



ATLANTIC ENERGY  
ASSOCIATES LLC

# Mercury Emission Estimates with the iPOG

Mercury Emission from Coal / Minamata Online / Season 2

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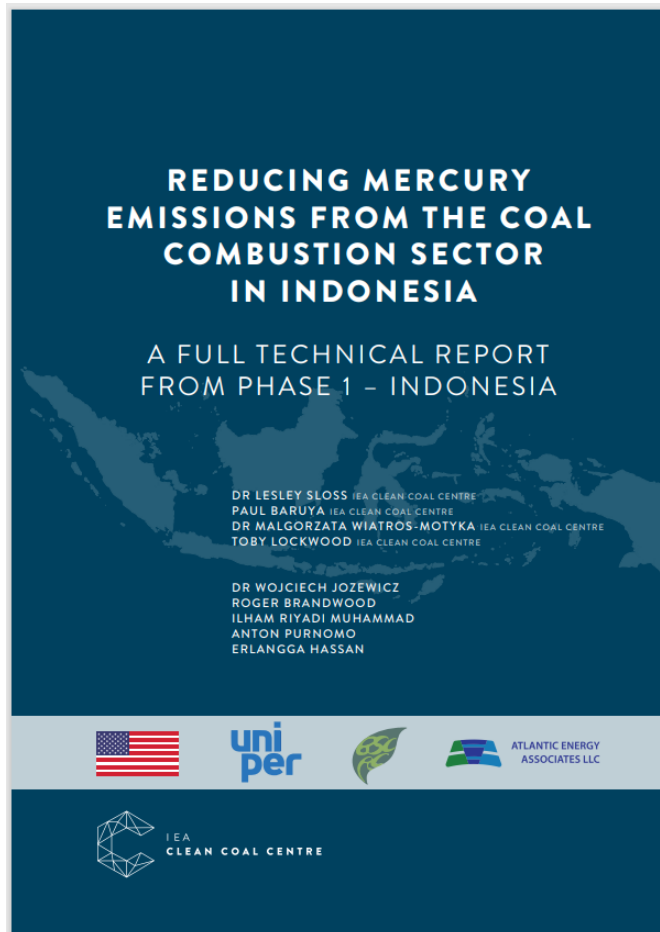


# Outline

- Existing plants challenge
- Mercury emission on plant-by-plant basis
- Introduction to UNEP tools
- Overview of iPOG approach
- Example of iPOG analysis





# An Example of Country-wide Analysis




- Plants nearing the end of life, but likely to upgrade soon
- Plants with SWFGD, to investigate means to reduce potential for increased Hg deposition
- Inefficient plants due for imminent refurbishment



# UNEP Tools for Plant-by-plant Analysis

 UNITED NATIONS ENVIRONMENT PROGRAMME 

## Process Optimization Guidance for Reducing Mercury Emissions from Coal Combustion in Power Plants



Division of Technology, Industry and Economics (DTIE)  
Chemicals Branch  
Geneva, Switzerland  
November 2010

**Mercury iPOG**

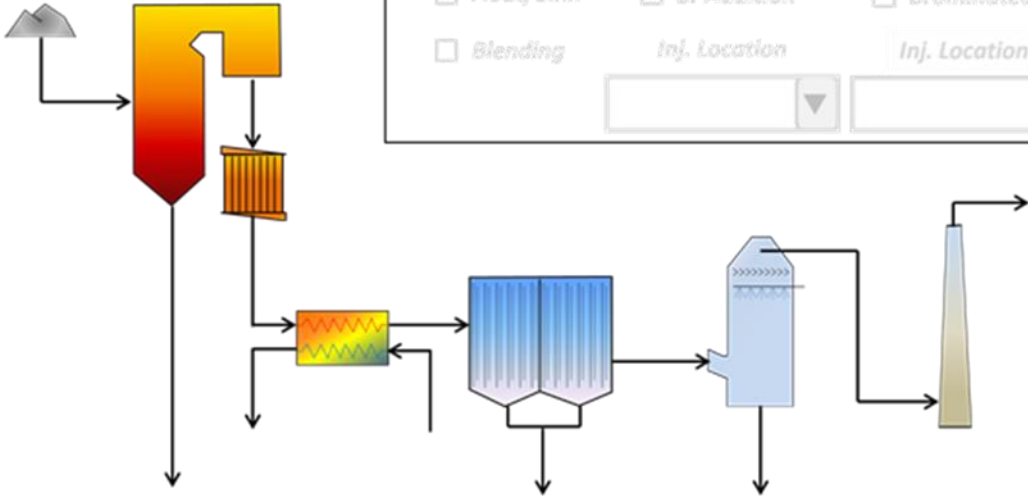
Post-Combustion Controls	Mercury Controls	Coal Properties		Furnace Conditions	Mercury Control Parameters	Calculate
		Single	Blend			

