Greenhouse Gas Related Research in NIM

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GHG Reduction & Carbon Trading

- China’s GHG emissions ranking 1\textsuperscript{st} in the world.

- Reduction Targets
  - In 2009, China committed to reduce 40\%-45\% CO\textsubscript{2} emissions per unit of GDP by 2020.
  - Recently, China plans to invest $6.8 trillion to reduce GHG emissions. GHG emission in China will reach max value in 2030.

- Carbon Trading
  - In 2013, seven cities in China started carbon trading pilot.
  - In 2016, national carbon trading market will be established.
  - NDRC predicts China will become the world's largest carbon trading market.
Metrology in GHG Emission & Carbon Trading

- Atmospheric Monitoring
- National Inventory
- Reduction in Carbon Trading
  - Verification & Certification
  - Third Party Designated Operational Entity

- Calibration & Verification

- Fuel Based Measurement
- Emission Measurement

- Standards
National Metrology Verification Regulation

- National Metrology Technical Committee of Carbon Measurement was established in 2013

Diagram:

- National Metrology Technical Committee of Carbon Measurement
  - Emission Source/Sink Measurement
    - Fuel based calculation
    - Direct Measurement
    - Verification Method
  - Atmospheric Monitoring
  - Energy Saving Measurement
    - Enterprise Energy Efficiency
    - Energy Saving Technology Assessment
    - Industrial Equipment Energy Efficiency
Main Research Interests of NIM

- Atmospheric Monitoring
  - Standard Gas
  - Cavity Ring Down Spectroscopy

- Carbon Emission & Reduction
  - Direct Emission Measurement
  - Point Source: Direct Emission Measurement
  - Distributed Source: LADAR and its Calibration
  - Cities and Provinces: GHG Observation & Inversion Model

Precise Fuel Based Measurement
Verification
Standard Gas Key Comparison

CCQM-K82   CH₄ in air (~2ppm)

CCQM-K52   CO₂ in air (~350ppm)

CCQM-K84   CO in air (~350ppb)

CCQM-K71   Carbon monoxide in Stack gas
Cavity Ring Down Spectroscopy
Smoke Stack GHG Emission

- Smoke Stack Simulator
- Research on the flue gas flowrate measurement and flowmeter calibration method using experiments and Computational Fluid Dynamics (CFD) simulations.
Thank you for your attention!