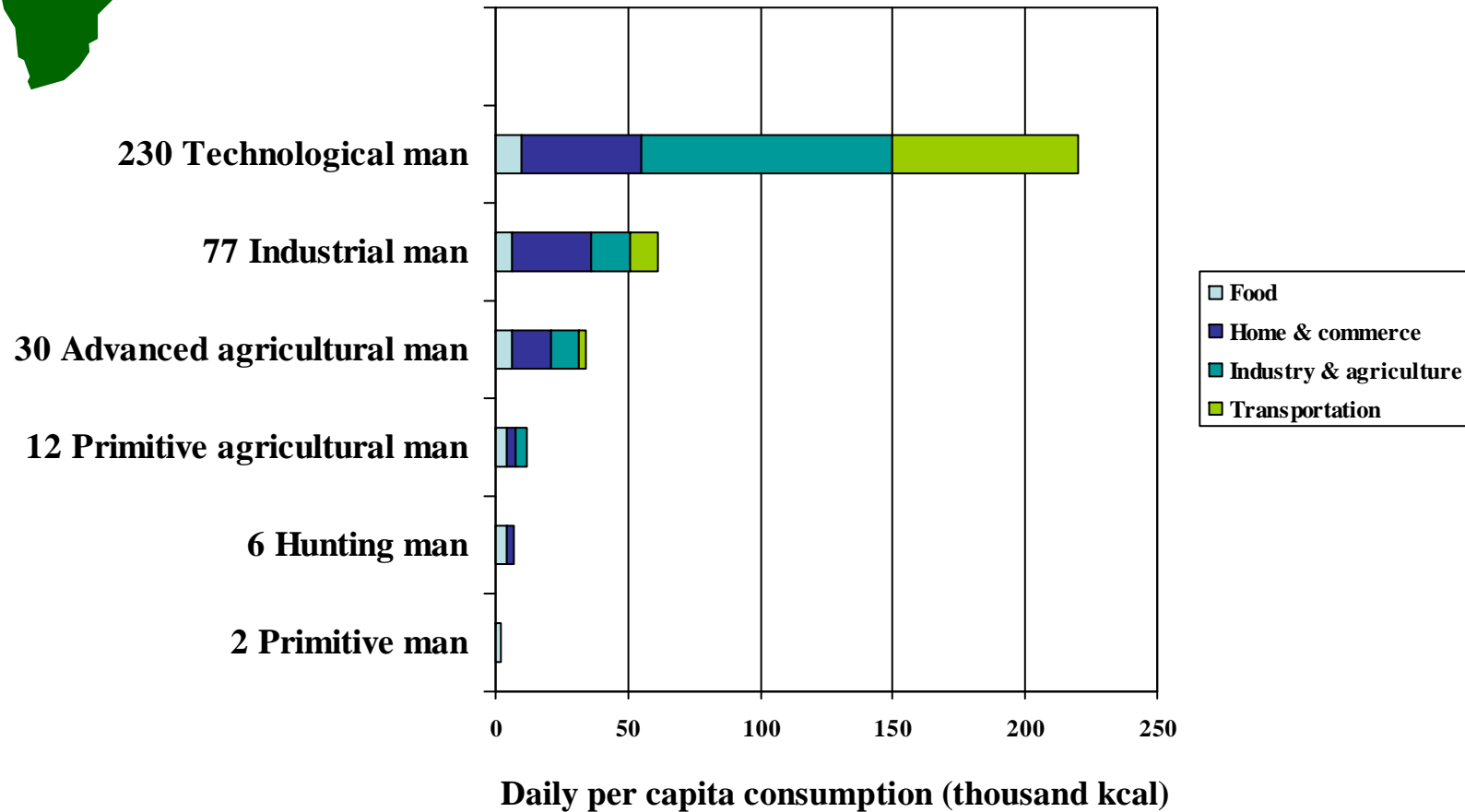
# The African Energy Vision



Overview, Challenges and  
Elements of the Plan of Action



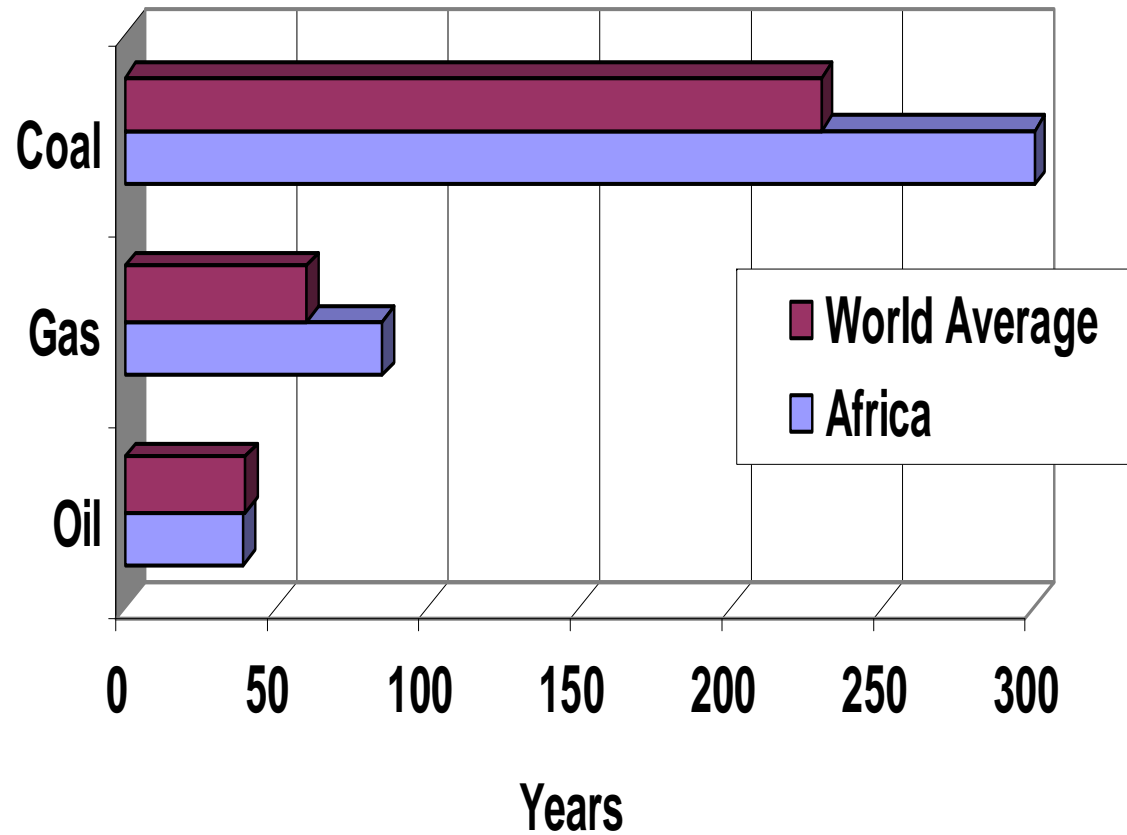
# Stages of development and energy consumption



Source: Cook, E, Man, Energy, Society, WH Freeman and Co, San Francisco, US (1976)



## Reserves-to-Production Ratio for Fossil Sources (Africa and World)





## Africa's New Masterplan







To Sustainably Develop  
African Vast Energy Resources  
for Increased Productivity, Wealth Creation  
and Improved Quality of Life for Africans



## How Can Africa Achieve this Vision? (1)

- **Think Bigger Act Faster**
- **Scale up Both Local and External Energy Investments for Projects/Programs that Lead to Sustainable Development**
- **Revisit the Current Approach of Household Energy Issues i.e. Indicator of access to electricity, etc.**



## How Can Africa Achieve this Vision? (2)

- Shift the Focus to Industrial and Productive Energy Issues
- Develop and Organise Resources (Human, Infrastructure and Institution) to Increase Effectiveness
- Take Ownership of Externally Funded Projects/Programs
- Develop and Facilitate Implementation of Integrated Development Plans in Particular Incorporating Full Menu of Options (Energy)



