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Developing Energy Efficiency Indicators for the industry sector in South Africa – a focus on Pulp and Paper and Automotive industry

23 September 2021

Please share your questions and comments with us!

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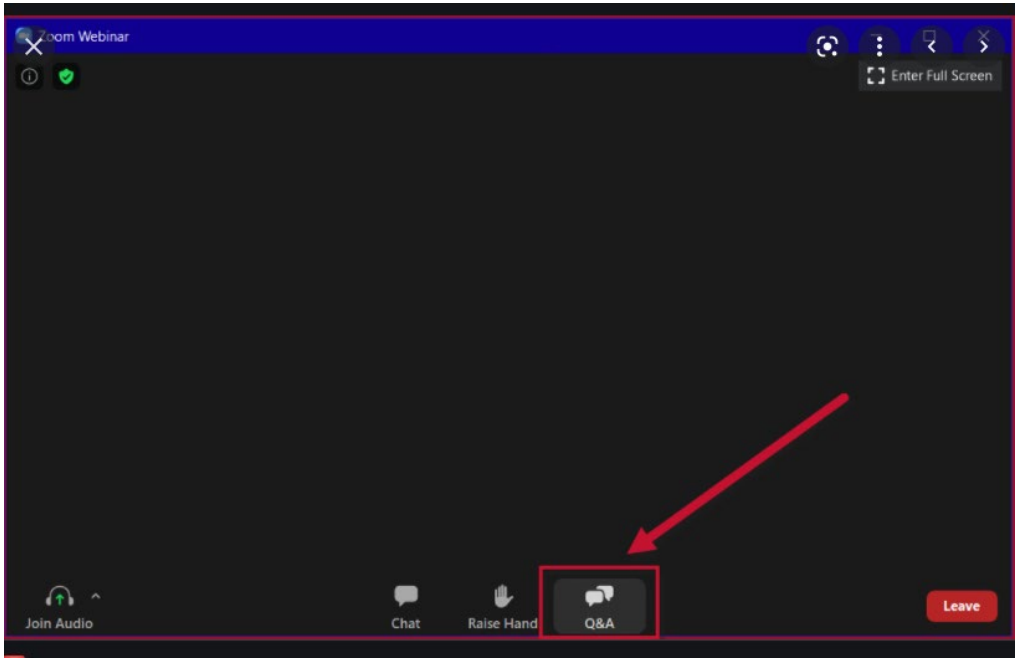

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Opening remarks

Mr. Xolile Mabusela, Director Energy Efficiency Projects, Department of Mineral Resources and Energy

Mrs. Mel Slade, Senior Manager E4 Programme, IEA

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Importance of Energy Efficiency Indicators for pulp and paper and automotive sub-sectors

Thomas Elghozi | International Energy Agency

Developing Energy Efficiency Indicators for the industry sector – a focus on pulp and paper and automotive industry, September 2021

Contents

The industry sector and energy efficiency

- ✓ Economic development
- ✓ Employment
- ✓ Social welfare
- ✓ Competitiveness
- ✓ Largest energy-consuming sector in South Africa

➢ **SDG9:** Build resilient infrastructure, promote **inclusive and sustainable industrialization** and foster innovation

hand in hand with

➢ **SDG7**: Ensure access to **affordable, reliable, sustainable and modern energy for all**

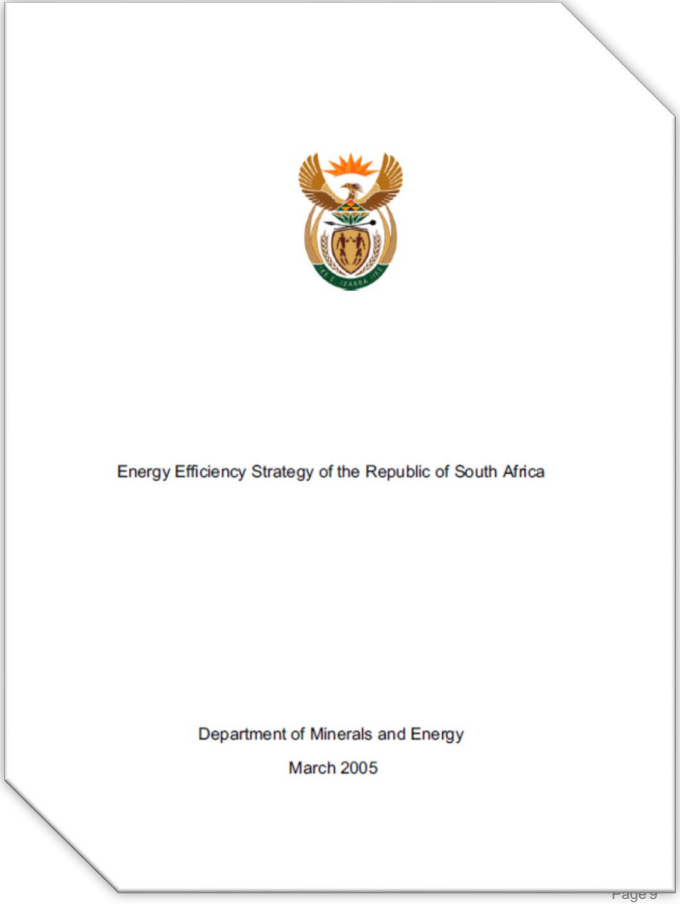
Energy is a key industrial resource: energy efficiency helps meeting SDGs 9 and 7. Tracking it is essential!

Good data for good policies

The case for energy efficiency data and energy efficiency indicators

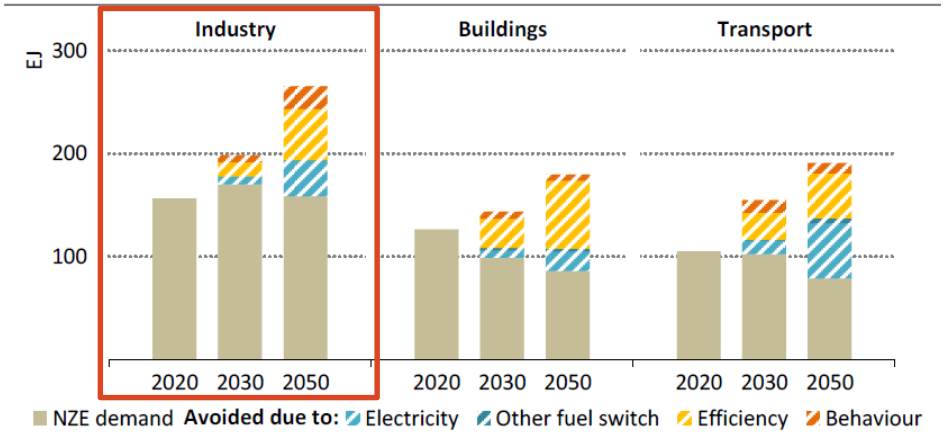
Efficiency data key to monitor progress towards national objectives…

