



# Verifier Accreditation Training for Mandatory GHG Reporting

Transactions Specialty – Course 2.3

Suppliers of Natural Gas, Natural Gas Liquids,  
Liquefied Petroleum Gas, Compressed Natural  
Gas and Liquefied Natural Gas



# MRR Verifier Accreditation: Course Content

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- Course 2: Transactions Specialty
  - 2.1 Electric Power Entities
  - 2.2 Suppliers of Transportation Fuels
  - 2.3 Suppliers of NG, NGL, LPG, CNG, and LNG
  - 2.4 Suppliers of Carbon Dioxide (CO<sub>2</sub>)
- Some common acronyms used here:
  - NG: Natural Gas
  - NGL: Natural Gas Liquids
  - LPG: Liquid Petroleum Gas
  - CNG: Compressed Natural Gas
  - LNG: Liquefied Natural Gas

# Course 2.3 Outline Suppliers NG, NGL, LPG, CNG, and LNG

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## 1. Overview

- Reporting Entities
- The Big Picture
- Fuels to Report
- What to report
- Reporting and Verification Thresholds
- Key Regulatory Sections

## 2. Reporting and Verification

## 3. Case Study

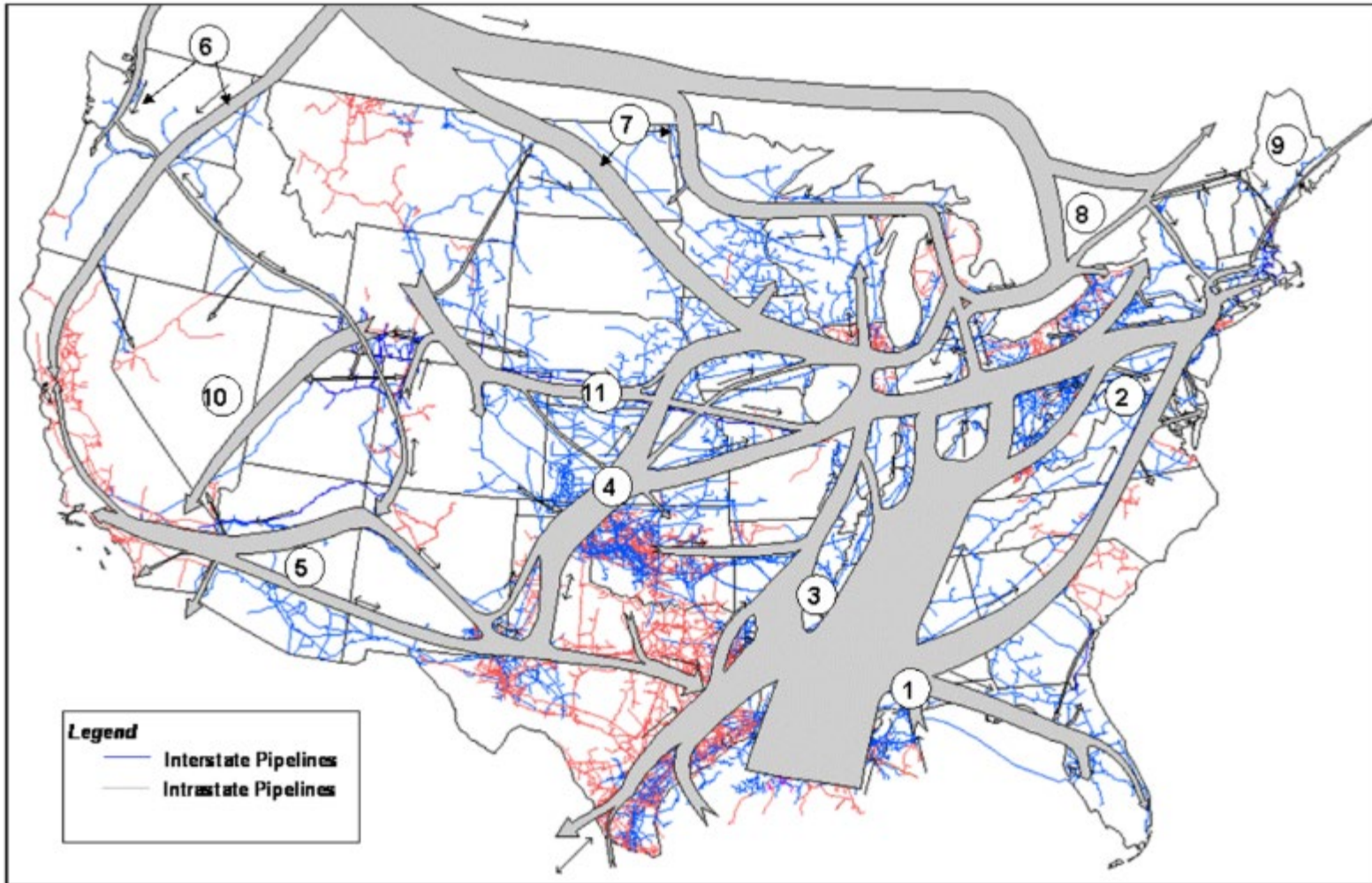
## 4. NGL Fractionators

# Reporting Entities [§95122, §95102]

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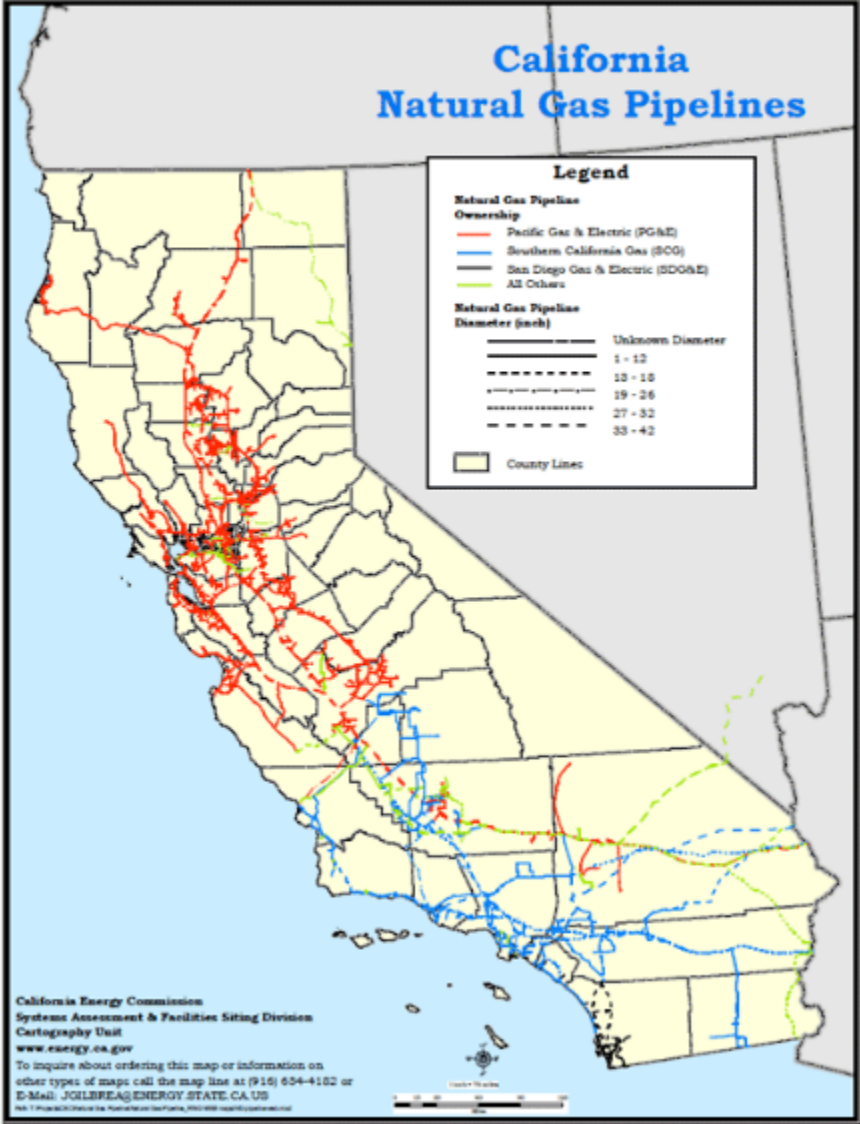
- Local Distribution Companies (LDC)
  - A company that owns or operates distribution pipelines that physically deliver natural gas to end users
  - includes public utility gas corporations, and publicly-owned natural gas utilities
- Operators of intrastate pipelines (if not LDCs) delivering gas to California end-users
- Operators of interstate pipelines delivering gas to California end-users
  - Report deliveries, but no emissions reporting
- Importers of LPG, CNG or LNG into California
- Operators of facilities that make CNG/LNG product
  - By liquefying or compressing NG received from interstate pipelines
- NGL fractionators
  - A facility that fractionates NGLs into their constituent liquid products for supply to other facilities
  - No reporting threshold

# The Big Picture



Source: Energy Information Administration, Office of Oil and Gas, Natural Gas Division, GasTran Gas Transportation Information System.

