



# EU-China CDM Facilitation Project Workshop on Verification

**Periodic Verification**

Beijing

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You **Cui**

TÜV Rheinland Group



EU China CDM Facilitation Project

 **TÜVRheinland**<sup>®</sup>  
Precisely Right.

## ► Contents

- Introduction of Periodic Verification
  - Entities
  - Scopes
  - Process
  - Principle
  - Risk-based Method
- Desk Review
- On-site Assessment
- Procedures for revising monitoring plan
- Procedures for requesting post-registration changes to the start date of the crediting period
- Summary



## ► Definition of Periodic Verification

“Periodic independent review and ex post determination by DOE of the monitored reductions in GHG emissions during the defined verification period.”

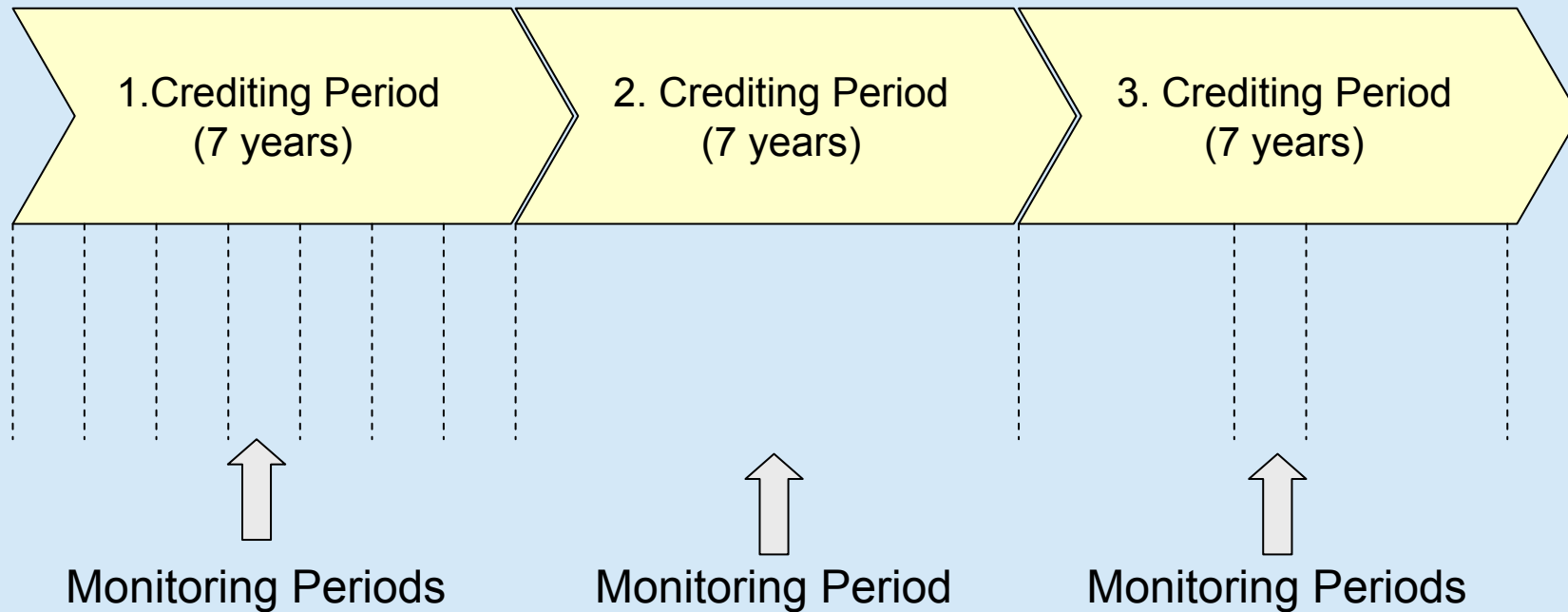
- *VVM*



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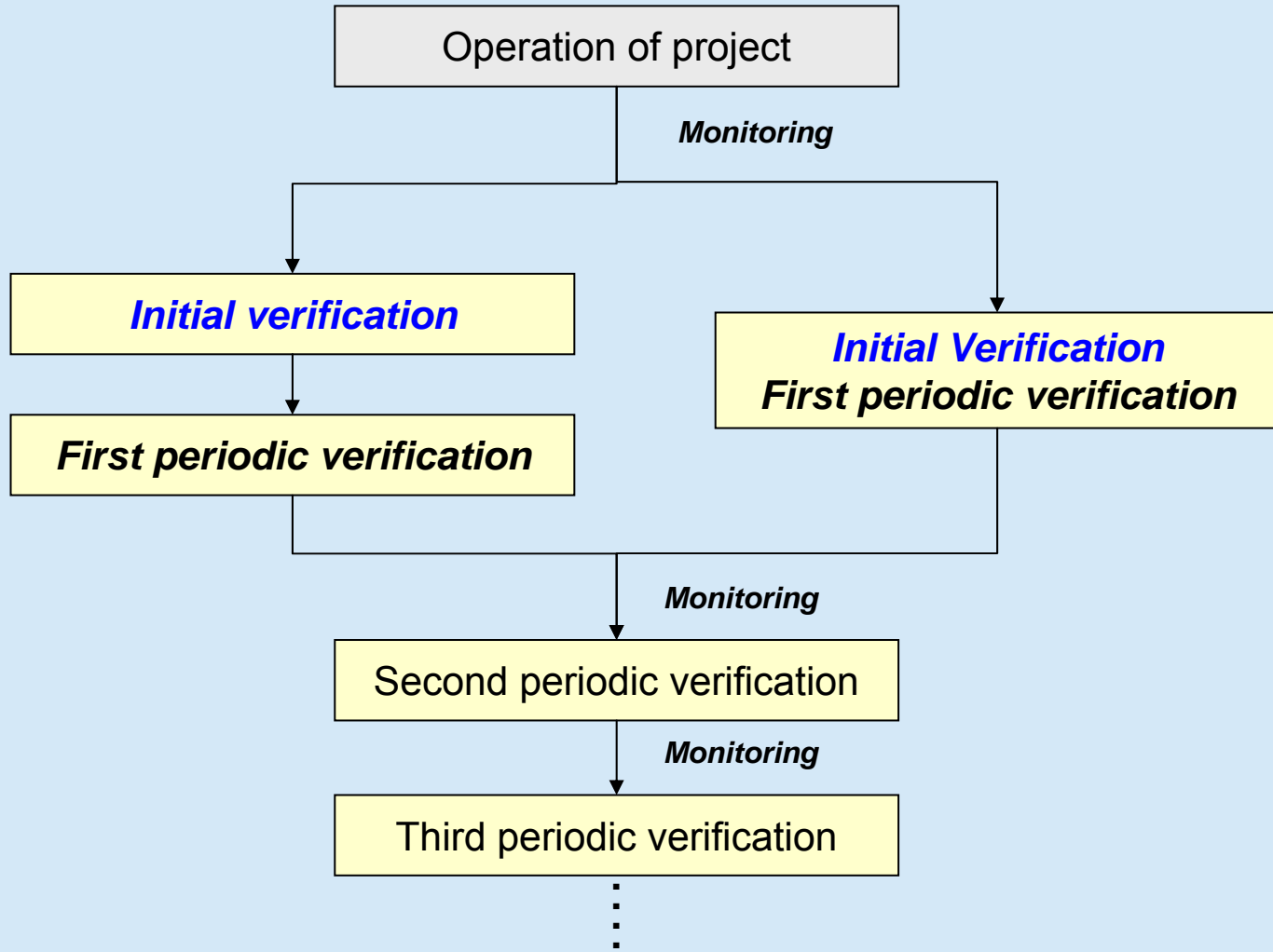
## ► Overview of Periodic Verification



