
**Monday 16 January 2023**
**12:00 – 14:00 CET**

# Mercury releases from coal combustion Partnership Area

## 2023 Annual Meeting

# Smooth running of the meeting - Few tips

**Microphones and cameras turned off**, unless when making an intervention.

Use the **“Chat”** to ask technical questions or share views (select the option to “everyone” if you wish to send a chat to all attendees, including panelists).

When connecting to the meeting, please enter your name as **Organisation/Affiliation, First name, Last Name**.

The **meeting will be recorded** (for internal use only) please indicate if you have any objection.

# Agenda

1. Opening remarks
2. Introduction of new partners
3. Recent and upcoming Partnership overarching activities
4. Update on the project "Reducing Mercury Emissions from Coal Combustion in the Energy Sector" funded by the US Department of State
5. Update on the project "Assessment of existing and future emissions reduction from the coal sector toward the implementation of the Minamata and Stockholm Conventions" funded by the GEF
6. Update on the call for comments on the draft guidance on best available techniques and best environmental practices to control mercury releases to land and water
7. Partners' updates on ongoing projects and events
8. Any other issue
9. Closing

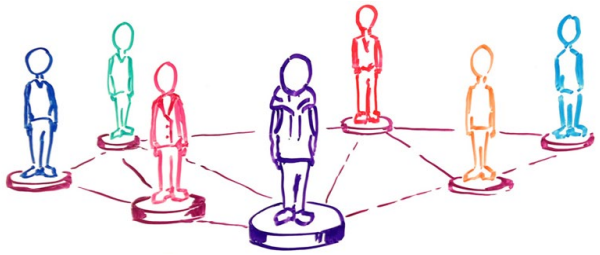

Annual meeting of the UNEP Global Mercury Partnership Area on Hg from Coal Combustion

# 1. Opening Remarks


Annual meeting of the UNEP Global Mercury Partnership Area on Hg from Coal Combustion

# 2. Recent and upcoming Partnership overarching activities

# The Global Mercury Partnership in 2023



- **Overall Goal**: to protect human health and the environment from the releases of mercury.

- **Priorities**:
  - Support timely and effective implementation of the Minamata Convention
  - Provide knowledge and science on mercury
  - Deliver outreach and awareness raising towards global action

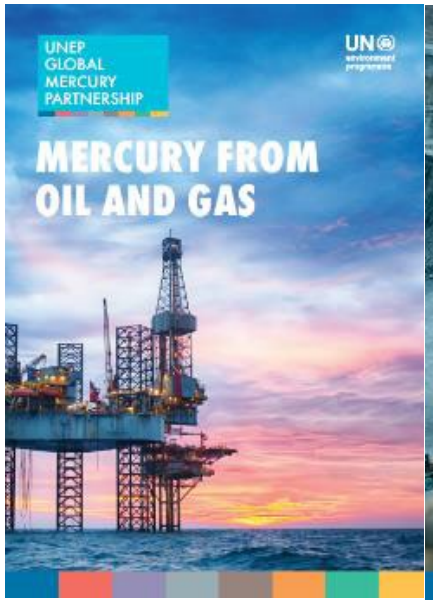
- **New members since PAG-12**: Alchemy Mining Group, Inc., BlackForest Solutions GmbH, CLASP, Colnodo, EAM Environmental Inc., Qa3, TAUW bv, Tellus Holdings ltd, University of Geneva

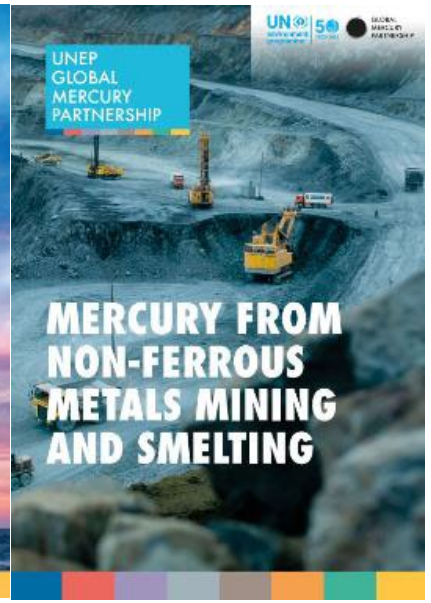
- **To date: over 240 partners** from
  - Governments
  - Intergovernmental organizations
  - Non-government organizations
  - Industry, private sector
  - Academia, scientific community and others

# Recent Events

- [Thirteenth Meeting of the UNEP Global Partnership Advisory Group (PAG-13).]

- Exchange on recent activities and priorities for future work on cross cutting activities.




- [Study report on mercury from non-ferrous metals mining and smelting]

- [Study report on mercury from the oil and gas sector]

- Trade and flow
- Technical and scientific capacity enhancement
- Management of Hg stocks
- Disposal of Hg added-products
- Biodiversity, climate change and mercury



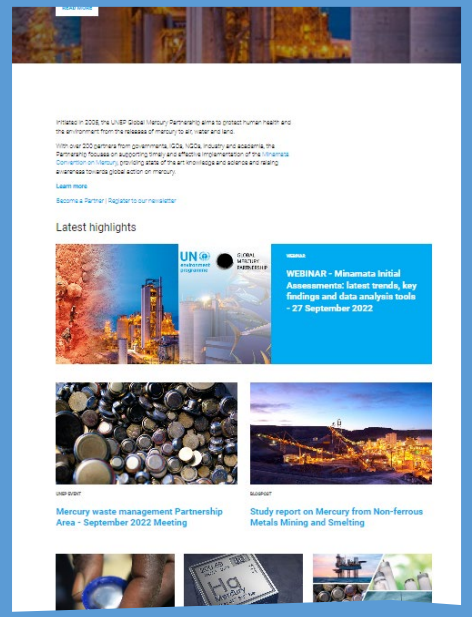

# Upcoming Events and Meetings

**Annual Meeting of the Partnership Area on Mercury Releases from the Cement Industry** – *13 February 2023*

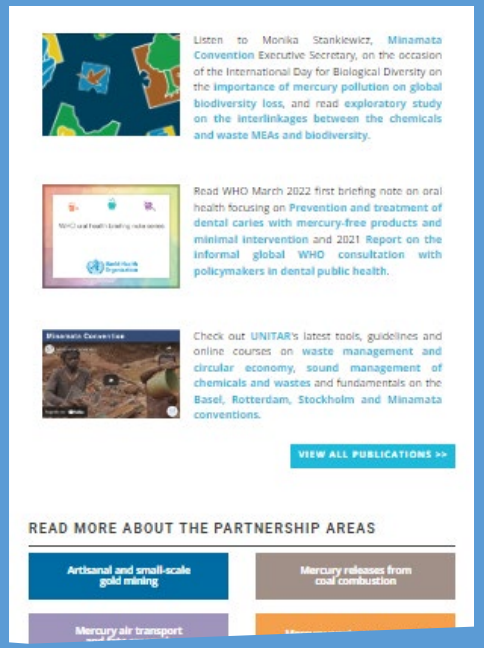
**Webinar on the Sound Management and Elimination of Mercury and Mercury Waste in the Chlor-Alkali Sector** – *16 February 2023*

**Annual meeting of the Partnership Area on Mercury Waste Management** – *15 March 2023*

Others *(tbc)*






## Reminder – Newsletter - E-mailings

- Opportunity to raise awareness and feature highlights by Partnership areas and partners, events, resources, etc.

## New website: Home | Global Mercury Partnership (unep.org)

Currently updating PAs webpages, Business Plans and Factsheets

**Any question?**

**For further information and assistance:**

- Stephanie.laruelle@un.org
- Sandra.averous@un.org
- Imelda.dossouetui@un.org

**Thank you very much!**


Annual meeting of the UNEP Global Mercury Partnership Area on Hg from Coal Combustion

