Energy Efficiency Training Week

Making the case for industrial energy efficiency policy

Industry Stream

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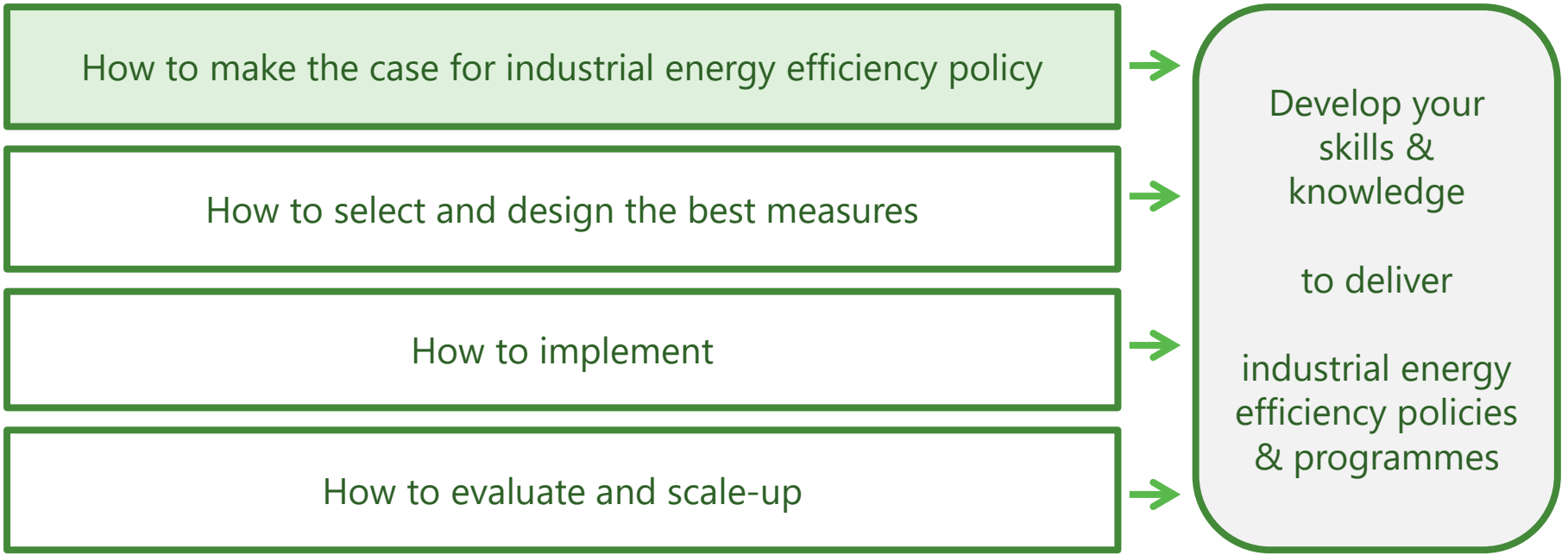
IEA #energyefficientworld

Link between training content and objectives



Learning outcomes

This session will focus on developing your capabilities to:

- Establish the barriers to energy efficiency in your country context
- Set meaningful programme objectives
- Identify other relevant policies and programmes that can complement your efforts

These are all important factors that help you to make a compelling case and rationale for an industrial energy efficiency policy or programme.

What is industrial energy efficiency policy?

- A set of strategies, legislation, measures, programmes that together stimulate energy efficiency improvement in the industrial sector.
- The industrial sector includes very large energy users …

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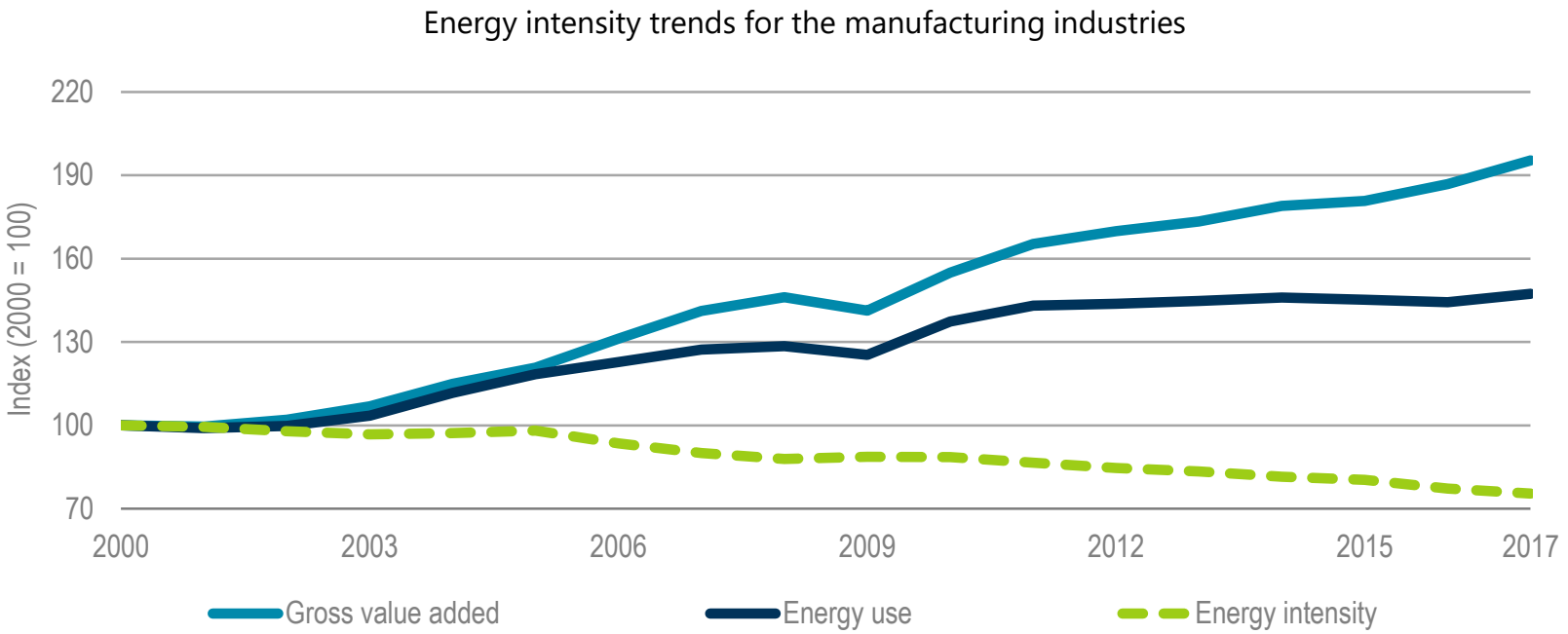
- The industrial sector includes very large energy users …
- And small and medium-sized enterprises in sectors that collectively consume significant energy.

