energy
Department:
Energy
REPUBLIC OF SOUTH AFRICA

International
Energy Agency

Indicators, evaluating and scaling up programmes

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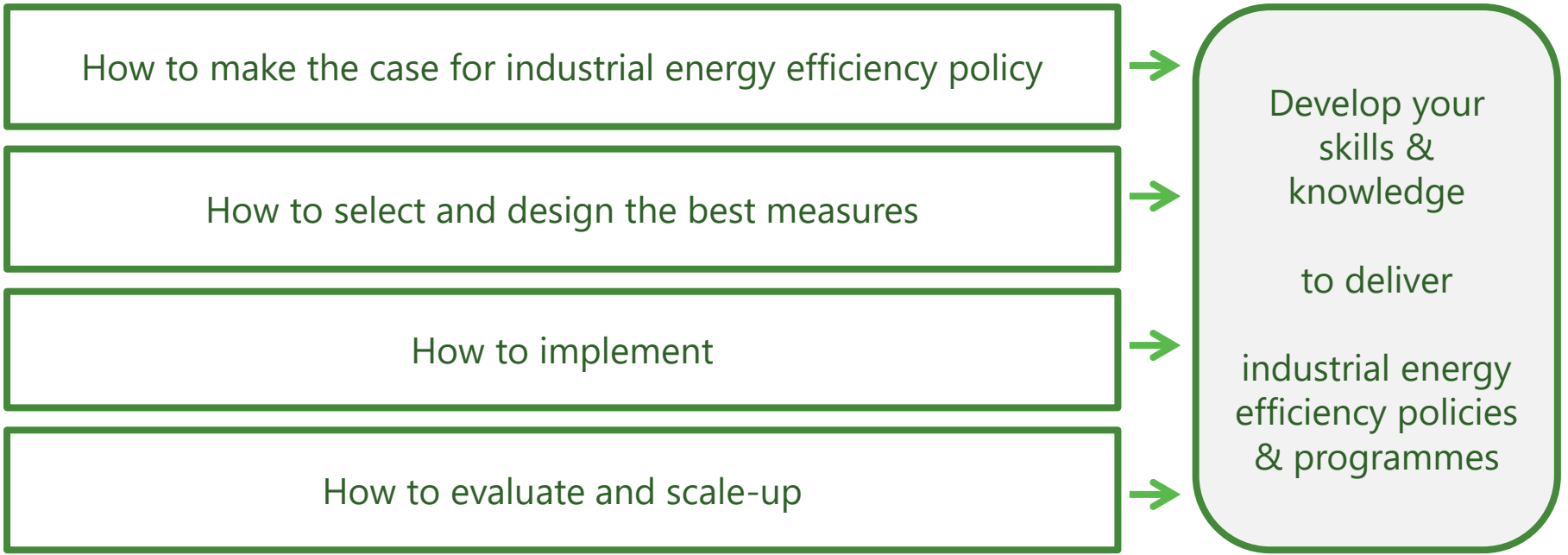
Energy Efficiency Training Week, Industry Stream, Pretoria, South Africa, October 2019

Link between training content and objectives



Learning outcomes

This session will focus on developing your capabilities to:

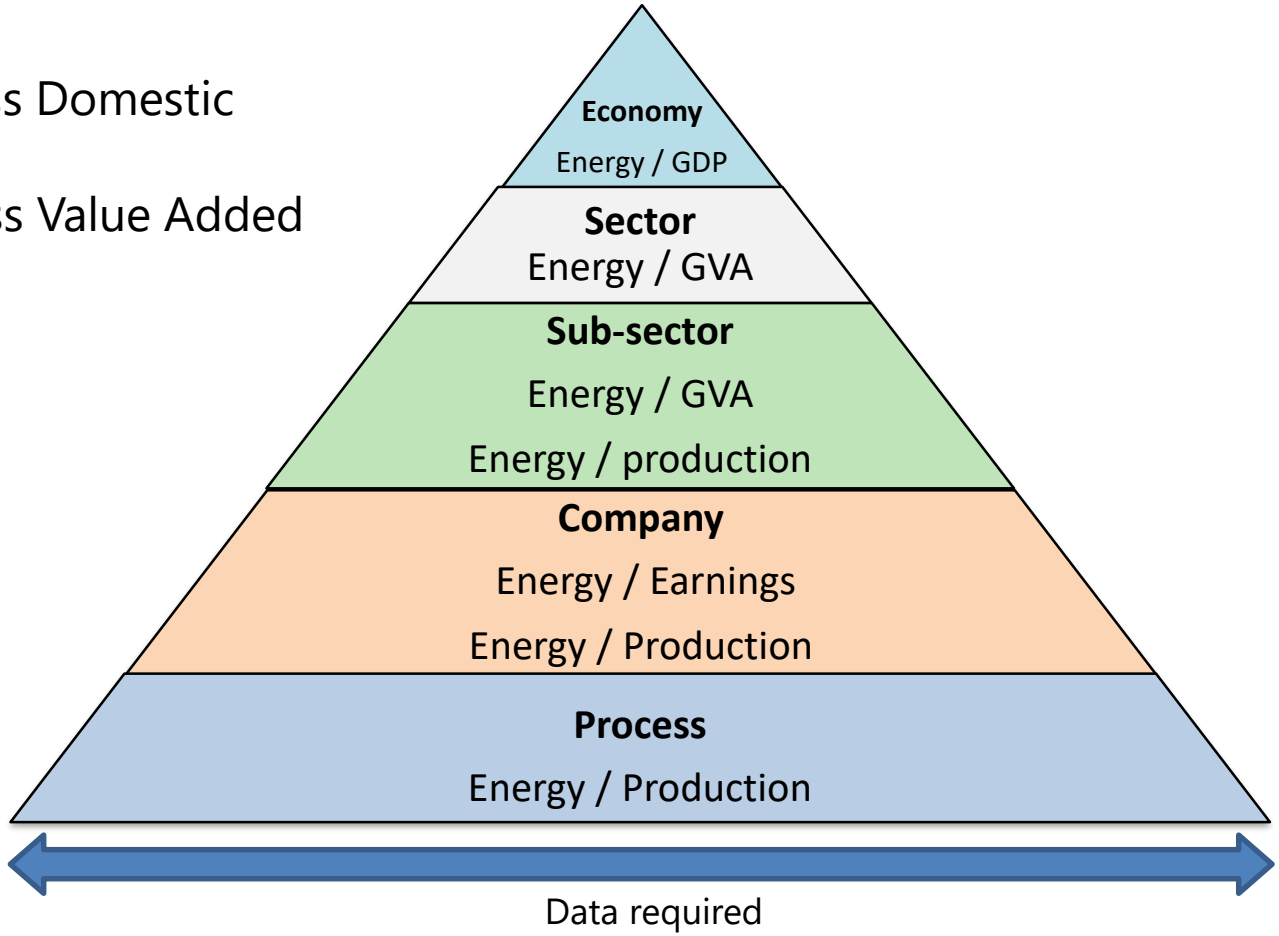
- Understand energy efficiency indicators and how they can be used
- Plan, implement and supervise industrial energy efficiency programme evaluations
- Differentiate between different types of programme impacts
- Draw conclusions from evaluations and communicate the results
- Use evaluation to inform options to expand the scale and reach of successful programmes

