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Tom Baumann  
CEO, ClimateCHECK and  
Director, Greenhouse Gas Management Institute

INNOVATIVE GREENHOUSE GAS MANAGEMENT SOLUTIONS

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# Overview of ISO GHG Groups

Technical Committee (TC) 207  
Environmental Management

Sub Committee (SC) 7  
Greenhouse Gas Management

14064 Part 1 Inventories  
14064 Part 2 Projects  
14064 Part 3 Verification

Working Group (WG) 1  
GHG Verifier  
Competency (14066)

14065 Accreditation of  
GHG Verification  
Organizations

Working Group (WG) 2  
GHG Management in  
Value or Supply Chain



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# Rationale of ISO GHG Standards

- **International recognition and compatibility** – 175 experts from 39 countries and compatibility with existing good practice (e.g. WBCSD/WRI GHG Protocol and UNFCCC CDM)
- **Program/policy neutrality** – common “building block” for use by different organizations and programs; “technical” requirements without program rules (e.g. no additionality, eligibility, etc.)
- **Auditable structure** – designed for independent verification and credibility for emissions trading and compliance reporting

# Overview of ISO GHG Standards

<b>Organizations</b> <b>ISO 14064</b> <b>Part 1</b>	Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.
<b>Projects</b> <b>ISO 14064</b> <b>Part 2</b>	Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions and removal enhancements.
<b>Validation / Verification</b> <b>ISO 14064</b> <b>Part 3</b>	Specification with guidance for the validation and verification of greenhouse gas assertions.
<b>Accreditation</b> <b>ISO 14065</b>	Specification for greenhouse gas validation and verification bodies for use in accreditation and other forms of recognition.