# Challenges Facing African Energy Sector



# Financing Energy Investments

## Mobilizing of Sustainable Local Financing Opportunities

- Reducing High Dependency on External Financing Sources
- Reducing Long Lead Times from Project Concept to Implementation Associated with Financing
- Improving Financial Management Needed to Achieve Optimization
- Developing Downstream Infrastructure



# Energy and Environment Nexus

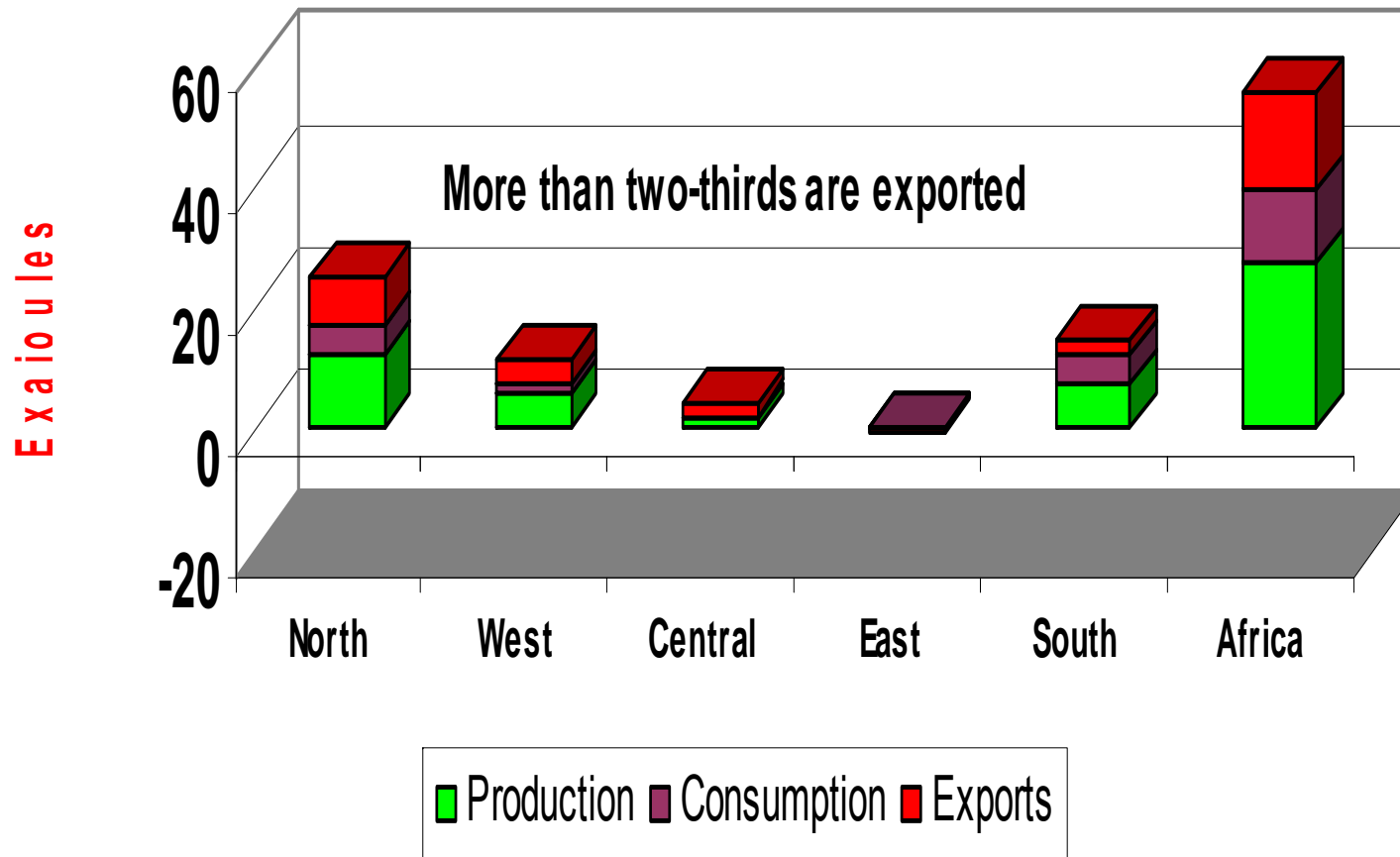
- Reconciling Global and/or Local Environmental Concerns with Africa's Energy for Development Needs
- Articulating Sustainable Energy in African Context vis-a-vis Generic Approach
- Circumscribing Role of Energy Efficiency and Renewables in the African Energy Systems





