International Energy Agency

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IEA Clean Energy Technology Assessment Methodology: Results from the Belarus pilot study

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www.iea.org

IEA-EBRD collaboration under FINTECC: scope and aim

- **Two mains components:**

1. **Policies for fostering deployment of clean energy technologies**
2. **Methodology for assessing clean energy technology markets**

➢ ***Regional focus of collaboration: ETC and SEMED***

ETC

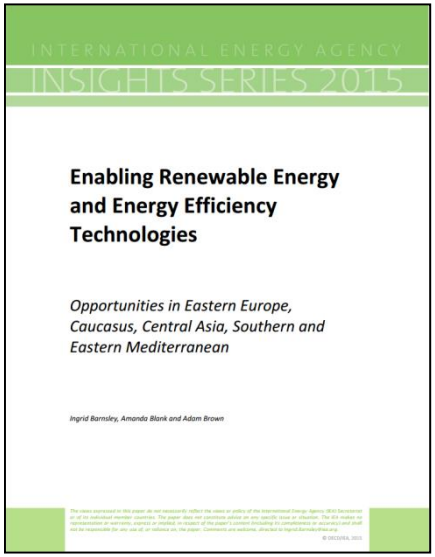
- Armenia
- Azerbaijan
- Belarus
- Georgia
- Kyrgyzstan
- Moldova
- Mongolia
- Tajikistan
- Turkmenistan
- Uzbekistan

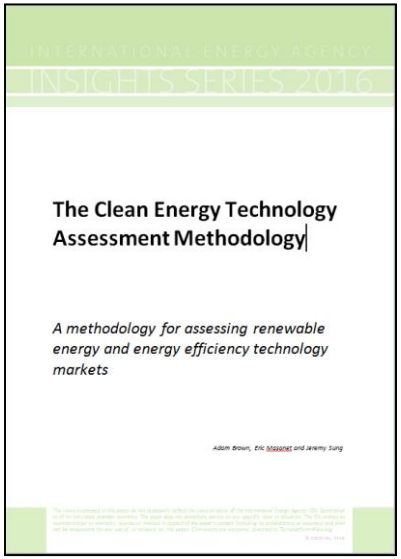
SEMED

- Egypt
- Jordan
- Morocco
- Tunisia

\+ Kazakhstan

Key outputs





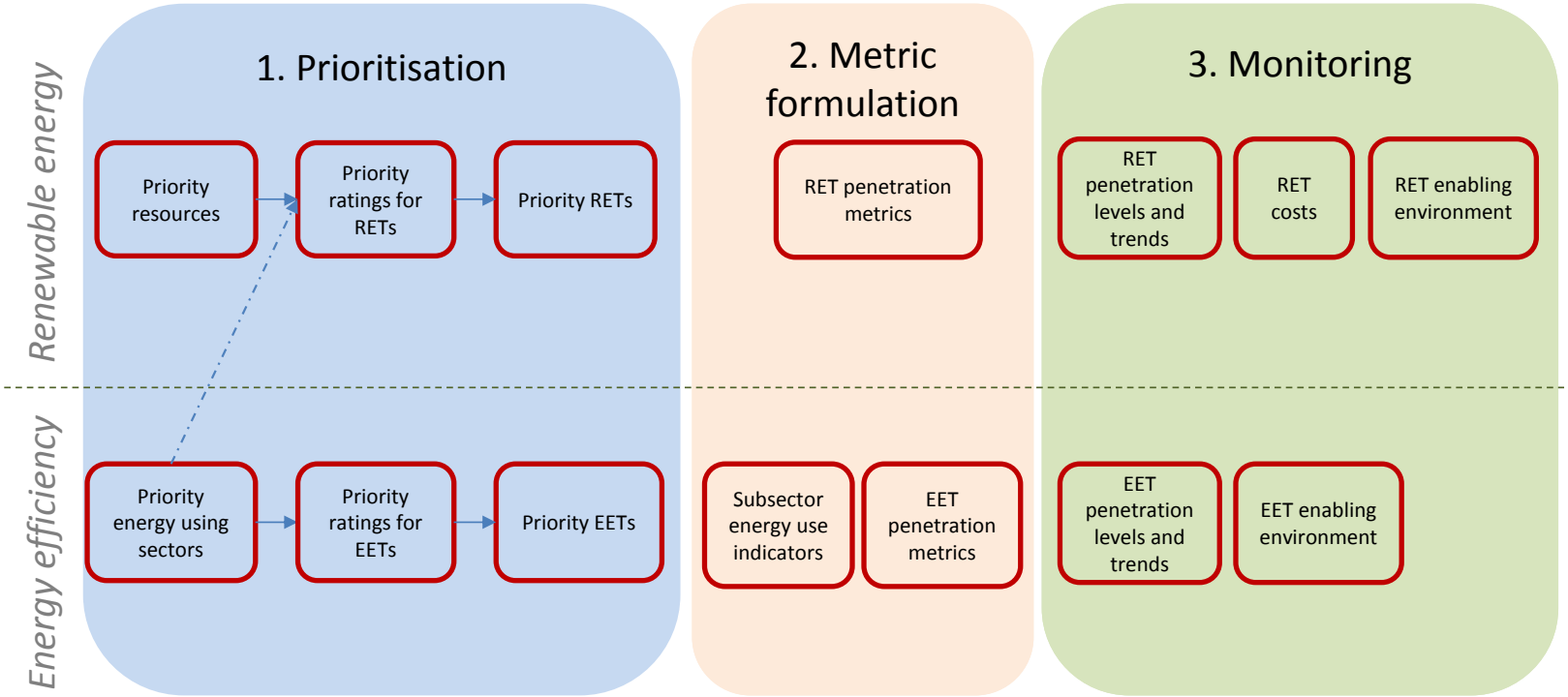
Policy paper
(June 2015)