# Framework for ISO GHG Standards

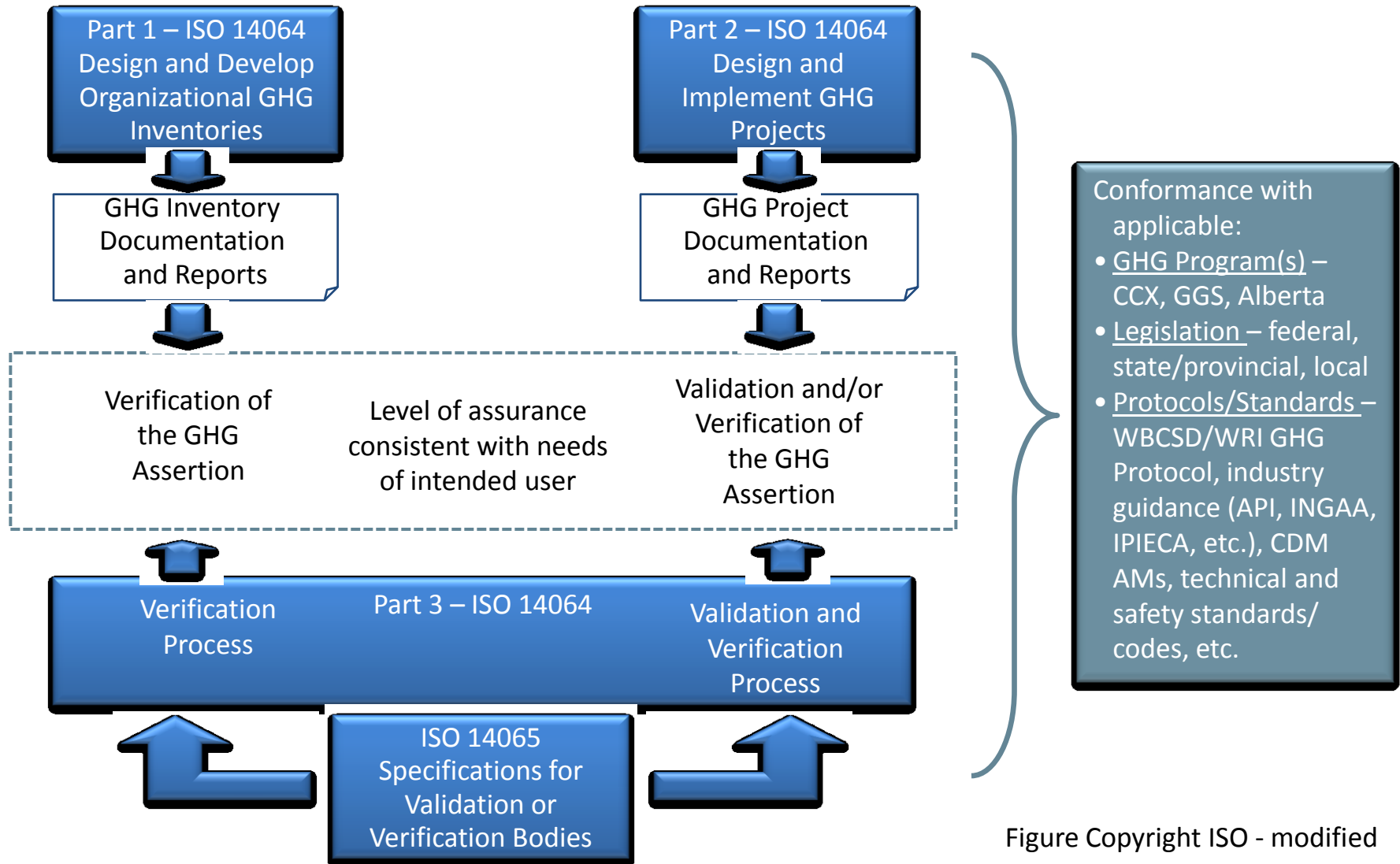


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# Description of ISO 14064 Part 1

- Process standard (not outcome or performance) specifying auditable general “what to do” requirements and some recommendations (only 11 pages), but not guidance for “how to do it”.
- Flexible to be used for different organization types and sizes for voluntary and mandatory uses.
- WBCSD/WRI GHG Protocol – Corporate has 116 pages.

# Contents of ISO 14064 Part 1

- **Scope, Definitions, Principles**
- **GHG inventory design and development**
  - Organizational boundaries
  - Operational boundaries
  - Quantification of GHG emissions and removals
- **GHG Inventory components**
  - GHG emissions and removals
  - Organizational activities to reduce GHG emissions or increase GHG removals
  - Base year GHG inventory
- **GHG inventory quality management**
  - GHG information management and monitoring
  - Document retention and record keeping
- **GHG reporting**
  - GHG report planning
  - GHG report content
  - GHG report format
  - GHG report dissemination
- **Verification (1st party)**

# Description of ISO 14064 Part 2

- Process standard (not outcome or performance) specifying auditable general “what to do” requirements (only 4 pages).
- Flexible to be used for different project types and sizes for voluntary and mandatory uses.
- Contains a further 13 pages of informative / interpretive guidance (‘should’ or ‘may’) on the application of requirements – it explains some of the “how to do it”.
- WBCSD/WRI GHG Protocol – Projects has 148 pages.

# Contents of ISO 14064 Part 2

- **Scope, Definitions, Principles**
- **Introduction to GHG projects**
- **Requirements for GHG projects**
  - General requirements
  - Describing the project
  - Identifying GHG sources for the project
  - Determining the baseline scenario
  - Identifying GHG sources for the baseline scenario
  - Selecting GHG sources for regular monitoring and quantification
  - Quantifying greenhouse gases
  - Managing data quality
  - Monitoring the GHG project
  - Documenting the GHG project
  - Validating or verifying the GHG project (should)
  - Reporting the GHG project (should/shall)

# Description of ISO 14064 Part 3

- Process standard (not outcome or performance) specifying auditable general “what to do” requirements (only 6 pages).
- Flexible to be used for different GHG assertions for voluntary and mandatory uses.
- Contains a further 23 pages of informative / interpretive guidance (‘should’ or ‘may’) on the application of requirements – it explains some of the “how to do it”.

