

# 2<sup>nd</sup> Workgroup Meeting

## Mexico Boiler Efficiency Project Protocol Workgroup



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October 1<sup>st</sup>, 2015



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This protocol development effort has been supported by generous funding from our partners:



Recommendations and other opinions in this slide deck, however, do not necessarily reflect the opinion of project partners, but rather, are subject to further change pending further workgroup discussion



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Item 1

# WELCOME, INTRODUCTIONS, REVIEW OF AGENDA

# Agenda



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- |               |   |
|---------------|---|
| 9:00 – 9:20   | Welcome, Introductions, &<br>Review of Agenda for the Day                     |
| 9:20 – 10:20  | Discussion of protocol scope:<br>Feedback & Questions on WG Memo              |
| 10:20 – 10:30 | BREAK   |
| 10:30 – 12:00 | Discussion of Performance Standard<br>& Data Collection Efforts               |
| 12:00 – 12:30 | Legal Requirements & Voluntary actions<br>incentivized by government programs |
| 12:30 – 1:30  | LUNCH   |

**Technical issues? Please email Mark: [mhavel@climateactionreserve.org](mailto:mhavel@climateactionreserve.org)**



# Agenda

- 1:30 – 2:00 GHG / Project Boundary
- 2:00 – 3:00 Monitoring & Quantification:
  - Availability of operational data
  - Discussion of practical monitoring requirements; impact on quantification methods
- 3:00 – 3:30 Other issues?
- 3:30 – 4:00 Questions, next steps, adjourn

**Technical issues? Please email Mark: [mhavel@climateactionreserve.org](mailto:mhavel@climateactionreserve.org)**

# Protocol Development Timeline

*This schedule is subject to change.*



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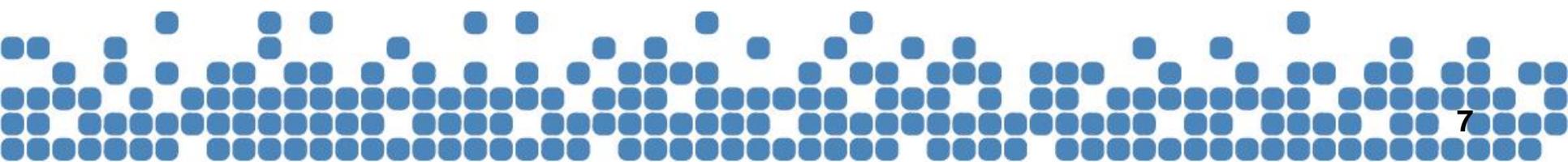
Milestone/Task	Timeline
Phase 1:	May – September 2015
Protocol drafting	May – September 2015
1 <sup>st</sup> Workgroup meeting (webinar)	July 9, 2015
2 <sup>nd</sup> Workgroup meeting (in-person)	October 1, 2015
Phase 2: Data collection and analysis	July 2015 – January 2016
Refinement of protocol	October – December 2015
Occasional outreach to WG w/ questions	October – December 2015
Phase 3:	January – June 2016
Reconvene workgroup, Distribution of 2 <sup>nd</sup> WG Draft of Protocol (1-2 additional workgroup meetings: 1 in-person)	January – April 2016
Public comment period	April / May 2016
Protocol presented to Reserve Board	June 2016



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Item 2

# PROTOCOL SCOPE





## Section 2: Project Definition

*For the purpose of this protocol, the GHG reduction project is defined as:*

*a project that implements eligible project activities, as defined in Section 2.2.2, at an eligible boiler, as defined in Section 2.2.1*

Comments?



## Section 2: Project Definition

General factors to consider in determining whether to include each equipment type and/or each activity as eligible:

- Availability of historic data \*\*
- Availability / accuracy / cost of gathering current/ongoing data;
- Existence of appropriate quantification methods;
- How easy it will be to verify emissions – ie monitoring / checking results;
- Legal requirements / existing regulations
- Potential emission reductions associated with such equipment; &
- Other policy / practical considerations.



