The role of indicators for effective policy implementation

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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

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

Framework: Indicators to Manage Implementation, Facilitate Learning, and Monitor Success

Standard frameworks

Input / Resource → **Process** → **Output** → **Final outcome / Result**
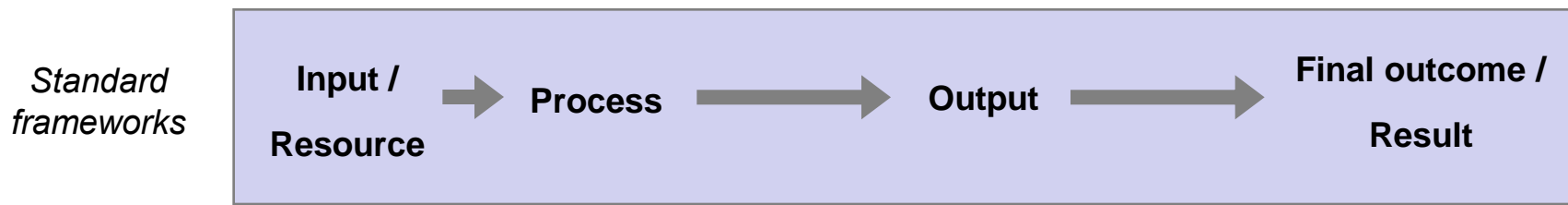
- **Input indicators** can quantify the resources that are available to address a problem

- **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

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Examples...

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

[1] Source: IEA-DSM. 2005. *Evaluating Energy Efficiency Policy Measures & DSM Programmes – Volume II*
[2] Source: Swedish Energy Agency. 2008. *Energy Indicators*
[3] Source: Federal Office for the Environment (FOEN) Switzerland. 2009. *Biodiversity Monitoring (BDM)*

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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

Legend:
- Switzerland
- Netherlands
- Finland
- UK

X-axis: Total, Aware, Evocation, Quality, User
Y-axis: 0, 200, 400, 600, 800, 1000

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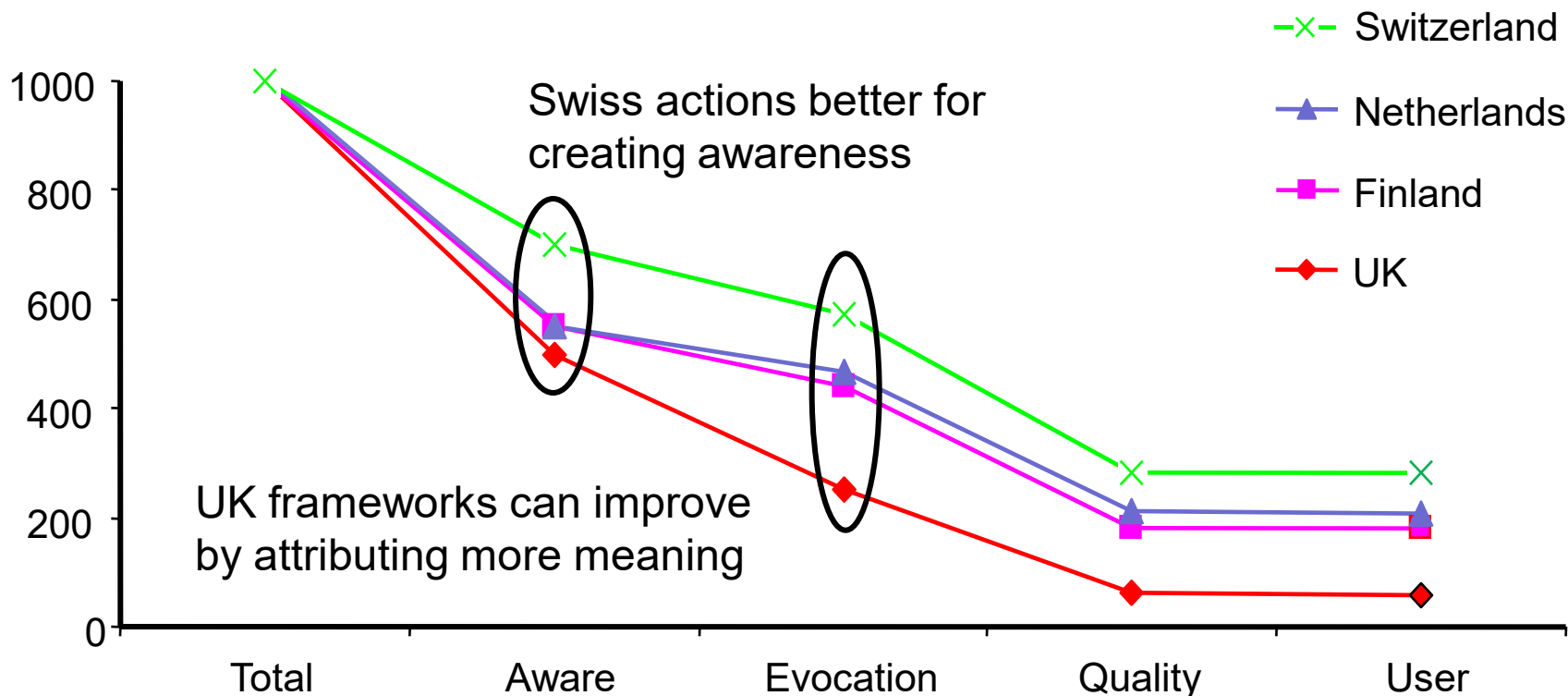
Survey to compare use of indicators across sectors (preliminary results!)

