

Continuous Emission Monitoring

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Hazardous Substances in the Air from Incineration Processes



Component	Source	Environmental Impact
N ₂	from combustion air (inert)	-
H ₂ O	from combustion air + reaction result	-
O ₂	unburnt combustion air	-
CO ₂	result of complete combustion	greenhouse gas
CO	result of incomplete combustion	toxic, inflammable
NO, NO ₂	combustion of impurities in fuel	very toxic, causes sour rain
SO ₂	combustion of impurities in fuel	toxic, causes acid rain
Dust	result of combustion of solids	carcinogenic
CnHm	result of incomplete combustion	carcinogenic
HCl	combustion of impurities in fuel	very toxic & corrosive
HF	combustion of impurities in fuel	very toxic & corrosive
Hg	impurity in fuel	soil pollution

Continuous Emission Monitoring



The Clean Air Act (CAA) introduced in 1970, and extended 1990, authorizes the Environmental Protection Agency (**EPA**) to establish **National Ambient Air Quality Standards**.



The standards are now part of the Code of Federal Regulations (CFR)

§ title 40 “Protection of Environment”

§ part 60 covers most of the combustion plants

The 40 CFR Part 60 titles are classified by

§ plant type

§ boiler output

§ fuels

European Regulations



Directive 2000/76/EC

of the European Parliament and of the Council, Dec 4, 2000

- § Environmental friendly disposal of household waste and similar combustible materials in incineration and co-incineration plants (WID)



Directive 2001/80/EC

of the European Parliament and of the Council, Oct 23, 2001

- § Limitation of emissions of certain pollutants into the air from large combustion plants (LCPD)

European Standard EN 14181

- § Stationary source emissions – Quality assurance of automated measuring systems

European Standard EN 14956

- § Air quality – Evaluation of the suitability of a measurement method by comparison with a stated measurement uncertainty

