Jean Laherrere draft 2st December 2025

US oil and gas production forecast

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-Introduction

My previous papers on US oil production were:
-https://aspofrance.org/2025/02/25/forecast-of-world-and-us-energy-production-jean-laherrere-17-fevrier-2025/
-https://aspofrance.org/2024/12/02/us-fossil-fuel-production-forecast/
-https://aspofrance.org/2024/05/26/us-ng-production-forecast/

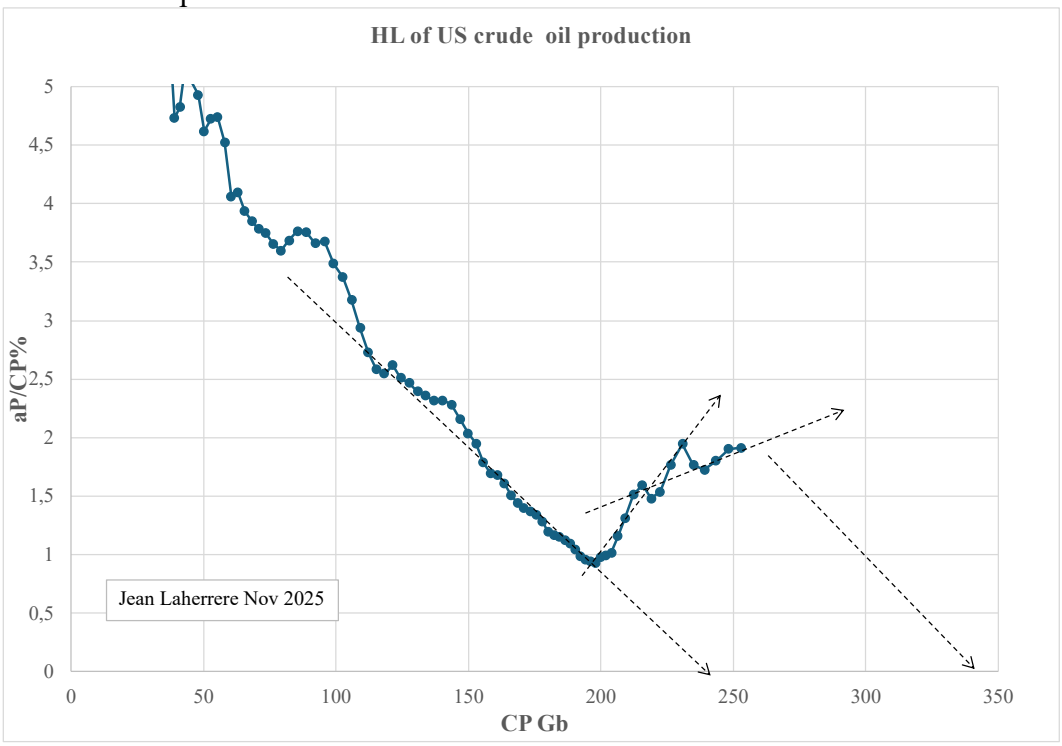
The data comes from EIA but in fact EIA data is not measure but estimate = form 914
https://www.eia.gov/petroleum/production/pdf/eia914methodology.pdf
EIA US data comes from 50 States, meaning 50 agencies, 50 sources!
In contrary, data for the Gulf of Mexico is real measures from BOEM, only one source!
Some of past US oil production data included condensate within crude oil, mainly for oil stripper wells (<15 b/d and 77% of US wells).
As US production data is not accurately measured (contrary to most countries as UK or Norway or France), it is why I never use more than 2 significant digits for energy data: those who use in papers more than 2 digits show that they do not realize the uncertainty of the data!
Financial data is more accurate; each digit is real, but in energy papers two digits is enough!

