The role of indicators for effective policy implementation

Karsten Neuhoff, Tim Laing, Sarah Lester, Adam Rysanek
Outline

• Experience with metrics
  – Literature
  – Structuring metrics
• Experience with metrics – survey
• Currently reporting UNFCCC and beyond
• Trade-offs involved in design of metrics
# Experience with metrics: literature base

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Sectors and Level of metrics</th>
<th>Objective/Motivation</th>
<th>Literature base</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Development and environmental metrics</td>
<td>National/ all sectors/ OECD</td>
<td>• Monitor and compare coupling of economic activity and environmental pressures. Inform and guide policy</td>
<td>• Sustainable development policy&lt;br&gt;• Environmental evaluation and monitoring. Infrastructure and land-use planning</td>
</tr>
<tr>
<td>Indicators for Overseas Development Aid</td>
<td>International development plans /National indicators/ all sectors.</td>
<td>• Inform and guide international dialogue, provide transparency and accountability, policy learning</td>
<td>• International development literature&lt;br&gt;• Development institution measurement (World Bank, IMF and IEA literature).&lt;br&gt;• Globalisation, trade and aid literature</td>
</tr>
<tr>
<td>UK government Performance Indicators (PSA framework)</td>
<td>From local level and national targeted priorities for UK public sector governance.</td>
<td>• Measure progress of policy, incentivise local government action and policy reform</td>
<td>• Results-Based Management (RBM), Performance Management Framework&lt;br&gt;• Public administration, performance budgeting and indicator systems</td>
</tr>
<tr>
<td>Key Performance Metrics (KPI)</td>
<td>Firm level indicators.</td>
<td>• Benchmarking for process learning and external comparison for adoption of ‘best practice’</td>
<td>• Business Process Management (BPM).&lt;br&gt;• Corporate Social Responsibility (CSR)&lt;br&gt;• Operational/strategic performance management. Systems thinking</td>
</tr>
<tr>
<td>OECD Science and Technology Indicators</td>
<td>OCED aggregated indexes of innovation for technology development.</td>
<td>• Measure and report relevant indicators to enhance cooperation and policy design for innovation</td>
<td>• Technology policy and Innovation chain literature. Renewable and energy literature. Low-carbon electricity systems</td>
</tr>
</tbody>
</table>
Framework: Indicators to Manage Implementation, Facilitate Learning, and Monitor Success

Standard frameworks

Input / Resource → Process → Output → Final outcome / Result

• **Input indicators** can quantify the resources that are available to address a problem.

• **Process indicators** can measure the short-term reaction of stakeholders to these actions.

• **Output indicators** can illustrate the results of the input activities.

• **Outcome indicators** can monitor if the framework is meeting its long-term goals.

Climate Strategies

www.eprg.group.cam.ac.uk
## Examples...

<table>
<thead>
<tr>
<th>Policy/Programme</th>
<th>Indicators</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark: Energy Labelling of Small Buildings[1]</td>
<td>Total estimated energy savings of target group</td>
<td>Actual realised potential for energy savings in labelled buildings</td>
</tr>
<tr>
<td></td>
<td>Satisfaction of programme among participants, real estate agents and auditors (e.g., % satisfied)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of building owners who are aware of the programme</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Take-up of the labelling programme among building owners</td>
<td></td>
</tr>
<tr>
<td>Sweden: Energy indicators of electricity market policy[2]</td>
<td>Not explicitly measured. The policies themselves are lead inputs.</td>
<td>Market concentration, and market power mark-up in wholesale and retail markets</td>
</tr>
<tr>
<td></td>
<td>Proportion of end-use customers who have renegotiated their contracts, including those who have switched to a different electricity supplier</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of administered electricity supplier changes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Calculated annual volume of administered electricity supplier changes (in GWh)</td>
<td></td>
</tr>
<tr>
<td>Switzerland: Biodiversity Monitoring (BDM) program[3]</td>
<td>Size of protected conservation areas (i.e., the size of areas as designated by policy)</td>
<td>Number of endangered species living in protect areas</td>
</tr>
<tr>
<td></td>
<td>Size of &quot;secure&quot; protected areas (i.e., the size of protected areas where &quot;protective measures are being successfully implemented&quot;, see reference)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implementation of environmental regulations (i.e., the degree to which regulations have been put in place in Switzerland)</td>
<td></td>
</tr>
</tbody>
</table>

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How indicators facilitate international learning?

