

“Mind the Gap” is based on a model developed by Clean Air Task Force. This document describes the methodology and key assumptions behind the data we present, including:

- Projected 2025 Emissions (with current regulations)
- Potential Reductions from Proposed/Announced Rules
- Potential Reductions from Strong Existing Source Rules
- Administration Pledge 40% - 45% Reduction from 2012 Level by 2025
- Potential Benefits of Voluntary Programs

#### Projected 2025 Emissions (with current regulations)

*Summary.* First, we estimated methane emissions in 2013 (the most recent year for which there is EPA data). Then, we estimated 2025 emissions by scaling to projected oil and gas production growth according to the 2015 Annual Energy Outlook (AEO)<sup>1</sup>. Finally, we subtracted out the impact of existing regulations (i.e., NSPS Subpart OOOO, Colorado rules, and Wyoming rules for the Upper Green River Basin) to get “business as usual emissions” in 2025.

For the 2013 emissions estimate, we used only EPA data sources. For most sources of emissions, we used data directly from the 2015 Edition of EPA’s US Greenhouse Gas Inventory (US GHG Inventory)<sup>2</sup>. For a few sources, we supplemented the GHG Inventory emissions estimate with data from the Greenhouse Gas Reporting Program (GHGRP)<sup>3</sup> and from the proposed NSPS Subpart OOOOa Regulatory Impact Assessment<sup>4</sup>. We used GHGRP data for pneumatic controllers, liquids unloading, and oil well production venting because GHGRP data is more accurate (generally due to more accurate data for equipment counts) and because GHGRP data differentiates liquids unloading and pneumatic controller emissions in ways that allow for direct calculations of potential mitigation. For example, GHGRP reports emissions from high-bleed, low-bleed, and intermittent-bleed pneumatic controllers separately, while the US GHG Inventory generally aggregates emissions from all types of pneumatic controllers. We used the OOOOa Regulatory Impact Assessment for oil well completions because this source is omitted from the US GHG Inventory<sup>5</sup>. Our estimate of 2013 oil and gas sector methane emissions based on these EPA data sources is 7.4 - 7.7 million metric tons methane (186 - 191 million metric tons CO<sub>2</sub>e, using a 100-yr GWP of 25 in accordance with IPCC’s fourth assessment report).

We scaled these emissions to 2025 based on oil and gas sector growth projected in the Energy Information Administration’s Annual Energy Outlook 2015 Reference Case. Most emissions sources are scaled to natural gas production (projected to grow 25% between 2013 and 2025)<sup>6</sup>. Certain sources are scaled to other projections, such as oil production, shale gas production, etc.

We estimated the emissions reductions associated with the EPA’s 2012 VOC rules (OOOO)<sup>7</sup>, the 2014 Colorado regulations<sup>8</sup>, and the Wyoming Upper Green River Basin (UGRB) nonattainment area regulations.

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<sup>1</sup> Annual Energy Outlook 2015, EIA, April 2015, available at <http://www.eia.gov/forecasts/aeo/>.

<sup>2</sup> Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2013, April 15, 2015, available at <http://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2015-Main-Text.pdf>.

<sup>3</sup> 40 CFR Part 98, Subpart W, EPA Greenhouse Gas Reporting Program.

<sup>4</sup> Regulatory Impact Analysis of the Proposed Emission Standards for New and Modified Sources in the Oil and Natural Gas Sector, August 2015, available at [http://www3.epa.gov/airquality/oilandgas/pdfs/og\\_prop\\_ria\\_081815.pdf](http://www3.epa.gov/airquality/oilandgas/pdfs/og_prop_ria_081815.pdf).

<sup>5</sup> *Id.* At 3-1.

<sup>6</sup> *Supra* note 1, at Table E-1.

<sup>7</sup> 40 Code of Federal Regulations Part 60 Subpart OOOO, August 2012, available at <http://www.ecfr.gov/cgi-bin/text-idx?node=sp40.7.60.oooo>.

<sup>8</sup> Colorado Department of Public Health and Environment, Regulation 7, 5 CCR 1001-9, available at [https://www.colorado.gov/pacific/sites/default/files/5-CCR-1001-9\\_0.pdf](https://www.colorado.gov/pacific/sites/default/files/5-CCR-1001-9_0.pdf).

The OOOO rules apply nationally, but only to new and modified sources. Sources covered by OOOO are: gas processing sector leaks, gathering and processing compressors, production and processing pneumatic controllers, production tanks, production dehydrators, gas well completions<sup>9</sup>. For these sources, since new equipment will be covered by the OOOO standards, the potential increase in emissions due to growth in production is reduced by abatement factors taken from OOOO documentation. (Gas well completions only occur at new or modified sources, so we assume mitigation for all gas well emissions under OOOO). We also expect some degree of turnover to occur: some sources are decommissioned and replaced by new sources—we assume turnover is between 5 and 10% per year for most sources, but others (such as compressors) turn over extremely slowly, so our model has no turnover for these sources. These new sources that are a result of turnover are in addition to the new sources resulting from increases in nationwide production. Since all new sources are covered by OOOO, we apply the same mitigation factors to a portion of the 2013 emissions base, with that portion growing year over year according to our turnover percentage assumptions.

