DOCKETED

Docket Number:	17-IEPR-06
Project Title:	Doubling Energy Efficiency Savings
TN #:	220546
Document Title:	NRDC CommentsDraft Staff Papers on SB 350 Energy Efficiency Savings Doubling Target
Description:	N/A
Filer:	System
Organization:	Natural Resources Defense Council
Submitter Role:	Public
Submission Date:	8/3/2017 5:02:49 PM
Docketed Date:	8/4/2017

Comment Received From: Natural Resources Defense Council
Submitted On: 8/3/2017
Docket Number: 17-IEPR-06

NRDC Comments:Draft Staff Papers on SB 350 Energy Efficiency Savings Doubling Targets

Additional submitted attachment is included below.

Comments of the Natural Resources Defense Council (NRDC) on the 2017 Integrated Energy Policy Report (IEPR)
Draft Staff Papers on SB 350 Energy Efficiency Savings Doubling Targets
Docket Number 17-IEPR-06
August 3rd, 2017
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I. Introduction and Summary

The Natural Resources Defense Council (NRDC) appreciates the opportunity to offer these comments on Draft Staff Papers on SB 350 Energy Efficiency Savings Doubling Targets on July 21, 2017. NRDC is a non-profit membership organization with more than 80,000 California members who have an interest in receiving affordable energy services while reducing the environmental impact of California's energy consumption.

II. Discussion

California Energy Commission (CEC) staff have established a thorough and transparent process to develop SB 350 compliant energy efficiency savings targets. NRDC's comments are in response to the two staff papers ("*Notice of Availability of Draft Staff Papers on SB 350 Energy Efficiency Savings Doubling Targets*" and "*Senate Bill 350 Energy Efficiency Targets for Programs Not Funded through Utility Rates*") published by CEC staff on July 21st.

- The CEC's effort is instrumental in better understanding (1) how different initiatives (utility and non-utility funded) can contribute toward meeting SB350's aggressive statewide energy efficiency goals; and (2) forecasted gap between feasible potential statewide energy efficiency savings estimates and the SB350's doubling energy efficiency goal.
- NRDC agrees with the CEC that energy efficiency savings potential in the agricultural and industrial sector needs to be better understood and prioritized.
- NRDC requests the CEC to make details (assumptions, methodology, and results) for low income weatherization, and fuel substitution energy savings potential calculation available so that NRDC can provide pointed and useful feedback.
    - Fuel Substitution: NRDC recommends that any comparison of GHG emissions from end-use electric and gas technology be conducted at the source for both

fuels. This will provide an accurate framework for comparing emissions from electricity and gas end-use technology. NRDC would also like to better understand the source of CEC's assumption that distribution losses for natural gas are about 2% of annual usage; the EPA estimates them to be about 5%.[1]

- Fuel Substitution: The current CEC GHG emissions analysis methodology for gas end-use equipment does not appear to consider fugitive methane emissions that exist in the production, transmission, distribution, and on-site use of natural gas. There is a wide range of estimates of the magnitude of these emissions, and they vary by producer, supplier, and distributor. Due to the high global warming potential of a unit quantity methane, these fugitive emissions have a much more significant impact than their volume would suggest. NRDC has included a literature review that summarizes how fugitive methane emissions from natural gas water heaters should be accounted for as an appendix to these comments.

III. Conclusion

Thank you for your commitment to energy efficiency and for the opportunity to comment on the 2017 IEPR Workshop on 2030 Energy Efficiency Targets. We look forward to working with the CEC staff and stakeholders on the 2017 IEPR and the energy efficiency targets. It is critical to the success of SB 350's doubling of energy efficiency savings goal to set up the right framework to drive the right outcomes regarding energy, GHGs, and costs.

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[1] https://portfoliomanager.energystar.gov/pdf/reference/Source%20Energy.pdf

Appendix: Methane Leakage in GHG Analysis of Water Heaters

It is important to factor in upstream fugitive methane emissions as part of an analysis of the GHG emissions from gas and electric water heating. Methane is the principal component of natural gas and a potent short-lived greenhouse gas.[2] To account for the large range of analysis on methane leakage rates in the U.S., we included scenarios for low, mid, and high methane leakage in this review.

Fugitive methane emissions occur along all stages[3] of the lifecycle of natural gas, although at different rates. Given this, it is key to have specific leakage rates for natural gas that goes from the well to the power plant, and for natural gas that goes from the well to the building end-use. Leakage rates for well to power plant include leakage that occurs at the well-site (exploration + production), processing, and storage and transmission to the power plant. Leakage rates for well to building end use include leakage that occurs at the well-site (exploration + production), processing, storage and transmission, and distribution within the city gates.[4] In the high leakage scenario, we also include leakage at the actual end-use as well (i.e. in the building).