Based on interpretation of various surveys

Swiss actions better for creating awareness

UK frameworks can improve by attributing more meaning

Source: Choosing to save
Maria Heinrich, Karsten Neuhoff

www.eprg.group.cam.ac.uk
Survey to compare use of indicators across sectors (preliminary results!)

**Sector of Participants' Activities**
- Government: 35%
- Private Sector: 35%
- International Institutions: 13%
- Non-Profit Organization: 17%

**Size of Projects / Policies**
- Greater than 10,000 EUR: 36%
- Greater than 1,000,000 EUR: 32%
- Greater than 100M EURO: 18%
- Not sure: 14%

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Preliminary Survey Results

Distribution of Indicator Objectives / Roles

- **Manage implementation**
- **Facilitate learning**
- **Report success / failure, or basis for incentives**

<table>
<thead>
<tr>
<th>Type of Indicator</th>
<th>Input</th>
<th>Process</th>
<th>Output</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Occurrences</td>
<td>9</td>
<td>11</td>
<td>12</td>
<td>7</td>
</tr>
</tbody>
</table>
Preliminary Survey Results

Use of Indicators for Policy / Project Management
- Indicators significantly improved implementation.
- Indicators provided an early warning of problems or issues.

Use of Indicators as Basis for Incentives
- The focus on indicators distracted from long-term goals.
- Indicators were part of the internal reward schemes.
- Indicators offered a fair measure for success.

Use of Indicators to Facilitate Learning
- Indicators were important to translate experience to other contexts.
- Indicators identified ‘best practises’ for future projects / policies.

Legend:
- **Strongly Disagree**
- **Strongly Agree**
- **Disagree**
- **Agree**

www.climatestrategies.org
UNFCC Indicators

- Only GHG inventories mandated (even then there are exceptions!)
- Use of other indicators are encouraged, but not mandated.
- Leads to wide variety of indicators used by different countries
- Makes comparability hard
# Reported Indicators in NCRs

<table>
<thead>
<tr>
<th>Country</th>
<th>Industrial Indicators</th>
<th>Agricultural Sector</th>
<th>Transport Sector</th>
<th>Energy Sector</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Korea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Second NCR)</td>
<td>Korea's Industrial Structure</td>
<td></td>
<td></td>
<td>Primary Energy Consumption by Source</td>
<td>Status of ESCO Registrations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uzbekistan</td>
<td></td>
<td></td>
<td></td>
<td>Coal production during 1992-2004,</td>
<td>Prices for electric and heat power</td>
</tr>
<tr>
<td>(Second NCR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td></td>
<td></td>
<td></td>
<td>Gross Domestic Supply of Energy by Source</td>
<td>Installed Generating capacity</td>
</tr>
<tr>
<td>(1st NCR)</td>
<td>Index of real product-Industry</td>
<td>Cement production</td>
<td>Raw steel production</td>
<td>Evolution of ethanol production</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Distribution of Cattle on Brazilian Territory</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China (1st NCR)</td>
<td></td>
<td></td>
<td></td>
<td>Consumption of China's proven energy resources and remaining exploitable energy resources</td>
<td>Installed capacity of power generation</td>
</tr>
<tr>
<td></td>
<td>Ratio changes in primary and medium products and industrial finished products in China's import and export products</td>
<td>Casting ratio of steel-making in iron and steel industry</td>
<td>Consumption of chemical fertilizers on farmlands in China</td>
<td>Number of major livestock on hand in China</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of civil aviation routes</td>
<td>Number of major livestock on hand in China</td>
<td></td>
</tr>
<tr>
<td>India (1st NCR)</td>
<td></td>
<td></td>
<td></td>
<td>Number of major livestock on hand in China</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Share of industry in GDP</td>
<td></td>
<td></td>
<td>Total number of registered motor vehicles in India</td>
<td>Commercial energy production</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Livestock population, excl poultry</td>
<td></td>
</tr>
</tbody>
</table>

