INVESTING IN THE GREEN ECONOMY

UNCTAD EXPERT MEETING ON GREEN AND RENEWABLE TECHNOLOGIES AS ENERGY SOLUTIONS FOR RURAL DEVELOPMENT
9-10-11 February 2010

Fatma BEN FADHL
Economic Affairs Officer – Green Economy Initiative
Division of Technology Industry & Economics
Economics & Trade Branch

1. The Global Context
2. Global Green New Deal
3. Making the economic case for transition to a green economy (GEI)
4. Energy in a Green Economy

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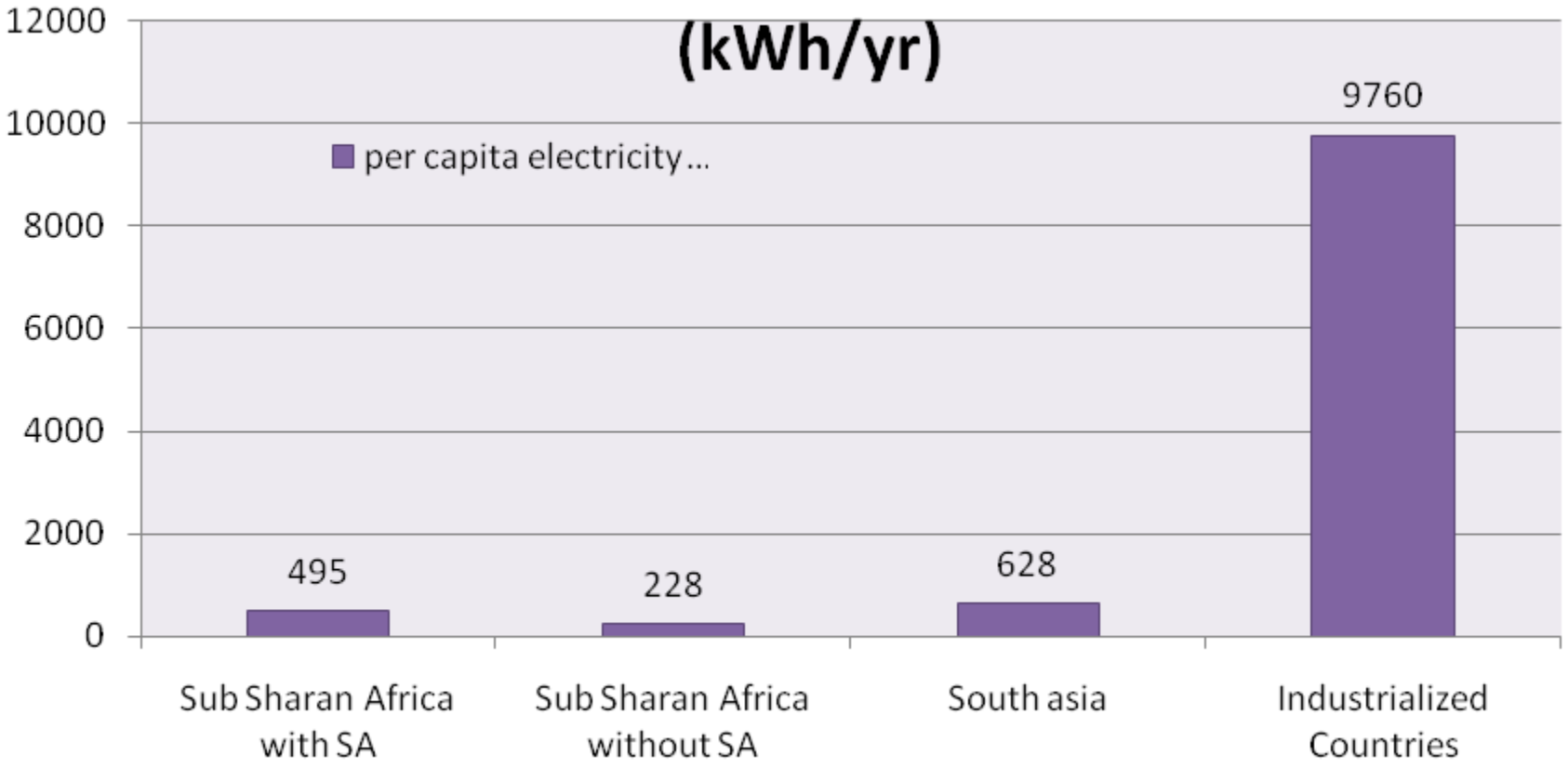
The global context

Multiple crises: More than a financial and economic crisis:

- **Social** - 18 to 51 million unemployed over 2007 levels & the number of extremely poor has increased by at least 100 million people worldwide
- **Fuel** - rising prices cost developing economies USD 400 bn in higher energy bills in 2007
- **Food** - rising prices cost developing countries USD 324 bn in 2007
- **Ecosystems** - EUR 50 bn worth of biodiversity is being lost each year
- **Climate** - current global GHG emissions at 42 Gt per annum - 5 times higher than the earth can absorb