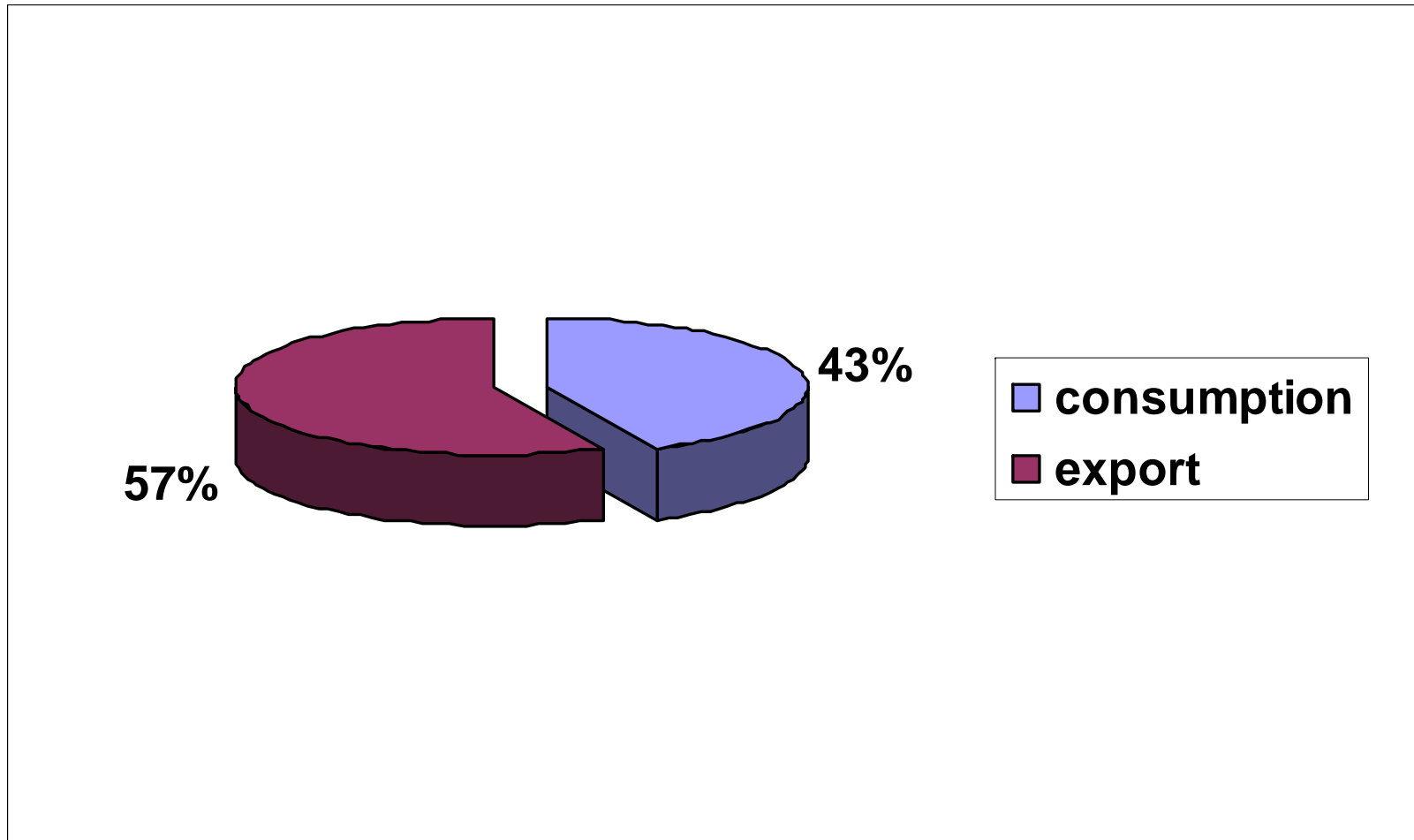
# Shifting the Balance

## Modern Fuels Production, Consumption and