Industrial energy demand is important

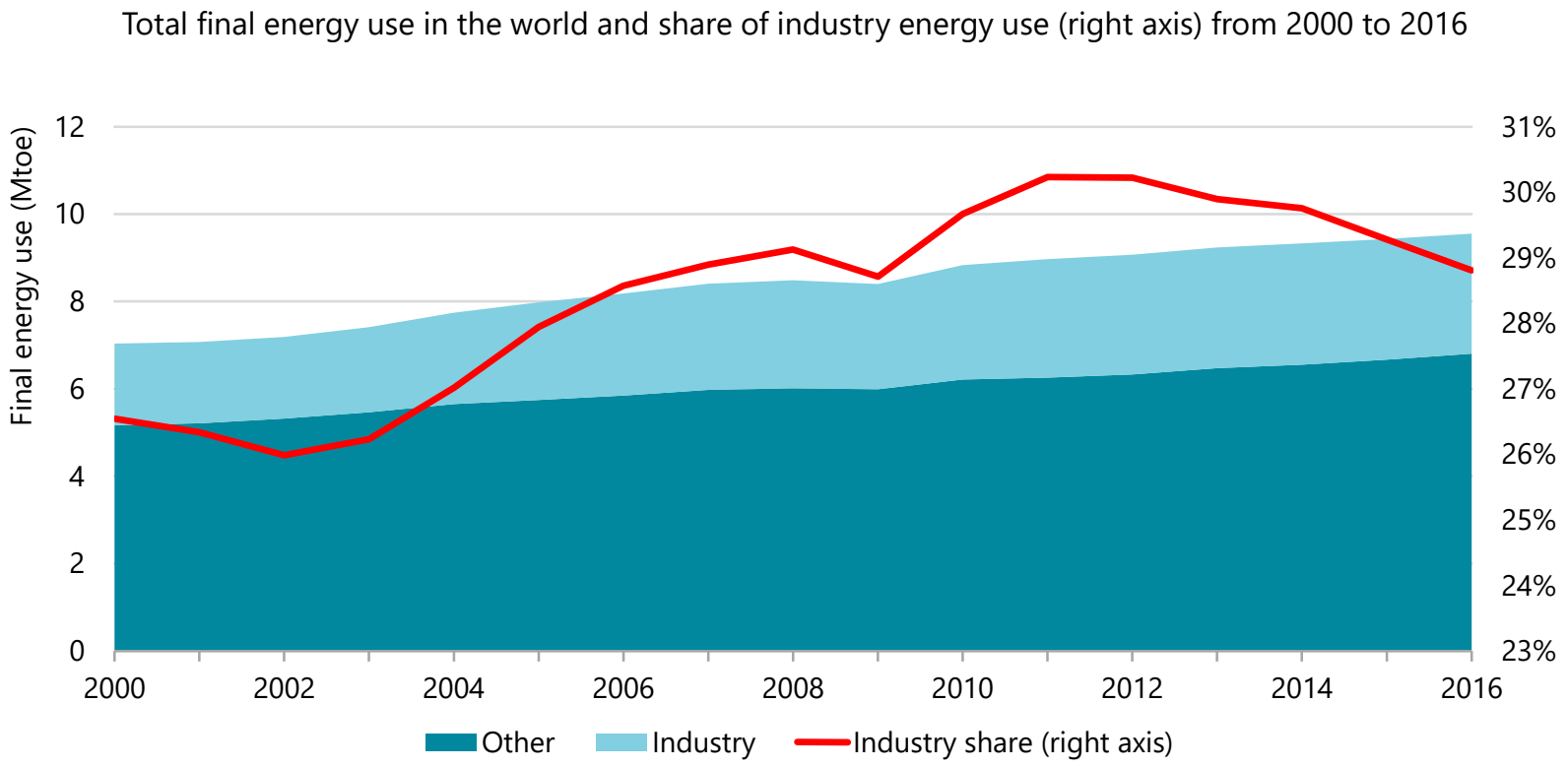
- 24% of global CO_2 emissions in 2016
- Consumption has grown by about 1.3% annually since 2010 (industrial sector value-added has grown by 2.9%)
- Highest energy demand growth in 2010 to 2016 period occurred in India (4.7%), South Korea (2.7%), China (2.6%), and the Middle East (2.5%)
- Global industrial productivity (industrial value-added per unit of energy used) has increased by 1.6% annually from 2010 to 2016

Industrial energy demand trends



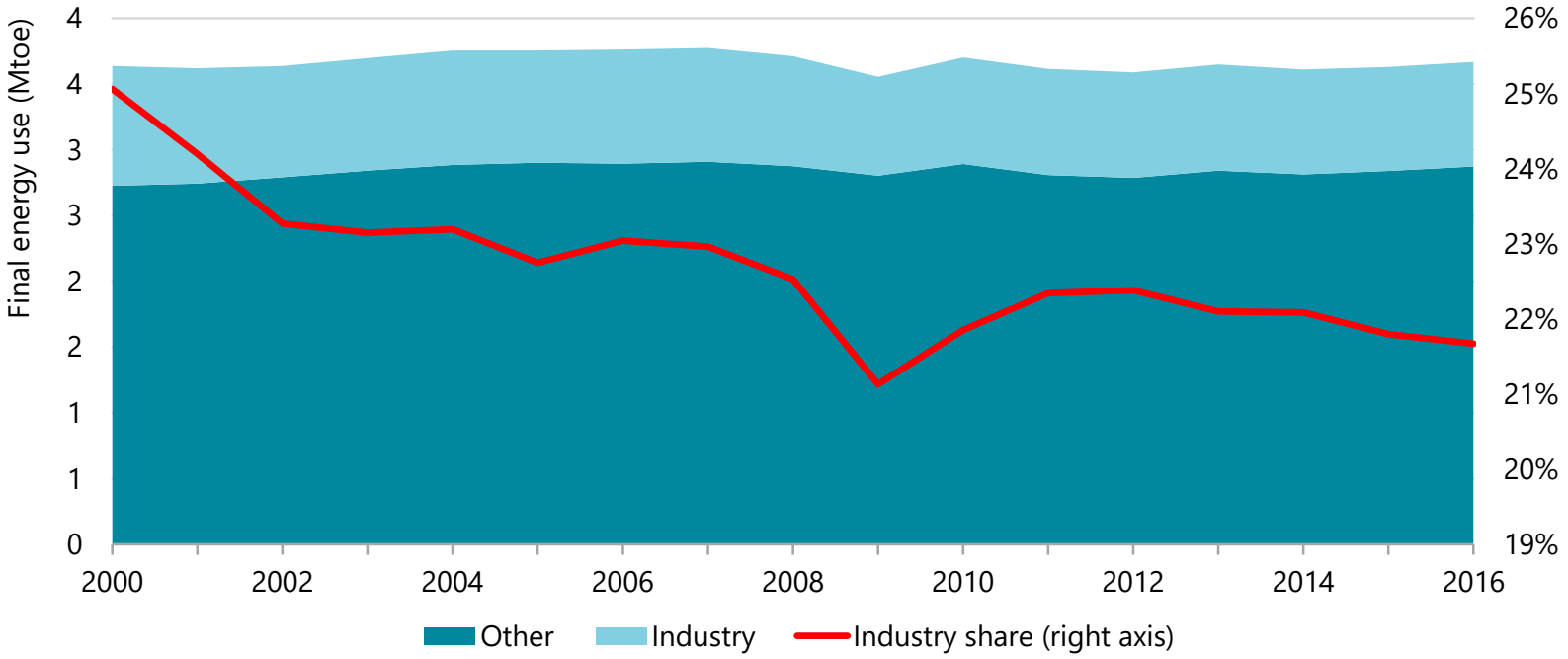
Countries covered for trends from 2000-17 are IEA members plus Argentina, Brazil, China, India, Indonesia, Russian Federation and South Africa. Industry energy intensity in the NPS and EWS is calculated on the basis of energy use per unit of gross value added (GVA), measured on a purchasing power parity basis in 2016 US dollars. Source: IEA *Energy Efficiency 2018*