- ✓ The **2005 National Energy Efficiency Strategy** (NEES) included targets for improvements in energy efficiency to be achieved by 2015 relative to the year 2000.
- ✓ Targets defined in terms of the reduction in final energy demand, and were set at the economy-wide level (12%) and also for some specific sectors (e.g. **industry & mining – 15%,** commercial & public – 15%, residential – 10%, transport – 9%).
- ✓ The **energy intensity** (energy use/VA) of the **industry & mining sector** decreased by 34% between 2000 and 2012.
- ✓ **Can we be sure of how much is attributable to efficiency? Why?**

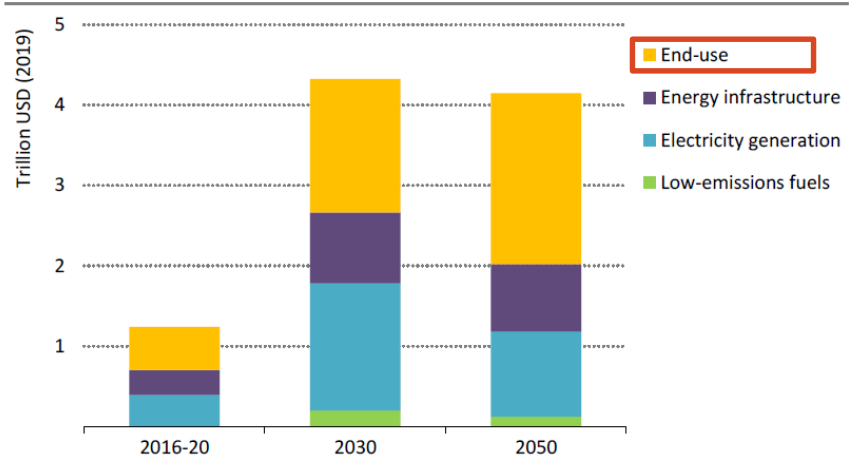


… and to track sectoral efficiency improvements for global net-zero path

Total final consumption and demand avoided by mitigation measures in the NZE



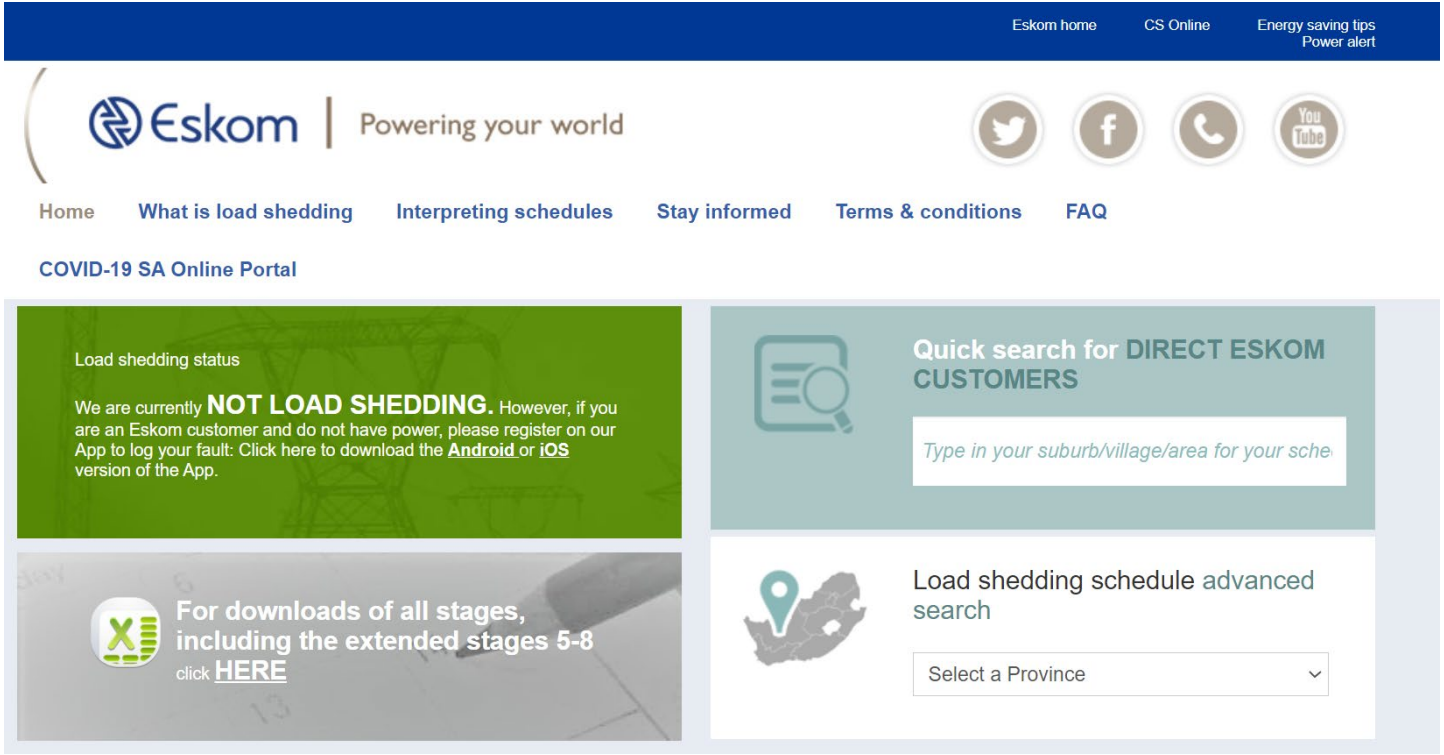
Clean energy investment in the net zero pathway



