

WCC-3

W2: Climate and Sustainable Energy
Geneva, 1 September 2009

Climate, Energy and Sustainable Development:

*Needs for Climate Information and
Projections*

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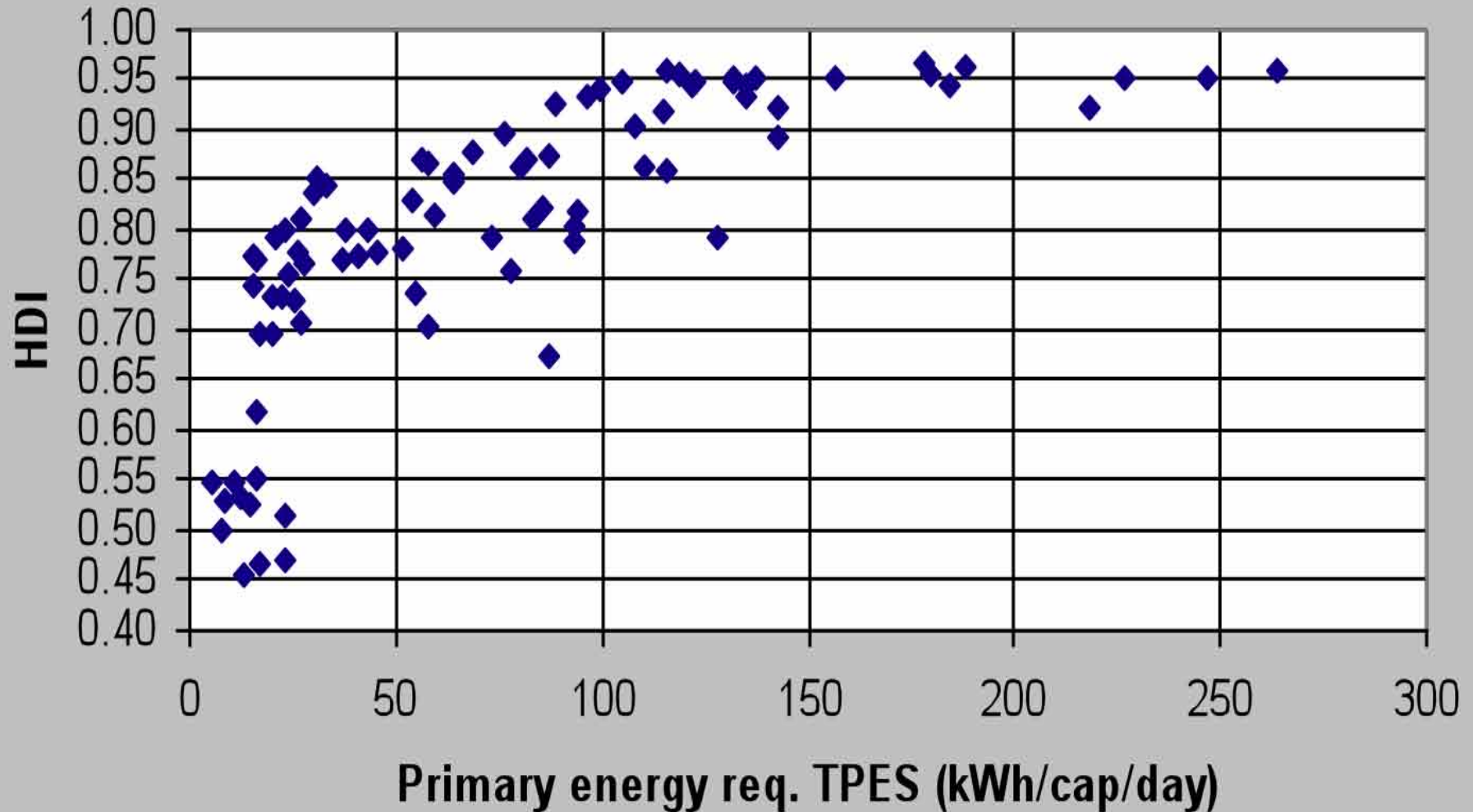
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Energy Sector and Climate Information Needs