Methodology paper
(June 2016)

Pilot studies: Belarus, Morocco & Kazakhstan
(June - July 2016)

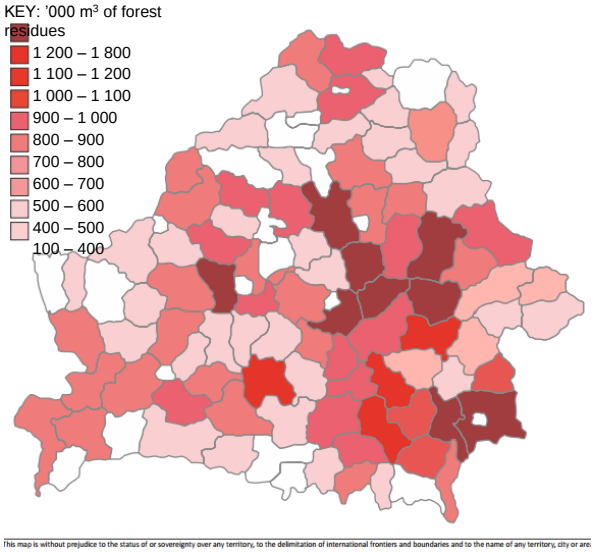
The Clean Energy Technology Assessment Methodology (CETAM)

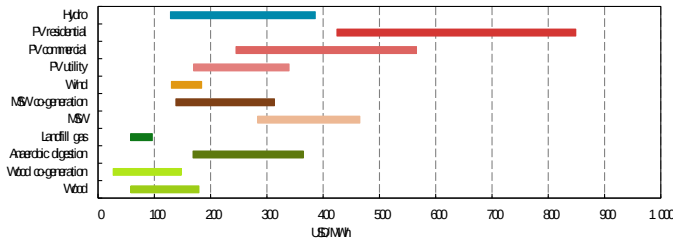
- **A 3-step process:**



Belarus - Renewables

Step 1: Prioritisation of renewable energy technologies





- Resources
  - Vast bioenergy resources - > 6 Mtoe
  - Other resources reasonable, insufficient CSP
- Cost of generation
  - IEA estimates show that wood and landfill gas based generation likely to be cost competitive; solar applications likely to be higher cost
- Strategic priorities
  - Energy security and reducing GHG
- Market opportunities
  - Grid-connected electricity, renewable heat, and biofuels in transport

