



**VIETNAM ENVIRONMENTAL ADMINISTRATION (VEA)
CENTRE FOR ENVIRONMENTAL MONITORING (CEM)**

Website: <http://www.quantracmoitruong.gov.vn/>

MERCURY MONITORING IN VIETNAM

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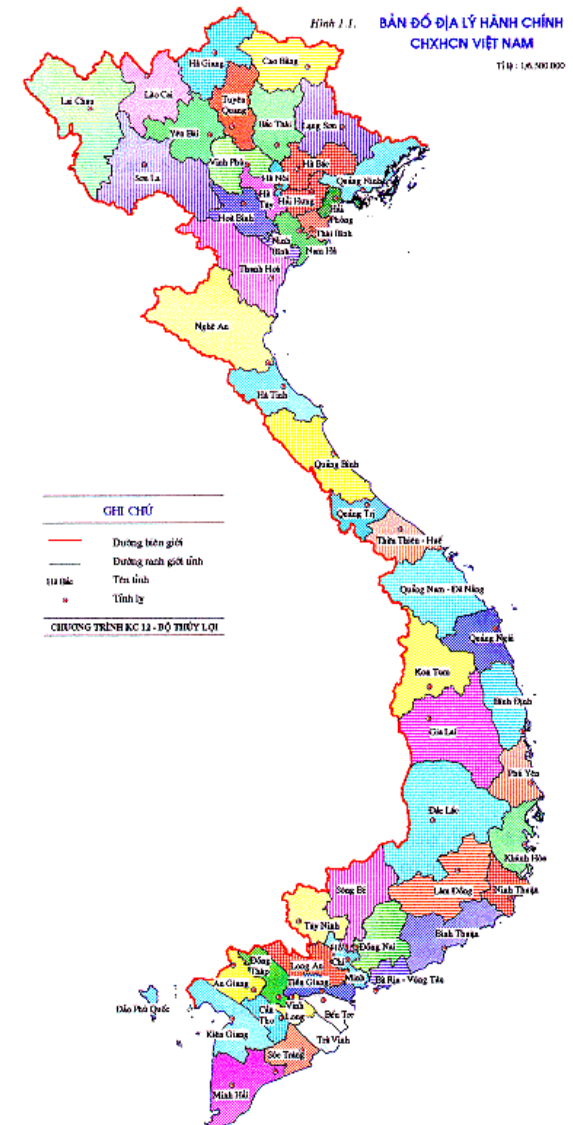
Plan and Propose

GENERAL INTRODUCTION OF VIETNAM

INTRODUCTION OF Vietnam



- Located at the Southeast of Asia
- Area: 333.000 km²
- Population: 91,2 million
- Urban population: 33,1 %
- Rural population: 66,9 %



SOURCES OF MERCURY



Industries with mercury emissions to the environment

In Vietnam, some mercury sources are found as below:

- *Coal fired thermal power plants*
- *Cement factories/plants*
- *Steel production plants*
- *Waste incinerator*
- *Gold mining*
- *Other sources:* Oil refinery, thermometer, Compact fluorescent lamp, dentistry, electric components, metallurgy, e-waste, landfill, chemistry...
- In Vietnam, currently, Hg has not been managed well and strictly.

The increase of industrial zones



According to statistics in 2017: more than 324 industrial zones; 220 industrial zones in operation.