# Protocol scope: Initial Proposed scope

- Commercial boilers
- Industrial boilers
- Power boilers
- Commercial furnaces
- Industrial furnaces
- Steam distribution systems

# Revised Protocol Scope



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Category	Capacity (Thermal)	Retrofitting	Fuel switch	New equipment	Early retirement
Steam boilers	Up to 9.8 MW (33.5 MMBtu/h or 1,000 BHP)	✗	✗	✗	✗
	9.8 to 30 MW (33.5 to 102.5 MMBtu/h)	✓	✓	✓	✓
	30 to 100 MW (102.5 to 341.4 MMBtu/h)	✓	✓	✓	✓
	>100 MW (>341.4 MMBtu/h)	✓	✓	✓	✓
Hot water boilers	Up to 4.9 MW (Up to 16.7 MMBtu/h or 500 BHP)	✗	✗	✗	✗
	>4.9 MW (>16.74 MMBtu/h or >500 BHP)	✗	✗	✗	✗
Furnaces (all)		✗	✗	✗	✗



# Revised Protocol Scope

The Reserve made the determination/recommendation to:

- Exclude all furnaces
- Focus exclusively on steam boilers greater than 9.8 MW (or 1000 BHP)

Rationale for this decision discussed in a Memo sent to the Workgroup on September 18

- Policy driven
- Data driven
- Technical

The Reserve may consider expanding protocol scope in the future, upon completion of a successful Boiler Protocol, if / when necessary data available

# Revised Protocol Scope: Policy Rationale



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- Protocols & CDM methodologies typically focus on a small number of technologies / activities
  - Narrower scope often allows for stronger protocol, especially if applying standardized elements
- The Reserve is known for producing standardized protocols of the highest rigor, and we realize that MLED, SENER, and all our stakeholders wouldn't want to settle for less than a level of rigor acceptable to international community.
- Limited time & budget resources

# Revised Protocol Scope: Data Driven Rationale



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- Standardized protocol needs sufficient data to develop robust performance standard & additionality assumptions
  - Need to understand business-as-usual efficiencies for given boiler design, capacities, etc.
- Data demonstrating performance of **large/intermediate boilers** appears sufficient to allow inclusion
  - Moving forward with effort to collect the data and then will analyze it.
  - Scope may be further refined, depending on the data
- No comprehensive dataset found to support analysis of performance efficiencies, operating practices or design characteristics for **small boilers**



# Revised Protocol Scope: Technical Rationale for excluding Furnaces

- Term “furnace” comprises a vast array of device
  - We are defining “furnace” as “a direct fired device other than a boiler or hot water heater”
  - Translated into Spanish, this could include: *calentadores, hornos, calcinadores, reformadores*
- Significant variability exists among furnaces in terms of application, design, fuels used, current energy efficiency levels & opportunities for practical energy efficiency improvements
- Preliminary attempt to allow for a subset of process heaters (used in chemicals, oil & gas) but analysis showed many retrofitting measures applicable for boilers are not applicable for furnaces
- Given above & limited resources – recommend focusing exclusively on boilers in this protocol.

# Revised Protocol Scope: Technical Rationale for excluding Boilers <9.8 MW (<1,000 BHP)



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- Including *all* boiler sizes and types within the same protocol would likely still be unmanageable in terms of the variability of applications and designs;
- Less likely performance data for such equipment routinely collected & reported to government (ie. likely not recorded)
- Emissions per unit low, limiting the emission reduction potential: as such, as carbon offset projects, likely not financially attractive;
- Most critically no boiler efficiency data available for these small steam or hot water boilers.

