



CLIMATE
ACTION
RESERVE

Developing Mexico Boiler Efficiency and Mexico ODS Projects

January 12, 2017



Agenda

En Español:

- 9:00 am PT: Introducciones a la Reserva y bonos carbonos de la Reserva en México
- 9:10 am PT: Eficiencia de Calderas en México
- 9:50 am PT: SAO en México
- 10:20 am PT: Preguntas Y Respuestas
- 10:30 am PT: Conclusión de la parte del webinar en español

In English:

- 10:30 am PT: Introduction to the Reserve & Reserve carbon offsets in Mexico
- 10:40 am PT: Mexico Boiler Efficiency
- 11:20 am PT: Mexico ODS
- 11:50 am PT: Question & Answer
- 12:00 pm PT: Conclusion of Webinar



Reserve Offsets in Mexico

- Climate Action Reserve is an environmental non-profit organization and carbon offset registry serving the US, Mexican, and Canadian markets and encouraging voluntary action to reduce greenhouse gas (GHG) emissions.
- In Mexico, the Reserve has adopted 5 carbon offset protocols for use in the voluntary market [agriculture, waste, forest and energy/ industrial sectors]
 - Mexico Livestock Project Protocol (2009)
 - Mexico Landfill Project Protocol (2009)
 - Mexico Forest Project Protocol (2013)
 - Mexico Ozone Depleting Substances Project Protocol (2015)
 - Mexico Boiler Efficiency Project Protocol (2016)



Reserve Offsets in Mexico

Key stakeholders in a carbon market

- Carbon offset project developers
 - May be facility owners themselves or 3rd party specialist project developers
- Verifiers – third party auditor of project emission reductions
- Carbon offset exchange / registry – ie MexiCO2 / Climate Action Reserve
- Carbon offset buyers
 - In compliance market: Regulated entities with a compliance obligation
 - In voluntary market: Companies and individuals seeking to voluntarily offset their emissions
- Traders – buy and sell carbon offsets on the exchange
- Government regulators
 - Rules to specifically create a carbon market or indirectly encourage emission reductions
 - General regulations affecting industries in which carbon projects operate



Reserve Offsets in Mexico: Verification

- To maintain integrity, 3rd party verification is an important part of most offset programs
- In the Reserve program, 3rd party verifiers must be accredited by ANSI and the Reserve for the project type
- In addition to the Reserve's Verification Program Manual, which includes program wide verification guidance, the Reserve also includes a Verification section (Section 8) in each Reserve protocol, which provides guidance for verifier and project developer on best practices for how to verify each specific project type
 - Includes guidelines for verifying eligibility criteria, quantification, records, monitoring plan, also where a verifier may use professional judgement and site visit requirements
 - Verification requirements must balance high cost / highly accurate measurements that might provide “absolute” assurance vs. sufficient evidence to verify to “reasonable” level of assurance
- To reduce project costs the Reserve:
 - Joint verifications (verification of multiple projects at a single site)
 - Use of standardized documentation
 - Develops and promotes the use of various specific tools to assist with project quantification (e.g. CONUEE tool for MX Boilers)
 - Exploring the use of verifiers accredited by EMA in Mexico (pilot for Mexico Forestry ongoing)

<http://www.climateactionreserve.org/how/verification/how-to-become-a-verifier/>



Project Lifecycle



<http://www.climateactionreserve.org/open-an-account/>
<http://www.climateactionreserve.org/how/projects/register/>



Protocol Organization

1. Introduction
2. Project Definition
3. Eligibility Rules
4. GHG Assessment Boundary
5. Quantification Methodology
6. Monitoring
7. Reporting
8. Verification
9. Glossary of Terms
 - Appendices



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Developing Mexico Boiler Efficiency Projects

Section 2: Project Definition



The GHG reduction project is defined as the implementation of eligible project activities at an eligible boiler or group of eligible boilers, located at a single facility or project site.

- Eligible boiler equipment is defined in Section 2.2.1 – includes requirement to have rated capacity of 9.8 MW (33.5 MMBtu/h) or greater
- Eligible project activities are defined in Section 2.2.2

Section 2.2.2: Eligible Project Activities



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- Retrofitting existing boilers
 - Eligible
- Installing new high-efficiency boilers
 - Eligible but with some restrictions
- Fuel switching
 - Allowable to take place simultaneous to project
 - However, not an eligible project activity (will not receive CRTs)



Section 2.2.2: Eligible Project Activities

Retrofitting existing boilers.

The project retrofits an existing boiler, installing one or more new efficiency improvement technologies to the existing boiler.



Section 2.2.2: Eligible Project Activities

Installing new high-efficiency boilers. The project installs a new boiler that demonstrates greater efficiency than conventional alternatives.

- Existing boiler (that is replaced):
 - Must not exceed 35 years of age (discussed in section 3.4.1 re PST)
 - Older boilers still eligible as retrofit project
 - May be retired or dismantled and sold for parts
 - May not be used to facilitate a capacity expansion at the project site or facility.



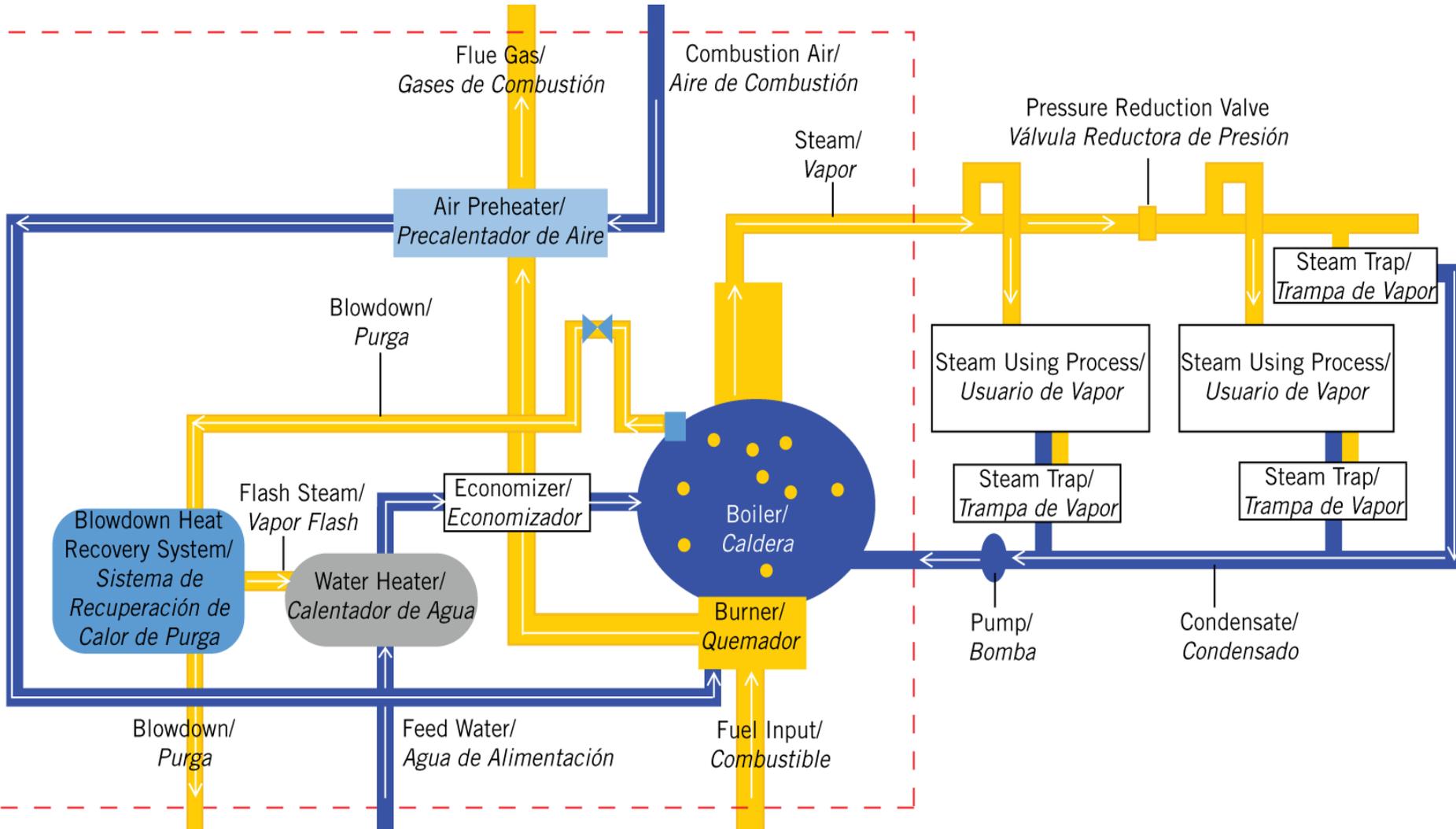
Section 2.2.2: Eligible Project Activities

Fuel switching.