Methane leakage varies greatly across the U.S., depending on the location, type of production, and quality and age of equipment used. For our analysis, we used rough national averages, although it is recommended that these estimates are updated with local leakage rates, when sufficient data is available.[5] Similarly, the leakage rates in our analysis are based on average natural gas use, not marginal or incremental changes in natural gas use. An important area for future research is the impact of marginal changes in natural gas use on fugitive methane emissions.

The time-dependent variance in the global warming potential (GWP) of methane can greatly impact the significance of methane leakage and the GHG analysis. The IPCC and EPA specify GWP estimates for methane based on a 20-year and 100-year time horizon, although not

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[2] Zavala-Araiza et. al., Toward a Functional Definition of Methane Super-Emitters: Application to Natural Gas Production Sites, Environment, Science & Technology, July 7, 2015,

[3] Stages include: exploration, production, processing, transmission, storage, distribution, and end-use. For a description of these stages see *Basic overview of stages in the NG system* or US EPA GHG Inventory

[4] David Lyon, EDF, conversation 4/1/16

[5] EDF analysis of local leakage rates should be published spring/summer 2016.

for time periods in between.[6] To keep our low-leakage methane scenario conservative and consistent with the EPA[7], we use a 100-year time horizon. However, for the high-end leakage rate we use the 20-year GWP for methane, particularly because our analysis is of GHG emissions in 2030, i.e. in 15 years. The mid-case is a straight average of 20-year and 80-year GWPs.

It is important to note that the low, mid, and high leakage rates are the result of analysis of methane leakage in *current conditions*, not projections of future leakage. Some, particularly the natural gas industry, believe that future leakage will be lower than or similar to current rates due to EPA's methane leakage reduction goals for 2025 and technology improvements in natural gas operations. Others,[8] however, forecast large growth in unconventional drilling, and associate this with higher methane leakage rates in the exploration and production stage. This is an important area for future research.

Our data sources include the U.S. EPA GHG Inventory,[9] academic publications,[10,11,12] and conversations with natural gas experts David Lyon and Tim O'Connor at Environmental Defense Fund.[13]

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[6] IPCC (2014)
[7] US EPA

[8] Howarth et al., A bridge to nowhere: methane emissions and the greenhouse gas footprint of natural gas, May 15, 2014; and conversations with Tim O'Connor (EDF)
[9] US EPA GHG Inventory for 2013, Draft 2/22/16
[10] Marchese et al. (2015)Methane Emissions from United States Natural Gas Gathering and Processing (data collection in 2012 - high end of 95% confidence interval)
[11] Zimmerle et al.(2015) Methane Emissions from the Natural Gas Transmission and Storage System in the United States (leakage in 2012 - uses upper end of 95% confidence interval. Includes "super emitters")
[12] Lamb et al.(2015) Direct Measurements Show Decreasing Methane Emissions from Natural Gas Local Distribution Systems in the United States (this is actually less than 2011 EPA GHG inventory and reflects significant upgrades at metering and regulating stations, improvements in leak detection and maintenance activities)
[13] Natural Gas Exploration + Production leakage rate - David Lyon conversation (4/1/16) increase EPA GHGI by 50% to include super emitters which are not included in EPA GHGI; Natural Gas end uses in buildings leakage rate - David Lyon conversation (4/1/16) 1% for high end.

Note: Mid-case for leakage is the average of low and high leakage rates.

Variable	Low-leakage	Mid-leakage	High-leakage
Well-to-power plant: leakage stages included	Production, processing, transmission and storage (total: 1.30%)	Production, processing, transmission and storage (total: 1.71%)	Production, processing, transmission and storage (total: 2.12%)
Well-to-building: leakage stages included	Production, processing, transmission and storage, distribution (total: 1.39%)	Production, processing, transmission and storage, distribution, *and end-use* (total: 2.35%)	Production, processing, transmission and storage, distribution, *and end-use* (total: 3.30%)
Super-emitters: sites with the highest proportional methane loss rates, often the 5% highest emitting sites[14]	Not included	Partially included	Included
EPA 40-45% methane leakage reduction below 2012 by 2025 (for new equipment at production site; voluntary goal)	Not included	Not included	Not included
Higher leakage rate for projected growth of unconventional drilling	Not included	Not included	Not included
Global warming potential (GWP)	100 years: 36 GWP	average of 100-year and 20-year GWP: 61 GWP	20 years: 86 GWP
Data source	EPA 2013 GHG Inventory (2/22/16 DRAFT)		Academic papers by Marchese (2015), Zimmerle (2015), Lamb (2015), and estimates by

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[14] Zavala-Araiza et. al., Toward a Functional Definition of Methane Super-Emitters: Application to Natural Gas Production Sites, Environment, Science & Technology, July 7, 2015,

			David Lyon. Use upper end of 95% confidence interval of academic papers.