- Energy is essential to ensure development
- A major transformation of the energy sector is expected
- Climate services are necessary to support an effective energy transformation and to secure a sustainable energy future

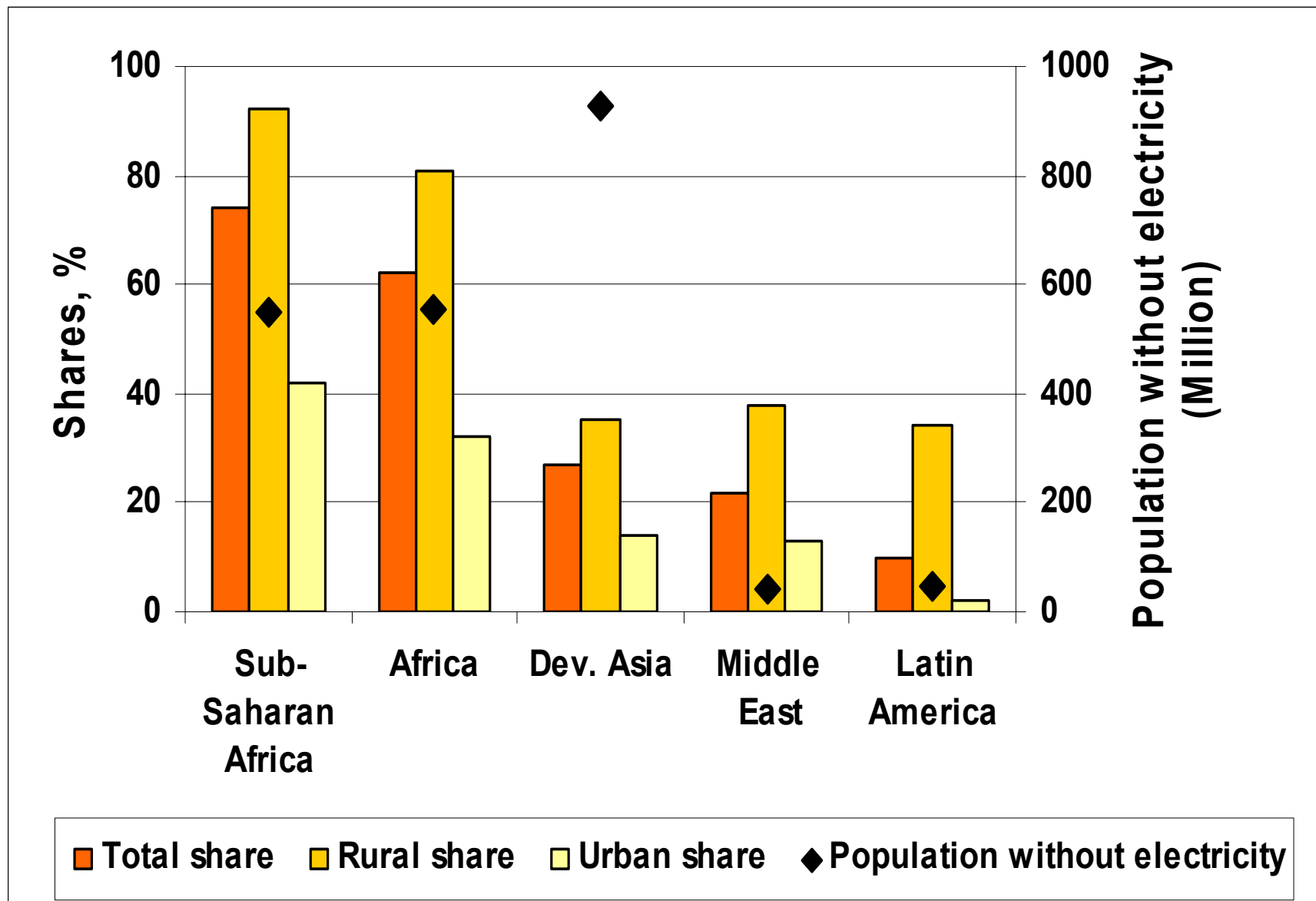
Energy Use and Development



Why a transformation of the energy sector?