- Allowable to take place simultaneous to other eligible project activities
- However, not an eligible project activity (will not receive CRTs)
- Assumption that numerous factors in Mexico are already driving desire to switch fuels
- In quantification of emission reductions, must use fuel emission factor for the fuel used in the project scenario for both the baseline and project



Project Boundary Diagram (Figure 2.1)





Section 3: Eligibility Rules

3.1 Location = in Mexico

3.2 Start Date

- Defined as a date, selected by the project developer, no more than 6 months (i.e. during the initial start-up period) after the date in which the boiler with improved efficiency and the associated steam generation system becomes operational (i.e., resumes or enters operation and begins generating outputs such as steam)

Section 3: Eligibility Rules



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3.3 Crediting Period

- Projects get a single 10 year crediting period

3.4.2 Legal Requirement Test

- Project activities must not be legally required

3.5 Regulatory Compliance

- Projects must be in compliance with all laws at all times during the reporting period

Section 3.4.1: Performance Standard

- Projects pass the Performance Standard Test (PST) by meeting a performance threshold, i.e. a standard of performance applicable to all boiler efficiency projects that screens out non-additional projects
- The performance threshold represents a level of energy efficiency that is beyond business-as-usual compared to existing boilers
- The performance standard is designed to be part of the eligibility criteria of the protocol: if a project meets the performance standard, it is automatically considered additional and eligible (so long as other eligibility criteria are met)



Performance Standard (Section 3.4.1)

Performance Standard for all projects: Applied to the existing boiler once the project activities have been implemented.

Boiler Capacity	Performance Threshold
Boilers 9.8 to 100 MW (33.5 –341.4 MMBtu/h)	80.5%
Boilers 100 MW or greater (>341.4 MMBtu/h)	82%

Additional Performance Standard for new boiler projects:
Maximum age of existing boiler (to-be-replaced) = 35 years

Appendix A: Data Analysis to Inform Performance Standard

Existing steam boiler data Mexico:

- No comprehensive public / official data on boiler efficiency
- Dated / limited previous surveys

Engaged in primary data gathering

- Confidentiality
- No industry standard for record keeping
- Limited time / budget
- Need representative sample

Section 4: GHG Assessment Boundary

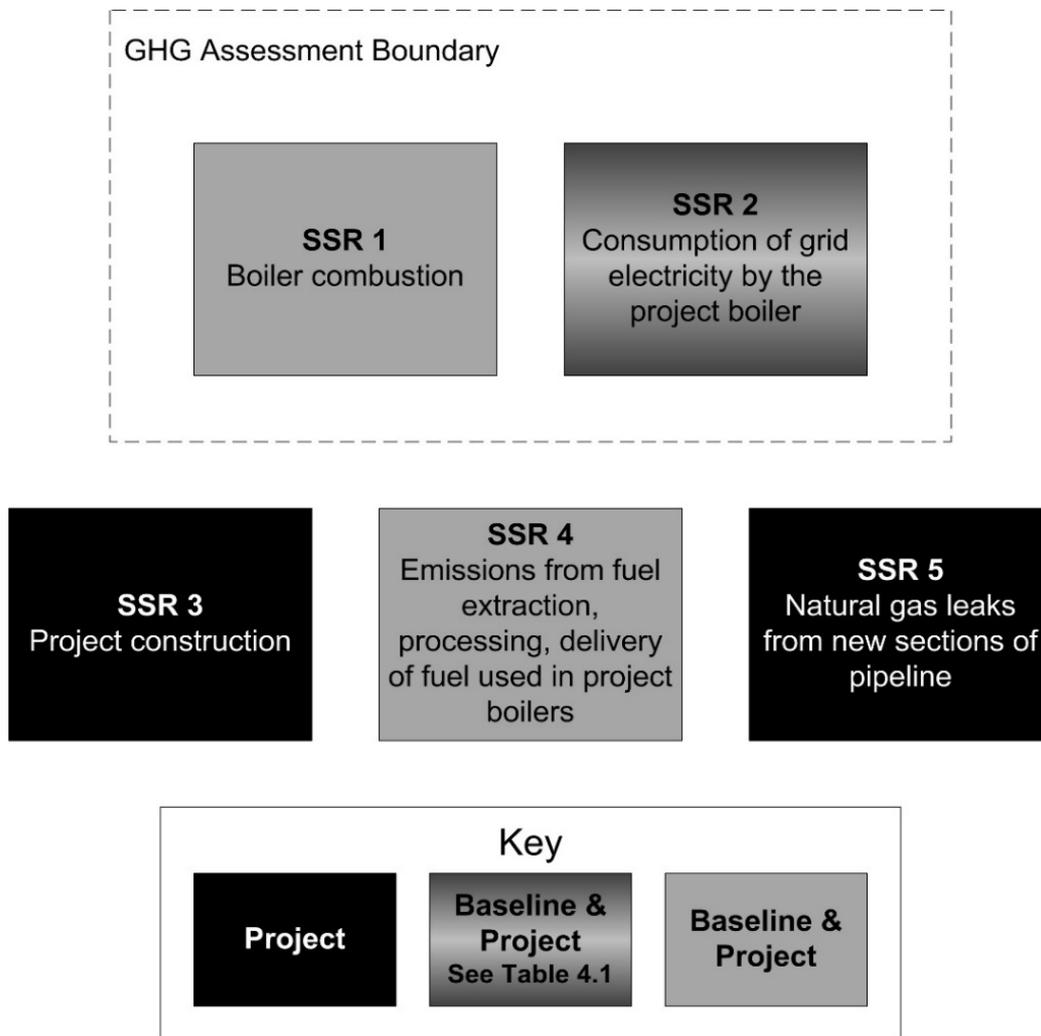


Figure 4.1. General Illustration of the GHG Assessment Boundary



Section 5: Quantification

- Organized as a step-by-step inductive procedure to guide required calculations
- Basic equation driving development of proposed quantification method:

$$ER = BE - PE$$

Where:

ER = Emission reductions

BE = Baseline emissions

PE = Project emissions



Section 5: Quantification

- Key issues worth noting:
 - Mechanism to allow for fuel switch without crediting:
 - If fuel switch to lower carbon intensity fuel, must use fuel emission factor for the fuel used in the project scenario for both the baseline and project
 - Options for calculating boiler fuel efficiency: Indirect method vs. direct method
 - Electricity emissions (Optional, unless emissions increase)

$$ER = BE - PE$$

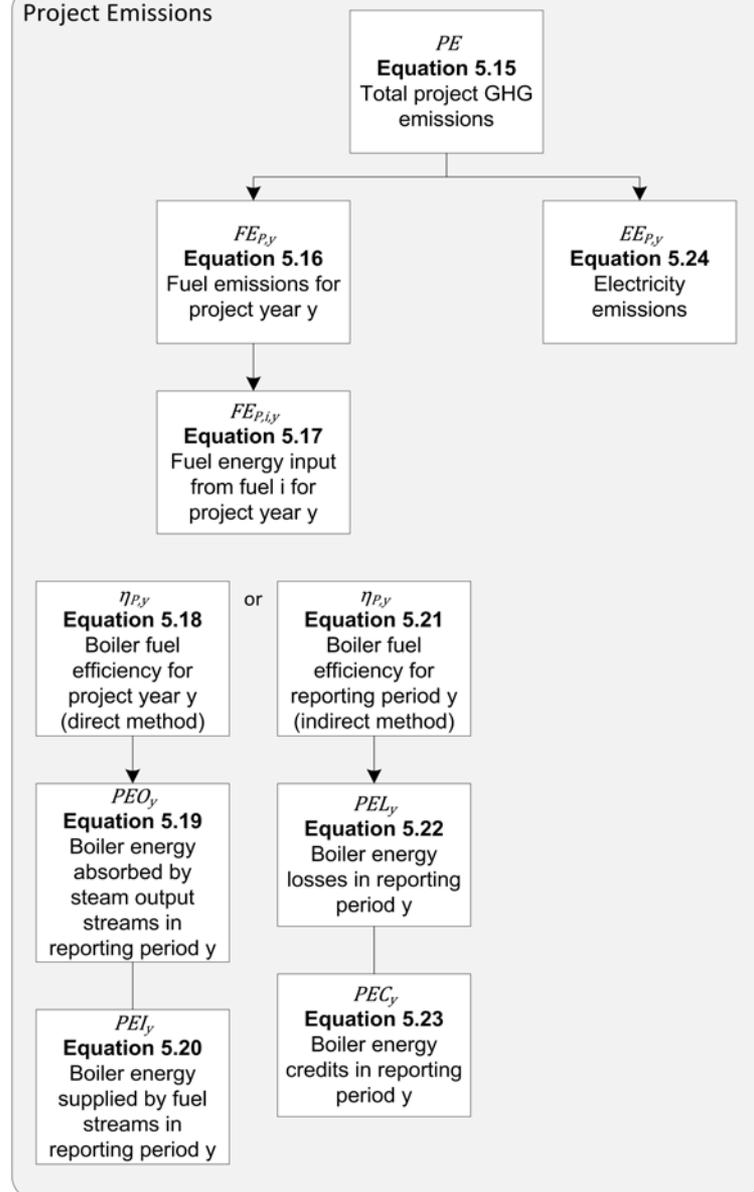
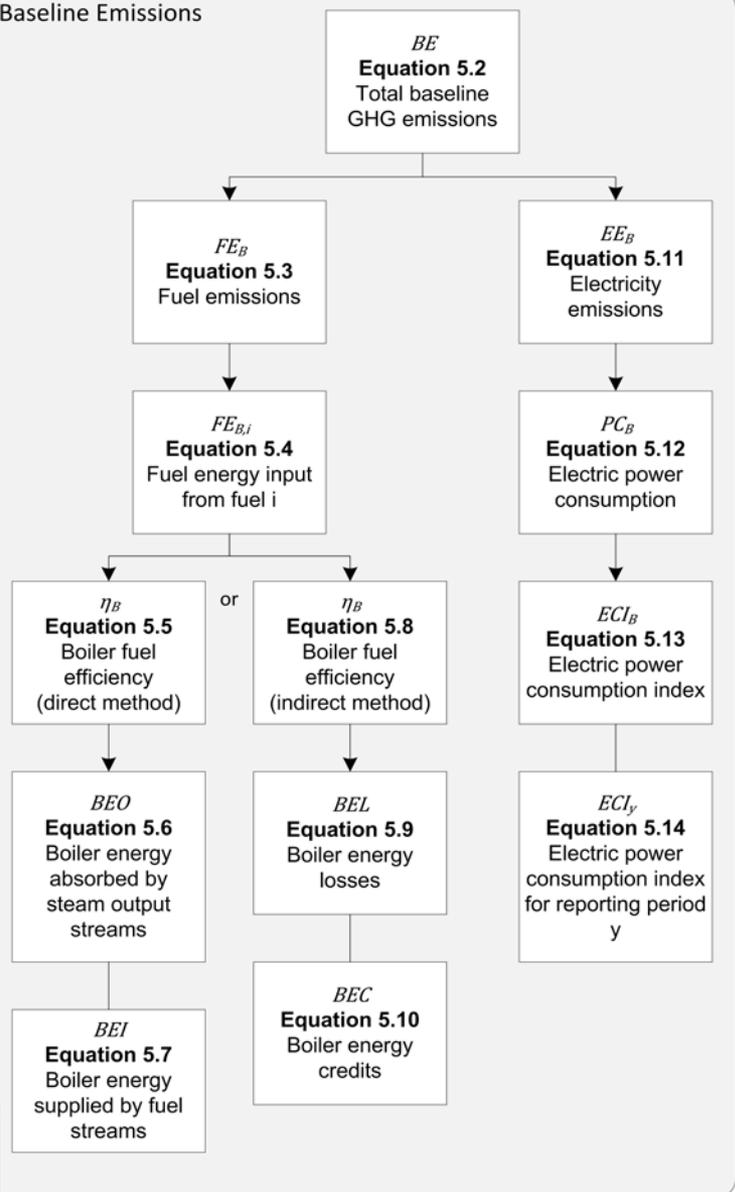
Equation 5.1
Emission reductions

Baseline Emissions

Project Emissions

Methodological Flow

Calculations flow





Section 5: Quantification

Boiler efficiency approach choice:

Efficiency Approach	Advantages	Disadvantages
Direct Method (Input-Output)	<ul style="list-style-type: none">• Direct measurement of primary parameters• Fewer measurements and calculations• No unmeasurable losses estimation required	<ul style="list-style-type: none">• Uncertainty highly affected by primary parameter measurement accuracy• Does not allow for efficiency corrections• No identification of loss sources
Indirect Method (Energy Balance)	<ul style="list-style-type: none">• Accurate measurement of primary parameters• Reduced uncertainty• Errors in secondary data minimal• Identification of loss sources• Allows for efficiency corrections	<ul style="list-style-type: none">• Incremented monitoring requirements• Some unmeasurable losses must be estimated• Does not yield automatic capacity/output data



CONUEE Boiler Efficiency Tool

- CONUEE developed a tool intended for general industry use in 2002
- Tool is a simplified version of ASME PTC 4.1
 - Based on ASME PTC 4-2013
 - More featured calculations, suitable for all kinds of boiler systems
 - Choice of direct / indirect method
 - Includes default values and reference data and heating value calculation tool
 - User-friendly platform
 - Now available

Comisión Nacional para el Uso Eficiente de la Energía

I.1.4 Protocol for the Use of the Calculation Tool

January 2017

I.1.4 Protocol for the Use of the Calculation Tool

<http://www.gob.mx/conuee/acciones-y-programas/empresas-energeticas-descripcion-de-la-herramienta-computacional-cuantificacion-de-la-eficiencia-energetica-en-generadores-de-vapor-a-fuego-directo?state=published>

Para utilizar la herramienta y obtener los resultados de la evaluación de su caldera, debe seguir las siguientes instrucciones:

1. Download the tool on your computer. The tool is downloadable and is in [Section I.1.5.a.](#)

Empresas energética -Herramientas computacionales-

Sección dedica a presentar las diferentes herramientas computacionales.

<http://www.gob.mx/conuee/acciones-y-programas/empresas-energetica-herramientas-computacionales?state=published>

herramienta electrónica con las características de cálculo que se establecen en el Código ASME PTC 4-2013.