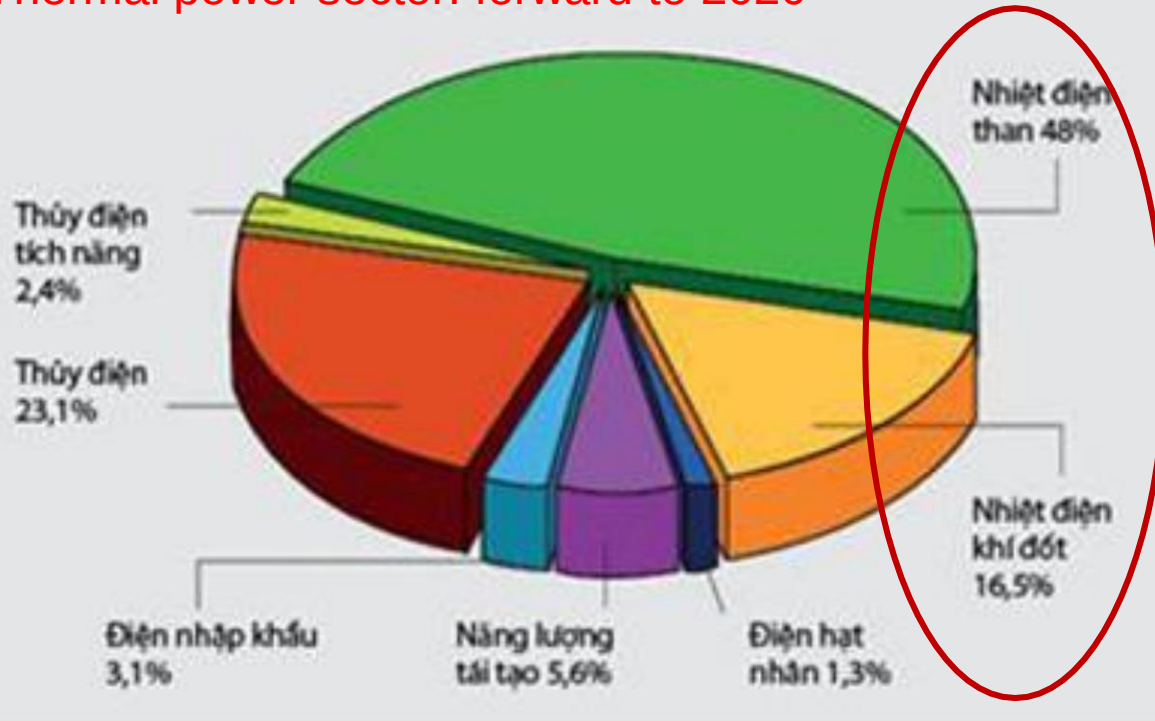
1. Cement Industry



In 2014, Vicem has produced 16.5 million tons of clinker and 18.46 million tons of cement, Production increase over 2013: 0,7% and 10,3% respectively