Source: IEA Net-zero by 2050 - https://www.iea.org/reports/net-zero-by-2050

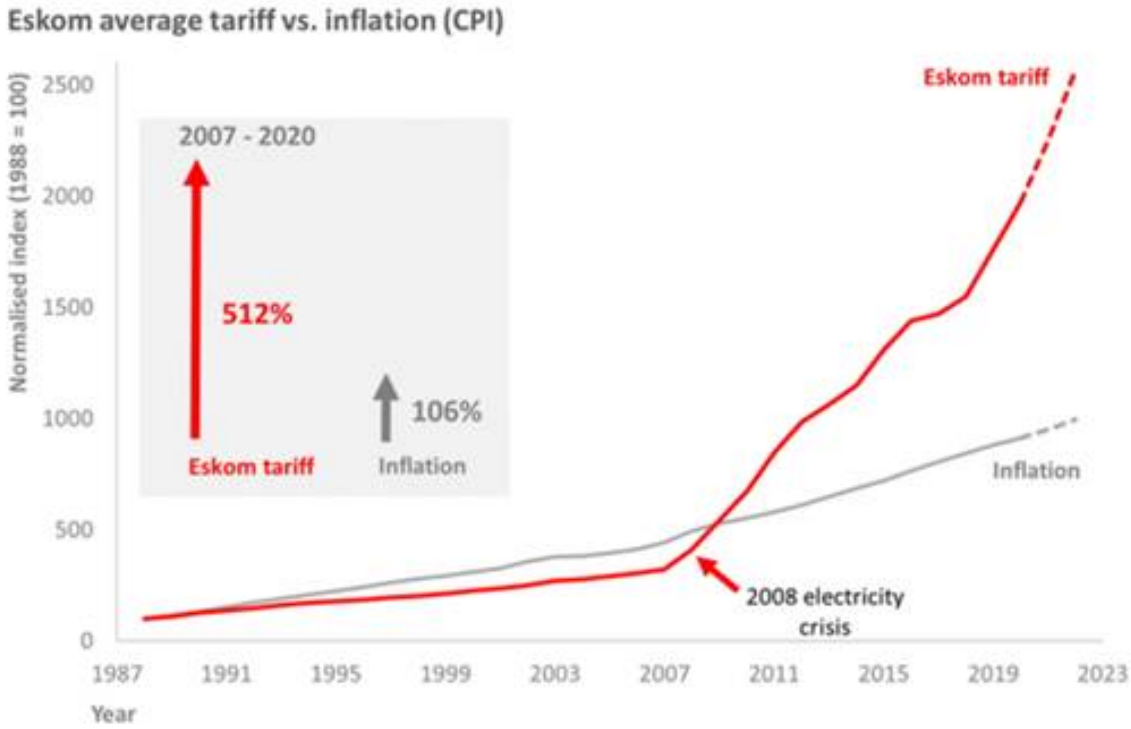
Industry demand needs to be reduced, mostly through efficiency measures, if aiming at net zero

Load shedding: data-driven efficiency improvements can deliver tangible outcomes



https://loadshedding.eskom.co.za/

The cost of not having good data may be very high!



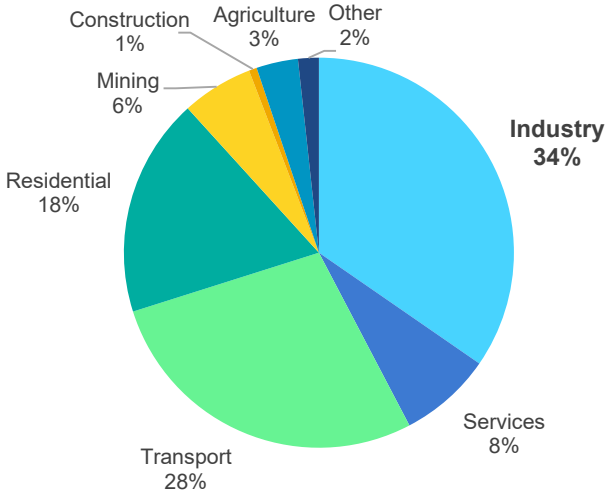
Unavailable or incomplete data may become very expensive and impact supply reliability

Understand demand-side trends through end-use data and efficiency indicators

Understanding energy demand is key to sectoral policy

- ✓ A sound **ENERGY BALANCE** is the pillar of energy data (including energy consumption by fuel and by industry subsector).
- ✓ However, in order to understand energy eficiency trends, more detail is needed: **ENERGY EFFICIENCY INDICATORS**

South Africa total final energy consumption by sector, 2019

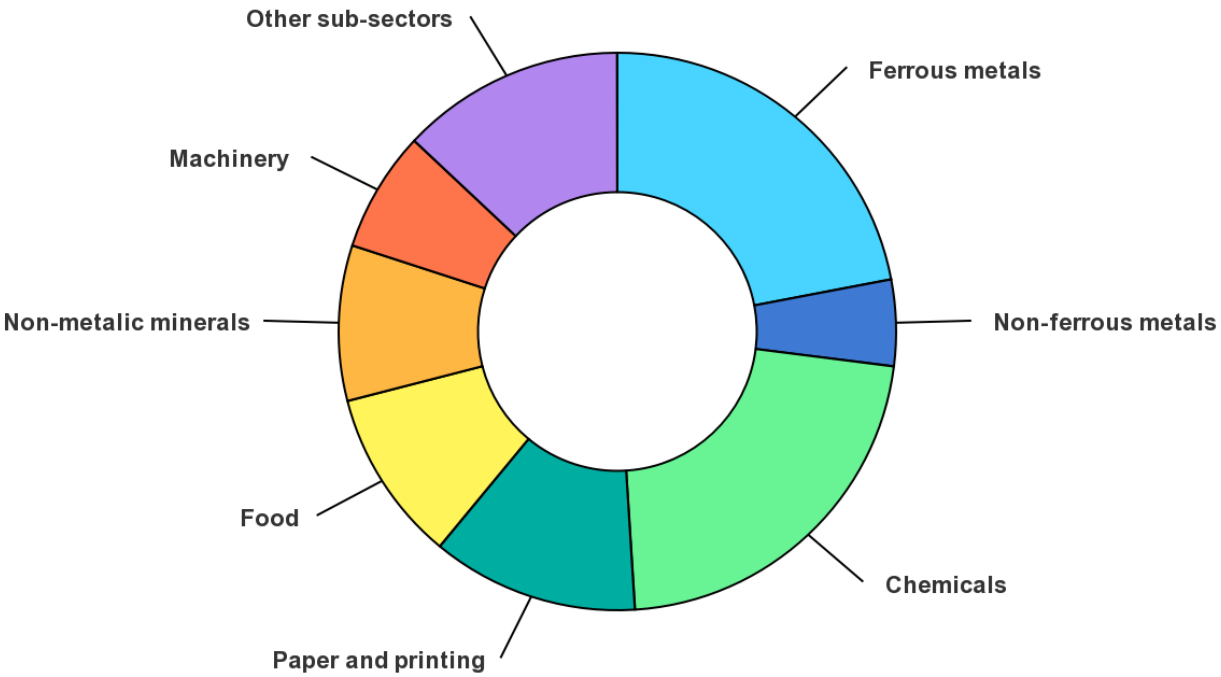


Source: *IEA World Energy Balances, 2021*

Sectoral totals are not enough to fully track efficiency progress.
Demand-side data is to be completed (ongoing progress!)

What drives sectoral demand?