**During 21 years:**

- min. 1 Monitoring period
- max. X Monitoring periods

# ► Overview of Periodic Verification

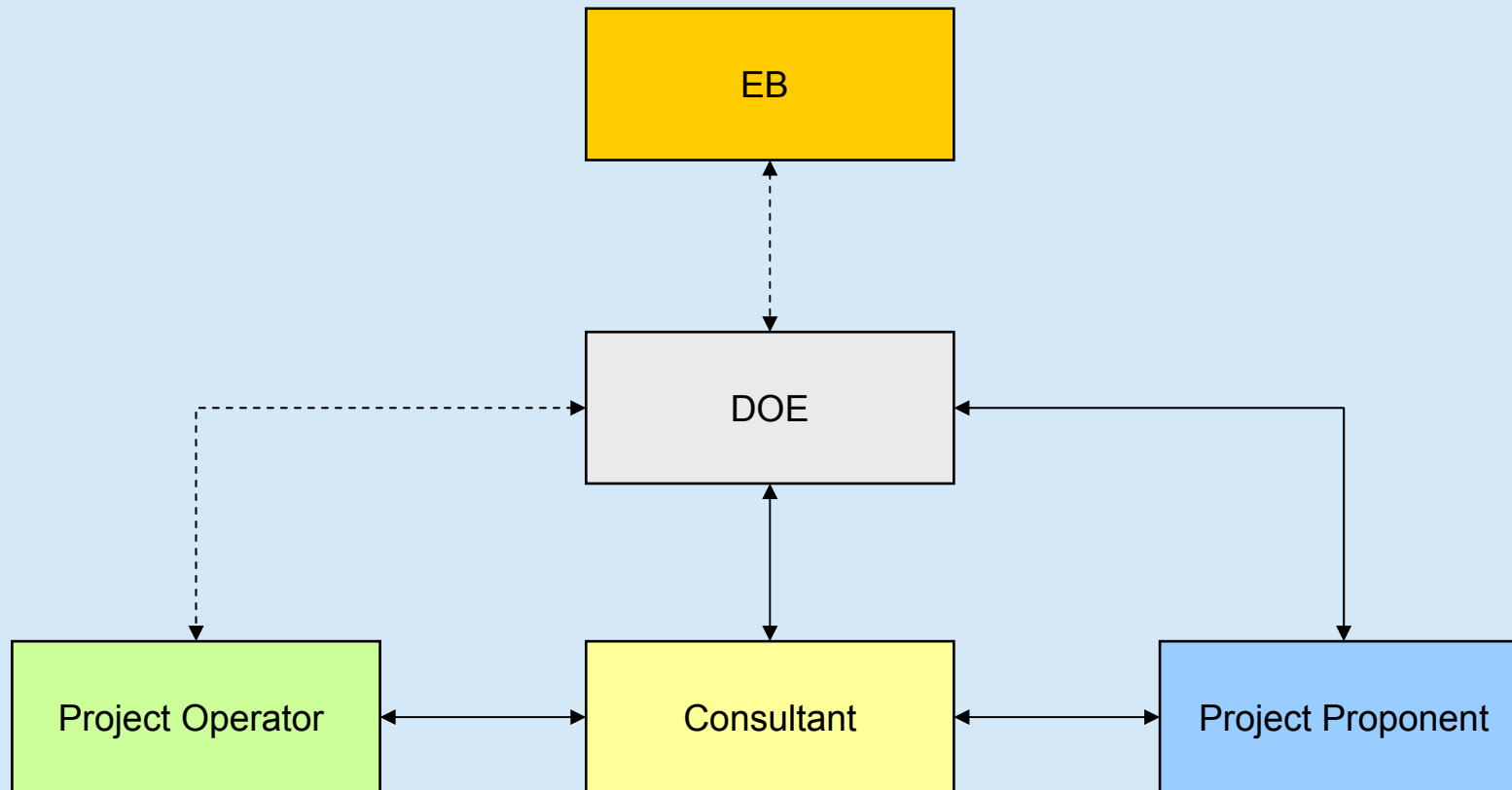


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## ▶ Periodic Verification Entities



↔ Contractual relationships  
↔ - - - Communication channels during periodic verification

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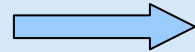
## ▶ Periodic Verification Scopes

Assurance



Actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.