Data and indicators underpin policy evaluation

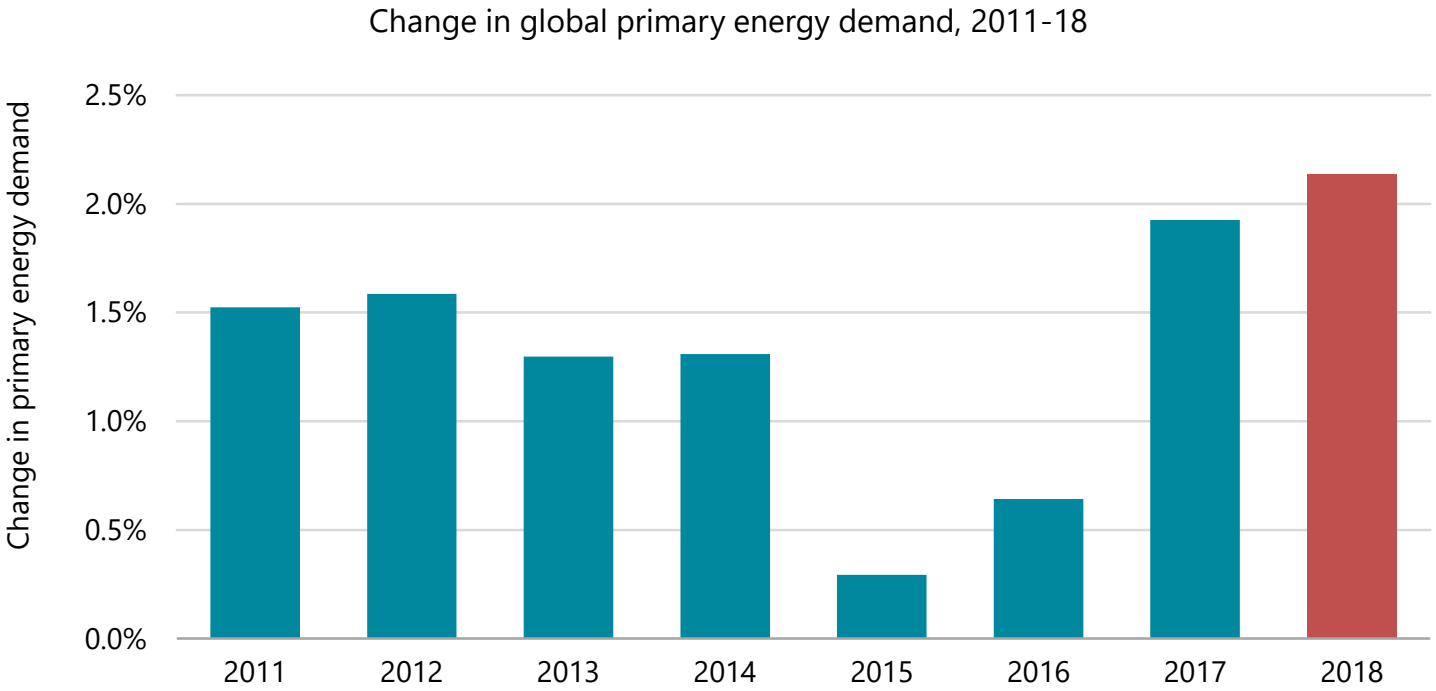
- Establish metrics to track progress and evaluate effectiveness
- Allow for objective judgement of policy/programme
- Data required should be established at start of programme
- Structured collection process is necessary
  - Company reporting is essential
- Provides evidence of policy benefits for other countries

