SoCalGas A Sempra Energy utility

SDGE A Sempra Energy utility

NATURAL GAS LEAKAGE WORKSHOP

Working Group Workshop on Best Practices

October 27, 2015

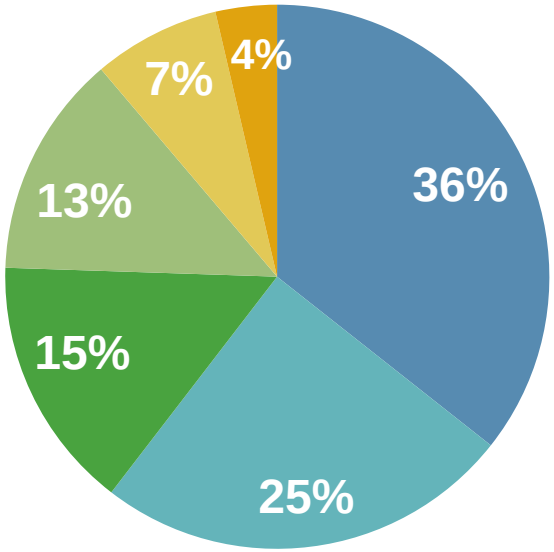
Agenda

- Background
- Critical Topics for SB 1371 Proceeding
  - Determining Cost Effectiveness
  - Selection of Best Management Practices (BMPs)
  - “Leak” Management and Best Practices
- Mitigating Top Emissions Categories
  - Customer Meter Sets
  - Buried System Leaks
  - Blow-Down and Purge Operations
  - Compressor Operations
  - System Damage Emissions Mitigation

BACKGROUND

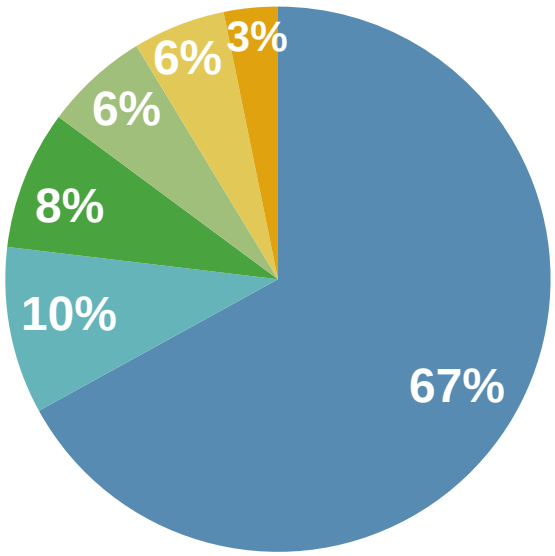
2014 Top Ten Reported Methane Emissions

SoCalGas



- Customer Meters & "Minor Releases" (1,8)
- Pipeline Leaks (2,7)
- Blow Down/Purge (3,9,10)
- Compressor Operations (4,6)
- System Damages (5)
- Other

SDG&E



- Customer Meters & "Minor Releases" (1,5)
- Compressor Operations (6,7,8,9)
- System Damages (2)
- Blow Down/Purge (4,10)
- Pipeline Leaks (3)
- Other

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Assessing Cost Effectiveness

- Focus on cost-effective operational strategies relative to each utility's asset inventory and key activities
  - Cap and trade price should be utilized as a benchmark for cost-effectiveness
- BMPs can be unique per utility
  - Different utilities are starting at different points
  - Make up of pipeline systems are different
  - Policies and procedures may differ substantially
  - Data collection systems
  - Capability and resources may vary
- It is appropriate for different utilities to use different approaches

Developing a Performance-Based Framework to Select Cost-Effective Solutions

- Performance-metrics should measure incremental solutions pursued without penalizing early-achievers
- Technological solutions must have an overall net benefit
  - Selection criteria should assess the amount of emissions reduced from the mitigation solution
  - Applications must address the utilities' major emission sources
- There should be a flexible selection and validation process
  - Stakeholders need a mechanism to introduce feasible technologies and select solutions that are most reasonable to address their system composition

Best Management Practices

- BMPs must be "technologically feasible"
  - Consideration should be given to availability of technology (i.e. "commercially available")
  - Consider number, volume of assets, or opportunities where the BMP should be applied
  - Mitigation solutions need to demonstrate successful broad-based utilization and implementation before being identified as a BMP
- Proceeding must result in reasonable requirements, and consider cost as stated in SB 1371†
- Should not discourage innovation and competing technologies

† See SB 1371 (Statutes 2014, Chapter 525), codified in CAL. PUB. UTIL. CODE § 975 (e)(1).