**Standard Hg Controls**

Inherent Only ▾

**Configure Hg Control Options**

Coal	Halogen	Sorbents
<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> None
<input type="checkbox"/> Washing	<input type="checkbox"/> Cl Addition	<input type="checkbox"/> Untreated ACI
<input type="checkbox"/> Float/Sink	<input type="checkbox"/> Br Addition	<input type="checkbox"/> Brominated ACI
<input type="checkbox"/> Blending	Inj. Location	Inj. Location
	<input type="text"/>	<input type="text"/>





# POG Overview

- Addressed Hg control options from coal-fired boilers
- Produced for UNEP with technological status quo in 2010
- Utilized global Hg control experience
- Significant utilization of results from USDOE Hg research program
- Has emphasized co-benefit approaches
- Was used as a platform for UNEP BAT/BEP development



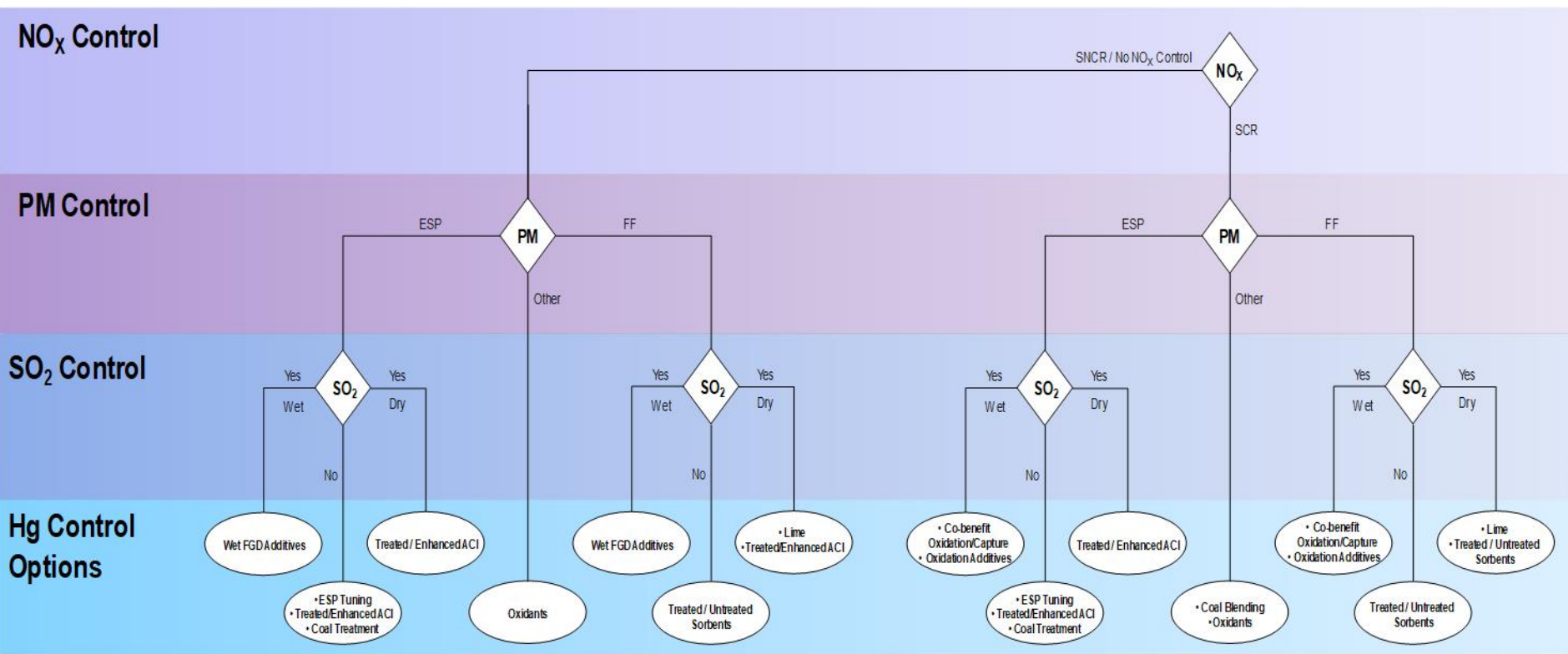
# iPOG Overview

- Developed by in cooperation with the Coal Partnership
- Has been coded according to POG
- Utilizes proprietary calculations (Niksa Associates)
- Intuitive interface over complex set of equilibrium calculations
- Free download from UNEP's website at:

[https://www.unep.org/resources/report/interactive-process-optimization-guidance-ipogtm?\\_cf\\_chl\\_managed\\_tk\\_\\_=pmd\\_7AOq4pJhAAkd7aNOf2LatYiP1OivbzpqGaVHKNd7feU-1631718181-0-gqNtZGzNAzujcnBszQiR](https://www.unep.org/resources/report/interactive-process-optimization-guidance-ipogtm?_cf_chl_managed_tk__=pmd_7AOq4pJhAAkd7aNOf2LatYiP1OivbzpqGaVHKNd7feU-1631718181-0-gqNtZGzNAzujcnBszQiR)

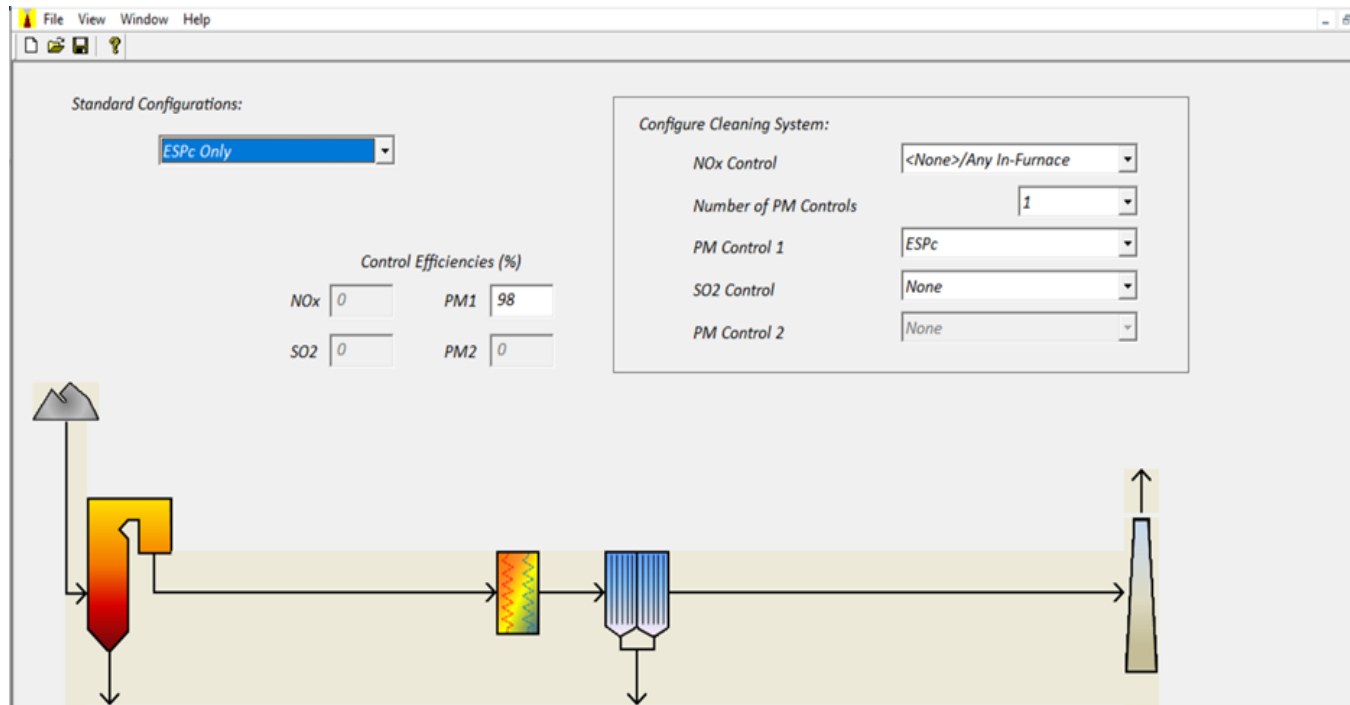


# iPOG Flow





# Example of iPOG Input - Configuration



- Example configuration: ESP only, no SO<sub>2</sub> control, no post-combustion NO<sub>x</sub> control systems