Indicators can be developed at different levels

GDP - Gross Domestic Product
GVA – Gross Value Added

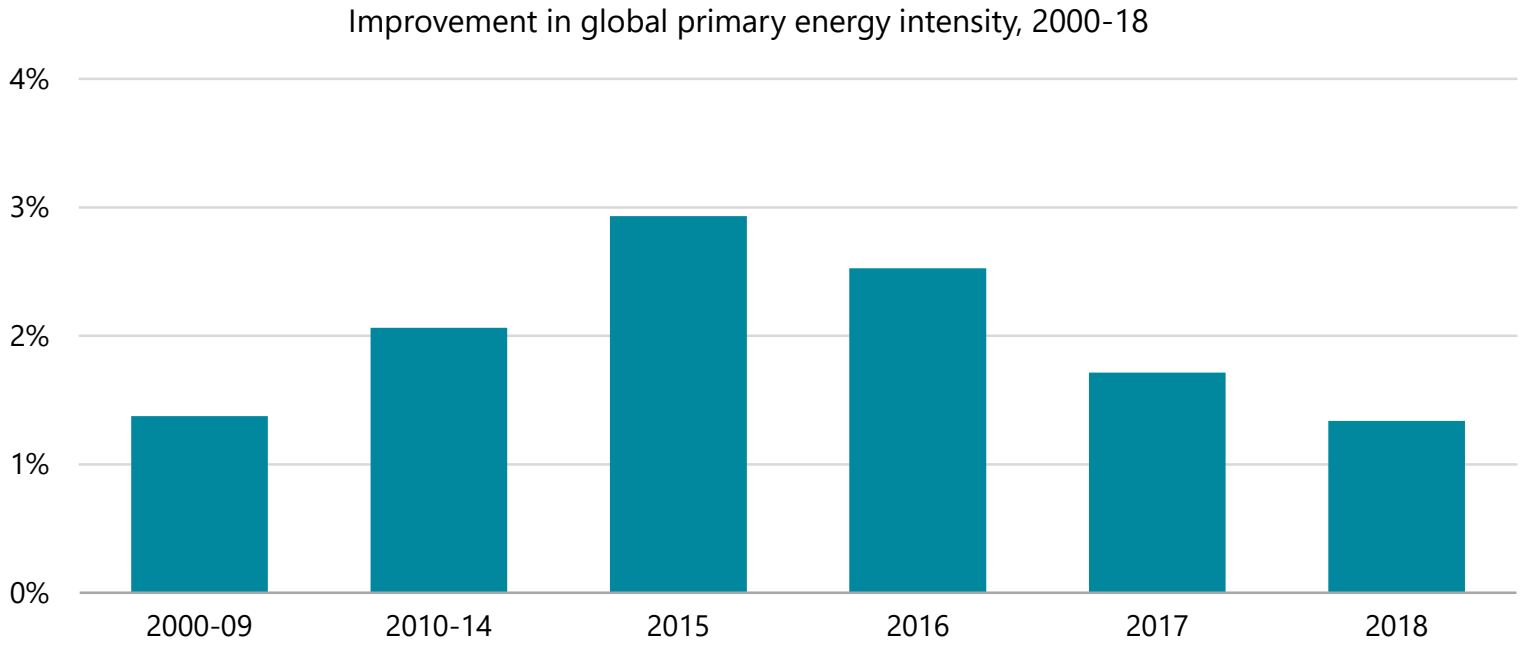


Global energy demand is on the rise again



Global energy demand rose by over 2% in 2018, the fastest rise this decade, driven by economic growth and continuing changes in consumer behaviour.

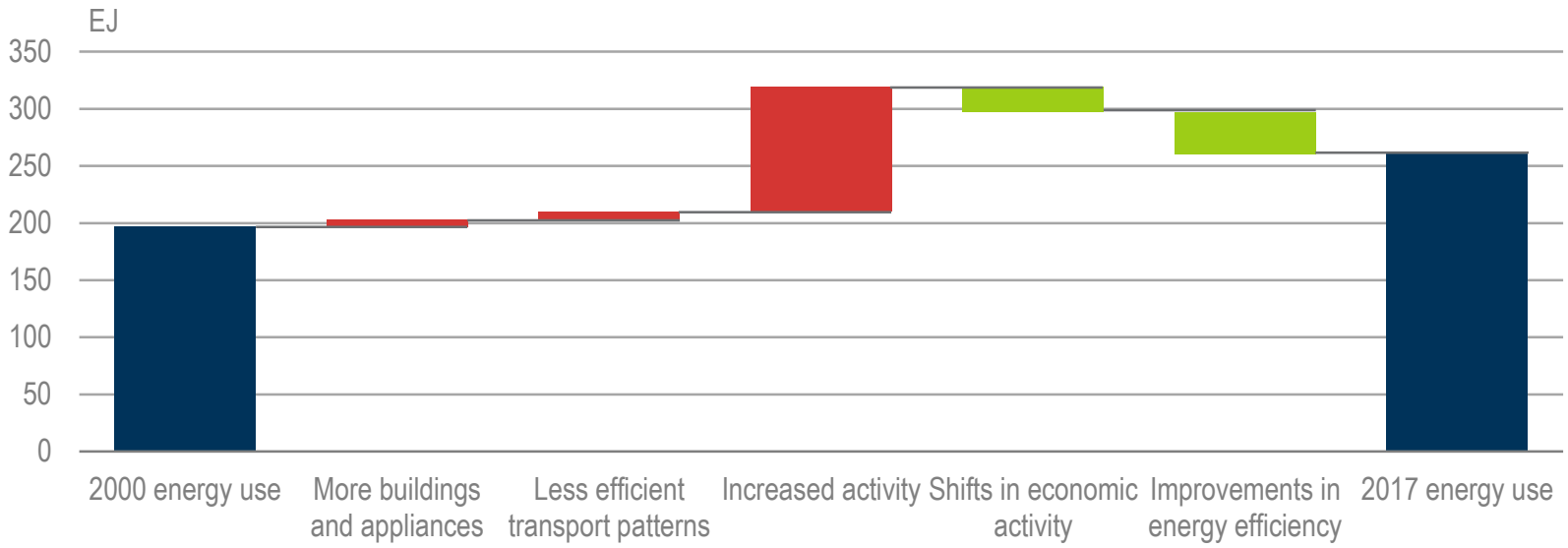
Primary energy intensity improvements are slowing



