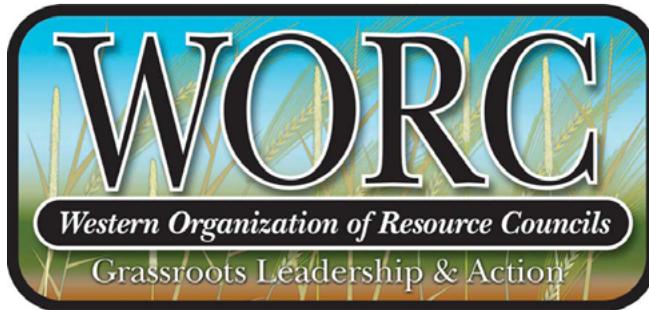


# THE FLARING BOOM

WESTERN ORGANIZATION OF RESOURCE COUNCILS



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WESTERN ORGANIZATION OF RESOURCE COUNCILS

*This report is a publication of the Western Organization of Resource Councils (WORC). WORC is a regional network of grassroots community organizations that include 10,000 members and 38 local chapters. WORC's network includes: Dakota Resource Council (North Dakota); Dakota Rural Action (South Dakota); Idaho Organization of Resource Councils; Northern Plains Resource Council (Montana); Oregon Rural Action; Powder River Basin Resource Council (Wyoming); and Western Colorado Congress. WORC's mission is to advance the vision of a democratic, sustainable, and just society through community action. WORC is committed to building sustainable environmental and economic communities that balance economic growth with the health of people and stewardship of their land, air, and water.*

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*All views and opinions expressed in this report are those of WORC and do not necessarily reflect the views of WORC's funders. Any errors are the responsibility of WORC.*

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# INTRODUCTION

Oil and gas development has always been a boom-and-bust affair. Any of a number of specific factors may trigger a boom. These factors may include newly available technology, advances in geological information and changing economic and market conditions.

Although the effects of an oil boom may be global, many of the impacts of a boom are quite local in their effects. For example, venting or leakage of natural gas at or near the drilling site presents health concerns in the immediate area. Some of the most noticeable local impacts of an oil boom result from flaring—the burning off of gas that comes up with the oil.

Over the past decade, there has been a relatively modest increase in worldwide oil production—a little less than six percent. Daily average worldwide crude oil production has increased from 72,587 million barrels in 2004 to 76,742 million barrels in 2014.<sup>1</sup> An upsurge of production in the United States and Canada has accounted for the lion's share of that increase—more than 89%. In the first quarter of 2014, the United States became the world's largest oil producer, surpassing Russia and Saudi Arabia.<sup>2</sup> Much of this new production is from the West. Unprecedented levels of oil are being extracted from the Bakken Formation of North Dakota, Montana, and Alberta due to advances in horizontal drilling and hydraulic fracturing technology. Oil production is also expanding elsewhere in the West, including the Eagle Ford formation in Texas (which surpassed the Bakken's production in April of 2014),<sup>3</sup> the Niobrara formation in Colorado and Wyoming (as well as several other formations in Wyoming) and the Monterey formation in California.

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*"IF YOU'VE GOT A BARREL OF OIL THAT'S WORTH \$95 AND YOU'VE GOT [1,000 CUBIC FEET] OF GAS ... THAT'S WORTH \$4.25, WHICH INFRASTRUCTURE WOULD YOU BUILD FIRST?"*

—RON NESS, PRESIDENT OF THE NORTH DAKOTA PETROLEUM COUNCIL, AN ASSOCIATION OF OIL PRODUCERS

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In the Bakken, and in many other areas of new production from shale and tight sand formations in the American West, the target of exploration is oil, not gas. Oil is more plentiful in the formations being drilled, and gas recovery is of secondary importance and value to the drilling companies. As a result, the gas is often discarded by being burned off or, less commonly, vented directly into the air.

“If you’ve got a barrel of oil that’s worth \$95 and you’ve got [1,000 cubic feet] of gas ... that’s worth \$4.25, which infrastructure would you build first?” said Ron Ness, president of the North Dakota Petroleum Council, an association of oil producers.<sup>4</sup>

Thus, what we have is not only an oil boom. It is also a flaring boom.

The flaring boom represents a huge waste of vital non-renewable natural resources and loss of revenue to the mineral owner. It also threatens the stability of our global climate and many aspects of local public health. Flaring natural gas emits carbon dioxide, methane and other greenhouse gases that contribute to climate change. Research in Nigeria suggests that soils in flaring areas are losing their fertility due to soil acidification.<sup>5</sup> More than 250 toxins released through flaring have been identified, including known carcinogens.<sup>6</sup>

This report describes the flaring boom and its causes and impacts. It reviews current and historic efforts to curtail flaring, venting and leaks in Alaska, Colorado, Montana, North Dakota, Texas and Wyoming. The Western Organization of Resource Councils salutes the advances made, and in this report goes on to identify opportunities and make recommendations for further advancement in policy development and enforcement.

# THE FLARING BOOM

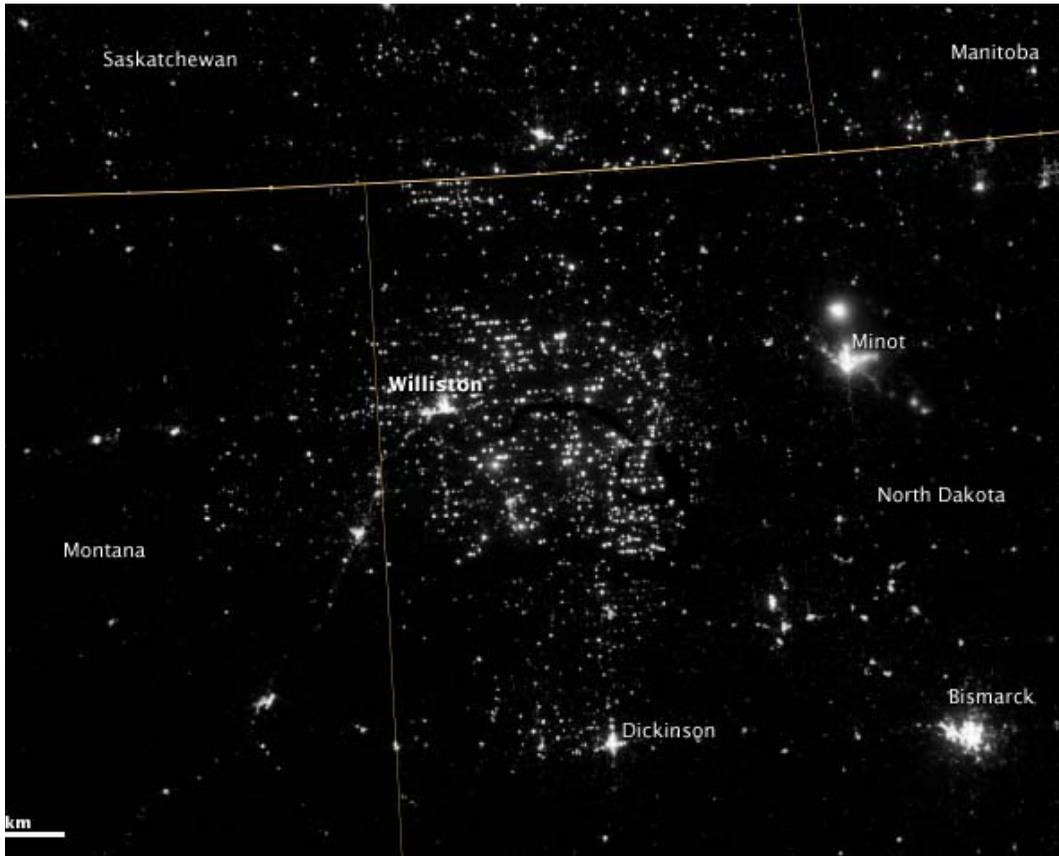
Three years ago, relying on an aggregation of satellite data, the World Bank estimated that flaring of natural gas across the planet had increased by 1.9% from 2010 to 2011, to 140 billion cubic meters annually, or just less than 50 trillion cubic feet—roughly twice the amount of natural gas used annually in the United States. This increase reversed what had been an opposite trend. Bent Swansson of the World Bank’s Global Gas Flaring Reduction Partnership called the 2011 increase “a warning sign that major gains [in flaring reduction] over the past few years could be lost if oil-producing countries and companies don’t step up their efforts.”<sup>7</sup>

Flaring increases in most major oil-producing countries in 2011 were generally moderate. Russia, which flares more gas than any other nation, reduced its flaring by nearly 30% from 2007 to 2010, but then increased it 1.8% in 2011. Of the three other top flaring nations, Nigeria continued its gradual reduction in flaring in 2011, while Iran and Iraq continued their gradual increases.