# California Pipelines







Oil and Gas extraction and processing. (Report §§95150-58)



Crude oil



Refinery (§§95111, 95113, 95115)



Transportation fuels supplied via on-site rack. (§95121, reported by refinery operator)

Natural gas (NG) and natural gas liquids (NGLs)



Imported fuels ("enterer"). (§95121 if outside terminal system)



Transportation fuels supplied via terminal rack (§95121, reported by position holder at terminal)

NG and NGLs



NGL Fractionator (§§95150-58 and 95115 as direct emissions. §95122 for NGLs supplied. §§95150-58 for product data for NGLs produced.)

Pipeline NG

Pipeline natural gas

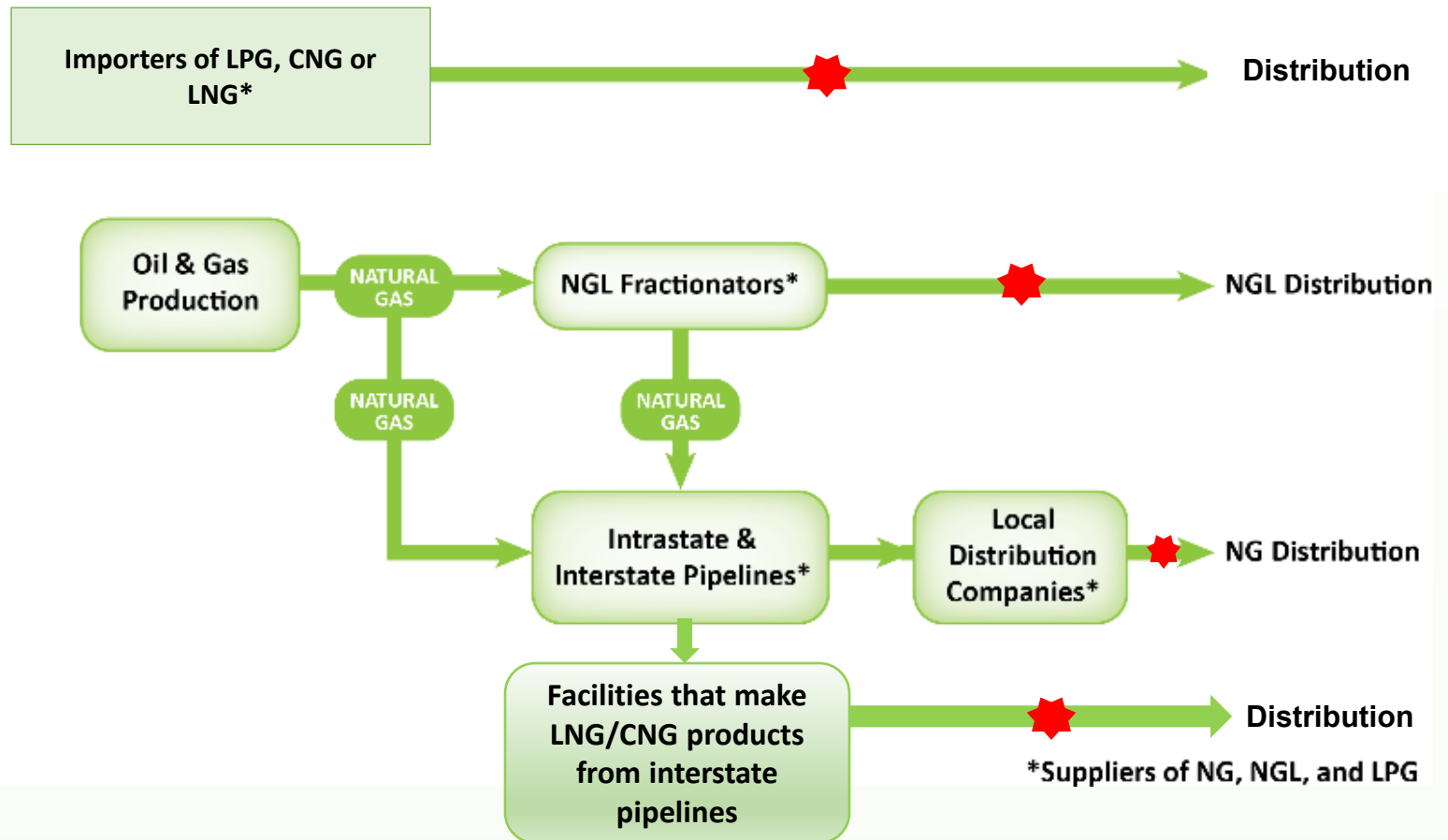


Natural gas distribution company/utility (§95122)

# Oil and Gas Process Diagram

# NG, NGL, LPG, CNG, and LNG suppliers

★ Volume and emissions reporting required





# Fuels to Report (§95102 definitions) (1 of 2)

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- Natural Gas (NG)

- Naturally occurring mixture or process derivative of hydrocarbon and non-hydrocarbon gases
  - Constituents include, methane, heavier hydrocarbons and carbon dioxide
- Natural gas may be field quality or pipeline quality
- Includes fuels such as field production gas, process gas, and fuel gas

- Compressed Natural Gas (CNG)

- Highly compressed (~2900 – 3600 psi) NG but not liquid

- Liquefied Natural Gas (LNG)

- NG (primarily CH<sub>4</sub>) that has been liquefied by reducing its temperature to -260 F at atmospheric pressure

# Fuels to Report (§95102) (2 of 2)

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- Natural Gas Liquids (NGLs)
  - NGLs are any liquids from NG processing, including LPG, bulk products, blends and feedstocks
  - Hydrocarbons in NG that are separated from the gas as liquids; classified according to their vapor pressures
    - Consists generally of ethane, propane, butanes, pentanes, and higher molecular weight hydrocarbons
  - Bulk NGLs refers to mixtures of NGLs that are sold or delivered as undifferentiated product from natural gas processing plants
- Liquid Petroleum Gas (LPG)
  - A NGL mixture of propane, butane, propene (propylene) and ethane used as a fuel, commonly referred to as commercial propane

# Course 2.3 Suppliers NG, NGL, LPG, CNG and LNG

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## 1. Overview

- Reporting Entities
- The Big Picture
- Fuels to Report
- **What to report**
- **Reporting and Verification Thresholds**
- **Key Regulatory Sections**

2. Reporting and verification

3. Case Study

4. NGL Fractionators

# What to Report

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- Emissions
  - CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, and CO<sub>2</sub>e emissions that would result from the complete combustion or oxidation of supplied NG, LPG, CNG, and LNG
- Annual quantity of NG supplied to customers in MMBtu (million British Thermal Units)
- This section is about calculating the emission from natural gas and LPG supplied. Point of regulation to determine reportable transactions is key!

# Reporting and Verification Thresholds

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- Natural gas suppliers that produce, import or deliver an annual quantity that, if completely combusted, would result in  $\geq 10,000$  MT CO<sub>2</sub>e
- NGL fractionators, regardless of size
- Under §95122 any supplier of NG or NGLs who is required to report under §95101 must comply with Subpart NN (except as otherwise provided)
- Verification threshold  $\geq 25,000$  MT CO<sub>2</sub>e

# Key Regulatory Sections

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- §95122. Reporting requirements
- §95102. Definitions
- §95101. Applicability
  - (c) Fuel and Carbon Dioxide Suppliers
- §95103. GHG Reporting Requirements
  - (j) Calculating, Reporting, and Verifying Emissions from Biomass-Derived Fuels
  - (k) Measurement Accuracy Requirements
- §95115. Stationary Fuel Combustion Sources
- §95131. Requirement for Verification Services
  - (b)(8)(F)(2) Reporting end-user names



# Key Regulatory Sections (continued)

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- §95156. Additional Data Reporting Requirements
  - (c) Reporting Annual Production of NGLs
- §95852. Emission Categories Used to Calculate Compliance Obligations
  - (e) Suppliers of Natural Gas Liquids
- §98. (40 CFR Part 98 GHG Rule)
  - §98.3 Subpart C – General Stationary Combustion Sources
  - §98.4 Subpart NN – Suppliers of NG and NGLs
  - §98.9 Subpart MM – Suppliers of Petroleum Products