# Contents of ISO 14064 Part 3

- **Scope, Definitions, Principles**
- **Validation and Verification Requirements**
  - General, competence of the validator or verifier
  - Validation or verification process
  - Validation or verification objectives, scope, criteria and level of assurance
  - Validation or verification approach
  - Assessment of GHG information system and information system controls
  - Assessment of GHG data and information
  - Assessment against validation or verification criteria
  - Evaluation of the GHG assertion
  - Validation and verification statement
  - Validation or verification records

# Description of ISO 14065

- Process standard (not outcome or performance) specifying principles and requirements (only 11 pages).
- Contains a further 6 pages of informative / interpretive guidance on the application of requirements – it explains some of the “how to do it”.
- Normative reference to ISO 14064 Part 3
- IAF Guidance in development.

# Contents of ISO 14065

- **Scope, Definitions, Principles**
- **General Requirements**
  - Legal status, contractual matters, governance, impartiality
- **Competencies**
  - Management and personnel, deployment, contracted validators or verifiers, personnel records, outsourcing
- **Communication and records**
  - Responsibilities to client, confidentiality, publicly accessible information, records
- **Validation or verification process**
  - General, pre-engagement, validation or verification, review and issuance of statement, records, facts discovered after the statement
- **Appeals**
- **Complaints**
- **Special validations or verifications**
- **Management systems**

# Summary

- ISO 14064 (Parts 1, 2, 3) and ISO 14065 are policy-neutral framework for GHG quantification, verification, and accreditation.
- Supports the market by improving consistency, credibility, cost-effectiveness and facilitating trade.
- Links inventory emission permits, project reduction credits, new technologies/products.

# Users of ISO 14064 and ISO 14065

- Governments (provincial, national), as well as regional and supranational governmental organizations
- Voluntary Carbon Standard (projects)
- The Climate Registry (successor to CCAR)
- GE-AES Greenhouse Gas Services (projects)
- International Petroleum Industry Environmental Conservation Association
- Greenhouse Gas Management Institute (training)
- Software companies
- Standards and certification bodies

# TEAM Protocols

- Description
- Development
- Overviews of Protocols
  - Wind Power
  - Grid Baseline

