Addressing Climate Change
With Development

Tariq Banuri
Background

Development is a positive sum game. When developmental gains are equitable, it leads to social stability, prosperity, and resilience.

Climate change is largely being viewed as a zero sum game. This has created obstacles for cooperation and effective action.

A development-based approach to climate change focuses on full employment and energy security in North and catch-up growth and energy access in South.

It would prioritize investment, policy guidance, strategic direction, and transparency.
The Challenge

How to transform climate change from a zero sum game to a positive sum game?

A development-based approach to climate change can enable developing countries to leapfrog; it can stimulate private sector activity; it can target global support into areas of common concern and effective action.
Key messages

Immediate Need: reduce emissions in rich countries, and slow (+ eventually reduce) in developing countries without compromising development momentum

Investment-led approach for both goals
Investments must be front-loaded, given danger of lock-in and importance of scale + learning economies for technology leapfrogging

Strategic public investment to crowd-in private investment through integrated policies

Focus of significant transfers (finance + technology) on the big push
DEVELOPMENT
Figure 3.10 Inequality between countries became much more important over the long run.

Mean log deviation

Source: Authors’ manipulation of data from Bourguignon and Morrisson (2002).
Stylized Facts: Development

• Indicators: GNP, Energy, Taxation. But it is a Phase Change over a generation even if measured in annual increments.

• Examples:

• Challenges:
  – Social inequity, jobless growth, rural poverty
  – Environmental degradation, pollution, climate
  – Agricultural (even if not driver), food security
Stylized Facts: Growth

• Drivers:
  – **Industry**: productivity, growth potential, linkages
  – **Energy**: Contribution to growth, HD, SD
  – **Trade**: scale economy, incentives, transparency
  – **Technology**: Especially ICTs, Renewable Energy

• Patterns
  – Ride the global wave(s), rather than go-it-alone
  – Contagion
  – Role of the developmental state
  – Structural Adjustment and the Lost Decade
A Race Between Growth and Catastrophe

• No country can live without growth (Rich and Poor)
  – Welfare: Full employment, social services
  – Development: end to permanent global inequality
  – Peace, security, democracy, and human rights

• The world cannot live long with current growth pattern

• contemporary history has become a race between growth and catastrophe

• But responses seem like a dialogue of the deaf
Three Development Strategies

Developing

• Win the Race!
  – Accelerate development and/or poverty efforts: food, water, health, etc

• Bend the Curve!
  – Internalize Externalities: taxes, subsidies, prices and valuation

• Build a New Path
  – Technology (green energy revolution, ICTs)
  – Infrastructure

Developed

• Think Beyond Growth!
  – Convince all countries to slow down growth

• Transfer Technology and Finance.
  – Continue the aid model.

• Build a Cooperative Program.
  – ?
CLIMATE
The CO$_2$ Budget Approach

Emission pathways for at least 67% probability of staying under 2 °C warming. The total “emissions budget” for 2010-50 is 750 Gt.
Result: Tension Between Countries

Trade-offs in reductions for Annex I and Non-Annex I emissions for different stabilization levels

Result: Neglect of Smaller Countries

Largest Emitters: *Developed & Developing*

Source: WRI, Baumert et al, 2005
What’s Wrong With this Approach?

• By turning climate policy into a zero sum game, it restricts room for action and makes cooperation difficult if not impossible.

• Q: How to transform it from zero to positive sum game

• Answer: Development-based approach.
What if the Chart was on Energy?

Instead of fighting over a fixed space, we’d ask how to expand the space!

Global emissions [Gt CO₂]

Year

2005 2010 2015 2020 2025 2030 2035 2040 2045 2050

Maximum reduction rate

- Green: 3.7% per year
- Blue: 5.3% per year
- Red: 9.0% per year
ENERGY
Energy is the Key