“Leak” Management

- SB 1371 definition of the term “Leak”
- Traditional “Leak Management”
  - Overall process is a multi-stage program
  - Many technologies used to accomplish objectives
- Addressed in detail within Pipeline Integrity Management plans
  - Care must be taken within this proceeding not to interfere with Pipeline Safety programs and Objectives
  - Distribution Integrity Management Program (DIMP) – Implemented as a High-Level, Flexible, Non-Prescriptive regulation
  - Prescriptive regulations may have unintended consequences of shifting focus from other areas of Pipeline Integrity and Safety programs

“Leak Management”

- Leak Detection
  - Current Means of Detection
    - Routine Leakage Survey; Special Leakage Survey; Odor Complaints
    - Scheduled M&I activities
      - Planned/Routine Meter Change
      - Inspection of Vaults, Relief Valves, Reg Stations, Valves
  - New Technologies
    - Advanced Meter Algorithms
    - Methane sensors at MSAs
    - Right-of-way methane monitors
- Policies and procedures for evaluation and classification
  - New Above-Ground Leak Policy came out of DIMP program
  - Leak Investigation - Leak Centering - Leak Repair
- G.O. 112-F
  - Increases frequency of leak surveys of transmission system to twice a year
  - Prescribes leak classification criteria and repair timeframes
  - Prescribes additional operator qualification requirements
  - Requires removal of encroachments and use of Compatible Emergency Response Standard

Technological Opportunities to Support Mitigation Strategies

- Leveraging Advanced Meter data and technology
  - With the deployment of the Advanced Meter network, SoCalGas/SDG&E has the opportunity to integrate data to develop algorithms that would support early leak detection and indicate premises where leaks are reoccurring
  - The Advanced Meter team has developed a proof of concept transactional analytics approach to detect unusual consumption patterns on closed accounts
    - The team assesses consumption patterns using a Per Day Average and in some cases will look at the hourly reads to conduct further research
  - Developing GIS algorithms that account for permitting and construction data
    - These additional data fields would allow SoCalGas/SDG&E identify areas with high levels of pipeline activity to increase patrol in the area
    - Technicians could monitor digging activities in the right of way

BEST MANAGEMENT PRACTICES TO ADDRESS TOP 10 EMISSION SOURCES

Customer Meter Set Assemblies

- Use of Emissions Factors verses Leak and Minor Release Repair Data
  - Need to study Above Ground leak repair and minor release data to evaluate the current factors
  - Data Constraints - available data currently limits ability to determine where to focus emissions reduction initiatives
  - “Minor release” (tightening/lubrication/adjustment) data is not required to be reported
  - Many data systems and internal operating organizations involved
- Methane Emissions Mitigation at the Meter Set Assembly (MSA)
  - Leaks are detected and identified during Distribution Leakage Survey; Customer Service Orders; Atmospheric Corrosion Surveys; Odor complaints from Customer/Public; Other Company Operations
  - Leaks are generally repaired upon discovery or within the next business day

Customer Meter Set Assemblies

- Methane Emissions Prevention at the MSA
  - Methane Monitors at the MSA integrated with Advanced Meter to facilitate early leak detection
  - Advanced Meter usage information – for 6 million meters; 60 billion reads; over 2.5 billion data elements every day
- Facility Design – possible strategy could be to design out as many potential leak points as possible
  - Typical Residential MSA has 15 threaded connections, plus other points that could potentially leak on individual components (such as valves, regulators, meters and swivels)