Belarus - Renewables

Matrix of priority indicators for renewable energy technologies, Belarus

Technology	Resource	Strategic drivers	Market opportunities	Technology maturity	Cost	Priority score
Rooftop PV	★★	★★	★★★	★★★★	★	Ready for deployment
Large-scale solar PV	★★	★★	★★★	★★★★	★★	Need further evaluation
Large-scale CSP	n/a	n/a	n/a	★★★	n/a	No potential
Solar water heaters	★★	★★	★★★	★★★★	★★	Ready for deployment
Solar space heaters	★★	★★	★★	★★★	★★	Ready for deployment
Solar heat for industry / services	★★	★★	★★	★★★	★★	Need further evaluation
Wind	★★	★★	★★★	★★★★	★★★	Need further evaluation
Biomass	★★★★	★★★	★★★	★★★★	★★	Ready for deployment
Biogas	★★	★★★	★★★★	★★★★	★★★	Ready for deployment
Geothermal	★★	★★	★★★	★★★★	n/a	Need further evaluation
Hydro	★	★★★	★★★	★★★★	★★	Ready for deployment

Notes: Star ratings are out of four stars, with ★ representing a low score and ★★★★ representing an exceptionally good score. Technology maturity represents the global level of maturity.

Belarus – Biomass example

Step 2: Bioenergy penetration indicators, Belarus, 2014

	Biomass	Biogas	Biodiesel	Share of national total attributed to biomass, biogas and biodiesel
Production (ktoe)	1 399.1	8.9	24.6	39%
Electricity from co-generation (GWh)	84	32	0	0.5%
Heat from co-generation (TJ)	2 465	111	0	1.7%
Heat from heat plants	17 240	0	0	16.6%
Consumption (ktoe)				
Industry	49.1	0.2	0	1%
Agriculture	40.6	0	22	5.5%
Commercial	219.4	0	0	9.4%
Residential	378.2	0	0	7.7%
Transport	0	0	2.6	<0.1%

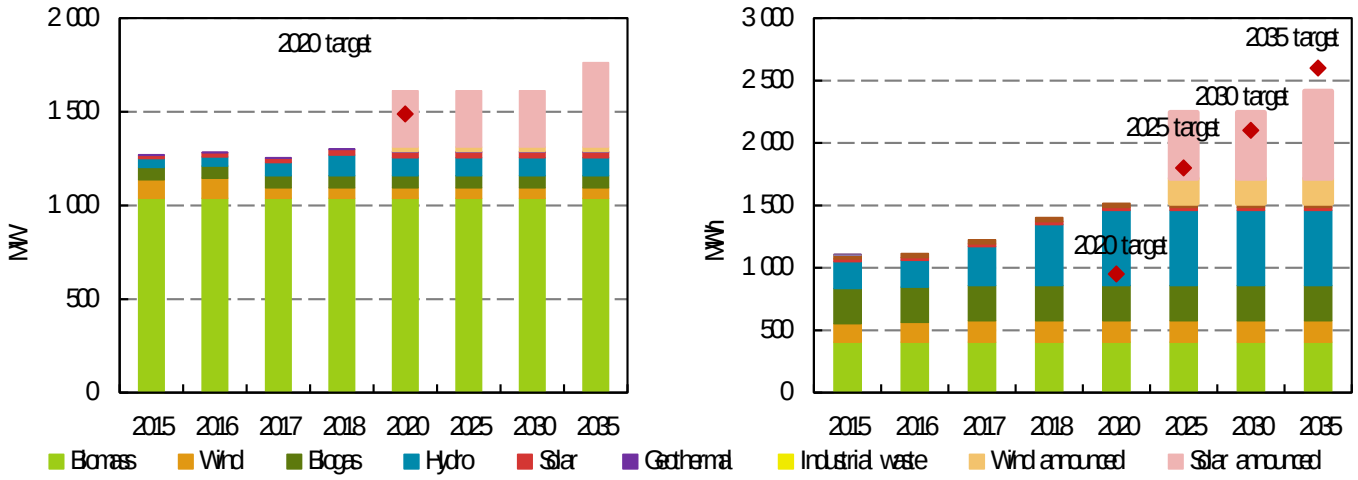
- Information to conduct a detailed cost analysis was not available.