- Growth, Basic Needs, Human Development
- Recycling, reduction, reuse
- Even universal acceptance of democracy, human rights, and equity
- But also inequity between countries, and GHGs (over 75% from energy and rising)
- Development needs mean 3-4 times more energy, affordable energy.
- Sustainability means clean energy
Energy Revolution – Pattern
<table>
<thead>
<tr>
<th></th>
<th>1800</th>
<th>2000</th>
<th>Δf</th>
<th>2050</th>
<th>Δf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (billion)</td>
<td>1</td>
<td>6</td>
<td>x6</td>
<td>10</td>
<td>x1.6</td>
</tr>
<tr>
<td>GDP (trillion 1990 $)</td>
<td>0.3</td>
<td>30</td>
<td>x100</td>
<td>85-110</td>
<td>&lt;x3-x4</td>
</tr>
<tr>
<td>Primary energy (EJ)</td>
<td>13</td>
<td>420</td>
<td>x30</td>
<td>600-1,040</td>
<td>x1.5-x2.5</td>
</tr>
<tr>
<td>CO₂ emissions (GtC)</td>
<td>0.3</td>
<td>6.4</td>
<td>x20</td>
<td>5-15</td>
<td>&lt;x1-x3</td>
</tr>
<tr>
<td>Mobility (km/person/day)</td>
<td>0.04</td>
<td>40</td>
<td>x1,000</td>
<td>120-160</td>
<td>x3-x4</td>
</tr>
</tbody>
</table>

World Energy Council, 2004
Energy Revolution – Emissions

The graph shows the change in CO₂ flux (Pg C y⁻¹) over time (y) from 1850 to 2000. The emissions sources include fossil fuel emissions and deforestation, with sinks such as the ocean, land, and atmospheric CO₂. The graph indicates a significant increase in CO₂ emissions from 1950 onwards, with a peak in 2000-2007.
The graph shows the relationship between TPES (kWh/cap/day) and HDI levels, categorizing countries into Low, Middle, and High HDI groups. The data points are scattered across the graph, with a clear trend indicating a higher TPES (kWh/cap/day) for regions with higher HDI levels. The black line represents a trendline that highlights the general pattern observed in the data.
## Energy Consumption (kWh/cap/day)

<table>
<thead>
<tr>
<th>Country</th>
<th>Final</th>
<th>Excluding industry</th>
<th>TPES</th>
<th>Electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>167.07</td>
<td>137.26</td>
<td>246.62</td>
<td>39.01</td>
</tr>
<tr>
<td>Germany</td>
<td>98.09</td>
<td>76.05</td>
<td>134.84</td>
<td>20.39</td>
</tr>
<tr>
<td>Korea</td>
<td>95.71</td>
<td>68.96</td>
<td>142.83</td>
<td>21.12</td>
</tr>
<tr>
<td>China</td>
<td>29.19</td>
<td>16.41</td>
<td>45.63</td>
<td>4.61</td>
</tr>
<tr>
<td>India</td>
<td>10.87</td>
<td>7.74</td>
<td>16.25</td>
<td>1.61</td>
</tr>
<tr>
<td>Brazil</td>
<td>30.39</td>
<td>18.27</td>
<td>37.73</td>
<td>6.41</td>
</tr>
<tr>
<td>Nigeria</td>
<td>20.85</td>
<td>18.59</td>
<td>23.13</td>
<td>0.43</td>
</tr>
</tbody>
</table>
Share of Population without Electricity
Reconciling two Strategies

- *Adjustment*: A key plank of global climate strategy is to raise conventional energy costs (by raising carbon costs (carbon tax or cap and trade)).

- *Investment*: Developing countries have tried to address energy poverty and HD by lowering the costs of energy for low income groups, through investment (including technological learning), but with subsidies in short run
A Question of Costs

- OECD: 10-20 cents per kWh, higher for final consumers than for industry and commerce.
- Old energy is cheap, new energy is costly, renewables costliest ($0.10-0.50/kWh+++)
- At 20 cents, countries with $2 per cap per day would afford 5 to 15 kWh/day.
- Developing countries need energy at 3-5 c, which means about $1/Watt in investment costs. CAN THIS BE ACHIEVED?
## Energy (kcd), GDP ($), Prices (c/kWh)