Electricity Consumption Per Capita 2008



Source: UNEP, *Based on data from Karekezi et al 2008*

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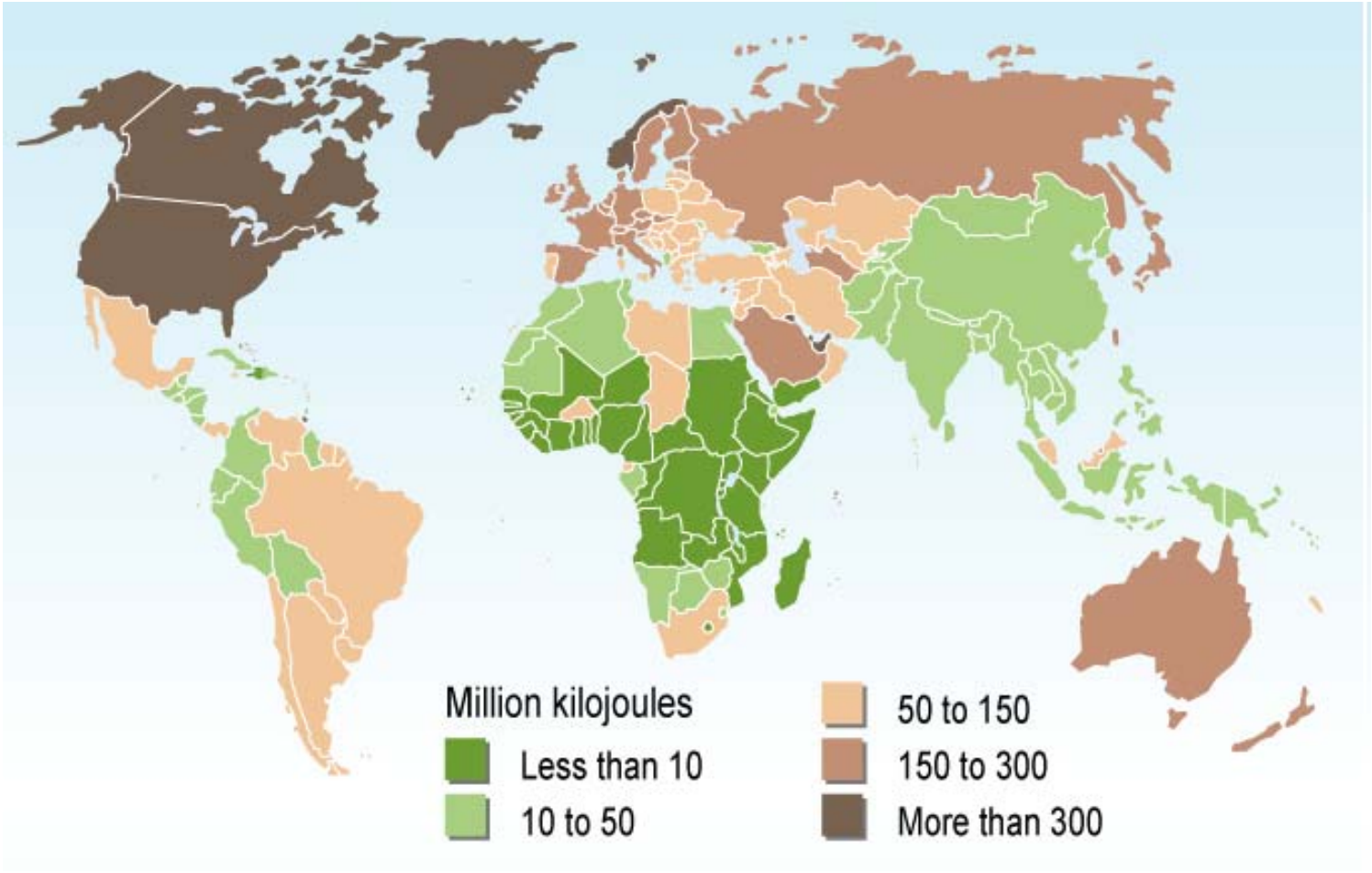
On a business as usual path…

By 2030 and beyond…

- Global energy demand up by 45%
- Oil price up to USD 180 per barrel
- GHG emissions up 45%
- Global average temperature up 6° C in the next century
- Sustained losses equivalent to 5-10% of global GDP
- Poor countries will suffer costs in excess of 10% of their GDP

Per-capita primary energy demand, 2004



Sources: IEA, WEO 2005; US Energy Information Administration, International Energy Annual 2004

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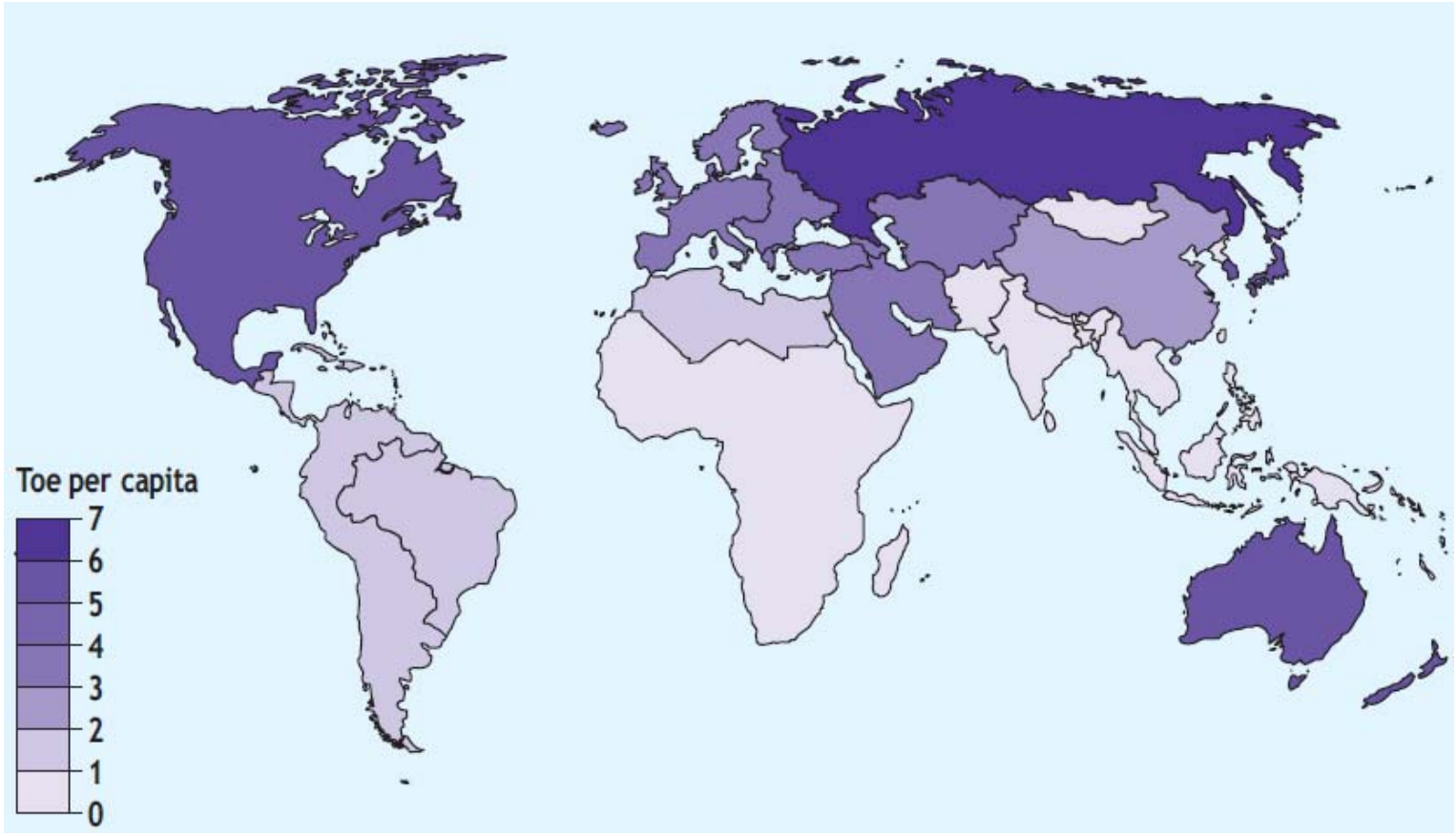
BAU Scenario: Per-capita primary energy demand, 2030