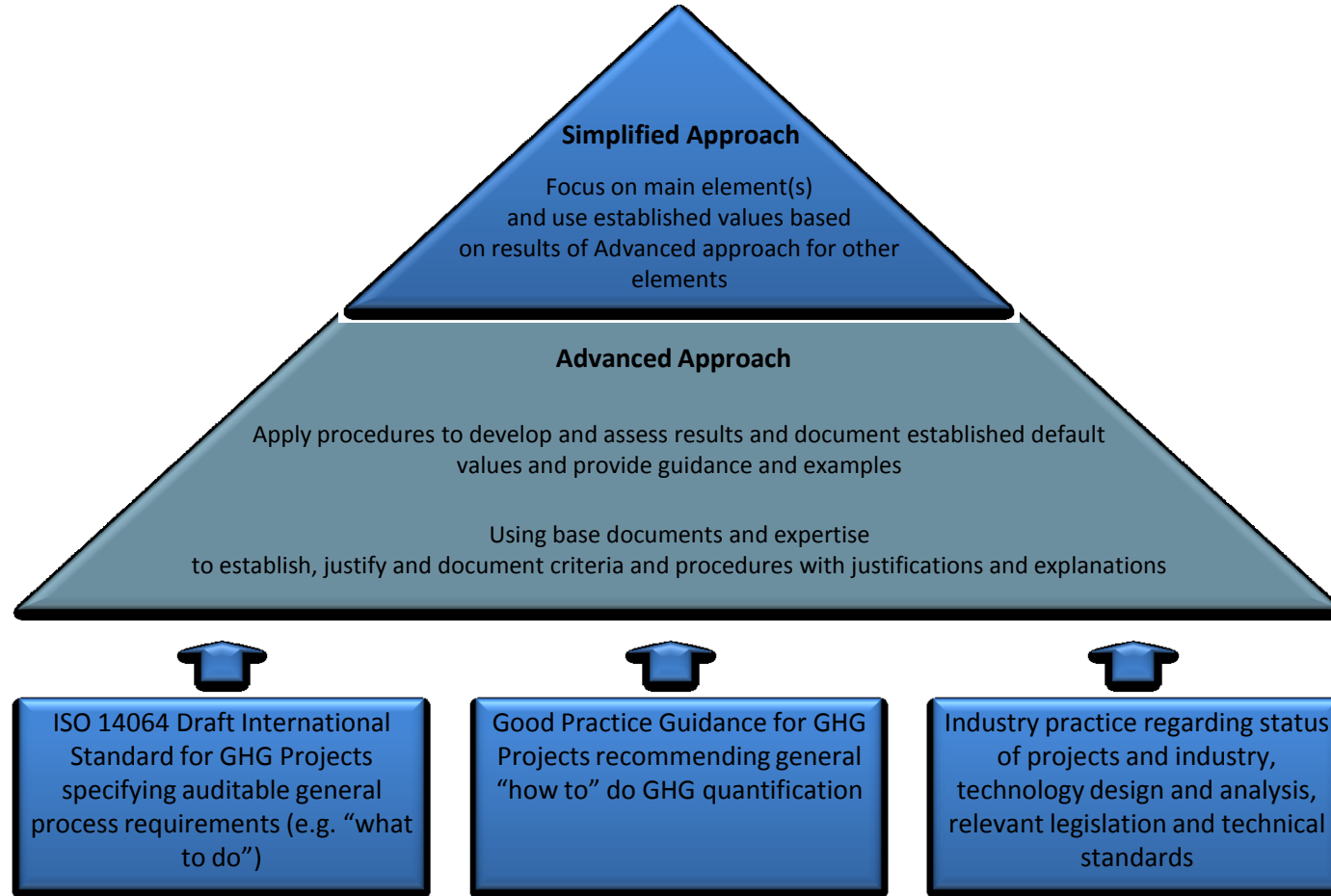
# TEAM Protocols

- Protocols specifying procedures and guidance providing “what to do” and “how to do it”, as well as providing justifications and explanations with the rationale for “why” decisions or an approach were done
- Comprehensive assessment framework to provide credibility to the GHG quantification, specifying 2 main approaches in order to be flexible and cost-effective depending on the specific circumstances and objectives of the project proponent

# TEAM Protocol Development

- Streamlined-standards development process (reflects “standard for developing a standard”)
- 6 months from October 2004 to April 2005
- Process managed by CSA (manages the ISO GHG Standards)
- Government of Canada, provincial governments, renewable energy companies, technical experts, consultants
- Based on ISO 14064 Part 2 (Draft), industry reports, LCA studies, codes and legislation, etc.

# TEAM Protocol Development



# TEAM Protocols

1. The “Simplified” approach requires relatively less effort from the project proponent. It is cheaper and faster (saving time and costs), but uses conservatively over-estimated project GHG emissions to ensure GHG emission reductions are not over-estimated.
2. The “Advanced” approach requires relatively more effort from the project proponent, but allows for more accurate quantification of project GHG emissions to support potential claims for more GHG emission reductions.

# Simplified vs. Advanced

1. Cost Effectiveness, Practicality and Uncertainty
  2. Availability and Reliability of Data
  3. Requirements of a Specific Process or System within which the Proponent is operating
- Which approach to use is determined by its marginal cost (e.g. for additional monitoring, verification, etc.) vs. marginal benefit (e.g. market value of credits, other direct or indirect compensation).