Manufacturing energy consumption by sub-sector in IEA countries, 2018

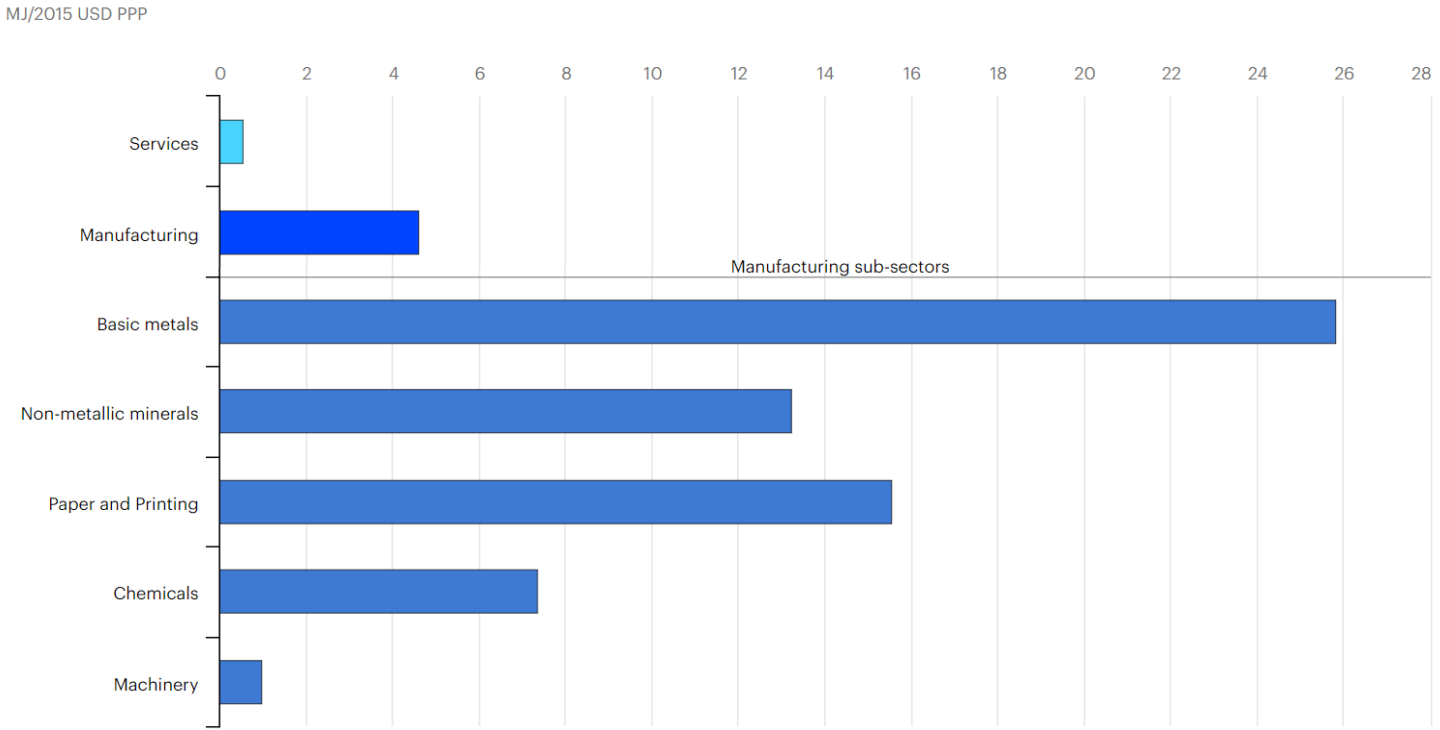


Source: IEA Energy Efficiency Indicators, 2021

Priority sectors require more detailed data for energy and activities to understand "structure".

What drives sectoral demand?

Manufacturing and services: selected intensities in selected IEA countries, 2018



Sub-sectoral data helps understand the drivers of the final industrial consumption

Industry indicators – Energy and activity data

Energy consumption data by subsector, including

- Pulp and paper
  - Paper and printing
  - Pulp
- Automotive manufacturing
- Iron and steel
- Non-ferrous metals
- Chemicals and petrochemicals
- Non-metallic minerals
- Textiles
- …