Source: IEA, WEO 2008

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Opportunity Amid Crisis

The Global Green New Deal

- Revive the world economy, create new and decent jobs, and protect the vulnerable
- Reduce carbon dependency, ecosystem degradation, and water scarcity – min 1% of GDP by 2011
- Eliminate persistent poverty by 2015…achieve the MDGs
- Seed a process of transformative change by rebalancing financial and economic capital, human capital and natural capital

From : "Rethinking the Economic Recovery: A Global Green New Deal", UNEP, Feb 2009

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Green Stimulus (as of September 2009)

Country	Stimulus $bn	% of GDP/GNI	Green Stimulus $bn	% of green stimulus	Green stimulus as % of GDP
Australia	26.7	2.49	2.5	9%	0.2
China	586.1	13.88	221.3	38%	5.2
Japan	485.9	10.03	12.4	3%	0.3
Korea, Rep	38.1	4.44	30.7	81%	3.6
France	33.7	1.12	7.1	21%	0.2
Germany	104.8	2.74	13.8	13%	0.4
UK	30.4	1.09	2.1	7%	0.1
US ARRA	787	5.27	94.1	12%	0.6
US EESA	185	1.29	18.2	10%	0.1
Canada	31.8	2.03	2.6	8%	0.2

source: HSBC 2009, UNEP

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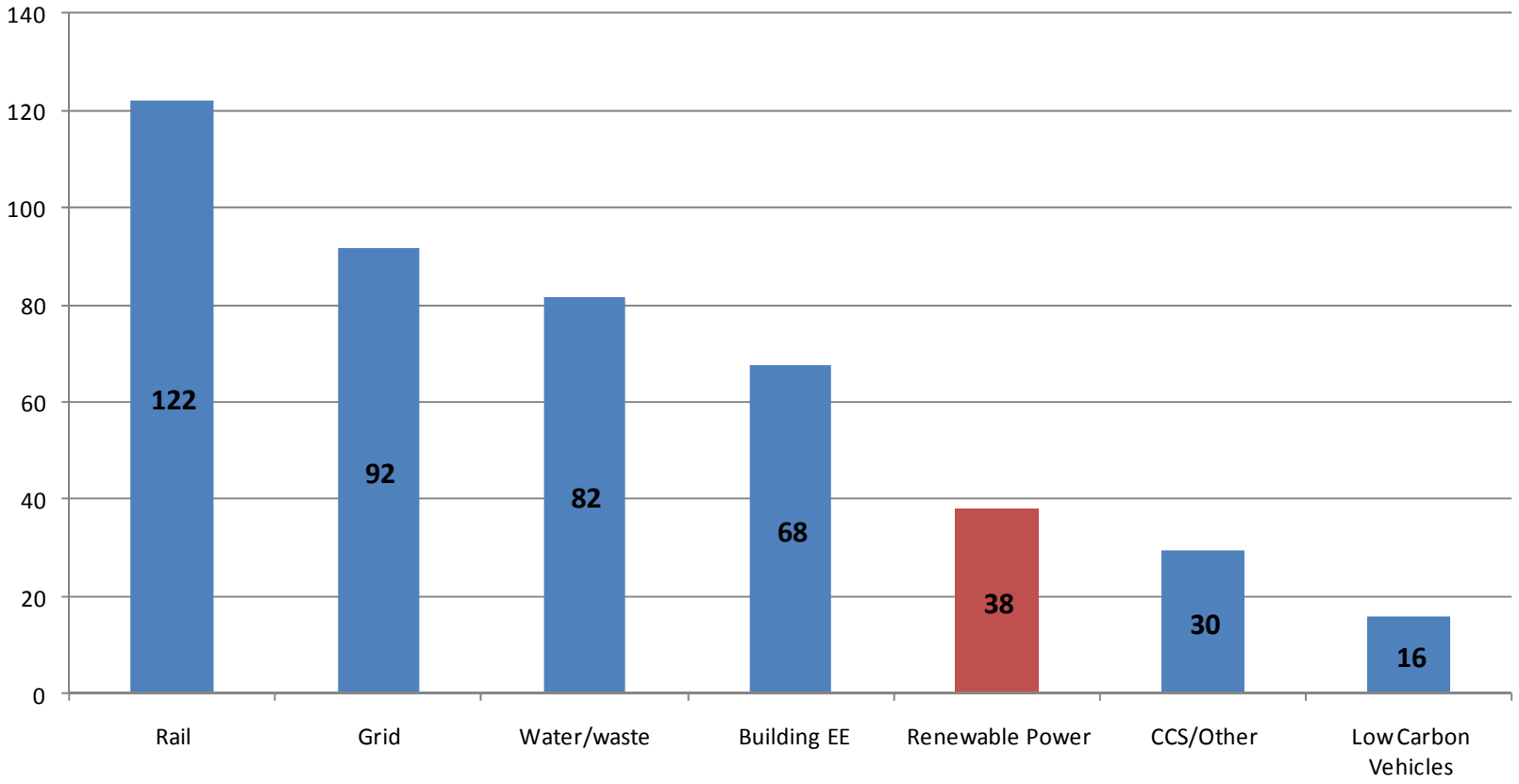
G20 Green Stimulus Spending Per Sector, as of September 2009 (US$ Billion)



Source: HSBC Global Research, UNEP

Global Green New Deal Components

- Invest minimum 1% of Global GDP (USD750bn) in five critical areas by 2011:
  - Energy efficiency in old and new buildings
  - Renewable energy technologies, such as wind, solar, geothermal and biomass technologies
  - Sustainable transport technologies, such as hybrid vehicles, high speed rail and bus rapid transit systems
  - The planet's ecological infrastructure, including freshwaters, forests, soils and coral reefs
  - Sustainable agriculture, including organic production

Global Green New Deal Policy Checklist

Domestic policy initiatives

a) reforming perverse subsidies, taxes, and other incentives;

b) creating proper incentives;

c) rationalising land use and urban policy;

d) adopting Integrated Water Resources Management;

e) improving and enforcing environmental legislation;

f) ensuring monitoring and accountability related to the implementation of the stimulus packages.