<table>
<thead>
<tr>
<th>Region</th>
<th>TPES</th>
<th>Elec Tot (HH)</th>
<th>Prices</th>
<th>PCGDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>55</td>
<td>6.8 (1.8)</td>
<td>3-30</td>
<td>8,579</td>
</tr>
<tr>
<td>OECD</td>
<td>174</td>
<td>25.6 (6.6)</td>
<td>10-20</td>
<td>39,345</td>
</tr>
<tr>
<td>China</td>
<td>45</td>
<td>5.3 (0.7)</td>
<td>..</td>
<td>2770</td>
</tr>
<tr>
<td>India</td>
<td>16</td>
<td>1.3 (0.3)</td>
<td>4</td>
<td>1010</td>
</tr>
<tr>
<td>Africa</td>
<td>16</td>
<td>1.6 (0.4)</td>
<td>5+</td>
<td>1082</td>
</tr>
<tr>
<td>Brazil</td>
<td>38</td>
<td>6.4 (1.2)</td>
<td>9.3</td>
<td>7350</td>
</tr>
<tr>
<td>Korea</td>
<td>143</td>
<td>21.1 (3.0)</td>
<td>9.8</td>
<td>21530</td>
</tr>
<tr>
<td>Russia</td>
<td>145</td>
<td>15.9 (1.9)</td>
<td>..</td>
<td>9620</td>
</tr>
</tbody>
</table>
## Affordability

<table>
<thead>
<tr>
<th>Income $/cap/day</th>
<th>Energy Budget 10%</th>
<th>Affordability kWh/day at prices (cents/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>India ($2)</td>
<td>$0.20</td>
<td>3</td>
</tr>
<tr>
<td>Egypt ($5)</td>
<td>$0.50</td>
<td>8</td>
</tr>
<tr>
<td>China ($7)</td>
<td>$0.70</td>
<td>12</td>
</tr>
<tr>
<td>Peru ($10)</td>
<td>$1.00</td>
<td>17</td>
</tr>
<tr>
<td>Croatia ($30)</td>
<td>$3.00</td>
<td>50</td>
</tr>
<tr>
<td>OECD ($100+)</td>
<td>$10.00</td>
<td>166</td>
</tr>
</tbody>
</table>
How Developing Countries Cope?

- *Exclusion*: Many people have no access to modern energy.
- *Environmental stress*: Reliance on inefficient but cheap biomass.
- *Regressivity*: Energy expenditure share falls with income (2-30%, median 10%).
- *Targeted Subsidies*: block tariffs, low diesel and kerosene prices, low quality public transport.
Energy subsidies in the 20 largest non-OECD countries hit $310 billion in 2007 – creating, in many cases, an unsustainable economic burden & exacerbating environmental effects.
Costs can be Lowered

<table>
<thead>
<tr>
<th>Source of Energy</th>
<th>2006-10</th>
<th>2011-20</th>
<th>2021-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Geothermal</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Large Hydro</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Small Hydro</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Solar PV</td>
<td>17.5%</td>
<td>15%</td>
<td>10%</td>
</tr>
<tr>
<td>Solar thermal</td>
<td>13%</td>
<td>10%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Tidal /Wave</td>
<td>15%</td>
<td>12.5%</td>
<td>10%</td>
</tr>
<tr>
<td>Wind onshore</td>
<td>0%</td>
<td>6.5%</td>
<td>5%</td>
</tr>
<tr>
<td>Wind offshore</td>
<td>0%</td>
<td>20%*</td>
<td>15%*</td>
</tr>
</tbody>
</table>
Is there a Better Strategy

• Many countries are seeking to become leaders of the new economy. For example, look at China
• China investment in power sector about $70-80 bn/year. 80% of electricity is from coal.
• Double capacity by 2020 (additional 860 GW)
• In 2008, 22% fall in coal power investment (vs rise in hydro, nuclear, and wind), closing down of old plants, and increased efficiency.
• Chinese costs already lower than elsewhere (including “clean coal”, which is competitive).
• Faster action requires external subsidies.
But it Needs a Global Partnership

• **Global Feed-in-Tariffs**: Identify technologies, consumers, and subsidies. A fund of $100 bn annually 2010-20. Channeled through energy systems on the basis of output delivered.

• **Global Climate Corps**: Patterned on the Civilian Conservation Corps during the New Deal and the Peace Corps from the 1960s, a cadre of professionals to support energy efficiency and renewable energy initiatives.

• **National Support**: Patterned on the Green Revolution, support for institutions of research, extension, credit, and inputs provision in the energy sector.
Alternative: Make Climate History

• Use Public Sector Investment as Driver: Enable developing countries to leapfrog—not “pollute first clean up later”.
• Set a Target: $1/W Renewable Energy
  – How to lower costs
  – How to make renewable energy affordable
• Global partnership on RE
Sources of finance

Urgent need to scale up existing + innovative sources of financing:

– Official development assistance
– Carbon credits (but need higher emissions commitments)
– International taxes or levies
– Reallocation of existing spending
– Global feed-in tariffs support
Thank you

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