# Course 2.3 Suppliers NG, NGL, LPG CNG and LNG

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## 1. Overview

## 2. **Reporting and Verification §95122(b)**

- **For LDCs §95122(b)(1-8)**

- Case Study 1

- For Importers of LPG, CNG, and LNG §95122(b)(9-10)

- For Facilities that make CNG/LNG Products §95122(b)(11-12)

## 3. Case Study 1 (revised) and 2

## 4. NGL Fractionators

# Local Distribution Companies (LDCs) Reporting Information

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- LDC is a “Catch-all” term for natural gas utilities and intrastate pipelines
  - LDCs must report the CO<sub>2</sub> (including CO<sub>2</sub> from biomass-derived fuels), CH<sub>4</sub>, N<sub>2</sub>O, and CO<sub>2</sub>e emissions that result from the complete combustion of natural gas products
  - The end goal is calculating emissions from customers in a given year

# Total Emissions Calculation for LDCs

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- §95122(b)(6):

$$CO_2 = \sum CO_{2i} - \sum CO_{2j} - \sum CO_{2l}$$

- **Total CO<sub>2</sub> = CO<sub>2</sub> from NG received at the state boarder or city gate - CO<sub>2</sub> from net NG redistributed - CO<sub>2</sub> net NG storage**

Where:

CO<sub>2</sub> = Total emissions,

CO<sub>2i</sub> = Emissions from NG received at the state border or city gate,

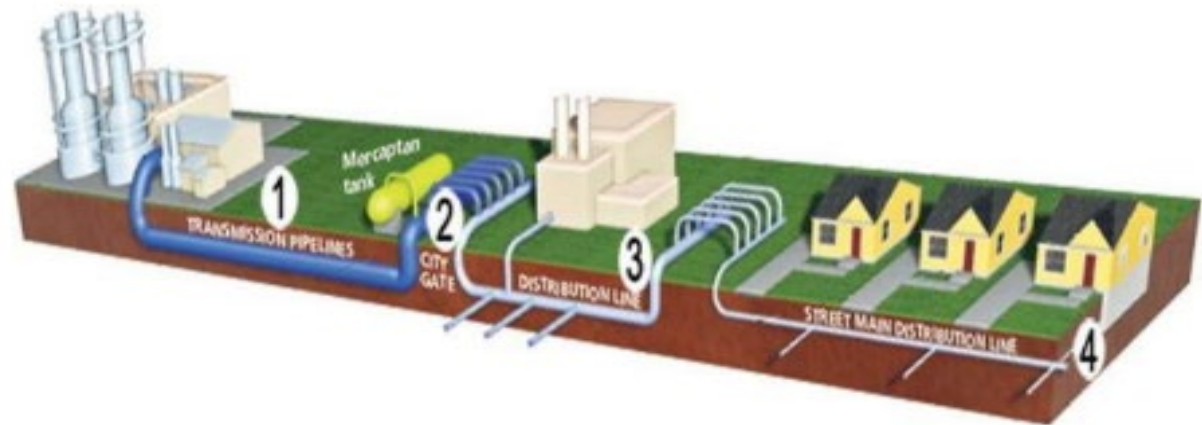
CO<sub>2j</sub> = Emissions from NG received for redistribution to or received from other NG transmission companies,

CO<sub>2l</sub> = Emissions from storage and direct deliveries from producers.

# NG Receiving Sources

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- i – Received at the State Border or City Gate
- j – Net Redelivered
- l – Net Stored



- City gate is “a point or measuring station at which a local gas distribution utility receives gas from a natural gas pipeline company or transmission system”
  - For small utilities, this is where they receive NG from a large utility, and may be their only reportable gas receipts
  - Interconnection with large interstate pipelines for large utilities
  - Example: NG that SoCal Gas receives from El Paso Pipeline is reported under CO<sub>2</sub>i for SoCal Gas; SoCal is closest to the gas' end user

# Total Emissions Calculation for LDCs (1 of 2)

$$\text{§ 95122(b)(6): } \text{CO}_2 = \sum \text{CO}_{2i} - \sum \text{CO}_{2j} - \sum \text{CO}_{2l}$$

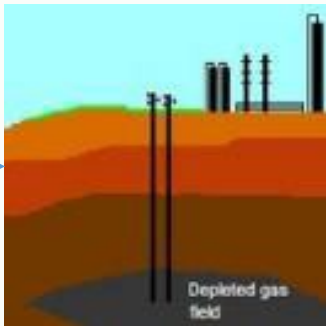
City Gate Boundary  
**Large LDC**

- NG redelivered to other pipelines or LDCs:  $\text{CO}_{2j}$

+ NG received at city gate or border:  $\text{CO}_{2i}$

- NG in storage:  $\text{CO}_{2l}$

+ NG received from other pipelines:  $\text{CO}_{2j}$



+ Local production to LDC pipeline:  $\text{CO}_{2l}$

+ NG out of storage:  $\text{CO}_{2l}$

City Gate Boundary



# Total Emissions Calculation for LDCs

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$$\text{§ 95122(b)(6): } \text{CO}_2 = \sum \text{CO}_{2i} - \sum \text{CO}_{2j} - \sum \text{CO}_{2l}$$

+

- Adds to suppliers emissions for reporting year:
  - NG received at city gate or border ( $\text{CO}_{2i}$ )
  - NG received from other pipelines ( $\text{CO}_{2j}$ )
  - Local production to LDC pipeline ( $\text{CO}_{2l}$ )
  - NG added to storage ( $\text{CO}_{2l}$ )

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- Reduces emissions for reporting year:
  - NG redelivered to other pipelines or LDCs ( $\text{CO}_{2j}$ )
  - NG removed from storage ( $\text{CO}_{2l}$ )

# CO<sub>2i</sub> from NG Received at the City Gate

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- §95122(b)(6):  $CO_2 = \sum CO_{2i} - \sum CO_{2j} - \sum CO_{2l}$

- CO<sub>2i</sub> = Emissions from NG received at the state border or city gate

- 40 CFR §98.403, Method 1, Eq. NN-1

- In general, NG is transacted in MMBtu, not volume. So calculation substitutes *MMBtu* for (*Fuel \* HHV*)

$$CO_{2i} = 1 \times 10^{-3} \sum \boxed{Fuel_h * HHV_h} * EF_h \quad (Eq. NN - 1)$$

Becomes:  $CO_{2i} = 1 * 10^{-3} * MMBtu * EF$

Use table NN-1 for Emission Factor (EF) kg CO<sub>2</sub>/MMBtu

# CO<sub>2j</sub> from NG Net Redelivered

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- §95122(b)(6):  $CO_2 = \sum CO_{2i} - \sum CO_{2j} - \sum CO_{2l}$
- CO<sub>2j</sub> = Emissions from NG delivered to or received from other NG transmission companies
  - Redistribution TO = NG delivered to other pipelines or LDCs (if total deliveries in the year exceed > 25,000 MT CO<sub>2e</sub>)
  - Received FROM = NG received from other pipelines or LDCs (regardless of amount)
    - Note: For larger utilities, little distinction between “received from” other utility (CO<sub>2j</sub>) and received at city gate (CO<sub>2i</sub>). Verifier should focus on ensuring correct volumes.

$$MMBtu_{Total} = MMBtu_{redelivery} - MMBtu_{receipts}$$

$$\sum CO_{2j} = 1 * 10^{-3} * MMBtu_{Total} * EF \text{ (Eq. NN-3)}$$

# CO<sub>2</sub>l from NG Net Stored

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- §95122(b)(6):  $CO_2 = \sum CO_{2i} - \sum CO_{2j} - \sum CO_{2l}$

- CO<sub>2l</sub>= Emissions from:
  - NG storage and
  - direct delivery from producers

- Mostly affects larger utilities

- Emissions calculated using Eq. NN-5

$$CO_2 = 1 * 10^{-3} [Fuel_1 - Fuel_2] * EF$$

- Fuel1 = MMBtu <sub>put into storage</sub>
- Fuel2 = MMBtu <sub>taken out of storage</sub> + MMBtu <sub>received directly from producers of NG</sub>
- Remember: §95122 calculates emissions from NG supplied in a given calendar year. Thus:
  - More NG taken from storage = more gas supplied = higher reported emissions
  - More NG put into storage = more gas stored and not supplied = lower reported emissions

# Determination of Pipeline Quality NG or Biomethane (§95122(b)(5))

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- Pipeline quality is based on the annual weighted average of HHV. If it is within the specified range, Tier 2 is used for emissions calculation and the default EF of 53.02 kg/MMBtu