Countries that most clearly stood out from all others in the World Bank study were the United States and Canada. Canada increased its flaring volume by one-third from 2009 to 2011. The United States more than doubled its flaring during that two-year period and had by far the largest increase in flaring in 2011 of any nation in the world—nearly 65%. U.S. flaring volume more than tripled over the five-year period studied, from 2007 to 2011, and overtook nine other nations to rise to fifth place globally in the total amount of gas flared. Natural gas wasted in the United States through flaring in 2011 alone could have provided nearly 2.9 million average American homes with all the natural gas needed that year, according to figures on average household use provided by the American Gas Association.<sup>8</sup>

Although the portion of U.S. natural gas flared annually remained below one percent of total U.S. natural gas production in 2012, rates of flaring vary from state to state, and flaring volumes can be high even in states with low rates overall. Rates in the West are generally higher than elsewhere. Montana flared or vented more than 7% of its natural gas production in 2011. Rates in

Wyoming, New Mexico, Texas and Alaska were at 2% or less, but the level of gas production in these states is high. Then there is North Dakota. According to the U.S. Energy Information Administration, North Dakota flared or vented over 30% of the natural gas it produced in 2012, over one-third of all gas flared in the U.S. Together, North Dakota and the other six Western states cited were responsible for the burning and wasting of 202.63 billion cubic feet (BCF) of natural gas in 2012, or roughly 95% of all natural gas vented or flared in the United States.<sup>9</sup>



*NASA satellite imagery captures the night glow in northwestern North Dakota from light caused by drilling equipment, temporary housing and flaring. Brighter lights are towns and cities in the area.*

## A NOTE ABOUT DATA QUALITY AND CONSISTENCY

In a 2013 post, FracTracker noted that finding reliable data regarding flaring and venting “often leads one to a dead end.” This finding is consistent with the experience of WORC and its member groups.

FracTracker notes that, although the U.S. Energy Information Administration (EIA) has the authority to require oil and gas companies to disclose this data, “they choose not to,” and quotes EIA as explaining that “... assessing the volume of natural gas vented and flared would add significant burdens to natural gas producers causing them substantial investments.” According to FracTracker, the EIA is not confident that oil and gas companies even have the ability to accurately estimate venting and flaring emissions.<sup>10</sup>

In a 2004 investigation, the Government Accountability Office (GAO) reported that EIA did not consider state-reported flaring and venting data to be consistent<sup>11</sup> and, in a subsequent 2010 report, stated that these data had not improved.<sup>12</sup>

And, federal data are no more reliable than state data. In its 2004 report, GAO recommended that the Secretary of the Interior direct BLM and the Minerals Management Service (MMS, now the Bureau of Ocean Energy Management, Regulation and Enforcement, or BOEMRE) to consider the cost and benefit of requiring that companies use flaring and venting meters to improve oversight. BOEMRE implemented new rules requiring offshore operators that process more than 2000 barrels of oil per day to install meters after GAO’s recommendation, but BLM, after conducting the analysis, concluded that “there is no benefit to knowing the volume over the current methods used [by the industry] to estimate volumes.” GAO also found that BLM has not used infrared cameras to identify gas leaks, although BOEMRE does.<sup>13</sup>

As of September 30, 2014, EIA posted state venting and flaring data from 17 states on its website for most years, as well as 14 states that reported no venting and flaring. Data for the most recent year (2012) were listed as “not available” for 12 of these states, however, including several states with significant oil and gas production—California, Colorado, Montana and Utah—and several others that had reported surprisingly high amounts of flared gas in past years—Alabama, Michigan, Mississippi and South Dakota.<sup>14</sup>

Because EIA’s national flaring and venting statistics represent a tally of the data reported by the states, 2012 data are clearly incomplete and inaccurate. However, WORC relied on EIA data for this report because no other, better source of state-by-state data is readily available.

# GLOBAL CONSEQUENCES

The waste of natural gas through flaring and venting is stunning in its extent. Flaring and venting are also unnecessary pollution that threatens the stability of the global climate. The World Bank estimates that flaring gas produces about 400 million tons in carbon dioxide pollution each year.<sup>15</sup>

In fact, natural gas—largely methane—that is vented or leaked without being flared results in emissions of methane and other greenhouse gases more potent than carbon dioxide in fostering climate change, especially during the first 20 years after release.

Over the past three years, new research has suggested that leaks from natural gas production systems are significantly higher than previously estimated, and could negate much or all of the benefit to the climate of shifting to natural gas in place of coal for power generation. A team of scientists from Cornell University published a study in 2011 which estimated that a fracked shale gas well will release between 3.6% and 7.9% of produced methane into the atmosphere through venting and leaks during its lifetime—at least 30% more and possibly twice the methane emissions of a conventional well. The highest methane emissions occur during hydraulic fracturing, when methane escapes from flowback fluids.<sup>16</sup>

A more recent study of fugitive methane emissions from tight oil formations found that methane emissions from the Bakken and Eagle Ford regions are likely underestimated, and that a net climate benefit from tapping energy resources from these formations is unlikely.<sup>17</sup>

Climate impacts may continue even after the productive life of a well. A Princeton University study published this year found that methane leakage from abandoned oil and gas well bores had not been accounted for in previous climate studies and presented “not only a risk to groundwater, but...a growing threat to the climate.”<sup>18</sup>

In March 2014, in acknowledgement of the growing understanding of the climate impacts of oil and gas production, the Obama White House issued an “action plan” to address climate change through reduction of methane emissions. The plan acknowledged that methane accounted for nearly 9% of domestic greenhouse gas emissions, and that 29% of methane emissions sprang from the oil and gas industries, and identified a series of actions to reduce these emissions, including new federal rules from the Bureau of Land Management and perhaps the Environmental Protection Agency.<sup>19</sup>



*Rancher Donald Nelson, outside his family ranch near Keene, North Dakota.*

# LOCAL COLLATERAL DAMAGE

The impacts of gas flaring, venting and leakage at these levels are not limited to the climate. More than 250 toxins have been identified as being produced and released during flaring, including benzene, naphthalene, styrene, toluene and xylene. Incomplete combustion during flaring, which can be identified by visible black smoke from a flare stack, yields hazardous pollutants.<sup>20</sup>

Health effects associated with these chemicals are wide ranging and can be severe, especially for those living near flare sites. Exposure to benzene is a well known cause of leukemia. Naphthalene can damage the membrane of red blood cells. Styrene is a skin and eye irritant. Toluene can affect the nervous system. Xylene can affect the central nervous system and stunt human development. Other known effects of exposure to these toxins include renal failure, cardiovascular failure, emphysema, bronchitis, endocrine and immune dysfunction, reproductive disorders, and autoimmune diseases.<sup>21</sup>