I.1.2 Alcance

I.1.3 Protocolo de Calderas en México

I.1.4 Protocolo para el uso de la herramienta de cálculo

I.1.5.a Herramienta Computacional (Hoja de cálculo descargable) y

I.1.5.b Archivo "Datos de responsable (Hoja de Excel descargable)

I.1.6 Manual de Usuario

I.1.7 Asesoría técnica

2. Save the file by renaming it.

CONUEE Tool Example 6.2 vfinal PTC 4-2013 v-5 protegida (14-11-16) c.xlsxm

Open with Google Sheets

Download icon highlighted with a red box and an arrow pointing to the text "Select Download file."

Balance de Energía de Generador de Vapor

QrF
Energía en combustible (química)

- QpBDA Aire seco
- QpBWA Humedad en aire de combustión
- QpBF Calor sensible en combustible
- QpBSIF Sulfatación
- QrBX Potencia de equipo auxiliar
- QrBSb Calor sensible en absorbente (sorbente)
- QrBWAd Energía suministrada en humedad adicional

QpB
Créditos de Energía

QrD
Salida de Energía

- Vapor principal
- Vapor auxiliar y purga
- Agua para desobrecalentador y bomba de circulación
- Agua de alimentación
- Vapor recalentado
- Agua para desobrecalentador
- Vapor frío a recalentamiento

QpL
Pérdidas de Energía

- QpLDFg Gases secos
- QpLH2F Agua por combustión de H₂
- QpLWF Agua en combustible líquido o sólido
- QpLWvF Vapor de agua en combustible gaseoso
- QpLWA Humedad en aire
- QpLSmUb Sumatoria de combustible no quemado
- QpLPr Rechazos de pulverizador
- QpLUBHc Hidrocarburos no quemados en gases
- QpLRS Calor sensible en residuo
- QpLAq Equipo de control de calidad de aire caliente
- QpLALg Infiltración de aire
- QpLNOx Formación de NOx
- QpLRSr Radiación y convección de superficies
- QpLWAd Humedad adicional
- QpLCh Calcínación y deshidratación de absorbente
- QpLWSb Agua en absorbente
- QpLAp Foso de ceniza húmeda
- QpLRy Corrientes recicladas
- QpLCw Agua de enfriamiento

Guardar como

Documentos > Mis documentos > RESPALDO CONAE > Documentos Trabajo Jorge

Biblioteca Documentos

F - L (29)

- Generacion Distribuida
- Gestion Documentos Direccion Adjunta
- Gestion Energetica UNE216301
- GRANDES CORPORATIVOS
- Grandes Corporativos 2013
- Guia cogeneracion
- Herramienta CFD (CD)
- ICE 2010
- ICEs PTQ 2015, 2do Trim
- Industria

M - R (44)

- INF TECNICA VARIADA
- Informacion Tecnica
- infortecdavid
- Inglés
- ISO 50001
- JICA-CONUEE
- Jorge
- Justificantes
- LEY

Motores

Calderas Eficiencia

Nombre: CONUEE Caldera de prueba 1

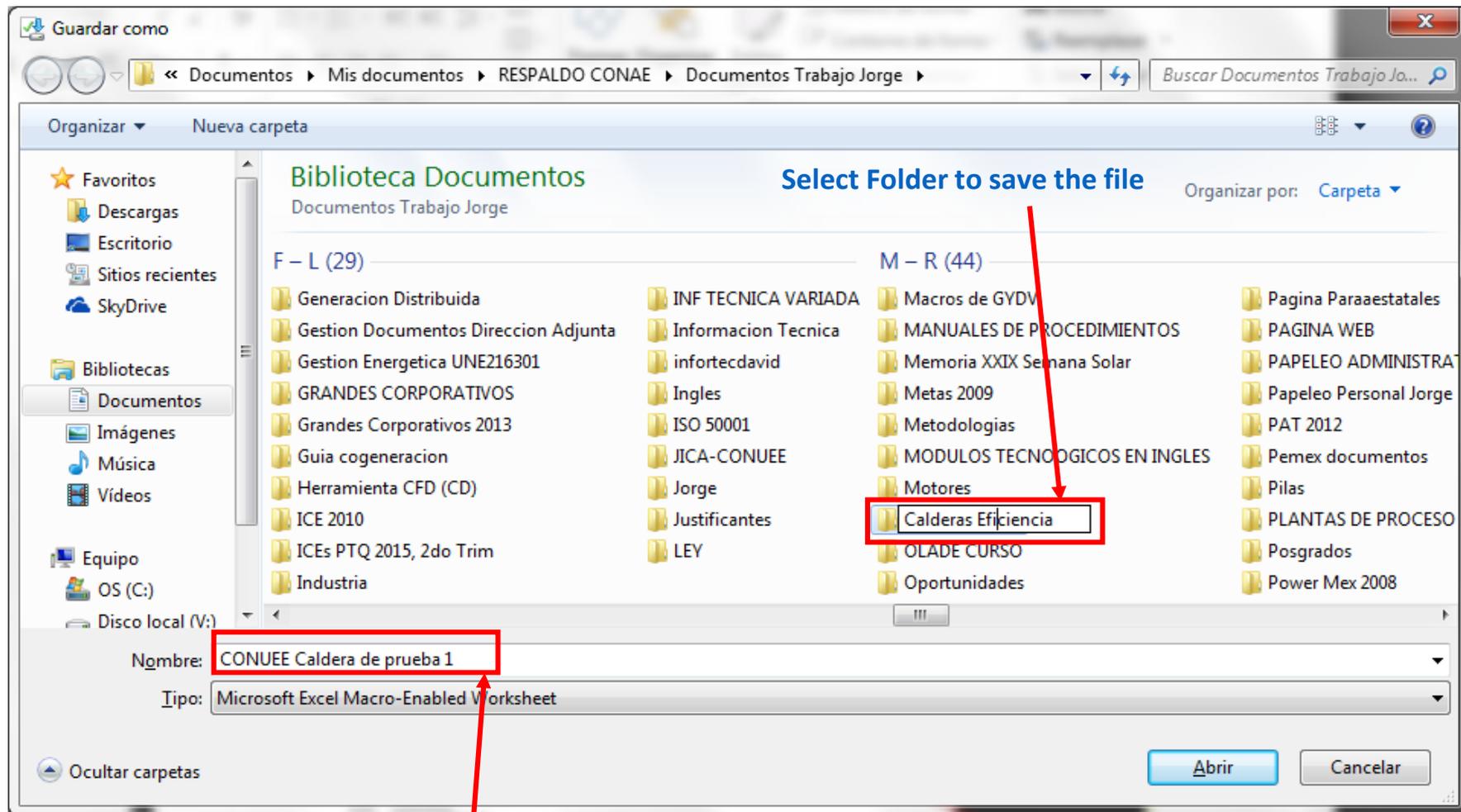
Tipo: Microsoft Excel Macro-Enabled worksheet

Save file to selected folder and rename

¿Quieres guardar CONUEE Tool Example 6.2 vfinal PTC 4-2013 v-5 protegida (14-11-16) c.xlsxm (588 KB) desde doc-10-3c-docs.googleusercontent.com?

Guardar Cancelar

2. Save the file by renaming it.



Change the file name.

3. Capture the requested information for the calculation method that you want to apply in the evaluation of your equipment. It is recommended to consult the user manual to prepare the information required by each method.