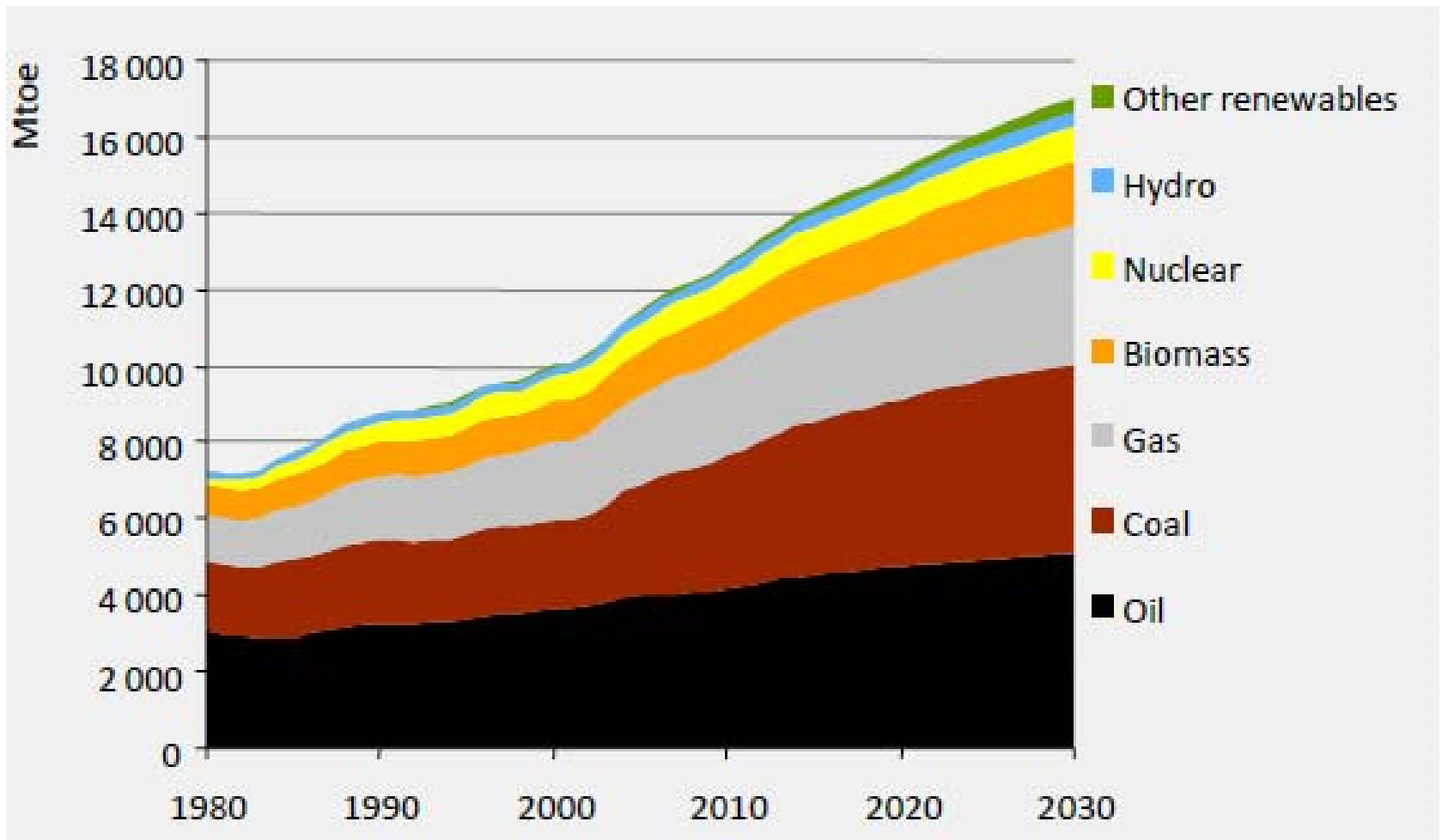
- Increasing ***energy access***
- Increasing **energy consumption**
- Shifting to **low-carbon** and environmentally sound technologies
- **Final objective:** Energy for sustainable development, energy security, adaptation and mitigation

Share of Population without Electricity



Source: IEA, World Energy Outlook 2006.