-Oil and NGL

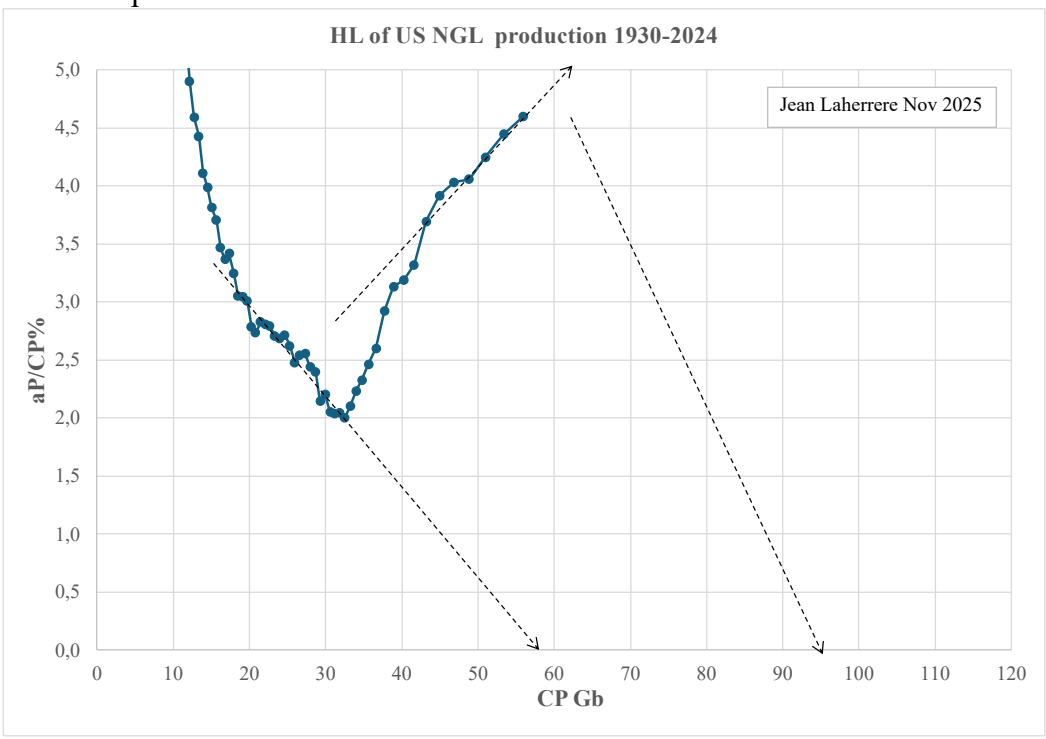
Hubbert linearization technique is useless for US crude oil and NGL production, trending towards infinite.

But modelling past production with the assumption of **symmetry** (future decline same as past increase) due to the "law of large numbers" with several thousands of US oil producers (9000 from IPAA) and US oilfields (>30 000 in 1989 from Ivanhoe & Leckie) allows to model past production and to estimate ultimates.

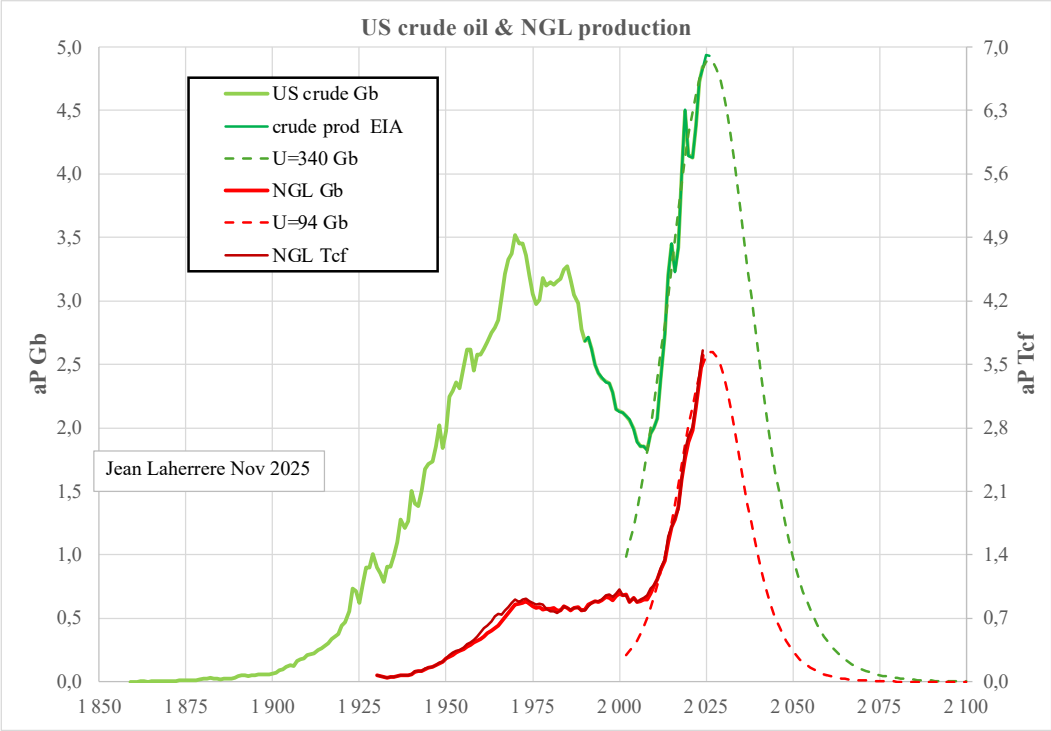
HL of US crude oil production:



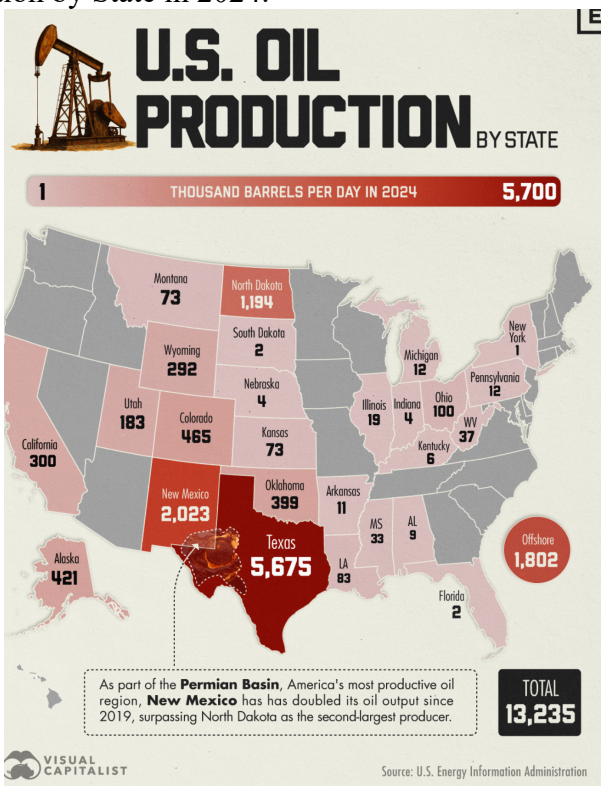
HL of US NGL production



Ultimate of 340 Gb for oil and 94 Gb for NGL are used by best fitting, giving a peak in 2026



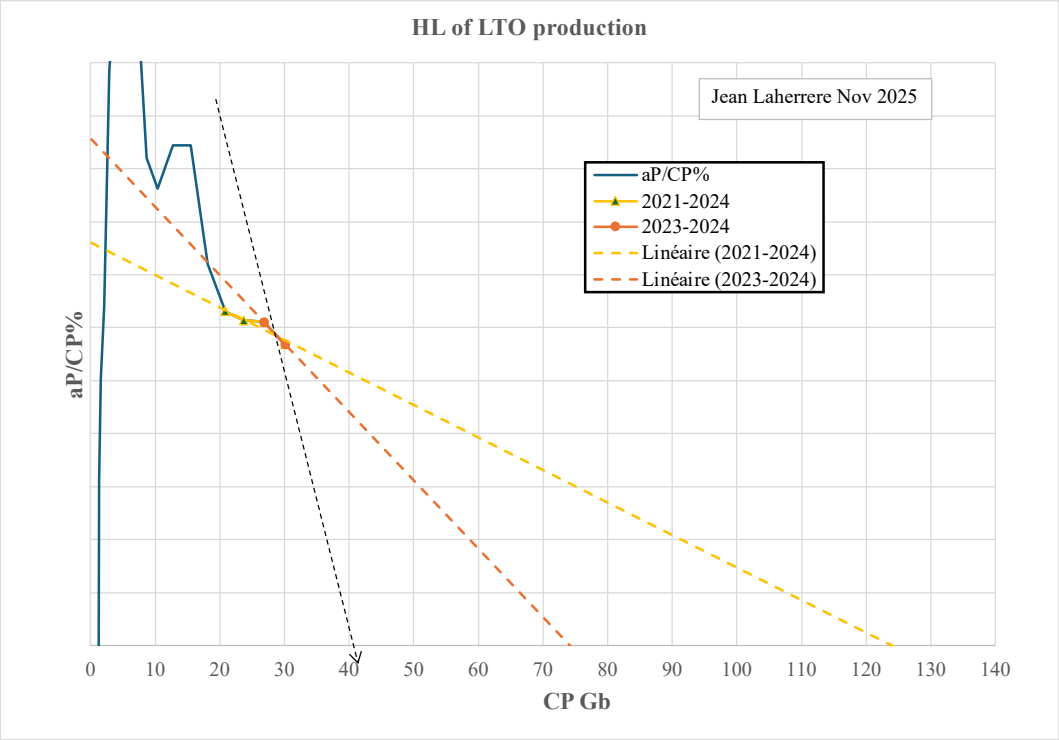
This graph from https://www.visualcapitalist.com/mapped-u-s-oil-production-by-state-2/ displays US oil production by State in 2024:



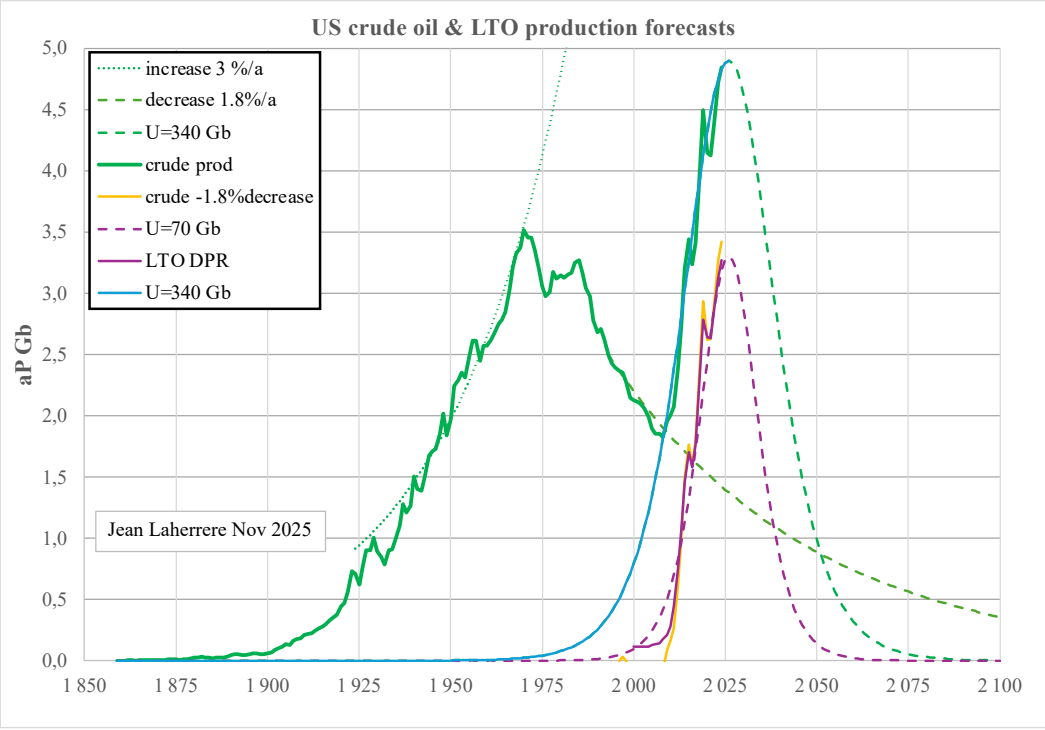
The largest State oil producer is the Texas followed by New Mexico, offshore, North Dakota.