The screenshot displays the Microsoft Excel interface with a spreadsheet titled 'CONUEE Tool Example 6.2.vfinal PTC 4-2013 v-5 protegida (14-11-16) c - Excel'. The spreadsheet is organized into columns A through R and rows 13 through 50. It contains two main sections: 'QrO Salida de Energía' (Energy Output) and 'QpI Pérdidas de Energía' (Energy Losses). The 'QrO' section includes a dashed box labeled 'Límite de Envolvente' (Envelope Limit) and lists various energy flows such as 'Vapor principal', 'Vapor auxiliar y purga', 'Agua para desobrecalentador y bomba de circulación', 'Agua de alimentación', 'Vapor reheated', 'Agua para desobrecalentador', and 'Vapor frío a recalentamiento'. The 'QpI' section lists losses like 'Gases secos', 'Agua por combustión de H₂', 'Agua en combustible líquido o sólido', 'Vapor de agua en combustible gaseoso', 'Humedad en aire', 'Sumatoria de combustible no quemado', 'Rechazos de pulverizador', 'Hidrocarburos no quemados en gases', 'Color sensible en residuo', 'Equipo de control de calidad de aire', 'Infiltración de aire', 'Formación de NOx', 'Radiación y convección de superficies', 'Humedad adicional', 'Calcinación y deshidratación de', 'Agua en absorbente', 'Foso de ceniza húmeda', 'Corrientes recicladas', 'Agua de enfriamiento', and 'Serpentina de recalentador de aire con'. A red-bordered dialog box titled 'Abrir archivo' (Open file) is overlaid on the right side of the spreadsheet. It contains two radio buttons: 'Archivo Nuevo' (New file) and 'Archivo Existente' (Existing file), and an 'Abrir' (Open) button at the bottom. A green arrow points from the 'Abrir archivo' dialog box to the 'Método de Entradas y Salidas' (Input and Output Method) box in the spreadsheet.

- Open the file
- Indicate whether the file is new or existing

CONUEE Tool Example 6.2 vfinal PTC 4-2013 v-5 protegida (14-11-16) c - Excel

Jorge Tamayo Ochoa

ARCHIVO INICIO INSERTAR DISEÑO DE PÁGINA FÓRMULAS DATOS REVISAR VISTA EnPI

Calibri 11 Fuente Alineación Número Estilos

Normal 2 Normal Buena Incorrecto Neutral Cálculo

Insertar Eliminar Formato Celdas

Autosuma Rellenar Borrar Ordenar y filtrar Buscar y seleccionar Modificar

L27

A B C D E F G H I J K L M N O P Q R

13 ← QrBSb Color sensible en absorbente (sorbenente)
 14 ← QrBWAd Energía suministrada en humedad

17 Límite de Envolverte

18 → Vapor principal
 19 → Vapor auxiliar y purga
 20 → Agua para desobrecalentador y bomba de circulación
 21 → Agua de alimentación

25 → Vapor recalentado
 26 → Agua para desobrecalentador
 27 → Vapor frío a recalentamiento

30 QrO Salida de Energía Método de Entradas y Salidas

31 → QpLDFg Gases secos
 32 → QpLH2F Agua por combustión de H₂
 33 → QpLWF Agua en combustible líquido o sólido
 34 → QpLWvF Vapor de agua en combustible gaseoso
 35 → QpLWA Humedad en aire
 36 → QpLSmUb Sumatoria de combustible no quemado
 37 → QpLPr Rechazos de pulverizador
 38 → QpLUbHc Hidrocarburos no quemados en gases
 39 → QpLRs Color sensible en residuo
 40 → QpLAq Equipo de control de calidad de aire
 41 → QpLALg Infiltración de aire
 42 → QpLNOx Formación de NOx
 43 → QrLsrc Radiación y convección de superficies
 44 → QrLWAd Humedad adicional
 45 → QrLCih Calcínación y deshidratación de
 46 → QrLWSb Agua en absorbente
 47 → QrLAp Fosa de ceniza húmeda
 48 → QrLRy Corrientes recicladas
 49 → QrLCw Agua de enfriamiento
 50 → QrLAc Serpentin de arocalentador de aire con

QpL Pérdidas de Energía Método de Créditos y Pérdidas

Datos de la instalación

Localidad

Centro de Trabajo

TAG Equipo

Potencia Máxima (kW)

Potencia Nominal (kW)

Registrar

03:28 p.m. 10/01/2017

- Provide the data for the facility.

CONUEE Tool Example 6.2 vfinal PTC 4-2013 v-5 protegida (14-11-16) c - Excel

Jorge Tamayo Ochoa

ARCHIVO INICIO INSERTAR DISEÑO DE PÁGINA FÓRMULAS DATOS REVISAR VISTA EnPI

Calibri 11 Fuente Alineación Número Estilos

Normal 2 Normal Buena Incorrecto Neutral Cálculo

Formato condicional Dar formato como tabla Insertar Eliminar Formato Celdas

Autosuma Rellenar Ordenar y filtrar Buscar y seleccionar Modificar

L27

A B C D E F G H I J K L M N O P Q R

13 ← QrBSb Color sensible en absorbente (sorbenste)

14 ← QrBWAd Energía suministrada en humedad

15

16

17 Límite de Envolverte

18 → Vapor principal

19 → Vapor auxiliar y purga

20

21 → Agua para desobrecalentador y bomba de circulación

22 → Agua de alimentación

23

24

25 → Vapor recalentado

26 → Agua para desobrecalentador

27 → Vapor frío a recalentamiento

28

29

30

31 → QpLDFg Gases secos

32 → QpLH2F Agua por combustión de H₂

33 → QpLWF Agua en combustible líquido o sólido

34 → QpLWvF Vapor de agua en combustible gaseoso

35 → QpLWA Humedad en aire

36 → QpLSmUb Sumatoria de combustible no quemado

37 → QpLPr Rechazos de pulverizador

38 → QpLubHc Hidrocarburos no quemados en gases

39 → QpLRs Color sensible en residuo

40 → QpLAq Equipo de control de calidad de aire

41 → QpLALg Infiltración de aire

42 → QpLNOx Formación de NOx

43 → QrLSrc Radiación y convección de superficies

44 → QrLWAd Humedad adicional

45 → QrLCih Calcificación y deshidratación de

46 → QrLWSb Agua en absorbente

47 → QrLAp Foso de ceniza húmeda

48 → QrLRy Corrientes recicladas

49 → QrLCw Agua de enfriamiento

50 → QrLAc Serpentin de arocalentador de aire con

QrO Salida de Energía

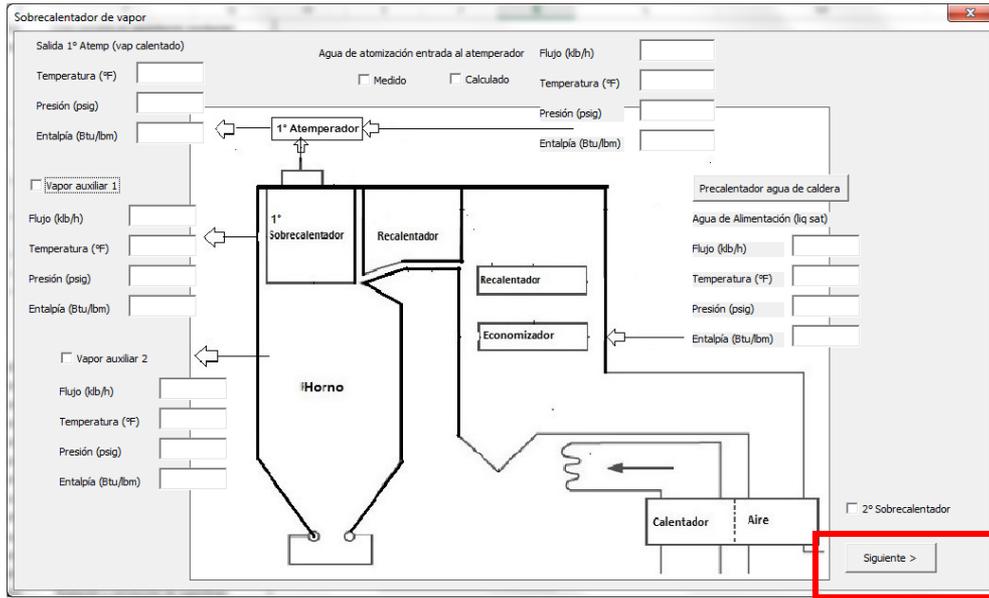
Método de Entradas y Salidas

QpL Pérdidas de Energía

Método de Créditos y Pérdidas

- Select the calculation method.