International policy architecture

a) multilateral and bilateral trade regimes conducive to the flow of environmental goods and services

b) international aid in support of the national shift towards a green economy

c) the proper functioning of a global carbon market

d) the development of global markets for ecosystem services

e) the development and transfer of environmentally friendly technologies

f) international coordination in implementing green stimulus packages

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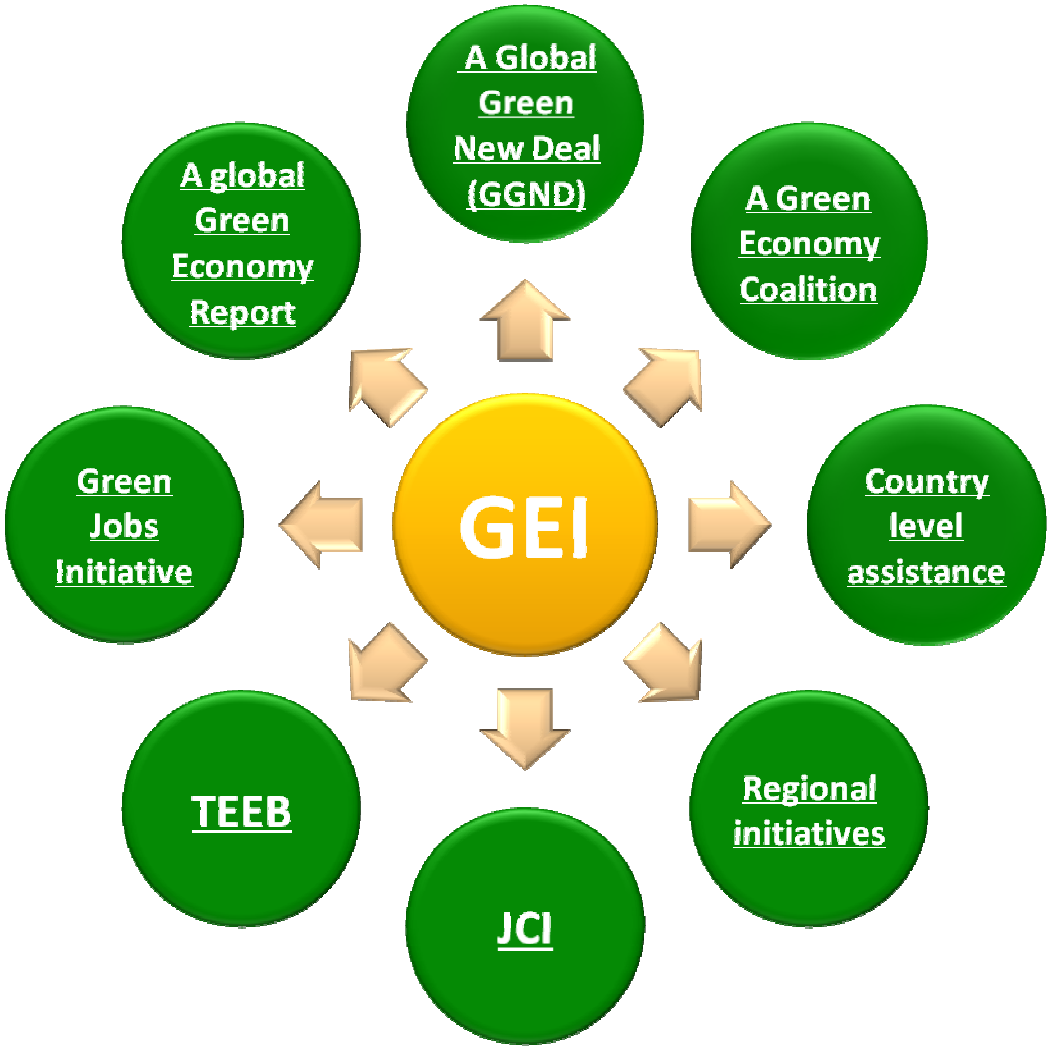
Making the Economic Case for Reform and Transition to a Green Economy