Animals (livestock, wildlife and pets), crops and vegetation are affected by the chemicals produced by flaring as well as people. Flaring can cause soil acidification, leading to depleted nutrients, lost fertility and reduced capacity for agricultural production.<sup>22</sup>

An oil boom is not a boon for everyone. Among the immediate losers when gas is flared are mineral owners, since drilling companies are not required to pay royalties on gas that is flared off. An industry analyst has estimated the value of natural gas flared in North Dakota at \$1 million per day. Many mineral owners in the Bakken now obtain a 20% royalty rate upon leasing; at that rate, non-payment of royalties from flared gas could be costing mineral owners about \$73 million per year.<sup>23</sup> U.S. District Court Judge Daniel Hovland earlier this year dismissed 13 lawsuits filed against oil and gas companies, which sought to force them to pay royalties on flared gas. The judge said that “mineral owners failed to exhaust their administrative remedies through the state’s Industrial Commission” before filing suit.<sup>24</sup>

More recently the Three Affiliated Tribes, which represents the Mandan, Hidatsa and Arikara nations, announced that it would require payment of royalties on flared natural gas. At present, the Fort Berthold Reservation accounts for approximately one-third of North Dakota's oil production. Flaring rates on the reservation have been significantly higher than those in other areas in the Bakken.<sup>25</sup> The tribe's proposal said its requirement would motivate oil companies to come up with gas capture plans, and that royalties collected would be used to monitor greenhouse gas emissions and develop a natural gas system to produce electricity for the reservation. Oil industry leaders reacted by questioning the tribe's authority to take such steps and calling them "disincentives" that do "nothing to get pipe in the ground."<sup>26</sup>

The industry's rush to produce oil is exacerbated by the fact that oil and gas leases typically run for three to five years. If a company waits to drill until it can deliver the gas to market, its leases with mineral owners may run out. Such an outcome means a complete loss of the bonus payments already paid, and the unappetizing prospect of having to renegotiate with dozens or even hundreds of mineral owners on a typical 1,280-acre spacing. In North Dakota, for example, the value of mineral acres has significantly increased due to the success of Bakken wells. Conversations with mineral owners in McKenzie County indicate that many leases went for \$100 or less per acre as late as 2009. In October, 2012, Business Journal Daily reported bonus rates of up to \$14,000 per acre in North Dakota.<sup>27</sup> On county-by-county private discussion websites in North Dakota, mineral owners more regularly report per-acre bonus offers in the range of \$2,500.<sup>28</sup> Even at this rate, having to lease a typical 1,280-acre spacing unit would mean an extra cash outlay of \$3.2 million to renew the leases if they expired.

The flaring boom not only disadvantages mineral owners, but also taxpayers as a whole, since state governments and federal land managers do not collect taxes or royalties on natural gas production that is flared off.

"We've seen that one operator had 9 wells on state trust lands flare volumes that would be equal in terms of a royalty rate on a \$3 gas price, about \$189,440," said the Wyoming Director of the Office of State Lands and Investments. "If you add severance taxes on that at the 6% rate the amount of severance taxes on those 9 wells would be \$68,197... If you multiply that over time we're talking

about real money, especially when you consider the budget picture that we face today in the state with declining revenues or at least static revenues. These are wasting assets that frankly we never get a chance at again. And we better get it right.”<sup>29</sup>

A flaring boom may also have negative effects on other economic enterprises. Recently, a jury awarded \$1 million in damages to the owners of a western North Dakota hunting ranch, who said Fidelity Exploration and Production had turned their enterprise into “an industrial zone,” where “the well pumps operated continuously and emit a loud groaning noise” and “the oil wells flare and smell of excess gas.”<sup>30</sup> The verdict relied on a North Dakota law that requires oil and gas companies to negotiate “damage and disruptions payments” with surface owners, and provides the opportunity for the surface owner to seek compensation in court if an agreement cannot be reached.<sup>31</sup>

*Natural gas flares from a flare-head at the Orvis State well on a farm in McKenzie County, North Dakota, east of Arnegard and west of Watford City. The flare itself is about eight feet tall, with the flame shooting another 15 feet into the air.*

*(Source: wikipedia.org)*



Image Source: Tim Evanson, commons.wikimedia.org/wiki/File:Orvis\_State\_natural\_gas\_flare\_01\_-\_Arnegard\_North\_Dakota\_-\_2013-07-04.jpg

# THE REGIONAL PICTURE

More natural gas is flared in North Dakota than anywhere else in the United States. Over the last few years, about one-third of the natural gas produced in the state was flared or otherwise wasted. In contrast, each of the four other top oil-producing states in the West flare and vent much less gas than North Dakota. According to data compiled by the U.S. Energy Information Administration (USEIA), Texas flares just 0.58% of gas produced, California flares 1.02%, Alaska flares just 0.32% and New Mexico flares 0.96%.<sup>32</sup>

In most of these states, the low percentages have as much to do with high natural gas production as with better conservation policies and practices. Texas, Alaska and New Mexico are leading natural gas producers as well as major oil producers, and flaring from natural gas wells is generally only proposed under limited circumstances for short periods of time.

The amount of flaring in the Eagle Ford shale oil producing region of Texas is close to levels in North Dakota.<sup>33</sup> Nonetheless, Texas, the top producer of oil in the United States by far, was superseded in flaring volume by North Dakota in 2011.<sup>34</sup> In addition to high gas production, a key reason for Texas' relatively low flaring percentage may be what has been called "resource geography," or access to transportation and processing infrastructure.<sup>35</sup> Texas has long been a giant of oil production, and its highly-developed infrastructure gives producers significantly greater access to markets than states with more recent oil and gas development. Texas also has somewhat more stringent laws on flaring than some other states. Although like most states it imposes no tax on flared gas, Texas generally limits gas flaring to 180 days, rather than the full year allowed by North Dakota.<sup>36</sup>

However, flaring in Texas has been significant for some time and rose in 2012. Texas does not require operators to submit gas capture plans prior to obtaining drilling permits, and allows up to 50,000 cubic feet of gas per day to be

flared without a permit.<sup>37</sup> In recent years, the state has issued significantly more flaring permits—107 in 2008, 651 in 2011, 1,963 in 2012 and 3,012 in 2013. This upsurge in flaring coincides with new drilling and oil recovery from the Eagle Ford formation. Capturing the gas from the Eagle Ford is a secondary concern for the industry. In a well-researched four-part story this year, the San Antonio Express-News noted that emissions from the Eagle Ford “exceeds the total emissions of all six refineries in Corpus Christi.” Not only that, the newspaper found that fully one-third of the companies that flared had no permit to do so. “There’s a case to be made that it’s cheaper for me to flare it at the wellhead than it is for me to build the infrastructure to move the gas,” Skip York, an industry analyst with Wood Mackenzie, told reporters. “I’m throwing away money, but I’m throwing away less money.”<sup>38</sup> As Earthworks remarks, “Without adequate regulations to limit flaring, and enforcement of those regulation, companies will continue to have no incentive to capture more natural gas.”<sup>39</sup>

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VIRTUALLY ALL NATURAL GAS PRODUCED  
IN ALASKA FINDS ITS WAY TO MARKET

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By contrast, virtually all natural gas produced in Alaska finds its way to market. The state produced 3.2 trillion cubic feet of natural gas in 2012, with less than one percent lost to venting and flaring.<sup>40</sup> The primary reason for this low level of flaring is state regulations adopted in 1971 that prohibited all flaring, except for emergencies and system testing—a regulation which survived an industry lawsuit that sought to nullify it. Any gas “release, burning, or escape into the air” requires a written report and statement of compliance actions.<sup>41</sup> Former Alaska Commissioner of Natural Resources and Powder River Basin Resource Council member Bob LeResche noted that “Alaska took this action under the ‘prevention of waste’ portion of their mandate, and the rule has applied ever since to all gas produced in the state.”<sup>42</sup>