Exports, 1997





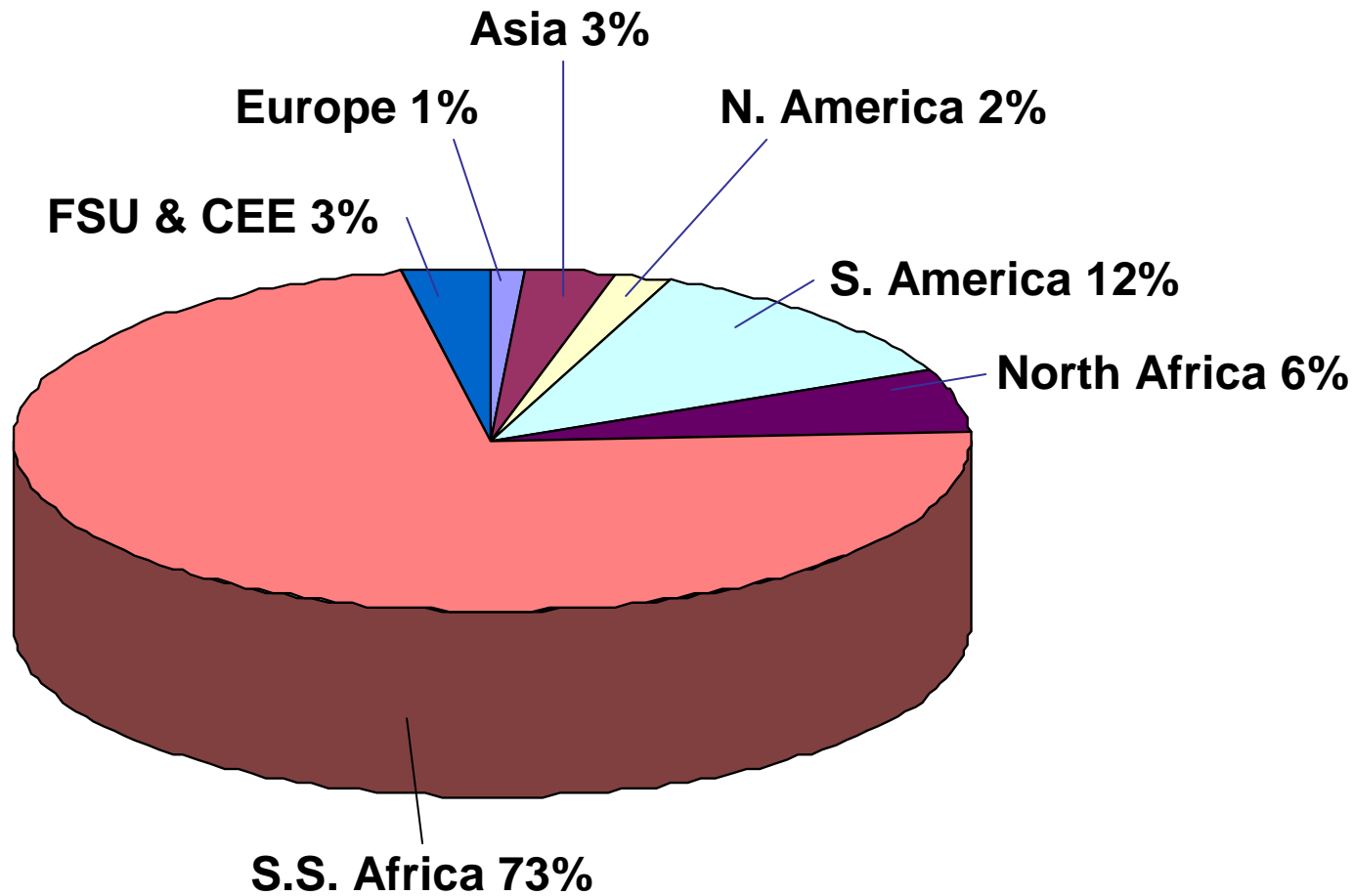
# Changing the balance to address local growth needs