Colorado rules apply to both new and existing sources, but only in that state. Sources covered by the Colorado rules are: production sector leaks, compressors, pneumatic controllers, tanks, oil well completions<sup>10</sup>. Similar rules apply in Wyoming's UGRB ozone nonattainment area. Since these cover existing sources, we apply the appropriate mitigation factors to a portion of U.S. emissions equal to the portion of U.S. gas production occurring in these areas (5.8% in Colorado, 1.2% in the UGRB).

We subtract the emissions reductions achieved by OOOO and the state rules from the 2025 scaled emissions to get our estimate of 2025 business as usual emissions: 8.3 - 8.6 million metric tons methane (209 - 215 million metric tons CO<sub>2</sub>e).

#### Potential Reductions from Proposed Rules

We include three separate actions for proposed rule projections: the proposed New Source Performance Standards (OOOOa), the draft Control Technique Guidelines (CTGs), and proposed Bureau of Land Management (BLM) rules.

#### **Reductions from proposed New Source Performance Standards**

We estimated the emissions reductions associated with the EPA's 2025 methane rules (OOOOa)<sup>11</sup>. The OOOOa rules apply nationally, but only to new and modified sources. Sources covered by OOOOa are: production and transmission & storage sector leaks, transmission & storage compressors, production pneumatic pumps, transmission & storage pneumatic controllers, oil well completions. Reductions compared to business as usual are between 0.7 and 1.0 million metric tons methane (18 to 24 million metric tons CO<sub>2</sub>e). The methodology mirrors the methodology described above. Beginning in 2016, we assume that the expected increase in emissions from the covered categories, due to increased nationwide production, will be reduced by factors drawn from OOOOa or OOOO documentation, and we also account for turnover in existing sources as described above. We assume that all oil well completion emissions are covered by OOOOa since all completions are at new or modified sources (with the exception of oil wells that do not meet the gas-to-oil ratio requirements specified in the rule).

#### **Reductions from draft Control Technique Guidelines**

We estimated the emissions reductions associated with the EPA's proposed Control Technique

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<sup>9</sup> *Supra* note 7.

<sup>10</sup> *Supra* note 8.

<sup>11</sup> FR 56593, Oil and Natural Gas Sector: Emission Standards for New and Modified Sources, *available at* <https://www.federalregister.gov/articles/2015/09/18/2015-21023/oil-and-natural-gas-sector-emission-standards-for-new-and-modified-sources>.

Guidelines (CTGs) for ozone Nonattainment Areas and the Ozone Transport Region<sup>12</sup>. These guidelines apply to both new and existing sources, but only in certain regions where ozone exceeds National Ambient Air Quality Standards. We estimated that between 15 and 21% of gas production and between 7 and 9% of oil production in the U.S. takes place in these areas and will be subject to CTGs. These figures were calculated from an analysis of current ozone design values by county<sup>13</sup>, coupled with data for oil and gas production in these counties compiled by EDF from the DI Desktop database. For this analysis, we assume that EPA will define areas with ozone design values of 75-81 ppbv as moderate non-attainment. The CTGs will also apply in the Ozone Transport Region in the Northeast U.S., and we included this area in our calculation.

Sources covered by the CTGs are: production and processing leaks, production and processing compressors, production and processing pneumatic controllers, production and processing pneumatic pumps, and production storage tanks. Reductions additional to NSPS reductions are between 0.1 and 0.2 million metric tons methane (3.4 to 4.2 million metric tons CO<sub>2</sub>e).

### **Reductions from proposed BLM rules**

We estimated the emissions reductions associated with the proposed BLM rules for oil and gas production on federal land<sup>14</sup>. This rule applies to both new and existing sources, but only on federal and tribal lands. Based on analysis of well location data from the DI Desktop database and maps of federal lands, we estimated that between 19 and 20% of gas production and between 23 and 24% of oil production in the U.S. will be subject to these additional regulations (after removing some production that may already be covered by both the CTGs to avoid double counting reductions). Among others, sources covered by the BLM rules include: production leaks, production compressors, and production pneumatic controllers and pumps. (The rule also covers storage tanks, liquids unloading, and venting from completions at conventional oil wells; regulations covering these sources are expected to yield a small amount of methane reductions and they are not yet included in the model.) The incremental impact of covering these sources is minimal). Reductions additional to NSPS and CTG reductions are approximately 0.1 million metric tons methane (approximately 3.5 million metric tons CO<sub>2</sub>e).

### Potential Reductions from Strong Existing Source Rules

We estimated the emissions reductions associated with a strong existing source methane standard. This rule would apply nationally to both new and existing sources. It would be similar to the currently proposed NSPS, but it would be strengthened in the following ways: more frequent leak surveys, a stronger requirement for zero bleed pneumatic controllers and pumps, and standards for emissions from liquids unloading. In general, the measures we assume are those described in our 2014 report, *Waste Not: Common sense ways to reduce methane pollution from the oil and natural gas industry*. Reductions compared to business as usual are approximately 4.2 million metric tons methane (105 million metric tons CO<sub>2</sub>e).