3. Thermal power sector

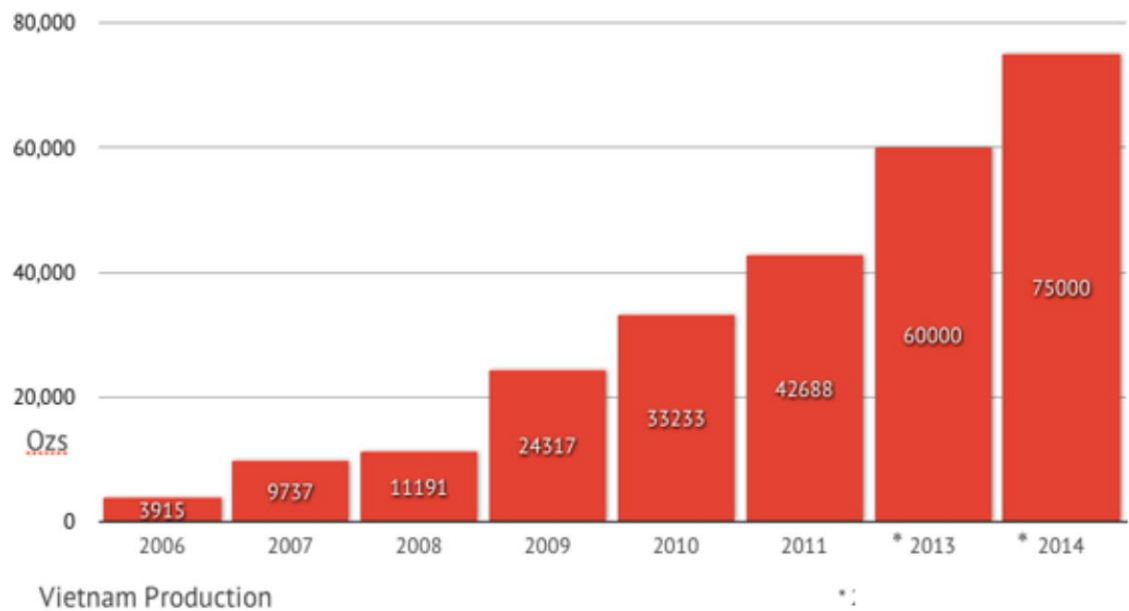
Thermal power sector: forward to 2020



The consumption of coal:

- 2015: needed 23 million tons
- 2020: need up to 67 million tons
- 2030: about 150 million tons

2. Gold mining



Gold mining production increased every year



RESULTS OF MERCURY SURVEYS (2009)

- Cement production:
 - Mercury was discovered in cement with small content (0.02 – 0.08 mg/kg)
- Iron and steel production:
 - Mercury was also discovered in coke coal (0.032 – 0.384 mg/kg)

MERCURY MONITORING IN VIETNAM

Mercury monitoring activities in Vietnam



- **2016:** workshop in Taiwan and Thailand.

- **2010:** Joint the 7-SEA program.
- **2012:** workshop in Taiwan.
 - 01 automatic station for air quality monitoring in Hanoi (*including Hg parameter*).
- **2013:** Workshop in EPA, Washintong DC.
- **2014:** Vietnam has joined the Asia-Pacific Mercury Monitoring Pilot Network.
 - 01 wet sampler in Hanoi (*for Hg analysis*).
- **2015:** Pilot of mercury monitoring for Coal Power Plants

Mercury monitoring activities in Vietnam

2017: Currently, the Ministry of Industry and Trade is submitting to the Prime Minister for approval the Minamata Convention

Vietnam is carrying out research and design of the mercury monitoring network. In April 2017, a study tour was held in Taiwan.



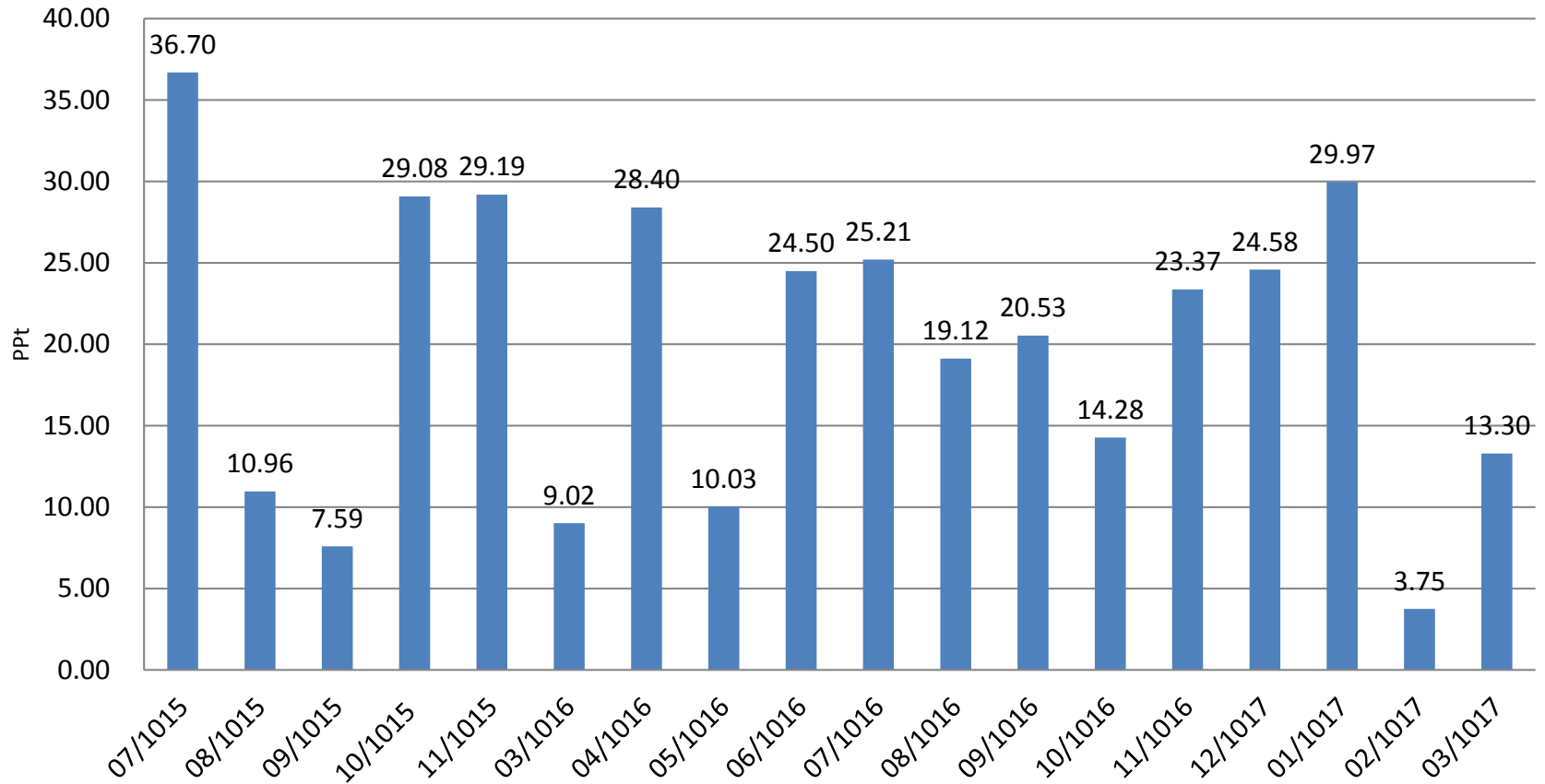
Updated atmospheric mercury level in Hanoi