**Pipeline quality:**

**970 Btu/scf  $\leq$  HHV  $\leq$  1,100 Btu/scf**

**Use Tier 2 calculation and EF=53.02 kg/MMBtu**

- If HHV is outside of the pipeline quality NG and
  - if emissions < 3% of total emissions then use Tier 2 and the appropriate EF:
    - 53.02 kg/MMBtu if HHV <970
    - 54.67 kg/MMBtu if HHV >1,100
  - If emissions  $\geq$  3% of total emissions then use Tier 3
  - HHV should be measured at or near each interconnection point

# Determination of Pipeline Quality NG or Biomethane (§95122(b)(5)) (continued)

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	<b>&lt;3% of total emissions</b>	<b>≥3% of total emissions</b>
<b>HHV &lt;970 Btu/scf</b>	Tier 2 calc; 53.02 kg/MMBtu	Tier 3 calculation methodology
<b>HHV ≥970 Btu/scf, ≤1,100 Btu/scf</b>	Tier 2 calc; 53.02 kg/MMBtu	Tier 2 calc; 53.02 kg/MMBtu EF
<b>HHV &gt;1,100 Btu/scf</b>	Tier 2 calc; 54.67 kg/MMBtu	Tier 3 calculation methodology



# Emissions Calculations for LDCs: CH<sub>4</sub> and N<sub>2</sub>O emissions (§95122(b)(7))

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- Use the same equations as in CO<sub>2</sub> calculation, replace CO<sub>2</sub> with CH<sub>4</sub> and N<sub>2</sub>O and use the appropriate EF. For CH<sub>4</sub>:
- $CH_4 = \sum CH_{4i} - \sum CH_{4j} - \sum CH_{2l}$ 
  - $CH_{4i} = 1 * 10^{-3} * MMBtu * EF$
  - $\sum CH_{4j} = 1 * 10^{-3} * (MMBtu_{redelivery} - MMBtu_{receipts}) * EF$
  - $CH_{4l} = 1 * 10^{-3} * [Fuel_1 - Fuel_2] * EF$ 
    - Fuel1 = MMBtu<sub>put into storage</sub>
    - Fuel2 = MMBtu<sub>taken out of storage</sub> + MMBtu<sub>received directly from producers of NG</sub>
  - use Table C-2 for EF in kg CO<sub>2</sub>/MMBtu
- Same for N<sub>2</sub>O emissions calculation

# Emissions Calculations for LDCs: Biomass-Derived Fuel (§95122(b)(8))

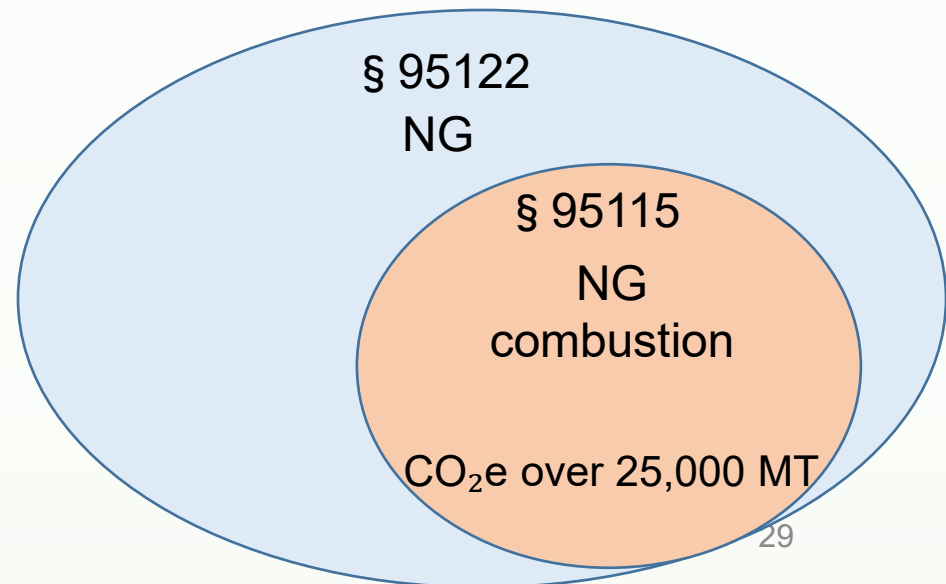
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- Natural gas suppliers can supply biomethane, which is biomass-derived NG meeting pipeline quality standards
- Biomass-derived NG fuels (biomethane) can be reported by LDC if:
  - Purchased by the LDC on behalf of and delivered to the end user; OR
  - Biomethane is directly purchased by end users and delivered by the LDC and LDC can provide all necessary documentation on behalf of purchaser during verification
- Must meet eligibility requirements for biomethane discussed in Course 1-2 (§§95103(j), 95131(i), C&T §95852.1.1)
- If any requirements not met, biomethane must be reported as fossil NG

# Calculating NG Covered Emissions

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- Under §95122 NG emissions from upstream supplier is reported
- Under §95115 NG emissions from downstream stationary combustion sources (i.e., power plants) are required to be reported by facility
- For C&T compliance to avoid double counting, CARB deducts NG sold to covered entities when calculating covered emissions after verification deadline

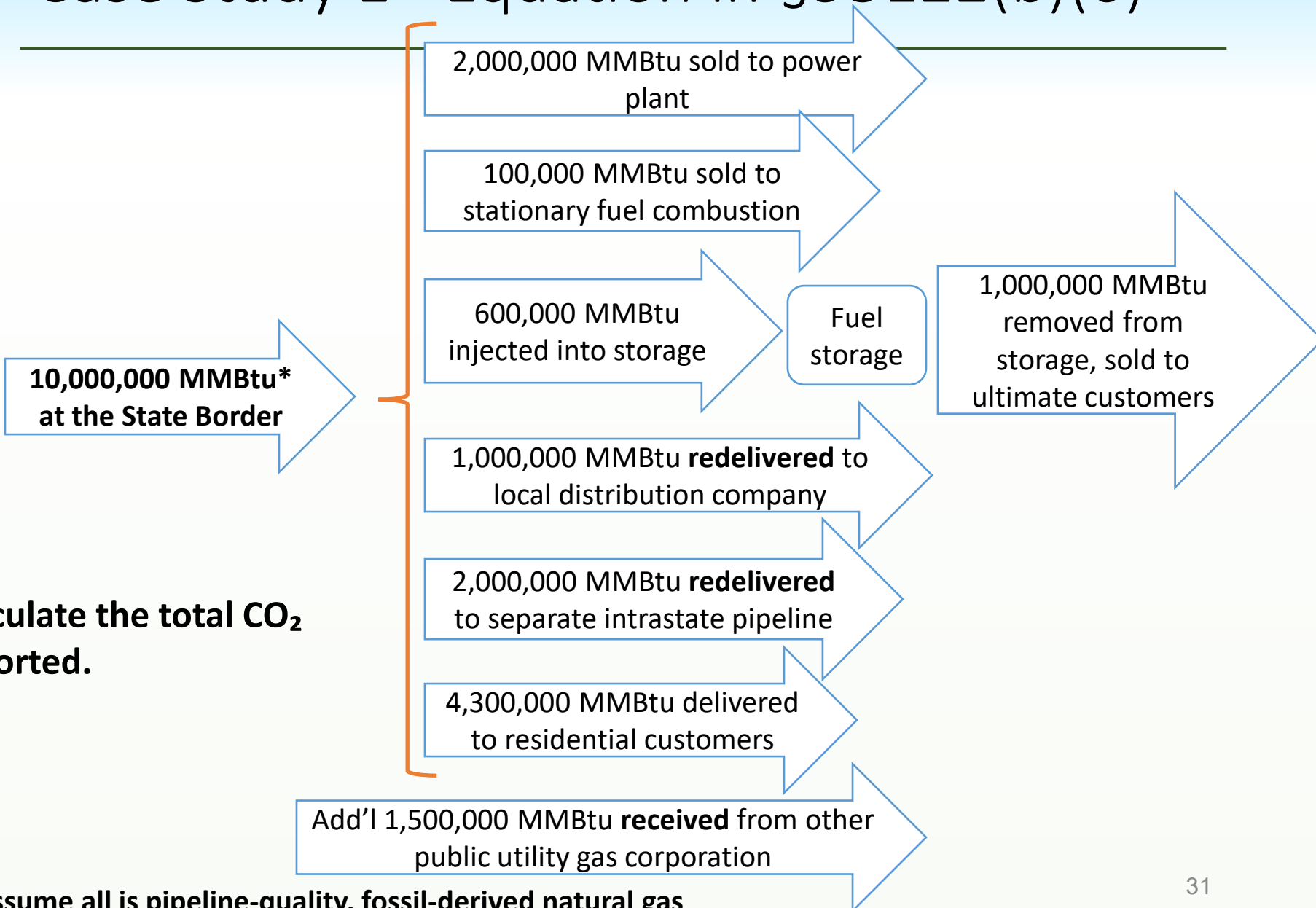


# Data Reporting Requirements: End User Reporting for LDC (§95122(d)(2-5))

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- NG suppliers are required to report all deliveries of NG to end-users  $\geq 188,500$  MMBtu (§95122(d)(2)(E))
  - 188,500 MMBtu is approximately 10,000 MT CO<sub>2</sub>e
  - Distinct from (CO<sub>2</sub>) redeliveries which are NOT to end-users
  - These reported volumes are separate from and do not impact emissions calculation in emissions data report
  - Still important because they are used later by CARB to calculate compliance obligation
  - Reporting this ensures no double counting by other covered entities
- Required conformance review (§95131(b)(8)(F)(2))
  - Confirm: End-user names, account identification numbers, and NG deliveries in MMBtu, is correctly reported
- Reporters complete a worksheet that is uploaded to Cal e-GGRT

# Case Study 1 - Equation in §95122(b)(6)



Calculate the total CO<sub>2</sub> reported.