Activity data

- Value added
- Physical production

Pulp and paper

Automotive

Iron and steel

Chemicals

Non-metallic minerals

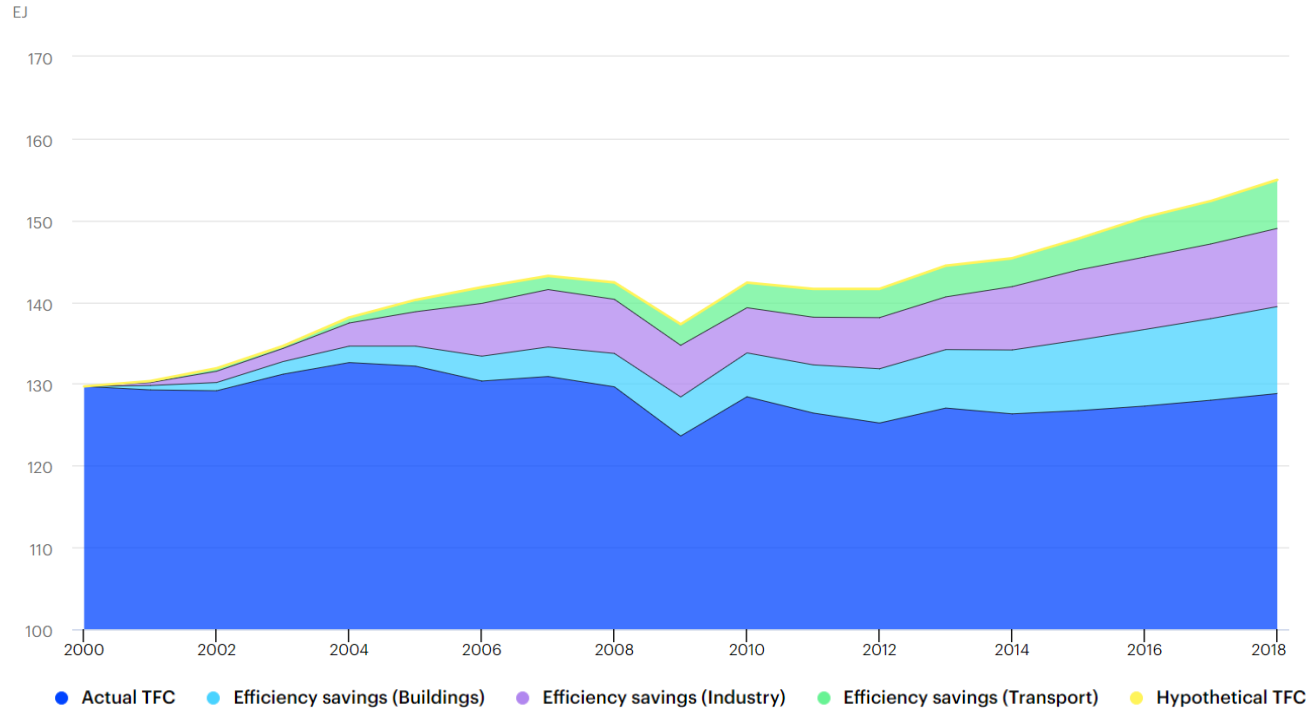
Textile

…

Physical production

Value added

Assessing efficiency progress by disentangling factors



Source: IEA Energy Efficiency Indicators, 2021

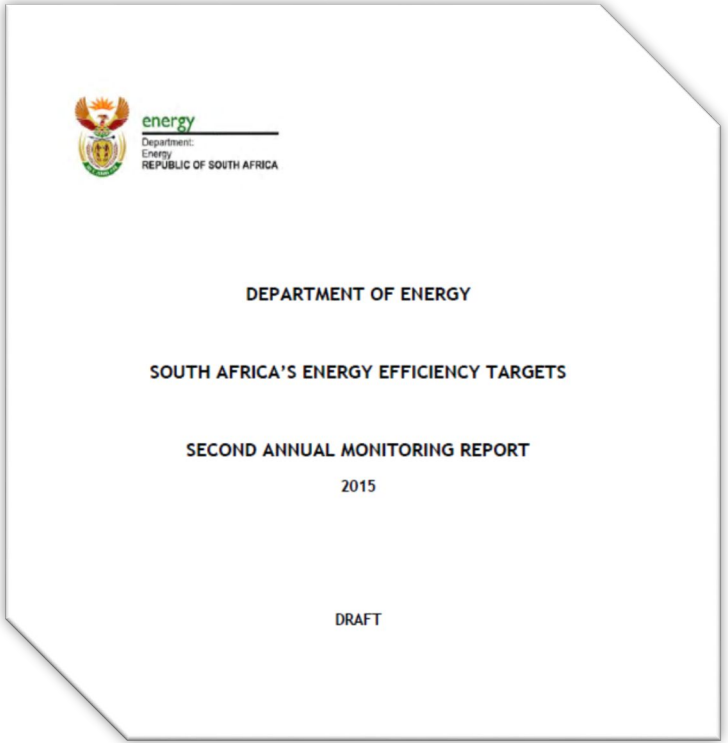
With detailed data across subsectors and end-uses it is possible to assess the contribution of energy efficiency independently of activity changes and structural changes in the economy.

Deep dive in industry

Pulp and paper and automotive subsectors

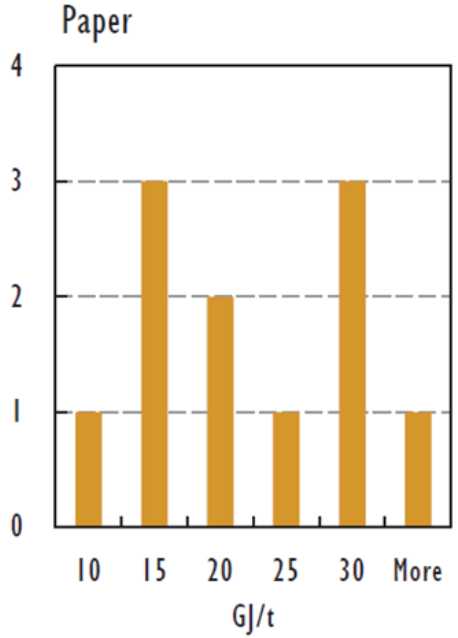
Industry data collection: national insights

- ✓ **“Energy intensity is not a good proxy for energy efficiency within the industry & mining sector.”**
- ✓ “DMRE has commenced collecting data on **energy consumption** and **physical production** levels, directly from firms in the **key energy-intensive industry & mining branches**.”
- ✓ “Data has so far been collected for the period 2010-14.”



Pulp and paper – key information

- ✓ 6th largest export to China (IPAP 2018/2019) with strong national companies
- ✓ Energy-intensive sub-sector
- ✓ ISIC 17 – Manufacture of paper and paper products: includes the manufacture of pulp, paper and converted paper products
- ✓ Typically reported together with printing [ISIC 18], which is much less intensive
- ❑ ‘Wished for’ indicators would be, for instance, **energy consumption for ISIC 17** by **physical production of paper**



Energy intensities per unit of physical output

Other options for zooming in

A- Beyond ISIC subsectors

- Manufacture of paper and paper products (ISIC 17)
  - Of which pulp
  - Of which paper
- Printing and reproduction of recorded media (ISIC 18)

B- By product type

- Pulp
  - Chemical pulp
  - Mechanical pulp
- Recovered paper
  - Inked
  - De-inked
- Paper and paperboard
  - Household and sanitary paper
  - Newsprint
  - Printing and writing paper
  - Wrapping, packaging paper and paperboard
  - Other

C- By process / technology

- Kraft mills
- Newsprint mills
- Paper machines in newsprint mills

https://www.pulpandpaper-technology.com/articles/pulp-and-paper-manufacturing-process-in-the-paper-industry

Benchmarking by product type (examples)

▶ *Typical Electricity Consumption for the Production of Various Types of Paper*

	Electricity *kWh/t*
Newsprint	500 – 650
Uncoated mechanical	550 – 800
Uncoated wood-free	500 – 650
Coated mechanical	550 – 700
Coated wood-free	650 – 900
Kraft papers	850
Tissue and specialty	500 – 3 000
Boxboard	550
Containerboard	680

Source: European Commission (EC), 2001.

▶ *Best Available Technology*

	Heat *GJ/t*	Electricity *GJ Electricity/t*
Mechanical pulping		7.5
Chemical pulping	12.25	2.08
Waste paper pulp	0.50	0.36
De-inked waste paper pulp	2.00	1.62
Coated papers	5.25	2.34
Folding boxboard	5.13	2.88
Household & Sanitary paper	5.13	3.60
Newsprint	3.78	2.16
Printing & writing paper	5.25	1.80
Wrapping & packaging paper and board	4.32	1.80
Paper and paperboard not elsewhere specified	4.88	2.88

Sources: EC (2001); Finnish Forestry Industries Federation (2002); Jochem, *et al.*, 2004.

Benchmarks help to set plausible ranges for indicators in each context and to follow trends over time

Benchmarking by process / technology

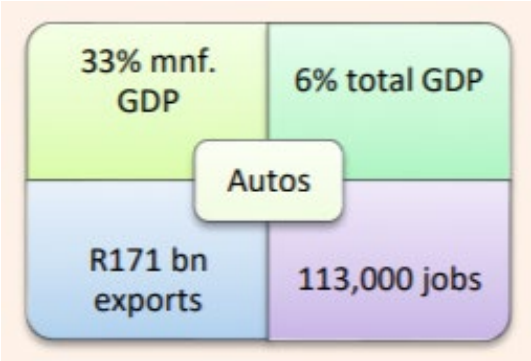
Table 7.7 ▶ *Benchmarking Results for Canadian Pulp and Paper Industry*

	Reference Year	Modern Mill	Best	Worst	Median	Improvement Potential %	Source
Kraft mills (GJ steam/t)	2001	10	15	26	20	50	PAPRICAN, 2002, p. 11
Kraft mills (GJ steam/t)	2003	10	12	22	17	40	Francis & Browne, 2004
Kraft mills (kWh/t)	2001	600	650	1 200	850	30	PAPRICAN 2002, p. 11
Newsprint mills (GJ steam/t)	2001	0.4	2.2	12	7	96	PAPRICAN 2002, p. 20
Newsprint mills (GJ steam/t)	2003	0.4	2	14	6.5	94	Francis & Browne, 2004
Newsprint mills (kWh/t)	2001	2 475	2 475	3 500	3 100	20	PAPRICAN, 2002, p. 20
Paper machines in newsprint mills (GJ/adt)	2003		3.3	8	6	45	Francis & Browne, 2004

Sources: PAPRICAN (2002); Francis & Browne (2004).