Sector of Partipants' Activities

- Non-Profit Organization 17%
- International Institutions 13%
- Government 35%
- Private Sector 35%
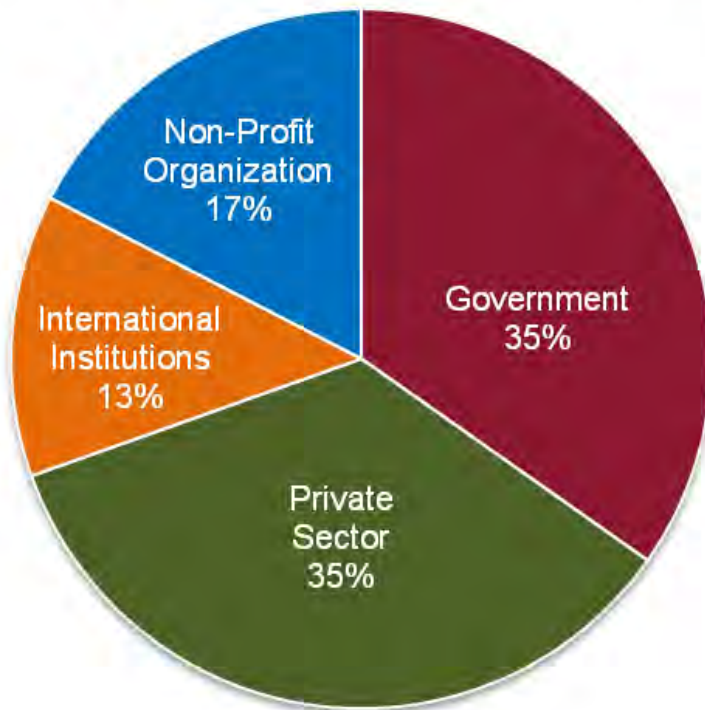
Size of Projects / Policies

- Greater than 100M EURO 18%
- Greater than 1,000,000 EUR 32%
- Not sure 14%
- Greater than 10,000 EUR 36%