Improvements in global primary energy intensity have been slowing since 2015

What factors are influencing energy demand

Decomposition of final energy use in the world's major economies, 2000-17

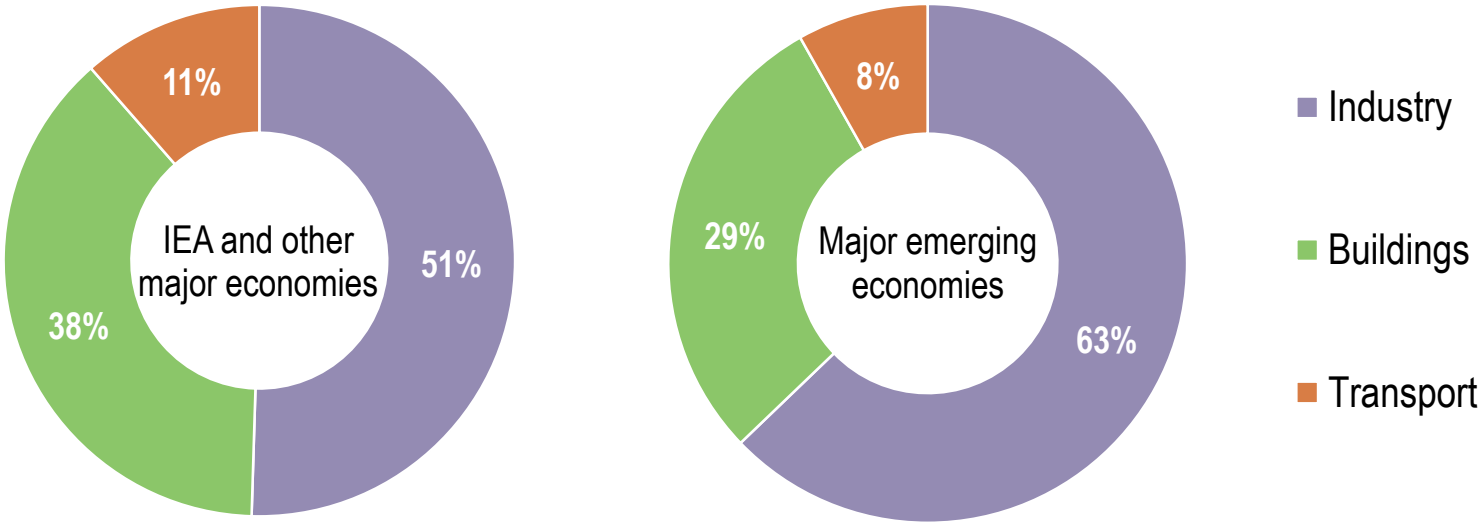


Notes: Major economies are IEA member countries plus China, India, Brazil, Indonesia, Russia, South Africa and Argentina.

Global energy efficiency is improving, but its impact is being overwhelmed by factors that create more demand for energy.

What sectors are contributing to efficiency gains?

Sectoral contributions to energy savings from improvements in energy efficiency



Notes: Other major economies are China, India, Brazil, Indonesia, Russia, South Africa and Argentina.
Major emerging economies are Brazil, China, India, Indonesia, Mexico and South Africa

Industry has made the largest contribution to historical efficiency gains

What does a more efficient world look like?

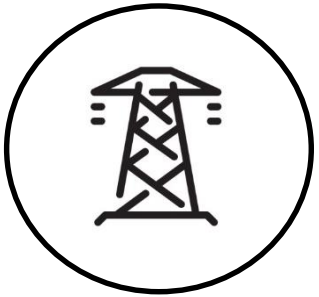
- The world is missing opportunities to improve energy efficiency, policy is not delivering the full potential gains that are available with current technology.

- What is possible with greater efforts on energy efficiency? The IEA's new Efficient World Scenario answers the question:

What would happen by 2040 if countries realised all the economically viable energy efficiency potential that is available today?

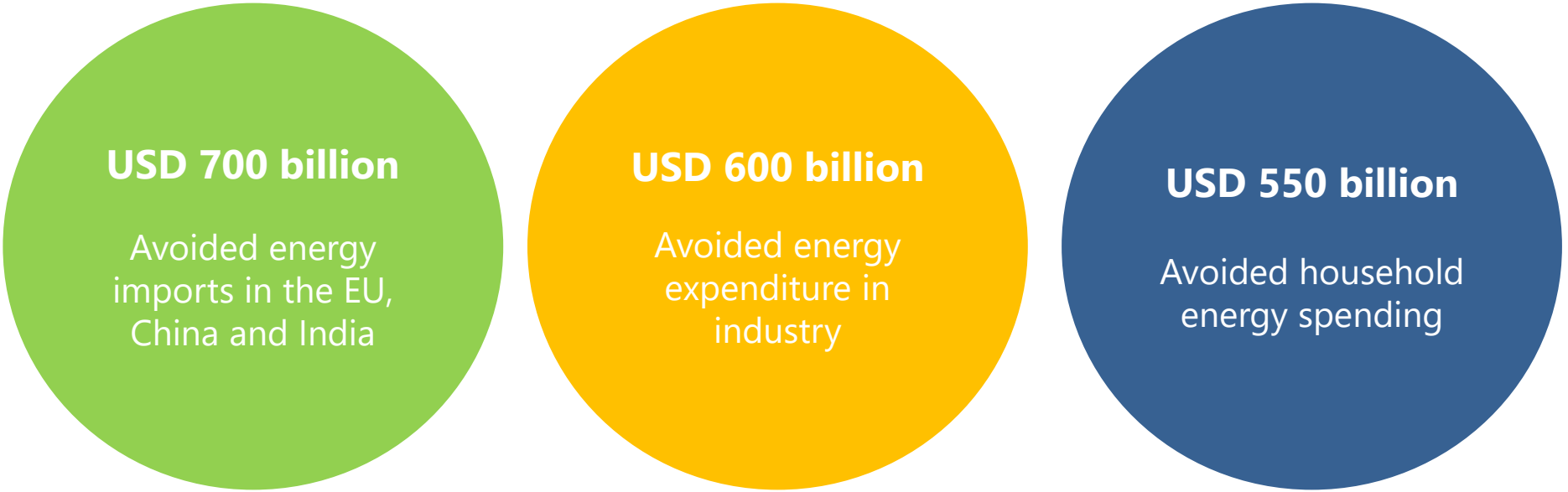
The Economy

The Energy System



The Environment

Efficiency brings benefits to all levels of the economy



The Efficient World Scenario also fully delivers the energy efficiency target (Target 7.3) of the UN Sustainable Development Goals

