Verifier Accreditation Training for Mandatory Greenhouse Gas Reporting

Transactions Specialty
Course 2.1: Electric Power Entities

California Environmental Protection Agency
Air Resources Board

Welcome and Introductions

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MRR Verifier Accreditation: Course Content and Exams

Course 1: General Verification for Mandatory GHG Reporting

Course 2: Transactions Specialty

- 2.1 Electric Power Entities
- 2.2 Suppliers of Transportation Fuels
- 2.3 Suppliers of Natural Gas, Natural Gas Liquids, Liquefied Petroleum Gas, CNG and LNG
- 2.4 Suppliers of Carbon Dioxide (CO2)

Course 3: Oil and Gas Systems Specialty

Course 4: Process Emissions Specialty

Disclaimer

This accreditation training is intended to provide administrative detail and recommended practices for compliance with the verification provisions of the California Air Resources Board's (ARB) Regulation for the Mandatory Reporting of Greenhouse Gas (GHG) Emissions (Regulation) (Title 17, California Code of Regulations, § 95100-95158).

Unlike the Regulation itself, this training and associated materials do not have the force of law. The training and associated materials are not intended to and cannot establish new mandatory requirements beyond those that are already in the regulation, and they do not supplant, replace or amend any of the legal requirements of the regulation. Conversely, any omission or truncation of regulatory requirements does not relieve verification bodies, lead verifiers, verifiers of emissions data reports, or reporting entities of their legal obligation to fully comply with all requirements of the regulation.

Note: ARB verification accreditation exams are not limited to this verification accreditation training or associated materials. The exams may test on anything contained in the regulation, this accreditation training, and associated materials.

Course 2.1 Handouts

- Handout 2.1.1 – Illustrative e-Tag
- Handout 2.1.2 – EPE GHG Inventory Program Checklist
- Handout 2.1.3 – Case Study 3, Database of e-Tags (physical handout during class with answers)
- Handout 2.1.4 – Location of Interties (may be provided in class or as part of guidance)

Course 2.1 Zip Folder

Background information for participants – not suited for printing

- Workbook 1 EPE Importers and Exporters
- Workbook 2 Supplementary Data for MJRP
- Workbook 3 EPE Supp Data for WAPA and DWR SWP CY2013
- Workbook 4 EPE Optional Asset Controlling Supplier Report CY2013

Course 2.1 Electric Power Entities

1. Overview
   - Key Sections of MRR
   - Reportable Transactions
   - Electricity Primer
2. Assigning Emissions Factors to Electricity Generation Sources
3. Tracking Electricity Transactions
4. Reporting Information
5. Verification

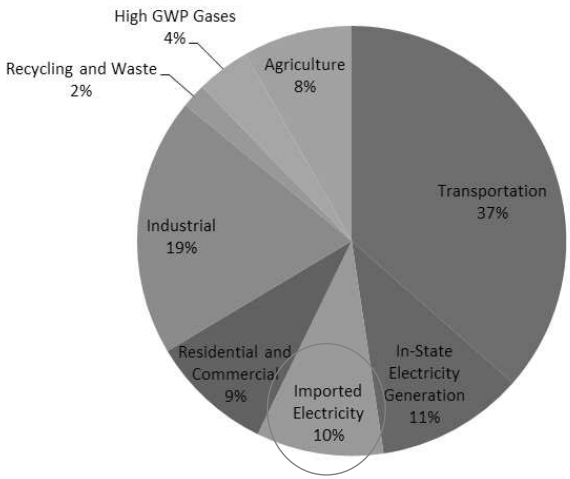
Transactions Specialist

- § 95111 – Electric power entities – Course 2.1
- § 95121 – Suppliers of transportation fuels (petroleum products and biofuels) – Course 2.2
- § 95122 – Suppliers of natural gas, natural gas liquids and liquefied petroleum gas – Course 2.3
- § 95123 – Suppliers of carbon dioxide – Course 2.4

Imported Electricity is a Significant Contributor to California's GHG Emissions

2012 California Emissions Inventory

44 Million MT CO_2e Imported Electricity



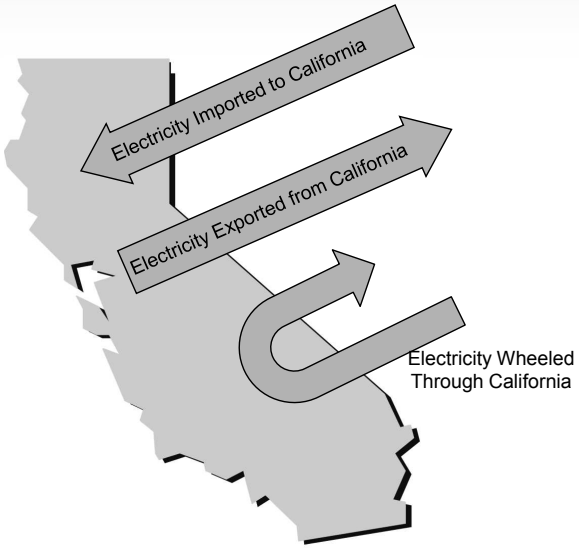
Key Sections of MRR on Reporting Electricity Transactions

- Reporting requirements for Electric Power Entities §95111
- Applicability §95101(d)
- Cessation of reporting §95101(h)(3)
- Cessation of verification § 95101(i)
- Definitions §95102
- Inventory documentation for Electric Power Entities §95105(d)

Electricity Imports and California's Cap-and-Trade Program

- First deliverers of electricity have a compliance obligation under Cap-and-Trade
  - Emissions associated with electricity generated in California
    - Addressed in Course 1.2 (Electricity Generating Units)
  - Emissions associated with electricity generated out-of-state and imported into California
- Why were electricity imports included in the program?
  - Statutory mandate to measure total emissions associated with California energy consumption (AB 32)
  - Large portion of electricity consumed in California is generated out-of-state. This reality of the California electricity sector requires imported electricity to be treated similarly to in-state generation. (2010 ISOR, page 164).

Overview of Transactions Reportable by EPEs



Why is Reporting of Electric Transactions Important?

- Imported Power – accounts for GHG emissions associated with electric power that is generated outside California but consumed inside the state
- Exported Power – documents electric power generated inside California but consumed outside of the State
- Wheeled Power – documents power generated outside California that passes through California but is consumed outside of the State

Electric Power generated and consumed inside California is excluded from electric transaction reporting (generation emissions are reported under § 95112)

Electricity Primer - Wholesale Electricity Market

- As verifiers under this specialty, you will be reviewing electricity transactions that occur in the wholesale electricity market
- Wholesale electricity market*
  - open access to anyone who, after securing the necessary approvals, can generate power, connect to the grid and find a counterparty willing to buy
  - includes independent power producers (IPPs) not affiliated with a utility, individual traders (or power marketers) who buy power on the open market and re-sell it, and traditional vertically integrated utilities who buy and sell power

*From: http://www.epsa.org/industry/primer/?fa=wholesaleMarket

Electricity Primer - The Wholesale Electric Market has a Multi-level Structure

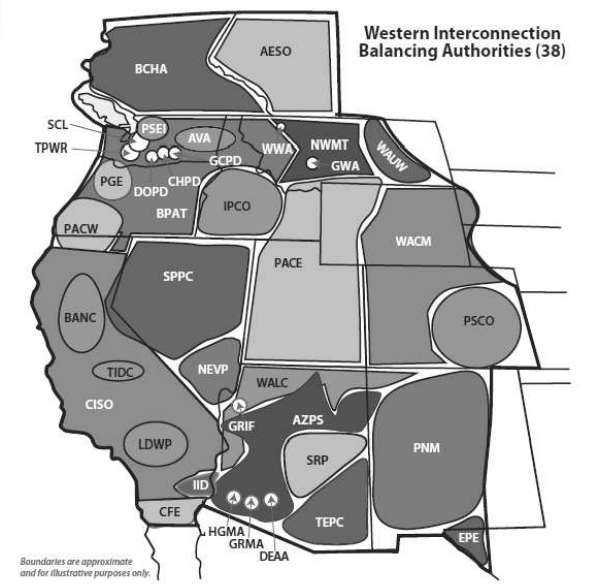
- Split structure of regional wholesale markets
  - markets organized under an independent system operator (ISO), aka regional transmission organization (RTO), such as CAISO
  - the movement of power is controlled by balancing authorities (BA)
  - vertically-integrated utilities retain functional control over the transmission system such as LADWP or PacifiCorp
- An ISO/RTO is a third-party independent operator of the transmission system
- ISO/RTOs conduct "spot" or real-time markets and "day-ahead" markets
- Regulated by the Federal Energy Regulatory Commission (FERC)

Electricity Primer - The Movement of Power is Controlled by "Balancing Authorities" (BA)

- Trading and scheduling – participants in the electricity market agree on transactions ahead of time. Power is scheduled to implement terms of agreements and meet the BA requirements
- Balancing authority areas integrate power resource plans ahead of time, maintain load-interchange-generation balance within a balancing authority area, and support interconnection frequency in real time*
- Note that MRR reporting boundaries are the geographical boundaries of California, not the balancing authority boundaries

*http://www.spp.org/publications/JTA%20List%20for%20BA%20Role.pdf

Western U.S. Balancing Authorities



https://www.ferc.gov/market-oversight/mkt-electric/wecc-balancing-authorities.pdf

California's Balancing Authorities

http://www.caiso.com/about/Pages/OurBusiness/UnderstandingtheISO/The-ISO-grid.aspx

Questions and ARB Comments

1. Overview
2. **Assigning Emissions Factors to Electricity Generation Sources**
   - **Specified vs. Unspecified Sources**
   - **Specified Sources Reporting Requirements**
   - **Direct Delivery Criteria**
3. Tracking Electricity Transactions
4. Reporting Information
5. Verification

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Types of Electric Power Entities that Submitted 2013 Emissions Data Reports

- Retail providers (30)
- Marketers (41)
- Multi-jurisdictional retail provider (1; PacifiCorp)
- Asset-controlling suppliers (2; BPA and Powerex)
- California Department of Water Resources
- Federal Western Area Power Administration
  - Sierra Nevada Region
  - Desert Southwest Region

Specified and Unspecified Sources (§ 95102(a))

What is a "specified source"?

- A single facility or unit which is permitted to be claimed as the source of electricity delivered
- An asset-controlling supplier (ACS) - entity that supplies electricity from a specific fleet of generation sources that is assigned an emission factor for the electricity procured from its system and imported into California
- Multiple dams, as long as they are considered as one project for FERC hydroelectric licensing purposes
- Power is delivered under contract to supply power from a specific generating facility or unit or by the generation-providing entity (GPE, defined in §95102(a))

- "Unspecified electricity" means a source of electricity not specified at the time of transaction (§ 95102(a))

Specified and Unspecified Sources - Emission Factors (§ 95111(b))

- Each <u>specified</u> source has an emission factor calculated by ARB based on the most recent data published by the US EPA (Part 98 data) and/or EIA (Form EIA 923)
  - Ranges from 0 MTCO2e/MWh to > 1 MTCO2e/MWh
- Unspecified source emission factor
  $EF_{\text{unspecified source}} = 0.428\ MTCO_2e/MWh$*
  - Calculated by ARB and Western Climate Initiative
  - Modeled to approximate the marginal generation that would be needed for an additional MWh of electricity imported to California

*http://www.arb.ca.gov/regact/2010/ghg2010/ghgisor.pdf , pages 167-169

Specified Source Reporting Requirements - Directly Delivered Electricity (1 of 2)

- Claims of specified source electricity must be "directly delivered," meaning that the actual power that flowed is what is reported (§ 95111(g)(3))
- Directly delivered electricity means electricity that meets <u>one</u> of four criteria (§ 95102(a)):
  1. Facility has first point of interconnection with a CA balancing authority
  2. Facility has first point of interconnection with distribution facilities used to serve end users within a CA balancing authority area
     (continued)

Specified Source Reporting Requirements - Directly Delivered Electricity (2 of 2)

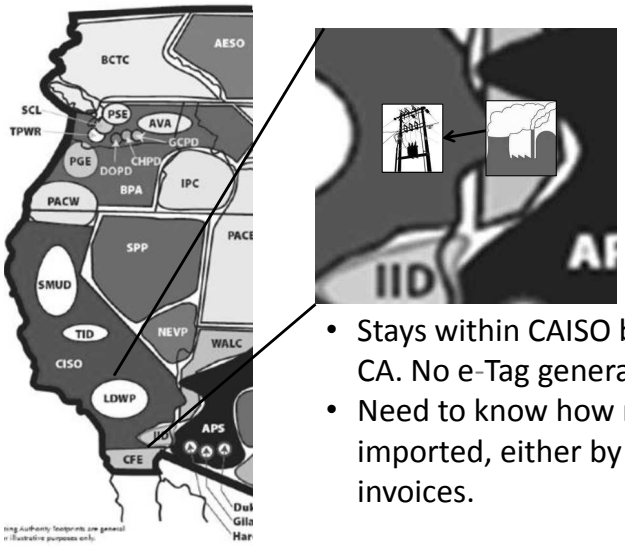
Directly delivered electricity means electricity that meets one of four criteria (§ 95102(a)) (continued):

3. **Electricity scheduled for delivery from specified source into a CA balancing authority area via continuous transmission path from interconnection of the facility in balancing authority area in which the facility is located to final point of delivery located in CA**
4. Agreement to dynamically transfer electricity from facility to a CA balancing authority

Direct Delivery Criterion 3 - Continuous Physical Transmission Pathway to California

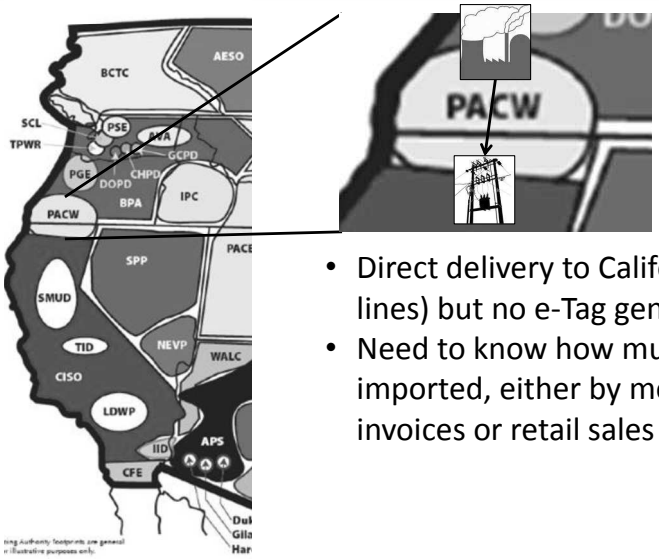
- Most common type of transaction
- "Electricity scheduled for delivery from specified source into a CA balancing authority via continuous transmission path from interconnection of the facility in balancing authority in which the facility is located to final point of delivery located in CA" (§ 95102(a))
- Any transaction among or between balancing authorities is tracked via e-Tag~~s~~ (discussed later)
- Also includes CAISO EIM transactions (discussed later)

Direct Delivery Criterion 1 - Facility has first point of interconnection with a CA balancing authority



- Stays within CAISO but source is outside of CA. No e-Tag generated.
- Need to know how much electricity was imported, either by metered data or invoices.

