Monitoring, Reporting and Verification for Emissions Trading: Challenges and Best Practices

Benjamin Görlach
Ecologic Institute

EU-China Exchange on Challenges and Best Practices in ETS MRV
Beijing, China
November 23, 2012

About Ecologic Institute

- Who we are
  - A private, not-for profit think tank for applied environmental research, policy analysis and consultancy
  - Founded 1995 in Berlin, Germany
  - Offices in Berlin, Brussels, Vienna, Washington DC and San Mateo CA
  - Currently 125+ employees
  - Ranked 6th among Environmental Think Tanks in the 2010 and 2011 Global Think Tank Index of the University of Pennsylvania
- Who we work with
  - International Organisations (UNEP, UNFCCC, CBD, World Bank, OECD)
  - European Union (European Commission, European Parliament, European Environment Agency)
  - National Parliaments and government agencies (e.g. German Environment Ministry, UK DECC, US EPA)
  - Non-Governmental Organisations
  - Educational Institutions
  - Foundations, …

Importance of MRV in an ETS

- A ton must be a ton, everywhere – every allowance has a monetary value, rules are necessary to prevent misreporting
- Integrity of the system is only guaranteed if all emissions are monitored and accounted for – otherwise efficiency and acceptance suffer
- Market requires reliable information to work:
  - Market players need to know their balance – do they need to buy or sell allowances?
  - Competent authority needs to know whether targets are being reached

Elements of the “Compliance Cycle”: MRV(A) + CE

- **Monitoring**: Determining the emissions by calculation or direct measurement
- **Reporting**: Notification of monitoring data to the competent authority
- **Verification**: Confirmation of the report’s correctness by an independent body
- **Accreditation**: Attestation of the competence of the verifier
- **Compliance**: Being in conformity with the legal requirements
- **Enforcement**: Measures taken by the authority for ensuring compliance