\*Assume all is pipeline-quality, fossil-derived natural gas

# Case Study 1 - Solution

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$$\text{\$95122(b)(6): } \text{CO}_2 = \sum \text{CO}_{2i} - \sum \text{CO}_{2j} - \sum \text{CO}_{2l}$$

$\text{CO}_{2i}$  = All NG received at state line or city gate:

$$10,000,000 \text{ MMBtu} * 53.02 \text{ kg CO}_2/\text{MMBtu} * .001 \text{ MT/kg} = 530,200 \text{ MT CO}_2$$

$\text{CO}_{2j}$  = Redelivered and received NG: ( $\text{MMBtu}_{\text{redelivery}} - \text{MMBtu}_{\text{receipts}}$ )

$$(3,000,000 - 1,500,000) * 53.02 * .001 = 79,530 \text{ MT CO}_2$$

$\text{CO}_{2l}$  = (Injected into storage – delivered from storage)

$$(600,000 - 1,000,000) * 53.02 \text{ kg CO}_2/\text{MMBtu} * .001 \text{ MT/kg} = -21,208 \text{ MT CO}_2$$

$$\text{CO}_2\text{Total} = 530,200 - 79,530 - (-21,208) = \mathbf{471,878 \text{ MT CO}_2}$$

# Course 2.3 Suppliers NG, NGL, LPG, CNG and LNG

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1. Overview
2. Reporting
3. Reporting and **Verification §95122(b)**
  - **For LDCs §95122(b)(1-8)**
  - For Importers of LPG, CNG, and LNG §95122(b)(9-10)
  - For Facilities that make CNG/LNG Products §95122(b)(11-12)
4. Case Study 1 (revised) and 2
5. NGL Fractionators

# Verification of CO<sub>2</sub>i

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- Verification of gas received at city gate or interconnection
- Identify how purchases are recorded. For example, review invoices, real-time data, and purchase records
- Review sales information and ensure that entire calendar year was included
  - If missing data, confirm that appropriate MRR procedures were used
- Ensure that MMBtu were calculated appropriately
  - More detail on HHV in the following slides
- Recalculate emissions
  - Double check inputs - If there are discrepancies, review with reporter and follow standard verification process



# Verification of CO<sub>2j</sub>

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- Based on risk analysis, sample a source or time period, obtain sales data, if available, as primary documentation
- Confirm that all the data sources for reportable transactions are documented in the GHG Monitoring Plan
  - Does the operator understand the regulation?
  - How did they ensure that only sales to pipelines and LDCs were included and sales to end-users were not?
  - Note that re-delivery data is reported as a spreadsheet attached to the Cal e-GGRT report for CARB reviewer
- Were only sales resulting in  $\geq 25,000$  MT CO<sub>2e</sub> included (in CO<sub>2j</sub> term)?

# Verification of Stored CO<sub>2</sub> (1 of 2)

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- Will likely be a part of SDG&E, PG&E, and SCG verification -- these are the only NG suppliers that deal with gas storage in California
- These are complex facilities, with a variety of meters, most of which do not apply to GHG verification
- Fundamentally: gas out minus gas in



# Verification of Stored CO<sub>2</sub>l (2 of 2)

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- Obtain inventory data for storage operations. Meter data? Inventory data?
- Are meters calibrated?
  - Can they provide evidence of +/-5% based on inventory data?
  - CPUC General Order 58a
    - Most NG meters are financial and do not need calibration
    - For those few that are not financial but are covered under 58a, they are also exempt from calibration
- Review sales or other data for purchases from local producers
  - Where is the HHV measured?
  - What is the annual weighted average HHV?

# Verifying CH<sub>4</sub> and N<sub>2</sub>O Emissions for NG Suppliers

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- Calculated using the same equations as CO<sub>2</sub>, but using CH<sub>4</sub> and N<sub>2</sub>O emission factors
- For CH<sub>4</sub> and N<sub>2</sub>O the same EF is used for pipeline and non-pipeline quality gas

# Verifying Measurements of HHV and Other Values (§95122(c))

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- Review documentation for HHV used by data reporters
- Verify that all measurements (including quantity, composition and HHV value) were made at least monthly
- HHVs determined by the reporter (i.e., not a default value or supplied by a separate fuel supplier) is a higher risk
- Verify that an appropriate standard test was used
  - Published by a consensus-based standards organization, e.g., American Gas Association [AGA] or American Petroleum Institute [API]
  - If an LDC makes its own HHV measurements according to established practices, then its own measurements shall be used
  - If LDC does not, it would use the delivering pipeline's measurements

# Verification of Measurement Accuracy for Natural Gas Suppliers

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- Most transactions will be financial transactions: exempt from §95103(k)(7) accuracy requirements. However, some NG utilities may have transactions that are not financial transactions, such as:
  - NG storage meters owned by the utility
  - EGUs and NG compressor stations owned by the utility
  - Tolling agreements (NG for electricity exchange)
- If not financial transactions, utilities can meet requirements of CPUC General Order 58A (§95103(k)(7)(C))
- For verification:
  - Ensure accuracy is documented in monitoring plan, and staff can provide evidence metering standards are met
  - Review sample of transactions to determine if they're the basis of financial transactions
    - For meter that are not, determine whether they're subject to General Order 58A or if another method can be used to show accuracy

# Verifying LDC Conformance – End Users

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- Discuss reporting requirement with the operator. How did they determine what needed to be included?
- Review source of transactions. Ask them to recreate query of customer database, if applicable.
  - Some facilities have multiple accounts with supplier, are these aggregated correctly in end-user list?
- How did they determine that the counterparties were end users of the NG and not other pipelines?
- Completeness check. Did the operator's source of data include all applicable end users?
- Sample sales data for individual customers
- Document steps in sampling plan

# Data Reporting Requirements: Biomethane Reporting (§95122(d)(6))

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- Must report, for each contracted delivery of biomethane, the information specified in section 95103(j)(3)
  - Names and addresses of the biomethane vendor from which it is purchased
  - Annual MMBtu delivered by each biomethane vendor
- Biomethane can be reported by LDC if:
  - LDC is the direct purchaser of the fuel OR
  - The end user of the fuel purchases if the LDC “can provide access during verification to the documentation necessary to identify the biomethane as exempt” (§95122(b)(8))



# Verification of Biomethane

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- Same eligibility requirements as biomethane discussed, based on §95103(j), 95131(i), and C&T 95852.1.1
- Discussed in detail in Course 1-2
- High risk - must review, even if small amount
- Whether purchased by LDC or end use customer, must have documentation to demonstrate eligibility if claiming biomethane
  - Contract for actual biomethane, consistent with C&T §95852.1.1
  - Invoices for purchase
  - Shipping reports
  - Allocation, balancing, and nomination reports
- Document your approach in sampling plan
- Must be reported as non-exempt natural gas if reporter cannot provide evidence of applicability and accuracy

# Course 2.3 Suppliers NG, NGL, LPG, CNG and LNG

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## 1. Overview

## 2. Reporting and Verification §95122(b)

- For LDCs §95122(b)(1-8)
- **For Importers of LPG, CNG, and LNG §95122(b)(9-10)**
- **For Facilities that make CNG/LNG Products §95122(b)(11-12)**

## 3. Case Study 2

## 4. NGL Fractionators

# LPG, CNG and LNG Importer Reporting (§95122 (d)(5))

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- LPG importers report:
  - annual quantity of LPG imported (bbl)
  - volume of individual components in 40 CFR 98, Table MM-1, if supplied by the producer
  - CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, and CO<sub>2</sub>e (MT) from downstream combustion of LPG, using calculation methods in section 95122(b)
  - The total quantity in barrels of LPG that is excluded from emissions reporting due delivery outside California (similar to requirement for transportation fuel suppliers)
- CNG and LNG importers report:
  - annual quantities imported, and delivered or sold (MMBtu)
  - CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, and CO<sub>2</sub>e (MT) separately for CNG and LNG using calculation methods in section 95122(b)