Green Economy Initiative Components



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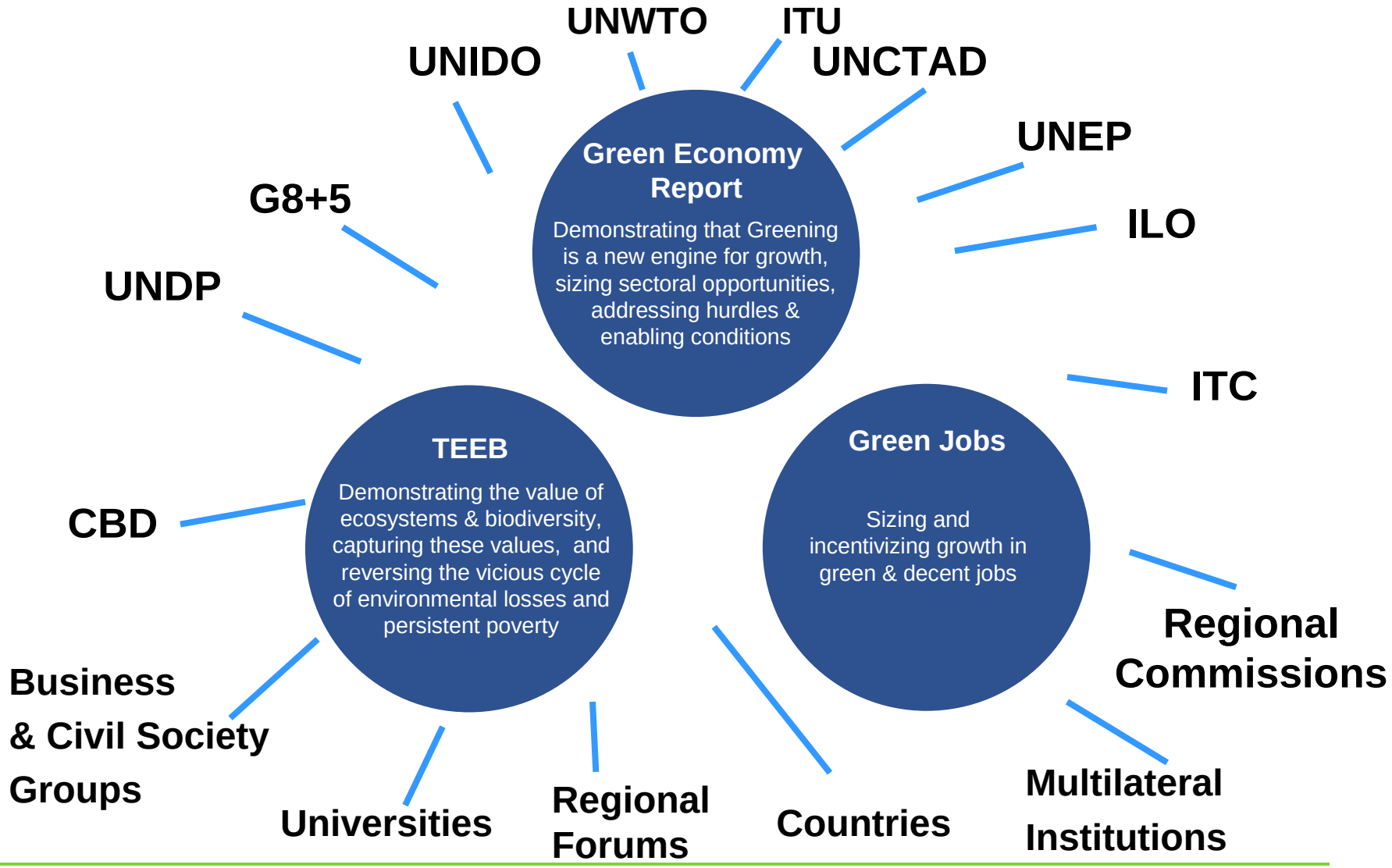
UNEP GEI Services

- Partnerships
- Advisory Services
- Research

A Global Network



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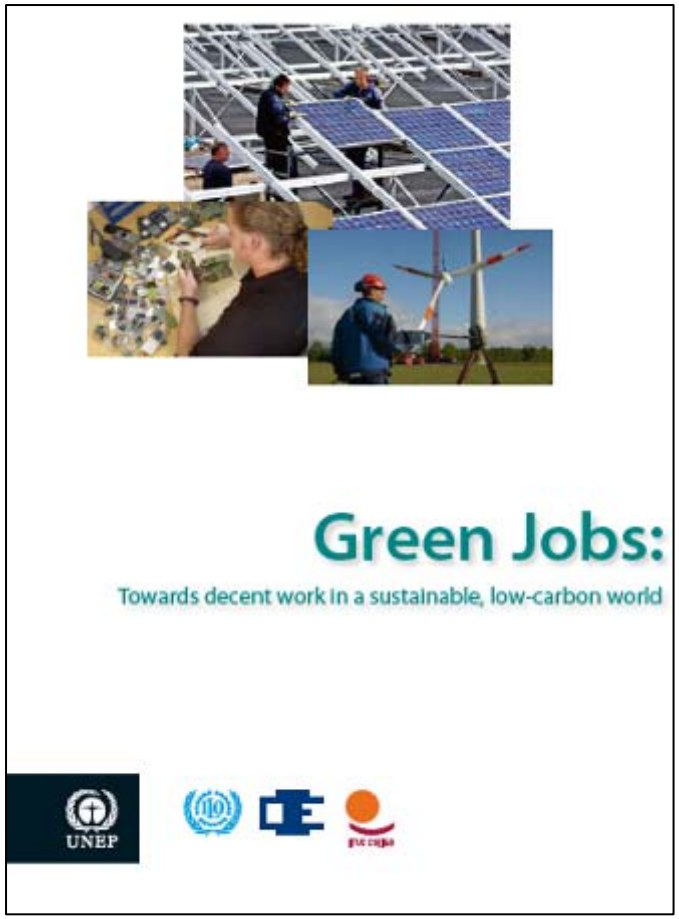
Advisory Services Menu

- Policy advice through:
  - Country and Regional Green Economy Scoping Studies
  - Country and Regional Green Sector Studies
  - Country and Regional Green Economy Reports
  - Country and Regional Green Economy Special Reviews

Green Jobs



- "Where capital flows today, jobs follow tomorrow"
- How does 'greening' impact employment ?
- What are the key sectors at risk ? What are the key sectors of opportunity ? What is the net change?

A Global Green Economy Report

An in-depth analysis and guidance on macroeconomic contribution from green investments in 10 sectors:

- **Cities**
- **Buildings**
- **Tourism**
- **Finance**
- **Industry**
- **Transport**
- **Energy**
- **Waste management**
- **Agriculture**
- **Water**
- **Forests**
- **Fisheries**

Supported by enabling conditions such as innovative financing mechanisms as well as policy reforms:

- **Taxes**
- **IPRs**
- **Subsidies**
- **Standards**
- **Pricing**
- **R&D**
- **Trade**
- **Training**
- **Market access**
- **Education**
- **Green technologies**

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Indicators of Green Economy

Action indicators

- Number of policies and officially approved plans to promote a green economy
- Green private investment as a % of total private investment
- Green government expenditure as a % of total expenditure
- Green stimulus as a % of total stimulus and GDP
- Amount of credit, including through micro credit programmes, available and utilized for green sectors including SMEs, as a percentage of total available and utilized credit.