# 4. Update on project “Reducing Mercury Emissions from Coal Combustion in the Energy Sector”

# US DEPARTMENT OF STATE PROJECT SUMMARY OF WORK

DR LESLEY SLOSS CENV FRSC FIENVSCI

INTERNATIONAL PROJECT MANAGER

INTERNATIONAL CENTRE FOR SUSTAINABLE CARBON

# FEDERAL ASSISTANCE AWARD

## US DEPT OF STATE

# CAPACITY BUILDING IN SOUTHEAST ASIA TO REDUCE MERCURY AND OTHER POLLUTANT EMISSIONS FROM THE COAL COMBUSTION SECTOR

# INDONESIA

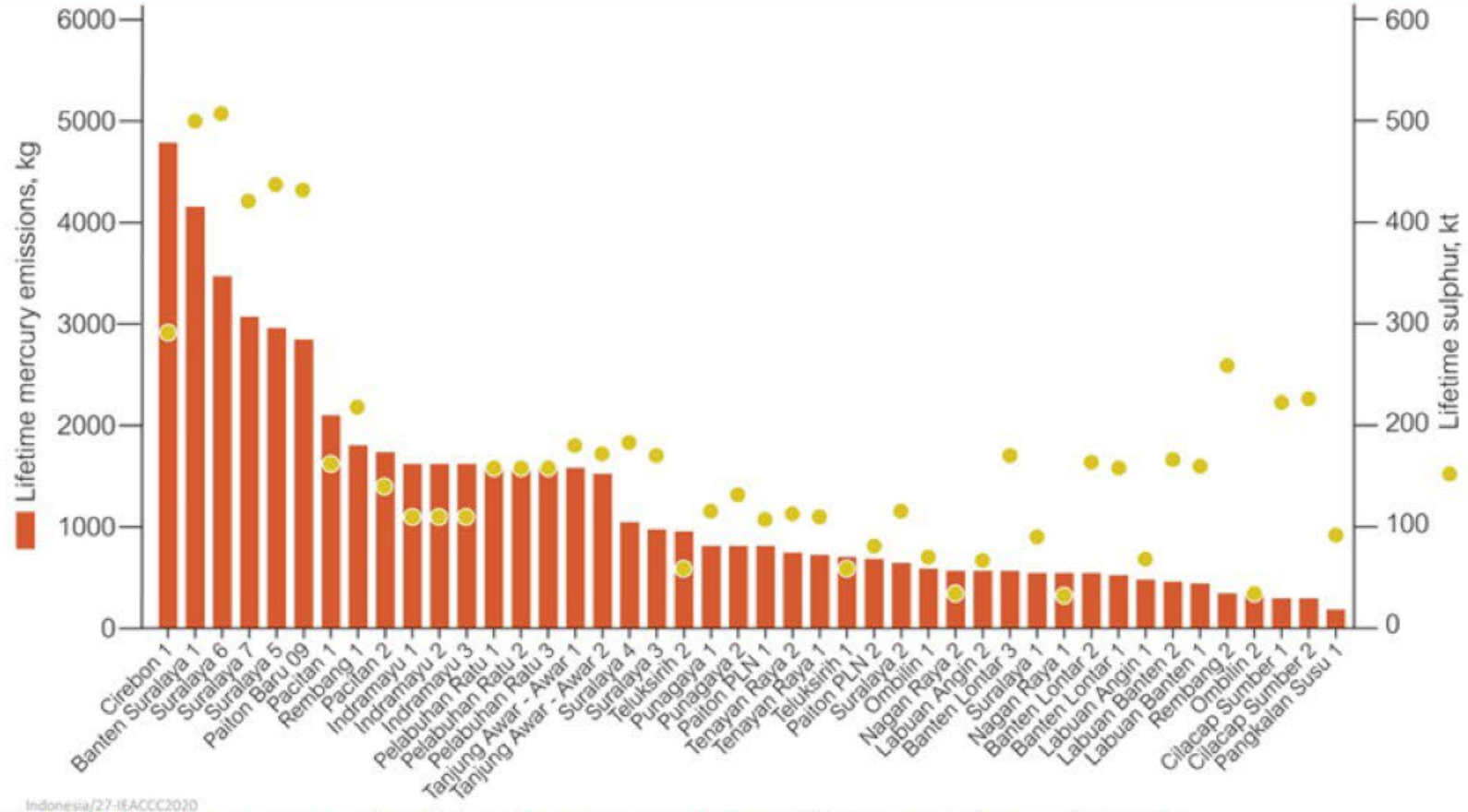
# INDONESIA PROJECT

**Phase 1:**
Estimate mercury emissions from the fleet and rank plants

**Phase 2:**
Select 3 plants for closer study. Call for project and strategy proposals

**Phase 3:**
Create a catalogue of proposals for the Indonesian Action Plan

# RANKING THE INDONESIAN COAL FLEET

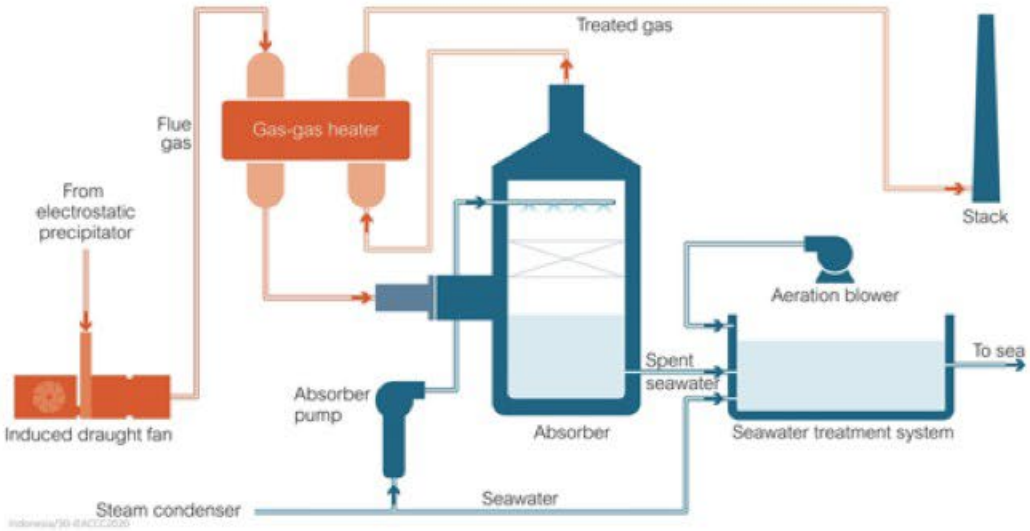



- Total mercury emissions are estimated for the remaining lifetime of each unit
- Over 100 units analysed (top 45 shown here)
- Top 15 units emit approximately 50% of the emissions from the entire fleet

*Targeted emission control will be far more cost effective than a blanket BAT requirement across the fleet*

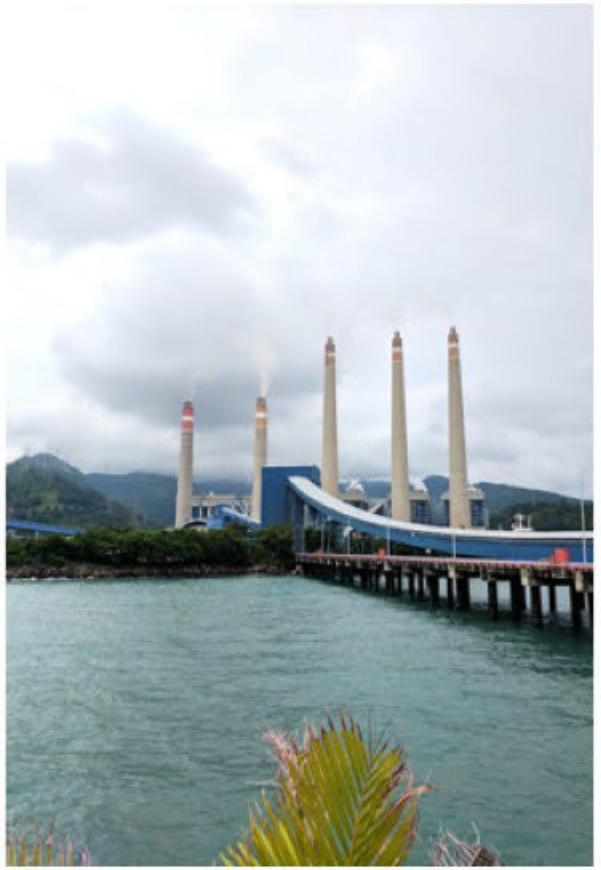
# 3 SELECTED PLANTS

## Paiton 1 unit 2



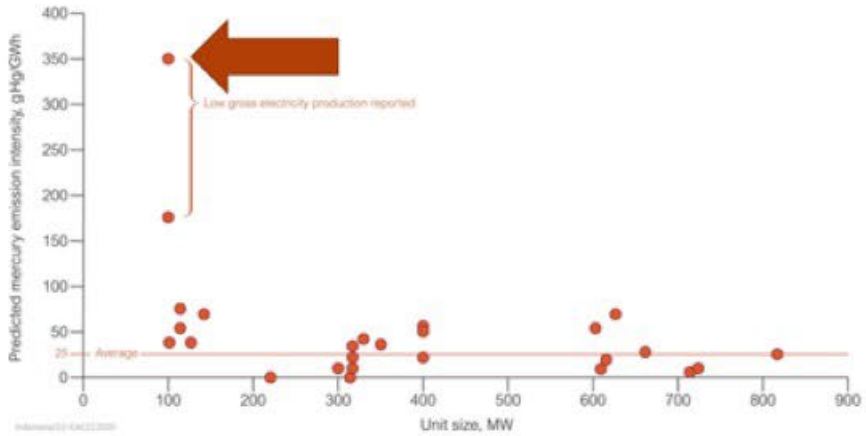

Plant with SWFGD

## Suralaya



Large, active plant

## Ombilin




"Dirty" plant due for imminent upgrade

# ONGOING ACTIVITIES

- Site visits to Suralaya and Paiton – January 2023
- Ministerial meeting and workshop – January 2023
- Collation of information to create a call for proposals – to be circulated in February 2023
- Preparation of a “catalogue of options” for mercury reduction across the Indonesian coal fleet
- A final event in Jakarta in June/July 2023

# HELP NEEDED

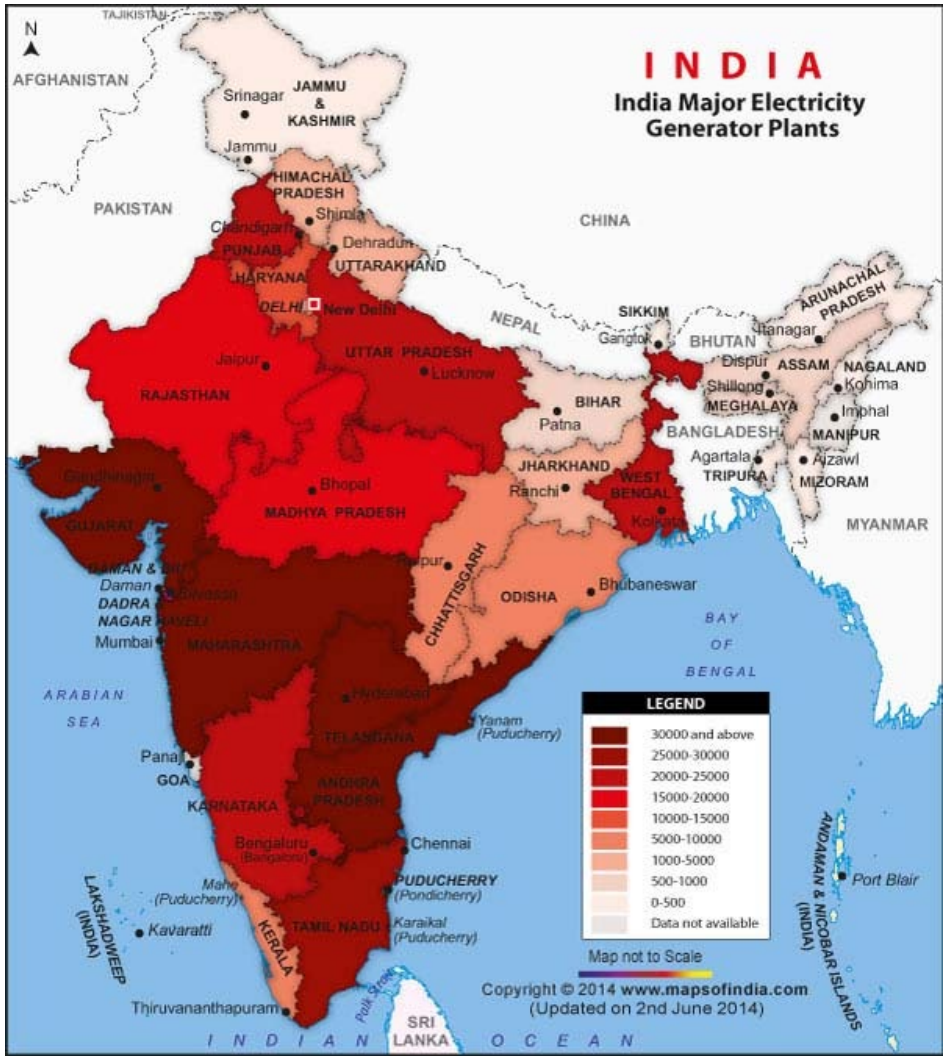
- Proposals for techniques and technologies to reduce mercury emissions in Indonesia (call for proposals to be circulated in February 2023) – *let me know what plant-specific information you need so we can include it in the information pack*

- Submissions will be collated into a catalogue of options for the Indonesian MOEF

- Final high-level workshop in Jakarta (June/July), similar to MEC with a focus on Indonesian compliance with the Minamata Convention – speakers welcome. Call for papers likely to be in March 2023

# INDIA

# India – three pillars of focus




Three pillars of work in India:

- flexibility of plant operation
- emissions monitoring - CEM
- emission control and ash management

# Flexibility

# Pillar: Plant Flexibility

## The Problem

As the proportion of variable renewable energy increases on the grid, coal plants must operate with greater flexibility. Increased plant flexing can lead to higher operating costs and an increased risk of plant damage

## The Solution

ICSC and EPRI have delivered “Flexibility Toolkit” training to utility operators, to arm them with the capacity to operate their plants efficiently and cost-effectively under challenging conditions