Direct Method (Input-Output)



Continue capturing the requested information according to the selected calculation method.

Indirect Method (Energy Balance)

Tipo de combustible

Eficiencia Energética en Calderas Industriales

Gas combustible

Gasoleo

Carbon

Iniciar

Composición combustible

CH4	<input type="text"/>	N2	<input type="text"/>
C2H2	<input type="text"/>	NH3	<input type="text"/>
C2H4	<input type="text"/>	CO	<input type="text"/>
C2H6	<input type="text"/>	CO2	<input type="text"/>
C3H6	<input type="text"/>	SO2	<input type="text"/>
C3H8	<input type="text"/>	H2	<input type="text"/>
C4H8	<input type="text"/>	H2S	<input type="text"/>
C4H10	<input type="text"/>	H2O (humedad del combustible)	<input type="text"/>
C5H12	<input type="text"/>	O2	<input type="text"/>
C6H6	<input type="text"/>		
C6H14	<input type="text"/>		
C7H8	<input type="text"/>		
C8H10	<input type="text"/>		
C10H8	<input type="text"/>		

Total

Siguiete >

4. The information capture must be completed every time you use the tool; the tool does not save partial information
5. When you finish your capture, save the file to your computer
6. Capture the following data in the file [“Datos de responsable”](#) which is found in [Section I.1.5.b.](#)

<http://www.gob.mx/conuee/acciones-y-programas/empresas-energetica-herramientas-computacionales?state=published>

herramienta electrónica con las características de cálculo que se establecen en el Código ASME PTC 4-2013.

I.1.2 Alcance

I.1.3 Protocolo de Calderas en México

I.1.4 Protocolo para el uso de la herramienta de cálculo

I.1.5.a Herramienta Computacional (Hoja de cálculo descargable) y

I.1.5.b Archivo “Datos de responsable (Hoja de Excel descargable)

I.1.6 Manual de Usuario

I.1.7 Asesoría técnica

File “Datos de Responsable”

Datos de Responsable.xlsx

Open with Google Sheets

Download icon (highlighted with a red box)

Select Download file.

	A	B	C	D	E	F
1		Protocolo de Eficiencia de Calderas en México				
2						
3		REGISTRO DE LA CALDERA				
4						
5		CALDERA (DATOS Y DIRECCIÓN)				
6	Nombre de La Empresa / Centro de Trabajo / Instalación Industrial:					
7	Dirección:					
8	Identificación del equipo:					
9	Potencia Máxima / Nominal (kW):					
10						
11		RESPONSABLE				
12	Nombre del Responsable:					
13	Telefono (LADA) y ext.:					
14	Correo Electrónico:					
15						
16						
17						
18						
19						
20						

Guardar como

Documentos > Mis documentos > RESPALDO CONAE > Documentos Trabajo Jorge

Biblioteca Documentos

Organizar por: Carpeta

F - L (29)

- Generacion Distribuida
- Gestion Documentos Direccion Adjunta
- Gestion Energetica UNE216301
- GRANDES CORPORATIVOS
- Grandes Corporativos 2013
- Guia cogeneracion
- Herramienta CFD (CD)
- ICE 2010
- ICES PTQ 2015, 2do Trim
- Industria

M - R (44)

- INF TECNICA VARIADA
- Informacion Tecnica
- infotecdavid
- Inglés
- ISO 50001
- JICA-CONUEE
- Jorge
- Justificantes
- LEY

Motors

Calderas Eficiencia (highlighted with a red box)

Nombre: CONUEE Caldera de prueba 1

Tipo: Microsoft Excel Macro-enabled worksheet

Abrir Cancelar

Save file in the selected folder and change name.

¿Quieres guardar Datos de Responsable.xlsx (10.0 KB) desde doc-0g-3s-docs.googleusercontent.com?

Guardar

Cancelar

Capture the requested information and save the file.

7. Send both files to the contacts listed below.

Caldera BA-501.xls

Responsable de Caldera BA-501.xls

Contact Information:

Ing. María de los Ángeles Peña Sánchez

Director of management programs in the energy sector

e-mail: angeles.pena@conuee.gob.mx

Tel: (01) (55) 30 00 10 00 ext. 1212

Ing. Salvador Mendoza Camacho

Deputy director of savings programs in the hydrocarbons sector

e-mail: salvador.mendoza@conuee.gob.mx

Tel: (01) (55) 30 00 10 00 ext. 1224

Ing. Jorge Tamayo Ochoa

Head of Department of facilities assistance

e-mail: jorge.tamayo@conuee.gob.mx

Tel: (01) (55) 30 00 10 00 ext. 1222

8. The information will be processed by the technical staff of CONUEE and the results will be sent through the same email sent.



Section 6: Monitoring Requirements

- Much depends on data available to Project Developers – as well as tools and methods for quantification
- Need Monitoring Plan – outlining all monitoring / reporting activities required for project
 - Specifies how data will be collected & recorded; how frequently
 - Quality Assurance/Quality Control (QA/QC) provisions for equipment
 - Frequency of instrument maintenance – calibration – qualifications of persons working on/with such equipment



Section 6: Monitoring Requirements

Critical parameters to be measured dependent on efficiency determination approach:

- Direct method:
 - Steam flow, pressure and temperature
 - Fuel flow and Heating Value
- Indirect method:
 - Flue gas analysis and temperature



Section 7: Reporting

Reporting requirements standardized for consistency / transparency

- Emission reductions must be reported and verified annually at minimum
- Record keeping of data: Project developers must maintain records and provide them to verifier
 - Must keep all primary data – not just monthly summaries
 - Copies of all permits – correspondence with regulators, etc.
 - Fuel / electricity use records, etc.
- Standard reporting documentation used at project submittal and each reporting period when seeking issuance of credits
- Joint project reporting & verification allowed where multiple projects are located at a single project site or facility. Provides economies of scale



Section 8: Verification

Provides guidance for the verifier and project developer on best practices for how to verify the boiler efficiency project

- Guidelines for verifying eligibility criteria, quantification, records, monitoring plan, and where a verifier may use professional judgement
- Site visit requirements
- Guidelines for joint verifications (verification of multiple projects at a single site – economies of scale)
- Currently, verifiers required to be accredited with ANSI and the Reserve. (In future, may expand to allow verifiers accredited with EMA (not just ANSI))
- Verification requirements must balance high cost / highly accurate measurements that might provide “absolute” assurance vs. sufficient evidence to verify to “reasonable” level of assurance
 - Are there tools or methods that might reduce cost / improve efficiency?
 - Use of CONUEE Tool, for example, might ease verification



Questions?



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<http://www.climateactionreserve.org/how/protocols/mexico-boiler-efficiency>



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Developing Mexico Ozone Depleting Substances Projects

Section 2: Project Definition and Eligible ODS



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- Any set of activities undertaken by a single project developer resulting in the destruction of eligible ODS at a single destruction facility within a 12-month period
- Refrigerants eligible for destruction will be the same as those eligible in Reserve's Article 5 Protocol
- Specifically:
 - CFC-11 CFC-113
 - CFC-12 CFC-114

**Sourced from Mexico*
- Notably, as CFC-115 was never produced nor imported to Mexico for use in appliances, CFC-115 is not eligible under this protocol.