Location: building No.556,
Nguyen Van Cu, Hanoi
(in the roof of the building of
Center for Environmental
monitoring)



The wet samples are send to National Central University (NCU) of Taiwan for mercury analysis

Vietnam Rainwater Hg data



Updated atmospheric mercury level in Hanoi

Problems encountered during the use of mercury monitoring equipment:

- Temperature sensor does not work
- Add sample preservation procedure and QC sampling guide to SOP



Updates on current mercury monitoring from emission sources

- Monitoring and emission control activities (2016):
 - CEM carry out manual monitoring Hg emission from waste incineration follow Vietnam Technical Regulation (QCVN 02; QCVN 30; QCVN 61). US EPA 29 has been used as a standard method for heavy metal sampling and analysis.
 - Mercury particle bound phase range from N.D to 0.3 ng/Nm³ in which close to Vietnam Technical Regulation.

Incineration type	Number of sample	Concentration (mg/Nm ³)	Duration
Municipal waste	05	Nd-0.2	From Jan 2016
Hospital waste	02	0.2-0.3	From Jan 2016
Industrial waste	03	0.1-0.3	From Jan 2016

Updates on current mercury monitoring from emission sources

- Monitoring and emission control activities (2016):
 - CEM is collaborating with Pollution Control Dept (PCD) in order to monitoring of Hg emission from 03 thermal coal power (TCP) plants. This activities will be completed in August 2016.
 - Total 84 samples had been collected for total Hg analysis which include flue gas, fly ash and coal powder samples. Flue gas samples will be collected by both of US EPA 29 and US EPA 30B.