-LTO

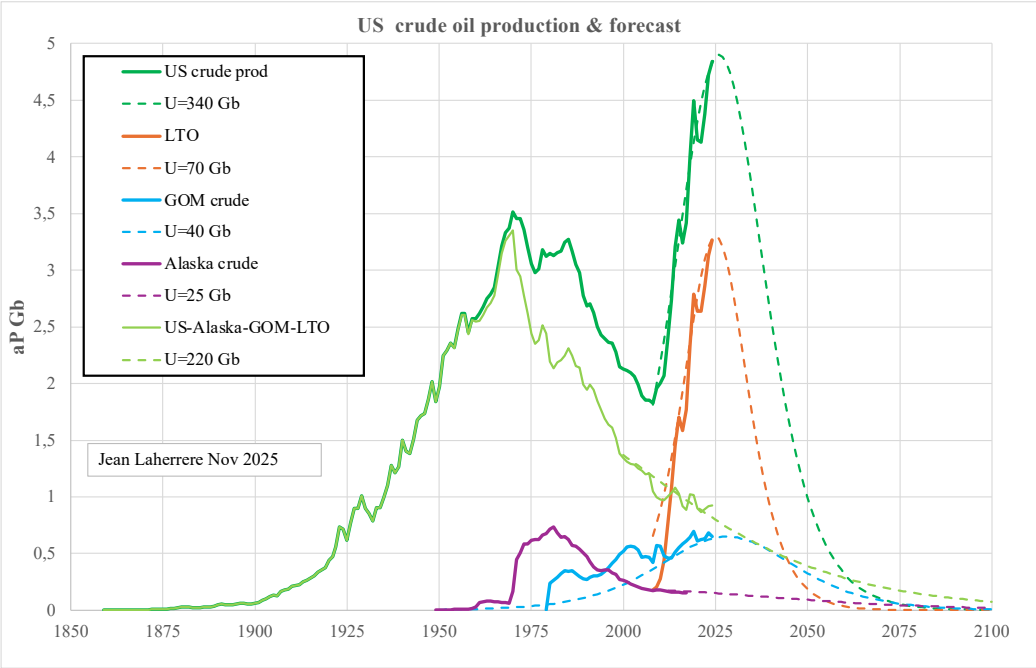
HL trends towards 73 Gb with a limited vertical scale 0-24% for the last 2 years, but to 125 Gb for the last 4 years



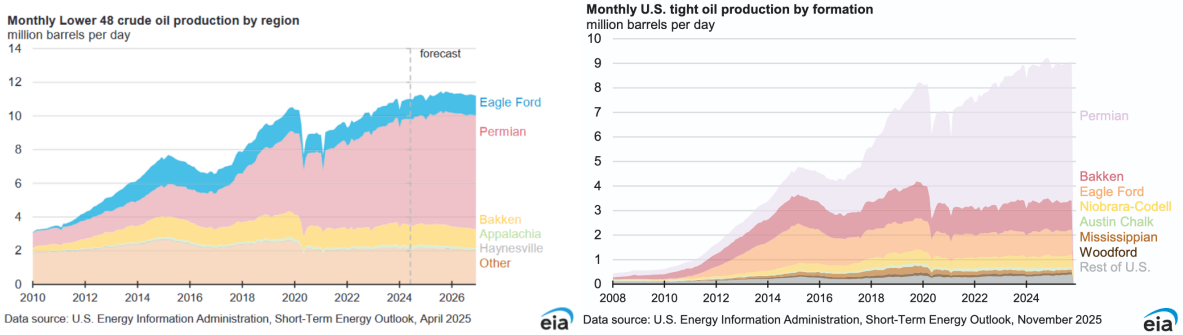
A 340 Gb ultimate is chosen for US crude oil production as 70 Gb for LTO, with a peak in 2026



US crude oil production increased by 3%/a from 1935 to 1970. As forecasted in 1956 by King Hubbert US crude oil production peaked in 1970.
Ultimates are 70 Gb for LTO and 40 Gb for GoM.
US crude oil production decreased by 1.8%/a from 1970 to 2008, but LTO increased sharply since 2008, being 40% over 1970 peak!
The crude production less1.8% decline (yellow) is very close to LTO production (violet).