Indicators of Green Economy

Outcome indicators

- X % contributions to growth in income at national or sector level
- X million jobs (of which X million for the poor)
- X million improvement in annual current account balance (increase in exports and/or savings on imports)
- Reducing CO2 emissions by X%
- Reducing income inequality by X%
- Reducing poverty by X%
- Economic cost of environmental degradation per unit of HDI
- Renewable energy as a percentage of total energy production and consumption
- etc

Green Economy & the Energy Challenge

Energy Challenges

- **Energy access**: 1.6 today with no access to energy (1.4bn by 2020)
- **Energy security**: Need for continuous access to energy at a stable low price
- **Climate change**: About 25% of GHG emissions from the power sector, all energy-related emissions would account for half of GHG emissions
- **Health**: Energy related pollution is responsible for more death than malaria and tuberculosis combined. (1.6 million annual deaths (800,000 being children below the age of 5)
- **Subsidies**: Global energy subsidies range from US$240 to US$310 billion/year or around 0.7% of global GDP, but there is inadequate support for renewable energy development
- **Prices**: Unstable oil prices affecting food prices and government revenue

GER Renewable Energy Team

CHAPTER COORDINATING AUTHORS

- Heleen DeConinck (ECN), Netherlands
- Xander van Tilburg (ECN) , Netherlands
- Raouf Saidi (ECN) , Netherlands

MAIN CONTRIBUTORS

- Peter Zhou (EECG), Botswana
- Suani Coelho (CENBIO), Brazil
- Amit Kumar (TERI), India
- Joyce McLaren (NREL), USA
- Alexandra Mallet (Sussex University), UK

UNEP COORDINATION & REVIEW

Fatma Ben Fadhl (UNEP-DTIE ETB), Energy & ETB Staff

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Chapter's approach

SECTION 1: OPPORTUNITIES AND CHALLENGES FOR RENEWABLE ENERGY

Opportunities

- ✓ Climate change mitigation
- ✓ Energy for poverty alleviation and economic development
- ✓ Security of supply
- ✓ Improving public health
- ✓ Economic co-benefits

Challenges

- ➢ Technology costs and competitiveness
- ➢ Technology transfer and capacity building
- ➢ Financial and technological risk
- ➢ Infrastructure, intermittency and matching demand
- ➢ Sustainability criteria

SECTION 2: RENEWABLE ENERGY TECHNOLOGIES

- ▪ Wind
- ▪ Solar energy
- ▪ Bio-energy
- ▪ Hydropower
- ▪ Geothermal power
- ▪ Innovation in renewable energy

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Chapter's approach (cont'd)

SECTION 3: STATE OF INVESTMENTS

- The economic crisis
- Future investments
- Mobilizing investments

SECTION 4: MACROECONOMIC DRIVERS AND CONSEQUENCES

- Macroeconomic indicators
- Modelling results
- Links with other sectors (Cities and buildings,Transport, Industry, Agriculture)

SECTION 5: ENABLING CONDITIONS, POLICIES AND MEASURES

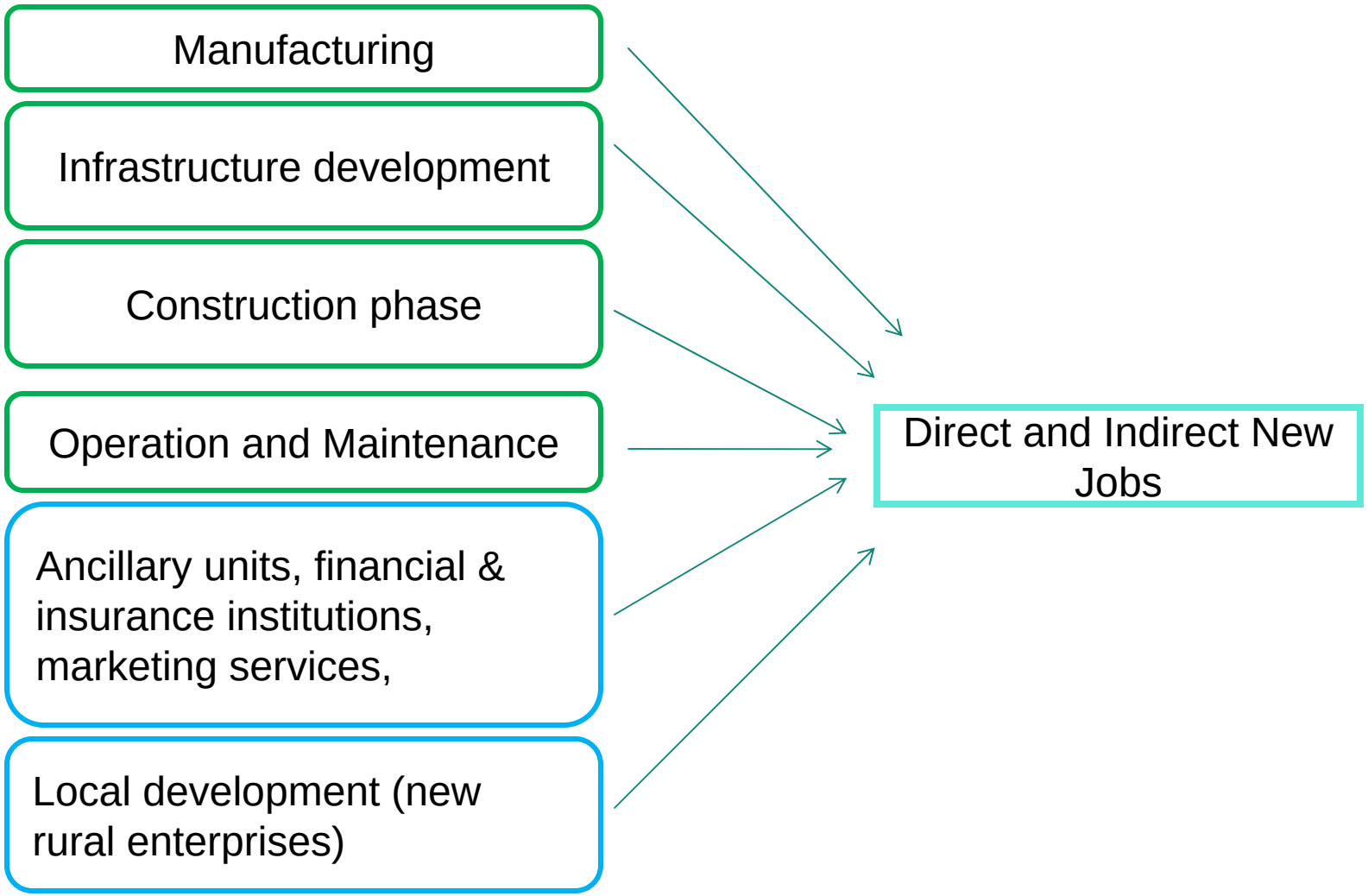
- Renewable energy market conditions
- Technology transfer and capacity building
- Policies and measures
- Getting started (Policy Checklist: "How to Get Started", Lessons Learned, Success Stories)