Belarus – Monitoring

Step 3: Monitoring progress towards targets

- Attainable targets
  - Technology neutral
  - 9% of total energy supply from renewables by 2035;
  - 2.6 TWh electricity generation from renewables generation by 2035;

Tracking progress toward renewable electricity capacity and generation targets, 2015-35



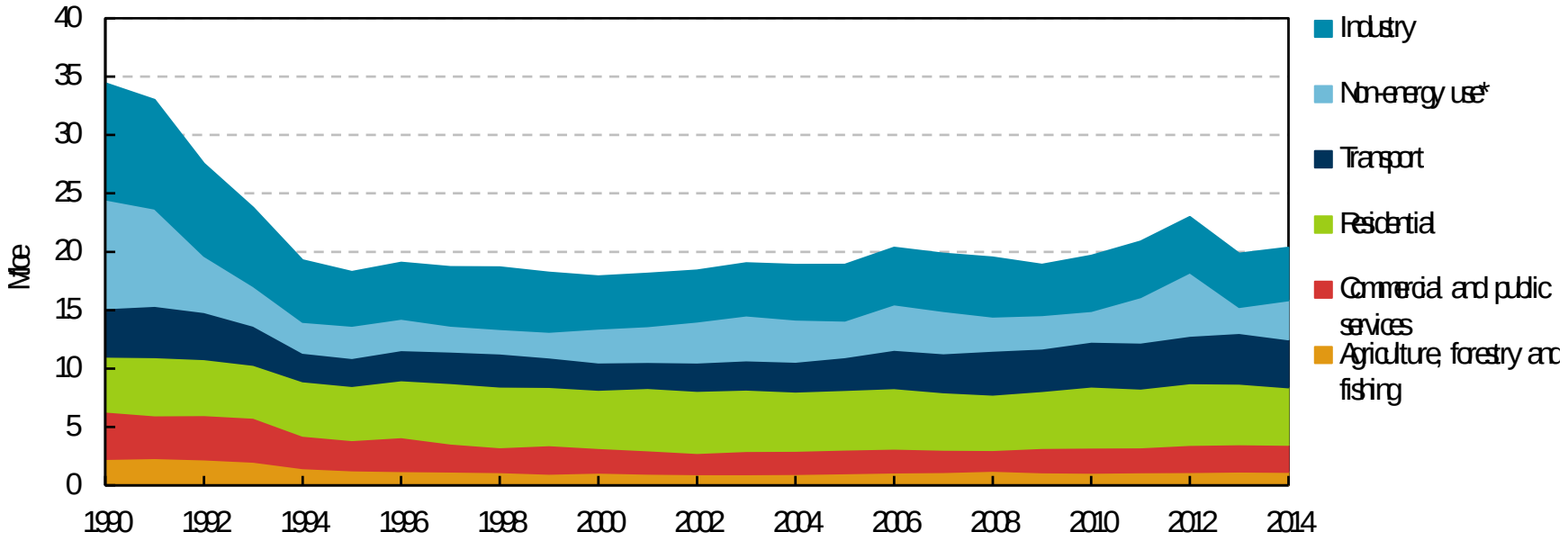
Belarus - Renewables

- **Conclusions:**
  - Strengths include:
    - Significant resource potential.
    - Improved legislative framework, relevant to foreign investments.
    - Generous FITs and attractive costs for certain technologies (particularly bioenergy from wood residues and landfill gas).
    - Comprehensive data on market penetration.
  - Suggested areas for improvement include:
    - Improving the enabling environment for renewables, by removing or increasing quotas for grid-connected renewables to 2018.
    - Increasing public awareness of renewables potential, particularly in state-owned enterprises where potential for smaller scale off-grid renewables is large.
    - Cost data – increase transparency