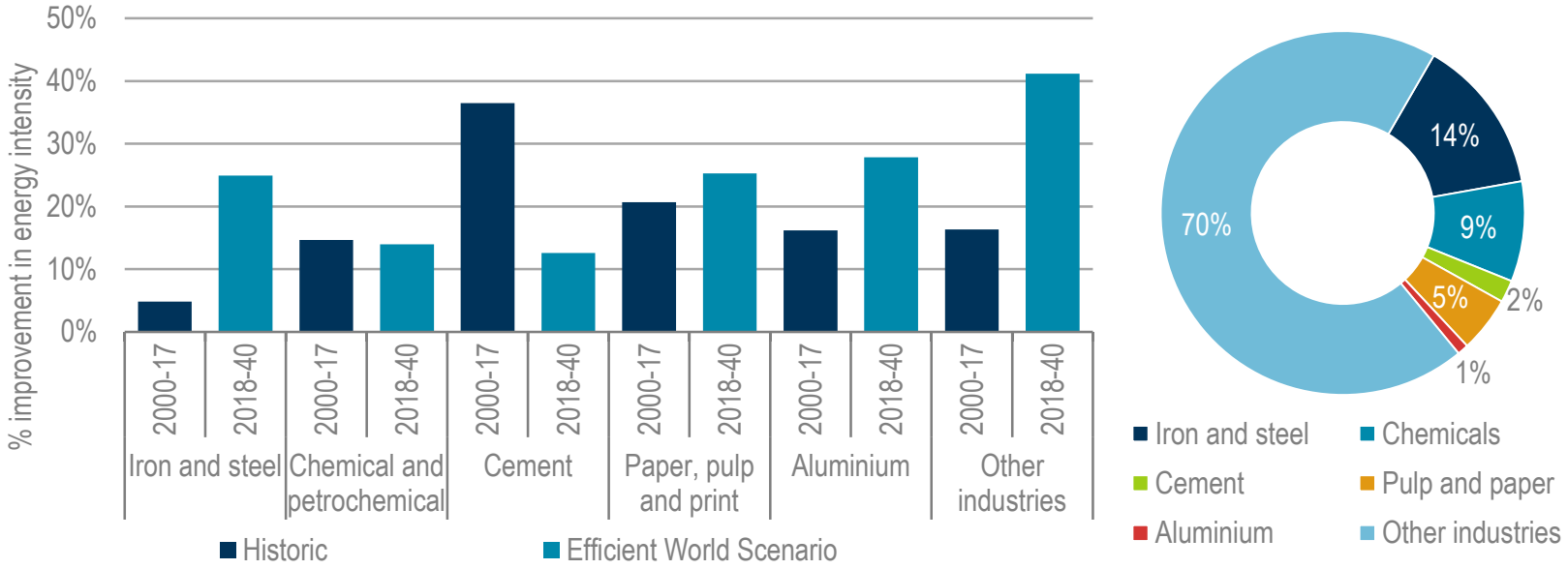
There is significant cost-effective potential in every sector

Cumulative energy savings in NPS and additional potential in the EWS to 2040

The majority of energy efficiency potential across all sectors is realised in the Efficient World Scenario.

Efficiency can improve across all industry sub-sectors

Percentage improvement in energy intensity by industry sub-sector (left) contribution to total energy savings in 2040 (right)



Energy efficiency improvements are possible across all sub-sectors
Light industry (e.g. food beverage and textile manufacturing) represent the bulk (70%) of savings.

Opportunities and policy actions for industry

What is possible by 2040	Key policy actions
	• Expanded and strengthened standards for key industrial equipment, including electric heat pumps and motors. • Incentives to encourage the adoption of energy management systems. • Mechanisms such as industry networks, training and case studies to enhance awareness and capacity.
• Value-added per unit of energy could double. • Less energy-intensive industry offers 70% of potential savings.	