# Curbing the NG Flaring

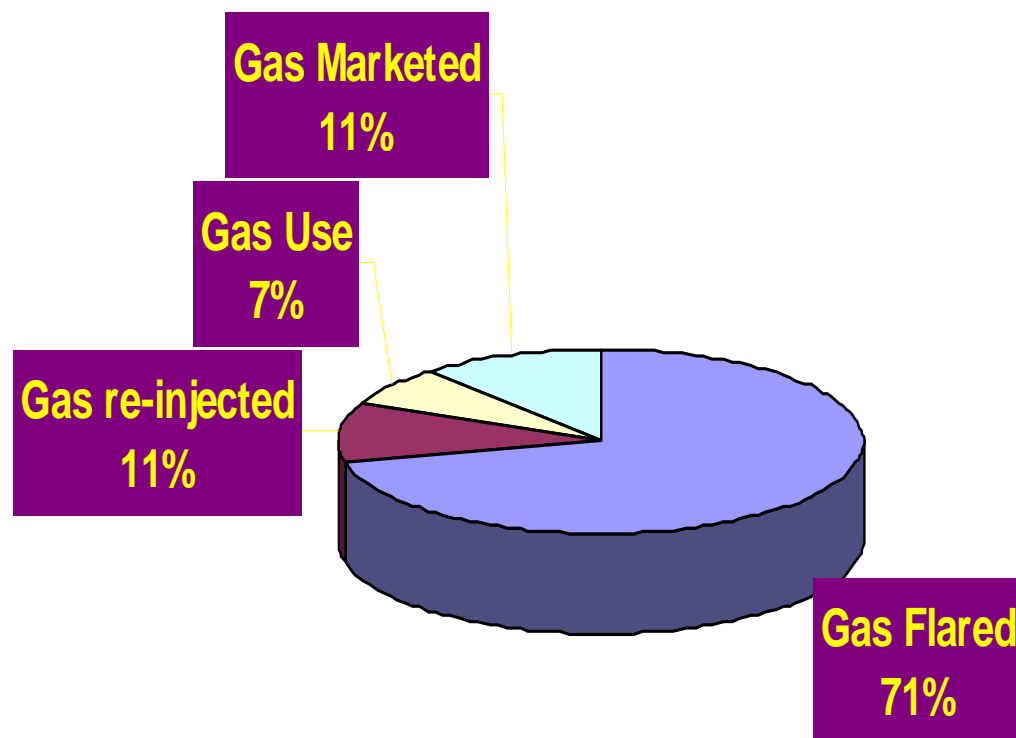
*Amount could generate electricity for the whole continent !*