Note: Demographic, Social, Macroeconomic, GHG and climate related indicators are also reported.

Note: Highlighted indicators represent statistics also reported at the IEA level.
Internationally reported energy & GHG emissions data

**Original Data**
- Private actors (NGOs, Companies, Academia)

**National Bodies**
- Collects GHG inventories of Annex I and non-Annex I countries

**Regional Bodies**
- Collects energy statistics and energy-related GHG emissions data from both OECD and non-OECD countries

**UNFCCC**
- Collects energy statistics and energy-related GHG emissions data from both OECD and non-OECD countries

**UN Statistics Division (UNSD)**
- Collects GHG inventories of Annex I and non-Annex I countries
- Energy and emissions data feeds into the OECD’s Key Environmental Indicators Set

**UNFCCC**
- Energy and emissions data feeds into the OECD’s Key Environmental Indicators Set

**CDIAC**
- Carbon Dioxide Information Analysis Centre

**OECD**
- Energy and emissions data feeds into the OECD’s Key Environmental Indicators Set
## Illustration of number of data points

<table>
<thead>
<tr>
<th>Sector / Topic Covered</th>
<th>OECD</th>
<th>Non-OECD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Germany</td>
<td>UK</td>
</tr>
<tr>
<td>Energy Production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renewable Resources</td>
<td>32</td>
<td>25</td>
</tr>
<tr>
<td>Non-Renewable Resources</td>
<td>110</td>
<td>106</td>
</tr>
<tr>
<td>Energy Consumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renewable Resources</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Non-Renewable Resources</td>
<td>64</td>
<td>51</td>
</tr>
<tr>
<td>Costs and Expenditures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy End-use and Commodity Prices</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>Public Energy R&amp;D Expenditures</td>
<td>37</td>
<td>28</td>
</tr>
<tr>
<td>GHG Emissions Data</td>
<td>70</td>
<td>65</td>
</tr>
</tbody>
</table>

**Definition:**
Data represents the no. of measurements with a non-zero value contained within the IEA's set of energy statistics

**Examples of measurements:**
- Total amount of bituminous coal used for electricity generation
- Total RD&D expenditures for small hydro (<10 MW) installations
- Total methane (CH\(_4\)) emissions from agriculture
### Reported Indicators on current/future policies actions in NCRs

<table>
<thead>
<tr>
<th>Country</th>
<th>Financial Indicators</th>
<th>Training Programmes</th>
<th>Public Awareness</th>
<th>Energy Related Programmes</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Korea (Second NCR)</td>
<td>Financial Contributions to Environment-Related Multilateral Institutions and Programs</td>
<td>Number of people and countries covered under KOICA training programs on: Energy Conservation and Utilisation Efficiency</td>
<td></td>
<td>Status and Expansion Plan for Subject Items of High Efficient Equipment Certification Program</td>
</tr>
<tr>
<td></td>
<td>Status of Grant Aids Assisted by the Korea International Cooperation Agency (KOICA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tajikistan (Second NCR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macedonia (Second NCR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uzbekistan (Second NCR)</td>
<td></td>
<td></td>
<td></td>
<td>Energy saving projects of Uzbek power generation complex- Emissions Savings, and Total Investment</td>
</tr>
<tr>
<td>Brazil (1st NCR)</td>
<td></td>
<td>National Electrical Energy Conservation Program - Students Trained</td>
<td>National Electrical Energy Conservation Program - Investments made, Reduction of Peak Load</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Numbers trained on programme about oil, natural gas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China (1st NCR)</td>
<td></td>
<td>Number of Pages on the Ministry of Science and Technology homepage in 2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>India (1st NCR)</td>
<td></td>
<td>Number of articles in large circulation magazines and newspapers in Brazil mentioning the problem of the greenhouse effect</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Designing indicators to meet objectives