# Emission Calculation for Importers of LPG, CNG or LNG (§95122(b)(9&10))

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## ○ CO<sub>2</sub> Emissions

### ○ Imported LPG use Equation NN-2

- $CO_2 = \sum Fuel_h * EF_h$
- Sum emissions from individual components to calculate total emissions (EF from Table MM-1)
- If the composition is not supplied use the default value for LPG in Table C-1 (EF=62.98 kg CO<sub>2</sub>/MMBtu)

### ○ Imported CNG or LNG, use Method 1 (40 CFR §98.403(a)(1))

- $CO_2 = 1 * 10^{-3} * MMBtu * EF$
- Use Table C-1 for EF

## ○ CH<sub>4</sub> and N<sub>2</sub>O

### ○ Equation C-8 and Table C-2 (40 CFR §98.33(c)(1))

# Importers of LPG, CNG, and LNG: Verification Requirements

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- Review GHG Monitoring Plan and interview staff to understand how reportable transactions are compiled
- Review database of transactions to understand data sources, how information is updated/reconciled and how data is queried for emissions report
- Sample invoices/bills of lading—what information is used to determine responsibility as an importer of the fuel?

# Emissions Calculation for Facilities Producing CNG/LNG products (§95122(b)(11&12))

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- Operators of facilities in California that make LNG/CNG products from interstate pipelines must calculate emissions from NG sold as LNG/CNG products
- CO<sub>2</sub> emissions
  - Use the following equation and Table C-2 for EF
    - $CO_2 = 1 * 10^{-3} * MMBtu * EF$
    - Annual MMBtu of the LNG sold or delivered in California
- Same equation for CH<sub>4</sub> and N<sub>2</sub>O, different emissions factors
- Must also report end-user information §95122(d)(6). For deliveries of LNG to industrial facilities and NG utility customers:
  - Including customer name,
  - Address, and
  - The annual quantity of LNG delivered to each customer in MMBtu.

# Verification of CNG/LNG Production Facility

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- Verification
  - Review sales documenting volume
  - Ensure correct units of measurement (MMBtu - they may transact in Mscf or GGE) and HHV is measured at an appropriate location
  - Ensure reported volumes and MMBtu were measured using financial transaction meters or ensure meter accuracy was met
  - CNG/LNG producers reporting “CNG/LNG from Biomethane”
    - Must report information required by §95103(j)(3) (§95122(d)(6)) (biomethane producer name and address and MMBtu delivered by vendor)
    - Provide documentation substantiating Cap-and-Trade eligibility criteria are met (§95852.1.1)

# Emissions Calculations for all Fuel Suppliers

(§95122(b)(13))

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- All fuel suppliers in this section must also estimate CO<sub>2</sub>e emissions using the following equation:
- $GHG_i =$ 
  - Mass emissions of CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O from fuels combusted or oxidized.
- $GWP_i =$ 
  - Global warming potential for each greenhouse gas from Table A-1 of 40 CFR Part 98.
    - CO<sub>2</sub> = 1 GWP
    - CH<sub>4</sub> = 21 GWP
    - N<sub>2</sub>O = 310 GWP

$$CO_2e = \sum_{i=1}^n GHG_i \times GWP_i$$



# Measurement Accuracy for LPG, CNG, and LNG suppliers

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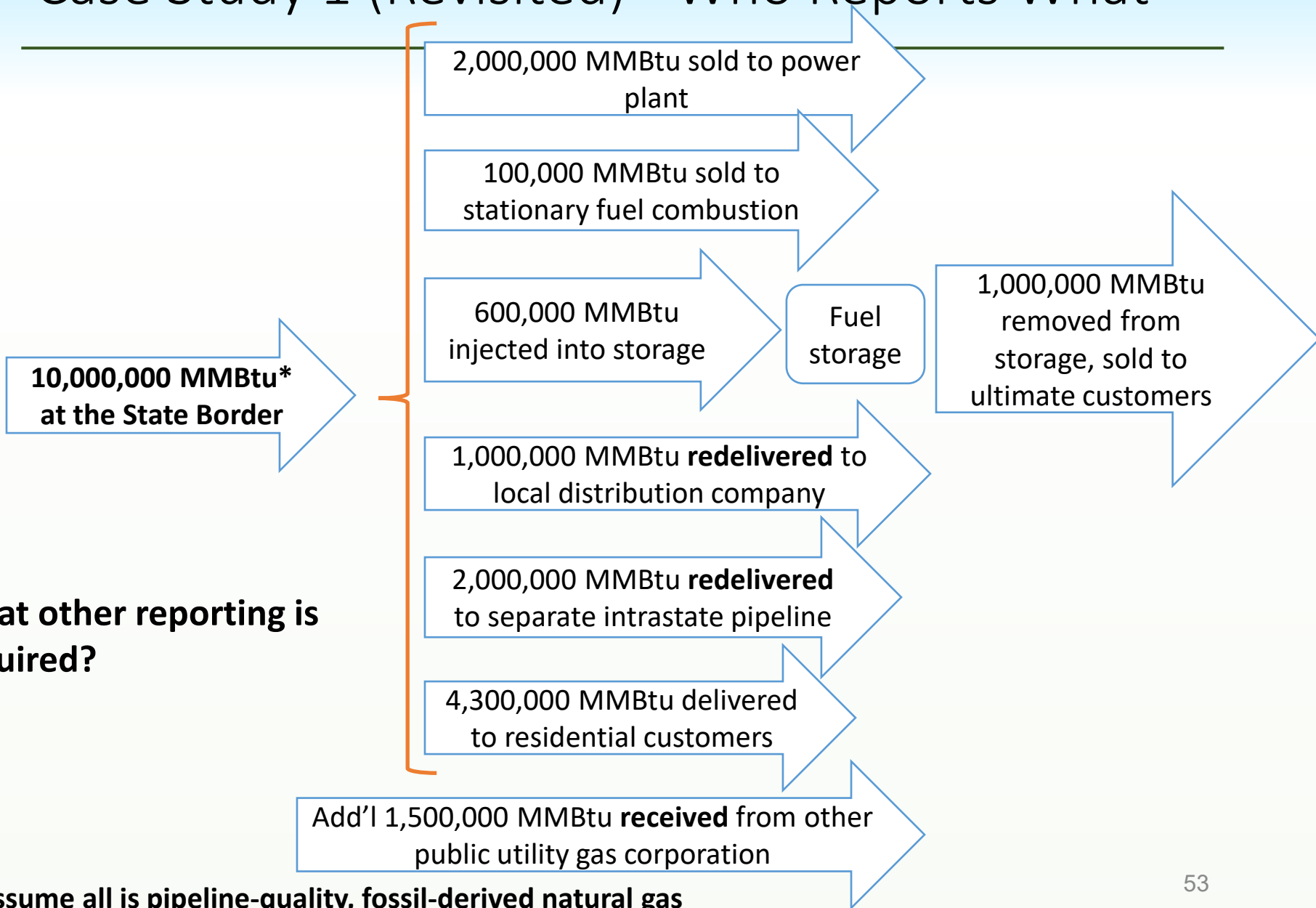
- Most transactions will be financial transactions-- exempt from §95103(k)(7) accuracy requirements
- For verification:
  - Ensure accuracy is documented in monitoring plan; ask staff to explain steps to ensure accuracy standards are met
  - Meters for emissions measurement that are used for financial transactions, meet MRR accuracy standards