Belarus – Energy Efficiency

Step 1: Prioritisation of energy efficiency technologies

- Energy consumption by sector, Belarus, 2014

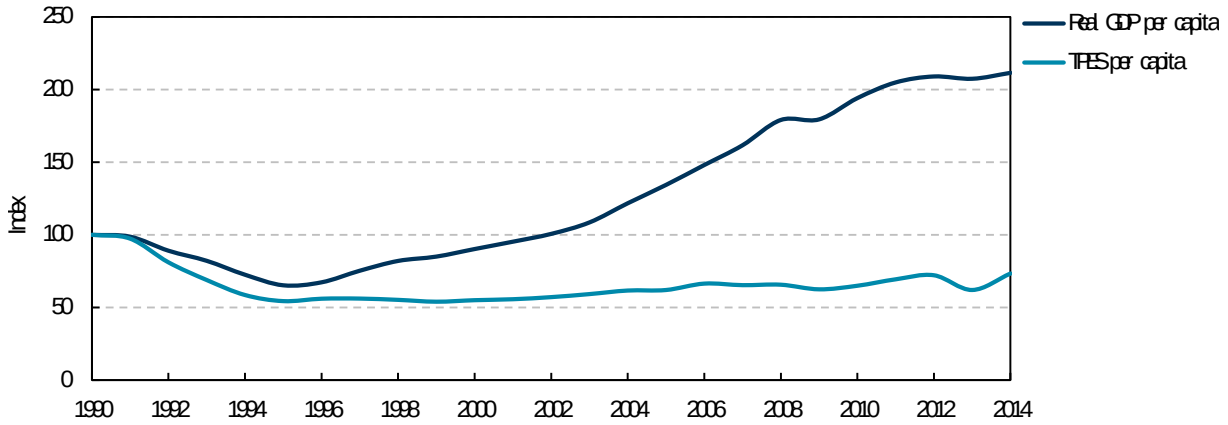


- Main demand drivers:
  - Economic growth/standards of living, structural change in the economy, urbanisation, transit country for transport
  - Energy saving measures have curbed demand growth

Belarus – Energy efficiency

Step 1: Prioritisation of energy efficiency technologies

- Economic growth and energy use decoupled.
- Finding EE opportunities means delving into the detail.



Residential: –

Industry: ⇩

Transport ⇧

Belarus – Energy Efficiency

Priority sub-sectors and end-uses for analysis

	Residential	Industry	Transport
Sub-sectors:	Buildings	Cement/building materials Chemical and petrochemical Food manufacturing Textiles Machinery manufacturing Wood processing	Road transport
End-uses	Space heating Water heating Cooking Appliances	Process heating Machine drive	Passenger vehicles Buses Heavy-duty vehicles

Belarus – Energy Efficiency

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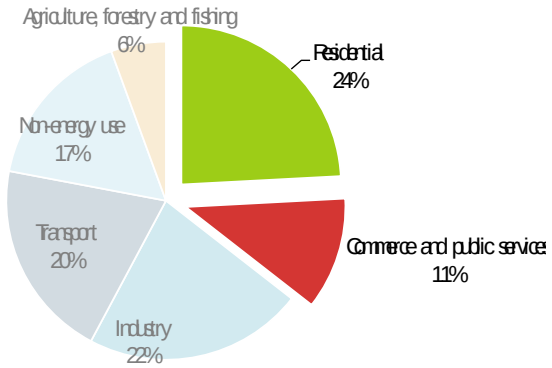
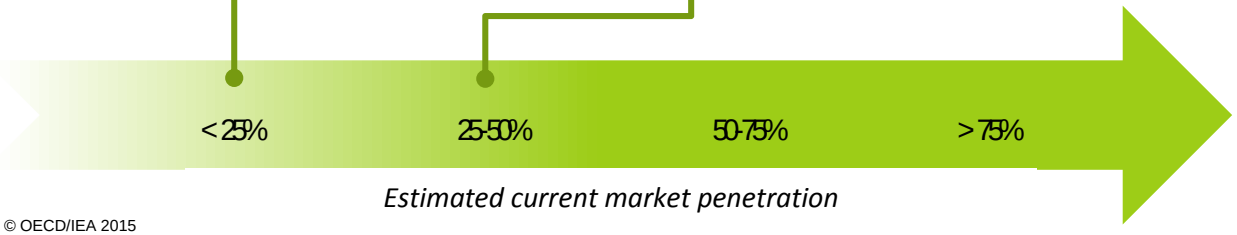
Priority EETs and estimated current market penetration