New Mexico’s level of flaring and venting has also been low—only about 0.96% of total gas withdrawals in 2012, yet more than 10 times the amount of gas wasted just five years earlier.<sup>43</sup> New Mexico law prohibits flaring of associated gas after 60 days, although it is possible to apply for exemptions.<sup>59</sup>

# NEW RULES FOR NORTH DAKOTA

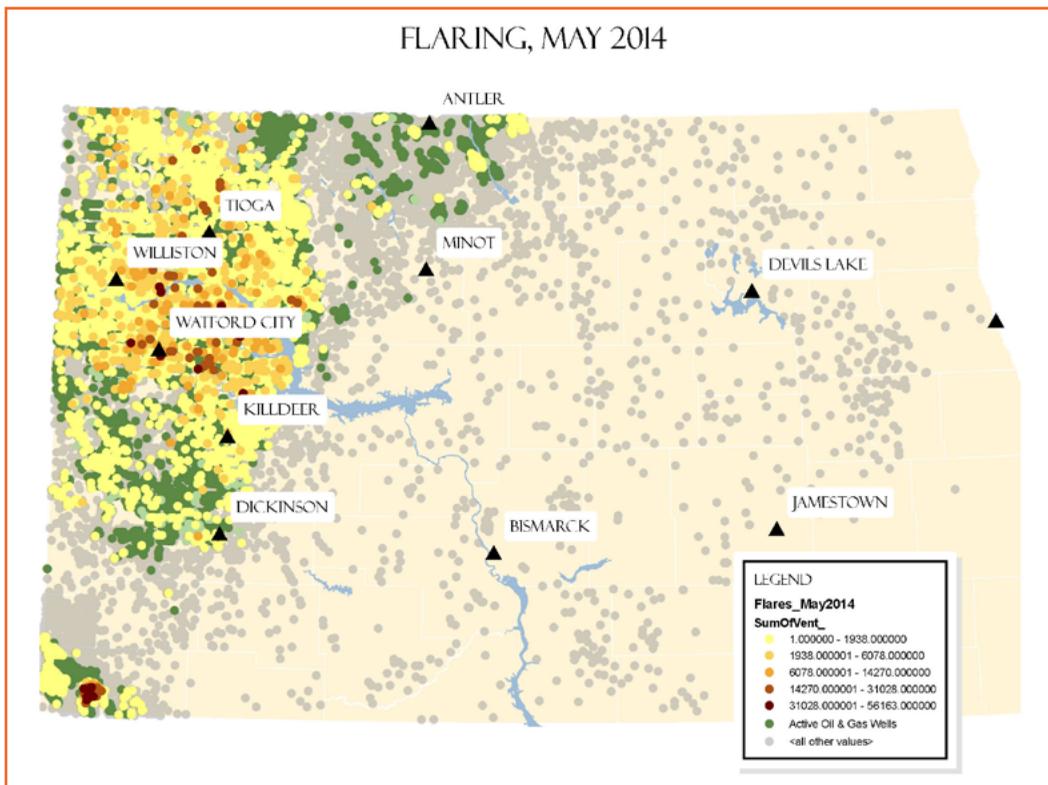
Nowhere in the U.S. are the effects of flaring more evident than in North Dakota. According to one report, North Dakota's Department of Mineral Resources estimated the market value of gas lost through flaring at \$50 million per month. North Dakota had a high level of flaring compared to other states even before the current boom began, however. The state website's record of natural gas production and sales dates to January 1990, when 5.8 million cubic feet (MMCF) were produced and 4.9 million sold—a 16% rate of waste. The rate dipped to 12% in January 2000 but rose sharply once the current Bakken shale oil boom began—to 26% by January 2010, then nearly 40% by January 2014, when over 12.4 MMCF of natural gas was produced but not marketed (that is, flared, vented or leaked) in a single month, according to statistics compiled by the state Department of Mineral Resources. (By June, the percentage had declined to about 32%.)<sup>45</sup>

It is hard to reconcile these facts with the state's declaration of policy that it is "in the public interest" to conduct oil and gas operations in the state "in a manner that a greater ultimate recovery of oil and gas be had and that the correlative rights of all owners be fully protected," and that "the greatest possible economic recovery of oil and gas be obtained within the state to the end that the landowners, the royalty owners, the producers, and the general public realize and enjoy the greatest possible good from these vital natural resources." The law goes on to say that "waste" of oil and gas means "the production of gas in excess of transportation or marketing facilities or in excess of reasonable market demand." It says flatly, "Waste of oil and gas is prohibited."<sup>46</sup>

Yet North Dakota law has been interpreted to allow flaring for an entire year after first production, despite the state's recently-adopted flaring reduction plan (see below). After one year, the law allows exemptions for "economic infeasibility." The flaring applicant counts the "direct costs of connecting the well to the line and...operating the facilities that connect the line during the life of the

well,” plus taxes, royalties and another 10% in overhead costs, including interest on borrowed money.<sup>47</sup>

Citizen-led efforts to place controls on flaring did not fare well in the 2013 North Dakota legislative session. Sen. Tim Mathern (D-Fargo) offered a bill to outlaw any waivers from the state’s one-year limit on flaring. The Dakota Resource Council supported the measure, as did the Environmental Defense Fund (EDF). Ron Ness of the North Dakota Petroleum Council urged, instead, tax cuts for companies that find alternative ways to capture gas. Perhaps not surprisingly, the legislature rejected the stick but enacted the carrot. The Senate amended the tax incentive bill to shorten from one year to six months the maximum period to flare without paying taxes. However, the House stripped out the amendment, the one-year flaring holiday remained state law, and the flaring rate rose from 32% in January 2013 to 40% in January 2014.<sup>48</sup>



The exposure and criticism of extreme rates of flaring in North Dakota<sup>49</sup> have put the oil industry and regulators alike on the defensive, however. Lynn Helms, a former Hess employee,<sup>50</sup> now the director of the state oil and gas regulatory program, told a forum on flaring in May, 2014, “[T]he patience and tolerance of North Dakotans for flaring has come to an end.”<sup>51</sup>

On April 22, 2014, the North Dakota Industrial Commission held a hearing on a draft flaring plan inspired by a proposal from the North Dakota Petroleum Council, and then issued a new flaring reduction policy July 1. The heart of the policy is the requirement that operators submit a gas capture plan (GCP) for each well drilled. The GCP lays out how much natural gas the operator expects to produce from the well, how the gas will be delivered, and to what processor. The Commission also laid out progressive flaring goals, seeking to reduce the percentage of gas flared to 26% by the last quarter of 2014, 23% by the first quarter of 2015, 15% by the first quarter of 2016, and 5 to 10% by 2020.<sup>52</sup>



*Theodora Bird Bear tells the BLM about flaring on the Fort Berthold Reservation, where companies flare up to two-thirds of the gas.*

There are loopholes in the Industrial Commission's order. The Commission will continue to allow unlimited flaring at the "first horizontal well" drilled in spacing units that are "not yet held by production." The Commission's rationale is that full production "will allow valuable information to be obtained...with regard to future wells and infrastructure requirements in the spacing unit." Certainly, that is true. However, it will also serve to help ensure that leases do not expire, and thus will deprive mineral owners of further leasing bonuses, as well as royalties on the flared gas, all while further contributing to atmospheric pollution.<sup>53</sup> The Commission's order does not apply to "wells completed in a Bakken, Bakken/Three Forks and/or Three Forks Pool" that have received an exemption from state flaring requirements because of an "economic infeasibility."<sup>54</sup> According to state production figures, over 90% of oil produced statewide in 2013 came from these three formations.<sup>55</sup>

In addition, the flaring reduction goals set in the new order are statewide. Thus, residents of certain areas of the state may continue to suffer disproportionately from the effects of flaring. The area most likely to experience continued high levels of flaring is the Fort Berthold Reservation, which has less infrastructure built than most other parts of the Bakken, and a history of high flaring rates.