Direct Delivery Criterion 2 - First point of interconnection with distribution facility used to serve end users in a CA BA



- Direct delivery to California (crosses state lines) but no e-Tag generated
- Need to know how much electricity was imported, either by metered data and invoices or retail sales in the state

Direct Delivery Criterion 4 - Dynamic Transfer of electricity to CA BA

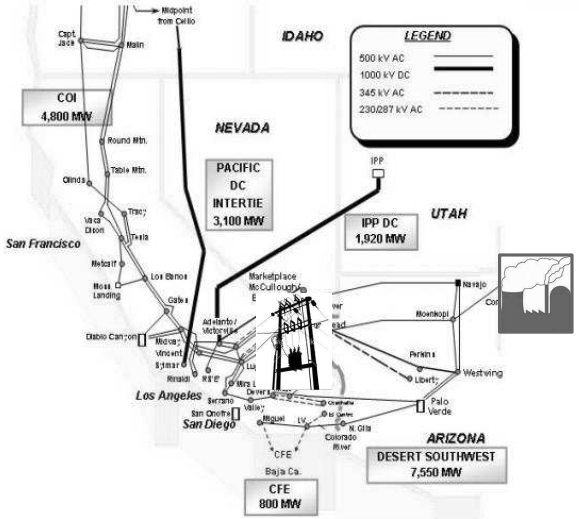


Figure 2 – California's 18,170 MW of EHV Transmission Interconnections

Different arrangement where sink BAA (like CAISO) controls dispatch. This is documented via e-Tag, so it's verified the same way as imports via continuous transmission path

Questions and ARB Comments

1. Overview
2. Assigning Emissions Factors to Electricity Generation Sources
3. **Tracking Electricity Transactions**
   - **NERC e-Tags**
   - **Reporting Imported Electricity Transactions**
   - **Reporting Wheeled Electricity Transactions**
4. Reporting Information
5. Verification

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NERC e-Tags Track Electricity Transactions

PSE = Purchasing-Selling Entity

POR = Point of Receipt

First Point of Receipt, also called the "Source"

POD = Point of Delivery

Physical Path								
CA	TP	PSE	POR	POD	Sched Entities	Contract	Misc (Token/Value)	
BPAT		PSE A	KFallsGen					
	BPAT	PSE B	KFallsGen	Malin500	BPAT			
	CISO	PSE C	Malin500	NP15	CISO		CAISO Product	ENGY
							CAISO Res ID	PCG2_MalN500_I_F_PPM_02
CISO			NP15				RPS ID	

Final Point of Delivery, also called the "Sink"

Border crossing (Malin500 is in OR, NP15 is in CA)

Tracking Electricity (*NERC e-Tags)* (1 of 2)

- North American Electric Reliability Corporation (NERC) energy tags (e-Tags)
- Represents transactions in bulk electricity markets scheduled to flow between or across balancing authority areas
- Identifies the "purchasing-selling entity" (PSE) for each physical path segment

Tracking Electricity (*NERC e-Tags)* (2 of 2)

- Identifies the "first deliverer" – the PSE on the last segment that crosses the physical border of California
- E-tags are not available for all power transactions
- E-tags cannot be used to establish specified vs. unspecified sources: this is done by looking at contract and generation-providing entity information

Reporting Imported Electricity Transactions (1 of 2)

- *Imported electricity* is electricity generated outside the state of California and delivered to serve load located inside the state of California
- The electricity is reported by the *purchasing-selling entity o*f the electricity when it crosses the border into California
- For reporting imported electricity, individual transactions may be grouped together - (aggregated/disaggregated) § 95111(a)(2)
  - Individual **unspecified import** transactions with the same first point of receipt listed on all e-Tags (the first POR listed on the e-Tag) can be summed together for reporting
  - Individual **specified import** transactions with the same first point of receipt AND same specified generation source can be summed together for reporting

Review of Electricity Transaction Terminology

- *Point of receipt (POR)* – interconnection or substation where power is received (NERC Registry defined points that are listed as PORs on e-Tags).-The "First Point of Receipt" is the first POR listed on the e-Tag (also called the "source")
- *Point of delivery (POD)* – interconnection or substation where power is delivered. The "Final Point of Delivery" is the last POD listed on the e-Tag (also called the "sink").
- *Purchasing selling entity (PSE)* – means the entity that is identified on the NERC e-Tag for each physical path segment.

Specifying the First Deliverer

- The first deliverer is the PSE on the last CA border crossing
- In the workbook, reporter identifies when they are the first deliverer
  - If so, emissions are counted for that transaction
- Retail providers must, in addition, report transactions where another entity imports power on their behalf to serve the retail provider's load (§ 95111(c))

Reporting Imported Electricity Transactions (2 of 2)

Examples of electricity imports include:

- Power delivered in California across balancing areas--documented via e-Tag
- Power imported into California over a multi-jurisdictional retail provider's transmission and distribution system, e.g., PacifiCorp
- Power imported from a generating facility located outside California but inside CA balancing area; for example, the La Rosita power plant in Mexico
- CAISO energy imbalance market (EIM) went live in November 2014. E-Tags only show net energy exchange among BAs, and no PSE information, so will need to rely on market results publication which will document regulated entities.

Which PSE reports this import?

Who reports this import?

Imported Electricity Example

"Source" or "first point of receipt".

				Physical Pat				
CA	TP	PSE	POR	POD	Sched Entities	Contra ct	Misc (Token/Value)	
BPAT		PSE A	KFallsGen					
	BPAT	PSE B	KFallsGen	Malin500	BPAT			
	CISO	PSE C	Malin500	NP15	CISO		CAISO Product	ENGY
							CAISO Res ID	PCG2_MalN500_I_F_PPM_02
CISO			NP15				RPS ID	

"PSE C" is the PSE at the border crossing into California, and must report this transaction.

Sink or "final point of delivery"

The "Source" is outside California and the "Sink" is inside California, so this transaction is reported as an electricity import.

Reporting Exported Electricity Transactions

- *Exported electricity* is electricity generated inside California and delivered to serve load located outside the state
- Electricity exports are reported by the entity with rights to the electricity when it crosses the border out of California (the "purchasing-selling entity" listed on the e-Tag at the border crossing)
- Per § 95111(a)(2), for reporting exports, individual transactions are grouped together as follows
  - Unspecified exports with the same final point of delivery (sink) listed on the e-Tag (the last POD listed on the e-Tag) are summed together for reporting
  - Specified exports with the same final point of delivery AND same specified generation source are summed together for reporting
- Exports are not included in covered emissions

Example e-Tag for an Electricity Export

Source/first POR is inside CA

Physical Path

CA	TP	PSE	POR	POD	Sched Entities	Contract	Misc (Token/Value)	
		PSE A	SP15					
	CISO	PSE B	SP15	PVWest	CISO			
	CISO	PSE C	PVWest	PaloVerde 500	CISO			
	SRP	PSE C	PaloVerde 500		SRP		RPS ID	

"PSE B" is the PSE at the border crossing out of California and must report this transaction as an export.

Sink/Final POD is outside CA.

Reporting Wheeled Electricity Transactions (1 of 2)

- Wheeled electricity is electricity that is generated outside the state of California and delivered into California with the final point of delivery outside California
- Wheeled electricity transactions are reported separately from imports or exports
- Wheeled electricity transactions are reported by the purchasing-selling entity when it crosses the border out of California (the PSE listed on the e-Tag at the **last** border crossing)
- Per § 95111(a)(2), for reporting wheeled power, individual transactions with the same first point of receipt (source) listed on the e-Tag are summed together for reporting

Reporting Wheeled Electricity Transactions (2 of 2)

- A wheeled electricity transaction is
  - Documented on a single e-Tag
  - Not included in total or covered emissions
  - Different from an exchange, which happens between or among two or more e-Tags. Exchanges must be reported as a separate import and export.
- "Electricity Wheeled through California"
  - Note this term is defined in MRR – the term has a more general meaning when used in industry
  - A transaction with source and sink both inside California is NOT reported

Who Reports this Wheeled Transaction?

Aggregating Reported Transactions (1 of 2)

- Transactions are grouped (aggregated) based on reporting emissions disaggregated by delivered electricity categories
- Delivered electricity (MWh) disaggregated by first point of receipt (first POR) or final point of delivery (sink)
  - Imported from unspecified sources (first POR)
  - Imported from specified facilities or units (by specified facility, then first POR)
  - Imported supplied by asset-controlling suppliers (by ACS and then first POR)

Aggregating Reported Transactions (2 of 2)

Transactions are classified based on reporting categories

- Exported (specified, unspecified, qualified exports are subset) (aggregated by sink)
- Wheeled (aggregated by first POR)
- Exchange agreements (report as separate imports and exports) (aggregated by POR/POD)

Questions and ARB Comments

1. Overview
2. Assigning Emissions Factors to Electricity Generation Sources
3. Tracking Electricity Transactions
4. **Reporting Information**
   - **Requirements**
   - **Unspecified imports**
   - **Examples**
5. Verification

Reporting of Information (1 of 2)

- All required data is submitted via ARB Excel workbooks (XML upload to Cal e-GGRT)
  - Workbook 1 is for retail providers and marketers (most common)
  - Workbook 2 is for Multi-Jurisdictional Retail Providers
  - Workbook 3 is for WAPA and DWR
  - Workbook 4 is for Asset-Controlling Suppliers
- Excel workbooks provided to you in zip files. (For reference only—latest version will be on Cal e-GGRT site)
- Workbook 1 is uploaded via XML to create final data report. Reporting entities can use workbook to check data, but must ensure that final report submitted to Cal e-GGRT is accurate

Reporting of Information (2 of 2)

- Workbooks contain all emissions reporting requirements
- Includes calculation of covered emissions (basis for material misstatement calculation)
  - Also includes calculation of total emissions which does not include QE and RPS adjustments
- Emissions disaggregated by delivered electricity categories

Workbook 1

CALCULATION OF COVERED EMISSIONS per 95111(b)(5)

$$CO_2e_{covered} = CO_2e_{unspecified} + (CO_2e_{specified} - CO_2e_{specified-not\ covered}) - CO_2e_{RPS_adjustment} - CO_2e_{QE_adjustment} - CO_2e_{linked}$$

COVERED		Unspecified Imports	Specified Imports	Specified Not Covered	RPS Adjustment	QE Adjustment	Linked
[$CO_2e_{covered}$] Annual metric tons of CO_2e with a compliance obligation.	=	[$CO_2e_{unspecified}$] Annual metric tons of CO_2e from unspecified imported electricity calculated pursuant to MRR 95111.	[$CO_2e_{specified}$] Annual metric tons of CO_2e from imported electricity from specified sources that meet the requirements of MRR sections 95111.	[$CO_2e_{specified-not\ covered}$] Annual metric tons of CO_2e without a compliance obligation pursuant to section 95852.2 from specified sources that meet the requirements in MRR section 95111	[$CO_2e_{RPS_adjustment}$] Annual metric tons of CO_2e calculated pursuant to MRR that meets the requirements of section 95852(b)(4).	[$CO_2e_{QE_adjustment}$] Annual metric tons of CO_2e from qualified exports pursuant to MRR section 95111 that meet the requirements of section 95852(b)(5).	[CO_2e_{linked}] Annual metric tons of CO_2e from electricity with a first point of receipt located in a jurisdiction where a GHG emissions trading system has been approved for linkage by the Board pursuant to subarticle 12.
0		0	0	0	0	0	0

INVENTORY ONLY CALCULATION

TOTAL EMISSIONS		Unspecified Imports	Specified Imports
[$CO_{2e\ Total}$] Annual metric tons of CO_2e	=	[$CO_2e_{unspecified}$] Annual metric tons of CO_2e from unspecified imported electricity calculated pursuant to MRR 95111.	[$CO_2e_{specified}$] Annual metric tons of CO_2e from imported electricity from specified sources that meet the requirements of MRR sections 95111.

Instructions | Version | Guidance | Data Export XML | Reporter Info | COVERED EM CALC | Retail Provi

Handout 2.1.2 - Workbook 1 - EPE Importers and Exporters

First Deliverer Determination

Only "Yes" line items are included in covered emissions

For reporting under 95111(c)(4), retail providers must report imports by others on their behalf. For these, mark "no". Excluded from covered emissions.

FIRST DELIVERER DETERMINATION

Required = Validation check!

Are YOU the PSE on the NERC eTag in the Physical Path table on the last California border crossing? If yes, then you are the First Deliverer. (Required)	Name of the First Deliverer? Select from List, or enter "Other" (Required)	If you selected "Other", who is the First Deliverer?	Your Relationship to the Specified Source Transaction, e.g., "I am the ___."
Yes	3 Phases Renewables - 3006		Party to a Specified Power Contract
Yes	3 Phases Renewables - 3006		Party to a Specified Power Contract
No	3 Phases Renewables - 3006		Party to a Specified Power Contract

Direct Delivery and First Deliverer Example

Physical Path								
CA	TP	PSE	POR	POD	Sched Entities	Contract	Misc (Token/Value)	
BPAT		PSE A	KFallsGen					
	BPAT	PSE B	KFallsGen	Malin500	BPAT			
	CISO	PSE C	Malin500	NP15	CISO		CAISO Product	ENGY
							CAISO Res ID	PCG2_MalN500_I_F_PPM_02
CISO			NP15				RPS ID	

"PSE C" is the PSE at the border crossing into California, and is therefore the first deliverer and must report this transaction.

This electricity was imported because the source (KfallsGen) is outside CA and the sink (NP15) is inside CA

Electric Power Entities (EPEs) - e-Tag Records

- EPEs have access to all e-Tags where they were PSEs, **regardless of proximity to California,** as part of a large, third-party database maintained for electricity reliability
- EPEs (or their contractors) will query the database based on parameters designed to meet MRR requirements
- They then report a subset of transactions where they are the required reporter under MRR
- Here's what to look for in that database query, tracking the reported data back to the source:

Order of Operations for Reporting

1. Query NERC e-TAG data
2. Sort queried data
3. Identify interties
4. Retain only PSE transactions
5. Clarify import and export deliveries
6. Select specified imports transmission loss factor
7. Disaggregate specified imports
8. Conduct lesser-of analysis
9. Aggregate unspecified transactions

Example of Order of Operations for Reporting Entity - Source Data → Reported Data (1 of 5)

1. Query NERC e-Tag data for all schedules implemented (electricity flowed) in calendar year where
   - Entity appears as a purchasing selling entity on any segment of the physical path **and**
   - Any POR/POD is located inside California
2. Sort queried data into imports, exports, wheels
   - Imports - Source outside CA and sink inside
   - Exports - Source inside CA and sink outside
   - Wheels - both source and sink outside CA with one or more intermediate POR/POD(s) inside

Example of Order of Operations for Reporting Entity - Source Data → Reported Data (2 of 5)

3. Identify interties on each side of California geographical boundary for each transaction's physical path
4. Retain only transactions for which the reporting entity is identified as the PSE on the last physical path segment crossing CA geographical boundary

Example of Order of Operations for Reporting Entity - Source Data → Reported Data (3 of 5)

5. Classify queried import and export deliveries (MWh) as Specified Source or Unspecified Source, based on additional records such as ownership, contracts, invoices consistent with direct delivery requirements

   Imports – Unspecified and Specified (Facility A, Facility B, Facility C, etc.)

   Exports – Unspecified and Specified (Facility X, Facility Y, Facility Z, etc.)

Example of Order of Operations for Reporting Entity - Source Data → Reported Data (4 of 5)

6. For specified imports, reporting entity
   - Applies TL factor of 1.0 (0% loss) when losses are supported by CA balancing authority, made up by CA electricity sources, or other evidence provided to verifier that losses are accounted for (ARB will issue guidance on TL)
   - Applies transmission loss (TL) factor 1.02 (2% loss) when losses are otherwise unaccounted for or no evidence can be provided that reported value accounts for losses

Example of Order of Operations for Reporting Entity - Source Data → Reported Data (5 of 5)

7. Disaggregate specified imports for emissions data year by generating facility or unit and "source" on e-Tag
8. Conduct Lesser-of analysis (discussed later)
9. Aggregate unspecified transactions
   - Imports by "source" shown on the physical path
   - Exports by "sink" shown on the physical path
   - Wheels by "source" shown on the physical path

Questions and ARB Comments

1. Overview
2. Assigning Emissions Factors to Electricity Generation Sources
3. Tracking Electricity Transactions
4. Reporting Information
5. **Verification**
   - **Verifying Data**
   - Case Studies
   - Verification Process

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How to Verify Data Reported via e-Tags (1 of 5)

- Review GHG Inventory Plan (should contain description of e-Tag database query used)
  - Review query for consistency with MRR
- Interview staff about query construction
- Review spreadsheet or database for consistency with reported data
- Ask staff to download sample of raw data while on-site (or via webinar) to ensure consistency with reported data
  - E.g., compare control totals for representative period time between raw (third-party database) and reported

How to Verify Data Reported via e-Tags (2 of 5)

- Sample a number of "paper" e-Tags (likely PDF) from the database
- Consider requesting read-only access to database (including links to "paper" e-Tags) to allow for dynamic sampling

How to Verify Data Reported via e-Tags (3 of 5)

- **Don't assume data presented is complete.** Verifiers must confirm that no reportable transactions were excluded—i.e., do not merely sample from transactions in emissions data report –look at raw data
- Consider risk associated with not using primary data (e.g., OATI vs. "mirror database")

How to Verify Data Reported via e-Tags (4 of 5)

Document your approach in sampling plan

- How did you verify the construction of the query? Was it explained adequately? Did you ask staff to compare raw and reported data?
- What were the risks identified for data management, reporting, and for different types of transactions?