Objectives measured by indicators
• Management of program/policy implementation
• Identification of best practice and international learning
• Create transparency to attract private sector investment & innovation
• Accountability to domestic constituencies
• Mutual accountability in the case of international cooperation

Reporting
Domestic
International
International Verified

Design Criteria
• Qualitative/quantitative?
• Sample/complete?
• Harmonised?
• Process of definition?
• Verification?
## Trade-off 1: Qualitative versus Quantitative data

<table>
<thead>
<tr>
<th>Relevance to Policy / Programme</th>
<th>Quantitative</th>
<th>Qualitative</th>
<th>Evolutionary Quantitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project / Policy Management</td>
<td>✫</td>
<td>✫</td>
<td>✫</td>
</tr>
<tr>
<td>Facilitate Learning</td>
<td>✫</td>
<td>✫</td>
<td></td>
</tr>
<tr>
<td>Used for Domestic Incentives</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used for International Incentives</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Example:
(A car mechanic in charge of repairing windshield wipers)

- Number of wipers replaced with high-quality parts
- Number of service complaints
- Why do the wipers need replacing in the first place? (through survey of customers)
- Number of wipers that were purchased at discount prices online.
Trade-off 2: Collection cost versus usefulness

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Depth of identification of problems</th>
<th>Depth of incentive compatibility</th>
<th>Response time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete coverage</td>
<td>***</td>
<td>***</td>
<td>*</td>
</tr>
<tr>
<td>Random sample</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Specific sample</td>
<td>*</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>Implementing Agency</td>
<td>*</td>
<td>0</td>
<td>***</td>
</tr>
<tr>
<td>Macrostatistics</td>
<td>*</td>
<td>**</td>
<td>varied</td>
</tr>
</tbody>
</table>

* to *** indicates increasing strength of approach

Aspects that contribute to successful implementation:
- Low cost of measurement
- Evidence of learning / best practice gains
Trade-off 3: Input versus outcome

Policy target applied to:

- Allow comparison of policy effectiveness
- Often more difficult to define

- Response time
- Identify barriers

- Easier to measure
- Can ignore important interactions / focus too narrowly

Response time

- PSA
- PRSP
- EU Accession
- MDG

Input

Outcome

Time frame (years)

GPRA Government performance result act
PSA Public Service Agreements
PRSP Poverty Reduction Strategy Papers
MDG Millennium Development Goals

Allow comparison of policy effectiveness
Often more difficult to define
Response time
Identify barriers
Easier to measure
Can ignore important interactions / focus too narrowly
### Trade-off 4: Domestic versus harmonised definitions

<table>
<thead>
<tr>
<th>Domestic definition (e.g. as part of NAMA discussion)</th>
<th>International harmonised category</th>
<th>International harmonised indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Own definition best matches needs and is relevant</td>
<td>• Outside requirement trigger development of indicators</td>
<td>• International guideline ‘inspires’ to think out of domestic box</td>
</tr>
<tr>
<td>• Enhances ownership</td>
<td></td>
<td>• Facilitates international learning</td>
</tr>
<tr>
<td>• Risk-selection bias to claim success</td>
<td></td>
<td>• Simplifies verification with common methodology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Makes efforts more comparable</td>
</tr>
</tbody>
</table>
Trade-off 5: National versus international reporting

- Domestic reporting
- International reporting
- International reporting and verification

- Avoids cost for verification
- Avoids incentive for donor and recipient to unduly claim success
- Contributes to continuity of statistics to manage performance
- Facilitates international learning