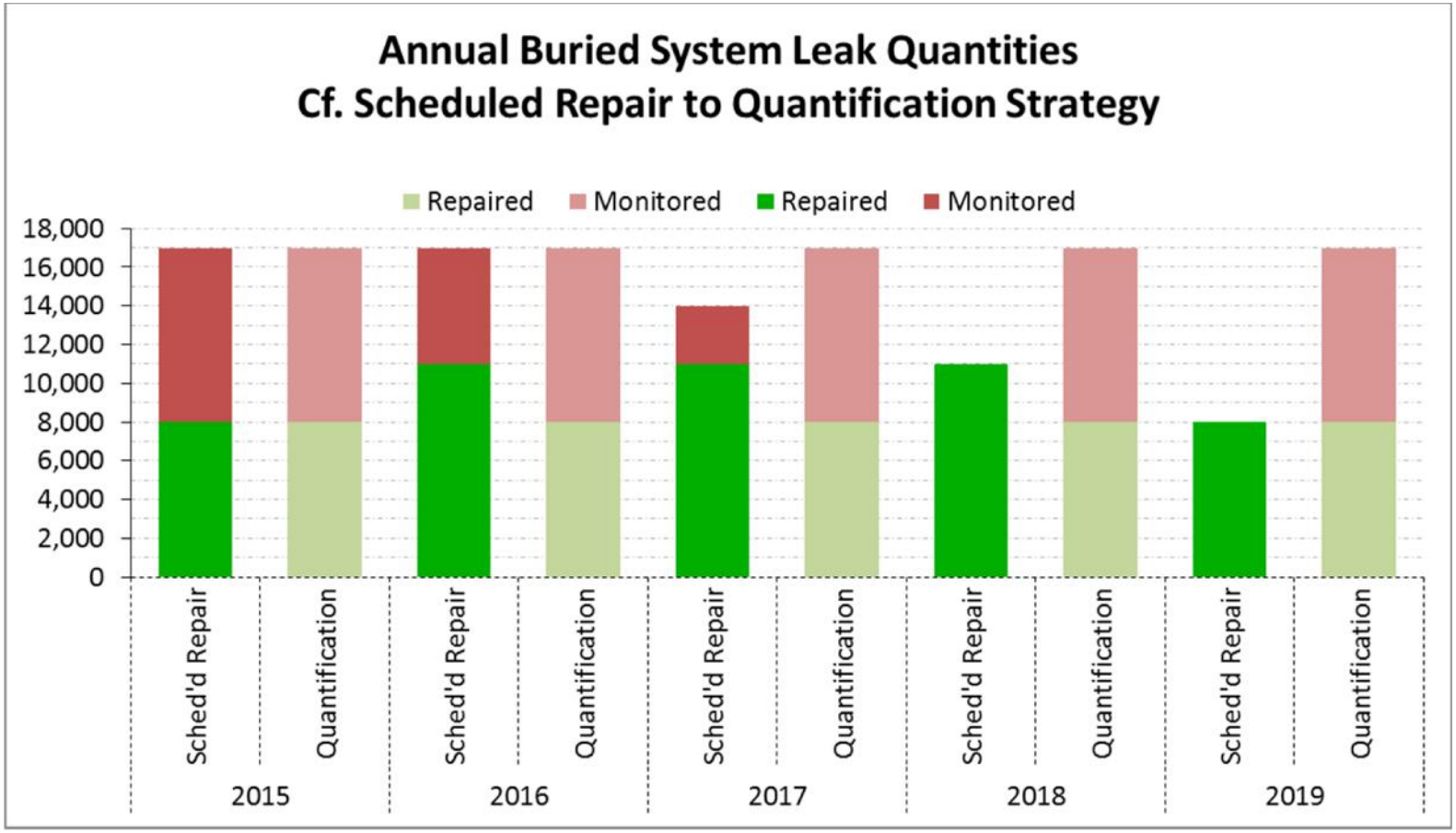
Buried Pipeline System Leaks

SB1371 Leak Source [Rank (%)]*	F/P**	Natural Gas STAR Best Management Practices	Cost Range ($) Assumes Capital Costs Unless Otherwise Noted
T&D Pipeline Leaks **[2 (22.1%)]** Storage Pipeline/Facility Leaks **[7 (2.7%)]**	F/P P F/P P	1. Direct Inspection & Maintenance 2. Insert Flexible Liners in unprotected steel pipe 3. Perform Valve Leak Repair During Pipeline Replacement 4. Increase Walking Survey from a 5 to 3 Year Basis	1. 10K – 50K/station/year 2. 1K – 10K/mile 3. 1K – 10K ($300 per valve) 4. 1K – 10K/mile (90% labor, 10% non-labor cost)

***Represents SoCalGas' leak source rank and percentage only**
****F = Storage/Compressor Facility; P = Transmission/Distribution Pipeline**
Gas STAR BMPs may be located at the following location: http://www3.epa.gov/gasstar/tools/recommended.html

- Approximately 8,000 leaks in this category are detected and repaired annually
- SoCalGas eliminating leakage "backlog"
  - Primarily consists of Grade 3 Leaks on Unprotected Steel
  - SDG&E is already doing this in practice – no unprotected steel
  - After Backlog is eliminated all leak indications will be scheduled for repair when found with 24 month repair policy
    - Majority of Grade 3 Leaks currently repaired within 12 months
    - 24 months policy needed for areas requiring more time for permitting and planning