# Revised Protocol Scope: Technical Rationale for Focus on Steam Boilers with Capacities of more than 9.8 MW (>1,000 BHP)



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- These boilers represent a significant emission reduction potential based on their share of emissions from Mexican industry and electricity generation, as well as the most significant emission reduction potential on a per boiler basis, likely making these carbon offset projects most cost effective as well.
- Propose evaluating boilers according to the following capacity-based categories:
  - Steam boilers with capacities of more than 9.8 and up to 30 MW
  - Steam boilers with capacities of more than 30 and up to 100 MW
  - Steam boilers with capacities of more than 100 MW

***Question: Thoughts on proposed groupings? Variability within each?***

# Revised Protocol Scope: Technical Rationale for Focus on Steam Boilers with Capacities of more than 9.8 MW (>1,000 BHP)



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- Groupings by capacity range will allow us to assess boilers of similar design / application
  - Presumably, boilers with similar capacities will share similar technological options for performance improvements
- Categories may need further refining as data analysis continues;
- Aim is to establish performance threshold for each category, reflecting a minimal level of energy efficiency which projects must achieve to demonstrate their additionality;
- Reserve has begun working with WG members whose organizations we believe have requisite data

**If you believe your organization has data or a study which may be useful for analysis of business as usual energy efficiency levels – please let us know**



## Section 2: Project Definition

### 2.2.2 – Proposed Eligible Activity Types

- Retrofitting existing boilers.
- Fuel Switching.
- Installing new high-efficiency boilers.
- Early retirement.



# Section 2: Project Definition

## 2.2.2 – Proposed Eligible Activity Types

**Retrofitting existing boilers:** Installing new efficiency improvement technologies to existing boilers.

- Heat recovery equipment (e.g., economizers, air or fuel preheaters, blowdown energy recovery systems)
- Improved combustion equipment
- Improved control devices
- Improved operational practices



# Section 2: Project Definition

## 2.2.2 – Proposed Eligible Activity Type: *Fuel Switching*:

- Through retrofits, switching boiler fuel use from a high-carbon intensity fuel to low-carbon intensity fuel - can switch from any fuel to any fuel – as long as result is less emissions;
  - **Natural gas** - will cover situations where NG is available, but has not been used (ie small section of new pipeline will need to be built to connect facility) or where facility is already connected to NG, but there has been insufficient gas to actually use for the boiler.
    - No maps of NG availability, so will require further certification (likely by CRE) of NG availability or lack thereof
  - Note switching to biogenic fuels may have large emission reduction potential – but likely require further considerations (ie might be contrary to existing Mexican policy);



# Section 2: Project Definition

## 2.2.2 – Proposed Eligible Activity Types

### *Installing new (higher-efficiency) boilers*

- Installation of new equipment with improved energy efficiency features as compared to equipment that would be installed under BAU
- *How do we demonstrate these changes are beyond BAU?*
  - *What are the drivers for these efficiency upgrades?*
  - *What are the barriers preventing the implementation of these efficiency upgrades?*



# Section 2: Project Definition

## 2.2.2 – Proposed Eligible Activity Types

**Early retirement of existing boilers.** Replacing an old, inefficient boiler with a more efficient boiler prior to the end of its useful life and scheduled retirement.

- Does this occur across all 3 size categories?
- Leakage emissions – if early retired boilers are re-used elsewhere this could prevent more efficient boiler being used;
  - Consider banning re-use of early retired boilers;
  - Consider limiting crediting period to remaining life of boiler being retired;

Discussion question: How common is early retirement of boilers in Mexico?

- If data demonstrates early retirement is uncommon in Mexico – then this activity can be removed.



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Item 3

# DATA AVAILABILITY & DATA REQUEST PROCESS



# How much data is needed?

- Reserve's data-driven standardized process requires significant upfront data and analysis to understand business-as-usual.
- Based on our understanding of BAU, the Reserve's protocols establish project definitions, eligibility criteria, and performance standards which seek to allow only truly additional projects to receive offset credits.
- Lot's of data now → less work proving additionality as part of each individual project's development



# Data Collection Effort

- The Reserve has been having conversations with numerous workgroup members whose organizations record data on energy efficiency in boilers.
- Who are we working with on data requests:
  - CFE, CONUEE, IIE, IMP, PEMEX, SEMARNAT, (CESPEDES? Others?)
- Formal data request letters will be going out by Tuesday October 6th.