# Outline: Data Reporting Requirements

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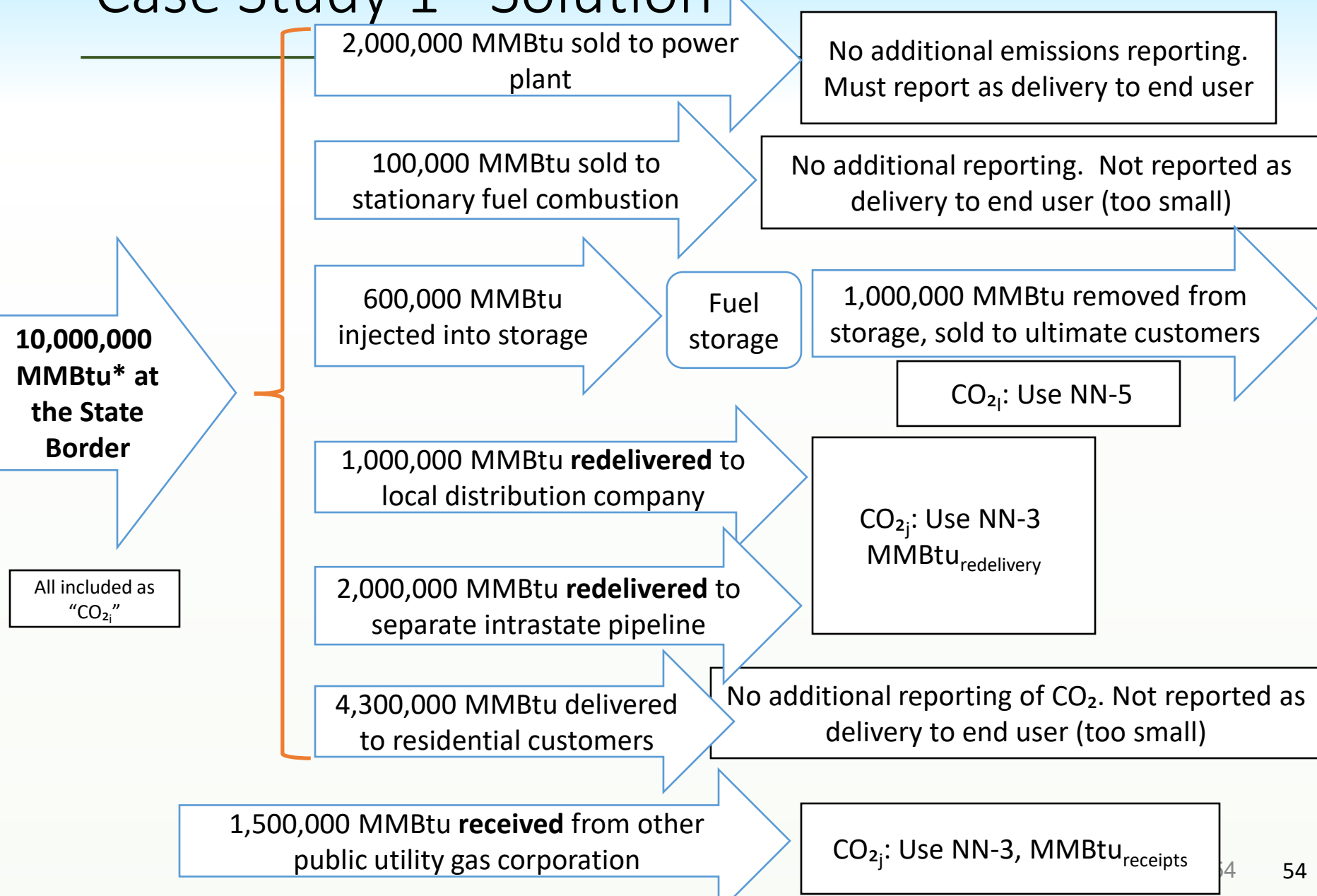
1. Overview
2. Reporting and Verification
- 3. Case Study 1 (revised) and 2**
4. NGL Fractionators

# Case Study 1 (Revisited) - Who Reports What



\*Assume all is pipeline-quality, fossil-derived natural gas

# Case Study 1– Solution



10,000,000 MMBtu\* at the State Border

All included as "CO<sub>2i</sub>"

# Case Study 2 - Verifying an LDC Report

- See Handout 2.3.1 for report format
- How would you characterize risk for each of these parameters?
- What type of data would you target for review?

CO2i	CO2j	CO2l	CO2l	not accounted for	CO2l
Total annual MMBtu of natural gas received at the city gate	Annual MMBtu of Product Supplied to Pipelines or Other LDCs	MMBtu received and stored on-system	MMBtu of NG withdrawn from storage	Vaporized LNG not accounted for in CO2i	MMBtu of NG from local production
10,000,000	3,000,000	50,000	40,000	3,000	2,000,000

**Data source:**  
Monthly invoices from another public utility gas corporation.  
**Risk? Data Checks?**

**Data source:**  
Spreadsheet based on data from gas accounting. Invoices available.  
**Risk? Data Checks?**

**Data source:** Storage balance reports. Entity owns storage  
**Risk? Data Checks?**

**Data source:**  
Estimates based on truck measurements; reported de minimis  
**Risk? Data Checks?**

**Data source:**  
Spreadsheet from accounting, based on invoices  
**Risk? Data Checks?**

# Case Study 2 -sample risk assessment, for discussion, not a suggested template

- See handout for report format

CO2i	CO2j	CO2l	CO2l	not accounted for	CO2l
Total annual MMBtu of natural gas received at the city gate	Annual MMBtu of Product Supplied to Transmission Pipelines or Other LDCs	MMBtu received and stored on-system	MMBtu of NG withdrawn from storage	Vaporized LNG not accounted for in CO2i	MMBtu of NG from local production
10,000,000	3,000,000	50,000	40,000	3,000	2,000,000

**Data source:** Monthly invoices from another public utility gas corporation.  
**Risk:** Medium-low; large emission source but high quality data  
**Data review:** Review all 12 monthly invoices; ensure all gas receipts and interconnections are included

**Data source:** Spreadsheet based on data from gas accounting. Invoices available.  
**Risk:** Medium-High; multiple counterparties; data supplied by entity acctg (rather than third-party)  
**Data review:** Review spreadsheet; sample 3 monthly invoices for each counterparty

**Data source:** Storage balance reports. Entity owns storage  
**Risk:** High; unknown volume accounting procedures; unknown calibration frequency  
**Data review:** Review storage reports; interview staff about accounting procedures and measurement accuracy; refine sampling plan. Consider requesting additional data, including calibration records if warranted

**Data source:** Estimates based on truck measurements; reported de minimis  
**Risk:** Low; small source, de minimis  
**Data review:** Review for reasonable calculation and

**Data source:** Spreadsheet from accounting, based on invoices  
**Risk:** High; multiple counterparties; some off-spec gas  
**Data review:** Sample invoices; review gas HHV measurements

# Outline: Data Reporting Requirements

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1. Overview
2. Reporting and Verification
3. Case Study
4. **NGL Fractionators**

# Data Reporting Requirements: NGL Fractionators

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- Emissions Data
  - Combustion and fugitive emissions from the fractionation of NGL (§95115, 95150-95158 )
  - Emissions from the combustion of NGL (§95122)
- Product data (§95156(c))
  - Annual production volume LPG sold or delivered to others
  - Reported by individual components listed in §95156(c)
  - LPG is finished fuel defined by MRR. Sometimes called “propane” in industry, but actual gas blend
- Will generally submit as single facility report for all emissions



# Reporting Emissions from Combustion of LPG (§95122(d)(1)&(8))

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- Combustion and fugitive emissions from NGL fractionation as covered in Courses 1-2 and 3-1
- NGL produced onsite and sold or delivered to other
  - Total NGL volume in barrels
  - NGL individual components (in barrels) listed in 40 CFR §98 Table MM-1
  - CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and CO<sub>2</sub>e emissions
- Except NGL exported outside California

# What Is Included as Covered Emissions Data?

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- Not all NGL products result in covered emissions
- Only LPG results in COVERED emissions pursuant to §95852(e)(1)
  - Why? Because LPG is used downstream as fuels for heating and transportation; other NGLs likely to be used as feedstocks for processes (plastics and other petrochemicals)

NGLs	Non-NGLs
Ethane (LPG and non-LPG)	Natural Gas
Propane (LPG and non-LPG)	LNG - Liquefied Natural Gas
Butane (LPG and non-LPG)	CNG - Compressed Natural Gas
Isobutane (LPG and non-LPG)	
Pentanes Plus (LPG and non-LPG)	
<b>LPG Constituents:</b>	
Ethane, Ethylene	
Propane	
Butane, Butylene	
Isobutane, Isobutylene	
Pentanes Plus	

NGLs

LPG

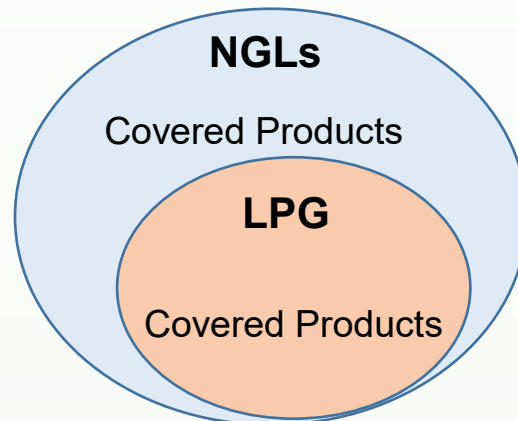
Covered Emissions

§ 95852(e)(1)