Global industrial energy use



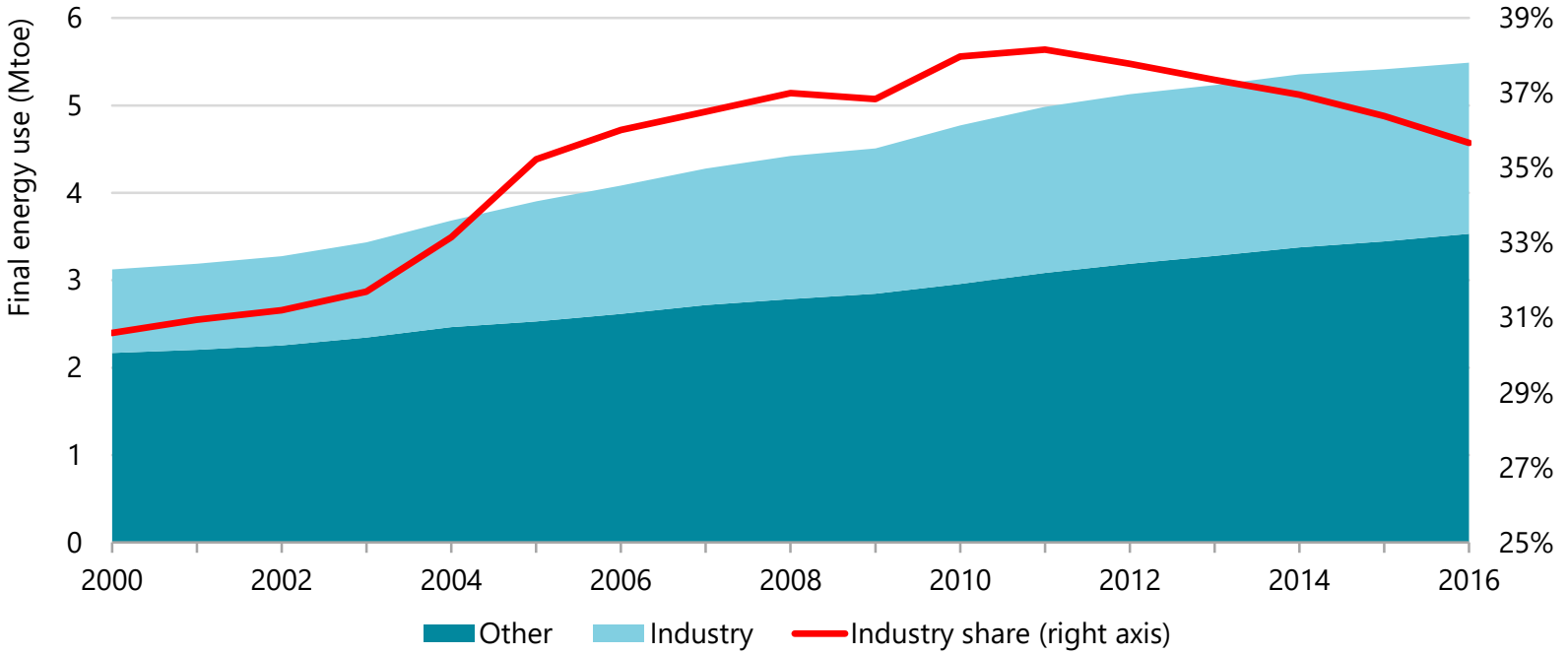
Industrial energy use in OECD countries

Total final energy use in OECD countries and share of industry energy use (right axis) from 2000 to 2016



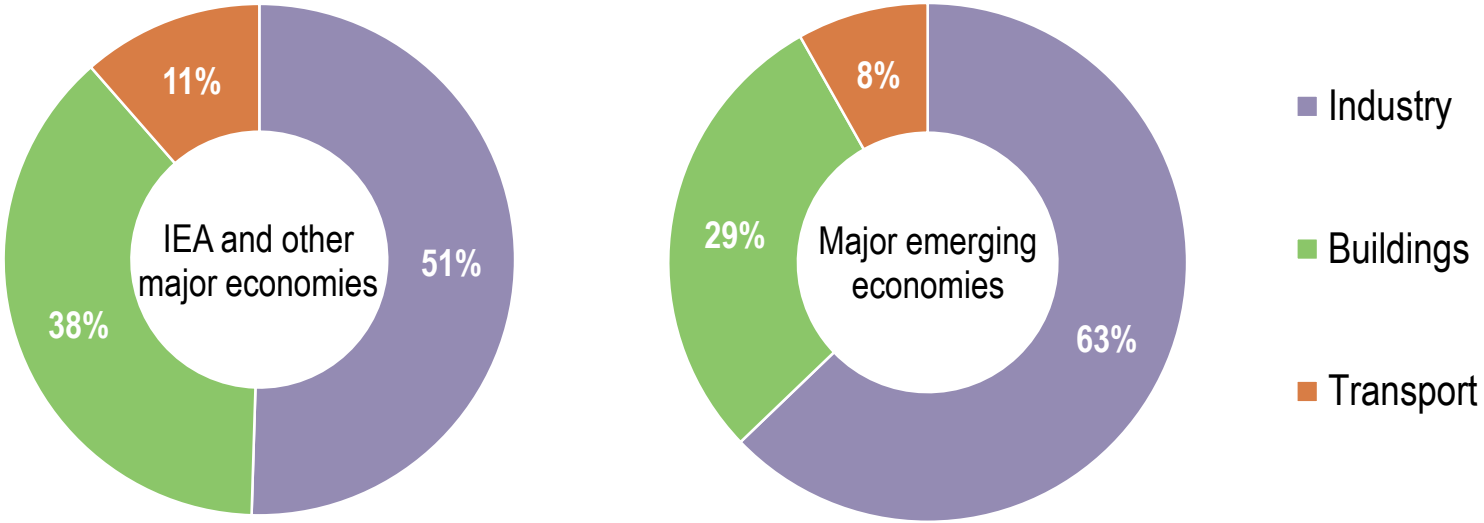
Industrial energy use in non-OECD countries

Total final energy use in non-OECD countries and share of industry energy use (right axis) from 2000 to 2016



What sectors are contributing to efficiency gains?