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Preliminary Survey Results

Types of Indicators Used in Example Projects / Policies
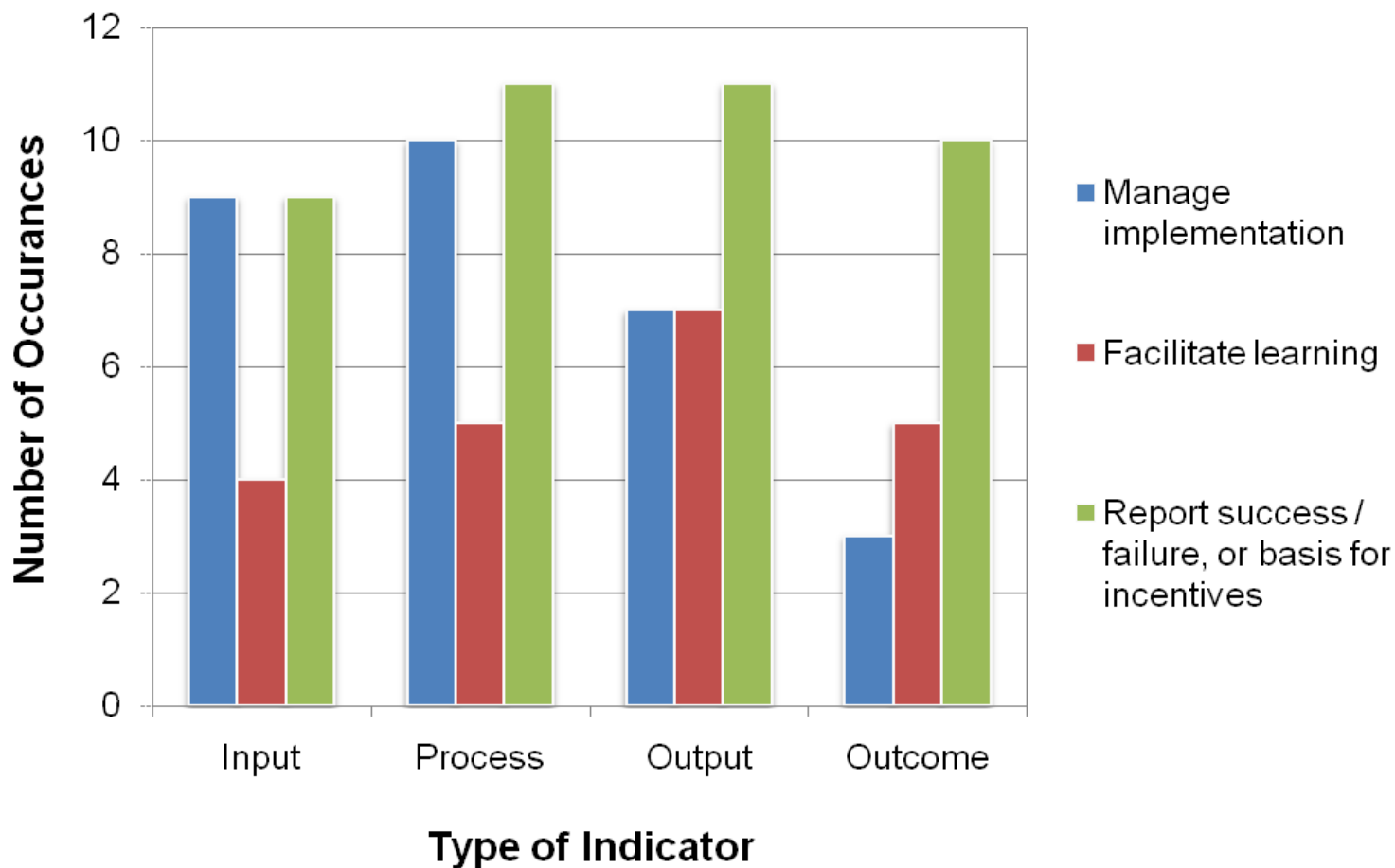
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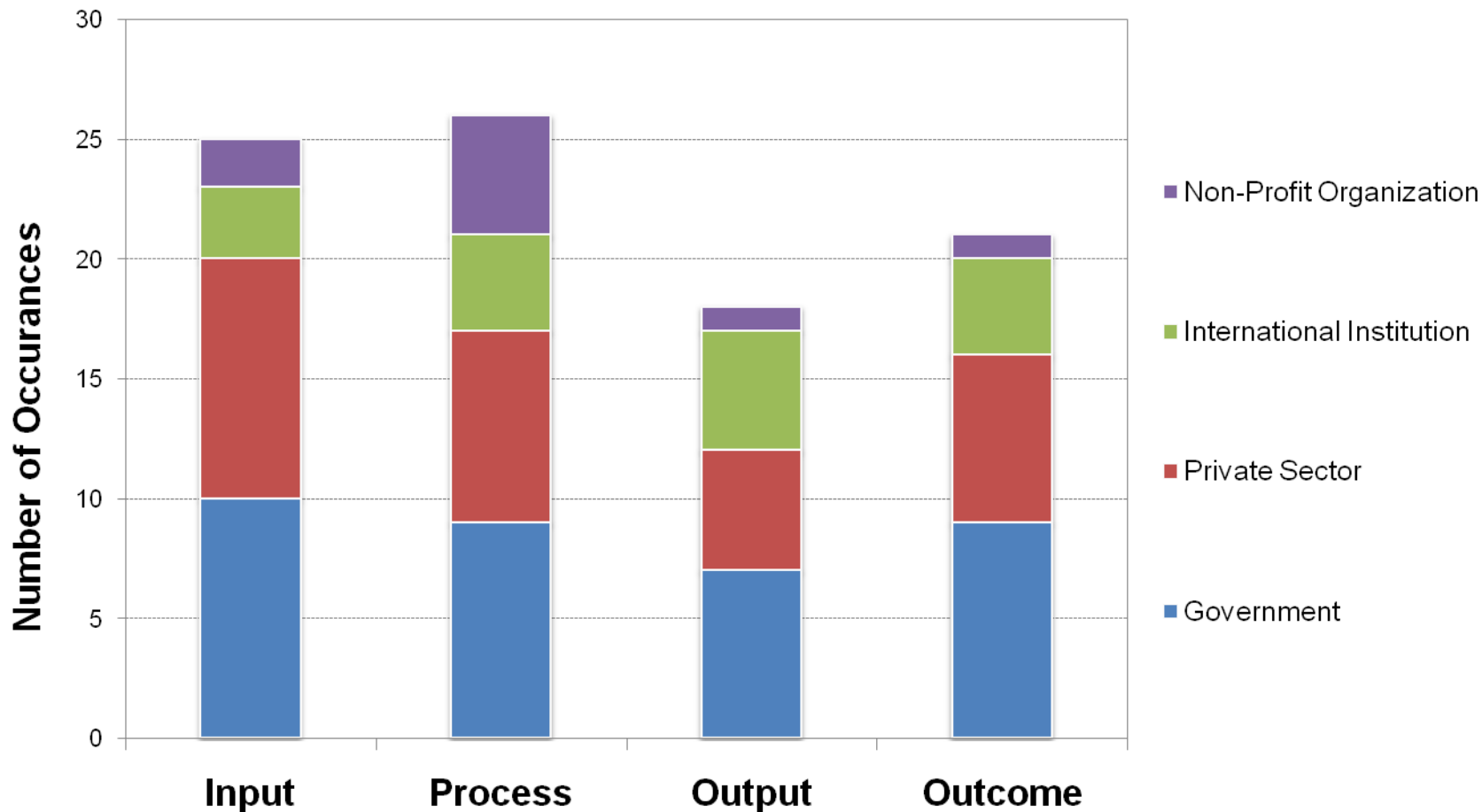
Preliminary Survey Results