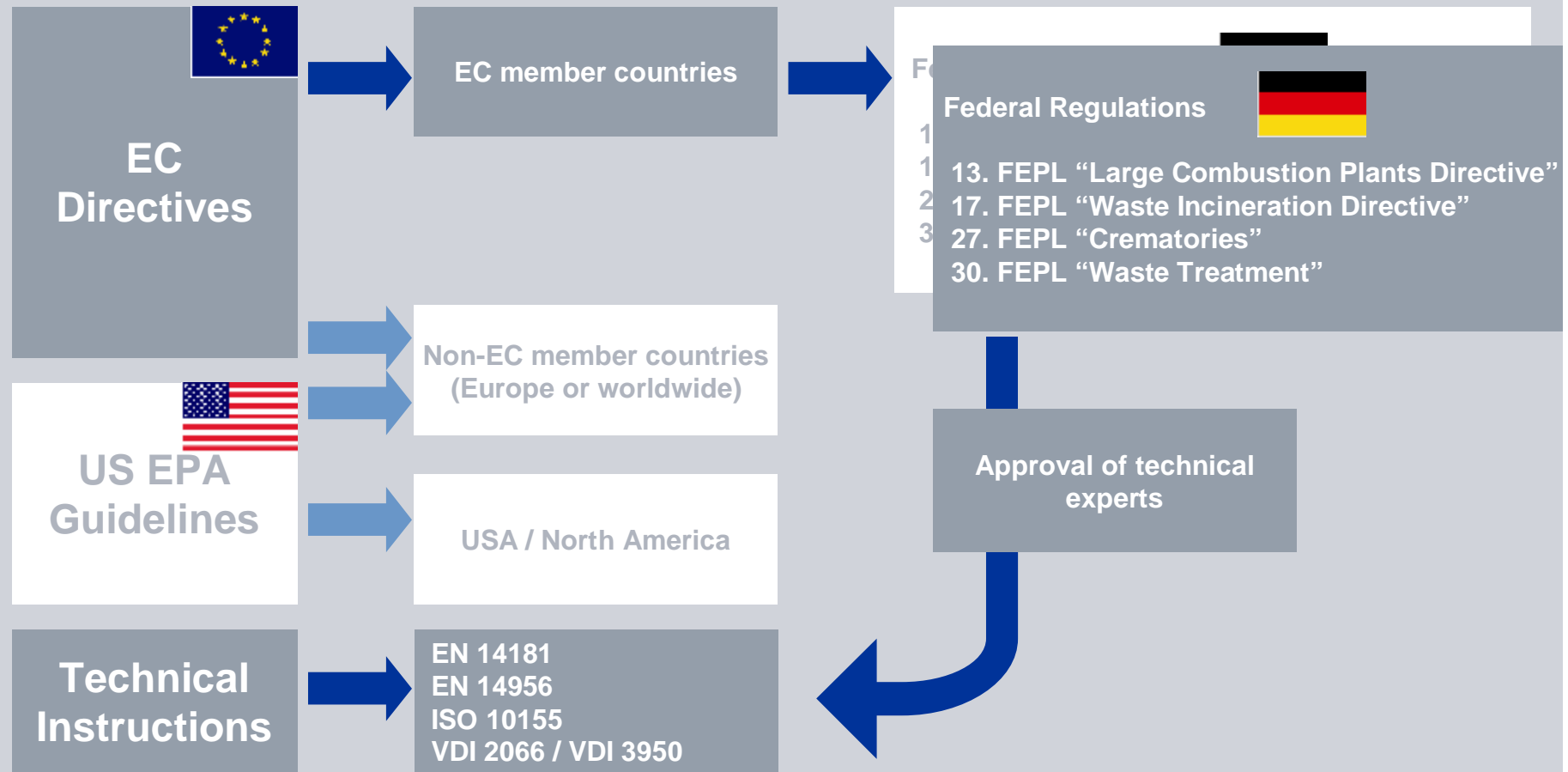
European Standard EN 15267-3

- § Certification of automated measuring systems
Part3: Performance specifications and test procedures for automated measuring systems for monitoring emissions from stationary sources

Guidelines and Regulations

Guidelines

National Rules/ Regulations



Directive 2000/76/EC – WID Emission Limit Values



Pollutant	T	Daily Limit	100 % <1/2h-LV Column A	100 % <1/2h-LV Column B
Dust	30'	10	30 mg/m ³	10 mg/m ³
TOC		10	20 mg/m ³	10 mg/m ³
HCl		10	60 mg/m ³	10 mg/m ³
HF		1	4 mg/m ³	2 mg/m ³
SO ₂		50	200 mg/m ³	50 mg/m ³
NO _x > 6t/h		200	400 mg/m ³	200 mg/m ³
NO _x < 6t/h		400		
CO		50		
Hg	30' to 8 h		0.05 mg/m ³	0.1 mg/m ³
Cd + Tl			0.05 mg/m ³	0.1 mg/m ³
Heavy Metals			0.5 mg/m ³	1 mg/m ³
Dioxin + Furan			0.0001 mg/m ³	
CO	10'	95 % of all values < 150 mg/m ³		
	30'	100 % of all values < 100 mg/m ³		

EN 14181



EN 14181

„Stationary source emissions – Quality assurance of automated measuring systems (AMS)”

§ Definition of the quality levels QAL and AST

§ Reference to EN 14956

Influenced by:

§ VDI 2066/3950

§ ISO 10155

North American (RATA) requirements

Prerequisites:

§ Suitable measuring instruments (QAL 1)

§ Comparable measuring instruments (QAL 1)

§ Error-free installation (QAL 2)

§ Permanent quality assurance during plant operation

Approved Analyzers for Emission Monitoring complying with FEPL (Federal Emission Protection Law - BImSchV.)