Sectoral contributions to energy savings from improvements in energy efficiency

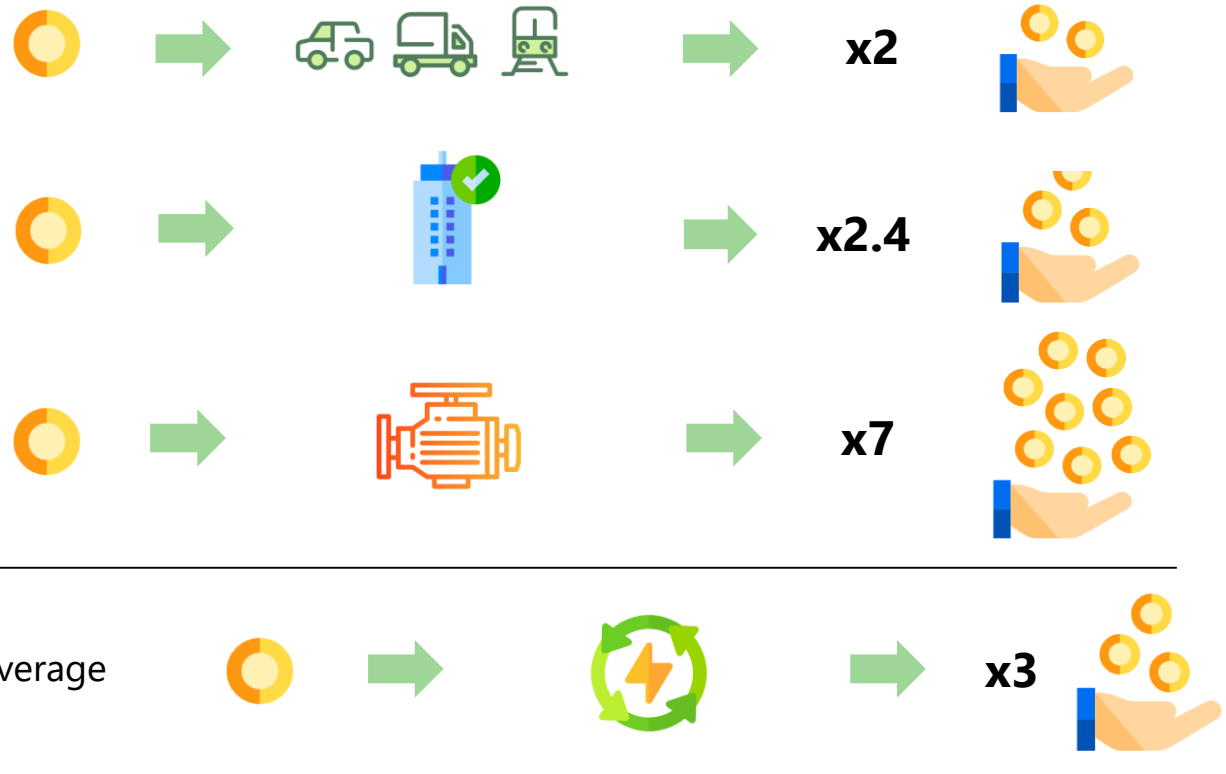


Notes: Other major economies are China, India, Brazil, Indonesia, Russia, South Africa and Argentina.
Major emerging economies are Brazil, China, India, Indonesia, Mexico and South Africa

Industry has been the largest contributor to energy savings, particularly in major emerging economies. Buildings have made a larger contribution in advanced economies, with transport smallest

Investment payback

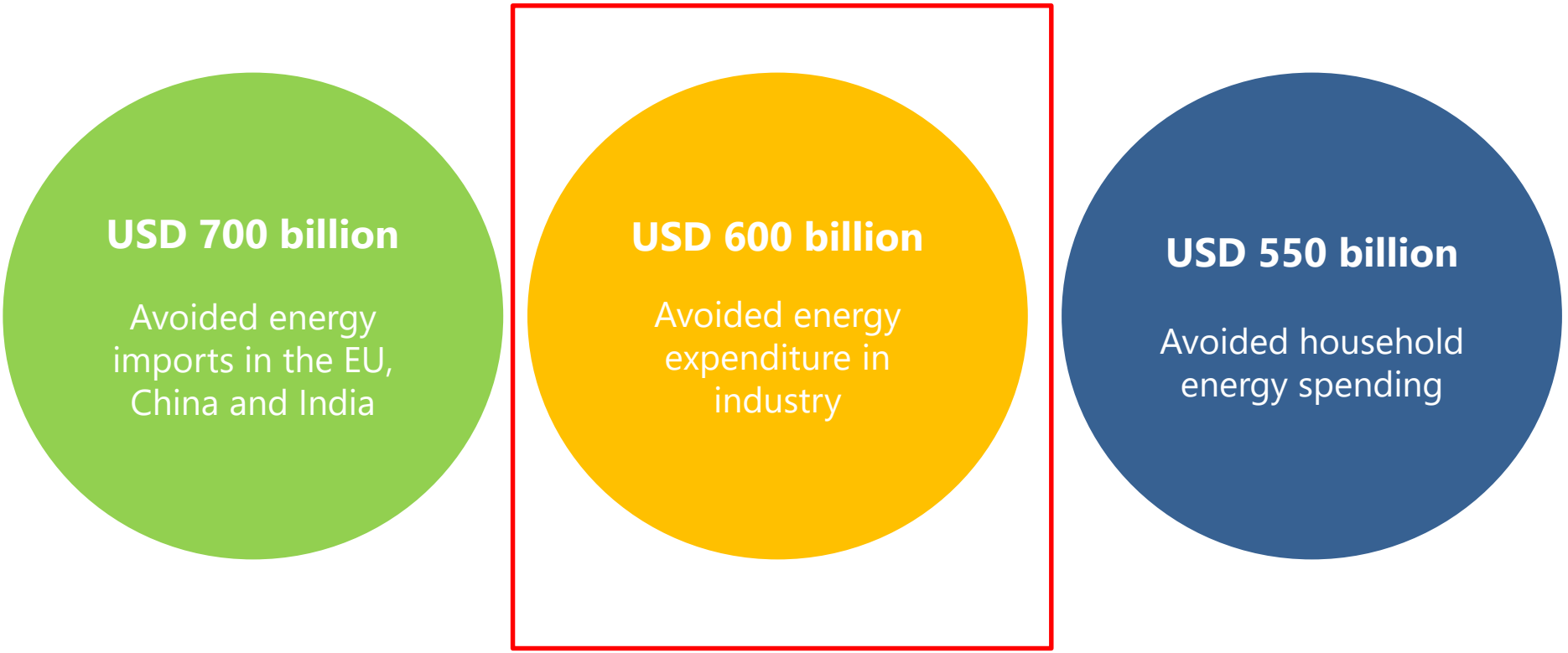
For 1 dollar invested



Over the lifetime of the equipment

On average, one dollar invested in energy efficiency will payback three times in energy saved over the lifetime of the equipment.