Evaluation



GHG emission reduction data and evidence

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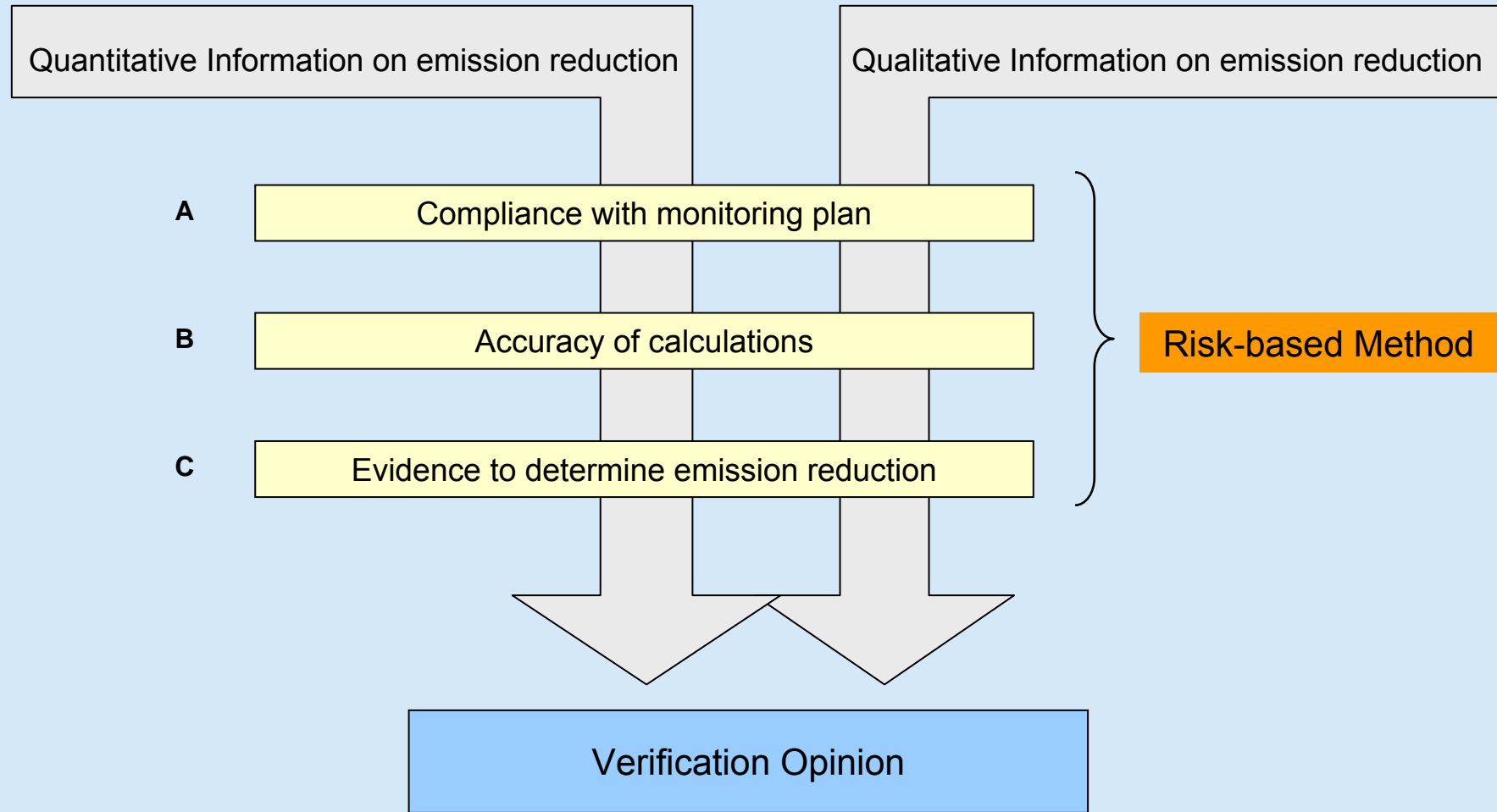
## ▶ Periodic Verification Process

Step	Action	PP	CB of DOE	Verification Team
1	DOE Selection	X		
2	Verifier Contract Establishment	X	X	
3	Verification Team Selection		X	
4	Publication of Monitoring Report		X	
5	Desk Review of Monitoring Report			X
6	On-Site Assessment	X		X
7	Draft Periodic Verification Report			X
8	CAR and FAR (if applicable)	(X)		X
9	Final Periodic Verification and Certification Report		X	X

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# ▶ Periodic Verification Principle



## ▶ A. Compliance with monitoring plan

Verifier shall check:

- Responsibilities and authorities for monitoring and reporting by relevant personnel
- Monitoring of all indicators stated in monitoring plan and their update as applicable i.e.
  - Baseline emission indicators
  - Project emission indicators
  - Leakage indicators
  - Sustainable development indicators
- Frequency of monitoring
- Accuracy of monitoring equipment
- Regular control and calibration of monitoring equipment
- Record and review of monitoring results

Mentioned in PDD

Not Mentioned in PDD

## ▶ B. Accuracy of calculations

Key issues of accuracy:

- Technological limitations (Measuring range)
- Correct use of emission factors
- Accurate material and fuel flow consumption
- Correct use of conversion factors
- Appropriateness of default data
- Transposition errors between data sets
- Consistency in aggregation of emissions data
- Uncertainty of measurement