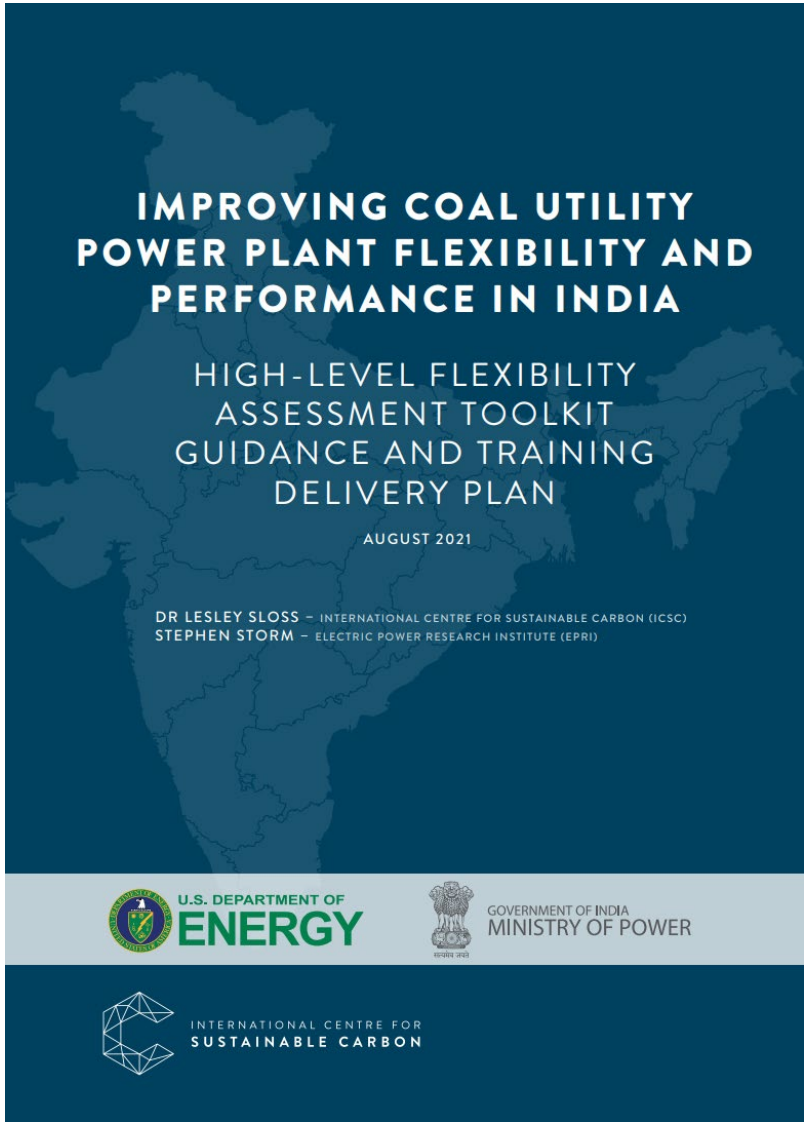
# Plant Flexibility

A report on improving plant flexibility in India was published in 2021

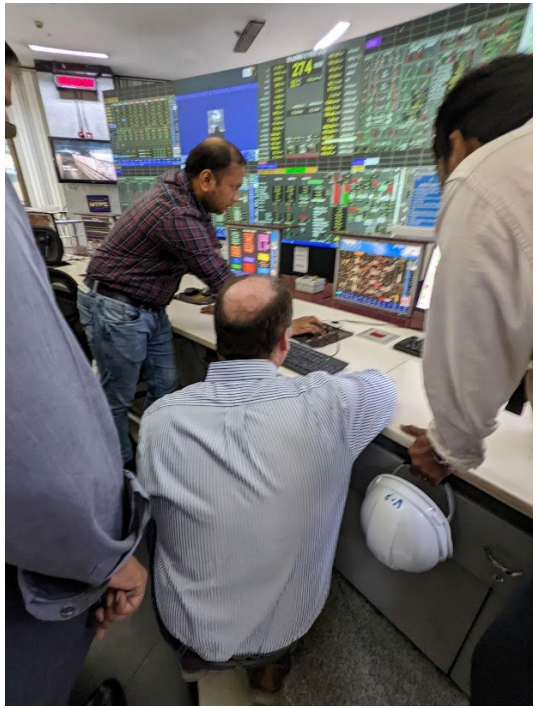
Four workshops have been delivered:

Hyderabad, New Delhi, Raipur and Ahmedabad

**All materials – reports and slides from this workshop – are available as a free download**



# Well attended workshops



# Collating feedback

| S.NO | QUESTIONS | MAJOR REMARKS |
|---|---|---|
| 1 | What are your top three challenges regarding generation flexibility | 1. Low load operation<br>2. Ramping of unit<br>3. Thermal mechanical failure of tubes<br>4. Soot blowing at extremely low load<br>5. Increased spray flow (MS/RH)<br>6. High flue gas exit temperature<br>7. Frequent start and stop of mills<br>8. Failure of valves due to cycle operation<br>9. High heat rate, High auxiliary power consumption & thus high fuel cost<br>10. Control of steam driven BFP<br>11. Long startup time to maintain the rate of rise of boiler tube metal temperature<br>12. Mandatory biomass cofiring<br>13. Dry to wet phase shift |
| 2 | What variables are limiting your station (or fleet) from achieving reduced minimum loads | 1. Fine tuning of loops<br>2. Poor coal quality results flame stability issues at low load<br>3. Metal temperature excursion<br>4. Windbox DP maintaining low due to lesser air flow<br>5. FD fan blade pitch reduced to <5% opening<br>6. Ash accumulation at goose neck area<br>7. Non availability of standard SOP<br>8. Drum level control with ON/OFF recirculation valve in BFP<br>9. Fan instability<br>10. Not getting design HRH temperature (500 Deg c against 540 Deg c) and high unburnt |

| S.NO | QUESTIONS | MAJOR REMARKS |
|---|---|---|
| 3 | Does your organization have an established generation flexibility program | Yes |
| 4 | Does your company have flexibility goals established | Yes |
| 5 | What defense strategies have you deployed to protect your assets under flexible operations | 1. Improvement in boiler & turbine controls etc<br>2. Step alarms and protection setup are taken into consideration.<br>3. Metal temperature excursion control<br>4. Ramp rate 50MW/block (15 mins)<br>5. Start & atop the unit as per OEM curve<br>6. Software installed for monitoring unit operational parameters during flexible operation<br>7. Optimised combustion under variable mode of operation<br>8. Preparing a page in DCS for close monitoring of key parameters during flexible operation<br>9. Additional metal temperature measurements in RH section<br>10. Training to O & M team<br>11. Implementation of mill auto operation<br>12. Advanced process control under implementation for fast ramp up and ramp down<br>13. Gap analysis to maintain FC/VM ratio<br>14. NDT for critical piping, turbine casing, etc., |

# Legacy

- White paper on flexibility in India
- FLEX-INDIA launch in New Delhi in November 2022
  - An Indian working group on flexibility issues
  - Supported by CII and EPRI as well as Indian utilities and related industries
  - Legacy materials
  - Monthly online working groups
  - Annual event
  - Proposed sectoral goals (costings, regulatory change)

# CEM: Continuous emission monitoring

# Pillar: CEMS

## The Problem

India has new emission norms for particulates, $SO_2$, NOx and mercury. In order to demonstrate compliance and to identify appropriate reduction strategies, Indian coal units must be able to accurately and consistently measure emissions from all stacks

India currently has no national standards for emissions monitoring and no training scheme for emissions monitoring

## The Solution

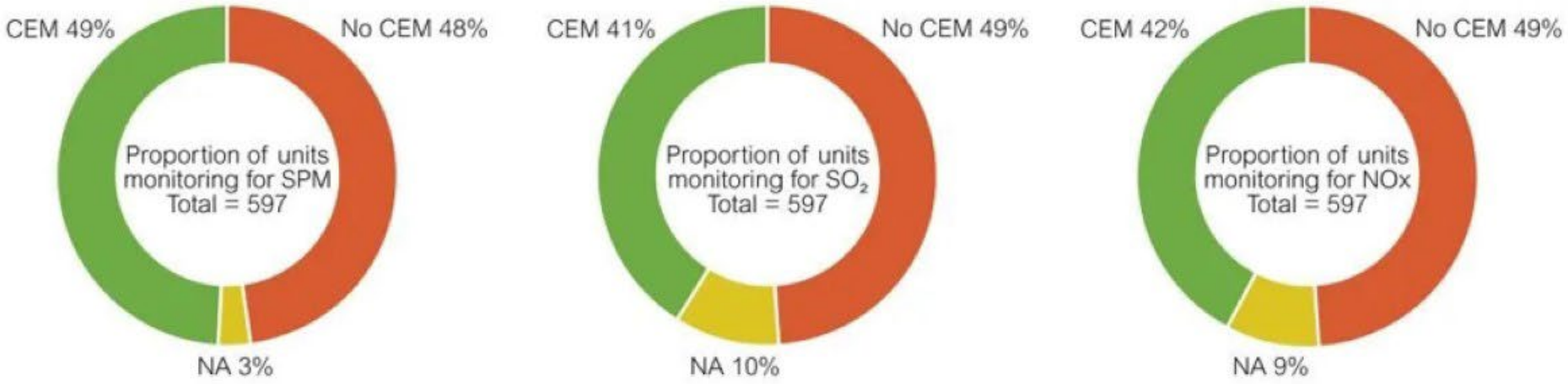
The ICSC worked with Indian stakeholders and international experts to develop a training scheme for monitoring emissions from coal-fired plants. Workshops are being delivered in 4 regions in India

# FULL DESK REPORT AVAILABLE NOW

- Review of current emission legislation in India
- Outline of national CEM requirements
- Summary of internet-based reporting system
- Assessment of status of CEM operation
- Proposal for delivery of training and capacity building

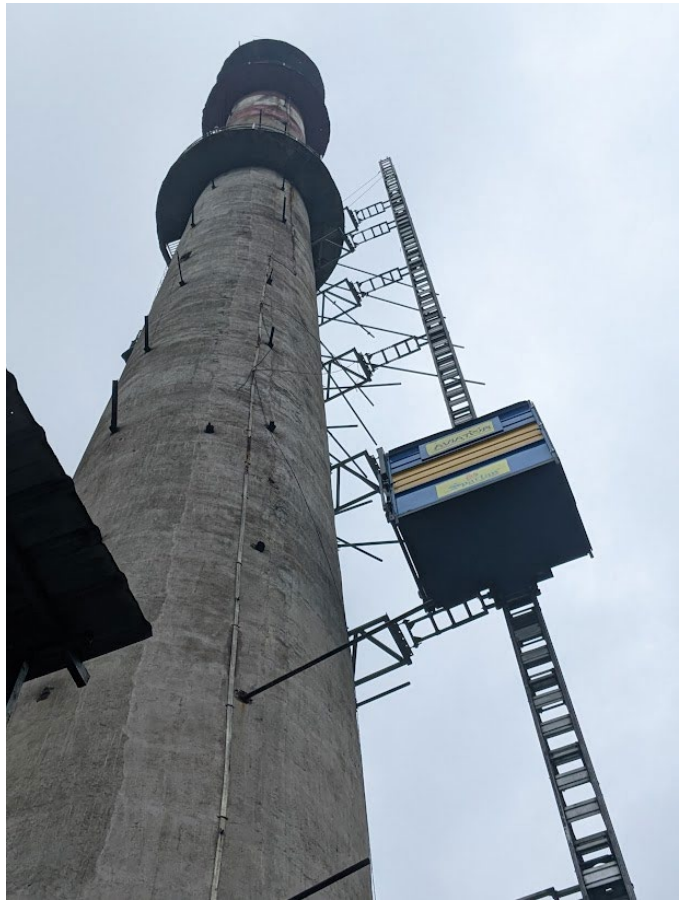
# CEM STATUS IN INDIA (2020 DATA)

| | Units reporting | Units with reporting issues | Units not reporting or data not available publicly* |
|---|---|---|---|
| **PM CEM** | 291 (49%) | 7 (1%) | 301 (50%) |
| **$SO_2$ CEM** | 248 (41%) | 57 (10%) | 294 (49%) |
| **NOx CEM** | 242 (40%) | 50 (9%) | 307 (51%) |