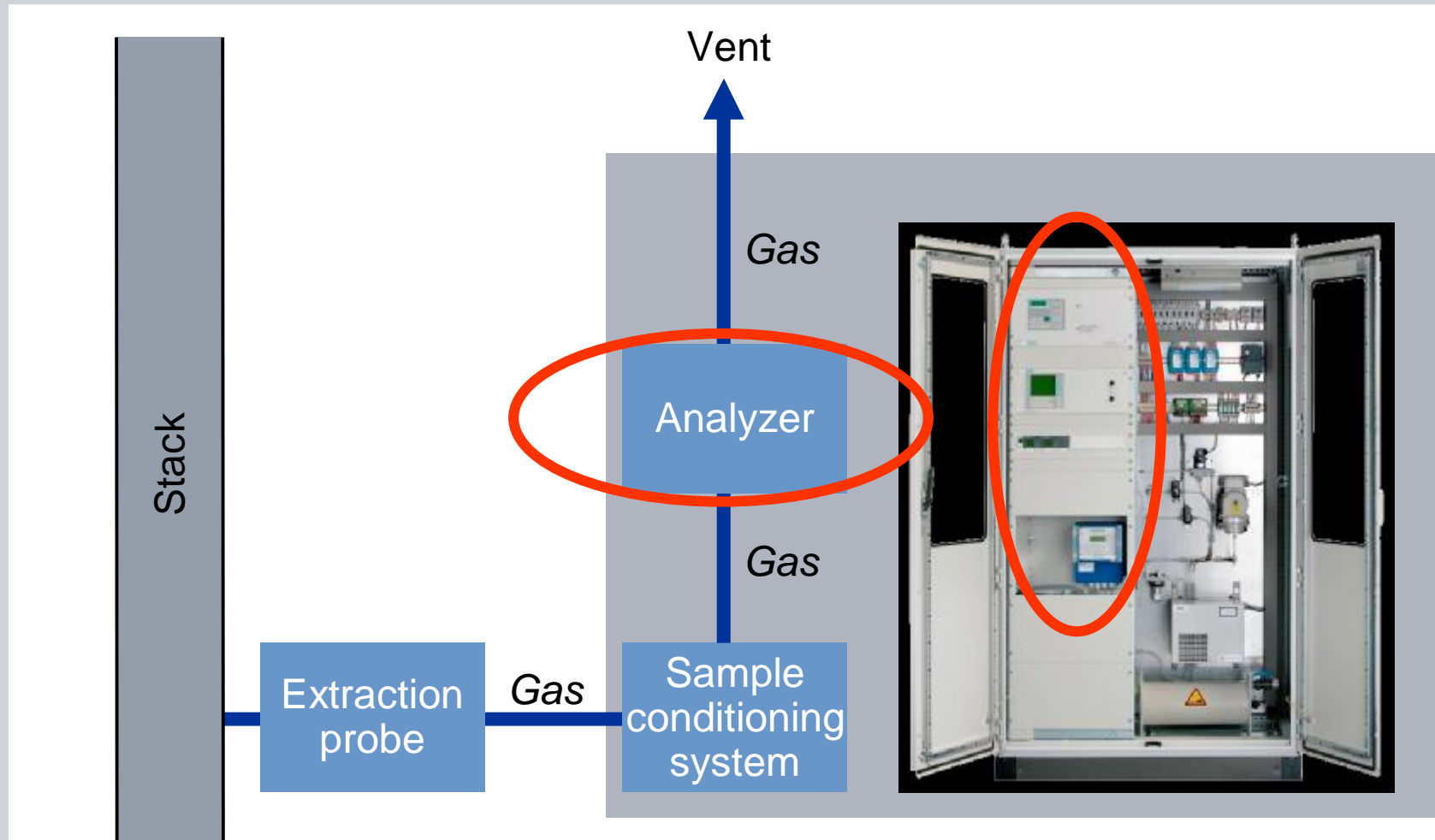
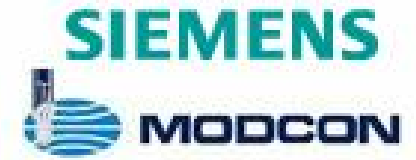


**Coal fired power
stations:
WID
(13. FEPL)**

**Waste incinerators
and thermal waste-
to- energy plants:
LCPD
(17. FEPL)**

Analyzer	Approval	Gas component	Measuring range
Ultramat 23			
	13. BImSch V	CO	150 mg / m ³
	13. BImSch V	NO	100 / 250 mg / m ³
	13. BImSch V	SO ₂	400 mg / m ³
	13. BImSch V	O ₂	5% / 25%
Ultramat 6			
	17. BImSch V	CO	50 mg / m ³
	17. BImSch V	NO	100 mg / m ³
	17. BImSch V	SO ₂	75 mg / m ³
Oxymat 6			
	17. BImSch V	O ₂	5% / 25%
Fidamat 6			
	17. BImSch V	C _n H _m	15 mg / m ³
LDS 6			
	17. BImSch V	NH ₃ / H ₂ O	35 mg / m ³ / 15 / 30%
	17. BImSch V	HCL / H ₂ O	15 mg / m ³ / 15 / 30%

System Integration for Extractive Measurements



LDS TÜV*) -Approval for NH₃, HCl and H₂O

“TÜV*) – Case“ for the semi-annual “basic“ calibration verification according QAL3 and for the “major“ verification according to AST.