Distribution of Indicator Objectives / Roles

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Preliminary Survey Results

Use of Indicators for Policy / Project Management

Indicators significantly improved implementation.

Indicators provided an early warning of problems or issues.

Number of Occurances
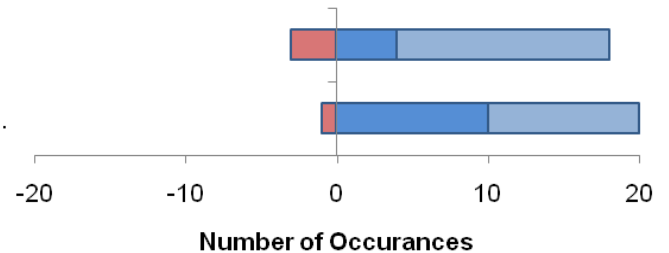
Use of Indicators as Basis for Incentives

The focus on indicators distracted from long-term goals

Indicators were part of the internal reward schemes.

Indicators offered a fair measure for success.

Number of Occurances
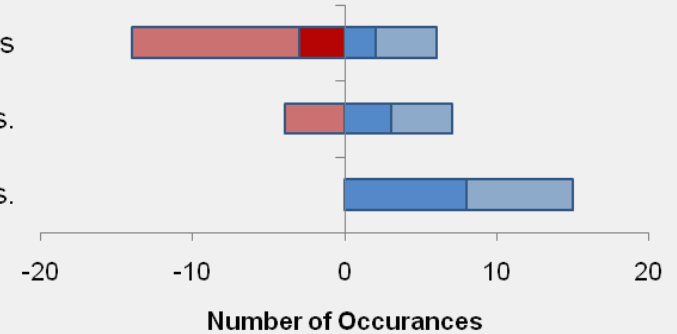
Use of Indicators to Facilitate Learning

Indicators were important to translate experience to other contexts.

Indicators identified 'best practises' for future projects / policies.

Number of Occurances
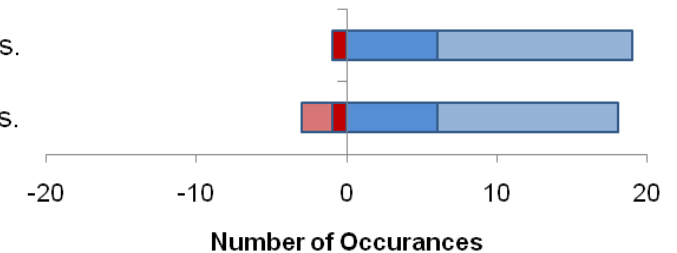
Legend:
- ■ Strongly Disagree
- ■ Strongly Agree
- ■ Disagree
- ■ Agree

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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