The challenge comes from the need for homogeneous boundaries, but it allows to identify the best available technologies and set up ambitious but reachable targets for energy saving

Automotive industry – key information



- ✓ A **world class automotive production capability**
  - producing ~600,000 vehicles/year
  - supporting 113,000 jobs
- ✓ Contributing **33% to manufacturing GDP** and **~6% to overall GDP**
- ✓ **Largest exporting sector to the EU**, 2nd largest to the USA (IPAP, 2018/19)
- ✓ **Spillover effects**: technology absorption, new skills, industrial capabilities

- ✓ Roughly corresponds to manufacture of **motor vehicles, trailers and semi-trailers (ISIC 29)** *(excl. electrical parts for motor vehicles, e.g. batteries)*
- ✓ Typically reported together with **manufacture of other transport equipment** (ISIC 30)

- ❑ Low hanging fruit indicator: energy consumption by value added **for ISIC 29** only
- ❑ **Challenge**: rather heterogeneous subsector

Other options for zooming in

A- Beyond ISIC subsectors

- Manufacture of motor vehicles, trailers and semi-trailers (ISIC 29)
  - Of which motor vehicles
  - Of which trailers
  - Of which semi-trailers
- Manufacture of other transport equipment (ISIC 30)

B- By product type

- Bodies
- Parts and accessories
  - Of which brakes, gearboxes, axles, road wheels, suspension shock absorbers, radiators
  - Of which safety belts, airbags, doors, bumpers
- …

C- By process / technology

- Coil transfer
- Decoiler and strip feed
- Strip washing plants
- Linking presses
- Scrap recycling
- …

IEA resources

IEA resources – Methodology on indicators

- **Fundamentals on statistics**
  - To provide guidance on **how to collect the data** needed for indicators
  - Includes a compilation of existing practices from across the world
  - https://www.iea.org/reports/energy-efficiency-indicators-fundamentals-on-statistics

- **Essentials for policy makers**
  - To provide guidance to **develop and interpret indicators**
  - Includes a compilation of existing practices from across the world
  - https://www.iea.org/reports/energy-efficiency-indicators-essentials-for-policy-making

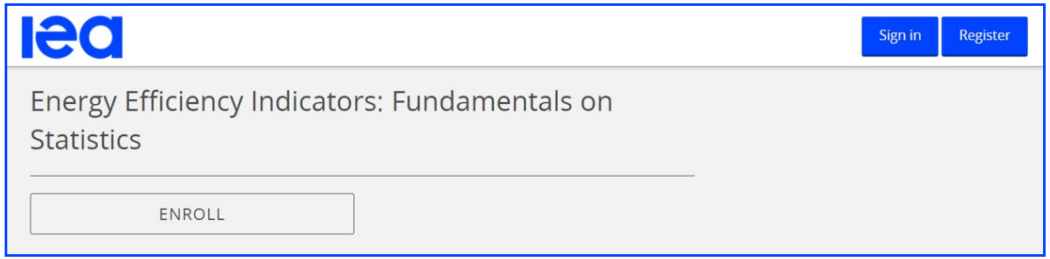
Both available in Chinese, French, Russian and Spanish

International guidelines are key to ensure comparability of data and indicators across countries.

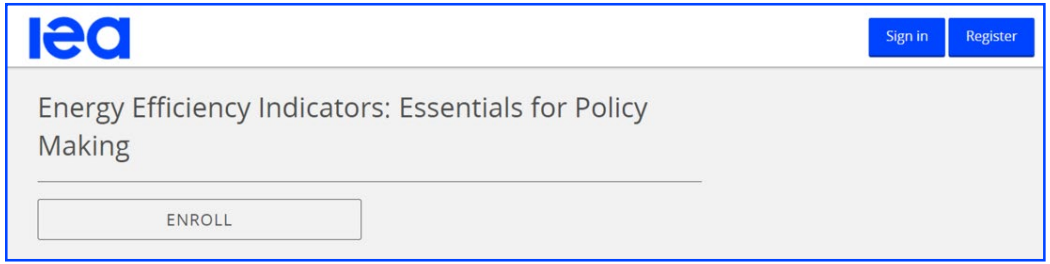
IEA e-learning courses – Capacity building on energy efficiency data

POWERED BY OPENedX

- **Energy Efficiency Indicators: Fundamentals on statistics**



- **Energy Efficiency Indicators: Essentials for policy makers**

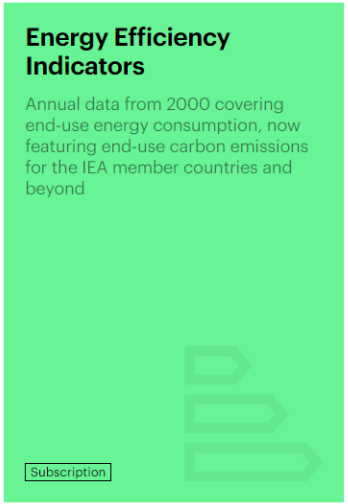


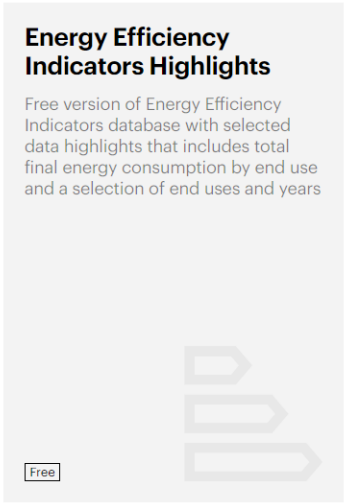
Both available on

https://elearning.iea.org/

IEA collects end-use data from members and beyond

In 2021, data for 44 countries were published in the database, including 12 beyond the IEA family.