NH₃ – case content:

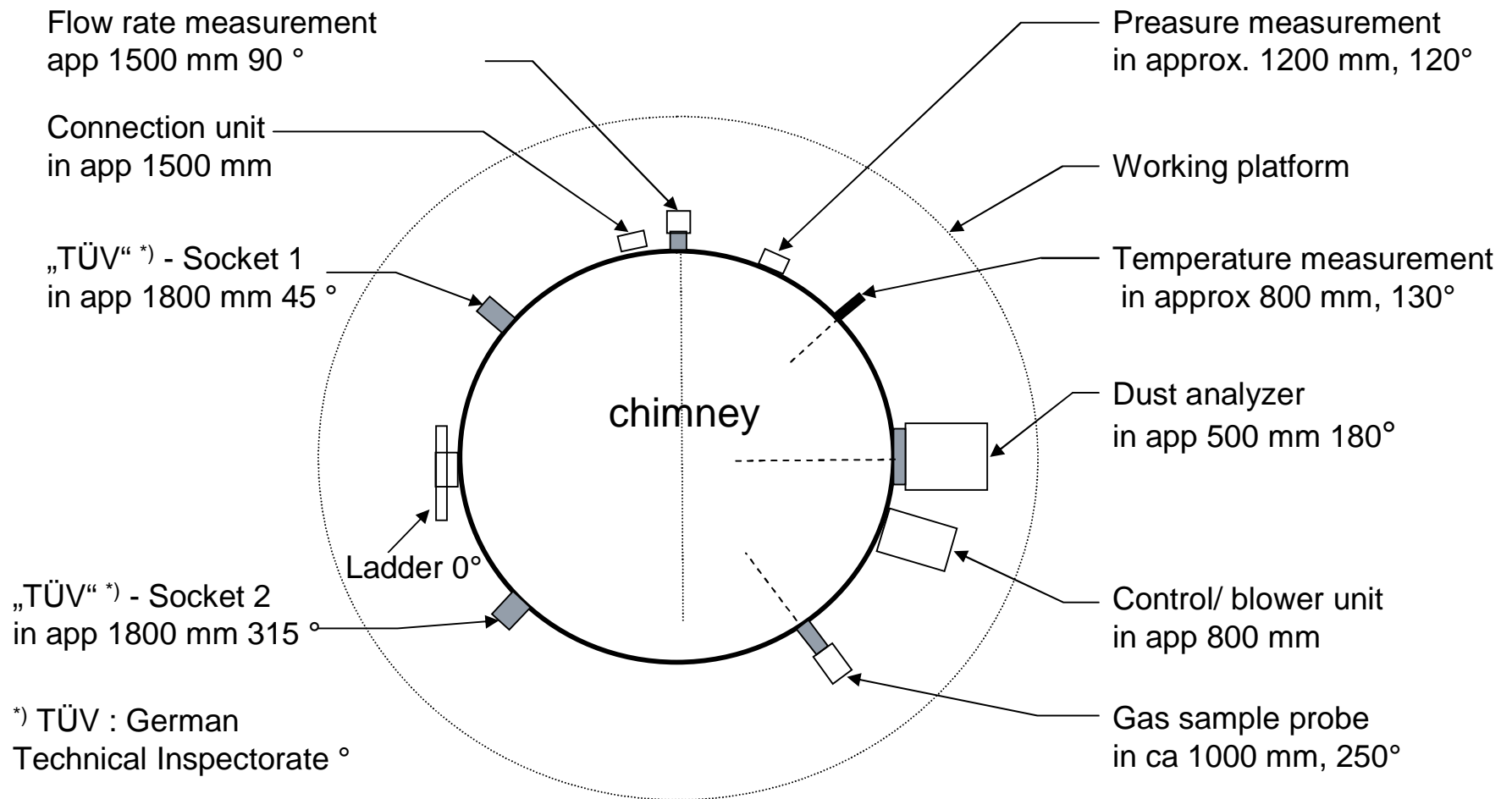
- 1 empty reference cell
- 1 NH₃-reference cell with 28 mg/Nm³ (80% of measuring range)
- 1 cable (2 m)
- 1 electronic set

(additional kits for NH₃/H₂O, HCl, HCl/H₂O)