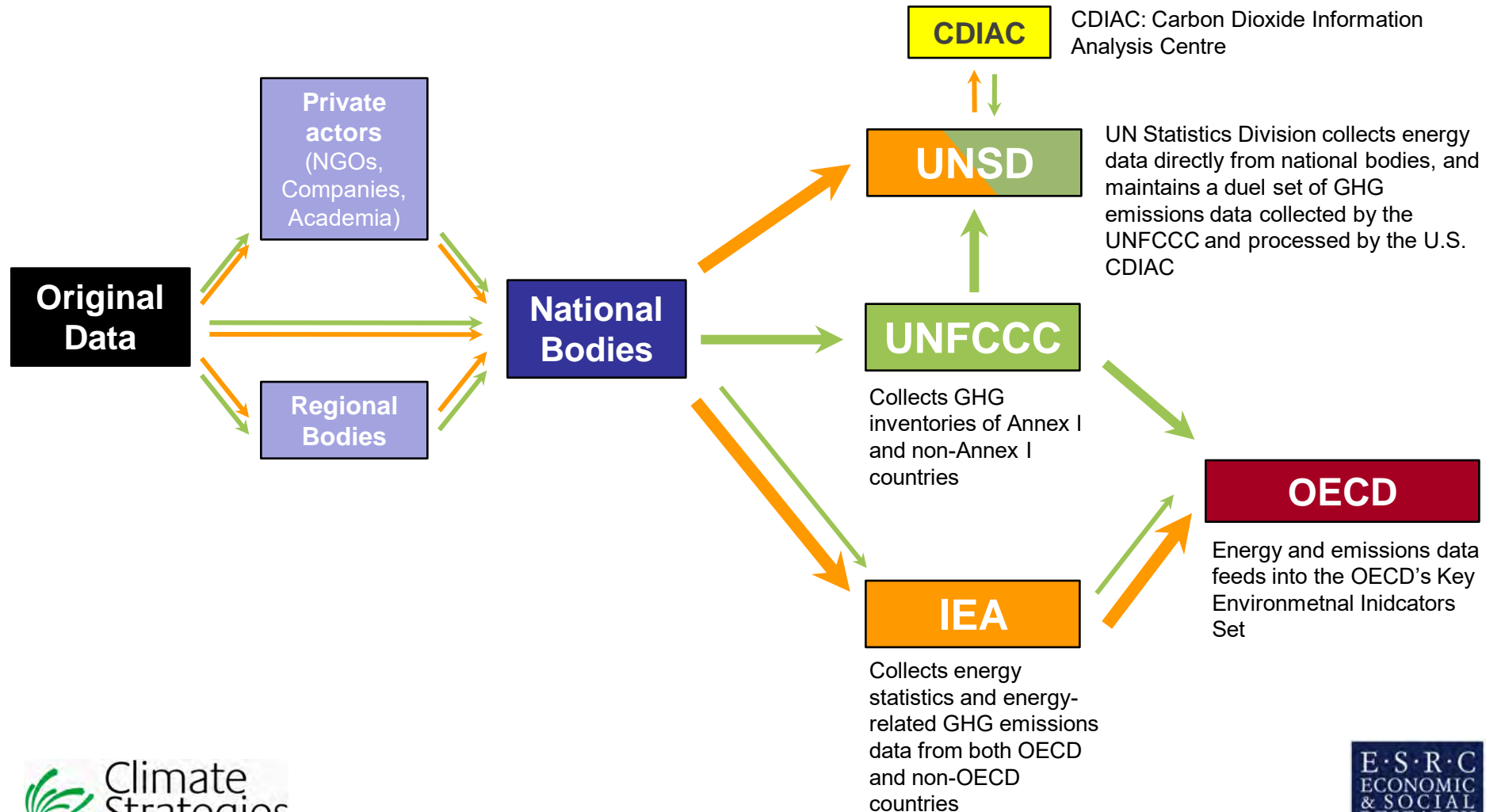| Country	Industrial Indicators			Agricultural Sector		Transport Sector	Energy Sector				
	Industrial Structure	Cement	Steel	Fertiliser Use	Livestock Indicators	Overall	Overall Energy Use	Electricity Indicators	Fossil Fuel indicators	Pricing/ Subsidies /Taxes	Other
South Korea (Second NCR)	Korea's Industrial Structure			Fertilizer Consumption	Number of Livestock	Progress of Korea's Passenger Transportation	Primary Energy Consumption by Source	Status of ESCO Registrations			Results of Voluntary Agreement
Uzbekistan (Second NCR)					Cattle and poultry livestock, thousand heads	Transport growth rate (passenger turnover)		Structure of the established capacities of power plants in Uzbekistan	Coal production during 1992-2004,	Prices for electric and heat power	Dynamics of internal consumption fuel-and-power resources by sectors,
Brazil (1st NCR)	Index of real product-Industry	Cement production	Raw steel production	Manure management systems	Distribution of Cattle on Brazilian Territory	Evolution of ethanol production	Gross Domestic Supply of Energy by Source	Installed Generating capacity	Production of run-of-mine coal		Consumption of charcoal from reforested areas
China (1st NCR)	Ratio changes in primary and medium products and industrial finished products in China's import and export products		Casting ratio of steel-making in iron and steel industry	Consumption of chemical fertilizers on farmlands in China	Number of major livestock on hand in China	Number of civil aviation routes	Consumption of China's proven energy resources and remaining exploitable energy resources	Installed capacity of power generation	Length of Petroleum and Gas Pipelines		Energy consumption per unit product of some major building materials
India (1st NCR)		Share of industry in GDP			Livestock population, excl poultry	Total number of registered motor vehicles in India	Commercial energy production	Growth of electricity	Share of petroleum imports in total consumption		GDP per unit of energy use

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

Note: Highlighted indicators represent statistics also reported at the IEA level.