*“Material impact is defined as issues that will have an impact of more than 5% of the claimed emission reductions.”*

– VVM



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## ► Uncertainty of measurement (IPCC good practice)

$$U_{\text{total}} = \sqrt{U_1^2 + U_2^2 + \dots + U_n^2}$$

$U_{1\dots n}$ : Percentage uncertainties associated with each of the quantities

$U_{\text{total}}$ : Percentage uncertainty in the product of the quantities

$$U_{\text{total}} = \frac{\sqrt{(U_1 \cdot x_1)^2 + (U_2 \cdot x_2)^2 + \dots + (U_n \cdot x_n)^2}}{x_1 + x_2 + \dots + x_n}$$

$U_{1\dots n}$ : Percentage uncertainties associated with each of the quantities

$X_{1\dots n}$ : Uncertain quantities

$U_{\text{total}}$ : Percentage uncertainty in the sum of the quantities

IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (Chapter 6.3)

## ► Uncertainty of measurement (Example)

Fuel		Measurement uncertainty (%)			Overall uncertainty (%)
		Activity rate	Calorific value	Emission factor	
1	Natural gas	1,5	1	1	2,1
2	Coal	2	2	3	4,1
3	Fuel oil	2,5	5	5	7,5
4	Residual gas	7	2	3	7,8

Fuel		CO <sub>2</sub> Emission (t/a)	Uncertainty (%)
1	Natural gas	319.200	2,1
2	Coal	128.700	4,1
3	Fuel oil	259.120	7,5
4	Residual gas	16.440	7,8
Sum/Overall uncertainty (%)		723.460	2,9

## ▶ C. Evidence to determine emission reduction

Auditor shall verify evidence to determine emission reduction:

- Sufficient quantity and appropriate quality
- Judgement on the reliability of the evidence
- Source and nature of the evidence (external/internal, oral, documented)

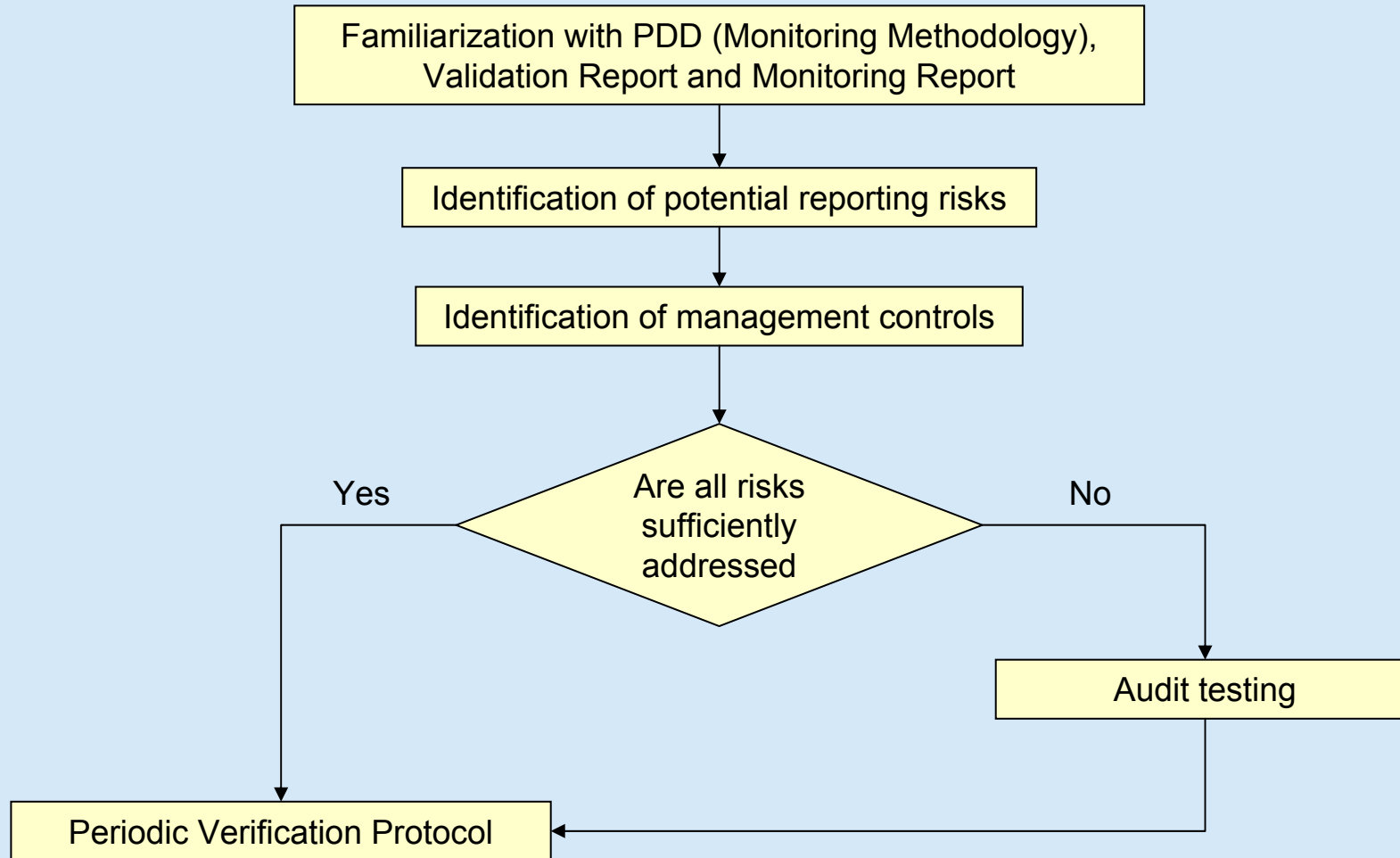
Evidence includes e.g.:

- Fuel purchase records
- Fuel consumption records
- Invoices for sold heat
- Invoices for sold electricity
- Laboratory analysis

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## ► Risk-based Method



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## ▶ Desk Review

Documents to be reviewed	Additional documents to be reviewed
PDD and its attachment	Process flow diagrams (More details as in PDD)
Validation Report	
Monitoring Report	Technical drawings
Previous Periodic Verification Report (if any)	Manuals of equipment suppliers
Management Manual	
Operation licenses	Performance records

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## ► On-site Assessment

Step		Subject
Preparation	1	Timetable
	2	Selection of persons to be interviewed
	3	Audit checklist
Implementation	4	Opening meeting
	5	Review of records and collection of measurements for baseline, project and leakage calculations
	6	Check of monitoring equipment
	7	Interview with data coordinators, process engineers, other key personnel at site
	8	Specific testing and calculation checks on high risks, material data sources and data management issues
	9	Closing meeting
	10	Periodic Verification Report



Risk-based Method

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## ► Procedures for revising monitoring plan

Step	Action	PP	DOE	UNFCCC Secretariat	Chair of Meth Panel	Chair of EB
I	Request for revision	X <sup>1</sup>	X <sup>2</sup>			
II	Validation opinion		X			
III	Submission to UNFCCC		X			
IV	Completeness Check			X		
V	Consideration			X	X	X

1: In order to improve accuracy and/or completeness of information

2: During verification DOE finds that monitoring plan is not in accordance with monitoring methodology.