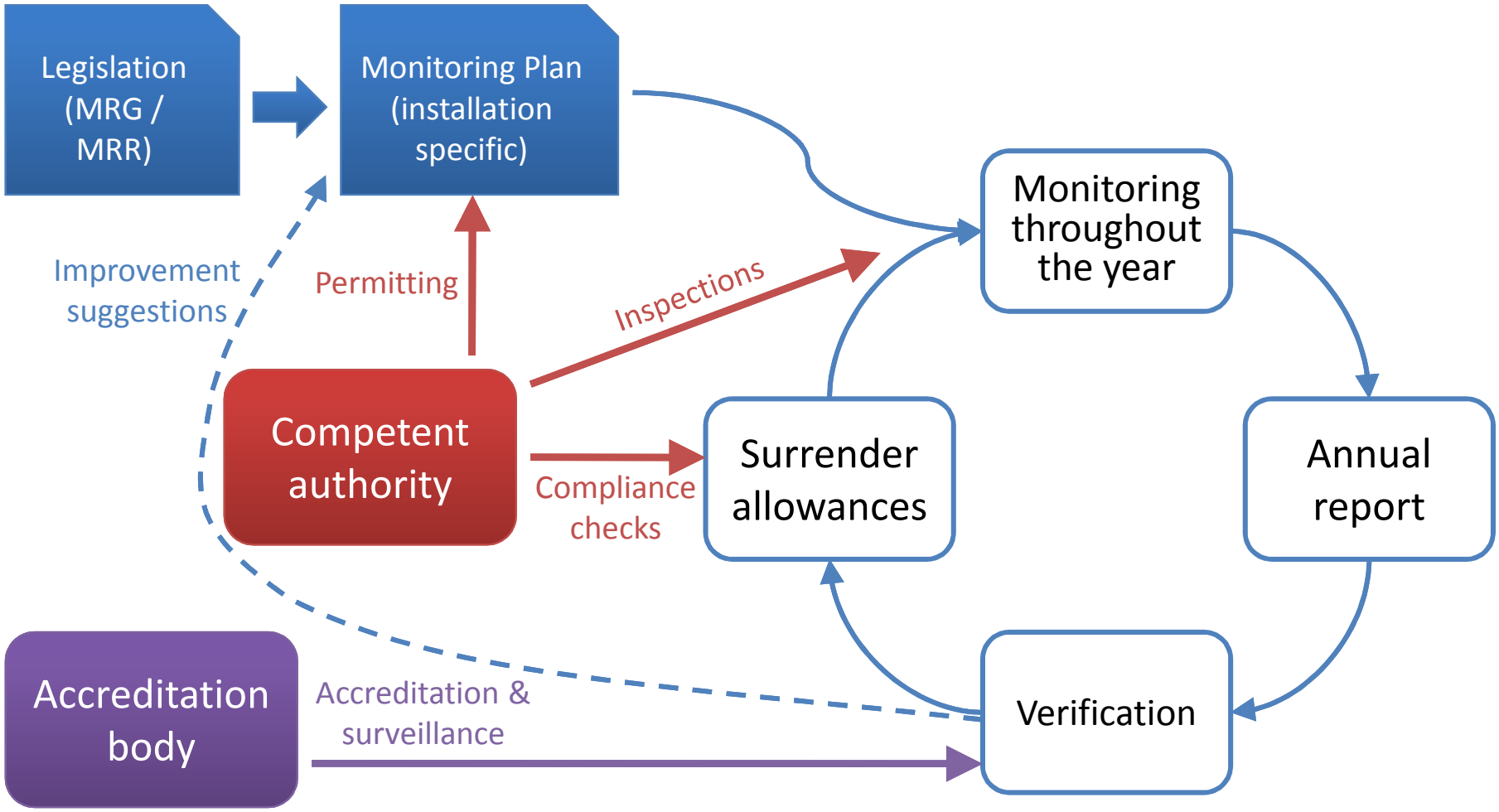
Development of the MRV system in Europe

- **10/2002** • Drafting of the first monitoring & reporting guidelines (MRG)
- **2003** • Stakeholder consultation, negotiation, adoption
- **2/2004** • Publication, translation
- **1/2005** • Entry into force
- **2005-06** • Consultation and re-drafting
- **8/2007** • Publication of revised MRG for the 2nd trading period (Decision 2007/589/EC)
- **2008-09** • Additions, incl. N_2O (Decision 2009/73/EC), Aviation (Decision 2009/339/EC), CCS (Decision 2010/345/EC)
- **07/2012** • Translating MRG into EU Regulation: Monitoring and Reporting (MRR), Accreditation and Verification (AVR)

The Monitoring and Reporting Regulation

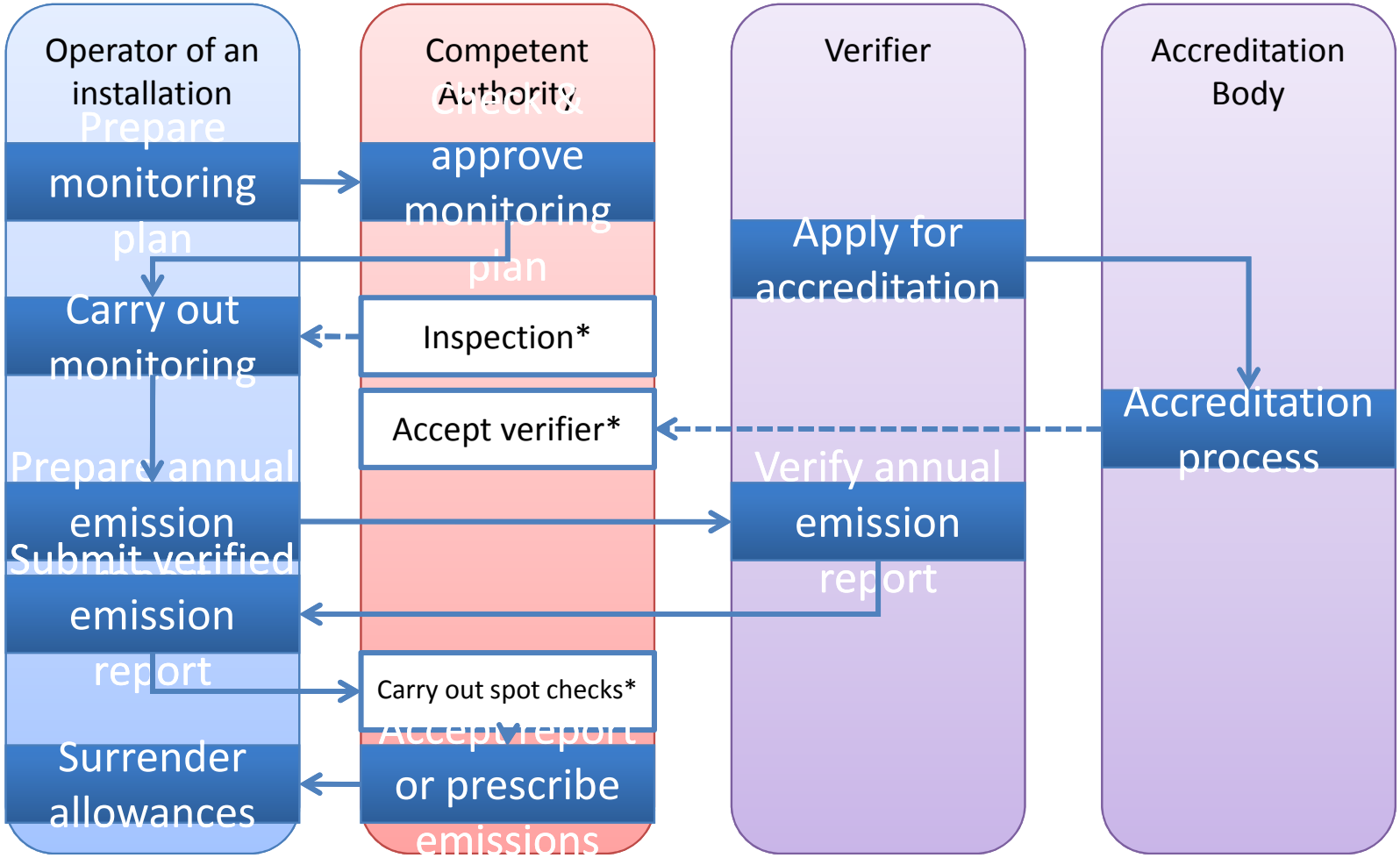
- Monitoring and Reporting Regulation No 601/2012 (adopted 21 June 2012)
  - MRR itself – 77 articles, 30 pages
  - Annex I: Minimum content of the monitoring plan
  - Annex II: Tier thresholds for calculation-based methodologies related to installations
  - Annex III: Monitoring methodologies for aviation
  - Annex IV: Activity-specific monitoring methodologies related to installations
  - Annex V: Minimum tier requirements for calculation-based methodologies
  - Annex VI: Reference values for calculation factors (NCV, emission factors)
  - Annex VII: Measurement-based methodologies
  - Annex IX: Minimum content of Annual Reports
- Guidance documents on
  - General guidance for installations
  - General guidance for aircraft operators
  - Biomass issues
  - Uncertainty assessment
  - Sampling and Analysis