Efficiency bring 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

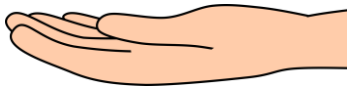
Obtaining support for industrial energy efficiency policy

Energy efficiency is good… but there are many demands on government funding

Minister of finance

Image: Cartoonsmix

Energy efficiency is good

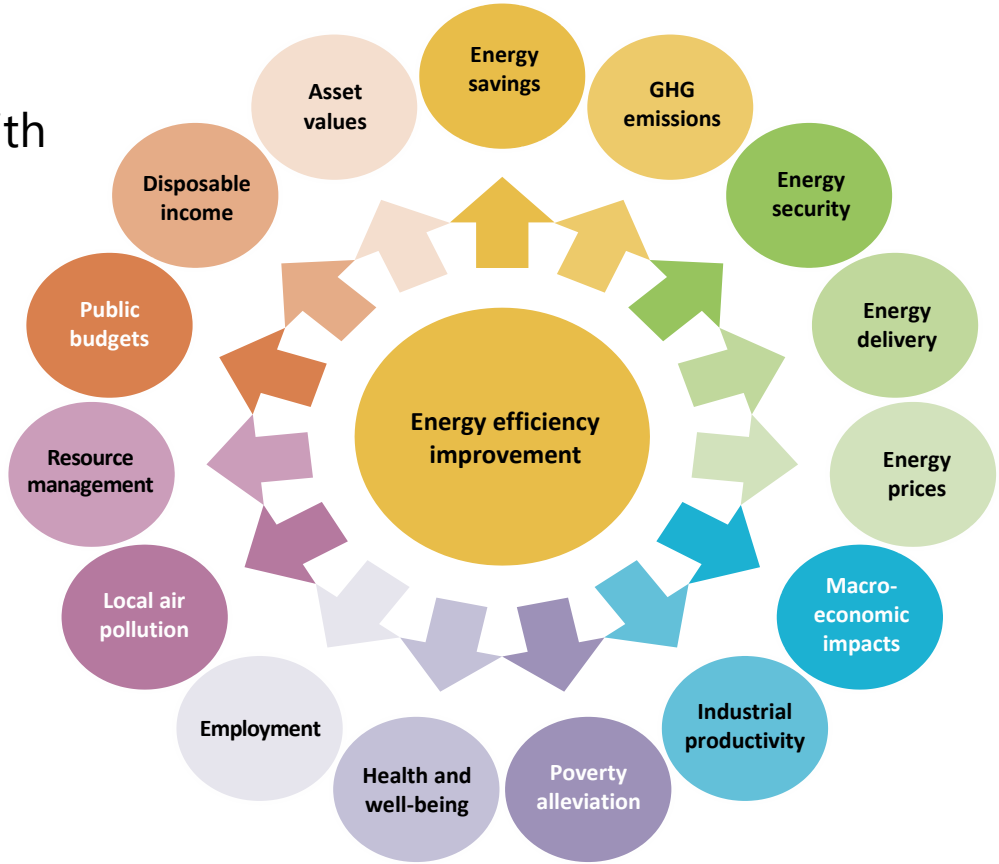


Energy Efficiency Agency

Identify all of the benefits

Build support by aligning your Industrial energy efficiency policy with national priorities!

Multiple benefits



Case study: multiple benefits

- Australian aluminum producer – system optimisation to reduce energy demand – increased production by 3000 tonnes per year (value USD 6 million)

CASE STUDY

Link

Case study: multiple benefits

- Peruvian smelting company (secondary lead)
- Implemented suite of energy efficiency measures including new burner, fuel mix optimisation, upgraded refractory bricks and furnace hood
- Reduced energy (value less than USD 2000) and increased extraction of lead by 34.7 tonnes per year (value almost USD 17000)


Before


After

CASE STUDY

Beyond energy savings – multiple benefits

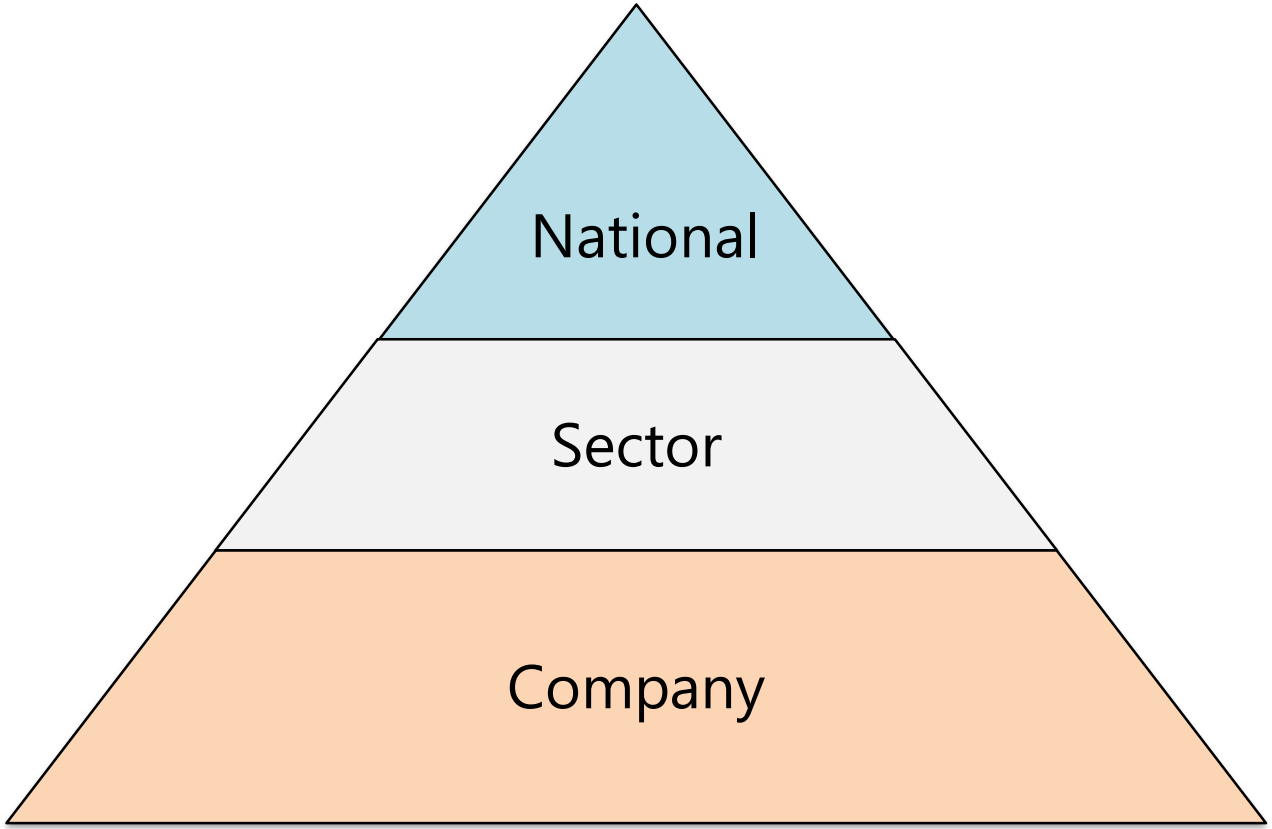
Benefits for companies

- Enhanced production
- Improved product quality
- Reduced liability
- Improved work environment
- Improved working conditions
- Reduced need for maintenance
- Improved environmental performance
- Improved profit margins
- Improved reputation