Validation opinion including information on

- Level of accuracy
- Compliance with AM
- Vertical comparison

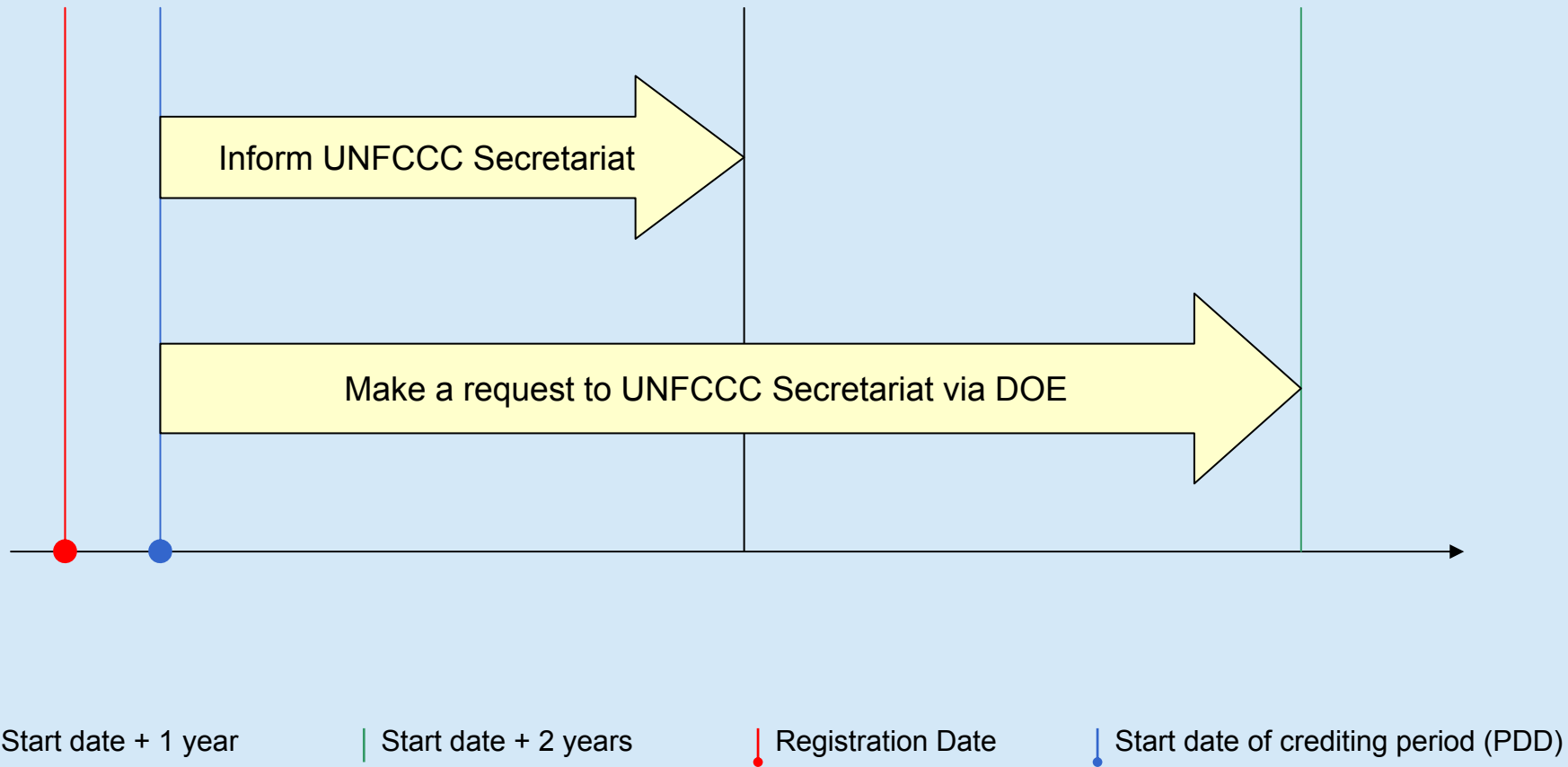
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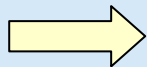
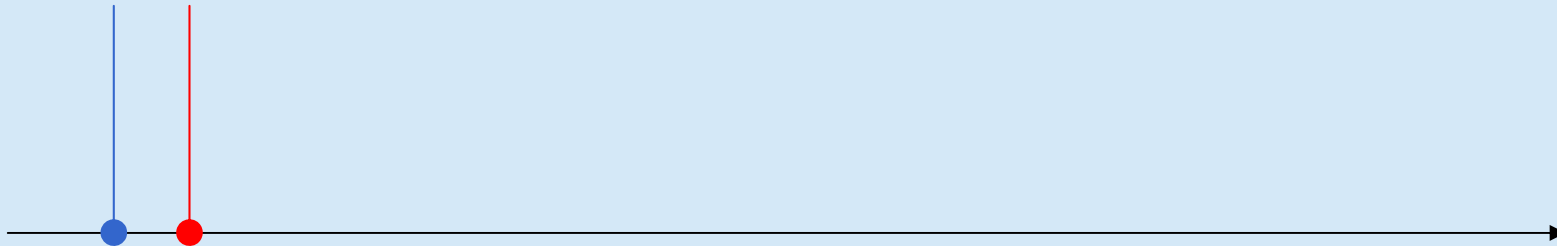
► Procedures for requesting post-registration changes to the start date of the crediting period



► Procedures for requesting post-registration changes to the start date of the crediting period



▶ Procedures for requesting post-registration changes to the start date of the crediting period



**Change of start date of crediting period: Not applicable**

Registration Date

Start date of crediting period (PDD)

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## ▶ Summary

- Verification scopes
- Risk-based Method
- Technical expertise of verifier