Energy savings	End use	Technology
★★★	Space heating	Triple glazed windows
★★★	Space heating	Windows (double low-e glazing, low-conductive frames)
★★★	Space heating	Energy-plus windows in cold climates (highly insulating and dynamic solar)
★★★	Space heating	Automatic heat control systems with heat metering and data collection devices
★★★	Lighting	LED lamps
★★	Space heating	Radiators - EU labelling A++
★★	Space heating	Electric heat pumps - EU labelling - A++
★★	Space heating	Gas heat pumps - EU labelling - A++
★★	Space heating	Fully-automated biomass boilers
★★	Space heating	Pellet-fired boilers
★★	Space heating	Biomass-fired boilers
★★	Space heating	Pellet stoves
★★	Water heating	Solar water heater - EU labelling - A
★★	Water heating	Heat pump water heater - EU labelling - A
★★	Lighting	Algorithmic lighting

TFC of applicable sectors (2014)



Energy savings	End use	Technology
★★★	Space heating	Solid wall insulation
★★★	Space heating	Low-E windows
★★★	Lighting	High-Intensity Discharge Lamps (HID)
★★	Space heating	Loft insulation (100 to 200mm)
★★	Space heating	Floor insulation
★★	Lighting	Daylight sensors
★★	Lighting	Presence sensors



Estimated current market penetration

INTERNATIONAL LOW-CARBON ENERGY TECHNOLOGY PLATFORM

Belarus – Energy Efficiency

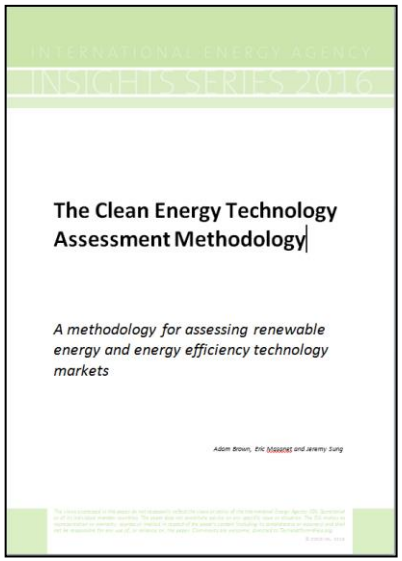
- **Conclusions:**
  - Strengths include:
    - Strong government focus and attention to energy savings – decoupling of economic growth and energy demand since the mid-1990s.
    - Clear policy direction and increasing public awareness.
    - Progressive phase-out of electricity and heat subsidies over time.
  - Suggested areas for improvement include:
    - Improving energy efficiency indicators by expanding data collection methods.
    - Improving market conditions for the development of ESCOs.

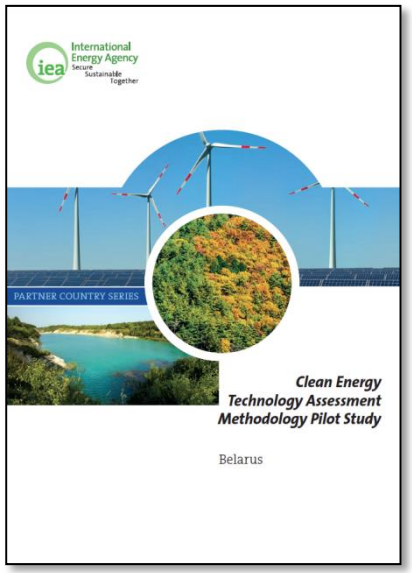
Overall outcomes and lessons learned

- **CETAM: Ready to be applied in other ETCs, SEMED countries and beyond.**
- **Variation across the pilot countries:**
  - Data quality
  - Ambition to deploy clean energy technologies
  - Some stronger on EE (e.g. Belarus) other on RE (Morocco)
- **Energy efficiency technologies: Much harder to measure and monitor than renewables – data from audits, etc is key.**
- **Even where it is difficult to apply, using CETAM can help identify data collection gaps.**

Closing remarks

- **Available from 30 June online at www.iea.org**





Thank you

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