CEM = continuous emission monitoring systems

# HANDS ON TRAINING



# PRACTICE WITH EQUIPMENT

# EXHIBITION AND ONLINE EXPERTS


# LEAVING A LEGACY

- Materials have been collated into a workshop support manual
- Materials are sent to delegates after the event and will be made available to all once the workshops are completed

*But if the training stops, what will we have achieved?*

- In the UK and EU, emission monitoring standards and training are run through MCERTS and the STA: Source Testing Association. Stack testers MUST be qualified
- In the US, there is the SES: Source Evaluation Society. Qualified stack testers preferred
- India needs an organisation to continue training and standards development. Qualification in stack testing should be made available

# EMISSION CONTROL AND ASH MANAGEMENT

# PILLAR: MULTI-POLLUTANT EMISSION CONTROL AND ASH MANAGEMENT

## The Problem

The new emission norms in India will require the installation of pollution control systems on many plants – what has worked elsewhere may not be suitable for India's high ash coals

## The solution

Indian utilities would benefit from knowledge sharing on which technologies will work best on their plants and with their specific coals, ensuring that the decisions made are cost-effective

## The problem

India produces large quantities of coal ash "waste" and the goal of 100% ash utilisation is challenging in some regions

## The Solution

Changes in ash management strategies at many Indian plants will turn waste material into an additional source of revenue. Knowledge sharing and technology sharing is key

# REMAINING CHALLENGES

- Desk reports – multipollutant and ash, to be published “soon”
- “Training materials” to be produced. But I would rather create workshops based on knowledge sharing within India.
- International expert team needed to add value - Looking for speakers

# HELP NEEDED

- 4 workshops to be held in Indiain  the first half of 2023
- Likely to be in 2 x 1-week events, back to back
- First pair of events will be in Raipur (Adani) and Hyderabad (NTPC) (March/May?)
- Next pair of events will be New Delhi and TBC (June/July?)
- Presentations on cost-effective emission control options (PM, SO2, Nox and mercury) suitable for high-ash Indian coals

- Some funding is available to offset travel/time
- Please check passports/visas before volunteering!

INTERNATIONAL CENTRE FOR
SUSTAINABLE CARBON

# THANK YOU FOR LISTENING

## ANY QUESTIONS?



Dr Lesley Sloss
Lesley.sloss@icscarbon.org


Annual meeting of the UNEP Global Mercury Partnership Area on Hg from Coal Combustion

# 5. Update on project "Assessment of existing and future emissions reduction from the coal sector toward the implementation of the Minamata and Stockholm Convention"

# GEF PROJECT:

# Assessment of existing and future emissions reduction from the coal sector toward the implementation of the Minamata and Stockholm Conventions


Peter Nelson* and Edward Archer

School of Natural Sciences
Macquarie University
Sydney, Australia

*Co-lead UN Environment Mercury in Coal Combustion Partnership


GLOBAL MERCURY PARTNERSHIP

gef UN environment programme 50 1972-2022

Coal Partnership Meeting, 16th January 2023

MACQUARIE University

# Project Objectives and Outcomes

MACQUARIE University

**OUTCOME 1:**

**Comprehensive coal sectoral analysis**

**Activities**

- Scientific data on mercury/POPs/GHGs from CFPPs reviewed
- Evaluate impact of UNFCCC-COP commitments and targets on coal sector emissions analysed
- Potential mercury/POPs/GHG reduction figures and scenarios from CFPPs produced

**Outcomes**

- Estimated mercury/POPs/GHGs **reductions and future scenarios for CFPPs**
- GEF interest: How many tons of mercury can be reduced by the coal sector?

# Project Objectives and Outcomes

MACQUARIE University

**Activities**

- Synthesis of results from **completed/ ongoing CFPP projects**
- Selection criteria: Future projects based on **highest impact potential**
  - Guidance on where to support large scale projects
- **Policy guidance**: Assist public and private sectors in their decision-making processes
- Detailed reports and communication materials on project findings developed and disseminated through dedicated platform (UNEP & MQ)

**OUTCOME 2:**

**Strategy for the coal sector's emissions reduction contribution to Stockholm and Minamata Conventions**

# Key Targets

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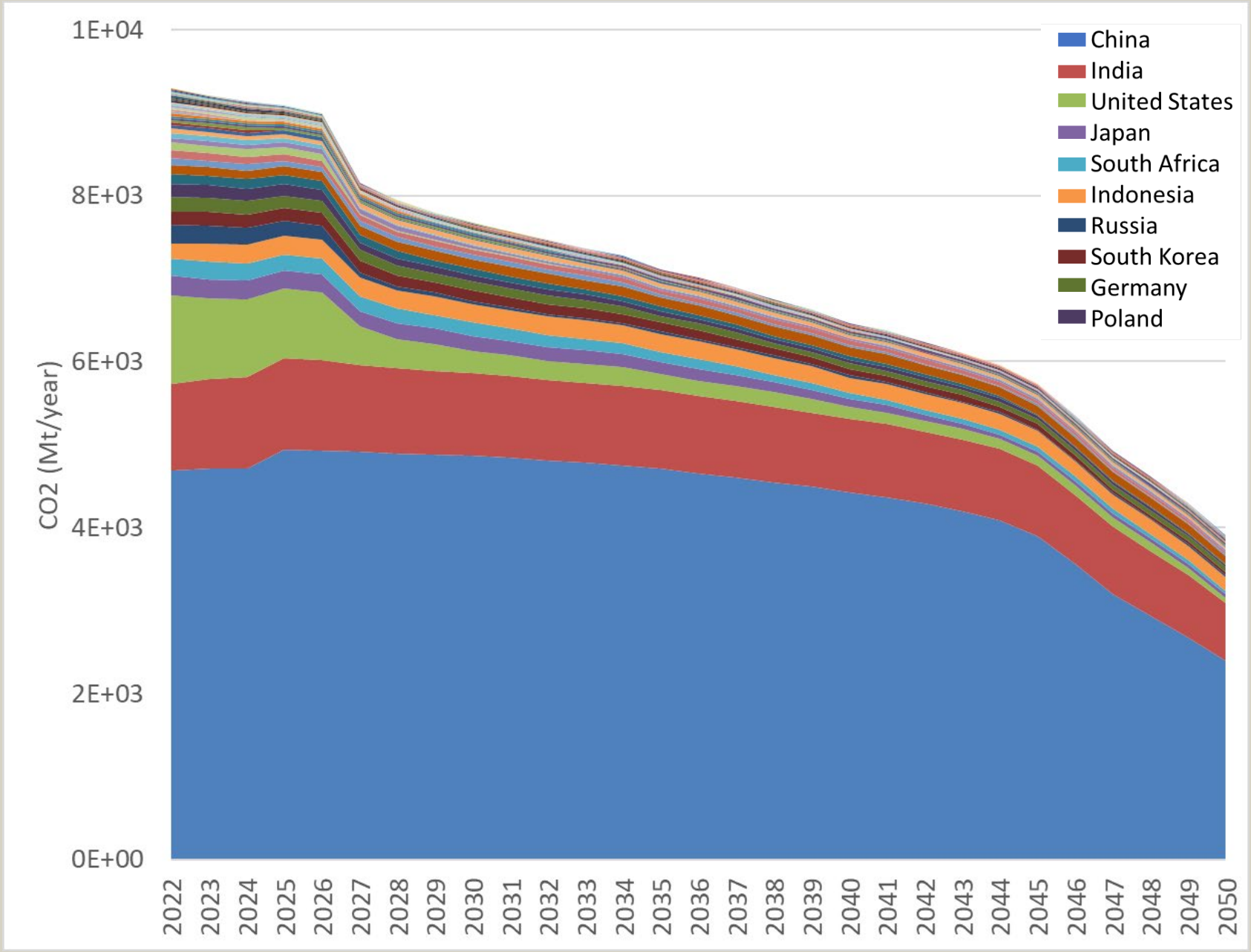
1. Demonstrate the ***effect of UN Conventions on implementing Hg/POPs emissions reduction strategies*** from coal combustion
   - Build on BAT/BET Guidance documents

2. ***ID priority countries*** for whom effective control of Hg/POPs emissions is essential for the success of the relevant UN Conventions
   - Future direction of funding & correct interventions

3. Summarize ***available existing scientific data on mercury/POP emission reduction potential***
   - Assess contribution of the coal sector to Hg/POPs emissions for future scenarios
   - Relationship to commitments under the Paris Agreement

4. Suggest recommendations to national stakeholders when evaluating the appropriate decision-making steps in approaching the coal sector to address mercury and POP emissions
   - Workshop on country specific action plans using the information and tools developed through the project




*Source: Global Energy Monitor, Global Coal Plant Tracker database, updated July 2022*

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## Fate of global CFPPs (BAU)*

- ***2026/27***

Large expected decline

- ***2030***

14% decline (MW)
17% decline ($CO_2$)

- ***2050***

53% decline (MW)
58% decline ($CO_2$)

* Excluding CCUS/APCD retrofit & projects under pre-construction phase (announced, permitted, pre-permitted)

# Project Overview

## National determined contributions (NDCs)

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| Country | Goal year | NDC |
|---|---|---|
| South Korea | 2030 | Reduce 24.4% from the total national GHG emissions in 2017 |
| Canada | 2030 | Reduce emissions by 40-45% below 2005 levels |
| | 2050 | Net zero emissions |
| Poland | 2030 | Reduce emissions by 43% from 2005 levels (EU ETS); reduce emissions 7% from 2005 levels (non-EU ETS) |
| | 2050 | Carbon neutrality |
| Russia | 2030 | GHG emission reduction of 70% compared to 1990 levels |
| Germany | 2030 | Reduce emissions by 43% from 2005 levels (EU ETS); reduce emissions 38% from 2005 levels (non-EU ETS) |
| | 2050 | Carbon neutrality |
| Philippines | 2030 | Projected GHG emissions reduction and avoidance of 75%, (2.71% unconditional, 72.29% conditional) |
| China | 2030 | $CO_2$ emissions peak; Lower $CO_2$ emissions per unit of GDP by 60% to 65% (2005 level); Increase non-fossil fuels in primary energy consumption (25%; Total installed capacity of wind and solar to over 1.2 bkW) |
| | 2060 | Carbon neutrality |
| India | 2030 | Reduce the emissions intensity of its GDP by 30–35% over 2005 levels (voluntary); 40% cumulative electric power from renewable energy resources |
| | 2070 | Net zero emissions |
| Indonesia | 2025 | New and renewable energy at least 23%<br>Coal minimum 30% of the energy mix |
| | 2030 | Reduce emissions 29% (unconditional) up to 41% (conditional) against the 2020 levels |
| | 2050 | New and renewable energy at least 31%<br>Coal minimum 25% of energy mix |
| Japan | 2030 | Reduce GHG emissions by 46% from 2013 levels |
| | 2050 | Net-zero emissions |
| South Africa | 2025 | Achieve the peak, plateau, and decline trajectory for GHG emissions; Annual GHG emissions 398-510 Mt CO2-eq |
| | 2030 | Procuring at least 20 000MW of renewable electricity; Annual GHG emissions 350-420 Mt CO2-eq |
| Vietnam | 2030 | Reducing emissions by 9% compared to the 2014-based BAU scenario |
| United States | 2030 | Reducing net greenhouse gas emissions by 50-52% below 2005 levels |
| | 2050 | Net zero emissions |