# Quantification Principles

- The application of principles is fundamental to ensure that GHG-related information is a true and fair account.
- **Completeness** - Include all relevant GHG emissions and removals. Include all relevant information to support criteria and procedures.
- **Consistency** - Enable meaningful comparisons in GHG-related information.
- **Accuracy** - Reduce bias and uncertainties as far as practical.
- **Transparency** - Disclose sufficient and appropriate GHG-related information to allow intended users to make decisions with reasonable confidence.
- **Relevance** - Select GHG sources, GHG sinks, GHG reservoirs, data and methodologies appropriate to the needs of the intended user.
- **Conservativeness** - Conservative assumptions, values and procedures are used to ensure that GHG emission reductions or removal enhancements are not over-estimated.

# Life Cycle Approach

## A. Upstream SSRs before Project Operation

1. Production and Transportation of Materials & Energy
2. Manufacturing of Project Components
3. Transportation of Components to Project Site
4. Site Preparation Installation and Commissioning

A1.1 Steel Production & Transportation

A2.1 Tower and Turbine System Manufacturing

A3.1 Tower and Turbine System Transport

A4.1 Road Construction

A1.2 Aluminium Production & Transportation

A2.2 Grid Connection Component Manufacturing

A3.2 Grid Connection Component Transport

A4.2 Clearing Overburden and Deforestation

A1.3 Fibreglass Production & Transportation

A4.3 Office, Travel, Support

A1.4 Concrete Production and Transportation

A4.4 Structure Construction

A1.5 Copper Production & Transportation

A4.5 Assembly & Commissioning

A1.6 Plastic/PVC Production & Transportation

A4.6 Grid Connection

A1.7 Petroleum Product Production & Transportation

A1.8 Gravel Production & Transportation

A1.9 Lead Production & Transportation

## B. Upstream SSRs During Project Operation

1. Production of Project Inputs
2. Transportation of Project Inputs to Project Site

## C. Onsite Project SSRs

1. Production/Provision of Product(s) and/or Service(s)

C1.1 Electricity Production

2. Maintenance

C2.1 Maintenance

## D. Downstream SSRs During Project Operation

1. Transportation of Product(s)
2. Use of Product(s)/Service(s)

D1.1 Electricity Transmission

3. Waste Management

## E. Downstream SSRs after Project Termination

1. Decommissioning and Site Restoration

E1.1 Decommissioning

E1.2 Site Restoration

2. Waste Management

E2.1 Waste Transport

E2.2 Waste Management

# Advanced Approach Quantification 1

- For each of the identified SSRs, the general procedure to quantify (using estimated data from various sources) is based on using data and information about:
  1. Inputs (e.g. raw materials, fuels, etc.)
  2. Outputs (e.g. volume or mass of material, electricity, etc. produced by the SSR)
  3. Level of activity (e.g. distance traveled)
  4. Emission factor(s) for specific activities associated with the SSR (e.g. combustion – x tonnes CO<sub>2</sub>e/litre of fuel; manufacturing - x tonnes CO<sub>2</sub>e/tonne of material manufactured).

# Advanced Approach Quantification 2

- In general, inputs, outputs and level of activity data can be obtained by:
  - Direct measurement such as continuous or periodic sampling
  - Performing mass and energy balances on the system
  - Manufacture/supplier specification documents (e.g. quantity of steel used in the manufacture of the pylon)
  - Professional estimation using published data or information collected from external similar sources.

# Advanced Approach Quantification 3

- Emission factors can be obtained by:
  - Undertaking a detailed assessment of the specific activity and developing from first principles - measuring and monitoring all related activities and then normalizing the overall emissions to a specific parameter (e.g. xx tonnes CO<sub>2</sub>e/tonne of steel produced)
  - Estimating using data derived from historical operations, external but similar processes, facilities or areas of operation or from published life cycle assessments performed on related industries, processes or activities.
  - Using emissions factors from recognized origins such as an industry association, national GHG inventory or an international body (e.g. IPCC).

