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Draining America First—The Beginning of the End for Shale Gas

The United States is the biggest producer of natural gas in the world and recently became the largest exporter of LNG (https://www.bloomberg.com/news/articles/2024-01-02/us-becomes-world-s-top-lng-supplier-after-exports-eclipse-australia-and-qatar). The industry is scrambling to build LNG (liquefied natural gas) export terminals (https://www.eia.gov/todayinenergy/detail.php?

id=61062#:~:text=About%2013.5%20Bcf%2Fd%20of,or%20more%20pipelines%20being%20developed.&text=Note%3A%20LNG%3Dliquefied%20natural%20gas.,-(https://www.eia.gov/todayinenergy/detail.php?id=61062#:~:text=About%2013.5%20Bcf%2Fd%20of,or%20more%20pipelines%20being%20developed.&text=Note%3A%20LNG%3Dliquefied%20natural%20gas.,-Southeast%20Texas%20Projects) as fast as permitting and funding will allow.

This couldn't come at a worse time. Instead of having an almost infinite amount of natural gas as many believe, we may be witnessing hard limits to that supply.

Figure 1 shows that shale gas plays have reached an apparent peak and may be starting to decline. It's not a good sign although some of this may be related to seasonal effects or regulatory matters. At the very least, the rate of production growth is slowing.