Section 2: Eligible ODS Sources

Destruction of the following ODS refrigerant sources is eligible (and meets the performance standard):

- Privately held stockpiles of used ODS that can be legally sold to the market
- Mexican government stockpiles of seized ODS refrigerant that can legally be sold to the market
- Mexican government stockpiles of seized ODS that cannot be legally sold to the market
- Used ODS refrigerant recovered from industrial, commercial, or residential equipment at servicing or end-of-life
- Privately held stockpiles of virgin ODS refrigerant that can be legally sold to the market (*no longer eligible. Was eligible for first 12 months, through April 28, 2016*).



Section 2: The Project Developer

- The “project developer” is
 - an entity with an active account on the Reserve
 - responsible for the submittal, accounting, and registration of the project
- Project developers may be the following:
 - Aggregators
 - Facility Owners
 - Facility Operators
 - Or GHG Financiers



Section 3: Eligibility

- Location (3.1) – Mexico
- Crediting period (3.3) – one or more destruction events over a 12-month period, beginning on the project start date.
 - ODS projects are issued CRTs for the quantity of ODS that would have been released over a ten-year period following a destruction event.
 - At the time the project is verified, CRTs will be issued for all ODS emissions avoided by the project over the 10-year crediting period.



Section 3.2: Start Date

- Start date slightly different depending on type of project
 - Non-mixed, non-aggregated ODS projects: the day project ODS departs the final storage or aggregation facility for transportation to the destruction facility.
 - Non-mixed ODS projects where eligible ODS is aggregated at the destruction facility: the day destruction commences
 - Mixed ODS projects: the day mixing procedures begin.
- For all ODS projects, the project must be submitted to the Reserve no more than six months after the project start date
- Consistent with definition of point of origin and project start date in other ODS Protocols (US and Article 5).
 - Point of origin traced back from start date.
 - “First-in / first-out” accounting for reservoir-style stockpile.
 - Stockpile location for government-held virgin sources.

Section 3.4.1: Legal Requirement Test



- All projects are subject to a Legal Requirement Test to ensure that the GHG reductions achieved by a project would not otherwise have occurred due to federal, state, or local regulations, or other legally binding mandates.
- The Reserve performed extensive analysis on the regulatory framework in Mexico to confirm that there are no legal requirements to destroy ODS in Mexico.
- To satisfy the Legal Requirement Test:
 - project developers must submit a signed Attestation of Voluntary Implementation form
 - the project's Monitoring and Operations must include procedures to ascertain and demonstrate that the project at all times passes the Legal Requirement Test.

Performance Standard (Section 3.4.2, Appendix B)



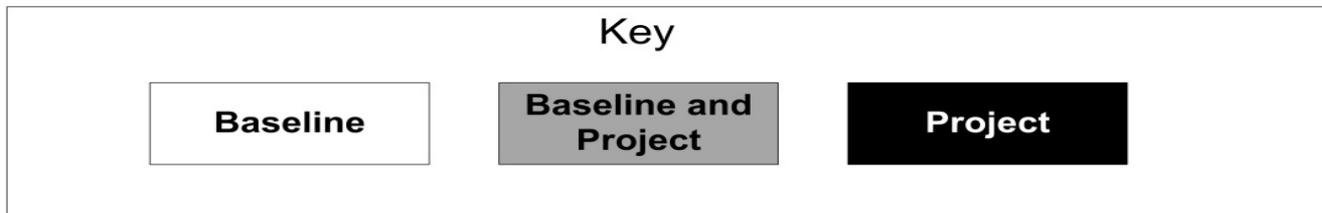
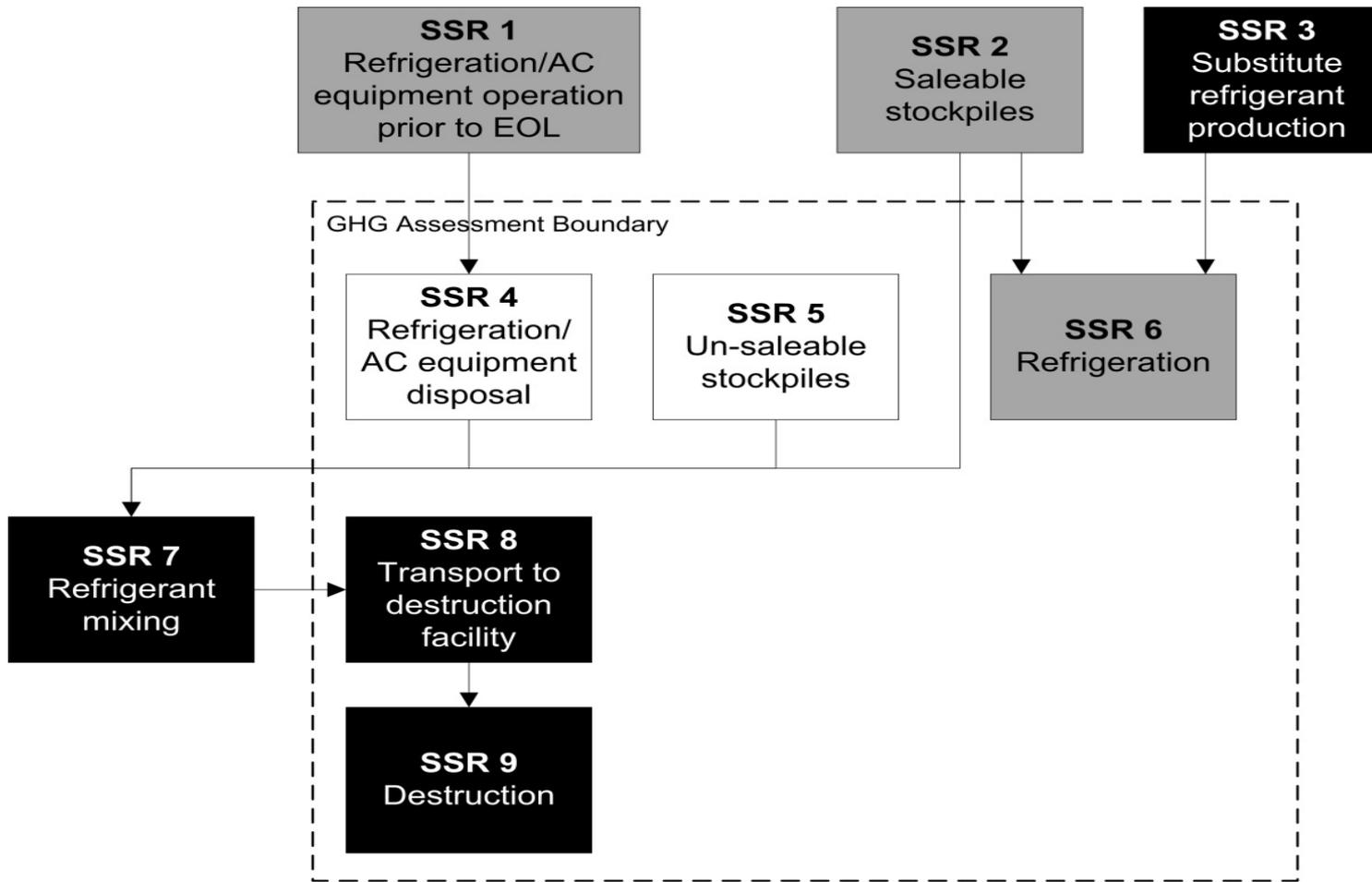
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- The Reserve evaluated the data on the management and destruction of ODS sourced from Mexico and determined that destruction of CFC refrigerant sourced from Mexico **is not common practice.**
- In an analysis of destruction facilities in Mexico, the Reserve determined that destruction of ODS at facilities in Mexico **is also not common practice.**
- Appendix B contains a discussion of this analysis.
- Projects meet the performance standard by destroying eligible ODS under this protocol.