Benefits for economies

- Reduced pollution
- Reduced environmental impacts
- Deferred need for new power plants and grid
- Lower need for energy imports
- Improved competitiveness of industry

Benefits occur at different economic levels



Select objectives that align with national priorities

Energy efficiency

- Reduce energy use (all types, specific fuels)
- Improve efficiency (not necessarily the same as reducing use)
- Reduce GHG emissions – counteract climate change

Multiple benefits

- Reduce air pollution
- Make environmental improvements
- Improve energy security
- Avoid need for new energy capacity
- Improve security of supply
- Improve competitiveness of industry
- Stimulate innovation
- Stimulate development of service and technology markets
- Create new jobs

Why is policy needed?

- Policy mechanisms including energy management programmes, minimum performance standards for industrial equipment (esp. electric motors) and other policies have contributed to a 20% fall in industrial energy intensity between 2000 and 2016…

Industrial energy efficiency barriers

Information

- lack of access
- too much information
- no time, not a priority
- perception that energy efficiency measures could have a negative impact on production

Capacity

- no internal expertise
- equipment vendors lack skills and incentives
- low external consultant quality (or no consultants)

Industrial energy efficiency barriers

Economic and finance

- lack of internal finance – how return on investment is calculated
- energy efficiency projects not seen as competitive
- no capacity to write bankable projects
- local financial institutions not supportive
- low energy prices

Regulatory barriers

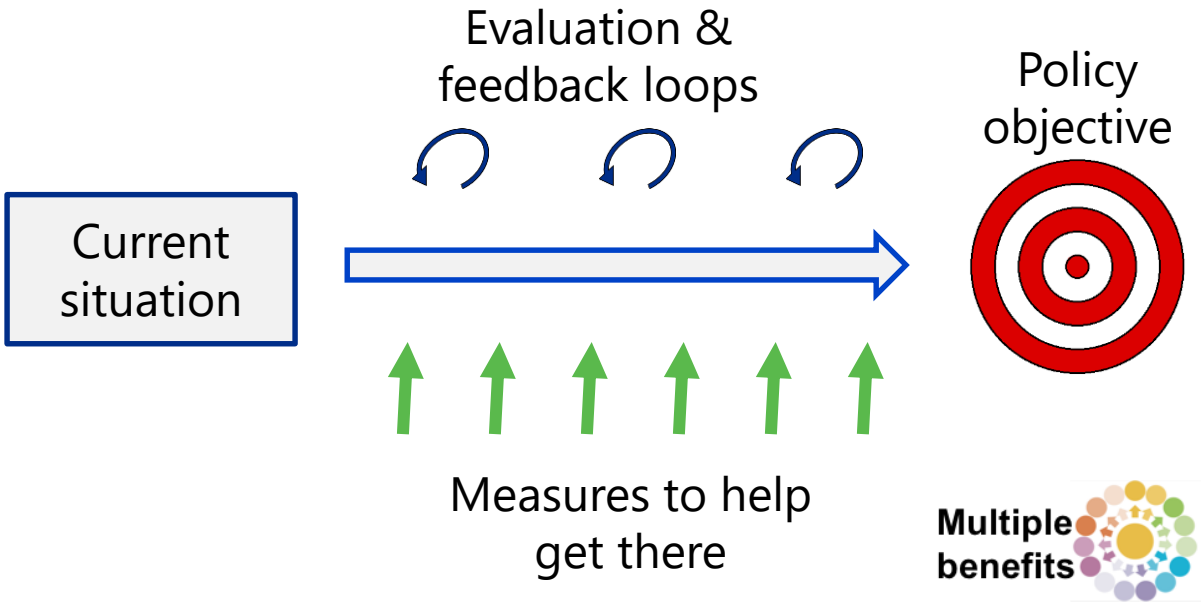
- utility business model
- fossil fuel subsidies

Industrial energy efficiency barriers

What are the key barriers in your countries?

Policy rationale

- Policy makers need to answer a fundamental question … How can policy overcome barriers to deliver benefits?



The role of industrial energy efficiency policy-makers

- Energy efficiency policy-makers have to effectively articulate *why* government intervention is needed and *how best* to intervene

Data that can be used to justify policy intervention

Types of data:

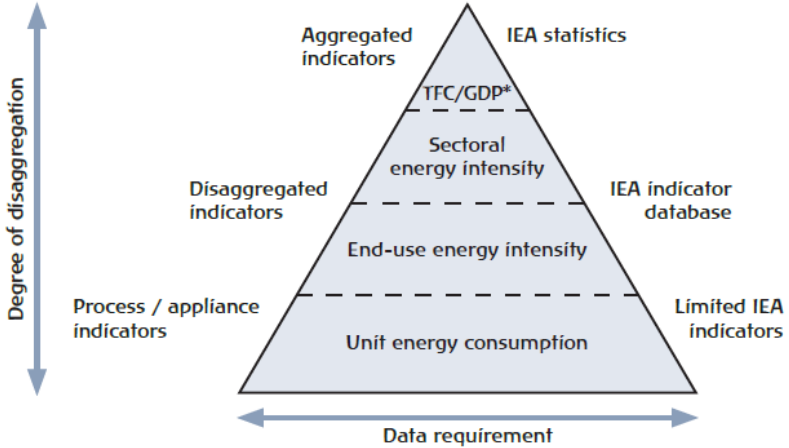
- Data on industrial energy use
- Data on fuel mix
- Data on sector specific use (e.g. energy used by textile industry)
- Data on specific energy use (e.g. energy per ton of clinker)
- Data to assess potentials

Data sources:

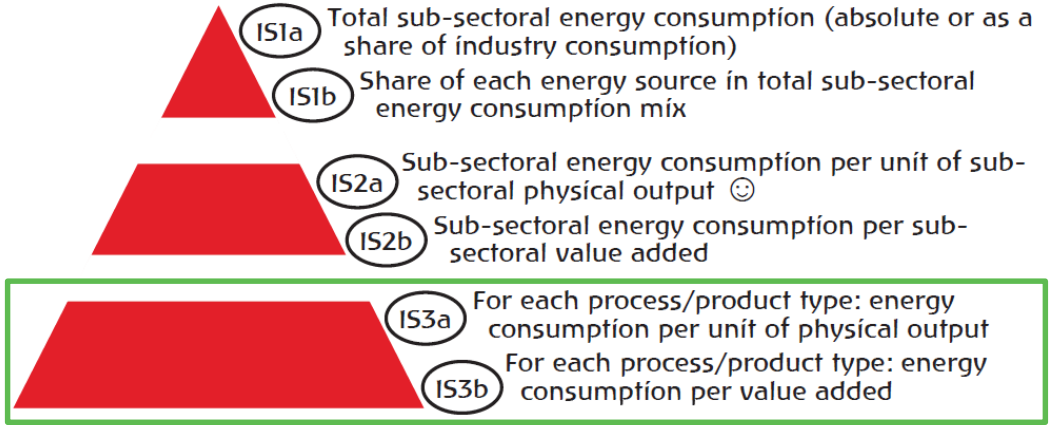
- National statistics
- Data from energy utilities
- Reports from companies (perhaps part of environmental reporting?)
- Samples, surveys
- Data from international organisations and other countries

Benchmarking work – Presentation

Schematic representation of the IEA energy indicators pyramid



Industry sub-sectors indicators



Indicators are key to understand sub-sectors energy consumption and to take actions. The more disaggregated the indicators the higher the amount of data required.