Scheduled Repair vs Quantification



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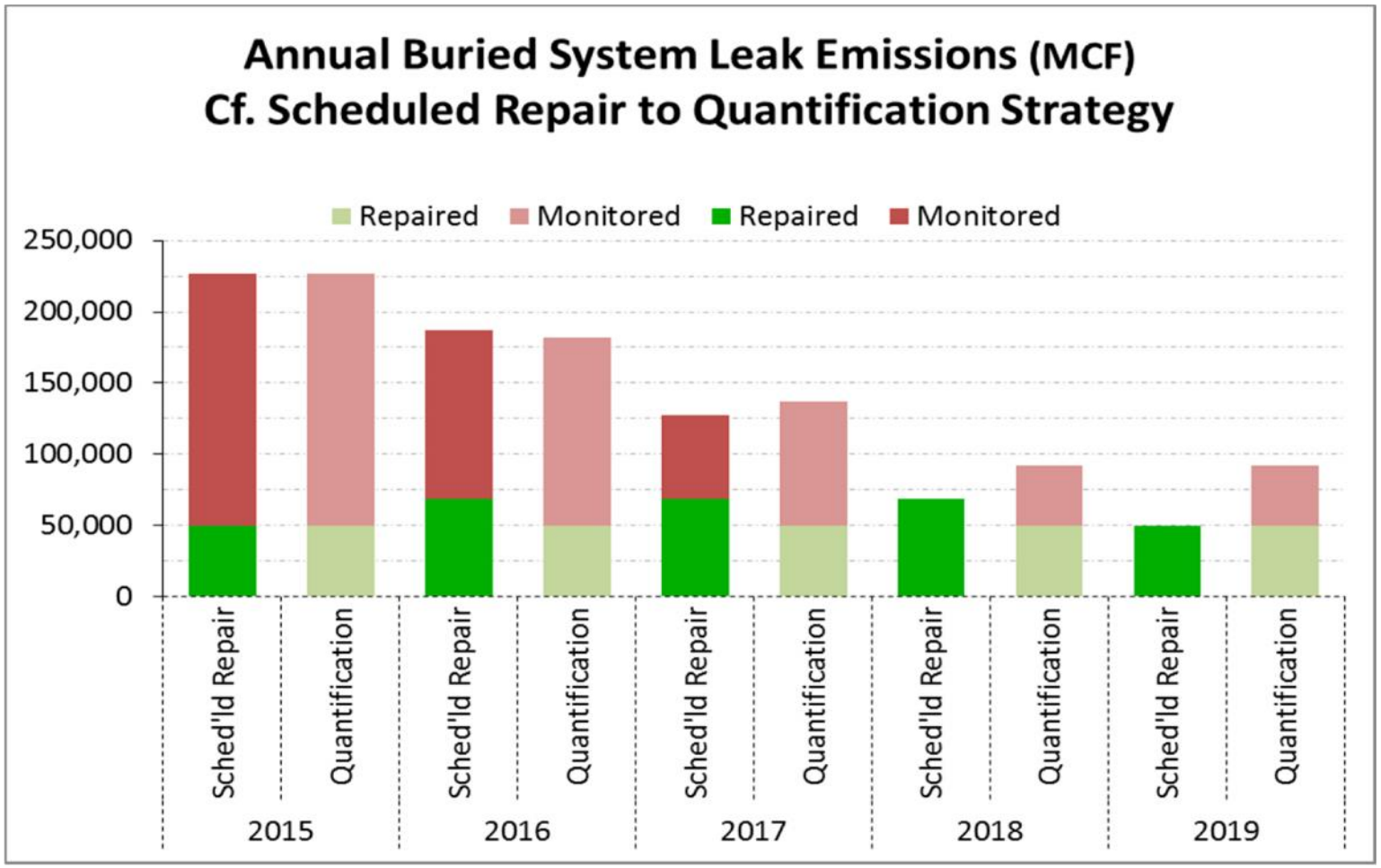

Scheduled Repair vs Quantification

- Cost of performing quantification activity only achieves categorization
  - No emissions reduction is achieved by this expenditure
  - No change in quantity of leaks repaired annually
  - Costs are recurring, monitored leaks would have to be re-quantified annually
- Scheduled Repair approach results in all incremental costs going toward some level of emissions reduction
  - Once leak is repaired there are no recurring costs
  - Cost of annual re-evaluations are eliminated
  - Overall methane emissions reduction achievement is greater, even over the implementation period.
  - When leaks are repaired by replacement of Unprotected Steel Main or Service, future leak potential is also minimized
  - Preventing future emissions is the <u>only means</u> of mitigating emissions from the time period between leak initiation and detection