Opportunities created when more data is available

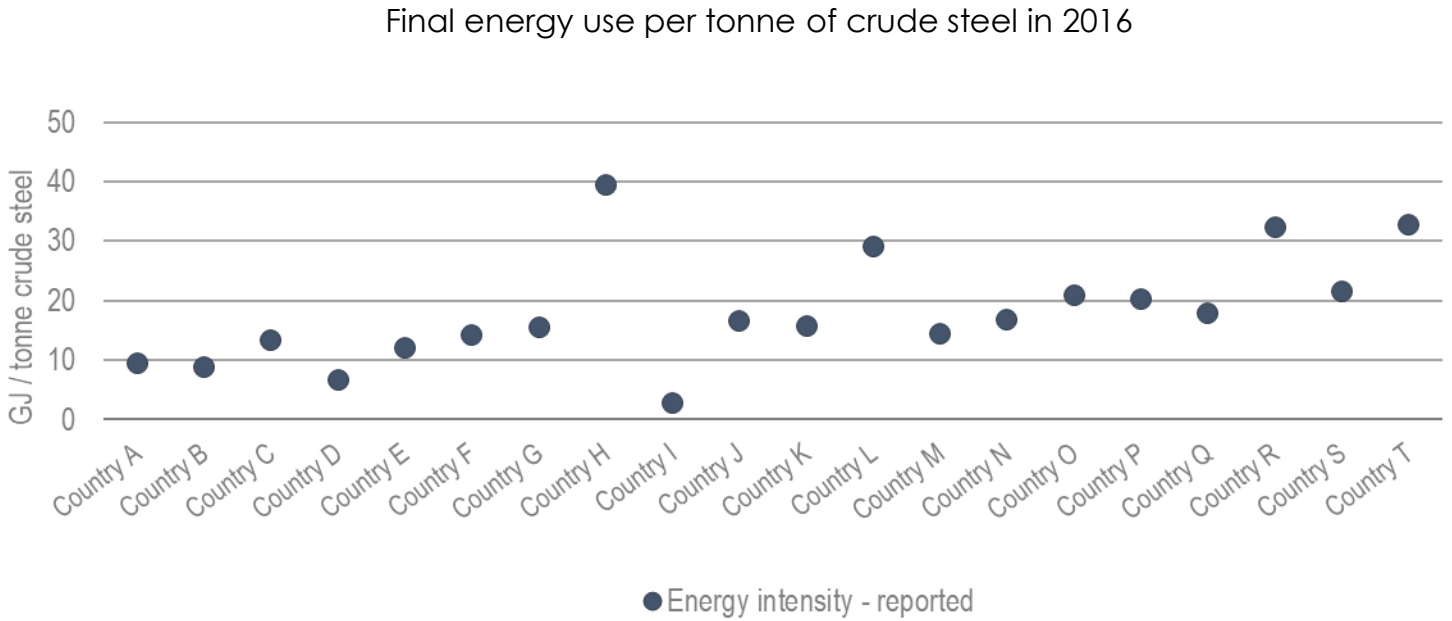
1. What data on industrial energy efficiency do we have available today?

2. What data would we ideally like?

3. Why would these data be useful?

4. How could we get better data in the future?

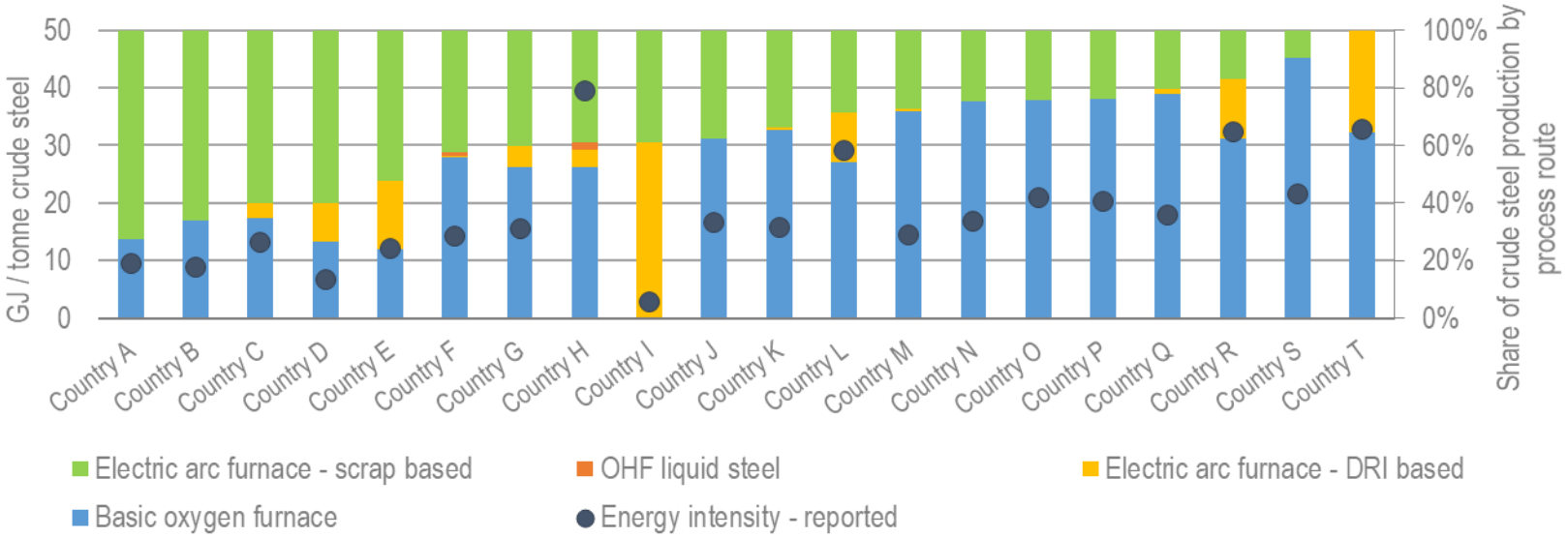
The IEA energy balance provides sectoral energy data…



The IEA energy balance enables us to see how broad sectors perform in energy terms. But due to the complex nature of industrial production, more detailed data is needed to assess energy efficiency.