Benchmarking work – Presentation

Typical processes or product types for selected industry sub-sectors

Sub-sector	Processes/product types	Sub-product
Iron and steel	Basic Oxygen Furnace (BOF) Electric Arc Furnace (EAF) Direct Reduced Iron (DRI)	
Chemical and petrochemical	Ethylene Propylene Benzene, toluene, xylene (BTX) Ammonia Methanol Butadiene	
Non-ferrous metals	Aluminium Copper	Bauxite Alumina Primary Recycled
Non-metallic minerals	Cement Clay brick and tile Building ceramics Glass Lime	Clinker (wet and dry) Cement
Pulp, paper and print	Pulp Recovered paper Paper and paperboard	Chemical pulp Mechanical pulp Household and sanitary paper Newsprint Printing, writing paper Wrapping, packaging paper, paperboard

Source: IEA – Energy Efficiency Indicators – Fundamentals on Statistics (2014)

Summary of variables needed for industry indicators and examples of possible sources and methodologies

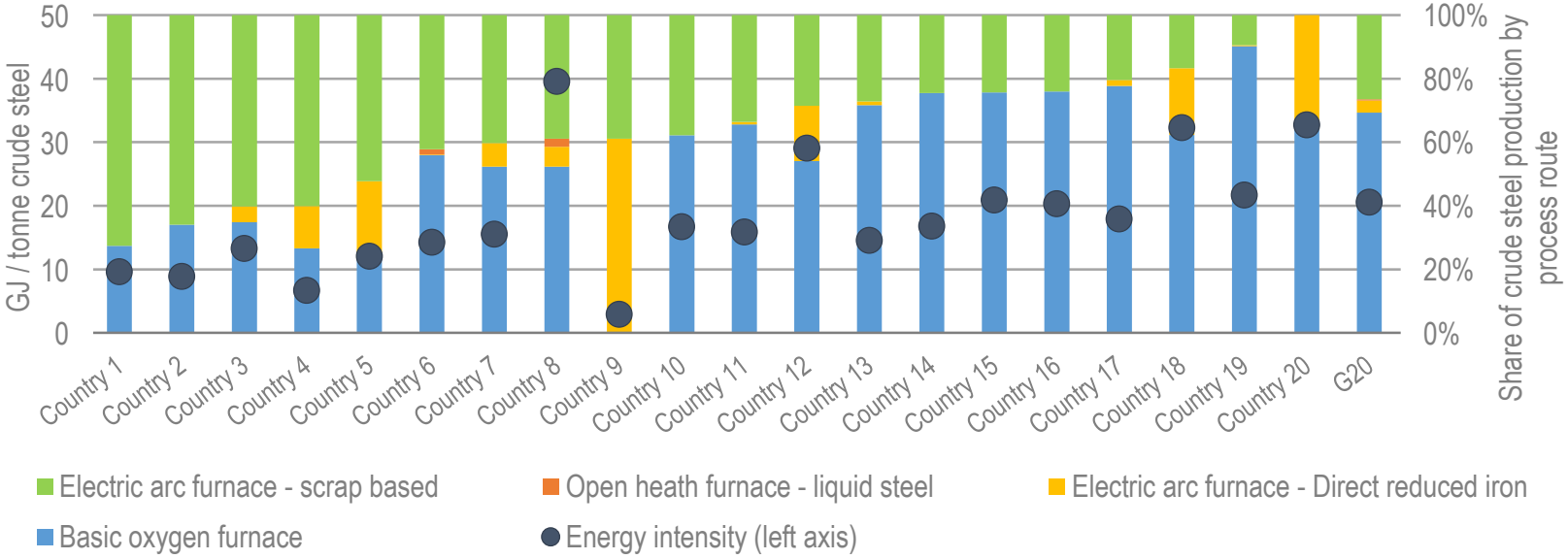
Data	Source	Methodology
Energy data		
Total industry consumption	National energy balance	Administrative sources
Total sub-sectoral consumption	National energy balance Utilities	Administrative sources
Sub-sectoral process consumption	Manufacturers Industry associations*	Facility-level audit Measurements Surveys
Activity data		
Value added	National statistics offices National accounts International sources**	Administrative sources
Sub-sectoral production output	Manufacturers Industry associations*	Measurements Surveys
Process/product type output	Manufacturers Industry associations*	Facility-level audit Surveys
Equipment	Manufacturers Industry associations*	Administrative sources Surveys

Source: IEA – Energy Efficiency Indicators – Fundamentals on Statistics (2014)

The benchmarking work has been focused until now on energy intensive sectors. The two key data required are production and energy use by process route.