Hai Phong TCP plant



Mong Duong 2 TCP
plant



Ninh Binh TCP plant

Updates on capacity building of mercury monitoring for CEM - VEA

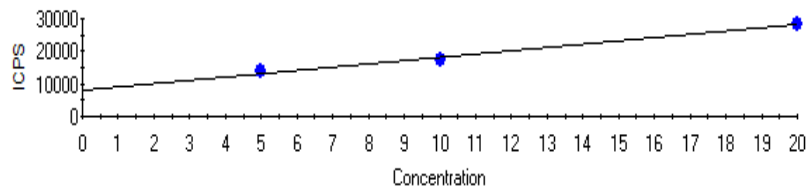
Updates on equipment capacity for mercury monitoring

Equipment	Method	Quantity
Wet deposition sampler	APMMN SOP	01 sampler (USEPA sponsor)
Isokinetic sampler	US EPA 29	03 sampler
Mercury on-site sampling and analysis (Apex A instruments)	US EPA 30A	01 MODULE (US MOFA sponsor)
AAS	US EPA 29	01 analyzer
ICP-MS	US EPA 200.8	02 available
Mercury analyzer (SMS 100)	US EPA 1631	01 available

Updates on capacity building of mercury monitoring for CEM - VEA



202Hg FQ Block 1

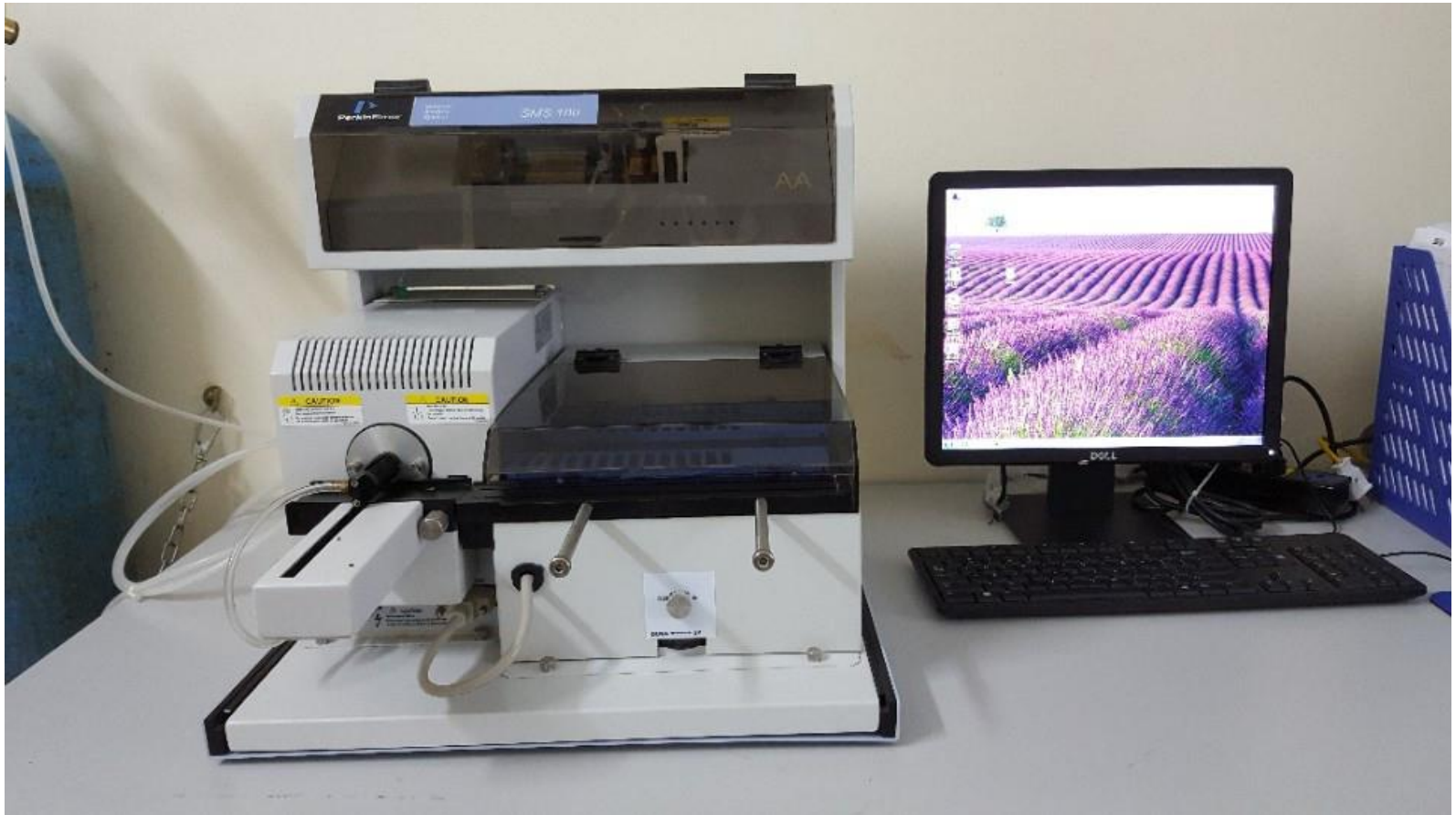


Intercept CPS=8209.248267 Intercept Conc=8.287984
Sensitivity=990.493996 Correlation Coeff=0.993646