How to Verify Data Reported via e-Tags (5 of 5)

Document your approach in sampling plan (continued)

- Did you trace data all the way to raw data, rather than relying on spreadsheet copies?
- How many e-Tags were reviewed and why was that sufficient for reasonable assurance? Did you sample e-Tags from all known transactions, or did you rely on the data provided?

Verification of CAISO EIM Entities (1 of 2)

- California ISO Energy Imbalance Market began operation on November 1, 2014
- EIM allows for real-time trading among additional balancing authorities in the west, including PacifiCorp
- Can result in electricity imports/exports; not documented on e-Tag, so different steps required by reporter and verifier
- Helpful background included in reporter FAQ document posted: http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep-power/eim-faqs.pdf

Verification of CAISO EIM Entities (2 of 2)

- Subject to same reporting and verification requirements as other EPEs
- E-Tags are not used in reporting EIM: EPEs will download CAISO data and maintain their own database used for reporting
- CAISO maintains original data on their servers for 3 years for raw data checks
  - Verifiers MUST ask EPEs to recreate data to have reasonable assurance data is complete and not edited
  - ARB plans to add FAQs to guidance to discuss verification

Notes on Specified Imports Section of Workbook

- Physical Transaction Attributes (MWhs) - choose facility from a dropdown menu or input
- ARB Emissions Factors automatically imported after facility selected (unless new)
- Manual emissions factor (generally not used)
- ARB Emissions Calculation - exempt and non-exempt
- REC status – serial numbers uploaded
  - However, RECs do not need to be retired for imports
  - Must be retired for RPS adjustment though! (discussed later)

RPS Adjustment Guidance

$$CO_2e_{covered} = CO_2e_{unspecified} + (CO_2e_{specified} - CO_2e_{specified-not\ covered}) - CO_2e_{RPS_adjustment} - CO_2e_{QE_adjustment} - CO_2e_{linked}$$

- RPS adjustment can be claimed for electricity procured for RPS compliance but <u>not</u> delivered to California by the reporting entity
- REC serial numbers must be uploaded to Cal e-GGRT
- RECs must be placed in retirement subaccount by July 15th
- RECs retired must be used to comply with CA RPS requirements during the same year the RPS adjustment was claimed (§ 95852(b)(4))
- Reduces covered emissions so must be reviewed closely
- RPS facilities http://www.energy.ca.gov/portfolio/documents/list_RPS_certified.html

RECs in "RPS Adjust" tab

RPS ADJUSTMENT REQUIREMENTS – Field Set from Workbook 1 in the RPS Adjustment Tab

ELIGIBLE RESOURCE Is the power from an Eligible Renewable Energy Resource, per Section 95802(a) (Y/N)	RIGHTS Electricity Importer Must Have Either of the following, per 95852(4)(A)	REC STATUS RECs must be used to comply with California RPS requirements during the same year in which the RPS adjustment is claimed, per 95852(4)(B)	REC DATE Date RECs Retired in WREGIS Subaccount?	DELIVERY No RPS adjustment may be claimed for an eligible renewable energy resource when its electricity is directly delivered, per 95852(4)(D).	ELIGIBLE RESOURCE Is the power from an Eligible Renewable Energy Resource, per Section 95802(a) (Y/N)	RIGHTS Electricity Importer Must Have Either of the following, per 95852(4)(A)	REC STATUS RECs must be used to comply with California RPS requirements during the same year in which the RPS adjustment is claimed, per 95852(4)(B)	DELIVERY No RPS adjustment may be claimed for an eligible renewable energy resource when its electricity is directly delivered, per 95852(4)(D).	ELIGIBLE RPS ADJUSTMENT Eligible for RPS Adjustment?
Yes	Ownership or Contract Rights	Retired in WREGIS	5/1/13	Not Directly Delivered to CA	0	0	0	0	Eligible
Yes	On Behalf of Owner or Contracted Entity	Will Be Retired Later		1st POR via Distribution Grid	0	0	1	1	No
No	Neither	Uncertain, Did Not Buy RECs		Not Directly Delivered	1	1	1	1	No
Yes	Ownership or Contract Rights	Uncertain, Sold the RECs		Not Directly Delivered	0	0	1	1	No

These questions determine RPS adjustment eligibility

Must result in all zeroes to appear as "eligible".

If not eligible, the emissions are not subtracted from covered emissions

QE Adjustment

- "Qualified export" (C&T § 95802(a)) means electricity that is exported simultaneous (meaning **in the same hour)** as imported electricity and documented by NERC e-Tags
  - Imports and exports must occur in the same hour
  - The entity can reduce their covered emissions by reporting any "simultaneous" imports and exports.

Retail Provider Reporting Requirements

- Retail providers have additional reporting requirements outlined in § 95111(c) and § 95111(a)(12)
- Review reporting for consistency with § 95111 - conformance only; does not affect materiality
- All requirements that must be verified are included in Workbook 1
- Must report California retail sales
  - Retail providers with no imports/exports and not classified as confidential, verification is optional

Retail Providers - Imports on Behalf

- Retail providers must report all imports made by others on their behalf to serve load
- Not part of covered emissions calculation; review for conformance only

For Retail Providers Only: Imports By Others on Behalf of Retail Providers, per Section 95111(c)(4)		
If you are a Retail Provider, was the Power Brought in on Your Behalf? See 95111(c)(4)	Isp = Imported MWh OWNED by Retail Provider from the Facility and Imported ON BEHALF of Retail Provider per Thresholds (MWh)	Non-exempt Emissions Associated with Power Imported on Behalf of Retail Provider per Thresholds (MT CO_2e)
	0	0

Retail Providers - Electricity "Not Imported"

Pursuant to 95111(c)(3)(C), retail provider must report high-GHG electricity to which they are entitled but are not importing ("laying off")

Ownership & High GHG Threshold			CO2e Not Imported, per Section 95111(c)(3)(C)(1)					
If any of the following apply, the resource is "Owned": Does the Retail Provider (1) operate the resource, (2) fully or partially owned the resource, and/or (3) have a Specified Source Contract for a SHARE of the Total Capacity or Total Output of the Facility, as opposed to a Fixed Amount? 95111(c)(3)	This IS or IS NOT considered a High GHG Resource as it is above 0.428 MT CO2e/MWh per 95111(c)(3)	This IS or IS NOT considered "Reportable Power" where power meets the Combined Criteria Under Section 95111(c)(3) for Ownership & GHG Level	Whole Facility Net Generation: EGsp = "Facility or unit net generation" which means Total Annual Facility or Unit Net Generation for the WHOLE facility for the entire Reporting Year (MWh)	Ownership Share: OS = Fraction Ownership Share in Facility or Unit	Retail Provider Share: Product of Net Generation and Ownership Share (MWh)	Isp = Imported MWh Owned by Retail Provider from the Facility (MWh)	NOT Imported (MWh)	Imported Total MT CO2e
	Low GHG	No			0		0	0

Must be "owned"

Must be "high GHG" (EF >0.428 $MTCO_2e$/MWh)

If "yes", they must fill in columns to right. If "no", they stop here.

Net gen times OS = retail provider share

If retail provider share * 90% > imported MWh, must report replacement electricity

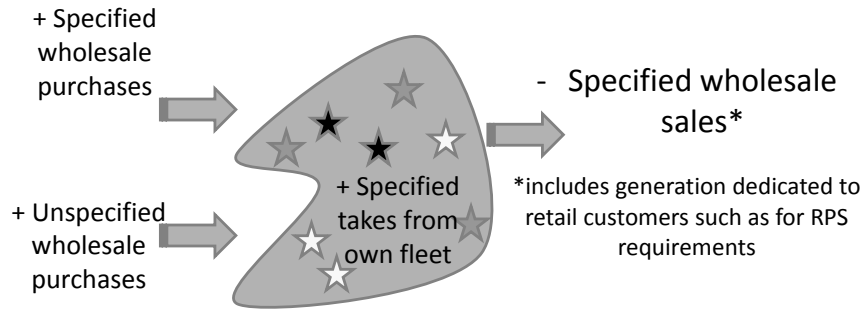
Reporting Requirements for WAPA and DWR

- WAPA must include all information for retail providers, and the amount of electricity used for pump loads to operate the Central Valley Project
- DWR must include all information for retail providers, and the amount of electricity used for pump loads to operate the State Water Project

Reporting Requirements for Asset-Controlling Suppliers and Multi-Jurisdictional Retail Providers

- Currently only 2 asset-controlling suppliers and 1 multi-jurisdictional retail provider (potentially more in future)
- Additional data are required for ARB to calculate a system emission factor
- Asset-Controlling Supplier participation is voluntary; if decision made to report, then subject to all facets of program
- MJRP must report out-of-state retail sales (as well as in-state)

Footprint Calculation for ACSs and MJRPs



Questions and ARB Comments

1. Overview
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   - **Case Studies**
   - Verification Process

California Environmental Protection Agency
Air Resources Board

Case Study 1 - Covered Emissions

A retail provider procures electricity from three eligible renewable energy resources to meet the requirements of California's RPS and retires the Renewable Energy Certificates (RECs):

- Facility A: Wind power facility in Washington, which produces 125,000 MWh. The total net electricity generated is sold by the retail provider into the local balancing authority area. The retail provider purchases 125,000 MWh of bulk system power and imports it into California to meet its load.
- Facility B: Solar photovoltaic facility in Nevada, which produces 12,500 MWh. The retail provider directly schedules this power into the CAISO day ahead market and is the purchasing selling entity on the NERC e-tag on the physical transmission path that crosses into California and sinks in California.
- Facility C: Biomass burning facility in Oregon, which produces 20,000 MWh and is measured at the busbar. The retail provider is the PSE on the NERC e-tag on the physical transmission path that crosses into California and sinks in California. ARB specified emission factor is 1 $MTCO_2$/MWh. (Ignore CH_4 and N_2O for this example.)

1. **Calculate the emissions associated with each of these electricity purchases to find the total covered emissions.**
2. **Discuss what happens if RECs are not retired for renewable transactions.**

Case Study 1 - Covered Emissions Solution (1 of 2)

- Facility A - This is two transactions and should not be combined until entered into the Covered Emissions Equation.
  - RPS Adjustment - 125,000 MWh x 0.428 MT CO_2e/MWh = 53,500 MT CO_2e
  - Unspecified Purchase - 125,000 MWh x 0.428 MT CO_2e/MWh x 1.02 = 54,570 MT CO_2e
- Facility B - This is directly delivered electricity with EF=0 MT CO_2e/MWh. It is entered into the Covered Emissions Equation as a specified import.
- Facility C - Specified-Not Covered: 20,000 MWh x 1 MT CO_2e/MWh = 20,000 MT CO_2e

Case Study 1 - Covered Emissions Solution (2 of 2)

- Covered Emissions Equation

  CO_2e(unspecified): 54,570 MT CO_2e

  + CO_2e(specified) – CO_2e(not covered): (20,000 – 20,000) = 0

  – CO_2e(RPS_adjustment): 53,500 MT CO_2e

  = 1,070 MT CO_2e
- If RECs weren't retired, two possible outcomes
  1. RECs not retired during a direct delivery of renewable energy is okay if serial numbers uploaded
  2. RECs not retired in an RPS adjustment invalidates the RPS adjustment and could affect materiality.

$$CO_2e_{covered} = CO_2e_{unspecified} + (CO_2e_{specified} - CO_2e_{specified-not\,covered}) - CO_2e_{RPS_adjustment} - CO_2e_{QE_adjustment} - CO_2e_{linked}$$

Case Study 2 - Covered Emissions

Calculate the total covered CO_2e emissions in metric tons for a retail provider with the following types of transactions

- #1 - 500,000 MWh imported electricity from unspecified sources, aggregated at various transmission source points.
- #2 - 150,000 MWh imported electricity from a specified facility under contract, measured at the busbar. The ARB-calculated facility-specific emission factor is 1 MT CO_2e/MWh.
- #3 - 10,000 MWh purchased under contract from an eligible renewable energy resource outside of California to meet RPS requirements, but does not meet the definition of *directly delivered electricity* in section 95102(a). RECs are ***not*** retired.
- #4 - 15,000 MWh geothermal directly delivered from Nevada and measured at the busbar. Emission factor of 0.073 $MTCO_2e$/MWh.
- #5 - 20,000 MWh electricity from verified biomass fuels directly delivered from Oregon and **not** measured at the busbar. Emission factor of 1.376 $MTCO_2e$/MWh.
- #6 - 250,000 MWh electricity –Transmissions source and sink points on e-Tag are both located inside CA.

Case Study 2 - Covered Emissions Solution (1 of 2)

- Transaction 1 - Unspecified Transaction 500,000 MWh x 0.428 MT CO_2e/MWh x 1.02 = 218,280 MT CO_2e
- Transaction 2 - Specified Transaction 150,000 MWh x 1 MT CO_2e/MWh = 150,000 MT CO_2e
- Transaction 3 - Not a specified import (since not directly delivered) and not eligible for RPS adjustment because RECs not retired
- Transaction 4 - Specified 15,000 MWh x 0.073 MT CO_2/MWh = 1,095 MT CO_2e (not covered)

Case Study 2 - Covered Emissions Solution (2 of 2)

- Transaction 5 - Specified 20,000 MWh x 1.376 MT CO_2e/MWh x 1.02 = 28,070 MT CO_2e (not covered)
- Transaction 6 - In-state electricity is not an import
- Covered Emissions Equation

  [**CO_2e unspecified**: (#1) 218,280 MT] + [**CO_2e specified**: (#2) 150,000 MT + (#4) 1,095 MT + (#5)28,070 MT] **–** [**CO_2e,specified-not covered**: (#4) 1,095 MT + (#5)28,070 MT] = 368,280 MT CO_2e

$$CO_2e_{covered} = CO_2e_{unspecified} + (CO_2e_{specified} - CO_2e_{specified-not\ covered}) - CO_2e_{RPS_adjustment} - CO_2e_{QE_adjustment} - CO_2e_{linked}$$

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California Environmental Protection Agency
Air Resources Board

Verification Applicability

- § 95103(f) Verification is required if either applies
  - EPE is an electricity importer or exporter in the current reporting year (defined terms in § 95102(a))
  - EPE was electricity importer/exporter and does not meet cessation of verification requirements (§ 95101(i))
- Wheels are not considered an import or export--separate category
- Retail providers that are not importers/exporters do not require verification if retail sales are listed as non-confidential

Verification Process

- Download Cal e-GGRT report and reporter workbook
- Request
  - GHG Inventory Program (§ 95105(d))
  - Any management documentation, which may include OATI's specifications for WebCARB, or internal collation of data based on settlements; this should include information on how NERC e-Tags are queried
  - Copies of reports submitted to person responsible for reporting, including OATI data files or other settlement files
  - Access to OATI and other settlement systems to review individual transactions

The GHG Inventory Program § 95105(d)

Information on

1. Boundaries
2. Management policies
3. Key personnel
4. Training practices
5. NERC e-Tag source data and query description
6. Data management systems and records, contracts, etc.
7. Steps and calculations used to aggregate data
8. Records of preventive and corrective actions taken in the past
9. Log of emissions data report modifications made after initial certification
10. Written description of internal audit program

Planning and Site Visit (full verification) (1 of 2)

- Prepare a Verification Plan (as discussed during Course 1)
- Prepare Preliminary Sampling Plan
  - Rank categorization of emission sources (imports and exports separately)
    - Consider ranking by MWh. May separate specified and unspecified
  - Consider uncertainty in your narrative, both quantitative and qualitative
  - Consider risk of under or over reporting

Planning and Site Visit (full verification) (2 of 2)

Conduct Site Visit

- Review GHG Inventory Program and confirm EPE follows steps outlined
- Ask responsible staff to walk through the process from starting with raw eTag data queries to input to the GHG report
- Confirm control totals for imports, exports, and wheels
- Interview staff about query construction
- Ask staff to recreate sample of queried data while on-site

Verifying in Less-Intensive Year

- Site visit not required, but still might be time-efficient
- What has changed this year?
  - Is there a strong monitoring plan? Was it updated?
  - Are there new contracts or are they all carried over?
  - Have query parameters changed?
- Consider webinar at minimum
  - Ask for re-creation of sample of data (from OATI database, etc) while on webinar
  - May review contracts for conformance
- MUST verify control totals—sampling only eTags from among reported data is not sufficient for reasonable assurance

Data Checks (1 of 2)

Revise sampling plan

- Identify those tags you intend to review, and why
  - Because you have determined some uncertainty, perhaps in reporting procedures while on your site visit
  - Because they document very high or very low volume imports
  - Because they represent imports from specified sources
  - Random selection of tags to confirm correct reporting

Data Checks (2 of 2)

You may have electronic access to database for dynamic sampling. If not, you will need to ask for PDFs

- **Don't assume data presented is complete:** Verifiers must confirm that no reportable transactions were excluded - i.e., do not merely sample from transactions in emissions data report
- Go back to settlement reports, randomly select some tags and confirm that they are included in the Cal e-GGRT report

Asset-Controlling Supplier (ACS) Power

- Asset-Controlling Supplier is an entity that supplies electricity from a specific fleet of generation and is assigned a system-wide emission factor for electricity provided by that entity
- Treated the same as specified power with regard to contract requirements and seller warranty
  - One exception: Purchasing power directly from BPA is considered specified if sourced from BPA Power or BPA Slice
- Also discussed in last year's guidance
  http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep-power/specified_source_acs_faqs.pdf

Verifying Specified Sources - Contract/GPE Requirements (1 of 2)

- A current contract or generation providing entity status (defined in § 95102(a)) is required for ALL specified source claims
- If the importer is GPE, they "automatically" meet the contract requirement
- Timeline for contracts - Must report electricity imports as required by MRR with regard to the contract language, regardless of when the contract was entered into. (No grandfathered contracts.)