Leak Detection Using Methane Mapping

- Mobile Methane Mapping
  - Estimate of cost to implement
    - $12.7MM annual incremental expense
  - Assessment of benefits:
    - One-Time increase in number of low-volume, Non-hazardous leak indications (Grade 3)
    - High volume leaks are easy to detect, and not likely to be missed using existing technology
    - No significant increase in detection of Hazardous leak indications (Grade 1)

- New Approach Idea for Mobile Methane Mapping
  - Leverage miles already being driven by Company vehicles
    - No incremental cost or vehicle emissions
    - 4,000 Company vehicles driving 7,000 mi/yr = 28 million miles driven annually
  - Develop an approach that is seamless to the vehicle operator
    - Use sensors on vehicle to gather and communicate all data automatically
  - Develop methane/odorant detector to differentiate Pipeline gas
  - Perform data analysis in centralized location
    - Large data volume may allow modeling of atmospheric methane levels across entire service territory
    - Company vehicles usually drive in areas we have facilities
    - Centrally coordinate standard work orders for Operations to investigate locations of concern
  - Approach should provide early detection of high-volume emitters across entire service territory allowing for earlier leak detection and mitigation

Blow Down & Purge

SB1371 Leak Source [Rank (%)]	F/P**	Natural Gas STAR Best Management Practice	Cost Range ($) Assumes Capital Costs Unless Otherwise Noted
T&D Facility Blowdown and purge (repair – intentional) **[3 (12.8%)]** T&D Facility/ Pipeline Blowdown **[9 (1.2%)]** Storage Facility/pipeline Blowdown **[10 (1.0%)]**	F/P F F/P F/P F/P F/P F F	1. Reduce Nat Gas Venting /Fewer Engine Startups 2. Install electric motor starters 3. Inject Blowdown Gas into Low Press Main/Fuel Gas System 4. Using Pump-Down to Lower Gas Line Pressure 5. Using Hot Taps for In Service Pipeline Connections 6. Use Inert Gases/Pigs to Perform Pipeline Purges 7. Redesign Blowdown Systems /Alter Emergency Shutdown Demonstration (ESD) Practices 8. Install flares	1. < 1K per compressor 2. 1K – 10K/engine 3. 1K – 10K (piping & set point control) 4. > 50K per leased or purchased unit 5. 10K – 50K (equip/labor) per year 6. Zero w/ owned equip w/o labor cost 7. 1K – 10K (to install isolation valves) 8. 10K – 50K/flare (plus fuel cost)

- Mitigation options
  - Draw down pressure
  - Divert into other local lines
  - “Vapor” Recovery/Compression and Transport
  - Flare
- Various options have limited application
- On some projects all options may not be feasible

Compressor Operations

SB1371 Leak Source [Rank (%)]*	F/P**	Natural Gas STAR Best Management Practice	Cost Range ($) Assumes Capital Costs Unless Otherwise Noted
Storage Compressor Seal Losses **[4 (9.0%)]** Transmission Compressor Seal Losses **[6 (4.2%)]**	F F F F	1. Wet Seal Degassing Recovery for Centrifugal Comp 2. Reduce Emissions from Compressor Rod Packing 3. Reducing Emissions Taking Compressors Off-Line 4. Replace Wet Seals w/ Dry Seals in Centrifugal Compressor	1. 33K/comp; 90K for 4 compressors 2. <1K /packing 3. 1K – 10K /compressor 4. > 50K/compressor
T&D Reg. Station Emissions **[8 (1.3%)]**	P	1. Directed Inspect & Maintenance at Gate Stations	1. 1K – 10K/regulator station

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Gas STAR BMPs may be located at the following location: http://www3.epa.gov/gasstar/tools/recommended.html

- Mitigation Options
  - "Vapor" recovery and inject into engine fuel lines
  - Flare or Oxidize
- Current reporting and emission factors may not consider mitigations already in place

System Damages

- Prevention
  - Bury Mesh - implemented for all High Pressure Pipeline installations
  - Excavation field meetings and stand-by activities for preventing damage to subsurface facilities during an excavation.
    - Required to be report by G.O. 112-F
    - Additional activities in designated high population areas; pipelines in close proximity to Schools, Hospitals, Churches, Business Districts, etc.
  - Risk Algorithms – develop risk models using permit applications, construction starts, and geographic damage event location information to increase patrols
- Emissions Reduction
  - Reduce response time to reduce duration
    - Mandated within G.O. 112F update
  - Installation of Automatic Shut-Off Valves - mandated within PSEP program
  - Increased use of Excess Flow Valves (EFVs) – being addressed by Pipeline and Hazardous Material Safety Administration (PHMSA)