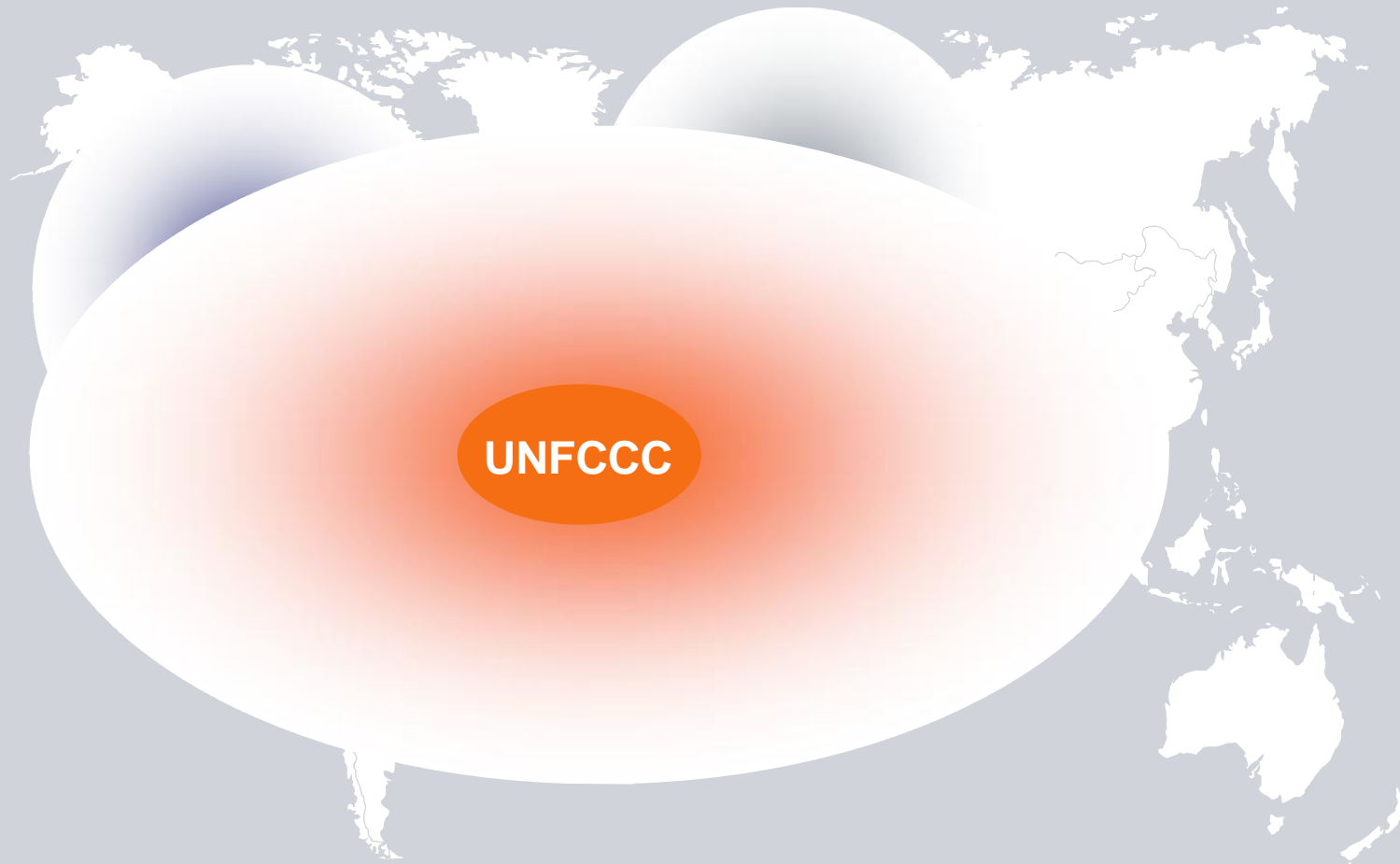
*) TÜV : German
Technical Inspectorate °



Installation on the Stack



Emission Control Guidelines driven by UNFCCC



GHG - Green House Gases



- § Driven by Kyoto-Protocol
- § Organized by UNFCCC (united nation framework convention climate change)
- § CDM- and JI-Projects
- § Market is growing very fast

www.unfccc.int

Carbon Market – Greenhouse Gases



Gases	Sources	GHG Warming Potential	Gas
CO ₂	fossil fuel, cement industry, deforestation	1	carbon dioxide
CH ₄	stock farming, biomass, waste sites, rice cultivation, delivery and transport of fossil energy sources	21	methane
N ₂ O	fertilizer, combustion of fossil energy sources, land use modifications	310	Nitrous oxide
HFCs	coolant, chip-production	140 – 11,700	Hydro-fluorocarbons
PFCs	aluminum, fire security, solvent, electrical industry	≈ 7,000	Per-fluorocarbons
SF ₆	electrical industry, insulators	23,900	sulfur hexafluoride

Source: ZEW (1999)

What are CDM Projects?