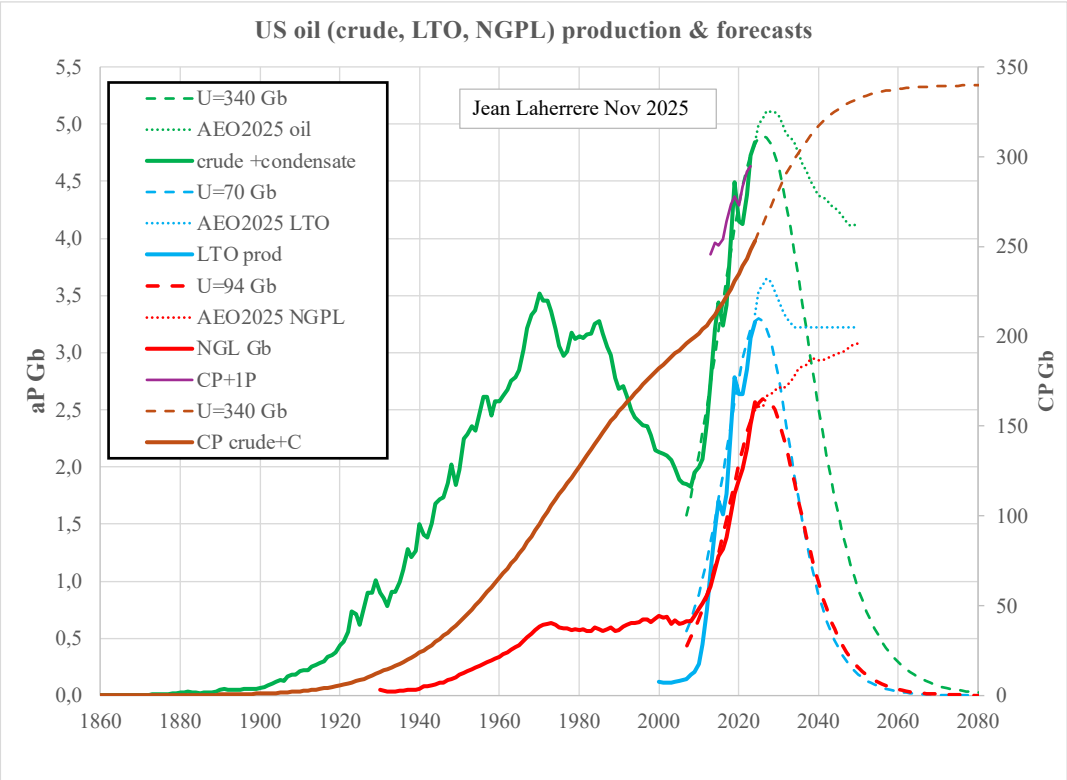


EIA graph 2010-2027 on US monthly L48 crude production with a peak in 2025- 2026



This April 2025 EIA graph is different with November 2025 for LTO in 2010

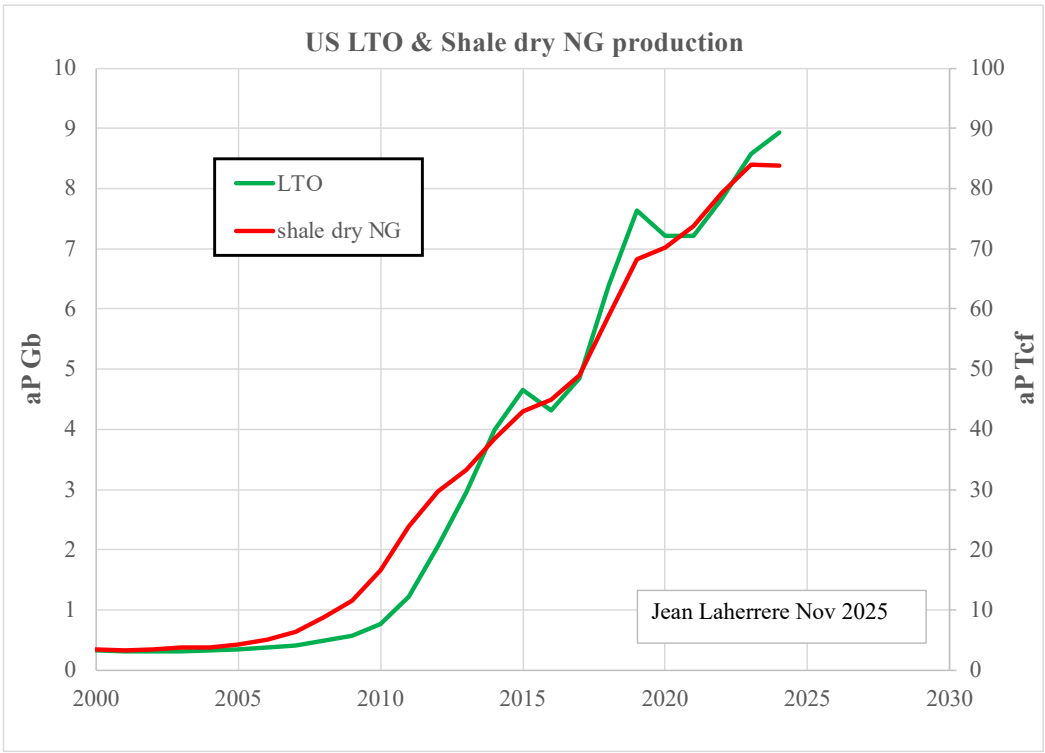
Oil, LTO and NGL production forecast= mine and AEO 2025
My 340 Gb ultimate of US crude oil production is not far from CP+1P 2024