COP21 · CMP11 PARIS 2015 UN CLIMATE CHANGE CONFERENCE

# Country-specific challenges

Impact on future emission scenarios

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## Rapid population growth

- Energy demand

## Rapid urbanization & industrialization

- Economic development

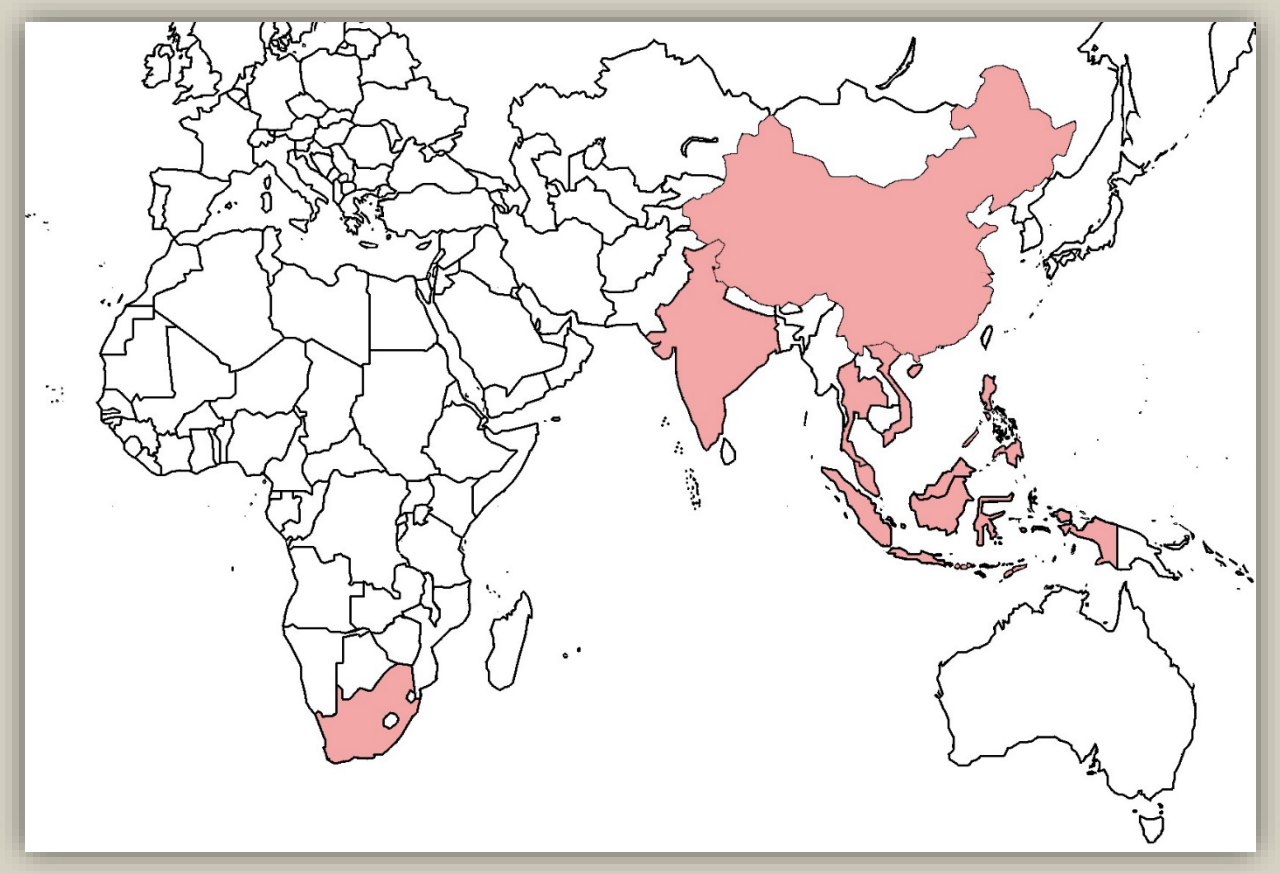
## Climate change

- Natural disasters
- Effect on renewables

## Pan/Epidemics

## Commitment to policies & pledges

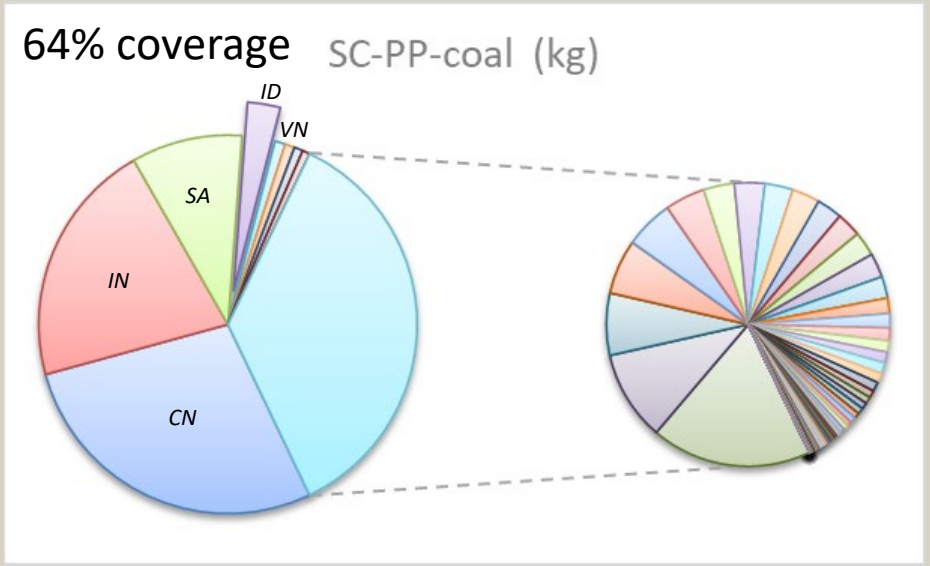
# Focus Countries

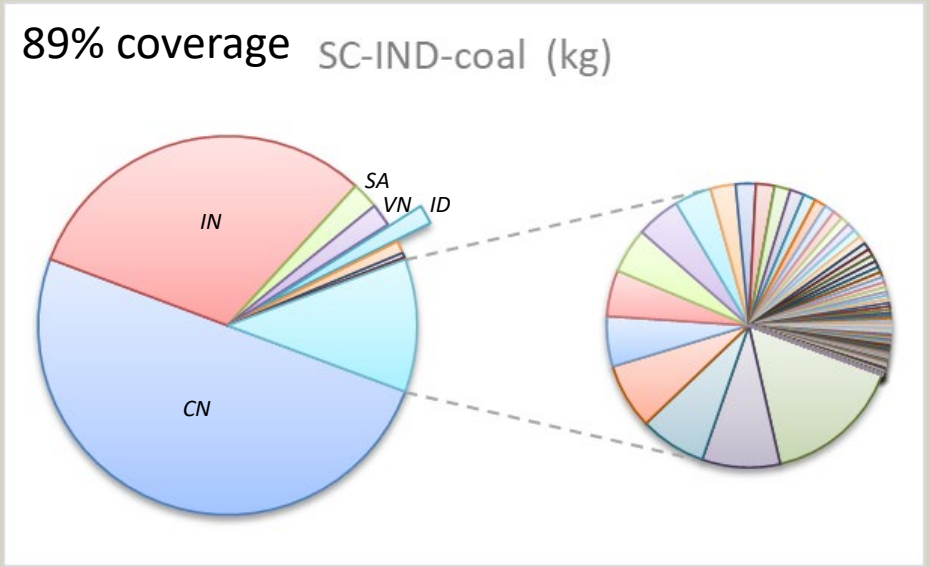


*China, India, Indonesia, Vietnam, Malaysia, Thailand, Philippines, South Africa*

***2030***

- 85% coverage (MW)
- 84% coverage ($CO_2$)



# Outcome 1: Coal Sectoral Analysis

Indonesia

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Methodology:

- Literature study “Indonesia”, “Coal”, “Coal Consumption”, “Energy Development”, “Electricity Generation”, etc.
- Reports: IEA, RUKN, RUPTL, IEA-CCC, BSCRC-SEA, UNFCCC, IESR, ERIA
- Databases: GEM, BP, EMBER, ERIA, IEA, PLN

| Year | NDC/LTS-LCCR |
|---|---|
| 2025 | • NRE at least 23% of energy mix<br>• Coal minimum 30% of energy mix |
| 2030 | Reduce emissions against BAU (2,869 $GtCO_2$-eq)<br>• 31,9% (unconditional)<br>• 43,2% (conditional) |
| 2050 | • NRE at least 31% of energy mix<br>• Coal minimum 25% of energy mix |
| 2060 | Net Zero emissions (sooner) |

National Electricity Plan 2019-2038 (RUKN):

- 2025 - 23% RE, 22% gas, 54% coal
- 2038 - 28% RE, 25% gas, 46.4% coal
- 2050 - 31% RE, 6.9% gas, 62% coal

NRE – including nuclear, biomass, coal gasification?
No “unabated” coal by 2040

| Year | MCM: Article 8 - Emissions |
|---|---|
| 2013 | Signed |
| 2017 | Ratified |
| 2022 | • Inventory of emissions from relevant sources<br>• Information on emission measures taken<br>• ID use of BAT/BEP (new sources) |
| 2027 | <u>≥ 1 measure in National Plan (existing sources):</u><br>• Quantified emission reduction goal<br>• Emission limit values<br>• Use of BAT/BEP (new & existing)<br>• Multi-pollutant control strategy<br>• Alternative measures for emission reduction |