Verifying Specified Sources - Contract/GPE Requirements (2 of 2)

- No time restriction - contracts may be short-term or "per event"
- Contract is "written document, including associated verbal or electronic records arranging for the procurement of electricity" (§ 95102(a))
  - Short-term (<1 week) will have overarching contract in place and transaction confirmed by IM or voice
- Focus is on whether source is conveyed as specified or not
  - IM/voice recording should make clear that specified power is transacted. Ambiguity should be interpreted as power being unspecified
- See last year's guidance: http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep-power/specified_source_acs_faqs.pdf

Seller Warranty

- Power purchased from entity who is not the source may be eligible as specified source claim
- The power must be conveyed as specified throughout the entire chain of buyers/sellers. Others are allowed in market path but all must convey as specified
  - Verifier should review a risk-based sample of additional contracts "up the chain" – between the reporting entity and the source to ensure the power was conveyed as specified
  - If any link in the chain does not convey power as specified, must be reported as unspecified
- Seller warranty is discussed in the specified source guidance: http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep-power/specified_source_acs_faqs.pdf

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Specified Imports: Lesser Of Analysis (§ 95111(b)(2)(E))

Applies to most RPS and zero emission resources

- Clarifies requirement to retain meter generation data
- For applicable imports, reporter is required to compare imports listed on e-Tag with actual generation from the resource
- If e-Tag value is greater, the generated value can be claimed as a specified import, with the balance claimed as "substitute power" (unspecified import)
- If generation exceeds tagged imports, the e-Tag value is specified import; the excess generation may be claimed as RPS adjustment if RPS requirements are met
- Verifier should review sample of tags, meter generation data, and hourly comparison spreadsheet

Lesser Of Analysis Example

Meter Data Requirement During Under- and Over Generation Illustration for Two Hours of Generation, Scheduled, and Delivered			
	Description	Hour 1: Under-Generation (MWh)	
1	Metered Generated at the Source	85	
2	Scheduled & Delivered on e-Tag	100	
3	Lesser Of: Meter or Scheduled?	Metered: 85	
4	**Reported: Zero Emission Specified Source Imported**	**Lesser of value = 85**	
5	**Reported: Substitute Power, Unspecified Import**	**100 – 85 = 15**	
6	**Reported: RPS Adjustment**	**0. No excess generation**	

Specified Source - REC retirement (C&T Reg § 95852(b)(3)(D))

- If RECs were created when the power claimed as a specified source was generated, RECs serial numbers must be reported in workbook 1
- This is a conformance requirement only. Emissions are not affected. Failure to report REC serial numbers leads to a non-conformance; failure to correct results in qualified positive, not adverse, verification statement

Verifying QE Adjustment

- Reported in workbook, which calculates lesser of imports and exports, and lesser of two emission factors

SUMMARY OF QUALIFIED EXPORT ADJUSTMENTS

Hour in CY2012	Quantity of IMPORTS in Each Hour (MWh)	Quantity of EXPORTS in Each Hour (MWh)	Lowest Emission Factor of any portion of the IMPORT in each hour (MT CO_2e/MWh)	Lowest Emission Factor of any portion of the EXPORT in each hour (MT CO_2e/MWh)	Lowest Quantity of Imports or Exports in Each Hour (MWh)	Lowest Emission Factor of Imports or Exports in each hour (MT CO_2e/MWh)	QE Adjustment MT CO_2e
1	200	100	1.200	0.850	100	0.850	85

Lesser of imports and exports

Lesser of the two emission factors

- Verifier's sample of e-Tags should include certain hours subject to QE adjustment. e-Tags should match the data presented in the QE adjustment section

Verifying RPS Adjustment

RPS ADJUSTMENT REQUIREMENTS

ELIGIBLE RESOURCE Is the power from an Eligible Renewable Energy Resource, per Section 95802(a) (Y/N)	RIGHTS Electricity Importer Must Have Either of the following, per 95852(b)(4)(A)	REC STATUS RECs must be used to comply with California RPS requirements during the same year in which the RPS adjustment is claimed, per 95852(b)(4)(B)	REC DATE Date RECs Retired in WREGIS Subaccount?	DELIVERY No RPS adjustment may be claimed for an eligible renewable energy resource when its electricity is directly delivered, per 95852(b)(4)(D)	ELIGIBLE RESOURCE Is the power from an Eligible Renewable Energy Resource, per Section 95802(a) (Y/N)	RIGHTS Electricity Importer Must Have Either of the following, per 95852(b)(4)(A)	REC STATUS RECs must be used to comply with California RPS requirements during the same year in which the RPS adjustment is claimed, per 95852(b)(4)(B)	DELIVERY No RPS adjustment may be claimed for an eligible renewable energy resource when its electricity is directly delivered, per 95852(b)(4)(D).	ELIGIBLE RPS ADJUSTMENT Eligible for RPS Adjustment?
Yes	Ownership or Contract Rights	Retired in WREGIS	7/1/13	Not Directly Delivered to CA	0	0	0	0	Eligible

- Depending upon the number of RECs, you may review all or sample some of the serial numbers
- Confirm by reviewing retirement status on WREGIS subportal
- Only RECs representing electricity generated after 12/31/12 are eligible to be used towards RPS adjustment (C&T Reg § 95852(b)(4)). Then, rolling 3 year window.

Direct Delivery Documentation in Workbook

- Direct delivery options are in drop-down menu
- Located in the "far right" side of Spec Imports tab

DIRECT DELIVERY	
Criteria for Direct Delivery per 95102(a)(108)	Directly Delivered?
1st POR is CA BAA	Yes
1st POR via Distribution Grid	Yes
Spec Source to POD in CA	Yes
Dynamic Transfer	Yes
Not Directly Delivered to CA	No

Must be listed as "Yes"

Red flag if "Not directly delivered to CA". For other options, consider sample for conformance

Wheeled Electricity

- Verifier must review sample of wheeled tags as part of review of the appropriate reporting of e-Tags
- Transactions that start and end in California (on a single e-Tag) are NOT reportable at all (as wheels, exports or imports). These are sometimes called "reverse wheels", but they are not wheels" as defined in MRR.
- Wheels have to be captured on one e-Tag. If e-Tags are separate or referred to as "broken", each transaction must be reported as separate import and export

Case Study 3 - Database of Transactions

See Handout 2.1.3

Questions and ARB Comments

Course 2: Transactions Specialty

Complete:

2.1 Electric Power Entities

Next:

2.2 Suppliers of Transportation Fuels

2.3 Suppliers of Natural Gas, Natural Gas Liquids, Liquefied Petroleum Gas, CNG and LNG

2.4 Suppliers of Carbon Dioxide (CO2)

Greenhouse Gas Verifier Accreditation Training

Course 2.2 Transaction Specialty – Suppliers of Transportation Fuels

California Environmental Protection Agency
Air Resources Board

MRR Verifier Accreditation: Course Content and Exams

Course 2: Transactions Specialty

2.1 Electric Power Entities

2.2 Suppliers of Transportation Fuels

2.3 Suppliers of Natural Gas, Natural Gas Liquids, Liquefied Petroleum Gas, CNG and LNG

2.4 Suppliers of Carbon Dioxide (CO2)

Course 2.2 Handouts

- Handout 2.2.1 – Fuel Reporting Overview Diagram
- Handout 2.2.2 – Fuel Supplier Emission Factors
- Handout 2.2.3 – Fuel Supplier Emissions Data Report
- Handout 2.2.4 – Reviewing Bills of Landing to Verify Fuel Supplied at the Rack
- In workbooks folder: Handout 2.2.3b – Fuel Supplier Cal e-GGRT input

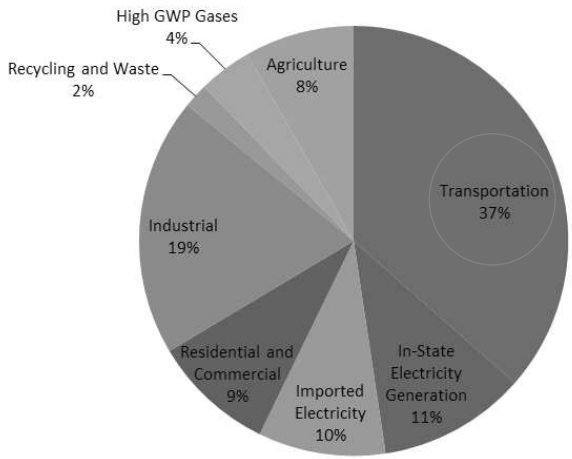
Course 2.2 Suppliers of Transportation Fuels

1. Overview
   - Key Sections of the MRR
   - Applicability
   - Information Reported
   - Types of Fuels
2. Monitoring and Emissions Calculations
3. Verification

Transportation is a Significant Contributor to California's GHG Emissions

2012 California Emissions Inventory

618 Million MT CO_2e Imported Electricity



Key Sections of MRR Pertaining to Suppliers of Transportation Fuels

- Reporting requirements § 95121
- Applicability § 95101(c)
- Cessation of reporting § 95101(h)(4)
- Cessation of verification § 95101(i)
- Definitions § 95102
- Inventory documentation § 95105(d)

Applicability under § 95121

- A transportation fuel supplier is
  1. A position holder at terminal
  2. An enterer of fuel outside the terminal system
  3. A refiner of fuel in California
  4. A biofuel production facility delivering outside the terminal system
- Reporting threshold - produce, import and/or deliver an annual quantity of transportation fuel that, when completely oxidized, would result in the release of greater than or equal to 10,000 MT
- Verification threshold: 25,000 MT CO_2e for all suppliers[1]
- Transportation fuel supplier must submit separate report from petroleum refinery reporting under § 95113
- About 39 total transportation fuel suppliers are verified

[1]See cessation details in Course 1.1

Definitions (§ 95102(a))

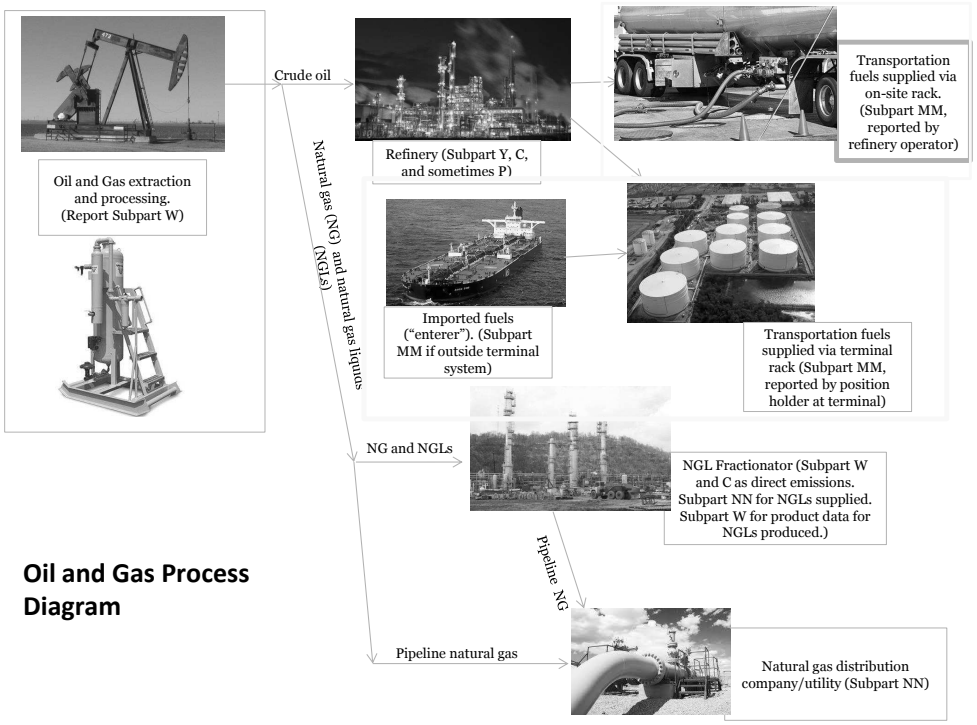
- Position Holder
  - *An entity that holds an inventory position in transportation fuel at a CA fuel terminal*
- Refiner
  - *An entity that delivers transportation fuel to end-users in CA that were produced at an entity or entity-subsidiary owned refinery*
- Enterer
  - *An entity that imports transportation fuel and is the importer of record under federal customs law or the owner of the fuel upon entry into CA*
- *Biofuel Production Facility*
  - *Production facility that produces one or more of the following biomass-derived transportation fuels: ethanol, biodiesel, renewable diesel, rendered animal fat, or vegetable oil*

How § 95121 Fits with Cap-and-Trade

- Transportation fuels capture emissions from downstream combustion—mostly mobile emissions
- Transportation fuel covered by Cap-and-Trade starting January 1, 2015
- Included under the "cap" of Cap-and-Trade beginning in 2015, second compliance period
- Point of regulation minimizes double counting, only captures California-destined fuels, and aligns with Board of Equalization (tax records), to the extent feasible