Indicators used in the Renewable energy chapter of the GER…

- …Are based on detailed statistics of end-use energy consumption and activity, to analyze energy use and efficiency trends
- …Examine impacts of renewable energy policies and investments on economic activity and structure, income, prices, policies, other sectors, etc
- …Will be used to shape priorities for future action and to monitor progress
- …Will be used for estimating CO2 savings, so a key element of environment policy tool

Renewable Energy & Green Economy Opportunities

Renewable Energy Greenjobs creation



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Relative employment generation potential per technology

	Average Employment over Life of Facility (Jobs per megawatt of average capacity)		
	Manufacturing, Construction, Installation	Operations & Maintenance/ Fuel Processing	Total
Solar PV	5.76–6.21	1.20–4.80	6.96–11.01
Wind power	0.43–2.51	0.27	0.70–2.78
Biomass	0.40	0.38–2.44	0.78–2.84
Coal-fired	0.27	0.74	1.01
Natural gas-fired	0.25	0.70	0.95

Source: UNEP/ILO

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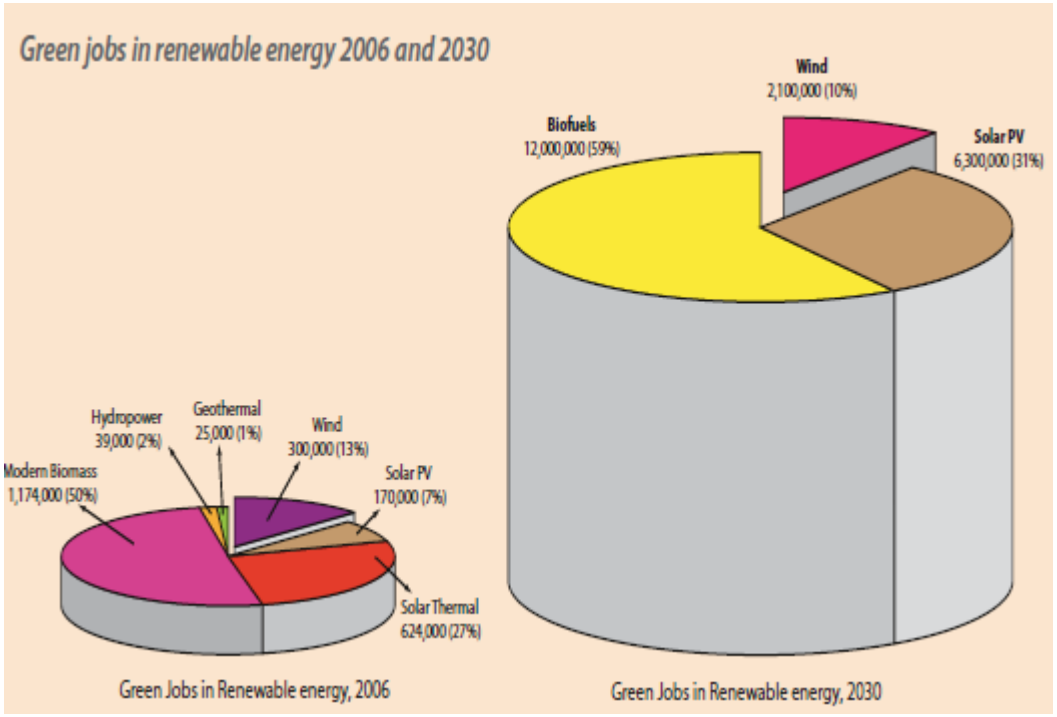
Renewable Energy Greenjobs Trends



Source: UNEP/ILO

- About 2.3 million jobs in renewable energy sector in comparison to 2 m employed in oil & gas refining industry in '99.
- Globally, investing US$630 bn in the renewable energy sector by 2030 would create 20 million additional jobs

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Renewable energy for income generation and social services in rural areas

Income generation:

- Water pumping for irrigation
- Cottage industry like sewing, weaving, handicrafts
- Agro-industry processing
- Crop and meat drying and freezing
- Kiln firing for pottery
- Welding and wood-working

Social services:

- Home, school, and community-centre lighting
- Water pumping for drinking
- Medical equipment in health clinics
- Community street lighting
- Telecommunications and computing centres

Cost competitiveness of RETs

Technologies	Power Generation Costs (US$/MWh)
nuclear/fossil fuels	40-80 (higher for peak load)
Hydro-power	30-140
Wind	70-140
ocean energy	15-200
Solar	130-800

IEA, 2008

Cost competitiveness of RETs (cont'd)

- Additional cost assessment factors:
  - Positive externalities of Renewable Energy and negative externalities of fossil fuels and nuclear
  - The 'learning effects' or potential cost reductions for less mature, emerging renewables

Learning rates of electricity generating technologies in bottom-up energy system models [%]

Technology	One-factor learning	Two-factor learning	
		LDR	LSR
Advanced coal	5-7	6-11	4-5
Natural gas combined cycle	10-15	11-24	1-2
New nuclear	4-7	4	2
Fuel cell	13-19	19	11
Wind power	8-15	12-16	6-7
Solar PV	18-28	19-25	10

Source: Messner (1997), Seebregts et al. (1999), Kypreos and Bahn (2003a), and Barreto and Klaassen (2004).

Accelerating the growth of RE: Policies at stake

- Feed-in tariffs for renewables
- Market share mandates
- Biofuel mandates
- Performance standards (or intensity standards)
- Regional land-use and water-use planning
- Electric transmission regulation, planning and infrastructure
- Urban land-use zoning and infrastructure planning
- Zero- and low-emission vehicle standards
- Zero- and low-emission building standards
- Net metering, smart grids and other policies
- Information programs, education and other forms of capacity development

Energy & Green Economy Opportunities

- Early action ⟶ lower societal costs and immediate co-benefits
- Government policy needs to target different challenges simultaneously
  - long licensing procedures
  - lack of structural incentives
  - institutional and human capabilities
  - infrastructure
  - availability of reliable information on potential, costs and risks.