Elements of MRV(A) – the compliance cycle



based on Fallmann 2011

Roles and responsibilities in the MRV(A) process



*not practised in all EU Member States

based on Fallmann 2011

Basis for monitoring: the Monitoring Plan

- Operator has to draft a Monitoring Plan (MP): a **detailed**, **complete** and **transparent** documentation of the monitoring methodology of the installation, describing:
  - configuration and complexity of the installation/facility, its activities, emission sources, source streams and their location etc.
  - how the responsibilities in the installation for the monitoring and reporting of emissions are managed and assigned
  - procedure for evaluation of the MP, its functioning and possibilities for improvement
  - control activities of an operator to manage the risks of misreporting, i.e. mistakes in the monitoring and the flow of data

based on Deckers 2012

Basis for monitoring: the Monitoring Plan (II)

- In particular, the Monitoring Plan shall describe:
  - monitoring methodology (approach) per emission source or source stream: calculation based approach or continuous emission measurements (CEMS)
  - measurement equipment, location and quality assurance (calibration etc.), the required level of accuracy (tier)
  - for calculation approach: how activity data are determined, how calculation factors are determined (e.g. default values or analysis)
  - for analysis of calculation factors: how the sampling in the installations is organised, etc.

based on Deckers 2012

Annual Emission Reports

- What has to be reported?
  - Amounts of fuels and materials consumed
  - Emission factors, net calorific value (NCV), oxidation factor, biomass content
  - Resulting emissions
  - Information on uncertainties
- All elements reported on an annual basis
- Not reported: Production data

Calculation of fuel emissions

Em = AD * EF (* OF)

Em Emissions

AD Activity Data (amount of fuels * net calorific value), taken from measurement (weighing, flow meters…) or from invoices

EF Emission factor (IPCC, national reference values or determined by chemical analysis)

OF Oxidation factor (standard value or taken from analysis of ash and slag)

Main alternatives: Continuous Emissions Measurement Systems (CEMS), mass balance approach

Main Alternatives to Calculation-based approaches

- Continuous Emissions Measurement Systems (CEMS)
  - Obligatory for N_2O emissions (from production of nitric acid and adipic acid) and for CO_2 transfers between installations (CCS)
  - Operator may use CEMS for CO_2 emissions if he/she can demonstrate that the method complies with the applicable accuracy requirements (tiers)
  - Different opinions about the cost of CEMS
- Mass balance approach
  - Measurement of all materials entering or leaving the boundaries of the mass balance, multiplication with material's carbon content

Process emissions

- Process emissions do not originate from the combustion of fuels, but from a chemical reaction (reduction) that is an essential part of the production process
  - E.g. Cement production (calcination of limestone: decomposition of calcium carbonate in limestone by heating, $CaCO_3 \rightarrow CaO + CO_2$)
  - E.g. steel industry (reduction of iron ore with metallurgical coke to form raw or pig iron)
  - Also common in numerous production processes in the chemical industry and refineries (oxidation/reduction of substrates, catalytic cracking)
  - Emissions of perfluorocarbons (PFCs) resulting from anode effects in the production of primary aluminium