# What Data are we Requesting

- List of equipment
- Maintenance info
- Nameplate data for all boilers
- Historic operational data of boiler, including:
  - Fuel Use
  - Output levels
  - Emissions data
  - Retirement age of equipment
- Any data you are willing to share on projections/future trends

# Section 3.4.1: Performance Standard



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## One of most critical sections of protocol

- Projects pass the Performance Standard Test (PST) by meeting a performance threshold, i.e. a standard of performance that screens out non-additional projects
- Standards are specified such that the incentives created by the carbon market are likely to have played a critical role in decisions to implement projects that meet the performance standard.
- The Reserve considers financial, economic, social, and technological drivers that may affect decisions to undertake a particular project activity.
- Access to data on Business-As-Usual (BAU) practices and efficiencies will be critical for development of the PST. As we discuss options, please consider what are the data needs for each and whether sufficient data may/may not be available

# Section 3.4.1: Performance Standard



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**Retrofit Projects:** The Reserve recommends the adoption of *fuel specific efficiency benchmarks* for retrofit projects.

- Threshold represents a level of performance (emissions rate) that is beyond that expected compared to the emissions of recently installed boilers.
- To meet the performance threshold, a project will be required to reduce CO<sub>2</sub> emissions per unit steam generated below fuel-specific values.



## Section 3.4.1: Performance Standard

- **New boilers** The Reserve recommends the adoption of *technology based performance thresholds* for new boilers.
  - Threshold represents a level of performance (technology) better than BAU, based on currently available boiler technologies
  - Can be used when there is a range of efficiencies/performances (dictated by operational/emissions requirements) applicable for a particular set of boilers.
  - Threshold could be defined as the least efficient fuel-specific boiler design that meets the engineer's specifications and all applicable legal requirements.
  - To generate reductions, a project developer would have to add at least one of the selected additional technologies to the boiler system in order to pass the performance threshold.



## Section 3.4.1: Performance Standard

- **Fuel Switching:** The Reserve recommends adoption of a *simple performance threshold* = presence of *some significant barrier to switching fuel use*
- The Reserve recommends that the performance standard for fuel switch projects simply be that there is some significant impediment to the switching of fuel use;
- Consider specifically defining what does / does not result in a “significant barrier to fuel switching”
- Examples:
  - Boilers already configured for dual-fuel use would likely not really go beyond BAU;
  - Boilers that require upgrading in order to use more efficient fuel would be eligible.



## Section 3.4.1: Performance Standard

- **Early retirement:** Multiple recommendations here – dependent upon what is happening to boilers in Mexico that are being retired early.
- *If retired boilers* are assumed *not to be re-commissioned*, compare the project to the old-boiler emissions until the point where the old boiler would have reached the end of its life, then compare to BAU replacement
- *If retired boilers* are assumed *to be re-commissioned*, treat such projects as new equipment projects – adopt a *technology based performance threshold*

*Question for consideration: Is equipment being retired early in Mexico? What is happening to such equipment?*



Item 4

# LEGAL REQUIREMENTS & VOLUNTARY ACTIONS (W GOVERNMENT INCENTIVES)



## Section 3.4.2: Legal Requirement Test

- A project passes the Legal Requirement Test when there are no laws, regulations, permitting conditions or other legally binding mandates requiring the project activity
- In the case of regulations requiring a minimum energy efficiency standard, it may be possible to set the legal requirement as the baseline, only crediting emissions reductions beyond what is required by law
- Do any laws and regulations in Mexico (effective now or in future) require boiler efficiency levels or upgrades?
- Are these most relevant laws effectively enforced?
  - If some legal requirements do exist, but are not enforced, further data and analysis on how effectively certain laws are enforced will be necessary.