### Administration Pledge 40% - 45% Reduction from 2012 Level by 2025

The Administration set a goal of reducing methane emissions to 40 – 45% below 2012 levels by 2025. We estimated 2012 emissions using the same methodology as for the 2013 emissions estimate: primarily using data from the Greenhouse Gas Inventory<sup>15</sup>, but supplemented with data from the Greenhouse Gas

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<sup>12</sup> Control Techniques Guidelines for the Oil and Natural Gas Industry (Draft), August 2015, available at [http://www3.epa.gov/airquality/oilandgas/pdfs/og\\_ctg\\_draft\\_081815.pdf](http://www3.epa.gov/airquality/oilandgas/pdfs/og_ctg_draft_081815.pdf).

<sup>13</sup> 2008 8-Hour Ozone NSAAQS, 2012-2014 Design Values, <http://www3.epa.gov/airtrends/values.html>.

<sup>14</sup> Bureau of Land Management, Waste Prevention, Production Subject to Royalties, and Resource Conservation, January 2016, available at [http://www.blm.gov/style/medialib/blm/wo/Communications\\_Directorate/public\\_affairs/news\\_release\\_attachments.Par.15043.File.dat/VF%20Proposed%20Rule%20Waste%20Prevention.pdf](http://www.blm.gov/style/medialib/blm/wo/Communications_Directorate/public_affairs/news_release_attachments.Par.15043.File.dat/VF%20Proposed%20Rule%20Waste%20Prevention.pdf).

<sup>15</sup> *Supra* note 2.

Reporting program<sup>16</sup> and the OOOOa Regulatory Impact Assessment<sup>17</sup>. Our estimate of 2012 methane emissions based on these EPA sources is approximately 7.3 million metric tons methane (181 million metric tons CO<sub>2</sub>e). The emissions level from a 40 – 45% reduction is 4.0 to 4.4 million metric tons methane (100 – 109 million metric tons CO<sub>2</sub>e).

#### Potential Benefits of Voluntary Initiatives

Several voluntary Initiatives have been highlighted as means to reduce emissions from existing sources of methane pollution. The Administration has specifically cited the ONE Future initiative, the Downstream Initiative, and EPA's Methane Challenge Program.

We estimated the impact of the ONE Future voluntary initiative, as described below. To date the Downstream Initiative has not publicized methane reduction goals, so we make no estimate of its benefit. The EPA's Methane Challenge Program includes both the ONE Future Option and the Best Management Practice Option. Because the Best Management Practice Option, as proposed by EPA, will recognize industry commitments to address a number of sources of methane, including relatively minor sources, and because we cannot estimate the level of industry engagement with the program, we do not provide an estimate of the mitigation that might occur as a result of voluntary measures under this option.

Under the proposed ONE Future commitment option, industry participants commit to reducing methane emissions from their operations to levels consistent with gas industry emissions, from the whole supply chain, equivalent to 1% of gas production<sup>18</sup>. That is, if every natural gas production, gathering, processing, transmission, storage, and distribution firm complied with the goals of ONE Future, emissions would be reduced from around 1.4% of gas production (according to EPA inventories) to 1.0% or less, by 2025. Methane emissions associated with oil production are not covered by the ONE Future approach.

First, we calculated the reductions that would occur if in fact all natural gas firms complied with ONE Future's goals. We calculated the emissions equivalent of 1% of gas production, based on projected natural gas production figures from AEO, and then we added in an adjusted figure for methane emissions from oil production (accounting for oil production emissions reductions from OOOO, OOOOa, etc.) since ONE Future does not include oil production. The resulting emissions would be 21 MMT CO<sub>2</sub>-e below projected emissions with Proposed / Announced regulations in place.

As noted, the above estimate (21 MMT mitigation from ONE Future) assumes 100% industry participation in the ONE Future program. If only a portion of the industry participates, the reduction will be lower. We estimate that between 10 and 20% of natural gas industry facilities and equipment is owned / operated by the current members of the ONE Future Coalition. These eight companies (AGL Resource, Apache, BHP Billiton, Columbia Gas Transmission, Hess, Kinder Morgan, National Grid, Southwestern) represent approximately 12% of the methane emissions reported to the GHGRP. The GHGRP has coverage gaps; in particular, smaller-emitting facilities do not report emissions, and to date natural gas gathering facilities have not reported methane venting / leaking emissions. As such, we independently researched production / throughput / capacity figures for these firms. Their capacity as a portion of national capacity varies between industry segments. Overall, we estimate that they represent 10 to 20% of the natural gas industry, consistent with the result from the GHGRP analysis.

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<sup>16</sup> *Supra* note 3.

<sup>17</sup> *Supra* note 4.

<sup>18</sup> ONE Future, <http://www.onefuture.us/our-goal/>.