# Onshore Wind Turbine Simplified EFs

SSR Category Identifier	SSR Category Name	Emission Factor	Unit	Attribution
<b>A. Upstream SSRs Before Project Operation</b>				
A1	Production and Transportation of Materials & Energy	1328	t CO2e / MW	Related
A2.1	Manufacturing of Tower & Turbine	26	t CO2e / turbine	Related
A2.2	Manufacturing of Grid System Components	--	t CO2e / MW	Related
A3	Transportation of Components to Project Site	242	t CO2e / MW	Related
A4.1	Road Construction	35	t CO2e / project	Related
A4.2	Clearing Overburden and Deforestation	--	t CO2e / project	Related
A4.3	Office, Travel, Support	22	t CO2e / project	Related
A4.4	Structure Construction	--	t CO2e / project	Related
A4.5	Assembly and Commissioning	48	t CO2e / turbine	Related
A4.6	Grid Connection	14	t CO2e / km trans line	Related
<b>B. Upstream SSRs During Project Operation - N/A to wind energy project</b>				
<b>C. Onsite Project SSRs</b>				
C1.1	Power Production	0	t CO2e / MW / yr	Controlled
C2.1	Maintenance	1	t CO2e / project / yr	Controlled
<b>D. Downstream SSRs During Project Operation - N/A to wind energy project</b>				
<b>E. Downstream SSRs after Project Termination</b>				
E1.1	Decommissioning and Site Restoration	48	t CO2e / turbine	Controlled
E1.2	Site Restoration	--	t CO2e / project	Controlled
E2.1	Waste Transport	19	t CO2e / MW	Controlled
E2.2	Waste Management	Set the Standard™ --	t CO2e / MW	Related

# Using the Advanced Approach

- Criteria and procedures established for each requirement of ISO 14064 Part 2; the C&P are justified and documented; C&P applied to determine default EFs for Simplified Approach
- Within the Advanced framework, user can apply more accurate procedures for each ISO requirement – better monitoring and data quality as verifiable evidence – where it is economically efficient

# Using the Simplified Approach

1. identify and conform to relevant requirements of GHG programme (if applicable), legislation and technical codes and standards
2. describe the project, including participants, project location, project type, project size, market role, etc.
3. select emission factors for SSRs relevant for the project according to tables of emission factors are provided that are organized by project type
4. document monitored data for the electrical power produced and sold/delivered to the grid by the project – whether power monitored by project proponent or by utility/grid operator
5. select the most appropriate baseline procedure from the Baseline Grid Protocol to calculate displaced emissions that would have otherwise happened in the absence of the project.
6. calculate GHG emission reductions by subtracting the lower project GHG emissions from the higher baseline GHG emissions and indicates the attribution of emission reductions – whether or not the project proponent can claim credit depends on the rules of the GHG programme and/or other legal/contractual basis

# Baseline Grid Protocol

- Operating Margin and Build Margin Scenarios
- Baseline Selection Procedure
- Appropriate and Acceptable Scenarios – Example for Ontario
- Project Specific Criteria
- Grid Specific Criteria

# Operating Margin and Build Margin

- A project that displaces existing generation on a grid will affect the Operating Margin of the Grid.
- Conversely, a project that delays construction of future generating capacity rather than displacing existing generation is said to affect the build margin.
- The distinction between operating and build margins is significant, since emissions from existing generation will likely be different than emissions from future construction.
- A project that will affect both the operating plants on the grid and the new plants to be constructed will affect the combined margin (a combination of the build margin and the operating margin)


# Baseline Selection Process 1

1. Identify and list all potential grid baseline scenarios applicable to the project. The grid characterization procedures considered in this protocol include the operating margin, the build margin and the combined margin.
  - a. The operating margin includes: National Grid Average Emissions, Provincial Grid Average Emissions, Marginal Proxy plant, Monthly average load dispatch, and Marginal Load Dispatch Emissions.
  - b. The build margin includes: Average of recent grid capacity additions, and Proxy plants
  - c. The Combined Margin includes a combination of the Operating and the Build Margin
2. Determine the location of the grid to which the project is connected.
3. Determine the type of the project according to the following criteria:
  - a. Project is continuous/firm if it generates a steady and constant electrical output regardless of external factors,
  - b. Project is intermittent/non-firm if it generates an electrical output that fluctuates according to external factors.