Another weakness of the new North Dakota flaring goals is that the industry might have reached them without further regulation, especially in the first few years. According to at least one analysis, "most operators in the state are already in compliance with the current statewide gas-capture rules and already meet the 26% targets set for October."<sup>56</sup> In any case, with proposed limits on flaring not required to reach 10% until the end of 2020, and with the loopholes built into the new order, North Dakota seems destined to remain the leading flaring state in the Union for at least another six years. Even then, North Dakota will still flare a much higher percentage of its produced natural gas than any other major oil producing state in the U.S.

## BLAMING THE NEIGHBORS

Rhetoric from both industry and government regulators in North Dakota has often implied that its astronomical rate of flaring is due to factors such as lack of pipeline capacity, and the inability to reach timely agreement on pipeline easements with private landowners or federal land managers. Neither of these arguments is compelling. The North Dakota Petroleum Council, in a January 2014 proposal for reduced flaring, suggested “policies and legislation to enhance Right of Way access,” complaining that easements “may take 180 days or more to obtain.”<sup>57</sup> Landowners, however, whether or not they also own mineral acres, have legitimate interests in receiving fair compensation for the use of their property, and in carefully negotiating routes and conditions that best protect the farm or ranch operations that are their livelihoods.

Moreover, a recent Clean Air Task Force publication reported that the rate of flaring in 2013 in North Dakota was actually greater from wells already connected to pipelines than it was from isolated wells.<sup>58</sup> The North Dakota Pipeline Authority shed light on the source of the problem, citing three infrastructure factors driving exceptionally high rates of flaring in a 2013 report. First, new higher pressure wells had been added to the pipeline network and had overcome line pressure. Second, pipeline systems in the state are simply too small to handle the volume of gas produced. Third, natural gas liquids must be cleared from pipelines frequently, which requires temporarily shutting down the systems.<sup>59</sup> In other words, there appears to be more reason to blame the flaring boom on the failure of oil and pipeline companies to plan for sufficient pipeline and compressor capacity, rather than on landowners for taking time over negotiations.

# FLARING REFORM ON THE MOVE IN WYOMING

In Wyoming, a spike in flaring began in 2012 in connection with shale and tight sands oil plays in the Niobrara, Codell, Mowry, Turner, Sussex, Muddy, Parkman and Shannon formations in Converse, Campbell, Johnson and Laramie Counties. Like many other states, Wyoming prohibits “the waste of oil and gas,” and accepts flaring only insofar as it is “necessary for the drilling, completion or testing of the well.”<sup>60</sup>

Operators currently may flare up to 60 mcf of gas per day without any notice to the state, but must apply for a permit to flare more. The application may be submitted retroactively.<sup>61</sup>

Despite the law, flaring rates are relatively high in Wyoming (over 2% in 2012 according to EIA data), and total amounts of gas flared rivaled amounts flared in Texas for the highest in the nation until North Dakota overtook both states in 2011.<sup>62</sup>

As drilling advanced in the Niobrara shale and some tight sands formations, some in state government expressed concerns early on about state flaring policy. Tom Drea, the state’s geologist, said the industry was “not working diligently enough on marketing solutions” prior to drilling.<sup>63</sup> As oil drilling expanded in the state, concerns over flaring continued to grow. By the time the 2013 legislative session began, some Wyoming lawmakers had set their sights on charging operators a severance tax on flared gas. Opponents argued that the amount of tax collected would be insignificant, yet the “insignificant” tax would somehow pose a deterrent to exploration. Director of the Office of State Lands and Investments (OLSI) Ryan Lance brought forward a study showing that the state loses \$189,000 in severance taxes for every 10 wells flared for two years or

more.<sup>64</sup> A bill to impose a tax on flared gas was introduced, but met with strong opposition from the Petroleum Association of Wyoming. It was voted down in committee, 8-2.<sup>65</sup>

Before the final vote was taken, some state political leaders were already calling for a study of flaring in Wyoming. “I would hope as a committee we could look at it on the environmental side,” said State Senator Jim Anderson (R-Glenrock), saying that he receives complaints about flaring from neighbors daily.<sup>66</sup> Publicized reports of pollution and sickness due to flaring by people like Powder River Basin Resource Council (PRBRC) members Kristi and Pete Mogen, Douglas, were important in raising concerns about landowner impacts.<sup>67</sup>

By March 1, 2014, the OSLI established new policy addressing requests for venting and flaring on state lands. OSLI acts as “trustee for the beneficiaries of Wyoming State Land production royalties.” While the policy does not specifically limit venting and flaring, it requires the state Oil and Gas Commission to forward to OSLI for review any requests for venting or flaring, and it asserts the authority of OSLI to hear and determine whether or not it is appropriate to assess royalties on gas that is vented or flared.”<sup>68</sup>

In response to a citizen petition filed by the Powder River Basin Resource Council, the WOGCC has also initiated a review of its rules on flaring and setbacks, as well as reclamation bond amounts. Although the WOGCC rejected PRBRC’s specific proposal, it appears likely to strengthen its rules in each of these three areas, including tightening limits on flaring.

# LANDOWNERS SEEK TRANSPARENCY IN MONTANA

Although the Bakken Formation extends west of North Dakota into Montana, Montana's oil production has not skyrocketed like North Dakota's. Both oil and gas production in Montana had been declining in recent years, until oil production increased in 2011 and 2012.

Between 2008 and 2012, total withdrawals of natural gas in Montana dropped nearly in half to less than 67 million cubic feet. Flaring and venting rates stayed fairly constant at around 7%.<sup>69</sup> Tom Richmond, then Administrator of the Montana Department of Natural Resources and Conservation's Board of Oil and Gas Conservation (BOGC), told the press in May 2013 that flaring was down to 5%, and limited to 10 to 15 wells.<sup>70</sup> State rules allow a 60-day exemption from Montana's limits on flaring (100,000 cubic feet per day),<sup>71</sup> but staff indicate that six-month extensions are routine, and a full year's exemption is not unusual for remote wells.