…but more detailed data provides a fuller picture

Final energy use per tonne of crude steel and share of steel production by process route in 2016



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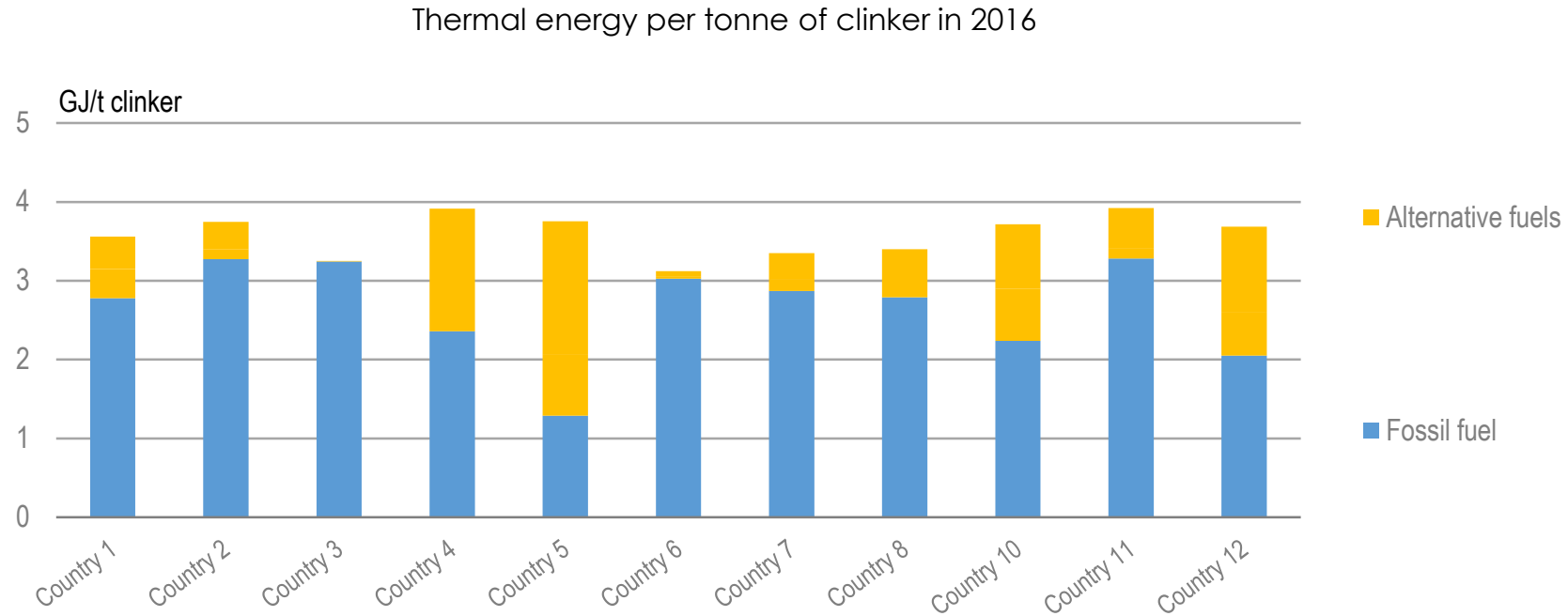
External data sources can provide additional details…



Using data from other data sources can provide more detail. However, for industry there are often limitations with this data as well.

…but this data also has limitations.

Region / Country	Year	Nb companies	Nb plants	GNR Cement production	Total cement production	Coverage
World	***2017***	***48***	***879***	***822078249***	***4224782640***	***19%***
Geographical	2017	48	877	821586586	4224782640	19%
Austria	2017	6	7	4191141	5168731.56	81%
Brazil	2017	6	55	36514895	53540000	68%
Canada	2017	4	18	12917095	11930000	100%
Czech Republic	2017	4	6	4127572	4077000	100%
Egypt	2017	5	10	25993839	64300000	40%
France	2017	4	39	17311580	17039000	100%
Germany	2017	6	57	34736068	34428000	100%
India	2017	8	107	157261399	297680000	53%
Italy	2017	5	45	15906238	19549000	81%
Philippines	2017	4	15	19978334	26000000	77%
Poland	2017	7	14	17356873	15667900	100%
Spain	2017	6	29	10433912	21118000	49%
Thailand	2017	3	12	37178139	35670000	100%
United Kingdom	2017	4	13	8688637	9280000	94%
United States	2017	10	83	70706585	86560000	82%

Using data from other data sources can provide more detail. However, for industry there are often limitations with this data as well.

Better data could provide multiple benefits

- Improved energy efficiency benchmarking, which enables:
  - Identifying best performers and sharing best practices
  - Setting regulatory targets
  - Identifying opportunities for improvement and pushing for better performance
- Tracking progress
- Energy modelling and analysis, for understanding future CO2 trajectories
- Additional sectors in particular in the less intensive sectors will be key to unlock most of the savings.

There are several possible paths to better data

- Collection directly from countries (for example, hosted by the IEA):
  - Could be incorporated into existing or new IEA data collection
- Better support from countries for reporting to industry associations:
  - Could improve coverage of existing data sets
  - Could help resolve confidentiality concerns and enable more data to be made publicly available

What is an evaluation

- A systematic and **objective** assessment of an ongoing or completed project, programme or policy, its design, implementation and results

- The aim is to determine the relevance and fulfilment of **objectives**, **efficiency**, **effectiveness**, **impact** and **sustainability**

Why evaluate?

- Document and report results and benefits
  - Meet requirements
  - Gain support for programme continuation or expansion
  - Get more companies to participate in the programme
- Identify ways to improve current and future policies or programmes
- Support energy demand forecasting and resource planning

Types of evaluation

- Impact evaluation asks the question: ”what happened?”
  - Includes direct and indirect benefits, energy and demand savings, multiple benefits
- Process evaluation asks the questions: ”what was done and how did we do”
  - Includes operations and scope for improvements, satisfaction levels, participatio
- Cost effectiveness evaluation asks: ”what impact did we have relative to our investment?”
- Market evaluation asks the question” ”what happened in the market?”
  - Including how supply of energy efficiency technologies and services has been affected)

Typically evaluations combine impact + process + cost effectiveness.