# Example of iPOG Input - Coal

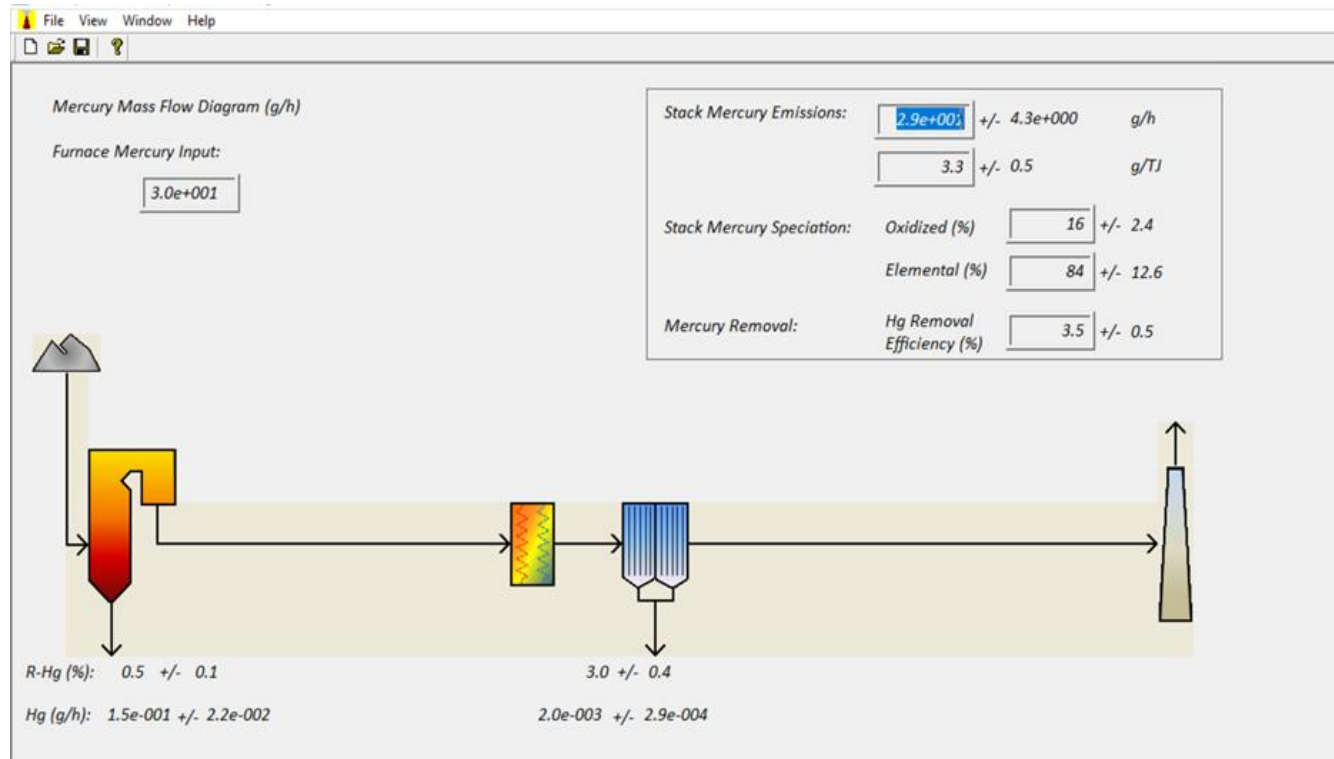
The screenshot displays the 'Single Coal Properties' tab in the iPOG software. The interface includes a menu bar (File, View, Window, Help) and a toolbar. The main content area is titled 'Single Coal Properties: (as-received %)' and features a coal icon. Below this, there are three sections for coal data entry:

- Select Coal:** A dropdown menu set to '<User Defined>'. Below it is a table with columns: Moisture, Ash, Sulfur, Chlorine, Mercury (ppmw), and HHV (I/g). All values are currently 0.
- Coal Rank:** A dropdown menu set to 'Subbituminous'. To its right is a text field for 'Coal Name' containing 'Suralaya Coal'. Below these are input fields for Moisture (27.5), Ash (3.8), Sulfur (0.95), Chlorine (0.015), Mercury (ppmw) (0.1017), and HHV (I/g) (23107). There are 'Load Coal' and 'Use This Coal' buttons.
- Current Coal:** A summary section showing 'Coal Rank: Subbituminous' and 'Coal Name: Suralaya Coal'. Below it are the same column headers as in the previous section.

- Coal blends may be used and may be user-defined
- Data may be entered for coal S and Cl content; these can significantly affect Hg behavior
- Data may be entered for Hg content in coal; affects Hg release from plant



# Example of iPOG Calculations - Results



- Estimates of elemental and oxidized stack emissions
- Estimates of Hg outflows from furnace (bottom ash) and ESP (flyash)



# Summary

- Hg emissions from coal-fired units may be estimated with iPOG on a plant-by-plant basis
- iPOG analyses may be helpful to determine upgrade priorities for plants
- iPOG analyses were used during numerous projects funded by UNEP and USDOS
- The iPOG tool is available as a free download from the UNEP website



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Thank you for listening