My forecast for oil production (green) is close to AEO25, as for LTO (blue), but not for NGL (red), AEO25 forecasts in 2050 NGL at >3 Gb increasing when my forecast is 0.2 Gb decreasing!
Quite a difference!

-Comparison LTO and NG shale production

LTO production increase is similar with NG shale production dry NG data is ten times LTO data! US producers put their efforts the same way on oil as on NG! In 2024, oil is increasing when NG is flat

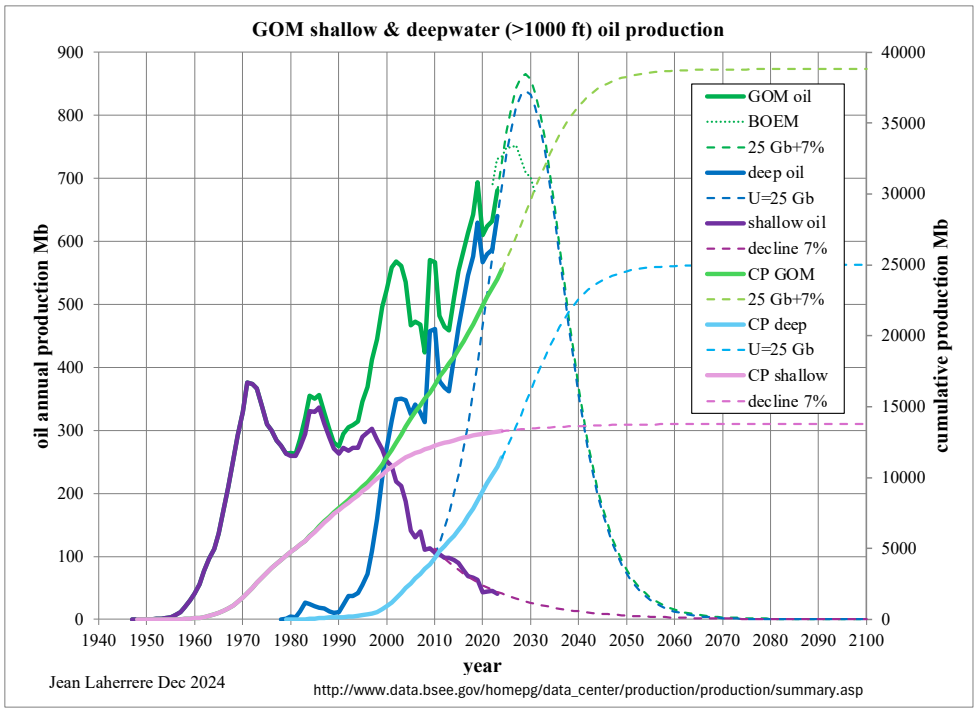


-Gulf of Mexico oil = GoM oil

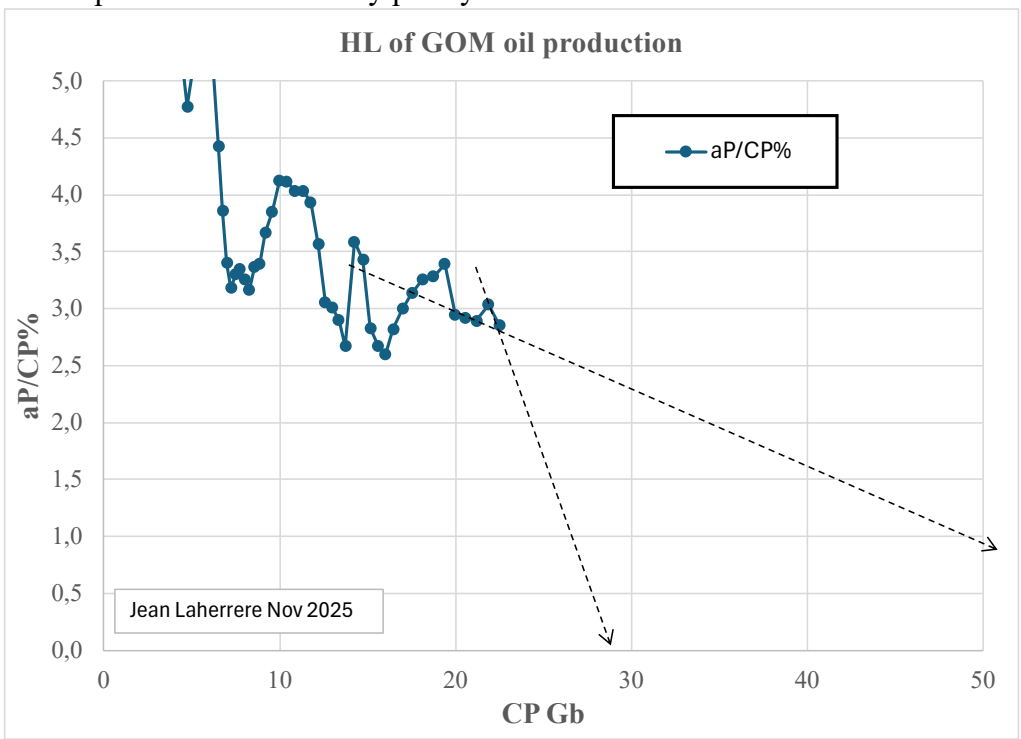
GoM is now Gulf of America for President Trump, then for BOEM Bureau of Ocean Energy Management, what would be after Trump? What about Gulf of California?