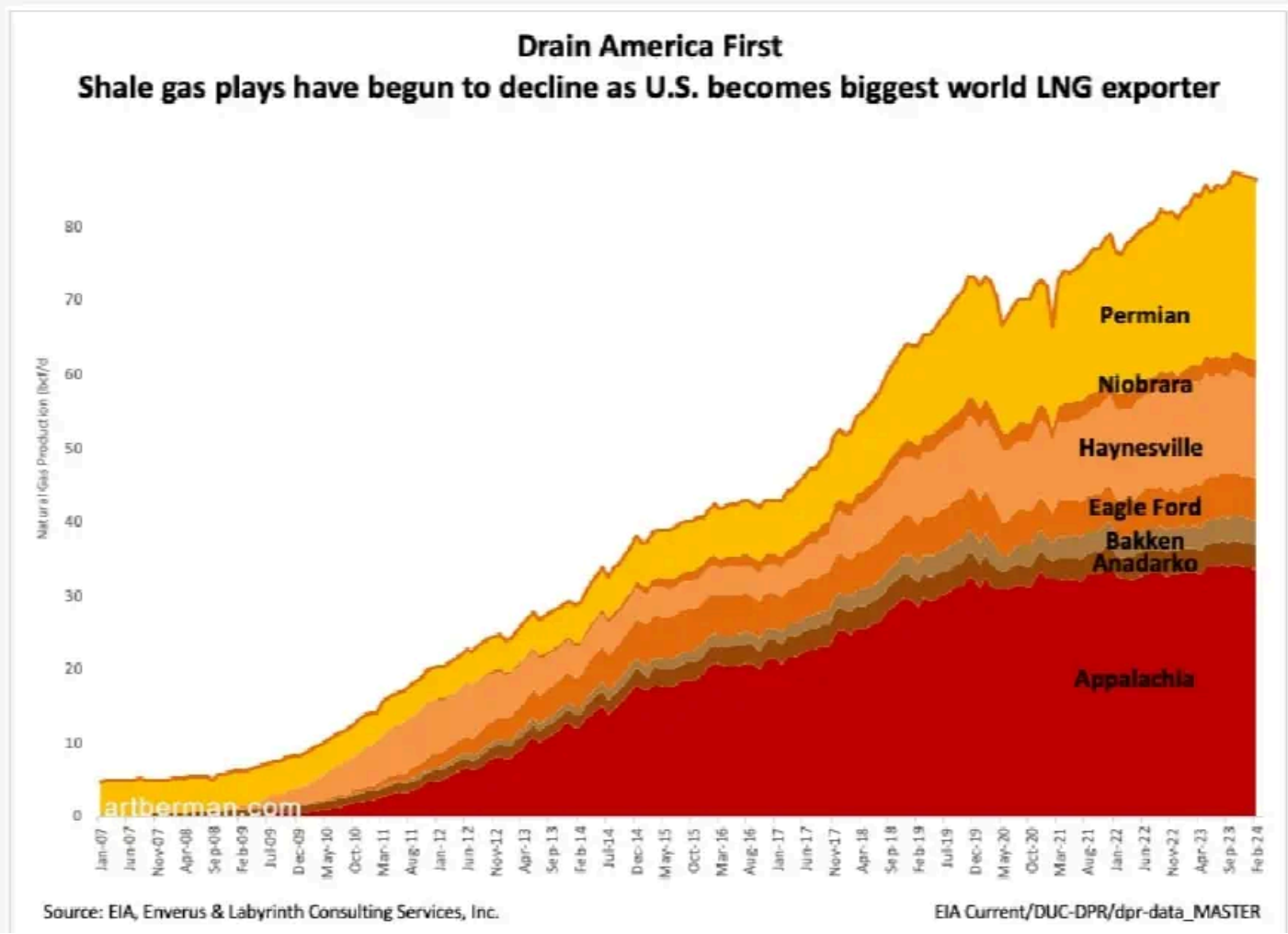

Figure 1. **Drain America First**. **Shale gas plays have begun to decline as U.S. becomes biggest world LNG exporter**. Source: EIA, Enverus & Labyrinth Consulting Services, Inc.

Any decrease in the growth of shale gas could become an acute problem because it accounts for 82% of U.S. dry gas production (Figure 2).

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Figure 2. **Shale gas accounts for 82% of U.S. dry gas production**. Source: EIA, Enverus & Labyrinth Consulting Services, Inc.

I am frankly less concerned about whether or not shale gas production is currently in decline as I am about what will happen to supply in five or ten years.

That concern is based on plans for increased LNG and pipeline exports. Net LNG exports are expected to increase +6.4 bcf/d by 2030 & another +7.1 bcf/d by 2035 (Figure 3). Total net exports are projected to increase +15 bcf/d by 2035 from 13 to 29 bcf/d.

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Figure 4. Shale plays with pure shale gas plays Utica, Marcellus and Haynesville in bold text. Source: EIA.

The Marcellus play in Pennsylvania and West Virginia is currently producing about 26 bcf/d but output appears to have stopped growing despite plenty of new wells being added every month (Figure 5).

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Figure 7. **Haynesville Shale gas production has stopped increasing despite more producing wells**. Source: Enverus & Labyrinth Consulting Services, Inc.

Because of this uncertainty, I decided to look a little deeper at the play. What I found is disturbing.

Haynesville Shale production rates for 2021-2023 horizontal wells are already lower than for wells with first production in 2018-2020 (Figure 8). Initial rates for 2022 wells were the highest ever but monthly output levels are already far below all other years. Initial rates for 2023 wells were lower than for 2021 and 2022 and later rates have declined more rapidly.

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Figure 8. **Haynesville Shale production rates for 2021-2023 horizontal wells are already lower than for wells with first production in 2018-2020**. Source: Enverus & Labyrinth Consulting Services, Inc.

Estimated ultimate recoveries (EUR) for the Haynesville Shale confirm the bleak picture from Figure 7. EUR for Haynesville wells drilled in 2021 was -3.6 bcf (-17%) less than for wells in 2019 and EUR for wells drilled in 2022 was -6.7 bcf (-31%) less than for wells in 2019 (Figure 9).

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Figure 9. **EUR for Haynesville wells drilled in 2021 was -3.6 bcf (-17%) less than for wells in 2019**. **EUR for wells drilled in 2022 was -6.7 bcf (-31%) less than for wells in 2019**. Source: Enverus & Labyrinth Consulting Services, Inc.