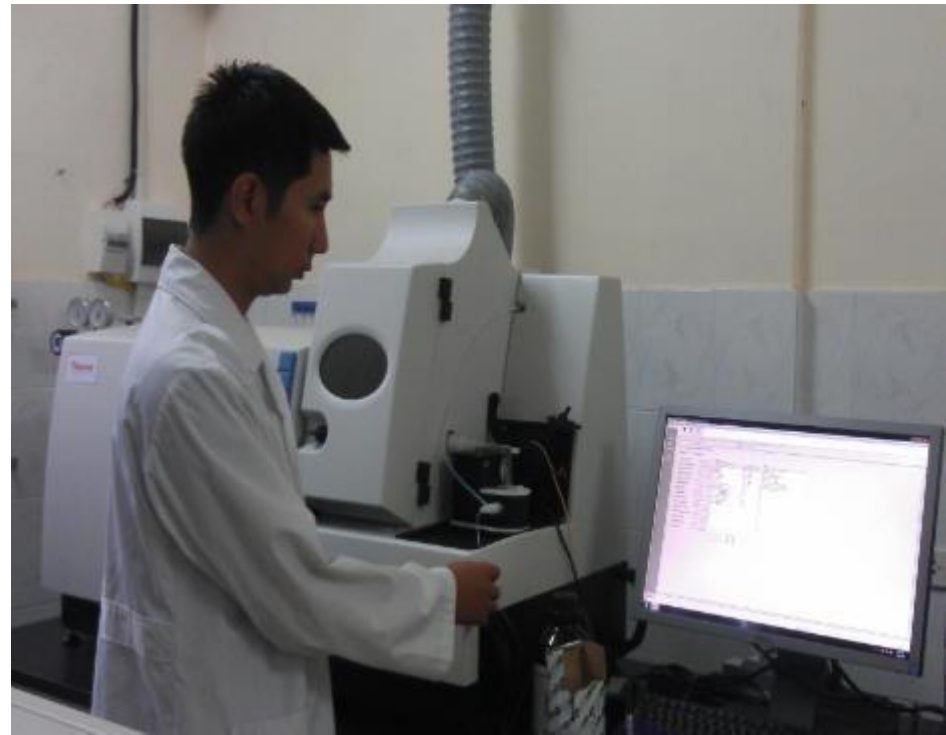
Laboratory analysis of Mercury in water and flue gas matrix samples (2016)

Updates on capacity building of mercury monitoring for CEM - VEA



Laboratory analysis of Mercury in water and flue gas matrix samples (2016)

Updates on capacity building of mercury monitoring for CEM - VEA



ICP-MS

PLAN

PLAN FOR THE FUTURE

- Designing Nationwide Mercury monitoring network;
- Completion of methods for monitoring and analyzing mercury in the air;
- Develop a map of mercury contamination in the air in Vietnam;
- Reception 02 additional mercury monitoring equipment of the APMMN;
- International collaboration for academic exchange and technical supporting;
- QA/QC guarantee in sampling, analysis and data processing

THANK YOU FOR YOUR ATTENTION!