# Legal Requirements

- General Law on Climate Change:
  - PECC Action Plan's? Legally binding?
  - Carbon tax on fuels – doesn't explicitly require a reduction, but implicitly could encourage efficiency improvements, fuel switching
- NOM-002-ENER-1995 & NOM-012-ENER-1996:
  - Both identified as setting minimum efficiencies (Eficiencia térmica?), but these standards only apply to small ineligible boilers (<100KW)
- NOM-085-SEMARNAT-2011:
  - air pollution maximum levels of combustion emissions CO, SO<sub>2</sub>, Nox
  - ***What is the impact on GHGs?*** (Equipment substitution, fuel switch?)



# Voluntary Programs

- CONUEE: technical assistance, software tools, case studies, no funding
- PROFEPA: Environmental Audit Program
  - Voluntarily undergo an audit of BAU of a company, identifying opportunities for adjustments/improvements
  - Attain certification of: PROFEPA-02-001-02-002
- FIDE program: technical assistance and funding to small or medium (what MW?) boiler efficiency projects



## Section 3.5: Regulatory Compliance

- Project must be in material compliance with all applicable laws at all times during each reporting period
- Under this protocol, projects may be located at facilities in a wide range of sectors - subject to a wide range of regulations
  - The Reserve will consider including a list of key regulations in Appendix
- In the event of regulatory non-compliance
  - Project developers alert verifiers of non-compliance
  - Verifiers use their professional judgment to determine if non-compliance relates to project – Reserve does final review
  - Credits may not be issued for periods of non-compliance



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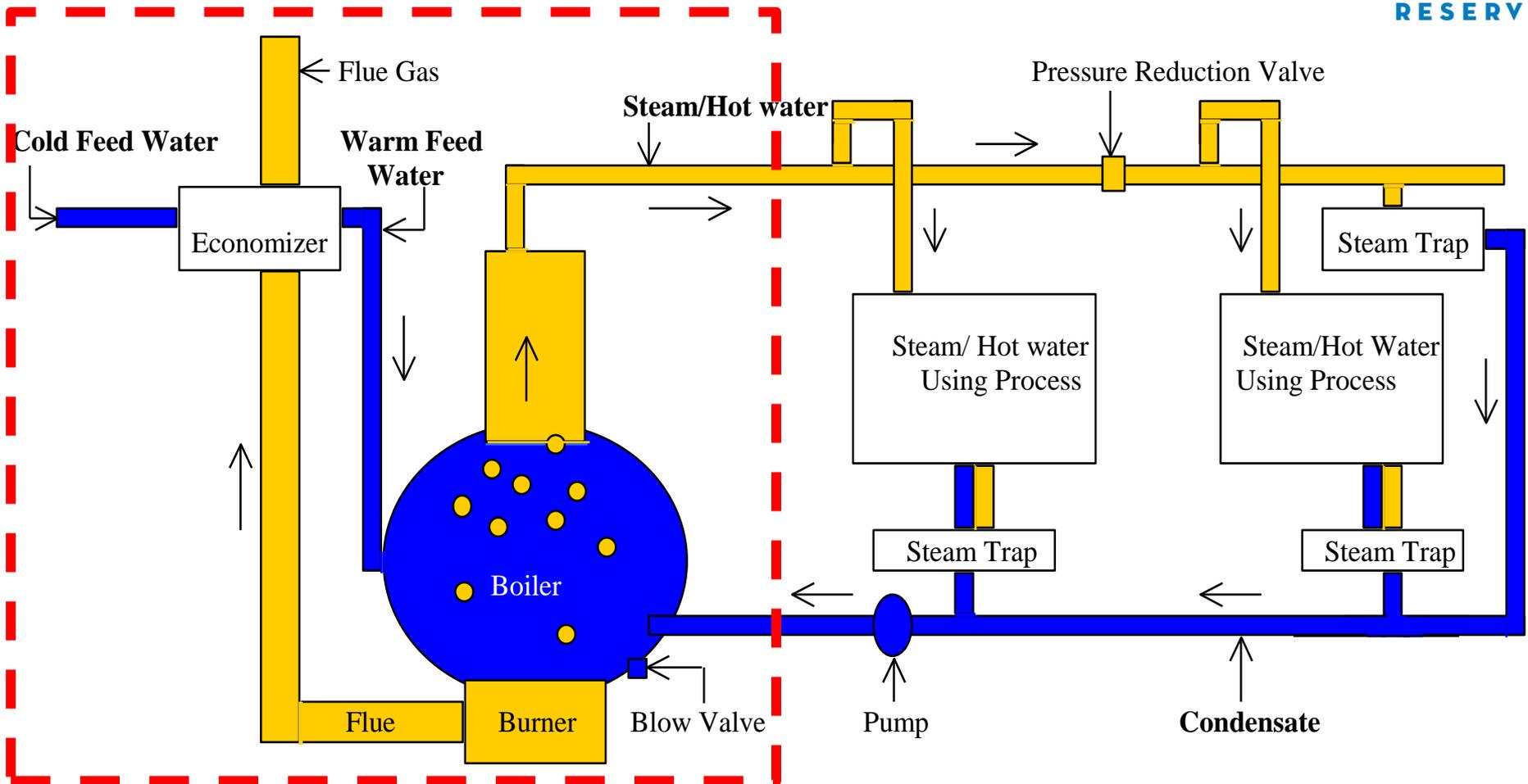
Item 5