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Internationally reported energy & GHG emissions data

CDIAC: Carbon Dioxide Information Analysis Centre

UN Statistics Division collects energy data directly from national bodies, and maintains a duel set of GHG emissions data collected by the UNFCCC and processed by the U.S. CDIAC

Collects GHG inventories of Annex I and non-Annex I countries

Energy and emissions data feeds into the OECD's Key Environmetnal Inidcators Set

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

Illustration of number of data points

Sector / Topic Covered		OECD		Non-OECD	
		Germany	UK	India	Ghana
Energy Production	Renewable Resources	32	25	7	3
	Non-Renewable Resources	110	106	78	20
Energy Consumption	Renewable Resources	6	12	5	2
	Non-Renewable Resources	64	51	38	21
Costs and Expenditures	Energy End-use and Commodity Prices	14	17	5	0
	Public Energy R&D Expenditures	37	28	0	0
GHG Emissions Data		70	65	60	36

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

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Reported Indicators on current/future policies actions in NCRs

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

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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

Relevance to Policy / Programme	Quantitative	Qualitative	Evolutionary Quantitative
Project / Policy Management	✦	✦	✦
Facilitate Learning	✦	✦	✦
Used for Domestic Incentives	✦		
Used for International Incentives	✦		

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

Cost of acquiring data →

Data Source	Depth of identification of problems	Depth of incentive compatibility	Response time
Complete coverage	***	***	*
Random sample	**	**	**
Specific sample	*	*	***
Implementing Agency	*	0	***

Macrostatistics	*	**	varied

* to *** indicates increasing strength of approach

Aspects that contribute to successful implementation:
- Low cost of measurement
- Evidence of learning / best practice gains

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Trade-off 3: Input versus outcome

Policy target applied to:

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

Outcome

- Response time
- Identify barriers

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

Input

Response time

PSA

PRSP

EU Accession

MDG

GPRA

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

Time frame (years)

1   3   10   15

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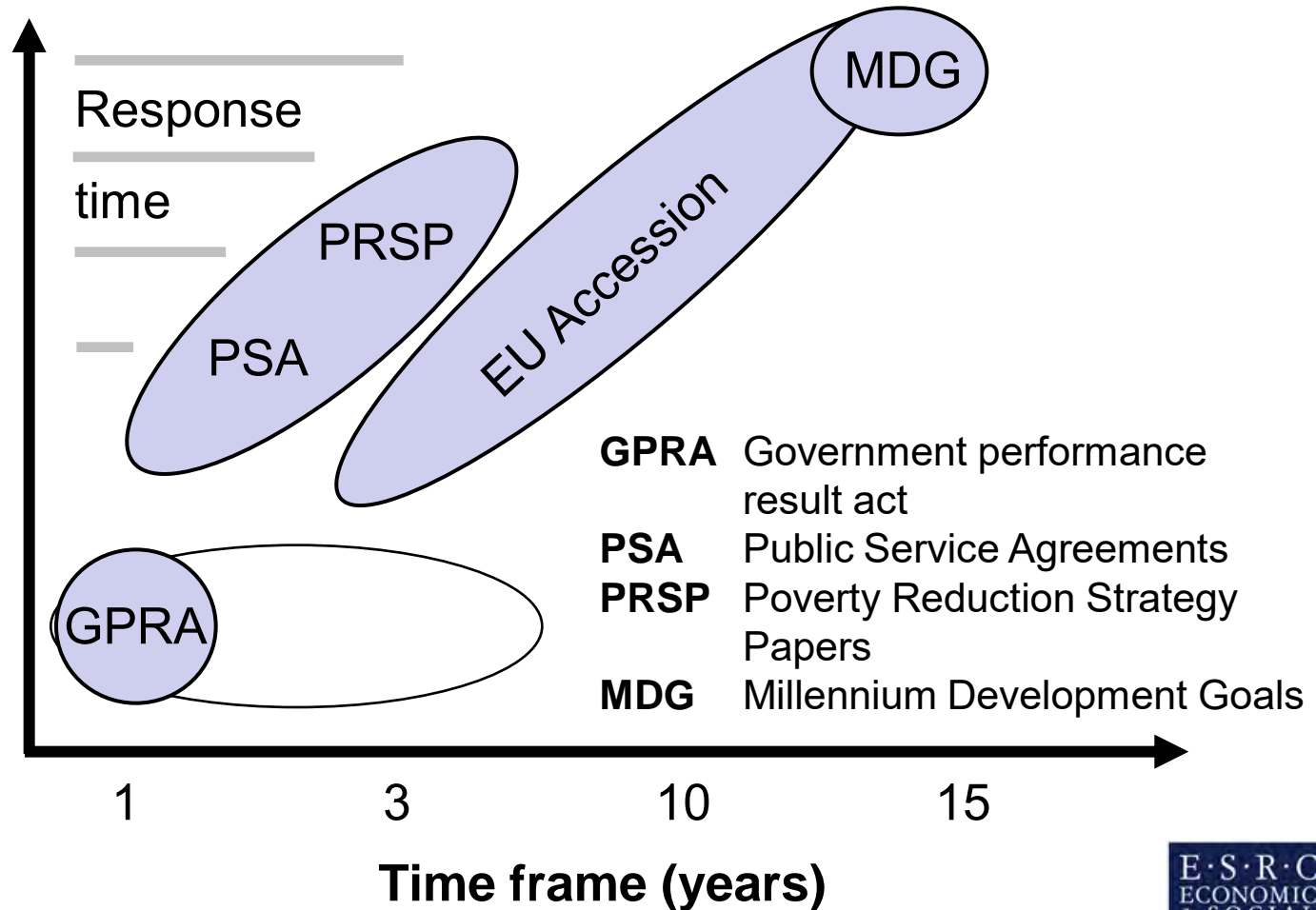
Trade-off 4: Domestic versus harmonised definitions