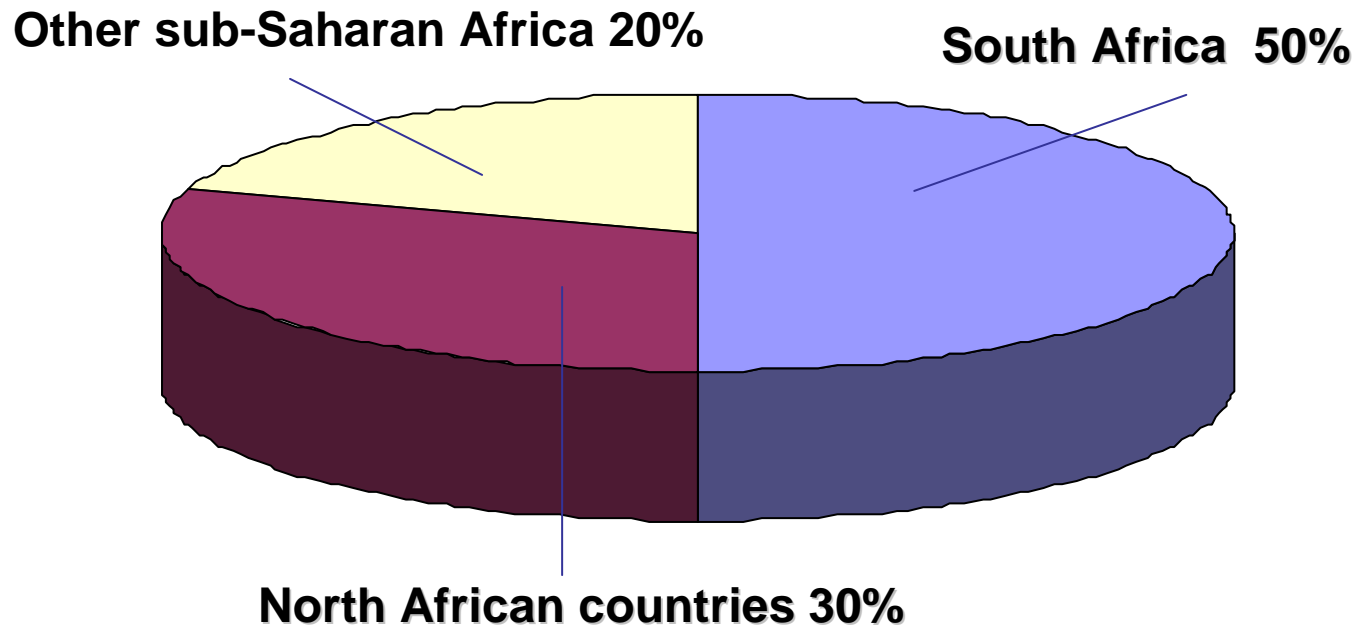
# Widening and Increasing the Use of NG

## Natural Gas Production and Use in Africa





# Where is the electricity in Africa?





# Power Sector Reform

- Incorporating Socio-economic Issues into the Reform Programs
- Disseminating Lessons Learnt on Improving Ongoing Reforms
- Improving Negotiating Capacities with Private Sector, Bilateral, Multilateral and International Financing Institutions
- Defining, Clarifying and Implementing Various Institutions Roles



## **Increasing Regional Cooperation & Trade**

- **Procuring Oil and Gas Collectively**
- **Eliminating 3<sup>rd</sup> Party Financing in Oil and Gas Procurements**
- **Improving Compatibility Between Development of Oil and Gas with Local Needs**
- **Improving and Widening Refining Infrastructure**
- **Adapting and Harmonizing Standards and Policies**
- **Overcoming 'Inconvertible' Currencies Issues and Lack of Trust**





## Elements of the Plan



## General Guiding Principles in Considering Elements of the Plan

- Cost-effectiveness
- Sustainability
- Resource limitations in the continent
- Ownership and self realisation



## Structure of the Plan

- Cross Sector Issues
- Human Resource Development
- Oil and gas development and use
- Power sector development
- Regional co-operation
- Rural transformation



## Cross sectoral (1)

- ***1. Objective:*** Elaborate on an African Energy Agenda
- ***HOW:***
  - Establish an African Energy Minister Forum
  - Develop Analytical Capacity to Integrate Contextual Issues into the Agenda
  - Develop Institutional Capacity to Implement the Agenda



## Cross sectoral (2)

- **2. Objective:** Shorten Duration Between Project/Program Conception and Implementation
- **HOW:**
  - Assist Countries in Undertaking Reliable Analytical Work
  - Assist in Maximising use of Human Resources
  - Assist Countries in Accessing other Financing including Regional Finance (beyond multi-lending)



