AIR

Commissioner Mike McKee is enthusiastic about life in Uintah County. He's quick to point out its blessings, and puzzles over its shortcomings. In winter, ozone can exceed EPA standards in the Uinta Basin but McKee isn't a hundred-percent sure about its source.

The air quality, for the most part out here in the Uinta Basin is outstanding. The air is fresh, it's clean, the sky is bright blue. And that's the way that it is here most of the time. But when there's snow on the ground with real cold air, then our air can get a little stagnant.

Atmospheric scientists have refined McKee's observations about stagnant air.

The snow is the key, for two reasons. One is that it is really what allows the inversion to form, because once the snow's in there, then the sunlight, or the energy from the sun, doesn't absorb really well onto the ground. Most of that's reflected back into the atmosphere by the snow. And so then what happens is the surface stays cold, instead of the sun warming it up. And so then the air above it stays warmer and that cold air doesn't rise and just sits in there like a bathtub. And then the other thing that the snow does—I mean, the same thing—as it reflects the light, then it's dramatically increasing the amount of solar radiation, and solar radiation is the energy that drives the reactions that produce ozone.

In high concentrations, ozone is particularly hard on some people−like those with asthma or emphysema.

My name is Seth Lyman. Most of what I do is air quality research here in the Uinta Basin, and I work for USU in the office of commercialization and regional development. And the reason that office is involved is because the way USU sees it, the air quality issues that we have here have a big impact, or have the potential to have a big impact on the development of this area.

Lyman's USU office is focused on regional development. Even so, he doesn't dodge conversations about sources of ozone.

Truck emissions and car emissions here in the populated parts of the basin are a relatively small factor in emissions that lead to ozone. So ozone forms from NOx and VOC, or oxides of nitrogen is what NOx means, and then VOC is volatile organic compounds. They react together in the presence of sunlight to make ozone. And for NOx and for VOC both, our current inventories show that the majority comes from the oil and gas industry.

There's 8,000 to 10,000 active wells in the basin, oil and gas. In the winter they have heaters, and the oil wells have pump jacks, and there's large and small compressor stations that compress the gas to keep it moving through the pipeline, and there's plants that process the gas, and all of that activity together, even though most of those individual sources are very small, adds up to quite a bit of VOC emission and quite a bit of NOx emission.

Beyond ozone, Commissioner McKee acknowledges that the oil-and-gas industry can complicate the larger question of climate change−but it's a question that he feels is as yet unanswered.

If a person was to go to one seminar, there would people that would say, if you don't believe in climate change, you're in denial. And I've been to other seminars where people really question a lot of the science—is it really man made. Is it caused by sun spots or other natural phenomena that may have nothing to do with men, or little to do with men. And so I think even in the scientific community there's just a lot of debate and different opinions.

Cameron Todd of US Oil Sands and Rikki Hrenko of Enefit offer a different perspective on climate change, a perspective that lies closer to the consensus of the scientific community. They both understand that our burning of fossil fuels contributions to carbon−and warming−in the atmosphere. They both would like to bring their carbon emissions down. But how low is low enough?

In 2013, the world's atmospheric carbon load reached 400 parts per million. The National Resource Defense Council has compared Green House Gas emissions from conventional oil with those from unconventional sources−that is, from oil sands and oil shale. Total carbon emissions −from well to wheels−was 14% higher for oil sands and 73% higher for oil shale mined on the surface. These numbers may sound definitive, but they necessarily blur many important distinctions. For instance, some conventional oil sources like Nigeria and California are 'heavy' and release higher levels of carbon. Both Todd and Hrenko hope to lower their carbon footprint −<u>maybe</u> even to the level of conventional oil.

But is it good enough just to bring carbon emissions down to levels that got us in so much hot water in the first place? By relying so heavily on conventional oil for the past century, we've already dramatically warmed our atmosphere. The worldwide production of oil would have peaked by 2005, but hydraulic fracturing−in North Dakota, in Pennsylvania−changed the rules of the game. More recently, Canada's carbon-intense oil sand deposits have come on-line, and suddenly the prospect of finite energy resources, of peak oil, has vanished. Supply is surging; demand never slowed down. And the atmosphere continues to warm. It's difficult to focus these climate concerns on any one energy development−on US Oil Sands, on Enefit, on Red Leaf−but if not here, then where?