# GHG / PROJECT BOUNDARY

# Project Diagram



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Source: EPA Climate Leaders Industrial Boiler Protocol (project boundary added)

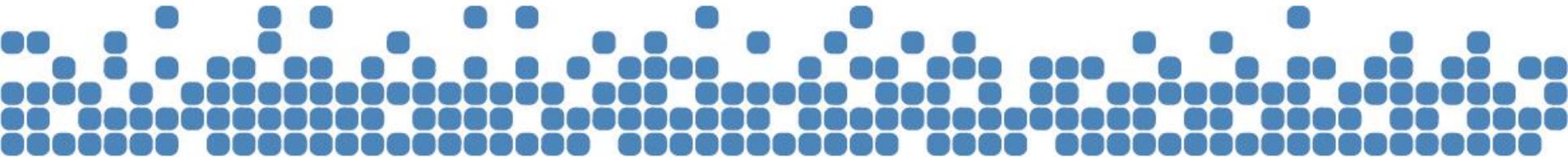
# Section 4: GHG Assessment Boundary



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We typically consider all sources, sinks, and reservoirs (SSRs), listing them in Table 4.1 of the protocol, then assess any material change between baseline and project for each SSR

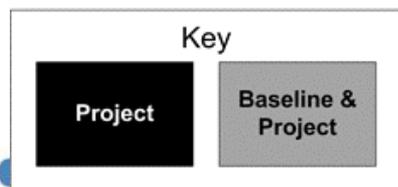
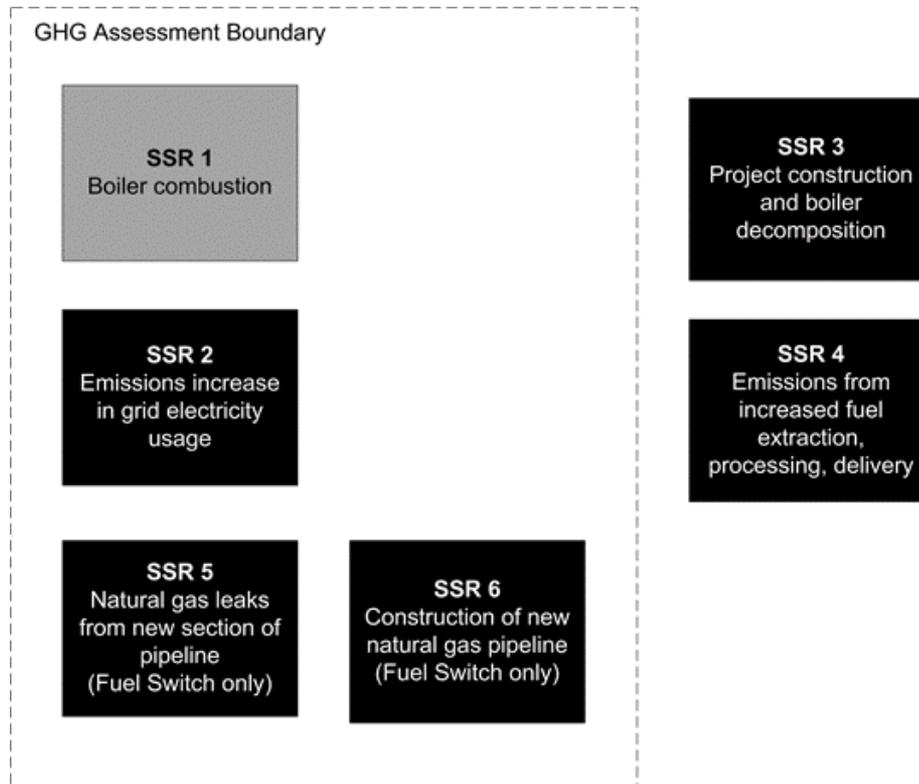
- **Source** = any process or activity through which a GHG is released into the atmosphere.
- **Sink / Reservoir** = something that takes up and stores a GHG.



# Section 4: GHG Assessment Boundary



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# Section 4: GHG Assessment Boundary



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SSR	Source Description	Gas	Included (I) or Excluded (E)	Baseline/ Project?
<b>1 Boiler combustion</b>	Emissions from fuel combustion at boiler, including emissions from incomplete combustion of fuels	CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> O	I E E	BL P
<b>2 Emissions increase from grid</b>	Indirect emissions associated to consumption of grid-electricity according to grid emission factor	CO <sub>2</sub>	I	P
<b>3 Project construction</b>	Project construction and emissions from decommissioning old boiler	CH <sub>4</sub> CO <sub>2</sub> N <sub>2</sub> O	E	P
<b>4 Emissions from fuel extraction, processing, delivery</b>	Facilities where fuel used undergoes extraction, processing and delivery	CH <sub>4</sub> CO <sub>2</sub> N <sub>2</sub> O	E	P