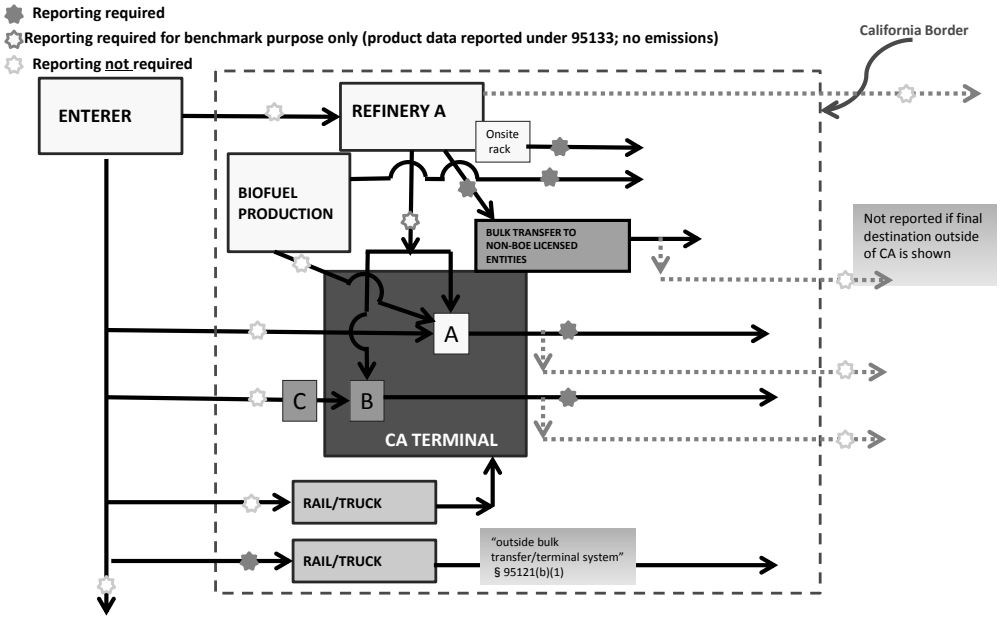
How § 95121 Fits with Other Federal and State Regulations

- Renewable Fuel Standard (RFS) is a federal standard that encourages the inclusion of biofuels in transportation fuels. Good RFS tracking reduces risk of misreporting biofuels to MRR program
- CARB Low Carbon Fuel Standard seeks to lower the carbon intensity of transportation fuel over time. However, fuel suppliers may use common data management system for reporting to both programs



Oil and Gas Process Diagram

Transportation Fuel Reporting Overview



Guidance to Review

- **Guidance for Fuel Supplier Greenhouse Gas Reporting**
  - http://www.arb.ca.gov/cc/reporting/ghg-rep/guidance/fuel_supplier.pdf
  - Will be updated for 2015

Fuels Included in "Transportation Fuels"

- Gasoline blend stocks
- Diesel fuels (defined in MRR; both on- and off-road)
  - Diesel is distillate fuel #1 and #2, each defined in MRR
- Ethanol fuels
- Biodiesel/renewable diesel fuels
- LPG from refiners (even if not used in transportation)
- **Excluded – fuels used in marine vessels and aviation; fuels exported from California**
- See Handout # 2.2.2 for a listing of applicable fuels and emission factors

Information Reported by Transportation Fuel Suppliers (1 of 2)

- CO_2, CH_4, N_2O, and CO_2e emissions that would result from the complete combustion, oxidation, or use of transportation fuels and LPG
  - CO_2 from biomass derived fuels is excluded from covered emissions
- Fuels and products distributed from refineries to entities that are not registered by the California Board of Equalization (BOE) as a "Supplier"
  - http://www.boe.ca.gov/sptaxprog/spftrpts.htm
- Terminal and refinery racks fuels delivered from rack for distribution
- Fuels distributed by importers to California consumers and entities

Information Reported by Transportation Fuel Suppliers (2 of 2)

- Emissions must be reported for the individual blendstocks, diesel fuels and biomass-derived fuels listed in 40 CFR Part 98 Tables MM-1 and MM-2
- Fuel suppliers report cost of implementation fee data, subject to conformance review
- Excluded fuels:
  - Fuels and products for which a final destination outside California can be demonstrated
  - Fuels where an exclusive use in marine or aviation applications can be demonstrated
  - Guidance includes new information on excluded fuels

Data Reporters

- **Position Holders -** Must report all transportation fuels that are delivered across the rack at California terminals
  - Fuels that change ownership upstream of a terminal rack (e.g. pre-terminal or inter-terminal transactions) are reported by the position holder that has ownership of the fuel as it is delivered across the rack
- **Enterers** - *Only* required to report fuels imported outside of the bulk transfer/terminal system
  - All imported fuel delivered to a California fuel terminal is reported by the position holder, not the enterer (unless they are the same entity)
- **Refiners of fuel** - Only required to report fuels supplied via on-site *rack*, that are not destined for BOE-registered terminal
  - Fuel supplier must be separate entity from refinery

Types of Fuel - Gasoline Blendstocks

- Gasoline Blendstocks
  - RBOB is equivalent to CARBOB (generally combined with 10% ethanol to make "motor gasoline")
  - CBOB is generally not legal for use as a vehicle fuel in California, so any CBOB emissions should be carefully examined by verifier
  - Ethanol (biomass-derived fuel) is typically mixed with RBOB at the fuel terminal to produce E10 motor gasoline (10% ethanol, 90% RBOB). All blendstocks must be reported separately
    - Example: 100 barrels (bbls) of E10 would be reported as 90 bbl RBOB, 10 bbl ethanol
- **Verifier red flags**
  - CBOB reported
  - Gasoline to ethanol ratio is significantly different from 90:10

Types of Fuel - Diesel and LPG

- **Diesel Fuel**
  - Only fuel that meets the definition of diesel (distillate) # 1 or # 2 is reported
  - Includes both undyed (on-road) and dyed (off-road)
  - CARB diesel may contain up 5% biodiesel. Only reportable if supplier has information to substantiate quantity
- **LPG (Liquid Petroleum Gas)**
  - Components of LPG must be reported separately
    - Ethane, Ethylene, Propane, Propylene, Butane, Butylene, Isobutene, Isobutylene, Pentanes Plus
    - Different emission factors for each
- **Verifier Red Flag**
  - More diesel #1 than #2 is reported

Types of Fuel - Biodiesel

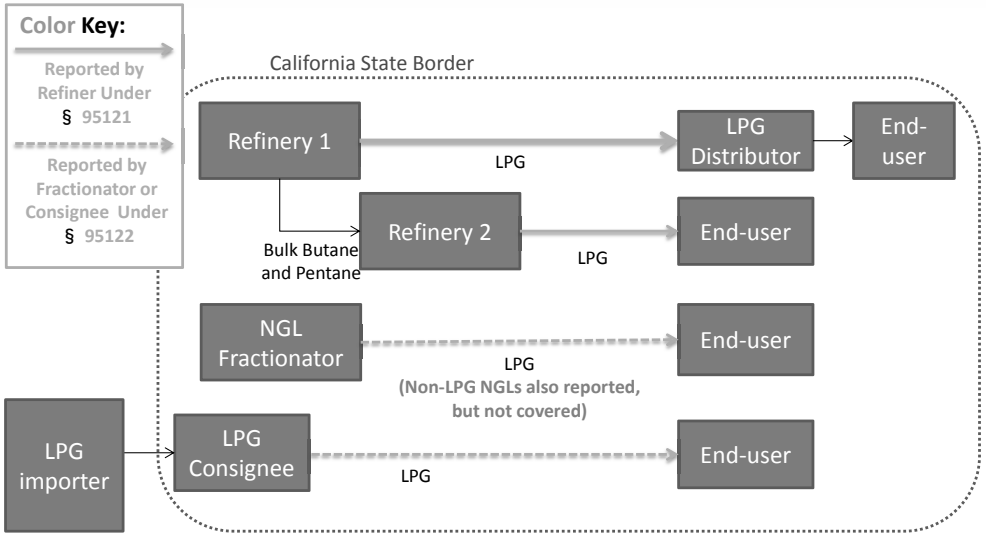
Biodiesel/renewable diesel (biomass-derived fuel)

- Bio- or renewable diesel (biodiesel) is produced for distribution as pure biodiesel (B100) or biodiesel blends such as B20 (20% biodiesel, 80% fossil derived diesel)
- Renewable diesel often blended upstream and transacted as "regular" CARB diesel (discussed in guidance doc)
- All biodiesel, whether blended or unblended, must be reported by the position holder or producer delivering the fuel across the rack
- Volumes of biodiesel should be carefully documented and considered in your sampling plan
- "Pure" biodiesel may have <1% diesel blending. Per MRR, this can be considered 100% biodiesel

Liquefied Petroleum Gas

- Refiners must report LPG produced and delivered in California as described in § 95121
- Refiners should only report LPG and LPG components that are produced and sold or delivered in <u>mixtures that could be used as a fuel by an end-user</u>
  - Bulk Butanes/Pentanes etc. sold to other refineries for use as feedstock do not fit the definition of LPG and are not reported as fuel for purposes of emissions calculations
  - All LPG and bulk butanes and pentanes are reported as product data under § 95113 but are not covered

Reporting Emissions from LPG



ARB Comments and Questions

Bulk Transfer to Other Fuel Suppliers

- Refiners commonly trade (buy/sell) bulk transportation fuel products with other fuel suppliers
- Refiners should not report fuel delivered in bulk via pipeline (or, rarely, trucked) to other fuel suppliers
  - Verifier must confirm that the purchaser is a licensed fuel supplier with the California Board of Equalization (BOE)
  - If this cannot be confirmed, the refiner must report the fuel delivered in bulk to the unlicensed entity
- If a fuel sold across a rack is re-blended and re-sold across a subsequent rack, only the position holder upstream of first rack is responsible for reporting. (Discussed in guidance doc)
- Contact ARB staff for assistance determining BOE status if it is unclear

Fuel Supplier Data vs. Petroleum Refinery Product Data

- Fuel volumes reported under § 95121 are used to calculate emissions from combustion of fuel by California end-users
- Refinery product volumes (including transportation fuels) are reported under § 95113 and may be used for Cap-and-Trade allowance allocation
- **Product data is not equivalent to fuel volume data reported under § 95121**

Data Monitoring and Meter Accuracy

- Request GHG Monitoring Plan, as described in § 95105(c), meeting 40 CFR § 98.3(g)(5) requirements
- Most meters used by fuel suppliers are financial transaction meters that do not need to meet calibration requirements if they meet the exemption criteria in § 95103(k)(7) and § 95121(c)(1)
  - Verifiers should confirm that meters are exempt and meet financial transaction requirement
  - Non-exempt meters must meet all calibration and accuracy requirements in § 95103(k)

Meter Calibration Requirements in MRR § 95121(c)

Do fuel suppliers and receiving entity have common or affiliated ownership?

- No – then they do not need to meet calibration requirements
- Yes – then they do not need to meet calibration requirements only if any of the follow conditions exist
  - Fuel supplier does not operate the fuel billing meter
  - Billing meter is also used by unaffiliated companies
  - Billing meter is sealed by County sealer of weights and measures

Emissions Calculations (1)

- **Key to correct emissions is reporting correct volumes!**
  - In workbook, entities cannot alter EF or HHV
- Reporting entities enter volume quantities into an XML spreadsheet where emissions are automatically calculated
- Spreadsheet is then uploaded to Cal e-GGRT

Emissions Calculations (2)

Blendstock, Distilate Fuel Oil or Biomass-Derived fuel	[Product,] Annual volume of product "i" supplied or imported into California by the reporting party. Report CARBOB as RBOB. (barrels).
TOTAL	0
CBOB—Summer	
Regular	
Midgrade	
Premium	
CBOB—Winter	
Regular	
Midgrade	
Premium	
RBOB—Summer	
Regular	
Midgrade	

Spreadsheet is available here:

http://www.ccdsupport.com/confluence/download/attachments/112035331/Suppliers+of+Transportation+Fuels+Calculation+and+Reporting+Tool.xls?version=8&modificationDate=1362614750000

Workbook - Calculation of Emissions (1)

- Calculation of CO_2 emissions - Eq. MM-1, emissions factors from Table MM-1, column C

(Eq. MM-1) $CO_{2i} = Product_i * EF_i$

- Calculation of CH_4 and N_2O emissions - Use Eq. C-8 (subpart C, 40 CFR Part 98),
  - **Exception - Table 1 (§ 95121(b)(3)) in lieu of HHV*EF**

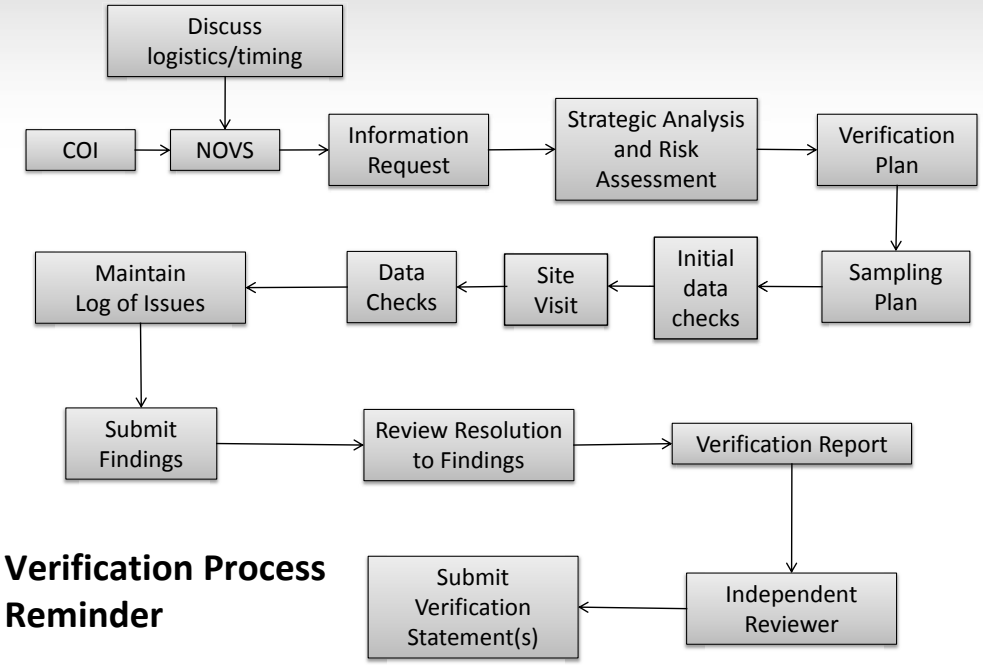
(Eq. C-8) $$CH_4 \text{ or } N_2O = 1 \times 10^{-3} * Fuel * HHV * EF$$

Workbook - Calculation of Emissions (2)

- Converting CH_4 and N_2O to CO_2e
- Calculation of CO_2e is in § 95121(b)(4)

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

ARB Comments and Questions



Verification Process Reminder

Verifying Emissions for Transportation Fuels

- Review Cal e-GGRT report
- Request additional data:
  - Review data in Reporting Tool
- Strategic Analysis and Risk Assessment
- Verification Plan
- Sampling Plan
  - Consider sampling based on volume of product, type of product and calculated emissions for each product
  - Remember qualitative considerations and exports out-of-state and exclusions for aviation and marine fuels

Verifying Emissions for Transportation Fuels Site Visit (1)

- Interview staff early in the site visit. Include questions like
  - Do they understand the MRR requirements and give confidence that the data was input correctly?
  - What QA checks or final reconciliations were done?
  - If volumes listed in different data sources disagree, which value is reported and why?
  - Are these steps documented in GHG Monitoring Plan?
- If possible, visually trace how the fuel moves to and from the rack or pipeline
- Identify product measurement and calibration points, even if they are financial meters
- Identify responsibility for calibration and operation of meters

Verifying Emissions for Transportation Fuels Site Visit (2)

- After obtaining database of transactions maintained by reporter
  - Compare database to data reported to ARB
  - Discuss with staff how database is maintained, what other purposes it serves and what queries/filters are applied prior to reporting to ARB
  - Ask staff to recreate any queries or filters for one month of data (or more if you consider it warranted)
  - Ask about reconciliations and original vs. final values
- Select a percentage of invoices to review, focusing on high risk sources identified in sampling plan
  - Both quantitative and qualitative

Verifying Emissions for Transportation Fuels Site Visit (3)

- Review bills of lading for any shipments that were excluded due to out-of-state destination, aviation or marine use
- After site visit
  - Cross-check vs. BOE tax data found here: http://www.boe.ca.gov/sptaxprog/spftrpts.htm
  - Ask about differences identified – maintain your issues log
- Spend ample time on tracking and reconciliation
  - What is the origin of final data reported?
  - Is it reconciled to other sources?
  - When sources are in conflict, which one is selected and why?