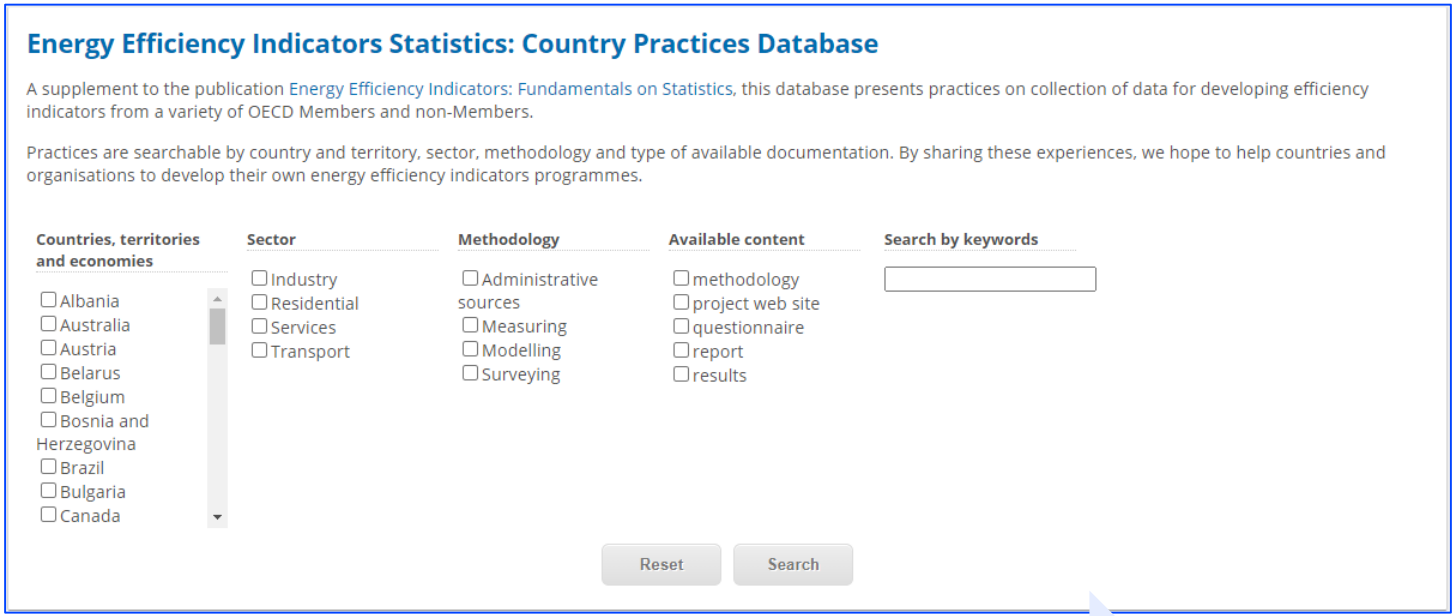


COUNTRY		
Argentina	Armenia	Australia
Austria	Azerbaijan	Belarus
Belgium	Brazil	Canada
Chile	Czech Republic	Denmark
Finland	France	Georgia
Germany	Greece	Hungary
Ireland	Italy	Japan
Kazakhstan	Korea	Kyrgyzstan
Lithuania	Luxembourg	Mexico
Morocco	Netherlands	New Zealand
Poland	Portugal	Republic of Moldova
Slovak Republic	Slovenia	Spain
Sweden	Switzerland	Turkey
Ukraine	United Kingdom	United States
Uruguay	Uzbekistan	

Visit https://www.iea.org/data-and-statistics/data-products?filter=efficiency

The IEA is keen to collaborate further on end-use data and indicators with South Africa!

IEA sharing platform – Country practices database



Contact us and share your practice

https://delegates.iea.org/delegates/eeindicatorsmanual/

A searchable database, gathering data collection practices from a variety of countries, to share expertise worldwide.

Final remarks

- ✓ Energy efficiency in industry is **central to SDGs** 7 and 9
- ✓ Tracking progress through energy efficiency **indicators** is the only way **to know we're on the right path**!
- ✓ A **sound energy balance** is the pillar for development of efficiency indicators in industry
- ✓ **Appropriate methodologies** for data collection needed to develop indicators – needs appropriate resource allocation too
- ✓ Data collection needs and efforts depend on indicators to be developed – level of detail is a **function of specific policies and targets** to be tracked
- ✓ Start with identification of national priorities

➢ **What are the next steps?**

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EETSM and National Energy balances in South Africa

Mr. Luvuyo Njovane, Department of Mineral Resources and Energy

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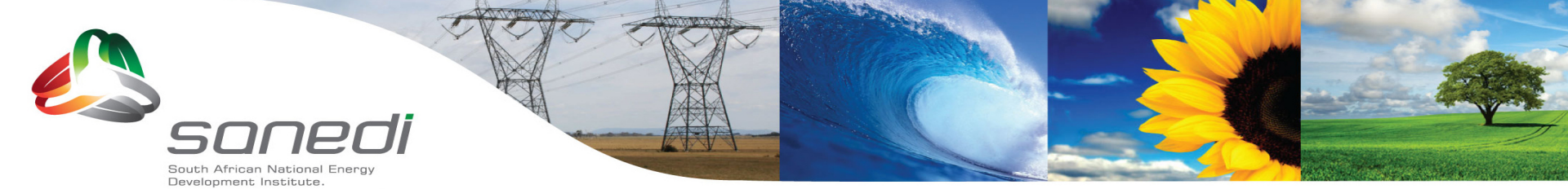
The 12L tax Incentive in South Africa: Overview and key insights