Section 3.5: Regulatory Compliance

- Projects must be in material compliance with all applicable laws (e.g. air, water quality, and safety) at all times during each reporting period
- The regulatory compliance requirement extends to:
 - Operations of destruction facilities where ODS is destroyed,
 - Facilities where mixed ODS projects are mixed and sampled,
 - Transportation of the ODS to the destruction facility, and
 - Export/import of project ODS samples for laboratory analysis
- A violation should be considered to be “caused” by project activities if it can be reasonably argued that the violation would not have occurred in the absence of the project activities. If there is any question of causality, the project developer shall disclose the violation to the verifier.

Section 4: GHG Assessment Boundary





Section 5: Quantification Methodology

$$ER = BE - PE$$

- **Baseline Emissions (BE):**
 - Emissions from stockpiled refrigerants and end-of-life refrigerants that would have occurred over the ten-year crediting period
- **Project Emissions (PE):**
 - Emissions from substitute refrigerants, plus
 - Emissions from the transportation of ODS, plus
 - Emissions from the destruction of ODS



Section 5: Quantification Methodology

- Most of this section is consistent with US and Article 5 Protocols
- However some changes and updates were necessary to make more appropriate for Mexico:
 - Baseline assumptions for ODS management under business-as-usual
 - Analysis underlying emission factors used for substitute refrigerants updated
 - Assumptions related to project emissions from transportation and destruction. Requirement to use standard deduction.
 - All measurements converted to kilograms and Celsius.

Section 5: Baseline Assumptions on ODS Management



Refrigerant Origin	Baseline Scenario	Applicable Annual Emission Rate	10-year Cumulative Emissions (%) (ER_{refr})
Privately held stockpiles of used ODS refrigerant that can legally be sold to the market	Continued storage	10%	65%
Privately held stockpiles of virgin ODS refrigerant that can legally be sold to the market	Continued storage	10%	65%
Government stockpiles of ODS refrigerant that can legally be sold into the refrigerant market	Continued storage	10%	65%
Government stockpiles of ODS refrigerants that cannot legally be sold into the refrigerant market	Continued storage	Site specific emission rate as documented (Equation 5.2)	$1-(1-ER_{stock})^{10}$
Used ODS refrigerant recovered from end-of-life equipment	End-of-life release to the atmosphere	100%	100%

Section 5: Quantification of Substitute Refrigerants



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- The protocol conservatively assumes that all substitute refrigerants are HFC-134a.
 - In the Article 5 Project Protocol, this decision was based on a 2009 review of the literature for all Article 5 countries, which concluded that HFC-134a and HC-600a were the dominant substitute refrigerants being used in place of ODS in Article 5 countries. HFC-134a has a higher GWP than HC-600a, so this is conservative.
 - A 2014 comprehensive inventory report of Mexico shows that HFC-134a, HCFC-22, and HFC-410a were all common substitutes from 2006 to 2012.
 - However, this same report also states that according to current trends and the Mexican HCFC Phase-Out Plan, HFC-134a will be the dominant new refrigerant being used in place of ODS in Mexico and Article 5 countries moving forward.

Section 5: Quantification of Project Emissions from Transportation & Destruction



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- Project emissions from transportation and destruction of ODS are quantified with a standard default emission factor for all projects.
- Project developers must apply a 7.5 tonne CO₂e/tonne ODS emission factor for all projects
 - This default emission factor represents a very conservative estimate of these emission sources derived using worst-case emission factors and empirical data.
 - Helps to streamline project development, project reporting, documentation requirements, and verification activities.

Section 6.2: Documentation of Point of Origin

- Project developers are responsible for collecting data on the point of origin for each quantity of ODS

ODS	Point of Origin
Government stockpiles of virgin ODS	Location of stockpile
Used ODS stockpiled prior to February 3, 2010	Location of stockpile
Privately held virgin ODS stockpiles	Location of stockpile
Used ODS in quantities less than 227 kg	Location where ODS is first aggregated to greater than 227 kg
Used ODS in quantities greater than 227 kg	Site of installation from which ODS is removed
Used ODS of any quantity recovered from end-of-life equipment	Location where ODS is recovered from end-of-life equipment

- Documentation of the point of origin of ODS shall include the following:
 - Facility name and physical address
 - For quantities greater than 227 kg, identification of the system by serial number, if available, or description, location, and function, if serial number is unavailable
 - Serial or ID number of containers used for storage and transport

Section 6.3: Documentation of Chain of Custody



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- Custody and Ownership of ODS must be established
 - Records shall include contact information of persons buying/selling ODS
 - Record options include
 - purchase orders
 - purchase agreements
 - packing lists
 - bills of lading
 - lab test results
 - transfer container information
 - receiving inspections
 - freight bills
 - transactional payment information
 - manifests (*new*)
 - other information that supports previous ownership of ODS and transfer of ownership

Section 6.4.1: Analysis of ODS Quantity (Scales)



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- Requirements are designed to be of equal rigor ODS analysis under the US and Article 5 ODS Project Protocols, but with reference to Mexican regulations
- The scale used must have its calibration verified by PROFECO or by a third party authorized by EMA to perform calibration verifications no more than 3 months prior to or after a project destruction event.
 - Verification must be performed according to NOM-010-SCFI-1994 using test weights certified to NOM-038-SCFI-2000.
 - A scale is considered calibrated if it is within the maintenance tolerance of the relevant NOM-010-SCFI-1994 accuracy class.
- The full weight of tanks must be measured no more than 72 hours prior to commencement of destruction and the empty weight must be measured no more than 72 hours after the conclusion of destruction, as must be noted on the Certificate of Destruction

Section 6.4.2: Analysis of Composition of ODS (Laboratories & Samples)



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- Requirements are designed to be of equal rigor to ODS analysis under the US and Article 5 ODS Project Protocols, but with reference to Mexican regulations, where possible.
- Samples of ODS must be analyzed at laboratories certified by and following the Air-Conditioning, Heating and Refrigeration Institute (AHRI) 700-2006 standard.
- As no Mexican labs are currently AHRI certified, samples will likely be sent to AHRI-certified labs in the US.
- If the AHRI-laboratory is located in the US, the transport and delivery of project samples must comply with Mexican and US import/export laws and maintain additional documentation of that process for verification purposes.
- ODS samples must be taken by trained technicians who have completed SEMARNAT's course "Services Refrigeration and Air Conditioning Good Practices" and who is listed on the ODS Information Monitoring System (SISSAO).

Section 6.5: Destruction Facility Requirements



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- Destruction of ODS must occur at a facility in Mexico that has a valid permit to destroy hazardous waste, which explicitly allows for the destruction of ODS, under Mexico's LGPGIR, as well as secure any other air or water permits required by local, state, or federal law to destroy ODS
 - Most notably, the facility must have a permit under NOM-098-SEMARNAT-2002 or NOM-040-SEMARNAT-2002 explicitly allowing for CFC destruction
- The facility must also have meet all of the guidelines provided in Appendix C and in the TEAP Report of the Task Force on Destruction Technologies
 - Facilities must document operation consistent with the TEAP requirements, including maintaining a “destruction and removal efficiency” (DRE) of at least 99.99.
- Facilities must provide third-party certified results indicating that the facility meets all protocol requirements. Following initial performance testing, facilities must be third-party certified every three years.
 - This third-party certification shall be performed by an independent laboratory certified by EMA

Section 7 & 8: Reporting & Verification



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- No significant differences from these sections and the US & A5 ODS Protocols
- Minor updates throughout consistent with adaptation
- One site visit required per year for a single verification body visiting a single facility
- Appendix E (list of relevant Mexican regulations) is included to assist verification bodies and project developers with understanding of regulatory compliance requirements.



Questions?



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