Domestic definition (e.g. as part of NAMA discussion)	International harmonised category	International harmonised indicator

- Own definition best matches needs and is relevant
- Enhances ownership
- Risk-selection bias to claim success

- Outside requirement trigger development of indicators

- International guideline 'inspires' to think out off domestic box
- Facilitates international learning
- Simplifies verification with common methodology
- Makes efforts more comparable

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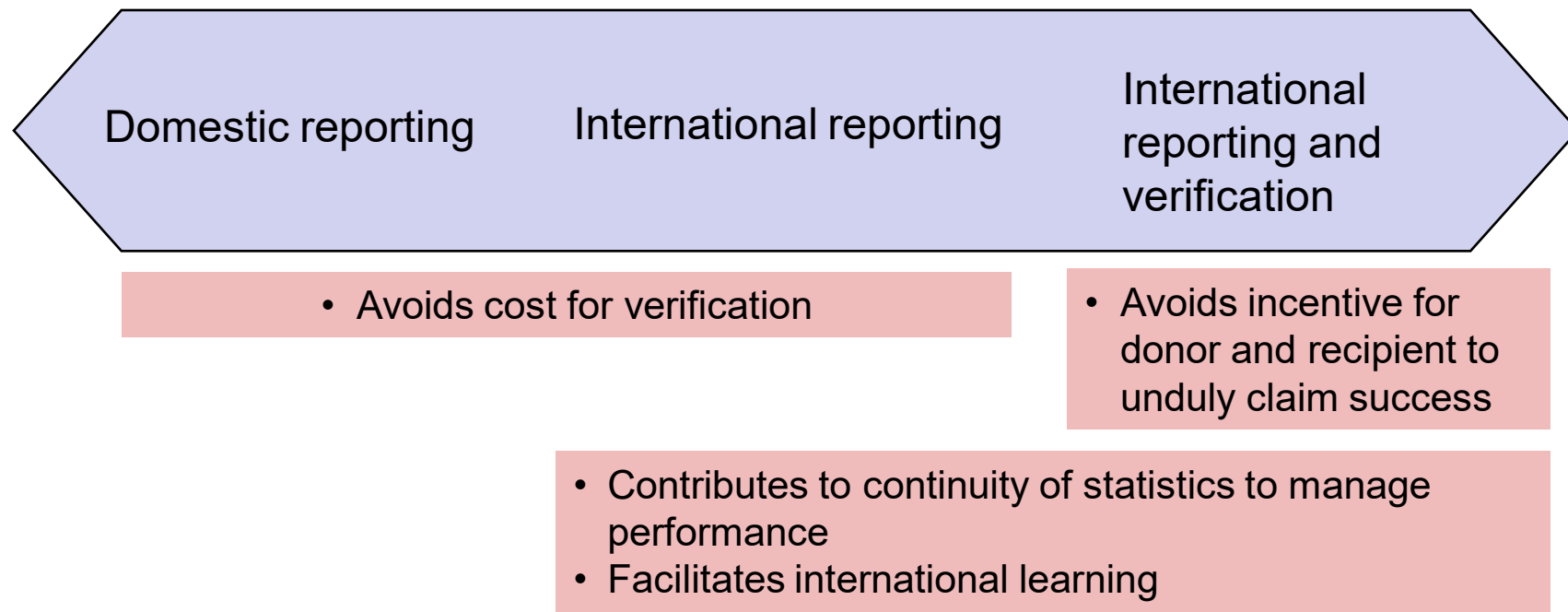
Reporting is basis for, but separate step from, evaluation
- Public reporting facilitates third party analysis

Who are the most suitable evaluation institutions?