<b>5 Natural gas leaks from new sections of pipeline</b>	Natural gas leaks from new sections of natural gas distribution pipeline	CH <sub>4</sub>	I (Fuel switch projects only)	P
<b>6 Construction of new pipeline</b>	Emissions from construction of new sections of the natural gas pipeline	CH <sub>4</sub> CO <sub>2</sub> N <sub>2</sub> O	I (Fuel switch projects only)	P

# Efficiency Upgrade Steam Distribution Systems



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- Including steam distribution systems would extend assessment boundaries to the whole steam plant including steam users and condensate recovery systems
- Including such systems would also add complexity for baseline determination and especially for protocol monitoring requirements (which will likely extend beyond simply monitoring boiler output)
  - *Is it possible to cost effectively quantify and monitor such emission reductions? If so, how?*
- Given the different nature and effects of steam generation systems, they may need to be assessed separately from boilers (ie not included in this protocol)



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Item 6

# MONITORING & QUANTIFICATION



# Monitoring & Quantification

- A central theme of protocol development has been an emphasis on data availability
- Though significant data is often monitored and collected at a facility-level, it is unclear
  - What data is available and/or monitored at the facility-level?
  - What data available and/or monitored at the boiler-level?
  - What data could be monitored (but perhaps is not BAU to monitor) at a reasonable cost?
- Ultimately, we are trying to inform our decisions about what data needs to be monitored for quantification purposes
- The quantification methodology will ultimately depend on the availability of this data.