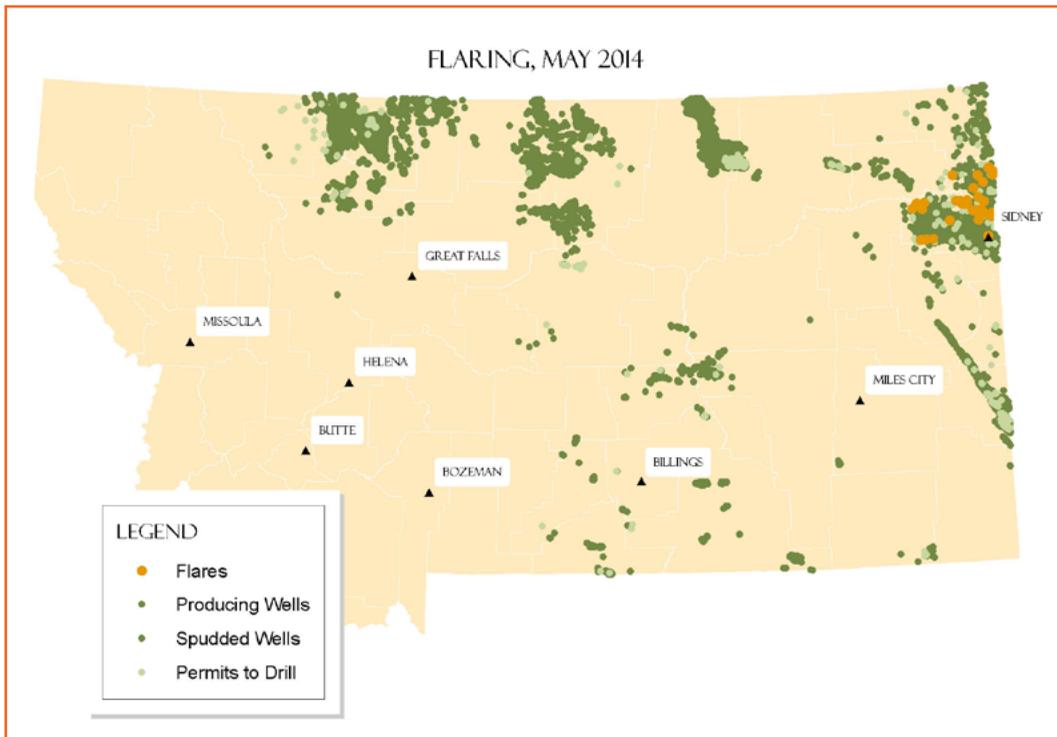
A 2004 article in the Sidney Herald noted that 14 residents of Richland County attended a Montana BOGC meeting where the state told them it would allow flaring to exceed the 100,000 cubic feet per day limit in order to pump the oil "while the market is good" and spare companies the cost of building a gas collection pipeline, "which is tremendous." One of the residents, a land and mineral owner, said at the meeting, "I feel the mineral owners should be compensated for the gas that is being burned off. We understand hitting the market while it's there.... But there is value being wasted and it affects the environment too."<sup>72</sup>

Frustrated with the difficulty getting basic information about flaring approval policies, procedures, and data on the amount of gas flared historically and currently, the Northern Plains Resource Council wrote to the Montana BOGC in

August of 2014, formally urging it to correct “the lack of transparency associated with the BOGC’s access to usable data regarding flaring and spills associated with oil and gas development” in accordance with a September 2011 performance audit of the agency performed by the Legislative Audit Committee.

“Not many people in northeastern Montana have the ability to go to the Board of Oil and Gas office and find a hard copy of this kind of information, and in this day and age they shouldn’t have to,” said Pat Wilson, Northern Plains member and Bainville rancher. “This is 2014, but the BOGC’s public access to data is stuck in the 1980s.”

Northern Plains’ letter said that the agency “should explicitly outline the process to obtain a flaring exemption.” The current rules “give the BOGC an excessive amount of flexibility in determining how to respond to applications to exceed the flaring limit,” the letter said.<sup>73</sup>



# DOING THE METHANE MATH IN COLORADO

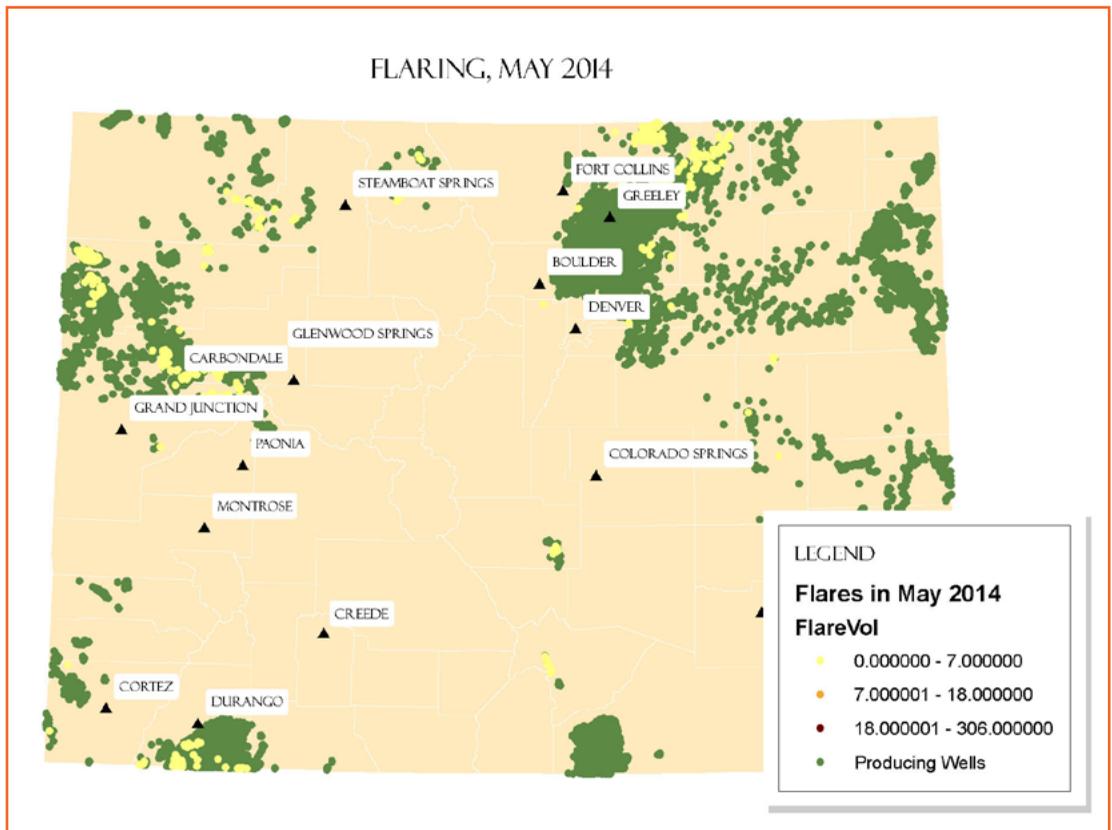
Colorado became the first state in the Union to adopt statewide rules to control methane venting and leaks from natural gas operations on February 23, 2014. The state's Air Quality Control Commission approved the new rules on an 8-1 vote after five days of hearings. The regulations require installation of equipment to capture or control 95% of emissions, as well as routine inspection of well sites for leakage. Frequency of inspection will be based on how much oil or gas the well produces. Leaks are to be fixed within 15 days. The Commission discussed but rejected provisions to exempt wells that emit less than 20 tons of pollution per year and to apply the new regulations only to operators in areas that routinely violate federal air quality standards.<sup>74</sup>

Support for the rules came from a number of grassroots community organizations and state and national environmental organizations, but also from the three largest oil and gas companies doing business in Colorado—Anadarko, Noble Energy and Encana. The Western Colorado Congress, which had supported more stringent rules, noted the groundbreaking nature of the new rules, and that the rules would reduce ground level ozone.<sup>75</sup> Dan Grossman of the Environmental Defense Fund (EDF) suggested that the oil and gas companies were moved by the realization that “the social license to operate here is a little bit in jeopardy” because of actions by several Front Range communities to restrict drilling and hydraulic fracturing. In any case, the industry was not in complete harmony on the rules, as the Colorado Oil and Gas Association and Colorado Petroleum Association tried unsuccessfully to weaken the rules.<sup>76</sup>

The new rules got a hearty endorsement from the University of Texas Center for Global Energy, International Arbitration and Environmental Law, which applauded the Colorado action on methane. The Center noted that methane is at least 84 times as potent as a greenhouse gas than carbon dioxide. It quoted a University of Texas study, which concluded that natural gas operations represent

the largest source of these emissions in the United States. The Center noted, however, that the new rules will not “increase in-person inspections of drilling sites, or raise fines for operators that violate the regulation.” It also suggested that the Colorado rules may provide both a stimulus and template for federal oversight.<sup>77</sup>

There were also environmental critics of the rule. Although it supported the rules, the Western Colorado Congress advocated for more monitoring, faster leak repair, and greater opportunities for the engagement of affected local residents. Gary Wockner’s critique for EcoWatch suggested that increases in oil and gas production could nullify the benefit of the new rules. He pointed out industry projections of 50,000 new Colorado wells in the next 30 years, “in addition to the redrilling and refracking of current active wells,” could worsen air pollution by 35% even with the new rules.<sup>78</sup>



# OVERSIGHTS IN FEDERAL OVERSIGHT

The Bureau of Land Management (BLM) manages almost 700 million acres of federally-owned oil and gas, as well as 56 million acres of Indian Trust minerals. The 38 million acres that are leased for oil and gas exploration yield 16% of all natural gas and 23% of all oil produced in the United States.