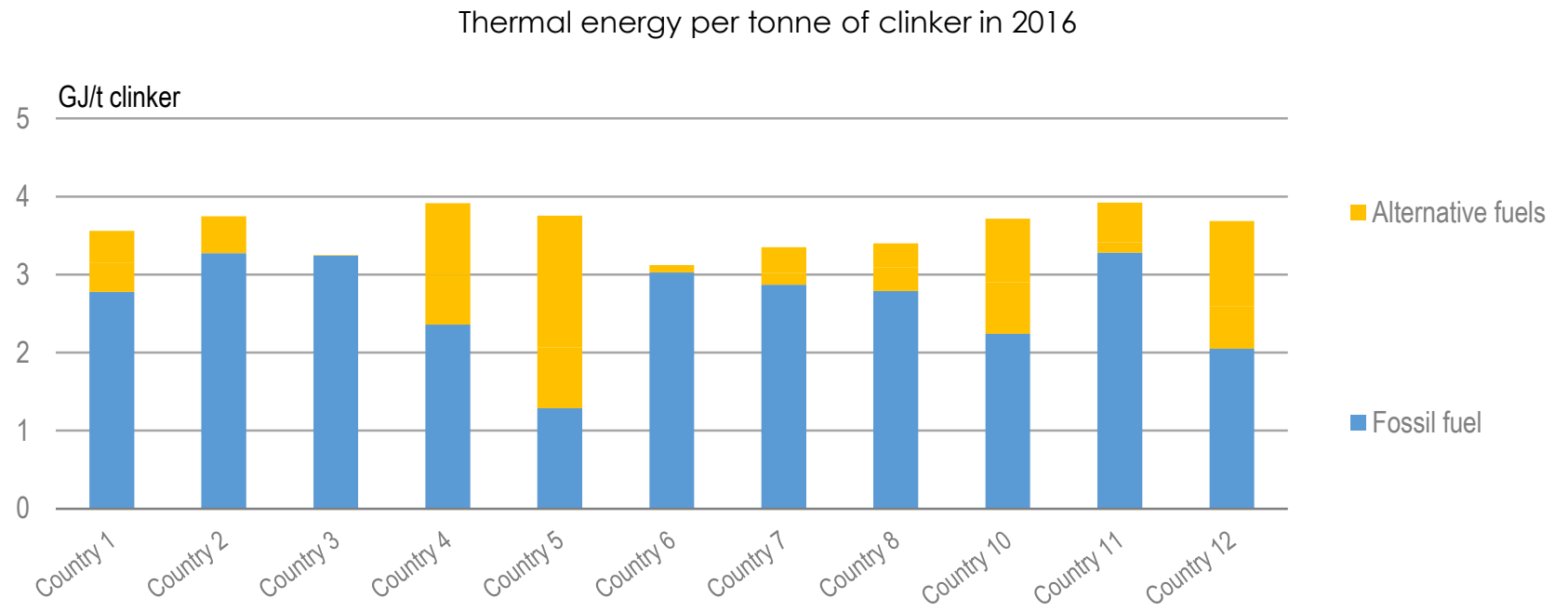
Industrial efficiency varies depending on a range of factors

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



The energy intensity of steel production varies across all G20 countries, as a result of different production routes. Efficiency gains can come from technology, recycling and energy management.

Variation is also observed in the cement industry



Thermal energy intensity of cement production varies across countries depending on the raw materials and the quality of data available.

Return on experience: key steps and challenges

Boundaries

This aspect is key as the industry is an extremely diverse sector; even in the same subsector process can change dramatically. International best practices should be followed both for physical output data and energy use data.

Sensitivity

The sensitivity of these data should be handled in order to ensure that data is compliant. This can be done through networks of industrial corporations, independent sectoral associations (World Steel Association, Sustainable Cement initiative).

Long term

The process established to monitor progress should be based on a long term perspective. This means it has to anticipate how the data will be regularly collected.

International best practices, collaboration and long term approach are essential for indicators and benchmarking analysis to be developed successfully.

Data that can be used to justify policy intervention

- What other types of data are useful?
- What other sources are available?

Map other policies and programmes

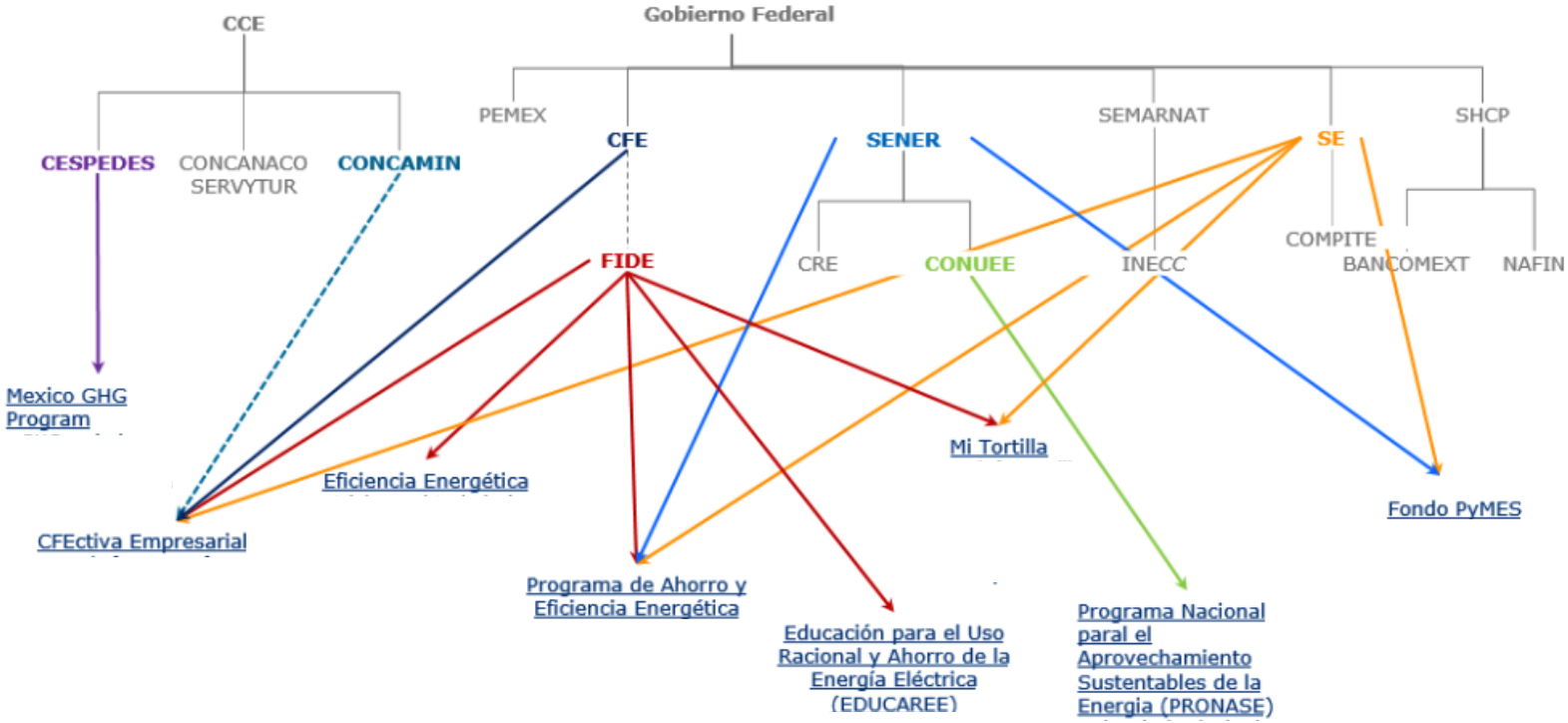
Identify existing policies and programmes

- National policies and programmes (climate, environment, business development, trade development, buildings energy efficiency, equipment energy efficiency)
- State and municipal programmes
- Donor-led initiatives

Analyse existing policies and programmes

- Scope and scale
- Successes & failures
- Possible synergies
- Possible negative impacts
- Duplication risk

Mapping policies in Mexico



CASE STUDY

What could the rationale include?

- ✓ Energy use trends
- ✓ Importance of energy efficiency
- ✓ Objectives
- ✓ Defined target group
- ✓ Energy efficiency potentials
- ✓ Barriers
- ✓ Multiple benefits
- ✓ Measures and mechanisms
- ✓ Mapping of policies and programmes

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What else could be included?

What would convince your stakeholders?

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