Mr. Stalin Ndlovu, South Africa National Energy Development Institute



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IEA 2nd Indicators Workshop

12L Tax Incentive
Turning Energy Efficiency into Profit

by
Stalin Ndlovu

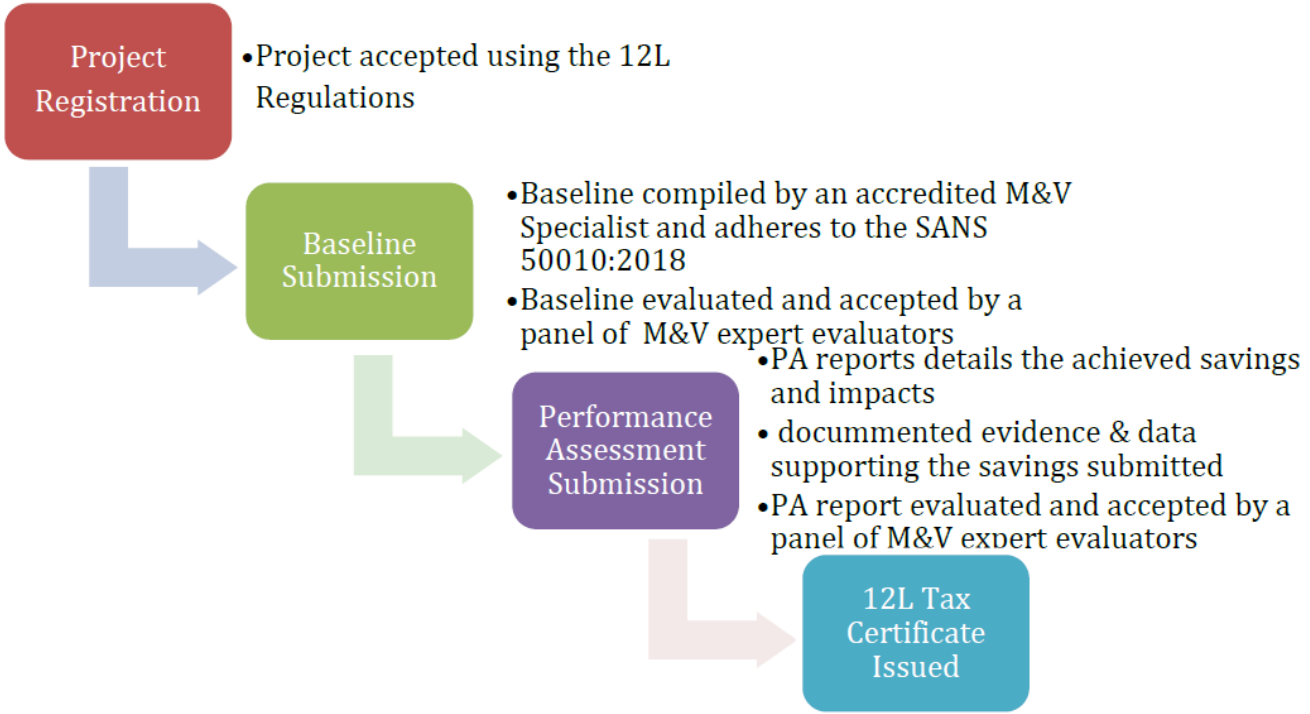
Section 12L Tax Incentives

- **About the Section 12L Tax Incentives Programme:** The 12L tax incentive, according to the Income Tax Act, 1962 (Act No. 58 of 1962) provides an allowance for businesses to implement energy efficiency savings. The savings allow for tax deduction of 95c/kWh saved on energy consumption.

- SANEDI adjudicates on all submission through a panel of experts both internal and external. The certified saving must adhere to the SABS: SANS 50010:2018 and the section 12L Tax Regulations.

- **Overall Programme Objective:** Encourage energy efficient processes & accelerate uptake of cleaner technologies and innovation, Promote a reduction in the demand for energy and resulting reduction in CO_2 emissions.

Section 12L Tax Incentives

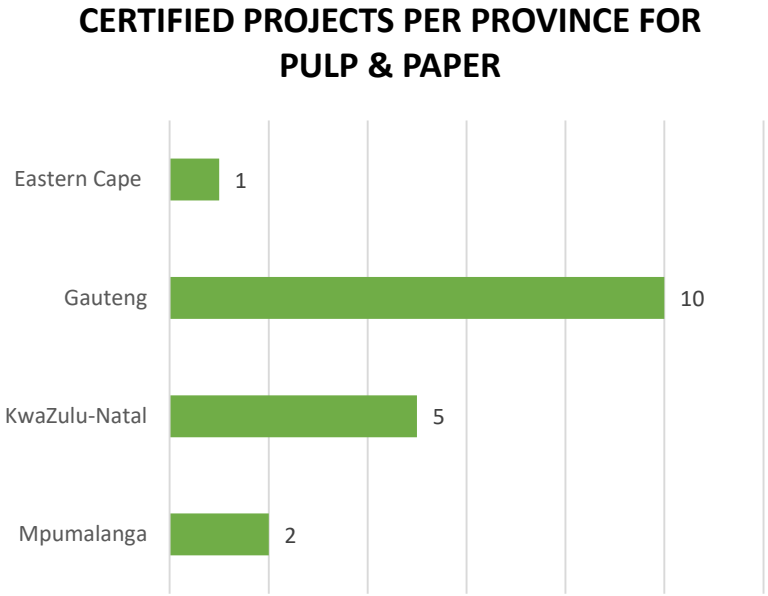


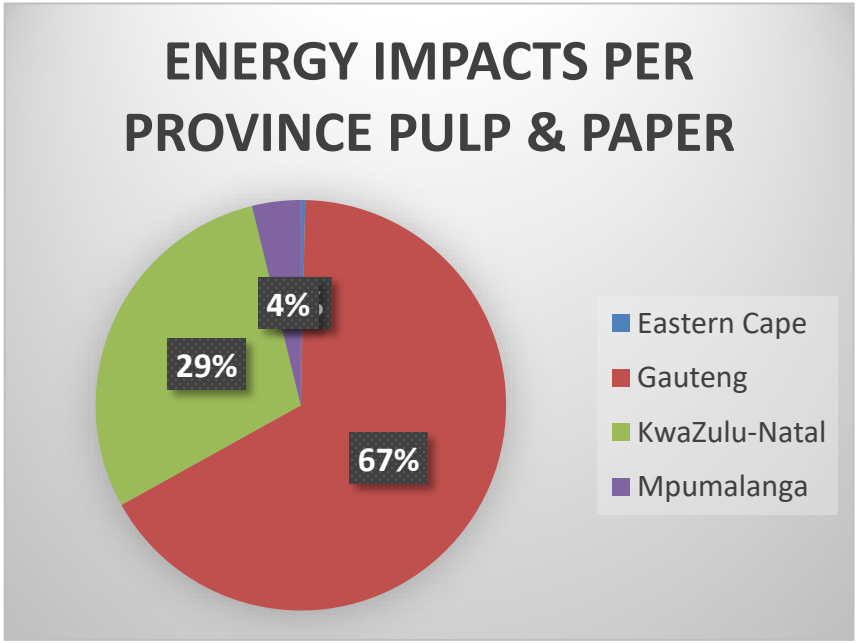
Summary Pulp & Paper Certified Projects

- 18 EE projects have been implemented and awarded the section 12L tax certificate in the pulp and paper industry from four companies.
- Overall impact from the pulp and paper industry – 1 346 GWh, 1.30 Mt CO_2 reduction and R 945 Million in tax incentives

Province	Certified Projects	Energy Impact kWh	Avoided CO_2 kg	Tax Incentives Rands
Eastern Cape	1	4 584 058	4 538 217	4 354 855
Gauteng	10	896 183 816	849 795 198	517 553 079
KwaZulu-Natal	5	393 467 885	393 124 368	373 794 491
Mpumalanga	2	51 620 353	51 568 213	49 039 335
Total	**18**	**1 345 856 112**	**1 299 025 996**	**944 741 760**

Summary Pulp & Paper Certified Projects





Summary Automotive Certified Projects

- Four (4) EE projects have been implemented and awarded the section 12L tax certificate in the automotive industry from two companies
- Overall impact from the automotive industry – 70 GWh, 0.07 Mt CO_2 reduction and R 66 Million in tax incentives
- All projects implemented in the Eastern Cape province

Province	Certified Projects	Energy Impact kWh	Avoided CO_2 kg	Tax Incentives Rands
Eastern Cape	4	69 702 580	69 254 242	66 217 451

Panel Discussion

Perspectives on Data

Perspectives on Policy

Key points for discussions

- The many benefits of indicators and benchmarking analysis:
  - Multiple perspectives, from government to industry and research institution and academy.
- Perspective from the industry and private sector: what indicators would be useful to promote energy efficiency
- To review existing data and determine the most appropriate indicators that can be used to measure the implementation of energy efficiency policy in the pulp and paper and automotive sectors respectively.
- What methodology to evaluate energy efficiency policy implementation ?
- Key recommendations on how to measure energy savings and cost savings using energy efficiency indicators
- Insights on energy efficiency benchmark in the industry sectors: pulp and paper and automotive industry