Shale gas plays are beginning to look like a graveyard. The once world-class Barnett and Fayetteville are no longer included in discussions of U.S. shale plays. The Utica looks like it is headed for the same zombie status.

This study suggests that expectations for future U.S. shale gas production may be too high and that reserves may be overstated. Plans to increase exports by 15 bcf/d will put serious pressure on future supply regardless of whether or not production has started to decline.

I noted in a recent post that signals are flashing yellow if not red about the future of tight oil production (https://www.artberman.com/blog/beginning-of-the-end-for-the-permian/). It now appears that there are similar danger signs for shale gas plays.

I hope that the U.S. Department of Energy reviews and updates its evaluations of future gas supply before approving any more export applications. Draining America first is a terrible idea.

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Art Berman (https://www.artberman.com/blog/author/art-berman/)

Art Berman is anything but your run-of-the-mill energy consultar With a résumé boasting over 40 years as a petroleum geologist, h here to annihilate your preconceived notions and rearm you with unfiltered, data-backed takes on energy and its colossal role in th world's economic pulse. Learn more about Art here (https://www.artberman.com/about/).

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36 Comments

PeakOilDude on March 30, 2024 at 3:25 am

I find it very strange that you have the data, or the right data, but they don't? I'm I missing something?

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=3191#respond)

Art Berman (https://www.artberman.com/) on March 31, 2024 at 11:02 am

PO Dude,

Not sure who you mean by "they."

I have done the hard work of interpreting EUR from production histories. "They" have not.

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All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=3197#respond)

oliv on February 8, 2024 at 3:35 pm

Thanks for your expose Art!

I wonder what'd the oil & gas shale situation in Canada ?
Are they also supposed to peak soon or do they have ample capacity left before peaking ?

Thanks,
Regards,
Olivier

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2876#respond)

Art Berman (https://www.artberman.com/) on February 9, 2024 at 4:04 am

Oliv,

I have not looked carefully at Canada lately but I believe the only sector that hasn't peaked is bitumen.

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All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2887#respond)

JEFF13 on February 19, 2024 at 12:53 am

I am also curious to hear about the massive Montney shale gaz play in BC and Alberta, Canada. Despite opposition, TC Energy recently completed its Coastal Gaslink, that will connect the Montney to Kitimat LNG Terminal on the Pacific.

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2937#respond)

Art Berman (https://www.artberman.com/) on February 22, 2024 at 11:16 am

Jeff,

The Montney is hardly new and I'm not sure it qualifies as "massive." I'd love to see the economics on Kitimat and how it competes with gas sources closer to Asia.

I'm all for the export of Montney gas but 3 bcf/d of export from Kitamt is hardly a market-changing volume.

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All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2945#respond)

Kent Robin Jansson on January 29, 2024 at 9:35 pm

Where can I find this?
Source: EIA, Enverus & Labyrinth Consulting Services, Inc.

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2824#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at 11:58 pm

Kent,

That is standard sourcing information. I don't understand what you don't understand.

All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2828#respond)

Carl Dean on January 26, 2024 at 3:04 am

Art – We are idiots for exporting our most valuable, clean. reliable and affordable energy resource to other countries. Solar & Wind can't not replace this valuable resource in any of the above attributes of natural gas.

We would rather buy EV components from China or send our children to the Middle East to secure replacement energy for our natural gas exports.

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2779#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at 4:22 am

Thanks for your comments, Carl.

All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2804#respond)

Rob Lowrey on January 25, 2024 at 6:39 pm

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Remember SDI? That “S” stood for “strategic”, yet even as the economy was burdened by a doubling of its national debt to pay for SDI, the plans to facilitate the export of technology developed by the R&D of the DOD were implemented, resulting in the Rust Belt. Similarly, the US has grown its LNG industry to the largest in the world in less than a decade to facilitate the export of what has been cynically monikered our “transition fuel” to a green energy future, burning our bridges in front of, instead of behind us.