# Global Energy Monitor

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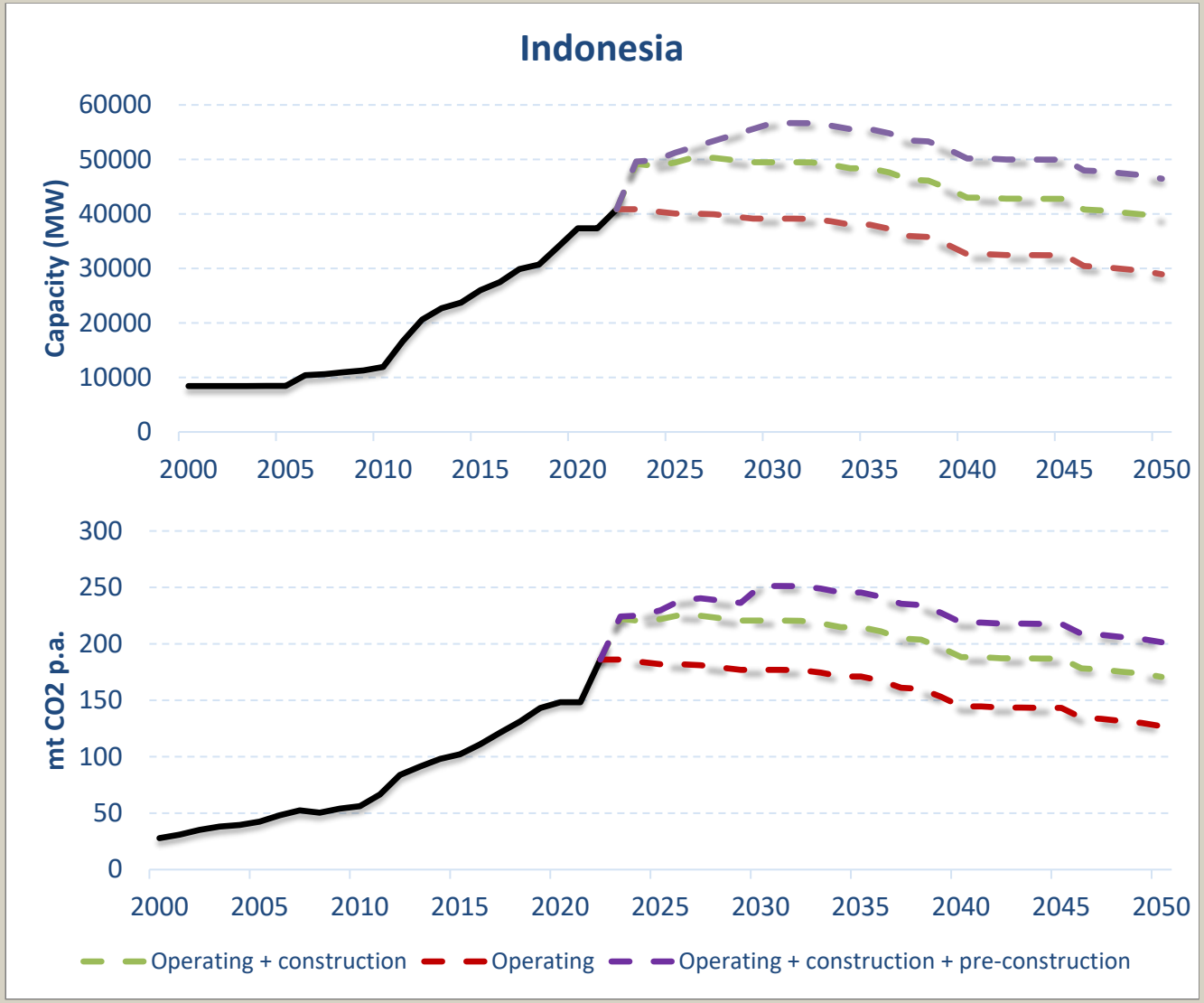
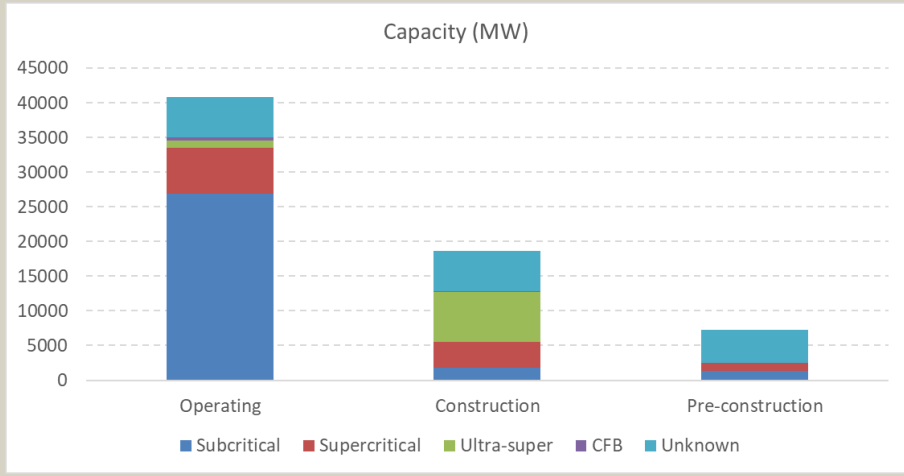
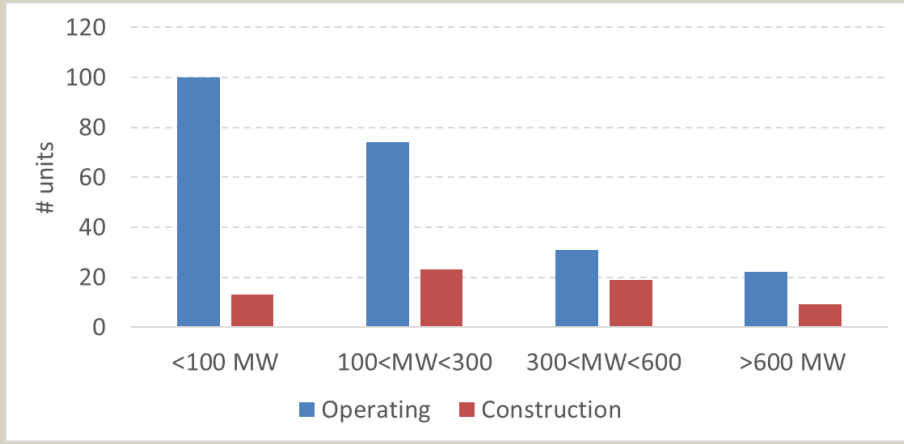
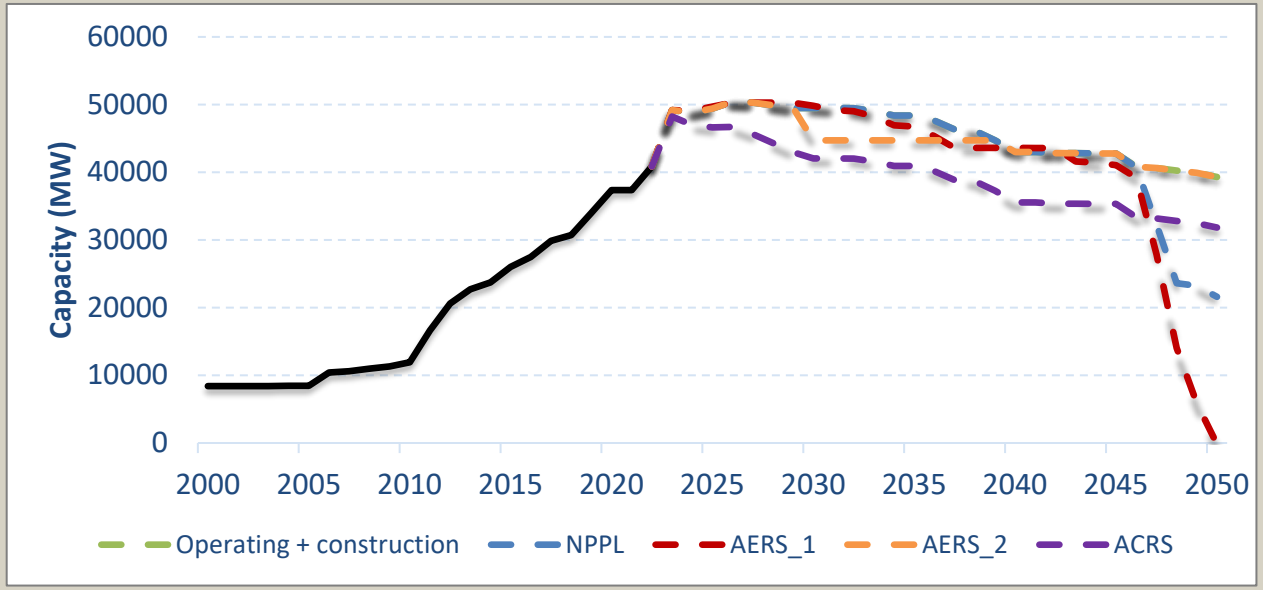


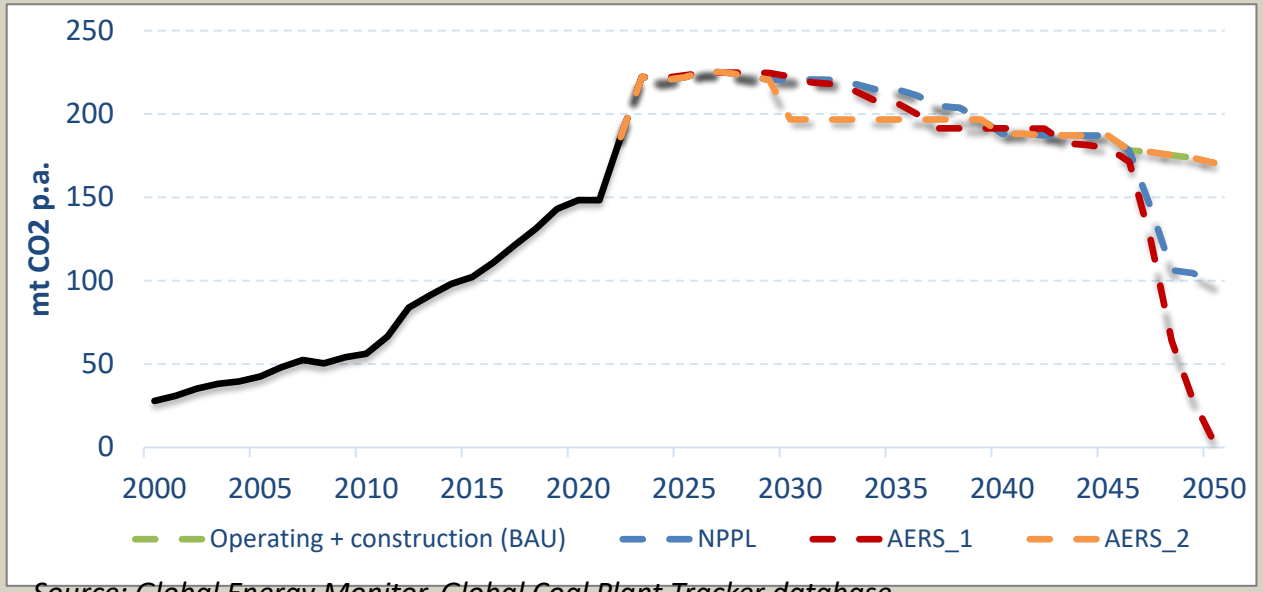




*Source: Global Energy Monitor, Global Coal Plant Tracker database*

# Global Energy Monitor




*Source: Global Energy Monitor, Global Coal Plant Tracker database*

NPPL – New power plant lifetime of 25 years

AERS_1 – Plants constructed before 2015 with 3-year early retirement
Plants constructed after 2015 with 10-year early retirement
New power plant lifetime of 25 years

AERS_2 – Plants older than 30 years from 2022 will retire by 2030

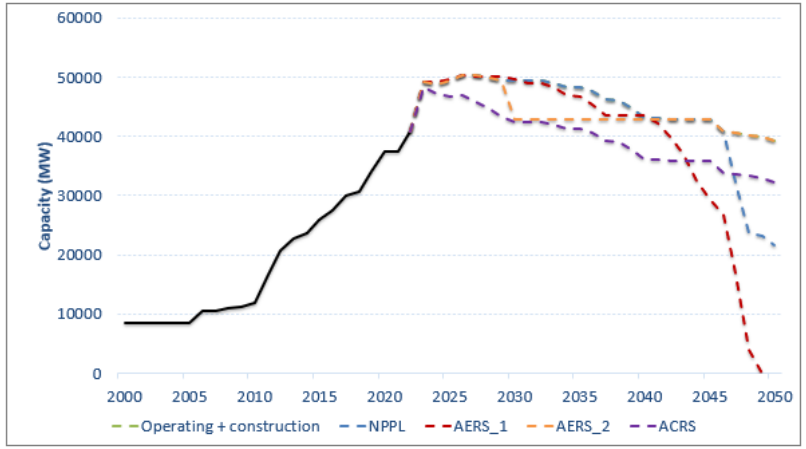
ACRS – Additional capacity reduction by 2030

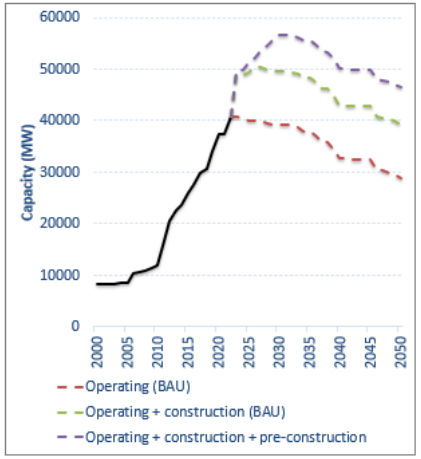
BMCF – Biomass co-firing included for some plants greater than a certain capacity by 2030