Binding targets

Kyoto Protocol requires limitation or reduction of their greenhouse gas emissions
By setting such targets, emission reductions took on economic value.

To help countries meet their emission targets, negotiators of the Protocol included three market-based mechanisms

- § Emissions Trading
- § the Clean Development Mechanism and
- § **Joint Implementation**

Clean Development Mechanism

The CDM allows emission-reduction (or emission removal) projects in developing countries to earn certified emission reduction (CER) credits, each equivalent to one ton of CO₂

These CERs can be traded and sold, and used by industrialized countries to meet a part of their emission reduction targets under the Kyoto Protocol.

Source: <http://cdm.unfccc.int/about/index.html>

Carbon Market – Greenhouse Gases



To date:

§ 945 registered CDM projects

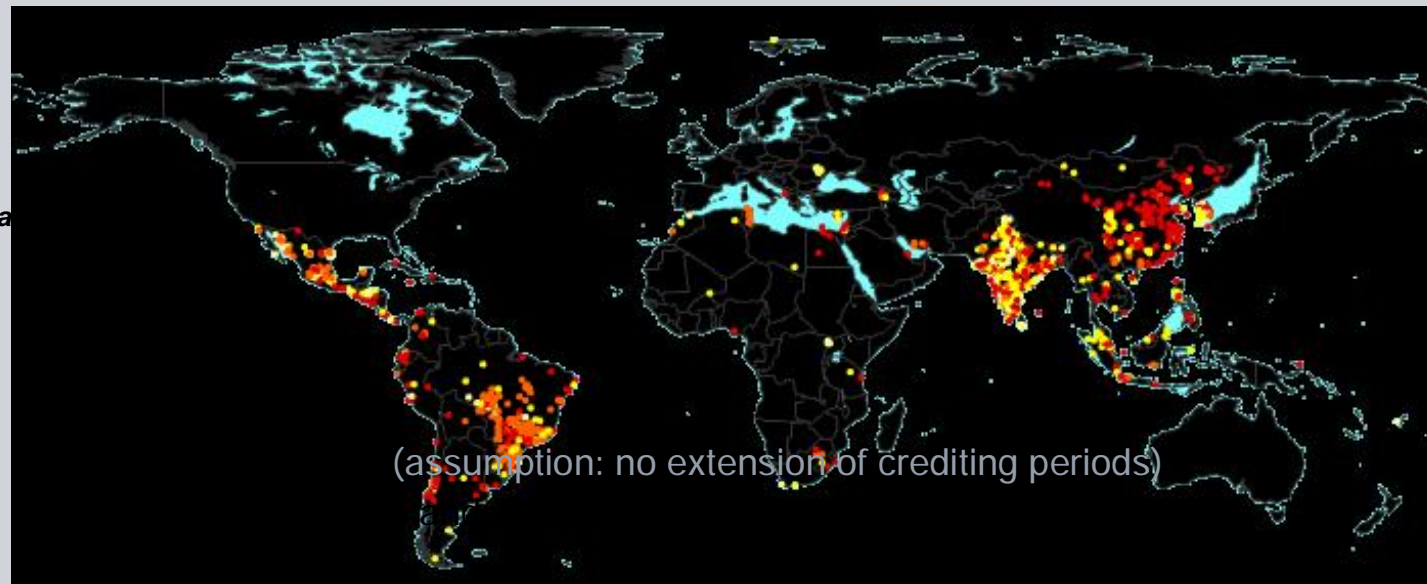
§ 1.17 billion CERs expected from existing registered projects to the end of 2012

In pipeline:

§ > 2,900 projects
(including registered projects)

§ > 2.6 billion CERs expected to the end of 2012

Figures as of February



Thank you for your attention!