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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)

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Option to structure indicators

		Domestic	Harmonised category	
			Country specific indicator	Harmonised indicator
Input	Qualitative			
	Quant. evolving			
	Quant. ex-ante defined			
	Quant. ex-ante + verified			
Process	Qualitative			
	Quant. evolving			
	Quant. ex-ante defined			
	Quant. ex-ante + verified			
Outcome	Qualitative			
	Quant. evolving			
	Quant. ex-ante defined			
	Quant. ex-ante + verified			

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

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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]

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Indicators along the Renewables Deployment Pipeline: Example from Ghana

Global Input: Technically-Feasible RE Generation Capacity

Planning

Access to Grid

Supply Chain

Project Finance

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

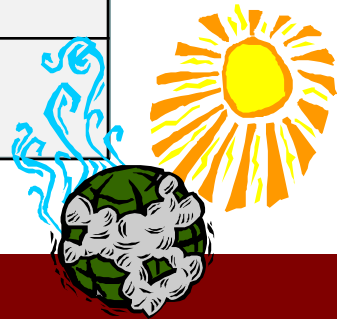| Indicator	Agency Responsible
RE Policy framework?	Energy Commission (EC), Ministry of Energy (MOE)
RE as part of rural electrification policy?	MOE
RE legal and regulatory framework?	EC
Number of ESCOs	Energy Foundation
Number of ESCO projects	Energy Foundation

Indicator	Agency Responsible
Total installed capacity (MW) - grid connected	EC, MOE
Number of grid-connected RE installations	EC, MOE
Annual capacity grid-connected RE (MWh)	EC, MOE
Average load factor of grid-connected RE	EC, MOE

Indicator	Agency Responsible
No. of outreach programmes for RE	EC, MOE, Energy Foundation
No. of staff in financing institutions trained in RE	EC, MOE, Energy Foundation
No. of policymakers/regulators trained in RE	EC, MOE, PURC
No. of technicians and engineers trained in RE	EC, Energy Foundation
No. of private developers in RE	MOE, Ministry of Finance

Indicator	Agency Responsible
Financing from government	MOE, Ministry of Finance, Central Bank
Financing from rural banks	MOE, Ministry of Finance, Central Bank
Financing from commercial / private institutions	MOE, Ministry of Finance, Central Bank
Bilateral or multilateral financing	MOE, Ministry of Finance, Central Bank

Acronyms: EC – Energy Commission
MOE – Ministry of Energy

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Feedback from Discussion in South Africa

Intermediate progress indicator	Not at all	Not successful	Somewhat	Successful	Very Successful
GHG mitigated			◄————	————►	
Electricity produced from CSP Plants (kWh)				◄————	————►
CSP Plant licenses issued				◄————	————►
CSP Plants under construction				◄————	————►
Committed finance to CS P developments			◄————	————►	
% of CSP in national planning process	◄————	————►			
Amount of land and water rights committed to CSP development	◄————	————	————►		
% of CSP developers engaged in South Africa			◄————	————►	
% of CSP developers with offices in South Africa	◄————	————►			

Source: Survey by Max Edkins, Energy Research Centre, UCT

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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.

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More Examples: Experience from Power Sector Indicators in India

Indicators used in APDRP

Indicator	Need for Indicator	Reported by	Reported to	Independent Verification	Data
Cash Loss Reduction	Basis for Incentive	Distribution Utility / SEB	Ministry of Power	Only ex post	Data available.
AT & C Loss	Basis for Measuring Success of Investment Programmes	Distribution Utility / SEB	Ministry of Power	Only ex post	Data available. Quality suspect

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

Project Finance

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

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Acronyms: EC – Energy Commission
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South Africa - Intermediate Indicators

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GHG mitigated			←———————————→		
Electricity produced from CSP Plants (kWh)				←———————————→	
CSP Plant licenses issued				←———————————→	
CSP Plants under construction				←———————————→	
Committed finance to CSP developments			←———————————→		
% of CSP in national planning process	←———————————→				
Amount of land and water rights committed to CSP development	←———————————————————→				
% of CSP developers engaged in South Africa		←———————————————————→			
% of CSP developers with offices in South Africa		←———————————→			

Brazil - Indicators

Proposal of best indicator for evaluates the policy sucess 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 intemodal stations

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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 Replacment
- 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