Reporting is basis for, but separate step from, evaluation
- Public reporting facilitates third party analysis

Who are the most suitable evaluation institutions?
Process matters – particular for joint projects

• Importance of partnership approach
  ❖ Throughout designing, implementing and evaluation
  ❖ Trust, sense of ownership of policy target, consensus
  ❖ Hurdle: avoid paternalism, imposed targets, poor negotiations

• Policy indicators need to be relevant and balanced
  ❖ Indicators appropriate, relevant, selective, outcome oriented, capture cross cutting outcomes

• Implementation challenges
  ❖ Costs, institutional capacity
  ❖ Political sensitivities (within country or internationally)
## Option to structure indicators

<table>
<thead>
<tr>
<th></th>
<th>Domestic</th>
<th>Harmonised category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Country specific indicator</td>
</tr>
<tr>
<td><strong>Input</strong></td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quant. evolving</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quant. ex-ante defined</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quant. ex-ante + verified</td>
<td></td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quant. evolving</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quant. ex-ante defined</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quant. ex-ante + verified</td>
<td></td>
</tr>
<tr>
<td><strong>Outcome</strong></td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quant. evolving</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quant. ex-ante defined</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quant. ex-ante + verified</td>
<td></td>
</tr>
</tbody>
</table>

### Data source
- Macro statistics
- Implementing agency
- Specific sample
- Random sample
- Complete coverage

### Tailor to context / purpose
- Low-carbon growth strategy
- Domestic NAMA
- Internationally supported NAMA
Next steps

• Up front definition of all indicators seems challenging

• Stepwise approach:
  ❖ EU Renewable Directive defines categories for reporting
  ❖ EU commission provides detailed guidance document that is more specific
  ❖ > can we define categories of reporting and then mandate UNFCCC secretariat to provide specific guidance?

• Iterative approach:
  ❖ PRSPs defined indicators
  ❖ They were improved in next phase (3 years later)
5. Examples from case studies

- Author presents policy suggested policy indicators (case study already presented in morning) [3 min]
- Audience votes whether set of indicators is acceptable [1 min]
- Discussion if there is disagreement [7 min]
Indicators along the Renewables Deployment Pipeline: Example from Ghana

**Global Input:**
Technically-Feasible RE Generation Capacity

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### Planning

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Agency Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE as part of rural electrification policy?</td>
<td>MOE</td>
</tr>
<tr>
<td>RE legal and regulatory framework?</td>
<td>EC</td>
</tr>
<tr>
<td>Number of ESCOs</td>
<td>Energy Foundation</td>
</tr>
<tr>
<td>Number of ESCO projects</td>
<td>Energy Foundation</td>
</tr>
</tbody>
</table>

### Access to Grid

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Agency Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total installed capacity (MW) - grid connected</td>
<td>EC, MOE</td>
</tr>
<tr>
<td>Number of grid-connected RE installations</td>
<td>EC, MOE</td>
</tr>
<tr>
<td>Annual capacity grid-connected RE (MWh)</td>
<td>EC, MOE</td>
</tr>
<tr>
<td>Average load factor of grid-connected RE</td>
<td>EC, MOE</td>
</tr>
</tbody>
</table>

### Supply Chain

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Agency Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of outreach programmes for RE</td>
<td>EC, MOE, Energy Foundation</td>
</tr>
<tr>
<td>No. of staff in financing institutions trained in RE</td>
<td>EC, MOE, Energy Foundation</td>
</tr>
<tr>
<td>No. of policymakers/regulators trained in RE</td>
<td>EC, MOE, PURC</td>
</tr>
<tr>
<td>No. of technicians and engineers trained in RE</td>
<td>EC, Energy Foundation</td>
</tr>
<tr>
<td>No. of private developers in RE</td>
<td>MOE, Ministry of Finance</td>
</tr>
</tbody>
</table>