Simultaneous to building floating bombs, we spread drone technology around the globe that would enable any 2-bit economy/terrorist to send bombs to blow them up, while simultaneously supposedly fighting the ersatz Global War On Terror (the scenario I envisioned in 2019, now become a reality in the Red Sea).

With the interstate highway system the DOD demonstrated the strategic importance of infrastructure, yet that insight was completely jettisoned during the decade of greed the Reagan/Bush admin’s ushered in with the full co-operation of their Moral Majority (which was neither). I’ve often thought that it was no coincidence that the cognitive dissonance necessary to consider Greed, the deadliest of the deadly sins, Moral, stems from the same mindset that decided it was a good idea to export the most vital industries and resources of an Industrialized nation while taxing its citizens to provide it “Strategic Defense”.

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2778#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at 4:21 am

Rob,

Is this a comment on something that I posted?

(https://www.arth

All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2803#respond)

Steven Natali on January 24, 2024 at 8:45 pm

Art,
Glad to see you out there predicting the all-too-soon peak in US natural gas production. The question is whether we will react in time by transitioning away from natural gas.

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2773#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at 4:18 am

Good to hear from you, Steve. I doubt we will do very much about transitioning away from anything. The super organism follows Odum's Maximum Power Principle.

All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2801#respond)

Ralph Tibilettirxtrxt on January 24, 2024 at 5:43 pm

Great article Art and congratulations. I worked with you at Amoco from 1991 to 1997 when I joined Mitchell Energy in the Woodlands. I consider Mr. Mitchell to be the father of fracking because of his unbelievable perseverance.
I am now 88 years old an retired but still very interested In computer applications in the oil industry especially modeling in the upsream areas like play and prospect evaluation..RAl

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2772#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at 4:16 am

Thanks for your comments, Ralph. I imagine that you've read Loren Steffy's book about John Mitchell.

All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2800#respond)

Vince Matthews on February 1, 2024 at 4:01 pm

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> George Mitchell, perhaps??

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2858#respond)

Art Berman (https://www.artberman.com/) on February 3, 2024 at 4:24 pm

> Right, Vince.
>
> Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2861#respond)

Austin on January 24, 2024 at 4:41 pm

> While I agree with your overall sentiment; I have to wonder a few key things.
>
> 1). How much of the decline in the Marcellus is due to takeaway constraints and low regional pricing?
> 2). As oil volumes fall in areas like the Permian I would think associated gas production would rise.

3). While it would only result in a drop-in-bucket, I personally believe the Barnett will have a second wind with recompletions using higher proppant loads on a larger scale than today's pricing warrants.

Again, these are not intended to takeaway from your overall thesis, or to argue that technology will reverse the decline, because there will be no slowing the beast of hyperbolic decline on a basin and national level.

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2771#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at 4:14 am

Thanks for your comments, Austin.

I considered the Marcellus takeaway in my analysis and judged it was not the main factor although it certainly is a factor. I expect gas volumes to fall in the Permian shortly after oil percent of volumes decrease. I see no possibility of a second coming for the Barnett.

All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2799#respond)

Kimberley Homer on April 30, 2024 at 5:45 pm

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Dear Art,
I love your work, and on days when I read utter nonsense from politicians pretending we are strengthening our geopolitical might by exporting our gas, I appreciate it even more. The Wall Street Journal has an article about the Permian sinking: https://www.wsj.com/business/energy-oil/in-americas-biggest-oil-field-the-ground-is-swelling-and-buckling-9d66eb42?utm_medium=email (https://www.wsj.com/business/energy-oil/in-americas-biggest-oil-field-the-ground-is-swelling-and-buckling-9d66eb42?utm_medium=email). Gee, what could go wrong? Please keep up your good work, and maybe sensible people will listen.
Warmest regards,
Kimberley

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=3491#respond)

Art Berman (https://www.artberman.com/) on April 30, 2024 at 9:35 pm

Kimberly,

I read and posted the WSJ article about Permian land subsidence. It's a bit trickier than the article suggested.