Verifying Excluded Fuels

- Verifiers should determine what fuels were excluded due to export or marine/aviation usage
- For fuel exported from California:
  - How was export amount determined?
  - Do bills of lading show destination outside of California?
  - Are exported fuels CARB fuels (CARB diesel, CARBOB), or fuels not used in California? (Non-CARB fuel exports are lower risk)

Verifying Excluded Fuels

- For aviation/marine fuels:
  - Is it a reportable fuels? If not, low risk.
    - (Many aviation fuels (jet fuel A, aviation gasoline) are not reportable
  - Review GHG Monitoring Plan—this should be discussed
  - Do bills of lading show marine-only terminal? How is that documented?
  - Do they use separate fuel codes and customer accounts for marine fuel? How is this documented? What controls are in place?

Missing Data Substitutions

- "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 reconciled; any terminal/refinery racks that are not two-party financial transactions should be discussed
- Worth requesting a copy of their financial audit
  - Even if audit from prior year, any major issues with revenue could be a flag to consider missing/invalid data

Case Study 1

Verifying a Fuel Supplier

Risk-Based Sampling for Bob's Fuel Supplier

The next three slides are an example of how the verifier might consider risk in a verification, which was discussed during the training. This is not a template.

(In barrels)	RBOB Summer Regular	RBOB Winter Premium	RBOB Winter Regular	Diesel #2 (next slide)
Sales at Terminal 1 – from entity-owned refinery	450,000	110,000	315,000	86,500
Sales at Terminal 1 – purchased upstream from Company A	0	0	40,000	20,000
Remote Terminal 2 – purchased upstream from Company B	35,900	12,500	[illegible]	211,000

Individually confirm with both engineering and financial staff how transactions were compiled from raw data/invoices; Check June & August; Visually trace fuel line and metering from rack; Test one day of past year's accounts.

Detailed recalculation of Feb-March sales; validate with all other in-house data sets.

Remote terminal managed by different group; Risk of mishandling data; Check completeness.

Purchase invoices are well-documented; review system; check subset of invoices.

Data Checks for Diesel Fuel

	Diesel #2 (in barrels)	# of Invoices or Records to Review	Risk Ranking
Terminal #1 Sales	106,500	440	High
Terminal #2 Sales	211,000	160	Medium

Larger number of samples

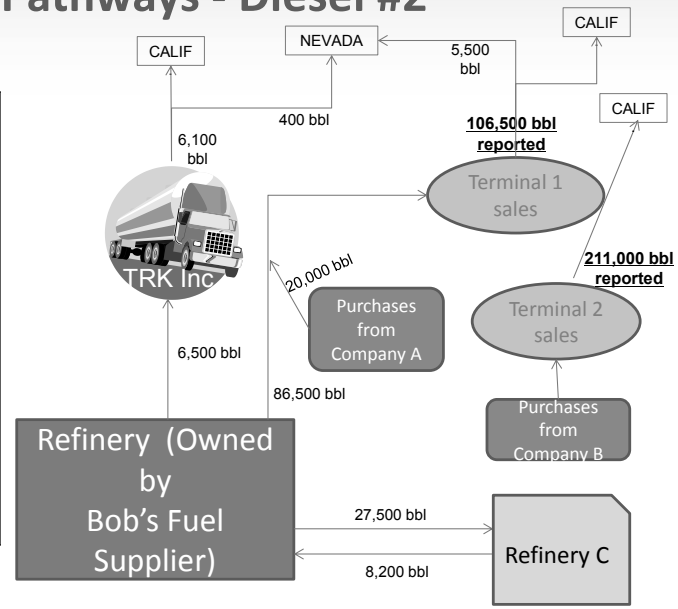
Smaller number of samples

Check annual total; Check monthly totals; Drill-down to daily data using BOL or invoices. Ensure financial purchase agreements or contracts with no evidence of fuel movements are excluded.

Check completeness; Spot check several invoices at random.

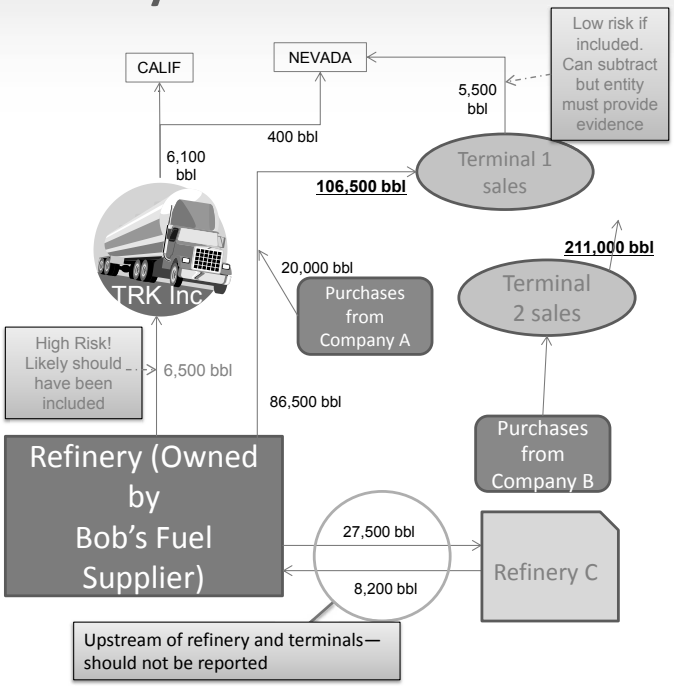
Tracing Fuel Pathways - Diesel #2

Terminal #1 Sales	Reported
Terminal #2 Sales	Reported
Purchases from A	Included in terminal #1 sales
Refinery C Sales	Not reported
Purchases from Refinery C	Not reported
Sales to TRK Inc.	Not reported



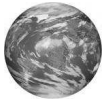
Tracing Fuel Pathways - Diesel #2 – Solution

Terminal #1 Sales	Correctly Reported
Terminal #2 Sales	Correctly Reported
Purchases from A	Correctly included in terminal #1 sales
Refinery C Sales	Correctly Excluded
Purchases from Refinery C	Correctly Excluded
Sales to TRK Inc.	Not reported



Participation Exercise 2.2.1

- See subpart MM emissions data report and data upload spreadsheet in handouts and zip file included with training materials
- How would you approach a risk assessment and sampling plan if you had this data?
- Identify any particular issues or red flag that you would sample.
- (Same data is included in emissions data report and spreadsheet)



Case Study 2: Review Bills of Lading for Use in Evaluating Fuel Throughput Data

- See Handout #2.2.4

Case Study 2 : Review Bills of Lading for Use in Evaluating Fuel Throughput Data - Solution

	Bills of lading		
Trans #	Fuel	Bbl	Destination
CARBOB1	RBOB summer regular	40	South Lake Tahoe, CA
CARBOB2	RBOB summer regular	50	Sacramento, CA
CARBOB4	RBOB summer regular	46	Orland, CA
CARBOB5	RBOB summer regular	84	Perris, CA
~~CARBOB6~~	~~RBOB summer regular~~	~~118~~	~~Lake Tahoe, NV~~
~~CARBOB7~~	~~RBOB summer regular~~	~~100~~	~~Medford, OR~~
DistULS6	Distillate #1 ULS	114	Riverside, CA
DistULS7	Distillate #1 ULS	92	Merced, CA
~~DistULS8~~	~~Distillate #1 ULS~~	~~116~~	~~Tucson, AZ~~
DistULS9	Distillate #1 ULS	120	Salinas, CA
~~DistULS9~~	~~Distillate #1 ULS~~	~~125~~	~~Las Vegas, NV~~
DistULS12	Distillate #2 ULS	90	Emeryville, CA
~~DistULS13~~	~~Distillate #2 ULS~~	~~100~~	~~Phoenix, AZ~~
DistULS15	Distillate #2 ULS	70	Rialto, CA
DistULS17	Distillate #2 ULS	130	Bakersfield, CA
~~DistULS18~~	~~Distillate #2 ULS~~	~~150~~	~~Reno, NV~~

Transactions in black text, strikethrough represent transactions with destinations outside of California, which were appropriately excluded from the emissions data report.

Transactions in blue text, strikethrough represent transactions with destinations outside of California, which were included from the emissions data report. Reporting entities may exclude transactions for which they can provide evidence that they are destined for outside California, but their inclusion does not represent a correctable error. (The calculation of material misstatement is shown both ways on the following slides.)

The transaction in red text was erroneously excluded, and represents a correctable error.

Case Study 2 : Review Bills of Lading for Use in Evaluating Fuel Throughput Data – Solution (2) if excluding out-of-state

	Bills of lading		
Trans #	Fuel	Bbl	Destination
CARBOB1	RBOB summer regular	40	South Lake Tahoe, CA
CARBOB2	RBOB summer regular	50	Sacramento, CA
CARBOB4	RBOB summer regular	46	Orland, CA
CARBOB5	RBOB summer regular	84	Perris, CA
~~CARBOB6~~	~~RBOB summer regular~~	~~118~~	~~Lake Tahoe, NV~~
~~CARBOB7~~	~~RBOB summer regular~~	~~100~~	~~Medford, OR~~
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~~DistULS13~~	~~Distillate #2 ULS~~	~~100~~	~~Phoenix, AZ~~
DistULS15	Distillate #2 ULS	70	Rialto, CA
DistULS17	Distillate #2 ULS	130	Bakersfield, CA
~~DistULS19~~	~~Distillate #2 ULS~~	~~150~~	~~Reno, NV~~

220 bbl CARBOB x .3686 $MTCO_2$/bbl = 81.09 $MTCO_2$

326 bbl DFO #1 x .4264 $MTCO_2$/bbl = 139.00 $MTCO_2$

290 bbl DFO #2 x .4296 $MTCO_2$/bbl = 152.58 $MTCO_2$

= 374.67 $MTCO_2$ verifier total

(382.1 $MTCO_2$ total reported)

(374.23 – 382.1)/ 382.1
= -2.06% error
No material misstatement, but correctable errors are present. Requires correction; otherwise, adverse verif statement

Case Study 2 : Review Bills of Lading for Use in Evaluating Fuel Throughput Data – Solution (3) if including out-of-state

	Bills of lading		
Trans #	Fuel	Bbl	Destination
CARBOB1	RBOB summer regular	40	South Lake Tahoe, CA
CARBOB2	RBOB summer regular	50	Sacramento, CA
CARBOB4	RBOB summer regular	46	Orland, CA
CARBOB5	RBOB summer regular	84	Perris, CA
~~CARBOB6~~	~~RBOB summer regular~~	~~118~~	~~Lake Tahoe, NV~~
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DistULS15	Distillate #2 ULS	70	Rialto, CA
DistULS17	Distillate #2 ULS	130	Bakersfield, CA
~~DistULS19~~	~~Distillate #2 ULS~~	~~150~~	~~Reno, NV~~

338 bbl CARBOB x .3686 $MTCO_2$/bbl = 124.59 $MTCO_2$

442 bbl DFO #1 x .4264 $MTCO_2$/bbl = 188.47 $MTCO_2$

290 bbl DFO #2 x .4296 $MTCO_2$/bbl = 124.58 $MTCO_2$

= 437.64 $MTCO_2$ verifier total

(382.1 $MTCO_2$ total reported)

(437.64 – 382.1)/382.1
= 14.5% difference

Exclusion of DistULS17 represents correctable error

Course 2.2 Completed

ARB Comments and Questions

Verifier Accreditation Training for Mandatory Greenhouse Gas Reporting

Transactions Specialty
Course 2.3: Suppliers of Natural Gas, Natural Gas Liquids, Liquefied Petroleum Gas, CNG and LNG

California Environmental Protection Agency
Air Resources Board

MRR Verifier Accreditation: Course Content and Exams

Course 2: Transactions Specialty

2.1 Electric Power Entities

2.2 Suppliers of Transportation Fuels

2.3 Suppliers of Natural Gas, Natural Gas Liquids, Liquefied Petroleum Gas (LPG), Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG)

2.4 Suppliers of Carbon Dioxide (CO2)

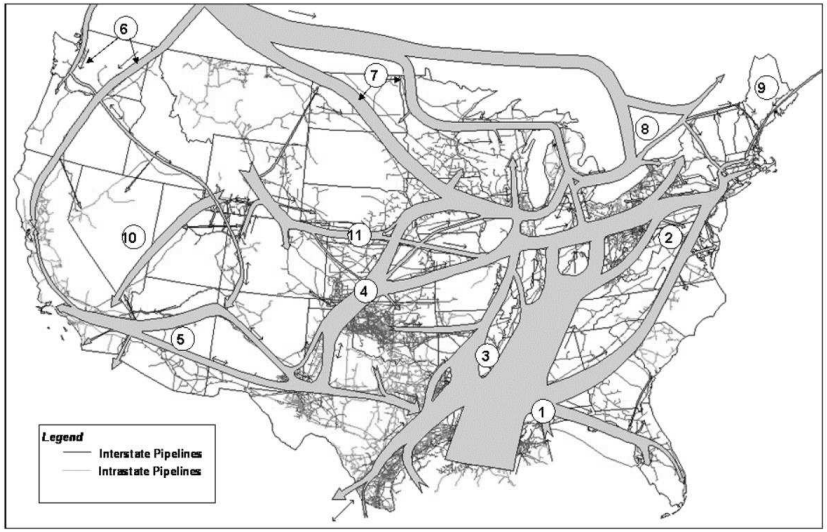
Course 2.3 Handouts

- Handout 2.3.1 NN Entity Report Case Study 5
- Handout 2.3.2 NGL Fractionation Facility Boundary

Course 2.3 Suppliers of Natural Gas, Natural Gas Liquids, Liquefied Petroleum Gas, CNG and LNG

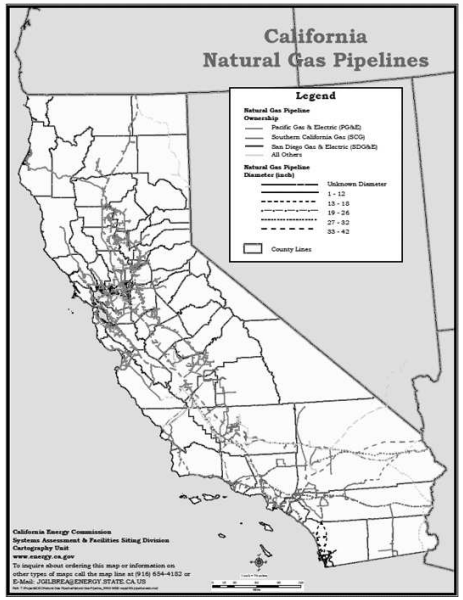
1. Overview
   - Applicability
   - Industry Overview
   - Emissions Calculations for LDCs
2. Measurement, Reporting and Verification
3. NGL Fractionators

The Big Picture



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

Still A Big Picture - California Pipelines



§ 95122 Applicability

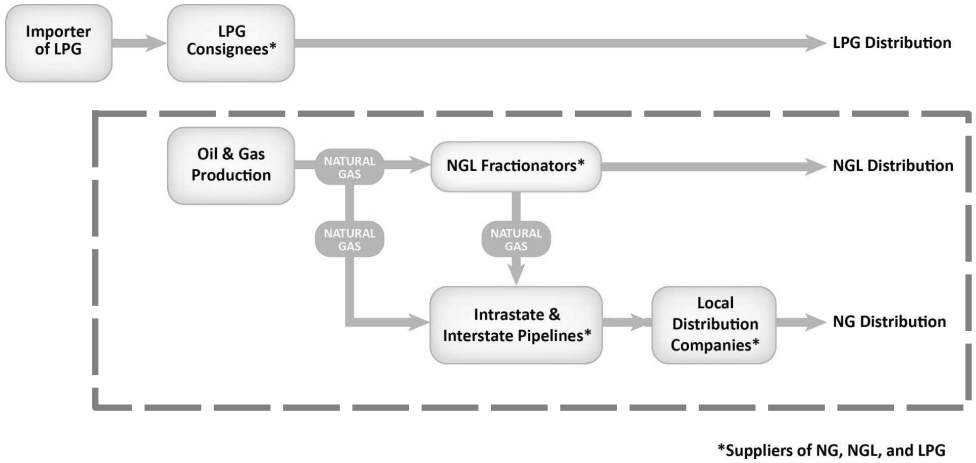
- Natural gas suppliers that produce, import or deliver an annual quantity that, if completely combusted, would result in ≥10,000 MT CO_2e, including
  - Operators of **interstate** pipelines
  - Operators of **intrastate** pipelines
  - Distributors of natural gas to end users
    - a.k.a., public utility gas corporations or publicly-owned gas utilities
  - LNG production facilities that receive NG from interstate pipelines
- Natural gas liquid (NGL) fractionators, regardless of size
- Consignees of LPG
- Consignees of CNG and LNG
- Verification required for emissions ≥25,000 MT CO_2e