Monitoring of process emissions

- Calculation-based approach using fixed emission factors, e.g. cement: emission factor of 0.525 t CO_2/t clinker.
- Mass balance approach:
  - e.g. metals: where C from fuels or input materials remains in the products or other outputs of the production, the operator must use a mass balance
  - e.g. refineries (emissions from catalytic cracker regeneration)

Particular challenge: blast furnace gases

- Blast furnace gases: by-product of iron ore processing in blast furnaces, generated when the iron ore is reduced with coke to metallic iron. Type of process emission, but not in the form of CO_2
- Chemical composition: 60% nitrogen, 18-20% CO_2, otherwise CO
- Can be used as a fuel – but with very low heating value, often mixed with natural gas. Alternative: flaring
- Problem not so much for monitoring – but more for allocation, if BFG is used in a nearby (but separately permitted) power plant.

Methods to determine emissions

- Building block system – in an effort to balance the costs of the process and the quality of the data, taking into account specific circumstances
- As far as possible, use available data and existing equipment
- Generally, the larger the emissions volume, the higher the quality requirement

Methods to determine emissions: the Tier approach

- Category **B** and **C** installations (> 50 kt CO_2/a) must meet highest tiers (defined in the activity-specific Annexes of the MRR)
- Category **A** installations (≤ 50 kt CO_2/a) must meet minimum tier requirements (defined in Annex V, Tab. 1)
- **Small emitters** (< 25 kt CO_2/a) must also meet the minimum tier requirements but can use additional monitoring simplifications (Art. 47)
- **Lower tiers** are allowed for minor and de-minimis source streams as well as for pure biomass fuels and for technical or economical reasons if approved by the regional regulator

Tiers related to Activity Data and Emission Factors

- Activity Data:
  - Tier 1: Uncertainty ±7.5%
  - Tier 2: Uncertainty ±5.0%
  - Tier 3: Uncertainty ±2.5%
  - Tier 4: Uncertainty ±1.5%
- Emission Factors:
  - Tier 1: IPCC standard factors
  - Tier 2: Standard factors from national inventories
  - Tier 3: Based on chemical analysis

Verification

- Goal is to create trust in the reported data through the opinion of an independent and competent body
- Under the EU ETS, this is carried out by a private entity
- Private verifier needs to be accredited
- Verifier assesses whether he can conclude with reasonable assurance
  - The data in the report are fairly stated (free from material misstatements)
  - The operator has complied with the approved monitoring plan
- Verifier shall also recommend improvements found during verification

Accreditation – how does it work?

- Art. 43 AVR: A verifier [..] shall be accredited for the scope of activities for which it carries out verification
- Art. 44: During the accreditation process and the monitoring of verifiers each national accreditation body shall assess whether the verifier:
  - Has the competence to carry out the verification
  - Is performing the verification in accordance with this regulation
  - Meets the requirements of verifiers detailed in Chapter III AVR
- Art. 54 AVR: the tasks related to accreditation shall be carried out by the single national accreditation body that is appointed by the Member State

Accreditation – how does it work?

- Once accreditation is granted the accreditation certificate is valid for a maximum of 5 years.
- The national accreditation body monitors the verifiers each year through annual surveillance
- If the national accreditation body detects that the verifier is not complying with the AVR, it can impose penalties:
  - reduce the scope of activities in which the verifier operates,
  - suspend the accreditation, or
  - withdraw the accreditation

Use of Information Technology in the MRV(A) process

- Reduces compliance costs, e.g. single data entries, automated reminders
- Can increase the transparency of the system
- Increases reliability of ETS data handling & processing
- Allows automatic timeliness and completeness checks
- Reduces the risk of transcription errors or human errors
- Enhances the capacity for reliable storage of data
- Offers potential for cost-effective data interrogation and analysis – also for other purposes - e.g. verification, input to the national emission inventories and improved national statistics

Challenges for an effective and efficient MRV

- Trade-off between quality, cost and timeliness – an impossible task?
- A ton must be a ton – but different regulatory cultures exist in the 30 EU ETS countries
  - E.g. definition of an installation – entire site, or individual units?
  - E.g. regular inspections at the installation, or emphasis on high-quality verification and supervision
- Common elements, standards, procedures needed to build up trust:
  - Transparency of the system rules
  - Existence of an effective control system

How to improve MRV?

- Accreditation is only a first step to high quality verification and cannot guarantee good verification results by itself – cooperation between competent authorities and accreditation bodies is necessary
- Random checks of emission reports and the related verification statements by the competent authorities remain crucial
- Sanctions for serious misstatements in the verification report?
- Compulsive regular training programs for verifiers?
- Idea: Commissioning of the verifiers by CAs? In order to avoid close commercial relation between operators and verifiers

Thank you for your attention

Benjamin Görlach
Ecologic Institute, Berlin
benjamin.goerlach@ecologic.eu
www.ecologic.eu