The federal Mineral Leasing Act requires BLM to ensure that oil and gas producers “use all reasonable precautions to prevent waste of oil and gas” and that violation of this provision “shall constitute grounds for the forfeiture of the permit or lease, to be enforced through appropriate proceedings in courts of competent jurisdictions.”<sup>79</sup> BLM has been criticized for doing too little to prevent venting, flaring and gas leaks from federal wells. One reason BLM may not be meeting the requirements of the Act is that its rules for implementation of this mandate are now 34 years old and outdated.

BLM’s broad goals under these rules sound strong. The agency is charged with “conducting all operations in a manner...which protects other natural resources and environmental quality; which protects life and property; and which results in maximum ultimate economic recovery of oil and gas with minimum waste and with minimum adverse effect on economic recovery of other mineral resources.”<sup>80</sup> BLM’s policy for oil and gas loss, “Notice to Lessees 4A”, requires that operators of oil wells submit a report that economically justifies continued flaring or venting, or provide an action plan to eliminate venting or flaring within one year.<sup>81</sup> In practice, however, BLM’s role is characterized more by oversights than oversight. The agency provides little specific guidance to its State Offices, Field Offices and oil and gas operators. The result has been few firm agency limits on flaring and venting.

Reporting requirements are also lax. Oil and gas operators reported flaring and venting of just 0.13% of gas from federal well sites in 2008. However, the federal Government Accountability Office (GAO) found that BLM’s reporting

requirements are unclear, and that as a result companies under report methane emissions. The GAO estimated actual rates between 4.2 and 5%.<sup>82</sup> Subsequent studies have found venting and leak rates to be as high as 7 to 12% in some natural gas fields.<sup>83</sup> Flaring rates are known to be just as high in some oil fields, where significant private mineral holdings are often intermingled with federal minerals over hundreds of thousands of acres.

Even using GAO's moderate estimates, between 111.8 and 133.1 MMCF of gas would have been vented, flared or leaked from federal sites in 2013. The losses would have amounted to \$54-\$64 million in federal royalties. At this rate, over the next ten years the losses would reach \$800 million, according to calculations conducted by the Western Values Project.<sup>84</sup>

The Obama Administration has pledged to address these problems with new rules to reduce flaring and other methane emissions from federal wells.



# FINDINGS AND RECOMMENDATIONS

As oil companies employ new technologies and practices to aggressively explore and develop shale and sandstone formations in the United States, the flaring of associated gas is expanding.

The wasteful and polluting increase in flaring is due to several factors, including low natural gas prices; urgency on the part of oil companies to recoup their investments before lease terms expire in order to minimize costs; and the lack of state and federal resolve to limit or penalize flaring. Statutes at the state and federal levels that prohibit oil and gas waste are weak in some cases, and not being enforced in some others.

Although it often benefits individual oil companies to flare and thus waste the gas associated with oil production, the collective costs of flaring off gas across an entire state or region may be very significant.

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ALTHOUGH IT OFTEN BENEFITS INDIVIDUAL OIL COMPANIES TO FLARE AND THUS WASTE THE GAS ASSOCIATED WITH OIL PRODUCTION, THE COLLECTIVE COSTS OF FLARING OFF GAS ACROSS AN ENTIRE STATE OR REGION MAY BE VERY SIGNIFICANT.

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Flaring, together with venting and methane leaks, contributes to health impacts and declining quality of life for everyone living or working in the communities near oil and gas fields. Flaring also contributes to global climate change and reduced enjoyment and value of private property, and denies fair value to mineral owners and taxpayers.

This mismatch between the short-term incentive for individual drilling companies to flare in order to hold leases and achieve earlier cash flow on the one hand, and the collective social interest in preventing waste and pollution on the other, creates a need for strong and effective regulation of flaring.

Based on our review of state and federal policies and practices, WORC makes the following recommendations:

1. Regulatory agencies should adopt the policies of Alaska, giving no permits for flaring, requiring explanations for all releases of gas, and taking appropriate enforcement action as needed. If this policy is not immediately possible, states should at least adopt hard limits on when flaring can occur, how much, and for how long, and make permitting of new oil and gas wells contingent on strict compliance.
2. Permits for flaring should be reviewed at public meetings, with advance notification of affected landowners and mineral owners, and the opportunity for public comment.
3. Oil and gas companies should be required to pay full royalties to all mineral owners, public or private, on all oil and gas wasted through flaring, whether authorized or not. An additional penalty should be paid on gas flared without authorization in violation of regulatory policies.
4. Regulators should ensure that the amount of gas that is flared, vented and leaked is measured, rather than estimated based on the amount produced or sold.
5. States should review and reconsider their air quality laws and rules in light of flaring, including placement of monitors, in order to develop adequate oversight of temporary air pollution sources such as gas flares and leaks that may exceed pollution standards, and take enforcement action when appropriate.

## HARD LIMITS PROPOSED IN WYOMING

In Wyoming, the Powder River Basin Resource Council (PRBRC) has petitioned the Wyoming Oil and Gas Conservation Commission to impose greater restrictions on flaring to comply with state statutes that prohibit the waste of natural gas and address growing public concerns about flaring. The WOGCC has approved flaring at 65 horizontal, hydraulically fractured oil wells in eastern Wyoming so far, and hundreds more are expected to be proposed. PRBRC's petition would:

- Require all flaring applications to be heard by the Commission, rather than being approved by the Supervisor;
- Limit emergency flaring to no more than 48 hours;
- Limit well purging and evaluation test flaring to no more than 48 hours;
- Limit production test flaring to no more than seven days or no more than 1,500 MCF;
- Limit the flaring of low rate casing head gas to no more than 30 MCF per day;
- Limit the gas that can be flared with Commission approval to no more than 90 days of flaring;
- Limit the amount of gas that can be flared with Commission approval to 250 MCF per day;
- Require proof of notice to surface owners and mineral owners.

# STATE AND FEDERAL POLICIES ON FLARING

All state laws and federal policy require state oil and gas commissions to conserve the resource. Current policies of Western states and the BLM vary significantly on how this mandate to prevent waste is implemented. This table summarizes key policies from the Alaska Oil and Gas Conservation Commission, the Colorado Oil and Gas Conservation Commission, the Montana Board of Oil and Gas Conservation, the North Dakota Industrial Commission, the Texas Railroad Commission, the Wyoming Oil and Gas Conservation Commission and in federal rules.