Steps in an evaluation

Secure resources (should be done at the outset of the programme)

1. Set the objective and review needs
   - Which audience(s)
   - What are the evaluation questions
   - What do we know
   - What do we need to find out
   - How will we source data
2. Terms of reference
3. Select who will carry out the evaluation
4. Manage the development of the evaluation design
   - Methodologies
   - Scope, boundaries
5. Manage the development of the evaluation work plan
6. Manage the implementation of the work plan, including the production of report(s)
   - Data collection, analysis, synthesis, interpretation
7. Use results, disseminate report and support use of the evaluation

Evaluation examples – assessing net benefits

Ireland SME programme 2007 - 2010	
Participants	1470
Public budget	USD 1.3 million
Average energy reduction per company	10%
Cost per kWh saved to 2020	USD 0.020
Cost per kWh saved to 2030	USD 0.008
Value emission abatement to 2020	USD 44 million
Value of emission abatement to 2030	More than USD 88 million
Emissions abated to 2030	Almost 1800 $ktCO_2$
Net benefit to society in 2020	USD 178 million
Net benefit to society in 2030	USD 425 million
Net benefit per USD 1 spent by authority to 2020	USD 16.5
Net benefit per USD 1 spent by authority to 2030	USD 36

Link

Evaluation examples – Small incentives big results

Swedish energy management programme 2004-2009	
Participants	100
Tax exemption value	EUR 15 million/year
Expected annual electricity savings	0.6 TWh
Achieved annual electricity savings	1.45 TWh
Measures implemented	1247
Private investment	EUR 70 million
Value of electricity saved per year	EUR 70 million

Link

After the evaluation – scaling up

Your evaluation shows that your pilot programme is successful and cost effective. You have covered 32 companies and 8% of national industrial energy use. What will you do next?

Scaling up

What does scaling up mean?

- Same sector more companies
- Same companies more implementation
- Same approach different sector
- Same approach more companies
- Using lessons learned to develop new approach to reach more companies and get more implementation
- New and innovative approaches for bigger coverage & greater efficiency

What is the end goal?

- Mainstreaming industrial energy efficiency - to business as usual – and no need for industrial energy efficiency programmes

Perform, Achieve, Trade (PAT) in India

- During first programme cycle, all sectors over-achieved their targets
  - 400 companies from 8 sectors
  - Energy use reduced by 5.3%, target was 4.1%
- Based on results PAT programme now being expanded for 2nd cycle
  - More companies and sectors (621 corporations from 11 sectors)
  - Financial support to encourage greater implementation

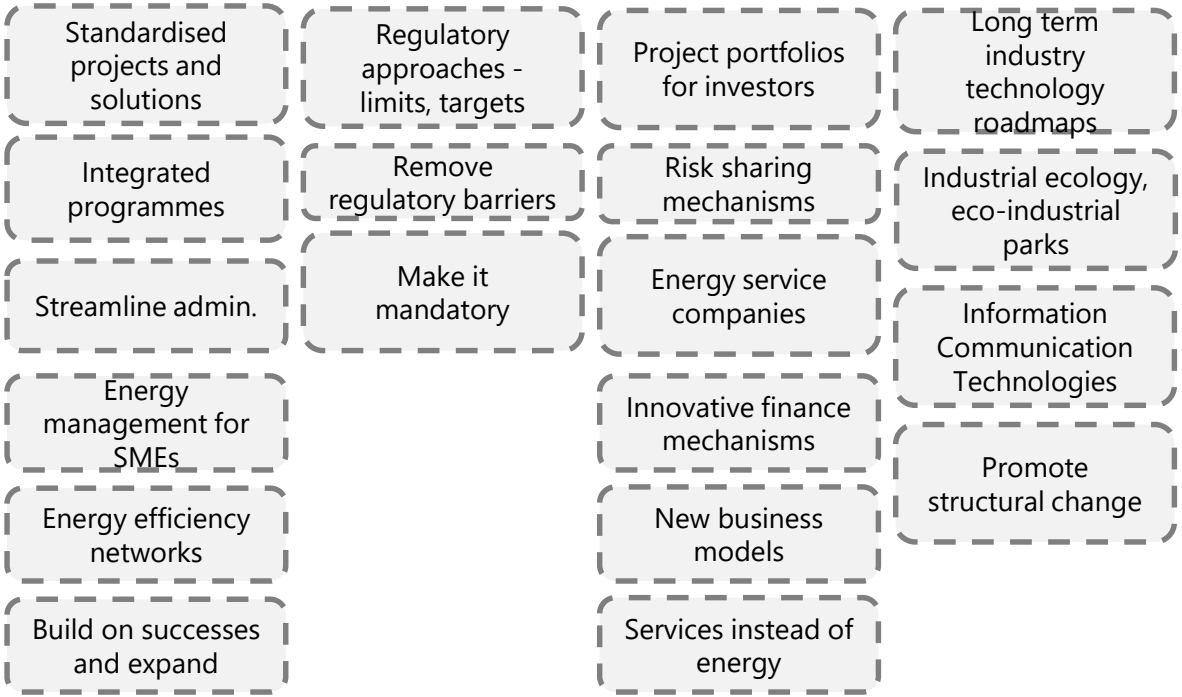
PAT programme results

Targets and achievements in the first cycle of the PAT Programme, 2012-15 (BEE, 2017)

Sector	Target (million toe)	Achievements (million toe)	% above target	% over achievement	Number of ESCerts (millions)
Power (thermal)	3.21	3.06	-5%	-5%	3.8
Iron and steel	1.49	2.10	29%	41%	
Cement	0.82	1.44	43%	76%	
Aluminium	0.46	0.73	38%	59%	
Fertiliser	0.49	0.83	42%	73%	
Paper and pulp	0.12	0.26	54%	117%	
Textile	0.07	0.12	45%	71%	
Chlor-alkali	0.05	0.13	58%	100%	
Total industry	6.68	8.67	23%	30%	

CASE STUDY

Upscaling or new approaches to scale up savings



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