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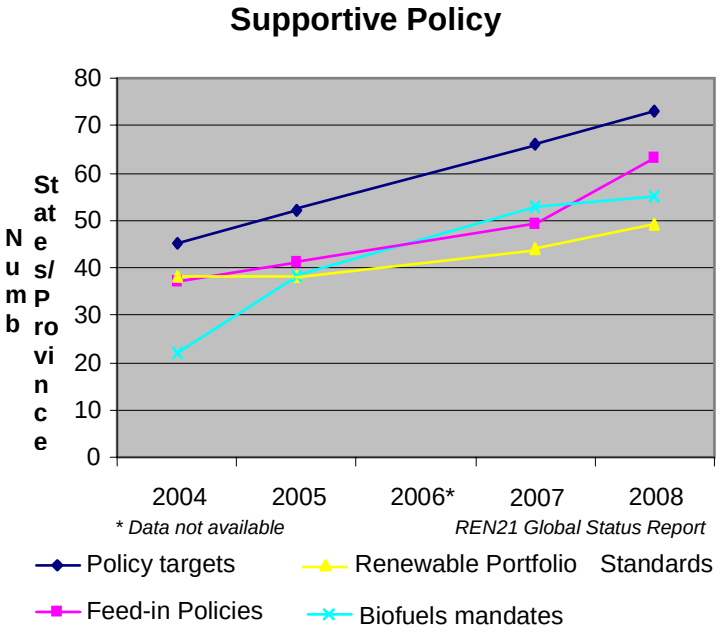
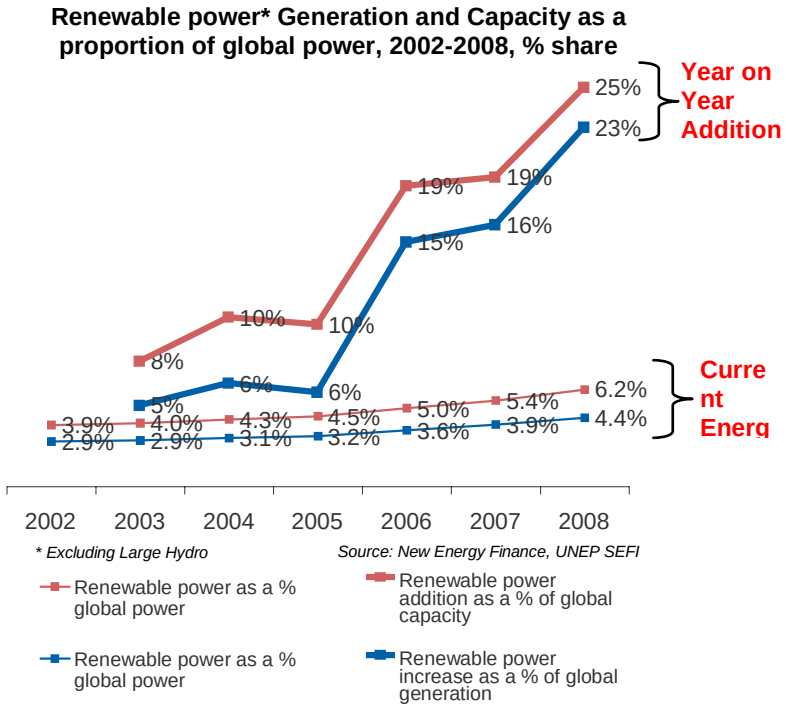
Why has all this investment shifted to non-fossil energy?





2008 Milestone: **for the first time renewables attracted more power sector investment than fossil-fueled technologies**

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Green Economy Report Timeframe

- September 2009- April 2010: Drafting and Peer review
- July- August 2010: Publication

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GEI key messages

- Place green investment at the core of the stimulus packages
- Include green investment in regular government budget
- Create public-private green investment funding mechanisms
- Provide domestic enabling conditions (fiscal/pricing policy, standards, education & training)
- Provide global enable conditions (trade, IPRs, ODA, technology transfer, environmental agreements)

What can you do?

- If you are a government official, please share your thoughts on how the GEI can help your country in both development and environmental terms. You are also encouraged to adopt green procurement policies to encourage the growth of green sectors.

- If you are from the business sector, please let us know your interest in contributing toward green economies wherever you operate and share with us your experience in practicing green investments and green businesses

- If you are a researcher, please contribute your analytical inputs, including data and information, to enable us to better capture the economic, social, and environmental contributions from investing in green economies and from implementing the enabling policy reforms.

- If you are an NGO and civil society representative, please communicate the GEI to your constituencies, get feedbacks, and help us ensure that the GEI adequately captures the particular concerns of your constituencies.

- If you are from the media, please help publicise the GEI and encourage debates on the various streams of the GEI.

- If you are an educator or student, please: a) promote and take green economy related courses and training in your education institutions; b) please advocate green economic practices in your campuses, such as promoting energy efficient dormitories, laboratories, and classrooms; and c) influence those around you to prepare them mentally for a shift towards a green economy.

- If you are a shareholder, you are encouraged to demand environmental information disclosure from the companies you invest in and adjust your portfolio towards green assets that are likely to provide a steady stream of income.

- As a citizen or consumer, you are encouraged to adopt green consumption behaviours and life styles. This may include: a) demand environmental as well as health labels for consumer products; b) give preference to products and services provides in an environmentally friendly manner; and c) minimise and recycle waste.

More Information

UNEP Green Economy Website

http://www.unep.org/greeneconomy/

More on learning curves

$SC_t = a * CC_t^{-b} * KS_t^{-c}$

Where:

SC_t: Specific cost in period t

CC_t: Cumulative capacity in period t

KS_t: Knowledge stock in period t

a: Initial specific cost at unit cumulative capacity

b: Learning-by-doing index

c: Learning-by-searching index

Instead of the learning-by-doing and learning-by-searching indexes, corresponding rates of learning-by-doing (LDR) and learning-by-searching (LSR) can be defined as follows:

$LDR = 1–2^{-b}$

$LSR = 1–2^{-c}$