<b>Agency waste prevention mandate</b>	
<b>Alaska</b>	Prohibits the waste of oil and gas, <sup>1</sup> “In addition to its ordinary meaning, “physical waste” this means “the release, burning, or escape into the open air of gas, from a well producing oil or gas”, unless authorized by the commission. <sup>2</sup>
<b>Colorado</b>	“[T]o foster the responsible development of Colorado’s oil and gas natural resources. The efficient exploration and production of oil and gas resources in a manner consistent with the protection of public health, safety and welfare... [and the] prevention of waste.” <sup>3</sup>
<b>Montana</b>	“(1) to prevent waste of oil & gas resources, (2) to conserve oil & gas by encouraging maximum efficient recovery of the resource, and (3) to protect the correlative rights of the mineral owners...” <sup>4</sup>
<b>North Dakota</b>	Prohibits the waste of oil and gas, defined as “[P]roduction of gas in excess of transportation or marketing facilities or in excess of reasonable market demand.” <sup>5</sup> However, the statute also allows flaring for a year or longer. <sup>6</sup>
<b>Texas</b>	“[I]n recognition of past, present, and imminent evils occurring in the production and use of gas,” waste is prohibited for the protection of the public and private interest. <sup>7</sup>
<b>Wyoming</b>	Prohibits “the waste of oil and gas,” and allows flaring only if it is necessary for the drilling, completion or testing of the well. <sup>8</sup>
<b>U.S.</b>	The Mineral Leasing Act requires BLM to ensure that oil and gas producers “use all reasonable precautions to prevent waste of oil and gas.” <sup>9</sup>

### Limits on flaring, allowances and exemptions

<b>Alaska</b>	1971 state rule prohibits flaring except for 1 hour for emergencies and system testing. <sup>10</sup>
<b>Colorado</b>	Unnecessary or excessive venting or flaring is prohibited. Flaring or venting requires notice and a permit unless conducted as a safety measure during upset conditions. <sup>11</sup> Flaring must be done as efficiently as possible to reduce air pollution. <sup>12</sup>
<b>Montana</b>	By rule, there are no limits on flaring for 60 days; in practice, operators need no permit to flare for 6 months. Permits allow flaring for 6 months, routinely extended for 6-12 months; No permit required for less than 100 mcf per day.
<b>North Dakota</b>	Unlimited flaring allowed for one year. Subsequent exemptions allowed if capture is economically infeasible (defined as anticipated revenue greater than costs plus 10%). <sup>13</sup>
<b>Texas</b>	Unlimited flaring allowed for 10 days. Flaring of up to 50 mcf per day for up to 180 days allowed by permit. <sup>14 15</sup>
<b>Wyoming</b>	Operators currently may flare up to 60 mcf of gas per day without any notice to the state, and may flare any amount for 15 days to test initial production, but must apply for a permit to flare more than 60 mcf longer than 15 days. The application may be submitted retroactively. <sup>16</sup>
<b>U.S.</b>	Operators may flare or vent for initial testing, emergencies, or less than 50 mcf per day without permission. BLM may authorize flaring or venting if capturing the gas is not economical, and would result in abandonment of the oil, or if the operator plans to end flaring or venting within a year. <sup>17</sup>

### Tax and royalty treatment of flared gas

<b>Alaska</b>	Severance taxes and royalties assessed on sales, and so are not collected on the limited amount of gas flaring allowed in Alaska.
<b>Colorado</b>	Royalties and taxes are collected on sales only. Severance taxes are not collected on wells producing less than 90 mcf per day.
<b>Montana</b>	No taxes or royalties collected on flared gas.
<b>North Dakota</b>	No taxation of gas flared in 1st year, or with an exemption.
<b>Texas</b>	No taxes or royalties are collected on flared gas.
<b>Wyoming</b>	There has been no taxation or royalties on flared gas. The Wyoming Office of State Lands asserted its right to assess royalties on state-owned gas in March, 2014, <sup>18</sup> but has not exercised that right.
<b>U.S.</b>	No royalties are collected on gas that is vented or flared with authorization by BLM, or by state agencies whose rules or orders have been ratified by BLM. Royalties can be collected on gas vented or flared without authorization and permanently lost. <sup>19</sup>

<b>Permitting process &amp; public involvement</b>	
<b>Alaska</b>	Not applicable
<b>Colorado</b>	COGCC requires explicit notice and advance approval of flaring. <sup>20</sup>
<b>Montana</b>	Operator must submit a statement justifying the need to flare with analysis of the resource, economic cost and markets and alternatives to flaring. <sup>21</sup> Permits to flare are granted by BOGC on advice of BOGC staff.
<b>North Dakota</b>	Operators apply to NDIC for permit to flare longer than one year. Gas capture plans will be required along with applications to drill for new wells submitted after July 1, 2014.
<b>Texas</b>	Operators must apply to Railroad Commission for permission to flare. Staff issue 45-day permits. After 180 days flaring must be cleared at a hearing before the Railroad Commission. <sup>22</sup>
<b>Wyoming</b>	Permits to flare, extensions granted by the WOGCC Supervisor, or by the Commission at public meetings. <sup>23</sup>
<b>U.S.</b>	Flaring and venting authorized by the BLM Area Oil and Gas Supervisor. <sup>24</sup>

<b>Data collection, record-keeping and public access</b>	
<b>Alaska</b>	Any gas “release, burning, or escape into the air” requires a written report and statement of compliance actions.
<b>Colorado</b>	Notice must be provided to emergency dispatch or local government designee. Operators must report gas flared, used and sold on a monthly report.
<b>Montana</b>	BOGC keeps paper records of flaring data reported by operators by field, not by well. BOGC also has pdf’s of the operator data.
<b>Texas</b>	Railroad Commission procedures require automated computer collection of data on flared gas and checks for required permits. <sup>25</sup>
<b>U.S.</b>	GAO report found BLM requirements unclear, leading to significant BLM under-reporting by oil and gas companies. <sup>26</sup>

<b>Notes</b>	
<b>Alaska</b>	After Alaska prohibited all flaring in excess of that required for safety in 1971, new industries, new jobs, and enhanced domestic energy supplies resulted and air quality improved. <sup>27</sup>
<b>Colorado</b>	Rules do not define “excessive” or “unnecessary” flaring. See COGCC Rule 912.
<b>Montana</b>	BOGC grants extension requests recommended by BOGC staff if production is expected to fall below the 100 mcf cutoff within the extension period requested. Venting is prohibited in Montana. <sup>28</sup>
<b>North Dakota</b>	New rules as of July 2014 require gas capture plans for new oil fields, and set statewide flaring reduction goals. Venting is prohibited in North Dakota.
<b>Texas</b>	Flaring in the Eagle Ford Shale formation today is reminiscent of uncontrolled flaring in the 1940’s, when the Railroad Commission shut down thousands of wells and whole oil fields to force companies to capture the gas.
<b>Wyoming</b>	Some legislators and the Office of State Lands are studying whether to assess taxes and collect royalties on flared gas. The WOGCC will consider further limits on flaring proposed by the Powder River Basin Resource Council.
<b>U.S.</b>	BLM expected to propose new rules to reduce flaring and venting on BLM and Indian lands in late 2014.

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- 47 North Dakota Century Code 38-08-06.4. This statute has been interpreted to effectively nullify other statutes, including NDCC 38-08-02.19, which defines “waste” to mean “the production of oil or gas in excess of transportation or marketing facilities or in excess of reasonable market demand,” and 38-08-03, which states simply, “Waste of oil and gas is prohibited.” For evidence required to meet the flaring exemption, see North Dakota Administrative Code 43-02-03-60.2.
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*The Flaring Boom explains the underlying causes and the problems caused by flaring and venting methane from oil and gas fields in North Dakota, Montana, Wyoming, Colorado, Texas and Alaska. The report describes attempts to control (or excuse) flaring and venting by oil and gas regulators in those states and by the Bureau of Land Management, and makes recommendations for public policies to reduce flaring and venting and the associated waste and pollution.*