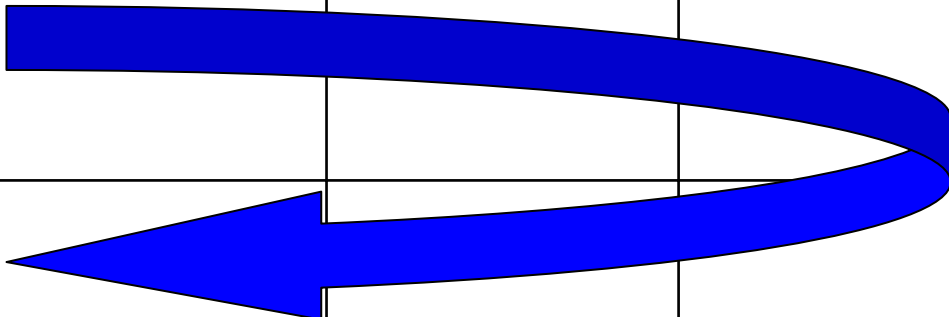
World Primary Energy Demand (IEA Reference Scenario)



Source: IEA, WEO 2008.

Traditional Path (BAU)

	Poor	Middle	Rich
2009	Biomass	Mix	Modern
2050	Renewables	Renewables	Renewables

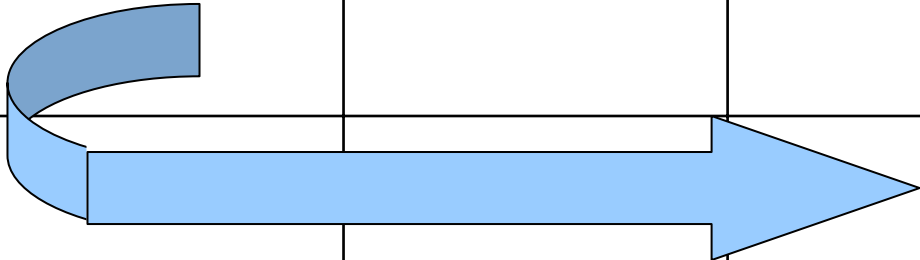


BAU

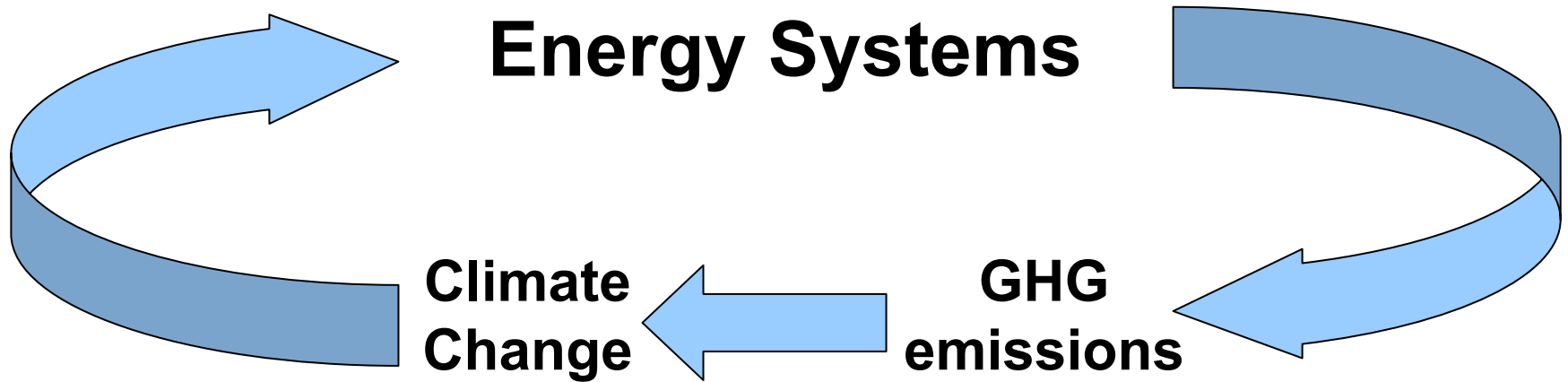
A New Path - opportunity to leap frog

***NEW
PATH***

	Poor	Middle	Rich
2009	Biomass	Mix	Modern
2050	Renewables	Renewables	Renewables



Energy Sector and Climate Change



- **Energy sector major source of global GHG emissions:**
 - 85% of CO₂ emissions are energy related
 - 68% of overall GHG emissions are energy related
 - 26% of GHG emissions are from energy supply sector
- **Climate changes may impact energy systems**