Most subsidence from oil and gas production is from removal of water from shallow reservoirs that are largely unconsolidated or uncemented. This is clearly not the case in the Permian basin since the reservoirs are deep and hard.

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My guess is that the subsidence is from water removed from shallow aquifers used in fracking. There are other possibilities but that seems most probable.

All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=3492#respond)

Sheng Wu on January 24, 2024 at 4:20 pm

you should watch my youtube about the revolution in coalbed methane right now in China.
https://www.youtube.com/watch?v=PRgw-rXZMn4&t=16s (https://www.youtube.com/watch?v=PRgw-rXZMn4&t=16s)

with this revolution, China might also replicate a gas freedom like US did, and no longer need LNG or Russian gas import.
More implications for countries worldwide, including the US where the coal bed methane is just as abundant as China if not more, therefore better export LNG now.

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2770#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at 4:11 am

Thanks, Sheng Wu.

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All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2798#respond)

John Munter on January 24, 2024 at 12:17 pm

Nice visuals. Looks like none are headed up. A few years ago they were planning on opening a lot of new plastic plants in the South. Are they still smoking hopium on that too?

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2768#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at 4:10 am

John,

I will look into those plans for plastic plants in the southern U.S. but I expect that they were shelved when LNG export became the rage.

All the best,

Art

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Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2797#respond)

Howard Rogers on January 24, 2024 at 11:43 am

Art, Thanks – very timely analysis. As you stress, recent dips could be weather related etc, but production growth is slowing. The real danger for US consumers is a scenario where LNG export capacity gets overbuilt, is not fully utilised and Henry hub starts rising towards a European and Asian spot LNG net-back through arbitrage. Not sure this would be a particularly welcome development politically.

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2767#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at 4:08 am

Thanks for your thoughtful comments, Howard.

All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2796#respond)

(https://www.artb **David** on January 24, 2024 at 11:17 am

This is what we did on the east coast of Australia. There was talk 10-15 years ago about becoming an “energy superpower” and a number of export LNG plants were built. Problem is gas production is now clearly in decline and we never had that much gas to begin with. Major users of gas like the Gibson island fertiliser plant have had to close and we have the absurd situation where import terminals are actually being built at the same time we are exporting. Would have been much better off thinking beyond the short term and using the gas domestically rather than trying to pump everything out of the ground as fast as possible.

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2766#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at 4:08 am

David,

Australia is the gas model and the UK is the oil model that I think of when I write posts about draining America first.

Many thanks for your comments,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2795#respond)

(https://www.artb **Dr. Scott Dorfner** on January 24, 2024 at 10:37 am

Art ,
Very interesting but these predictions have been wrong every single time

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2765#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at 3:59 am

Scott,

Which predictions and by whom? Hard to address a non-specific comment.

All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2794#respond)

Joe Clarkson on January 24, 2024 at 7:00 am

Don’t worry, after we run out of gas there will be plenty of coal left to burn or gasify.

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2764#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at 3:59 am

Ha! True enough, Joe.

All the best,

Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2793#respond)

Thomas Boyd - Cody, Wyoming on January 24, 2024 at 3:14 am

As a nearly 50 year industry professional, Art's take on the future of shale gas is very interesting. About my only real argument with his overall assessment of the shale gas situation is his failure to include the huge problem of takeaway capacity out of the Marcellus and Utica shale provinces. Assuredly with increased and sufficient transportation infrastructure, the decline seen currently in the App Basin in general will quickly and dramatically reverse.

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2763#respond)

Art Berman (https://www.artberman.com/) on January 29, 2024 at (https://www.artb
3:58 am

> Thomas,
>
> I am quite aware of the takeaway situation in the Marcellus and Utica. Production doesn't decline because existing capacity disappears.
>
> All the best,
>
> Art

Reply (https://www.artberman.com/blog/draining-america-first-the-beginning-of-the-end-for-shale-gas/?replytocom=2792#respond)

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