# Baseline Selection Procedure 2

4. Determine the size of the project according to the following criteria:
  - a. Project is considered Small when project installed capacity  $< 200$  MW
  - b. Project is considered Large when project installed capacity  $\geq 200$  MW
5. Determine the project role in the grid market according to the following criteria:
  - a. Project is considered to be a baseload type if the plant provides electricity continuously to the grid regardless of demand but is always below demand levels. Baseload is usually low cost.
  - b. Project is considered to be a dispatch (load-following) type if the plant provides electricity to the grid non-continuously, according to demand. Dispatch electricity sources are usually higher cost than the baseload. Usually the least costly electricity generated is dispatched first, while the most costly comes last on the grid.
6. Use one of the tables to select the identified most appropriate baseline procedure according to the determined project characteristics. The most appropriate baseline procedure is highlighted in these tables and represents the most accurate procedure according to the project characteristics, for which data is available.

# Appropriate and Acceptable Scenarios for Ontario

Project Type	Intermittent				Continuous			
Project size	Large		Small		Large		Small	
Market Role	Baseload	Dispatchable	Baseload	Dispatchable	Baseload	Dispatchable	Baseload	Dispatchable
<b>Most Accurate</b> 	CM using average provincial baseload for OM and average recent additions or proxy plant for BM (depending on case)	CM using marginal dispatch for OM and average recent additions or proxy for BM	NA	OM with Marginal Dispatch	CM using average provincial baseload for OM and average recent additions or proxy for BM	CM using marginal dispatch for OM and average recent additions for BM	OM average provincial baseload	OM with Marginal Dispatch
	CM using average provincial for OM and average recent additions or proxy plant for BM	CM using monthly average load dispatch for OM and average recent additions or proxy plant for BM		OM with weighted monthly average dispatch	CM using average provincial for OM and average recent additions proxy plant for BM	CM using marginal dispatch for OM and proxy for BM	OM using average provincial	OM with weighted monthly average dispatch
	OM with baseload provincial average	OM using Marginal Dispatch		OM with monthly provincial average	CM using average provincial for OM and proxy for BM	CM using monthly average load dispatch for OM and average recent additions for BM	NA	OM with provincial average
	OM with Provincial Average	OM using monthly weighted average load dispatch		NA	OM with baseload provincial average	CM using monthly average load dispatch for OM and proxy for BM	NA	NA
	NA	OM with monthly provincial average		NA	OM with Provincial Average	OM with Marginal Dispatch	NA	NA
	NA	NA		NA	NA	OM with weighted monthly average dispatch	NA	NA
	NA	NA		NA	NA	OM with provincial average	NA	NA
	NA	NA		NA	NA	NA	NA	NA

# Appendix: Additional Slides

- Operating Margin and Build Margin Scenarios
- Project Specific Criteria
- Grid Specific Criteria
- Baseline Selection Process Figure

# Scenarios

- Operating Margin
  - National Average
  - Provincial/State Average
  - Dispatch Proxy Plant
  - Marginal Load Dispatch
  - Monthly Weighted Marginal Dispatch
- Build Margin
  - Specific Plant
  - Average of Recent Capacity Additions
  - Proxy Plant

# Project Specific Criteria

- Project Technology and Supply Characteristics
- Intermittent/non firm versus Dispatchable/firm
- Spot Market versus Power Purchase Agreement
- Site-Specific Considerations
- Project Size

# Grid Specific Criteria

- Grid Electricity Generation Mix
- Storage Situation (e.g. large hydro for baseload)
- Non-Storage (e.g. large coal, run of the river hydro, or nuclear providing baseload)
- Grid Capacity Reserves
- Economic
- Electricity Market Structure
- Relevant Legislation/Policy Statements

# Baseline Selection Process