Energy Sector and Climate Change

- Long lifespan of energy infrastructures within the timeframe of potential impacts from Climate Change
- Many existing infrastructures may be affected
- New infrastructures may need to be redesigned
- New investments in energy infrastructures need to consider potential climate change impacts

Existing and future energy infrastructures and demand

Supply Side

- **Extraction & production:** Mines, offshore & onshore oil and gas facilities, energy feed stocks
- **Transformation & generation:** refineries, power plants (coal, hydro, solar, wind, nuclear), ethanol plants
- **Transmission & distribution:** Grids (electric, gas, district heating)
- **Fuel Storage** facilities

Demand Side

- Changes in services: water heating, refrigeration, space cooling, space heating, cooling water, etc.

Vulnerability of Energy Systems

- Many oil and gas facilities are located in areas vulnerable to climate change. Their operation and physical structures may be affected.
- Both glacier- and precipitation-dependent hydropower plants in many locations are expected to be affected. Glaciers are retreating. Hydrological cycles and precipitation patterns are more variable.
- Onshore Arctic energy infrastructures likely to be affected by the melting of the Permafrost. Pipelines, electric transmission lines, railroads may be at risk.

Vulnerability of Energy Systems

- Many power plants (in particular nuclear reactors) use large quantities of cooling water. Plants are in areas susceptible to climate changes such as sea level rise, extreme weather and storm surges. Also, they are located near rivers, lakes or reservoirs that contain increasingly valuable and variable fresh water supplies.
- Concern about water availability may affect specific energy projects such as: coal-to-liquid, oil sands, nuclear expansion projects, etc.
- Risks will translate into higher insurance costs

What are the gaps?

- Historical meteorological data are insufficient in many developing countries
- Climate models with higher resolution are needed to assess impacts in developing countries.
- Climate change impact assessments of current and future energy infrastructures are necessary
- Climate Information is critical for designing new or retrofitting existing energy infrastructures
- Climate change projections and information at national level are necessary to support substantial future energy investment

*What are the specific needs of the Energy Sector in **developing countries**?*

- Global projections from emission scenarios need to be translated into **regional climate projections** using **modeling tools or down scaling techniques**
- **Climate impact assessment methodologies** are needed to develop national projections and to identify specific climate impacts on energy infrastructures
- **Climate change impacts** need to be **integrated** into national energy assessments and long-term planning
- Alternative **long-term energy demand and optimal supply scenarios** need to be developed that reflect potential climate change impacts