# Section 6: Monitoring

- This section establishes monitoring requirements, such as listing all key parameters which must be monitored, and the frequency of any required QA/QC for monitoring equipment
- ***Questions to consider***
  - What data needs to be monitored for quantification purposes?
  - What data needs to be monitored to demonstrate meeting other standards? (i.e. what is already required to be monitored?)
  - What type of QA/QC would be necessary?
  - Do any other components of the project/process need to be monitored?
- Goal: balancing practicality & cost with robust data needs



# Section 7: Reporting

- *Related questions to consider*
  - When we establish a requirement, what will the project need to report?
  - What kinds of evidence will make it easier for a verifier to confirm emission reductions?
- Goal: balancing practicality and cost with robust data needs



# Section 8: Verification

- Related questions to consider:
  - When we establish a requirement, always ask: How will this be verified?
  - Are there tools, methods, technologies a verifier can use to make verification more efficient?
  - How can we streamline process to keep costs down while maintaining level of assurance?
- Goal: balancing practicality and cost with robust data needs



# Section 5.1.1: Setting the Baseline

- Various options for setting the baseline exist – Reserve recommendations are based upon the PST options presented in the section 3.4.1
- For **new installations**, the baseline should be standardized and linked to the performance standard threshold.
- For **retrofits, fuel switching**, and potentially **early retirement** projects, the baseline should simply be a continuation of historic baseline emissions.
  - Setting baseline based on historic emissions is often the simplest approach
  - Requires availability of historic data
  - For early retirement projects – need to consider assumptions for what would have happened to the retired equipment (as did in choosing PST)

## **Questions for discussion:**

- Is it accurate to assume that historic emissions would continue in BAU? Or should we assume that a low rate of efficiency improvements is BAU?
- How much historic data is likely to be easily accessible?

# Section 5.2.1: Quantifying Project Emissions



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- Two quantification methods are initially presented for estimating project emissions from boiler systems.
- Reserve is seeking WG feedback on how practical each method is (in terms of data availability), and may ultimately decide to include one or more methodology in the protocol.
- **(1) fuel volume measurement** : would require a fuel heating value data (from fuel supplier? default?), AND combustion efficiency (IPCC default), AND either:
  - Direct fuel volume measurement (flow meter / project developer) OR
  - Dealer certified fuel volume measurement (invoice)
- **(2) direct stack CO<sub>2</sub> measurement** – could be used when either fuel volume or heating value data is not available. Likely to be much more expensive for PD, due to need for (new) monitoring equipment.



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Item 5

# QUESTIONS



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Item 6

# NEXT STEPS



# Next steps

- Phase 2: Staff and contractor will prioritize data collection and analysis through January; formal data request forthcoming
  - If you have access to data that may be helpful here, please follow up with us after today's meeting.
- We will contact individuals or the group as we have questions along the way
- We ask that workgroup members provide written comments on the draft protocol, memo, and today's meeting. Please provide us these comments by October 16<sup>th</sup>.
- Periodic updates will be provided during Phase 2.



# Next steps

- During Phase 2, Reserve staff will continue working on the protocol draft.
- A revised Workgroup Draft of the Protocol will be distributed in January for review
- The next WG meeting will likely take place January/February, after the next Workgroup Draft of the Protocol is distributed.

# Protocol Development Timeline

*This schedule is subject to change.*



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Milestone/Task	Timeline
Phase 1:	May – September 2015
Protocol drafting	May – September 2015
1 <sup>st</sup> Workgroup meeting (webinar)	July 9, 2015
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Public comment period	April / May 2016
Protocol presented to Reserve Board	June 2016



# Contact Information

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# OTHER ISSUES??