## Cross Sectoral (3)

- **3. Objective:** Continental Ownership and Control of Projects/Programs
- **Why:** Integrate into Development Goals and Plans
- **HOW:**
  - Develop Strategies to Incorporate Projects/Programs into overall Development Plans
  - Organize Policy Dialogues between Energy Analysts and Government Agencies
  - Assist Countries to Utilise Regional Expertise
  - Organize Policy Forums between Donors and Government Agencies to Discuss Implications and Approaches



# Human Resource Development (1)

- *1. Objective:* Develop Technical and Negotiating Capacity
- *HOW:*
  - Design and Implement Targeted Regional Training Programs in Cooperation with Existing Training Institutions
  - Set up Coordinating Mechanism to Locate Regional Expertise





## Human Resource Development (2)

- *2. Objective:* Mobilize existing Human Resources
- *HOW:*
  - Develop a Roster of Experts
  - Design and Implement Mechanisms that Enable use of this Roster e.g. make it mandatory that every project demonstrates the use of this roster



## OIL and GAS sector (1)

- **1. Objective:** Stimulate Demand by Developing Downstream Infrastructure
- **HOW:**
  - Develop cross country plans depicting economies of scale in this approach
  - Market approach to international lenders and donors
  - Sensitise local banking systems



## OIL and GAS sector (2)

- **2. Objective:** Improve trade accross Africa
- **HOW:**
  - Establish a fund fueled by exporters for development in importing countries (mirrors *San Jose Accord Mexico and Venezuela make 20% of the cost of oil purchased by a country available for development projects*)



## OIL and GAS sector (3)

- *3. Objective:* establish forums for raising awareness of policy makers on pertinent issues
- *HOW:*
  - Cooperate with international and local agencies in funding the forums
  - Integrate such forums into existing meetings
  - Develop the policy background papers for dialogue



# Power Sector (1)

- **1. Objective:** facilitate dissemination of pertinent continental issues to international community
- **HOW:**
  - Implement policy forums between policy makers and donors and financial institutions
  - Expose the limitations to privatisation (*and hence enable shortenting of path towards better reform*)
  - Package lessons into accessible format and present at policy forums
  - Disseminate lessons (beyond continent) on ability to change trend and the extent to which other extrenal factors influence Power Sector Reform



## Power Sector (2)

- *2. Objective:* facilitate improved efficiencies
- *HOW:*
  - Assist formalisation of informal traders through
    - articulating disseminating lessons and opportunities
    - Establishing Legal Framework
  - Conduct studies that disaggregate technical with non-technical losses as a mechanisms to highlight management effectiveness of monopoly gov-owned utilities



# Regional Cooperation (1)

- *1. Objective:* improve trade terms through joint procurement
- *HOW:*
  - Design joint procurement terms and mechanisms across countries
    - Undertake in-depth analysis of implications and feasibility of such procurement
    - Negotiate across Participating countries on implementation
    - Develop system-oriented rather than political relationships across countries
    - Disseminate lessons on joint procurement





## Regional Cooperation (2)

- *2. Objective:* Adapt and Harmonise Standards
- *HOW:*
  - Develop Standards Taking into Account Prevailing Disparities and Realities
  - Identify Barriers to Adoption of Harmonised Standards and Develop Strategies to Assist Countries



# Rural Transformation

- *1. Objective:* Facilitate Integration of Energy within Rural Integrated Development Planning Context and stimulating the productive sector in rural areas
- *HOW:*
  - Develop integrated Resource Plans Aimed at improving the incomes of Rural Areas
  - Facilitate scale-up of mechanisation and expansion of agricultural system
  - Assist in setting an energy system that ensures increased value added in rural products

... Should be enough! Thank you.

The exchanges and contributions of my friends: Youba Sokona, Mathis Wackernagel and Dennis Meadows are highly appreciated as well acknowledged.