### Project Finance

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Agency Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing from government</td>
<td>MOE, Ministry of Finance, Central Bank</td>
</tr>
<tr>
<td>Financing from rural banks</td>
<td>MOE, Ministry of Finance, Central Bank</td>
</tr>
<tr>
<td>Financing from commercial / private institutions</td>
<td>MOE, Ministry of Finance, Central Bank</td>
</tr>
<tr>
<td>Bilateral or multilateral financing</td>
<td>MOE, Ministry of Finance, Central Bank</td>
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</table>

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**Acronyms:**

EC – Energy Commission
MOE – Ministry of Energy

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## Feedback from Discussion in South Africa

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<tr>
<th>Intermediate progress indicator</th>
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Source: Survey by Max Edkins, Energy Research Centre, UCT
More Examples: Experience from Power Sector Indicators in India

• Accelerated Power Development and Reforms Programme (APDRP)

• Began in 2000-01 as Accelerated Power Development Programme (APDP) and rechristened as Accelerated Power Development and Reforms Programme (APDRP) in 2002-03.

• The objectives of APDRP were:
  ✓ Improving financial viability of State Power Utilities
  ✓ Reduction of AT&C losses
  ✓ Improving customer satisfaction
  ✓ Increasing reliability & quality of power supply

Programme completed in 2007-08. Now restructured as R-APDRP.
More Examples: Experience from Power Sector Indicators in India

## Indicators used in APDRP

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Need for Indicator</th>
<th>Reported by</th>
<th>Reported to</th>
<th>Independent Verification</th>
<th>Data</th>
</tr>
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<tr>
<td>Cash Loss Reduction</td>
<td>Basis for Incentive</td>
<td>Distribution Utility / SEB</td>
<td>Ministry of Power</td>
<td>Only ex post</td>
<td>Data available.</td>
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<tr>
<td>AT &amp; C Loss</td>
<td>Basis for Measuring Success of Investment Programmes</td>
<td>Distribution Utility / SEB</td>
<td>Ministry of Power</td>
<td>Only ex post</td>
<td>Data available. Quality suspect</td>
</tr>
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Note: AT&C - Aggregate Technical and Commercial Loss
Indicators along the Renewables Deployment Pipeline: Example from Ghana

Global Input: 
Technically-Feasible RE Generation Capacity

Planning

- Access to Grid
- Off-grid

Supply Chain

Global Output:
- Installed RE Capacity by type,
- number of Biomass projects

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Agency Responsible</th>
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<tbody>
<tr>
<td>RE as part of rural electrification policy?</td>
<td>MOE</td>
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<tr>
<td>RE legal and regulatory framework?</td>
<td>EC, PURC</td>
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<tr>
<td>Number of ESCOs</td>
<td>Energy Foundation</td>
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<td>Total installed capacity (MW) - grid connected, mini-grid.</td>
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<td>Number of grid-connected RE installations</td>
<td>EC, MOE</td>
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<td>Annual capacity grid-connected RE (MWh)</td>
<td>EC, MOE</td>
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<td>Average load factor of grid-connected RE</td>
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<td>No. of outreach programmes for RE</td>
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<td>No. of policymakers/regulators trained in RE</td>
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<td>No. of technicians and engineers trained in RE</td>
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<td>No. of private developers in RE</td>
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## South Africa - Intermediate Indicators

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Brazil - Indicators

Proposal of best indicator for evaluates the policy success of changing modal split in Brazilian freight:

- Financial resources government applied/intermodal station
- Number of intermodal stations installed
- Cargo handled/intermodal station
- Quantity of fuel sold in areas of intermodal stations
India - Indicators

- Efficient Generation Technology
- Share of Generation (MWh) by efficient generation technology
- Energy Saved
- Policy for SC for plants above 500/600 MW

- Pumpset Replacement
- MW of pumps replaced
- MWh of energy saved
- Number of Pumps/DTs metered

- Upgrading Distribution (HVDS)
- km of LT lines replaced with HVDS
- Reduction in Grid Losses (%)
- MWh saved