# What Is Included as Covered Product Data?

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- For the purpose of reporting product data, all NGLs produced are considered covered products, which includes LPG and non-LPG (§95156(c))
  - Why? NGL fractionation is considered an emission-intensive trade-exposed sector; covered product data is used to calculate free allocation of allowances to offset cost associated with actual fractionation process, not the downstream combustion of fuel
- Only NGLs produced are counted; i.e., any NGLs received from other fractionators (CO<sub>2</sub>j) are not included as product data



# Calculation of Emission from NGL Combustion

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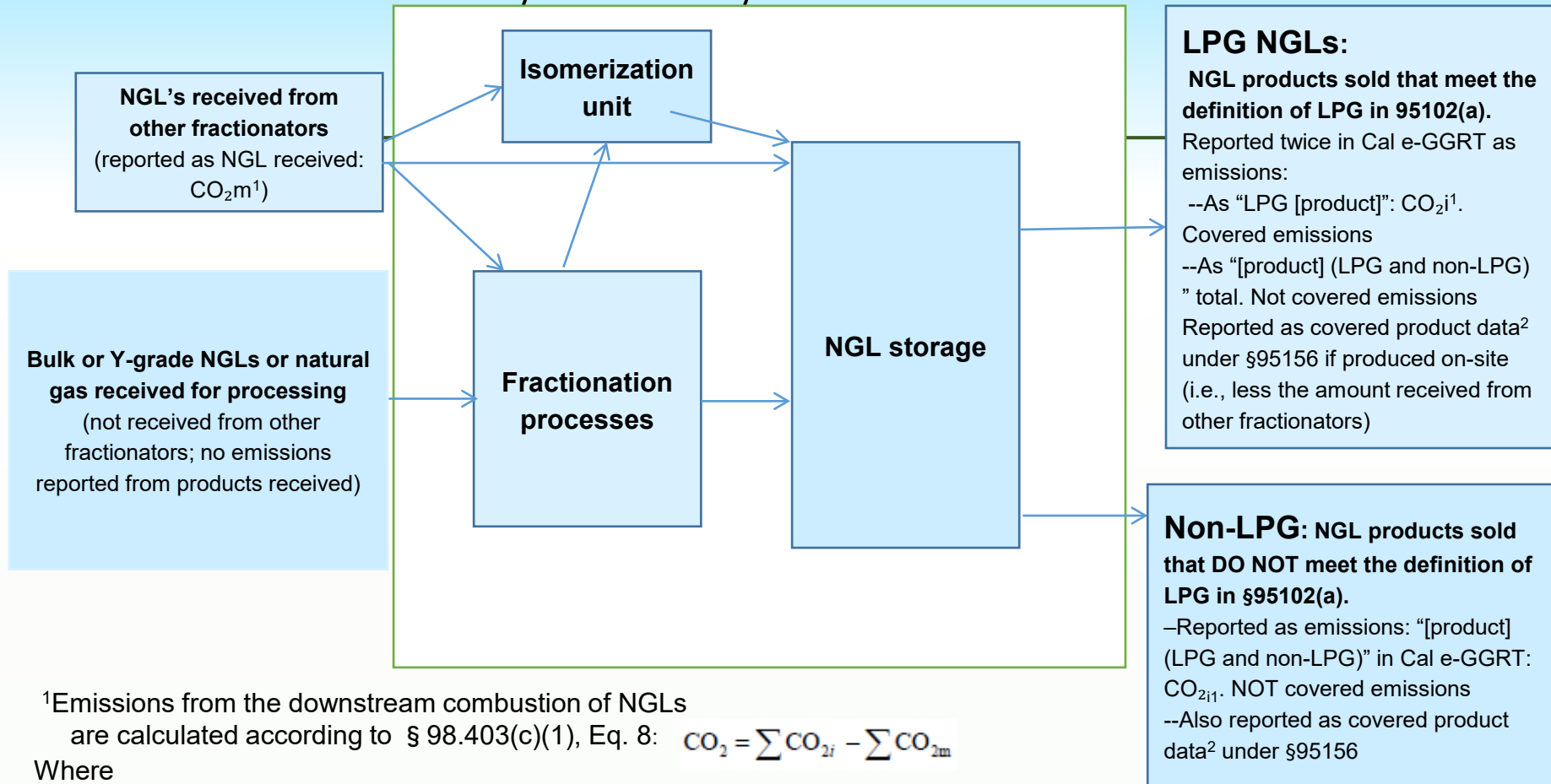
- Following requirements of 40 CFR Part 98 (Subpart NN)
- Use Equation NN-2 from §98.403(a)(2) and Table MM-1 to calculate emissions from NGL supplied ( $CO_{2j}$ )
  - $CO_{2j} = \sum Fuel_h * EF_h$ 
    - $Fuel_h$  = total annual volume of product “h” supplied (bbl per year)
    - $EF_h$  (from table MM-1) is in MT  $CO_2$ /bbl
  - Exclude NGL contained in bulk NGLs exiting the facility (e.g.,  $\gamma$ -grade, o-grade, and other bulk NGLs)
- Use equation NN-7 from §98.403(c)(1) and Table MM-1 to calculate emissions from NGL received ( $CO_{2m}$ )
  - $CO_{2m} = \sum Fuel_g * EF_g$ 
    - $Fuel_g$  = total annual volume of product “h” supplied (bbl per year)
    - $EF_g$  (from table MM-1) is in MT  $CO_2$ /bbl

# Calculation of Emission from NGL Combustion

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- Use Equation NN-8 from §98.403(c)(2) to calculate the NGL fractionator's emissions
  - $CO_2 = CO_{2j} - CO_{2m}$ 
    - $CO_{2j}$  = emissions from NGL supplied (Equation NN-2)
    - $CO_{2m}$  = emission from NGL received (Equation NN-7)
- $CH_4$  and  $N_2O$  emissions
  - Use the following equation and Table C-2 for EF
  - $CH_4$  or  $N_2O = 1 * 10^{-3} * \sum MMBtu_h * EF_h$

# NGL Fractionation Facility Boundary



<sup>1</sup>Emissions from the downstream combustion of NGLs

are calculated according to § 98.403(c)(1), Eq. 8:  $CO_2 = \sum CO_{2i} - \sum CO_{2m}$

Where

**CO<sub>2</sub>i** = Annual CO<sub>2</sub> mass emissions that would result from the combustion or oxidation of fractionated NGLs delivered to all customers or on behalf of customers

**CO<sub>2</sub>m** = Annual CO<sub>2</sub> mass emissions that would result from the combustion or oxidation of fractionated NGLs received from other fractionators (metric tons).

§ 95852(e)(1) "states that a producer of LPG...has a compliance obligation for every metric ton of CO<sub>2</sub>e included in emissions data report", so only the subset of fuels that meet the definition of LPG are considered covered emissions.

<sup>2</sup> Pursuant to § 95156(c), covered product data includes the "annual production of the following natural gas liquids in barrels". The volume of NGLs reported as product data only include those volumes fractionated by the reporting entity, and excludes any volumes received from other NGL fractionators

# Verifying Emissions from NGL Fractionators

## (1 of 2)

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- Evidence to request
  - GHG Monitoring Plan
  - Records of fuel production
    - Bills of lading for shipments
    - Metered data
  - Composition data of products supplied
  - Product specifications, especially for LPG (propane)
  - Any documentation on NGLs received from other fractionators (high risk!)

# Verifying Emissions from NGL Fractionators

## (2 of 2)

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- Fuel production measurement records should comply with measurement requirements and should be entered correctly into Cal e-GGRT
- The correct values from the emission factor and heating value tables should be entered correctly into Cal e-GGRT



# Verifying Covered Product Data from NGL Fractionators

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- All NGLs produced are considered covered products, so it includes LPG and non-LPG
- Information sources should be largely the same as emissions data
- Identify any differences (between §95156 product data and subpart NN [LPG + non-LPG])
  - Ask about source of difference
  - Covered product data should only include NGLs produced on-site
- LPG is one of the fuels produced by NGL fractionators: there are others
  - Verifiers - include all fuels in sampling plan

# Verifying Missing Data Substitutions for NGL Fractionators

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- Similar to transportation fuel suppliers, “missing” or invalid data is unlikely to be encountered, since the values verifiers see are likely already the result of established billing procedures
- However, verifiers should ask how invalid data would be counted and reconciled if measurement devices were malfunctioning or another error occurred
- Any adjustments in delivered volumes must be reviewed by verifier
  - Returns, reclassification, etc.

# Course 2: Transactions

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## **Complete:**

- Course 2.1: Electric Power Entities (EPE)
- Course 2.2: Suppliers of Transportation Fuels
- Course 2.3: Suppliers of Natural Gas, Natural Gas Liquids & Liquefied Petroleum Gas

## **Next:**

- Course 2.4: Suppliers of CO<sub>2</sub>