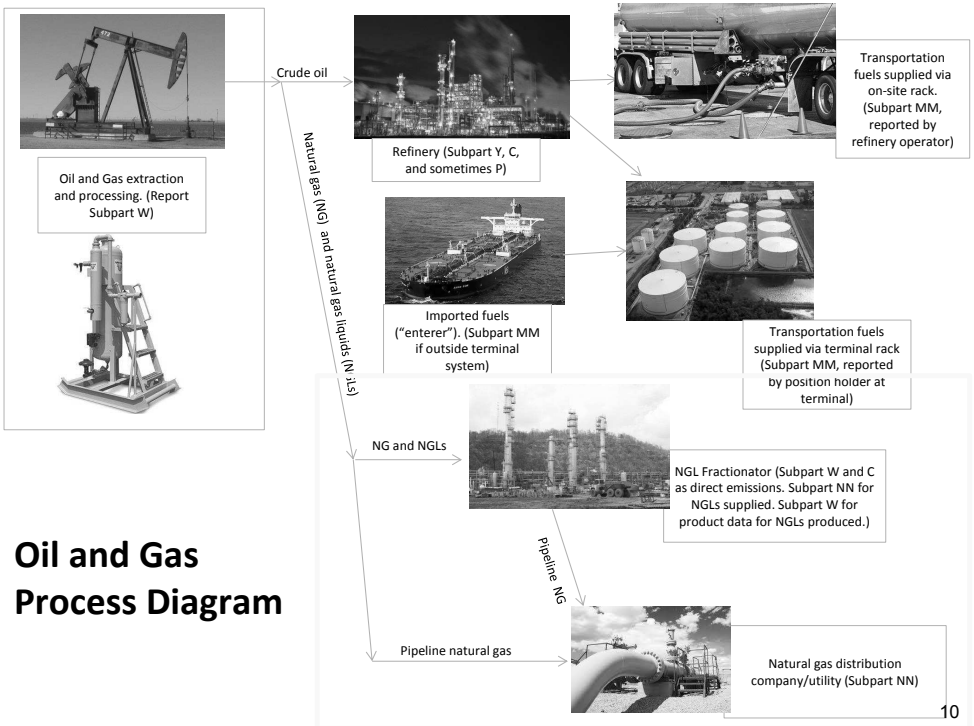
Subpart NN of 40 CFR Part 98

- MRR § 95122 *Any supplier of natural gas or natural gas liquids who is required to report under § 95101 [of MRR] must comply [with Subpart NN]*
  - *Except as otherwise provided*

- **§ 95122 also includes interstate pipelines, but for volumes only, not GHGs**

NG, NGL, LPG suppliers





Oil and Gas Process Diagram

Role in Cap-and-Trade

- Goal to capture statewide emissions from natural gas
- Accomplished by reporting all NG coming into California (from other states) plus in-state production
- Reported upstream of (before) combustion
- Included under the "cap" of Cap-and-Trade beginning in 2015, second compliance period
- For compliance obligation calculation, ARB will deduct NG sold to covered entities
  - To avoid double counting

Responsible for Reporting Emissions - Local Distribution Companies (LDCs)

"Catch-all" term for natural gas utilities and intrastate pipelines

- MRR - LDCs must report the CO_2, CO_2 from biomass-derived fuels, CH_4, N_2O, and CO_2e emissions that result from the complete combustion of natural gas products
- Total emissions are calculated based on emissions from downstream combustion of natural gas to all users
  - Covered emissions are based on combustion of gas by end-users that are NOT covered entities
- Focuses on "mass balance" approach between gas received and gas delivered
- Designed to avoid double-counting of emissions

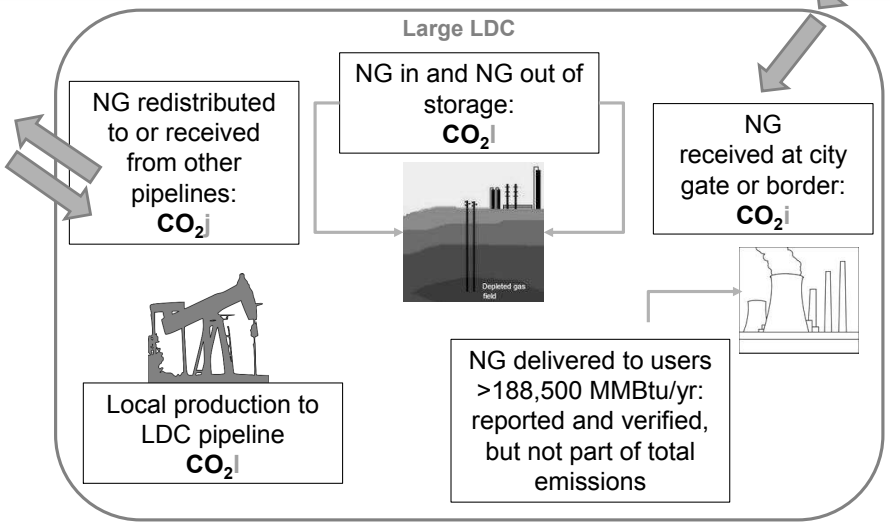
Total Emissions Calculation for LDCs (1 of 3)

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

CO_2 = Total emissions.
CO_{2i} = Emissions from natural gas received at the state border or city gate.
CO_{2j} = Emissions from natural gas received for redistribution to or received from other natural gas transmission companies.
CO_{2l} = Emissions from storage and direct deliveries from producers.

Total Emissions Calculation for LDCs (2 of 3)

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



Total Emissions Calculation for LDCs (3 of 3)

For calculation of CO_2 for **each** term in the equation, reporters ***must use 40 CFR 98.403***

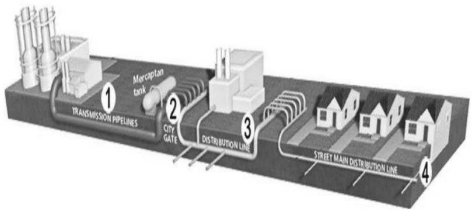
Method 1, Eq. NN-1, but replace the product of heating value and volume with the actual measured MMBtu of gas received

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

Calculation of CO_{2i} (1 of 2)

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

- **CO_{2i} = Emissions from natural gas received at the state border or city gate**
- *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



Calculation of CO_{2i} (2 of 2)

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

- For large utilities (e.g., PG&E, SoCal Gas), "city gate" is likely their interconnection with large interstate pipelines
- Example
  - NG that SoCal Gas receives from El Paso Pipeline is reported under CO_2i for SoCal Gas
  - SoCal is closest to the gas' end user

Verification of CO_{2i}

Verification of gas received at city gate or interconnection

- **Identify** how sales are recorded - invoices, real-time data, etc.
- **Review** sales information and ensure that entire calendar year was included
  - If missing data, confirm that appropriate MRR procedures were used
- **Ensure** that MMBtus were calculated appropriately
  - More detail on HHV in following slides
- **Recalculate** emissions
  - If there are discrepancies, review with reporter and follow standard verification process

Calculation of CO_{2j} –Avoids Double Counting

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

- **CO_{2j} = Emissions from natural gas received for redistribution to or received from other natural gas transmission companies (redelivered or received)**
- Redistribution **TO** = NG delivered to other pipelines or LDCs (if total deliveries in the year exceed 25,000 $MTCO_2e$)
- Received **FROM** = NG received from other pipelines or LDCs (regardless of amount)
  - Note: For larger utilities, this is similar to CO_{2i}

Redelivered or Received - Calculating CO_{2j}

- Breaking down the term

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

- CO_2 is calculated for redelivery and receipts, using MMBtus
  - MMBtu received contributes to CO_{2total} .
  - MMBtu redelivered reduces CO_{2total}
- $(-\sum CO_{2j}) = -(MMBtu_{Total} * EF) =$
  $-(MMBtu_{redelivery} - MMBtu_{receipts})*EF$
- Subtract received from redelivered **(double negative here)**

Verification of CO_{2j} (1 of 2)

Based on risk analysis, sample a source or time period, obtain sales data, if available, as primary documentation; This element can be confusing for reporter's staff

- Confirm that it is documented in the GHG Monitoring Plan
- Do they understand the regulation?
- How did they ensure that only sales to pipelines and LDCs were included?

Verification of CO_{2j} (2 of 2)

- Confirm that sales to end-users were excluded
- Note that re-delivery data is reported as a spreadsheet attached to the Cal e-GGRT report

- Were only sales resulting in ≥ 25,000 MT CO_2e included?

Stored Gas - Calculation of CO_{2l}

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

- CO_{2l} = Emissions from storage and direct delivery from producers
- Mostly affects larger utilities
- Storage is calculated using Eq. NN-5

$$CO_{2l} = [Fuel_1 - Fuel_2] * EF$$

  - Fuel1 = MMBtu put into storage
  - Fuel2 = MMBtu taken out of storage + MMBtu received from producers of NG

- Note the double negative again. MMBtu put into storage reduces reported emissions; MMBtu removed from storage and delivered, and NG received from producers adds to reported emissions

Stored CO_{2l} – Verification (1 of 2)

- Verification of stored gas will likely be part of a larger verification of PG&E or SoCal Gas
  - Other facilities, but PG&E and SoCal account for the bulk
- These are complex facilities, with a variety of meters, most of which do not apply to GHG verification
- Fundamentally, gas out minus gas in
- Follow the audit trail

Stored CO_{2I} – Verification (2 of 2)

- Obtain tracking data for storage operations. Meter data? Inventory data?
- Are meters calibrated?
  - Can they provide evidence of +/-5% based on inventory data?
  - General Order 58a?
- Review sales or other data for purchases from local producers
  - Where is the HHV measured?
  - What is the annual weighted average HHV?

Questions and ARB Comments

1. Overview
2. **Measurement, Reporting and Verification**
   - **HHV and Pipeline Quality Standards**
   - **LDC End User Reporting**
   - **Biomethane**
   - **LNG Production**
   - **Case Studies**
3. NGL Fractionators

California Environmental Protection Agency
Air Resources Board

HHV and Pipeline Quality Standards (1 of 3) (§ 95122(b)(5))

- HHV should be measured at or near each interconnection point
- Pipeline quality standards are met if annual weighted average HHV is >970 Btu/scf and <1,100 Btu/scf If non-pipeline quality **and** single interconnection that contributes more than 3% of total emissions, must use tier 3 (carbon content)

HHV and Pipeline Quality Standards (2 of 3) (§ 95122(b)(5))

- If HHV >1,100 Btu/scf **but less than** 3% of emission, operator can use standard calculation, but must use emission factor of 54.67 kg CO_2/MMBtu. If <970 Btu/scf and 3%, use standard EF.
- Mostly an issue for utilities that receive NG from local production. Several reporting entities had to use 54.67 emission factor, but none had to use Tier 3.

HHV and Pipeline Quality Standards (3 of 3) (§ 95122(b)(5))

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

Verifying Measurements of HHV and Other Values (1 of 2)

- Review documentation for high heating values (HHV) used by data reporters
- Verify that all measurements (including quantity, composition and HHV value) were made at least monthly

Verifying Measurements of HHV and Other Values (2 of2)

For all HHVs determined by the reporter (i.e., not a default value or supplied by fuel supplier)

- Verify that an appropriate standard test published by a consensus-based standards organization was used (e.g., American Gas Association [AGA], 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 shall use the delivering pipeline's measurements

End User Reporting for LDC

- NG suppliers are required to report all deliveries of NG to end-users equal to or greater than 188,500 MMBtu (§ 95122(d)(2)(E))
  - Separate from MMBtu redeliveries that are NOT to end-users
  - Not included in emissions calculation, but used later by ARB to calculate compliance obligation
  - Ensures no double counting by other covered entities
- Required conformance review (§ 95131(b)(8)(F)(2))
- Reporters complete a worksheet that is uploaded to Cal e-GGRT

Verifying LDC Conformance – End Users (1 of 2)

- 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.
- How did they determine that the counterparties were end users of the NG and not other pipelines?

Verifying LDC Conformance – End Users (2 of 2)

- 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

Biomethane Reporting (1 of 2)

- Natural gas suppliers can supply biomethane, which is biomass-derived natural gas meeting pipeline quality standards
- Only biomethane purchased by the supplier on behalf of the end user is reported as biomethane
- If biomethane is purchased directly by the end user, it is reported as fossil NG by the supplier (and reported as biomethane by the end user)

Biomethane Reporting (2 of 2)

- If reporting biomethane, must include name and address of biomethane vendor and production facility and annual MMBtu from each (§ 95103(d)(3))
- No NG suppliers reported biomethane in 2012. (They may deliver biomethane, but it is purchased by end user and reported as NG by supplier.)

Responsible for Reporting - LNG Production Facility

- LNG production facilities that received their NG from an interstate pipeline must report emissions from NG sold as LNG products
- One reporting entity. First reporting year is 2014 data reported in 2015.

Verification of LNG Production Facility

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
- LNG producers reporting "LNG from Biomethane" must report information required by § 95103(j)(3) (biomethane producer data)

Verifying Measurements of Quantity for Natural Gas Suppliers

- Most transactions will be financial transactions- exempt from 95103(k) accuracy requirements (§ 95103(k)(7))
- Some NG utilities may have transactions that are <u>not</u> financial transactions
  - NG storage meters owned by the utility
  - EGUs and NG compressor stations owned by the utility
  - Tolling agreements (NG for electricity exchange)
- If so, utilities can meet requirements of CPUC General Order 58A (§ 95103(k)(7)(C))

Verifying CH_4 and N_2O Emissions for NG Suppliers

- Calculated just like CO_2, but using CH_4 and N_2O emission factors
- Standard emission factors still used for non-pipeline quality gas

Case Study 1 - 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?