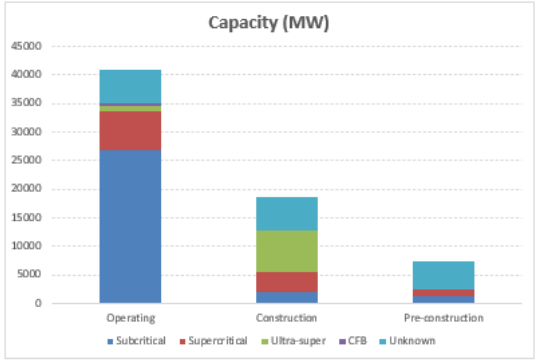
GEM_interactive spreadsheet for CFPP reduction scenarios up to 2050 - with macros - Excel

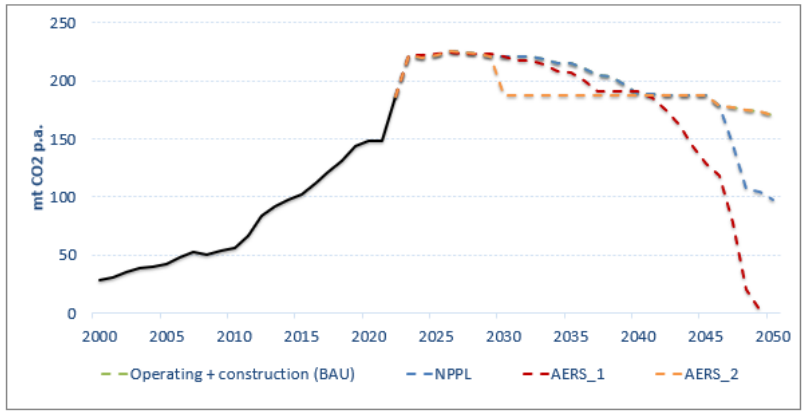
| Scenario* | | COUNTRY | Indonesia |
|---|---|---|---|
| NPPL | New plant lifetime | | 25 |
| | ER year (20xx) | | 2015 |
| AERS_1 | Years ER for plants <20xx | | 3 |
| | Years ER for plants >20xx | | 15 |
| | Plants older than xxx years from 2022 | | 25 |
| AERS_2 | Retire by... | | 2030 |
| | Additional MW | | 7000 |
| ACRS | by year | | 2030 |

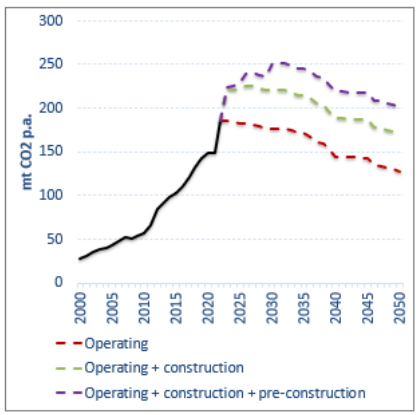
| | MW |
|---|---|
| Operating (July 2022) | 40861,6 |
| Construction | 18699,0 |
| Pre-construction | 7260,0 |

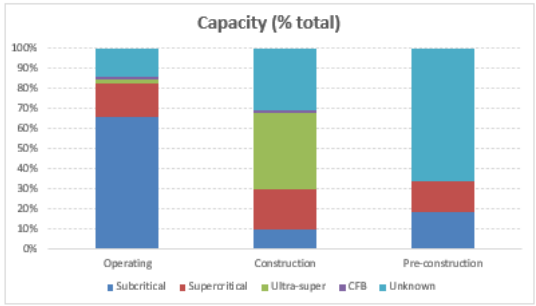


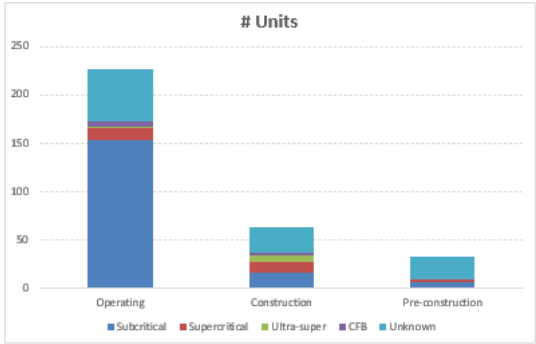



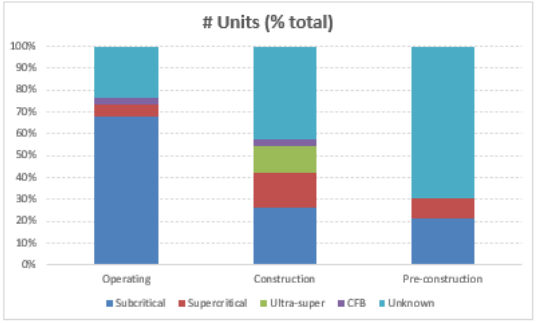




**% Change from 2022 levels (MW)**

| | Operating (BAU) | Operating + con | Opera - | ons reduction achieved NPPL | AERS_1 | AERS_2 |
|---|---|---|---|---|---|---|
| 2022 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 2023 | 0,0 | 20,3 | 21,4 | 0,0 | 0,0 | 0,0 |
| 2024 | -1,0 | 19,5 | 22,0 | 0,0 | 0,6 | 0,0 |
| 2025 | -2,0 | 20,9 | 25,4 | 0,0 | 0,6 | 0,0 |
| 2026 | -2,0 | 23,4 | 30,9 | 0,0 | -0,4 | 0,0 |
| 2027 | -2,3 | 23,1 | 32,0 | 0,0 | -0,4 | 0,0 |
| 2028 | -3,3 | 22,1 | 31,1 | 0,0 | 0,5 | 0,0 |
| 2029 | -4,2 | 21,1 | 30,1 | 0,0 | 1,4 | 0,0 |
| 2030 | -4,2 | 21,1 | 38,7 | 0,0 | 0,4 | -14,8 |
| 2031 | -4,2 | 21,1 | 38,7 | 0,0 | -1,2 | -14,8 |
| 2032 | -4,3 | 21,0 | 38,6 | 0,0 | -1,1 | -14,7 |
| 2033 | -5,4 | 20,0 | 37,5 | 0,0 | -1,8 | -13,8 |
| 2034 | -7,0 | 18,4 | 36,0 | 0,0 | -3,2 | -12,5 |
| 2035 | -7,0 | 18,4 | 36,0 | 0,0 | -3,7 | -12,5 |
| 2036 | -8,8 | 16,5 | 34,1 | 0,0 | -5,3 | -10,9 |
| 2037 | -12,0 | 13,3 | 30,9 | 0,0 | -6,5 | -8,2 |
| 2038 | -12,5 | 12,9 | 30,5 | 0,0 | -6,0 | -7,7 |
| 2039 | -15,9 | 9,4 | 27,0 | 0,0 | -2,7 | -4,4 |
| 2040 | -20,2 | 5,2 | 22,8 | 0,0 | 1,7 | -0,1 |
| 2041 | -20,2 | 5,2 | 22,8 | 0,0 | -1,8 | -0,1 |
| 2042 | -20,6 | 4,8 | 22,3 | 0,0 | -6,8 | -0,1 |
| 2043 | -20,6 | 4,8 | 22,3 | 0,0 | -13,5 | -0,1 |
| 2044 | -20,7 | 4,7 | 22,3 | 0,0 | -23,1 | 0,0 |

**CO2 emissions per year - operating CFPPs**

| | country | world | % |
|---|---|---|---|
| Mt CO2/a | 186,10 | 9421,70 | 1,98 |
| Lifetime CO2 | 5316,00 | 201875,80 | 2,63 |

**Change from 2022 (operating + construction)**

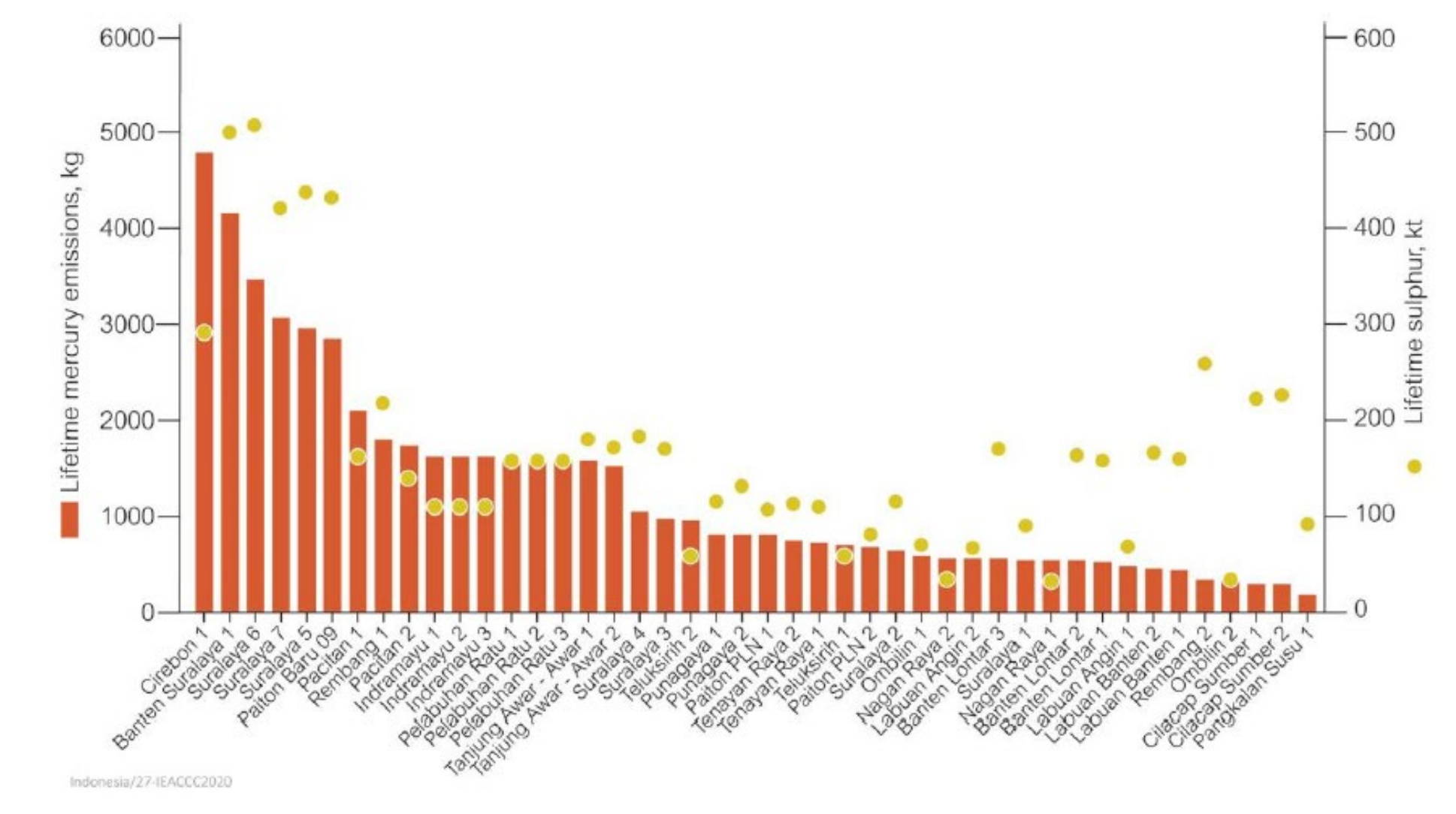
| | BAU | | NPPL | | AERS_1 | | AERS_2 | | ACRS | |
|---|---|---|---|---|---|---|---|---|---|---|
| | MW | % | MW | % | MW | % | MW | % | MW | % |
| 2030 | 49492 | 21,1 | 49492 | 21,1 | 49647 | 21,5 | 42957 | 5,1 | 42492 | 4,0 |
| 2040 | 42987 | 5,2 | 42987 | 5,2 | 43612 | 6,7 | 42957 | 5,1 | 35987 | -11,9 |
| 2050 | 39290 | -3,8 | 21591 | -47,2 | -3228 | -107,9 | 39290 | -3,8 | 32290 | -21,0 |