Information Gaps in Integrated Energy System

Climate Services

GHG scenarios

Global
Circulation
Models

Global Climate
Variables

Down
scaling
techniques

Regional Climate
Variables

Climate Impact
Assessment
Methodologies

National Climate
Variables

Feedback

Joint Effort
Climate &
Energy Experts

**Climate
Change
Impacts on
Energy
Infrastructures**

Climate
Energy
Integrated
Assessments

**Energy
System**

Energy
Demand

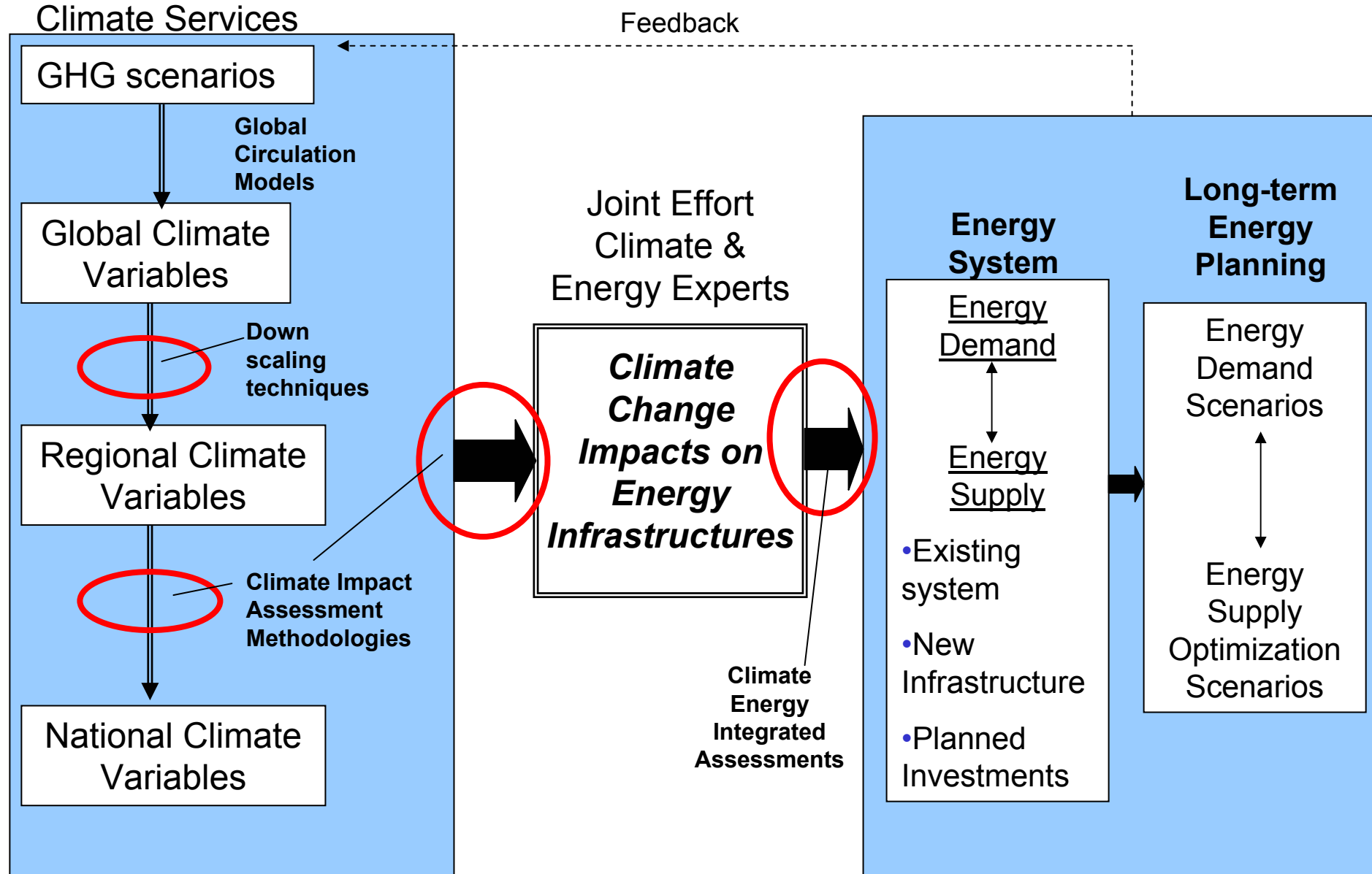
Energy
Supply

- Existing system
- New Infrastructure
- Planned Investments

**Long-term
Energy
Planning**

Energy
Demand
Scenarios

Energy
Supply
Optimization
Scenarios



What are the services that are needed?

- **Observation and Monitoring:** Improvement of national meteorological information, databases and capacities to reduce uncertainty of sectoral impact modeling.
- **Research and modeling:** Development of down scaling techniques and climate impact assessment methodologies to define climate change scenarios
- **Climate Services Information System:** National and regional meteorological institutions, mechanisms and infrastructures.
- **Climate Services Application Programme:** Linking climate change impact scenarios with integrated long-term energy assessment and planning. Partnerships, capacity building, integrated climate-energy modeling tools, etc.

Future collaboration between climate and energy organizations

- Major cooperation to increase historical meteorological data in developing countries
- Partnerships for cross-disciplinary research among climate organizations, energy companies and energy planning institutions
- Capacity building and technical cooperation to assess climate impacts in energy systems
- Development of alternative energy scenarios that may allow synergies in relation to mitigation, adaptation, optimal energy supply options and sustainable development

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Thank you!

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