Eq. NN-1	Eq. NN-3	Eq. NN-5, fuel 1	Eq. NN-5, fuel 2b	Eq. NN-5, fuel 2a	Eq. NN-5, fuel 2c
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 NN-1	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 1 -Verifying an LDC Report

(sample risk assessment, for discussion, not a suggested template)

- See handout for report format

Eq. NN-1	Eq. NN-3	Eq. NN-5, fuel 1	Eq. NN-5, fuel 2b	Eq. NN-5, fuel 2a	Eq. NN-5, fuel 2c
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 NN-1	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

Questions and ARB Comments

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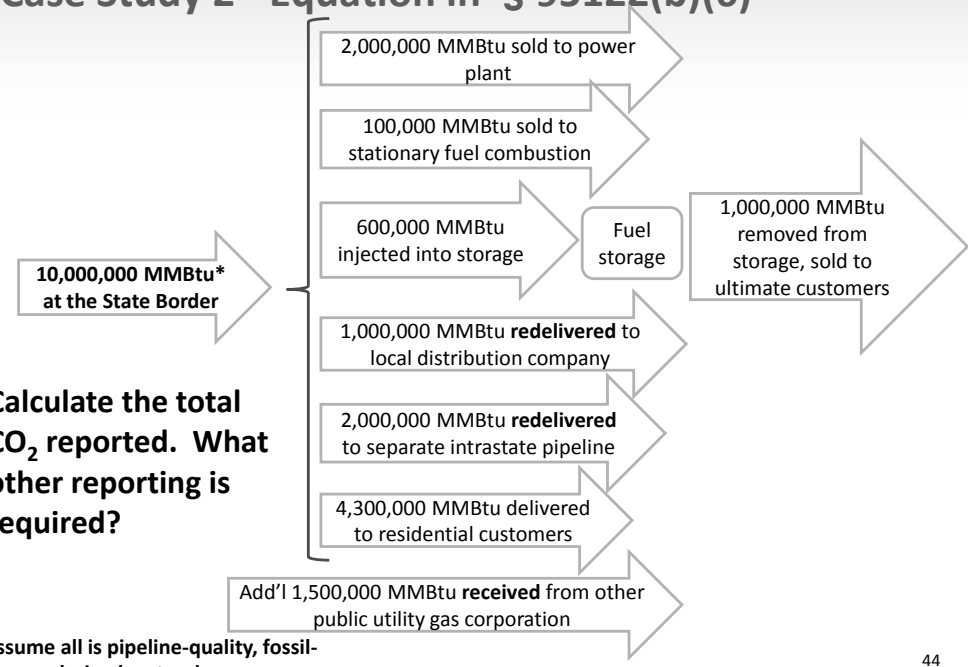
3. NGL Fractionators

California Environmental Protection Agency
Air Resources Board

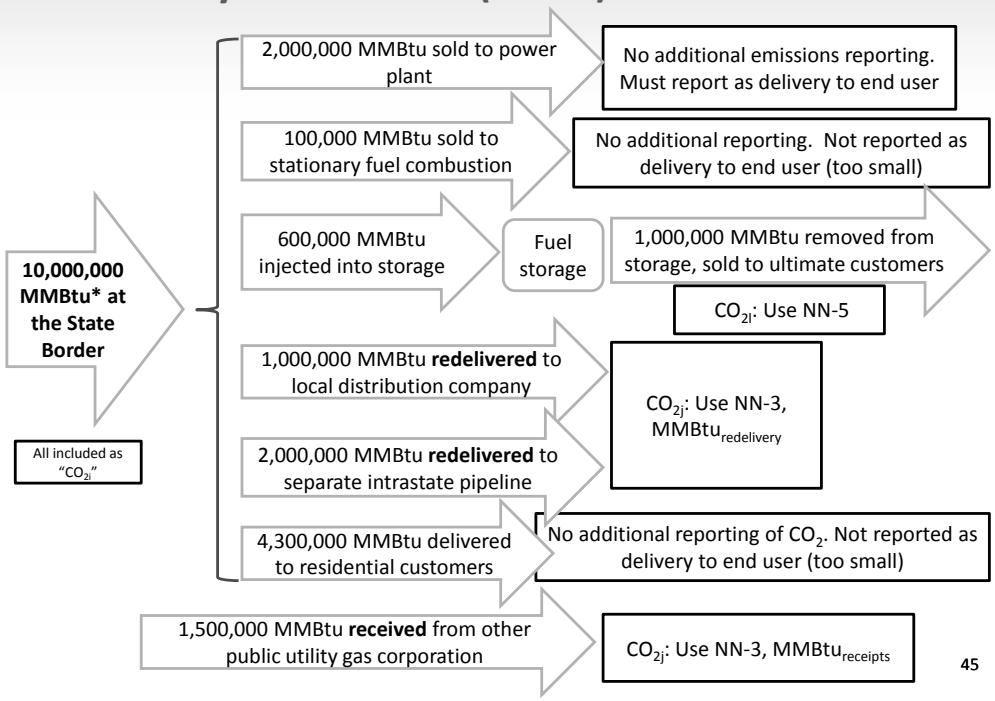
Case Study 2 - Equation in § 95122(b)(6)



Calculate the total CO_2 reported. What other reporting is required?

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

Case Study 2 – Solution (1 of 2)



Case Study 2 - Solution (2 of 2)

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

CO_{2i} = All NG received at state line:
10,000,000 MMBtu * 53.02 kg CO_2/MMBtu *.001 MT/kg = 530,200 $MTCO_2$

CO_{2j} = Redelivered and received NG: ($MMBtu_{redelivery}$ – $MMBtu_{receipts}$)
(3,000,000 – 1,500,000)*53.02*.001 = 79,530 $MTCO_2$

CO_{2l} = (Put on storage – delivered from storage)
(600,000 – 1,000,000)* 53.02 kg CO_2/MMBtu *.001 MT/kg = -21,208 $MTCO_2$

CO_2Total = 530,200 - 79,530 - (-21,208) = **471,878 $MTCO_2$**

Questions and ARB Comments

1. Overview
2. Measurement, Reporting and Verification
3. **NGL Fractionators**
   - **Information Reported**
   - **LPG vs. non-LPG**
   - **Verifying Emissions**

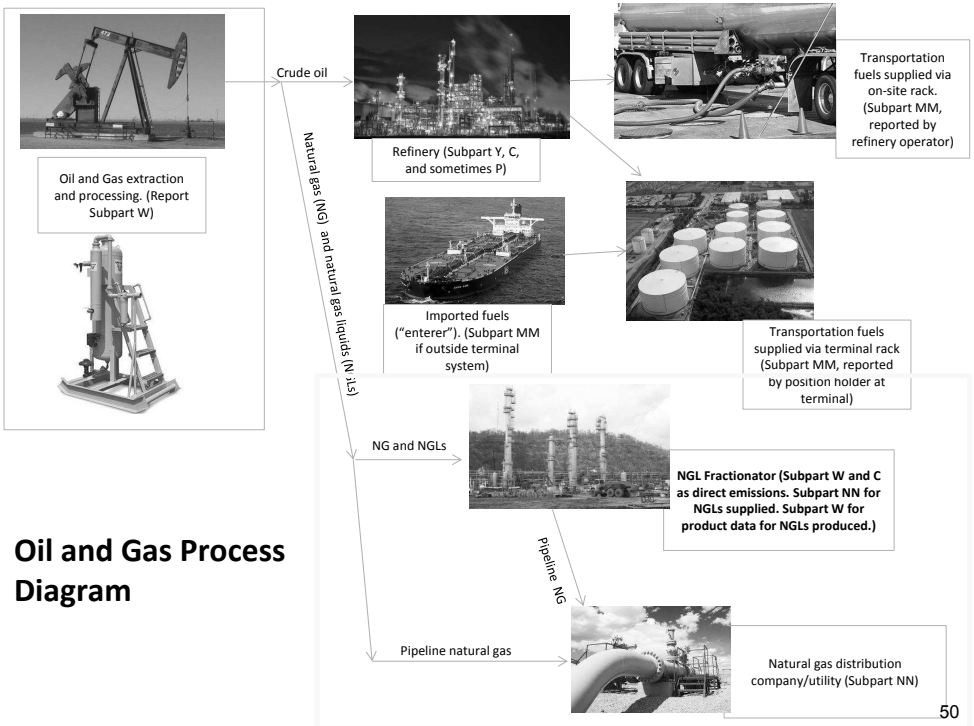
NGL Fractionators Reporting (§ 95122)

- NGL fractionators are facilities that separate natural gas and y-grade natural gas liquids (minimally processed liquids) into liquid products like propane
  - Report emissions and product data
  - 8 reporting entities, all verified
- NGL fractionators report emissions from combustion and fugitive emissions (subparts C and W)
  - Only discussing supplier emissions in this course
  - Will generally submit as single facility report for all subparts (§ 95110 [C], 95150-95158 [W], and 95122 [NN])

LPG Consignee Reporting (§ 95122)

LPG consignees are the entities to whom shipments of LPG are delivered

- LPG generally enters California by rail; receiving entity must report
- Only emissions from downstream combustion of LPG (no subpart C or W)
- Consignees can be refineries or other large end-users or LPG distributor and marketers
- Consignees is often the "importer of record", but not always. Contact ARB with question.



Oil and Gas Process Diagram

Information Reported by NGL Fractionators (1 of 2)

NGL fractionators and consignees of LPG

- Quantities of NGL components produced/imported
  - Unless destination outside California can be demonstrated
- CO_2, CH_4, N_2O and CO_2e emissions that would result from the complete combustion of NGL components
- Annual quantity of LPG (propane) produced must be reported as **covered** product data (§ 95156(c))

- Emissions calculated using *40 CFR 98.403*
  - Method 2, Eq. NN-2 and Table MM-1 in 40 CFR 98.398
- Fractionators must sum the emissions from individual constituents

$$CO_{2i} = \sum_h Fuel_h * EF_h \qquad \text{(Eq. NN-2)}$$

LPG vs. non-LPG NGLs: Emissions Considerations (1 of 2)

- Natural gas liquids are any liquids from natural gas processing, including LPG, bulk products, blends, feedstocks
  - Not all NGL products are covered emissions
- NGL from condensate from oil production (considered product data for producer), and also could be sent to fractionator

LPG vs. non-LPG NGLs : Emissions Considerations (2 of 2)

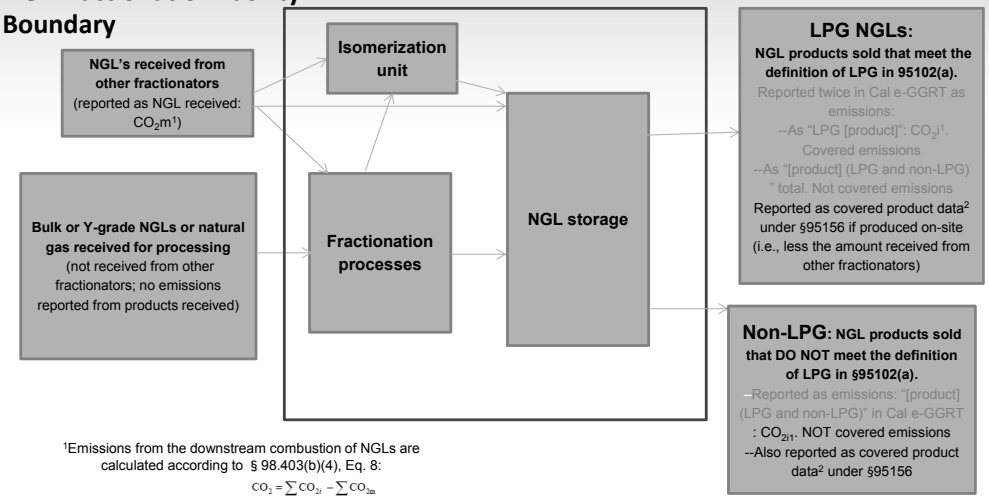
Liquefied petroleum gas (LPG) , aka "propane," is a commercial fuel that meets specifications laid out in definition; used for heating, transportation, BBQ grills, etc.

- This is a subset of total NGL production
- These are the **COVERED** emissions pursuant to § 95852(e)(1)
- Why? Because they are used downstream as fuels for heating and transportation; other NGLs likely to be used as feedstocks for processes (plastics and other petrochemicals)

LPG vs non-LPG NGLs - Covered Product Data (§ 95156(c))

- All NGLs produced are considered covered products, so it includes LPG and non-LPG
- 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_{2j}) are not included as product data

NGL Fractionation Facility Boundary



[1]Emissions from the downstream combustion of NGLs are calculated according to § 98.403(b)(4), Eq. 8:

$$CO_2 = \sum CO_{2i} - \sum CO_{2m}$$

Where **CO_2i** = Annual CO_2 mass emissions that would result from the combustion or oxidation of fractionated NGLs delivered to all customers or on behalf of customers and **CO_2m** = Annual CO_2 mass emissions that would result from the combustion or oxidation of fractionated NGLs received from other fractionators and calculated in paragraph (c)(1) of this section (metric tons).
§ 95852(e)(1) "states that a producer of LPG…has a compliance obligation for every metric ton of CO_2e included in emissions data report", so only the subset of fuels that meet the definition of LPG are considered covered emissions.

[2] 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)

Evidence to request

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

Verifying Emissions from NGL Fractionators (2 of 2)

How to evaluate evidence

- Fuel production 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

- All NGLs produced are considered covered products, so it includes LPG and non-LPG
- Information should be largely the same as emissions data
- Identify any differences
  - 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

Consignees of LPG and Information Reporting Requirements

- LPG consignees are the entities to whom shipments of LPG are delivered – fewer than 3 reported 2013 data
- LPG consignees are required to report the volume of LPG received in California
  - Reported by constituent, if known; if not known, report as total LPG consigned
- Verifier should review database of transactions, and sample invoices, shipping reports, or other applicable transactions data

Verifying Missing Data Substitutions for NGL Fractionators and LPG Consignees (§ 98.405)

- 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

Questions and ARB Comments

Course 2: Transactions Specialty

Complete:

2.1 Electric Power Entities

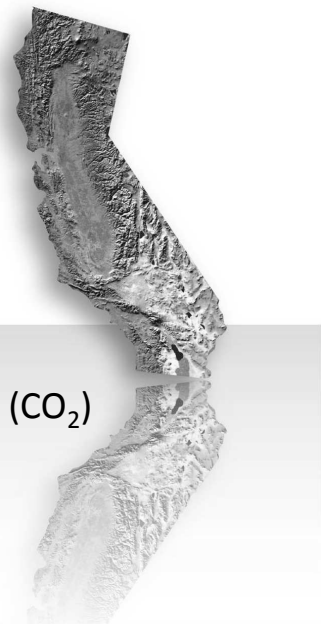
2.2 Suppliers of Transportation Fuels

2.3 Suppliers of Natural Gas, Natural Gas Liquids, Liquefied Petroleum Gas, CNG and LNG

Next:

2.4 Suppliers of Carbon Dioxide (CO_2)

Verifier Accreditation Training for Mandatory Greenhouse Gas Reporting



Transactions Specialty
Course 2.4: Suppliers of Carbon Dioxide (CO_2)

California Environmental Protection Agency
Air Resources Board

MRR Verifier Accreditation: Course Content and Exams

Course 2: Transactions Specialty

2.1 Electric Power Entities

2.2 Suppliers of Transportation Fuels

2.3 Suppliers of Natural Gas, Natural Gas Liquids, Liquefied Petroleum Gas, CNG and LNG

2.4 Suppliers of Carbon Dioxide (CO_2)

Course 2.4 Handouts

No handouts are provided for this course.

Applicability § 95123

- All suppliers of produced CO_2 for use in California
- California importers and exporters of ≥ 10,000 MT CO_2
- Facilities that capture CO_2 from processes or geological sources for commercial purposes, or for injection underground
- Can combine with other reports (unlike other suppliers)

On-site use of the CO_2 recovered from a process is not covered by § 95123.

Types of CO_2 Emissions Reported

- Mass of CO_2 captured from production process units
- Mass of CO_2 extracted from CO_2 production wells
- Mass of CO_2 imported and exported
  - Exports for purposes of geologic sequestration must be reported separately from exports for other purposes
- 8 major refineries capture some CO_2 for supply to other industries, mostly food and beverage
  - Most capture CO_2 from H_2 production process
- 1 brewery also captures CO_2

Calculation of CO_2 Emissions

Emissions calculated using equations in 40 CFR 98.423

- Using mass or volume meters
- If volume meters are used, volume is multiplied by density; measurements taken quarterly or more often for both

Verification of CO_2 Emissions

Verification

- Ensure completeness of data
- Ensure data are accurately measured, compiled and entered
- Ask about meter location and concentration measurement location to ensure reported data matches actual CO_2 supplied
- May be able to do quick review of sales records
- If CO_2 is captured from H_2 production process, these emissions must be subtracted from Subpart P emissions (§ 95114(i))

Case Study 1
CO_2 Reported Under Subpart P and PP

Calculate the CO_2 reported under Subparts P and PP for a CO_2 supplier given the following information:

- The hydrogen production unit at a refinery produces 85,000 $MTCO_2$
  - The refinery captures some CO_2 generated from hydrogen production and provides the following annual data: 20,000,000 scm capture, 97% CO_2 concentration by weight, 0.00183 MT/scm
- What is the amount of CO_2 reported under Subpart PP as CO_2 supplied and what are the emissions reported under subpart P as hydrogen production unit emissions?

Case Study 1 - Solution
CO_2 Reported Under Subpart P and PP

Calculate the CO_2 reported under Subpart PP for a CO_2 supplier given the following information:

- Answer: 20,000,000 scm * 97% CO_2 * .00183 $MTCO_2$/ = 35,502 $MTCO_2$ reported under PP
- 85,000 $MTCO_2$ – 35,502 $MTCO_2$ = 49,498 MT CO_2 reported under subpart P

Questions and ARB Comments

Course 2: Transactions Specialty

Complete:

2.1 Electric Power Entities

2.2 Suppliers of Transportation Fuels

2.3 Suppliers of Natural Gas, Natural Gas Liquids, Liquefied Petroleum Gas, CNG and LNG

2.4 Suppliers of Carbon Dioxide (CO_2)