**Change from 2022 (operating + construction)**

| | BAU | | NPPL | | AERS_1 | | AERS_2 | |
|---|---|---|---|---|---|---|---|---|
| | mt CO2 | % | mt CO2 | % | mt CO2 | % | mt CO2 | % |
| 2030 | 220,6 | 18,5 | 220,6 | 18,5 | 221,4 | 19,0 | 188,0 | 1,0 |
| 2040 | 188,2 | 1,1 | 188,2 | 1,1 | 191,4 | 2,8 | 188,0 | 1,0 |
| 2050 | 170,7 | -8,3 | 97,8 | -47,4 | -10,2 | -105,5 | 170,7 | -8,3 |

# **Indonesia Hg emission factor** (BCRC-SA, 2017)**:** **0,011 – 0,231 mg/kg (0,056 mg/kg)**

MACQUARIE University




Source: IEACCC, Full Technical Report from Phase 1 – Reducing Mercury Emissions from the Coal Combustion Sector in Indonesia

# Project Outcome 2:

## Emissions reduction contribution to Stockholm and Minamata Conventions

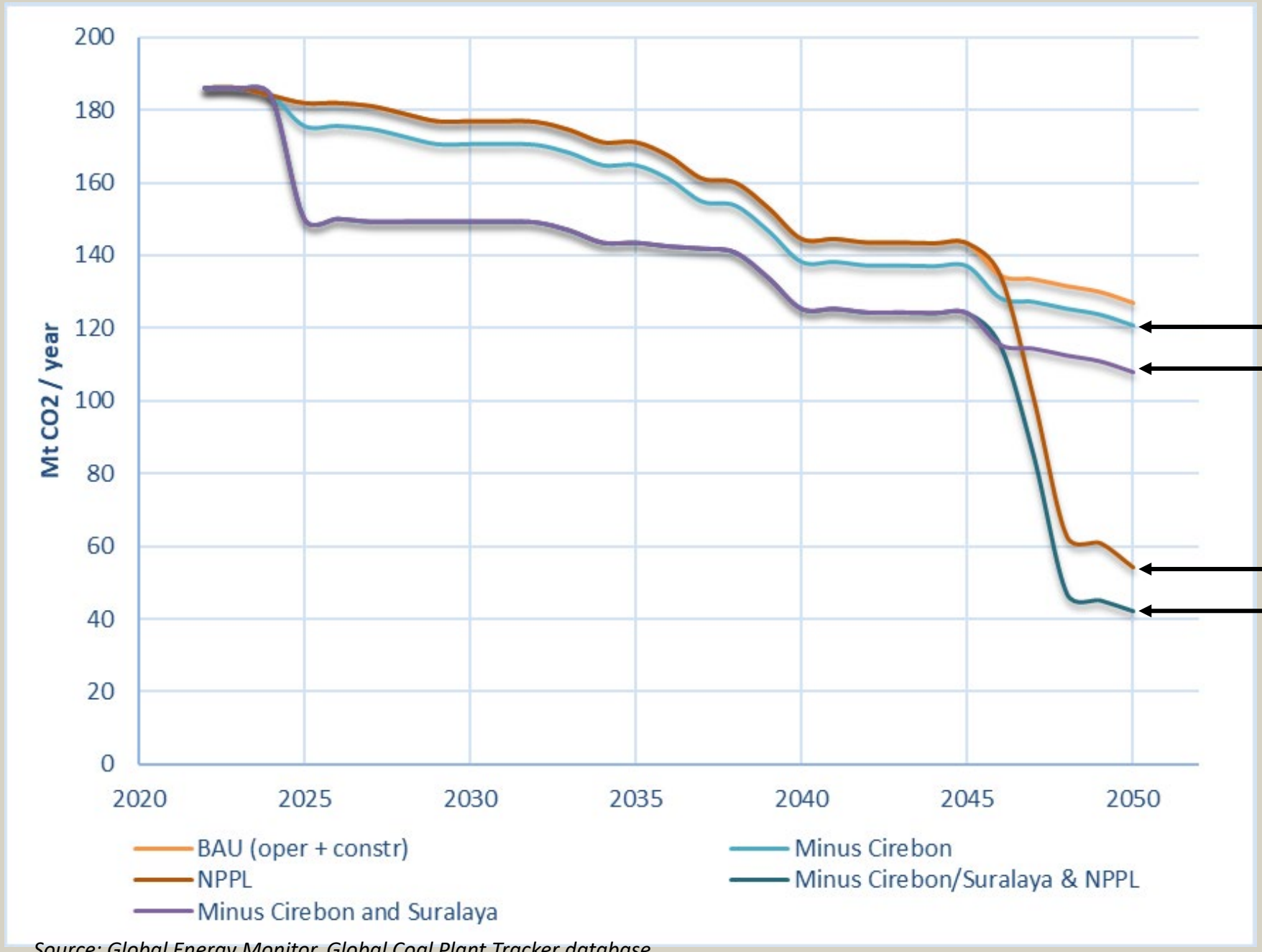
MACQUARIE University

**Activities**

- Synthesis of results from completed/ ongoing CFPP projects
- Selection criteria: Future projects based on highest impact potential
    - Guidance on where to support large scale projects
- Policy guidance: Assist public and private sectors in their decision-making processes
- Detailed reports and communication materials on project findings developed and disseminated through dedicated platform (UNEP & MQ)

**OUTCOME 2:**

**Strategy for the coal sector's emissions reduction contribution to Stockholm and Minamata Conventions**




MACQUARIE University

% Reduction from BAU

| | *2030* | *2050* |
|---|---|---|
| Minus Cirebon | 4% | 5% |
| Minus Cirebon and Suralaya | 16% | 15% |

% Reduction (NPPL 25 yrs)

| | *2030* | *2050* |
|---|---|---|
| NPPL | 0% | 57% |
| Minus Cirebon/Suralaya & NPPL | 16% | 67% |

*Source: Global Energy Monitor, Global Coal Plant Tracker database*

# Outcome 2: Strategy for coal sector emissions reduction contribution to UN Conventions

MACQUARIE University

- Initiatives
  - Powering Past Coal Alliance (PPCA)
  - Accelerating Coal Transition Program (ACT; Climate Investment Funds)
  - Energy Transition Mechanism (ETM; Asian Development Bank)
  - Just Energy Transition Partnership (JETP; World Bank)

- Considerations for CFPP early retirement
  - Available excess thermal capacity/flexibility
  - Plant-specific operation (consideration during ETM?)
  - Cost of retirement compared to APCD retrofit
  - BAP for retirement mechanism – RE transition

# Project Outcome 2:

## Contribution to future GEF projects

MACQUARIE University

**BAT/BEP**

- Co-benefit of emissions control from APCDs are well-known

- Options to meet climate action goals:
  - APCD retrofit, including deployment of CCUS in all units (high cost, stranded asset risk)
  - CFPP flexibility (reduced emissions to facilitate RE transition)
  - Early retirement of CFPPs (new projects will become stranded, risk to meet energy demand)

- For countries that will still rely on coal-fired power production
  - Plant/Unit-specific modifications in operation?
  - Coal choice & blending options?
  - Training on emissions monitoring & forecasting?

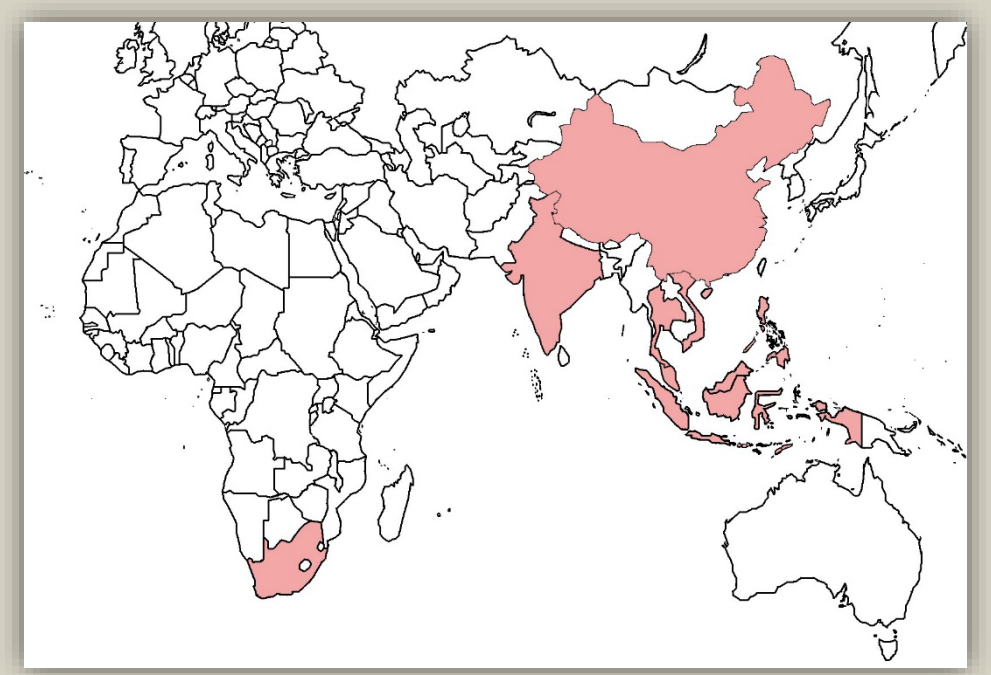
- For countries considering an accelerated transition to RE
  - Roadmap to energy transition mechanism
    - Facilitating the procedure
    - Refined selection criteria for the next phases of CFPPs in the mechanism

# Research and Data Needs

MACQUARIE University

Country-specific CFPP & CFIB information

- Plant efficiency (%)
- Coal source (Import/domestic coal share)
- Planned/current projects for CFPP/CFIB emissions mitigation
- Scenarios for CFPPs up to 2050
  - Capacity
  - Electricity generation
  - GHG emissions



- *Coal consumption (Mt/year)*
- *Mercury emission factors*

} UNEP toolkit

# QUESTIONS?


Annual meeting of the UNEP Global Mercury Partnership Area on Hg from Coal Combustion

# 6. Update on the call for comments on the draft guidance on BAT/BEP to control mercury releases to land and water


Annual meeting of the UNEP Global Mercury Partnership Area on Hg from Coal Combustion

# 7. Partners' updates on ongoing projects and events


Annual meeting of the UNEP Global Mercury Partnership Area on Hg from Coal Combustion

# 8. Any other issue


Annual meeting of the UNEP Global Mercury Partnership Area on Hg from Coal Combustion

# 9. Closure of the meeting