BOEM is one of the few agencies with UK NSTA, France former BEPH and Norway NPD reporting data by fields and 2P reserves, which are real data when proven reserves are very far from reality, being mainly financial or political information.

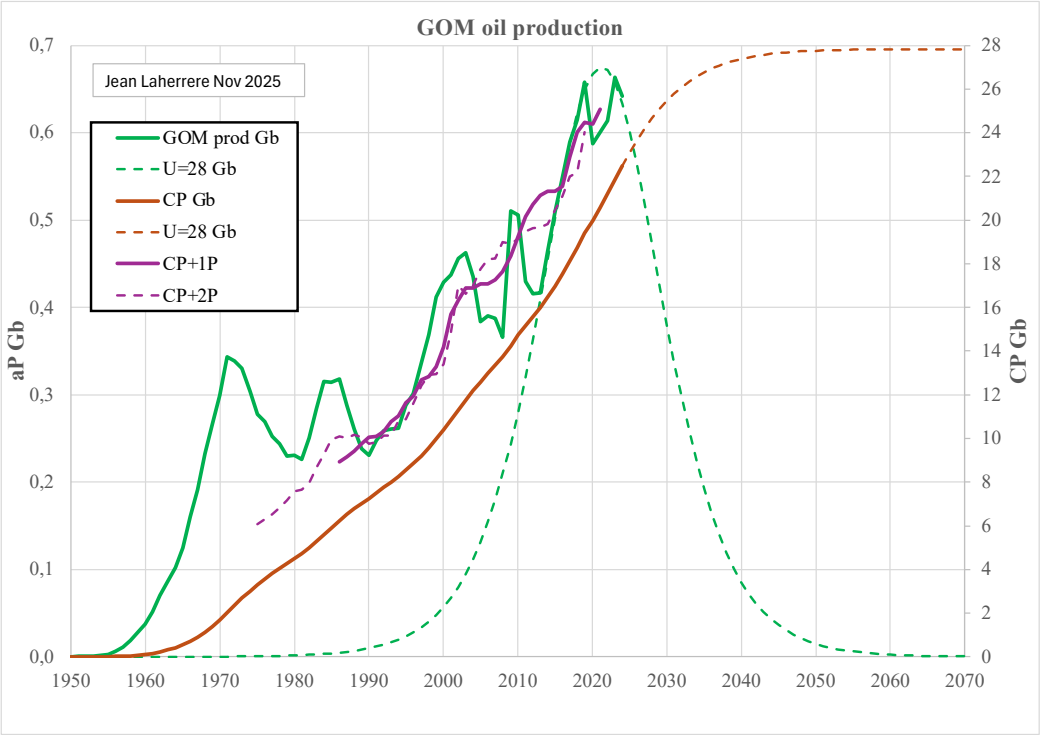
In 2024, I forecasted that GoM oil ultimate is about 40 Gb and GoM oil production will peak around 2030 at 2.3 Mb/d



HL of GOM production trends very poorly well over 50 Gb



With an ultimate of 28 Gb GOM oil production will decline in the future after a peak in 2023



CP +2P is close to CP+1P, it is strange and is far from the ultimate!
BOEM forecasts a peak in 2026 at 2 Mb/d for oil and a flat production for NG:

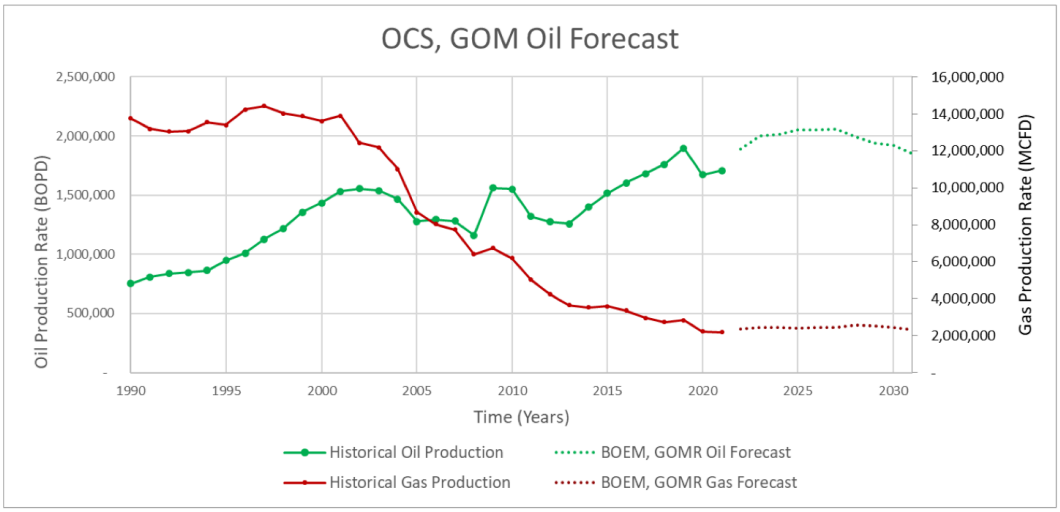
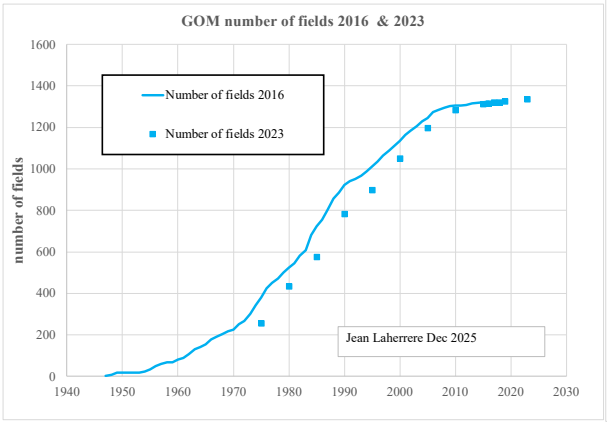


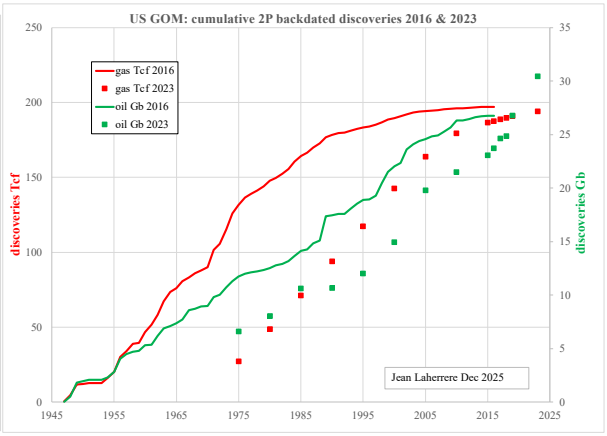
Figure 1: BOEM, GOMR Oil & Gas Forecast, 2022-2031

BOEM reports https://www.boem.gov/factsheet/2025-estimated-oil-and-gas-reserves-report-gulf-america-ocs-region at end 2019 CP at 24.66 Gb and 194.02 Tcf with original reserves of 30.43 Gb and 201.17 Tcf

Estimate	OIL (Bbbl)	Gas (TCF)	BOE (Bbbl)
Original Reserves:			
Previous Estimate, as of 12/31/2019	26.77	197	61.83
Reserves from Fields Added 2020-2023**	0.52	0.49	0.60
Revisions from Ongoing/Daily Reservoir Maintenance 2020-2023 *	3.14	3.68	3.79
Estimate, as of 12/31/2023	**30.43**	**201.17**	**66.22**
Cumulative Production:			
Previous Estimate, as of 12/31/2019	22.12	190.9	56.09
Production during 2020-2023	2.54	3.12	3.09
Estimate, as of 12/31/2023	**24.66**	**194.02**	**59.18**
Remaining Reserves:			
Previous Estimate, as of 12/31/2019	4.65	6.10	5.74
Reserves from Fields Added 2020-2023**	0.52	0.49	0.60
Revisions from Ongoing/Daily Reservoir Maintenance 2020-2023 *	3.14	3.68	3.79
Production during 2020-2023	-2.54	-3.12	-3.09
Estimate, as of 12/31/2023	**5.77**	**7.15**	**7.04**

The big problem is that GoM data changes with time and authors: the number of fields discovered in the GOM changes between 2016 and 2023: reserves of fields change with time but also the dates of discovery! It is very disappointing! Authors add change data in order to be recognized! The goal is more fame than truth!

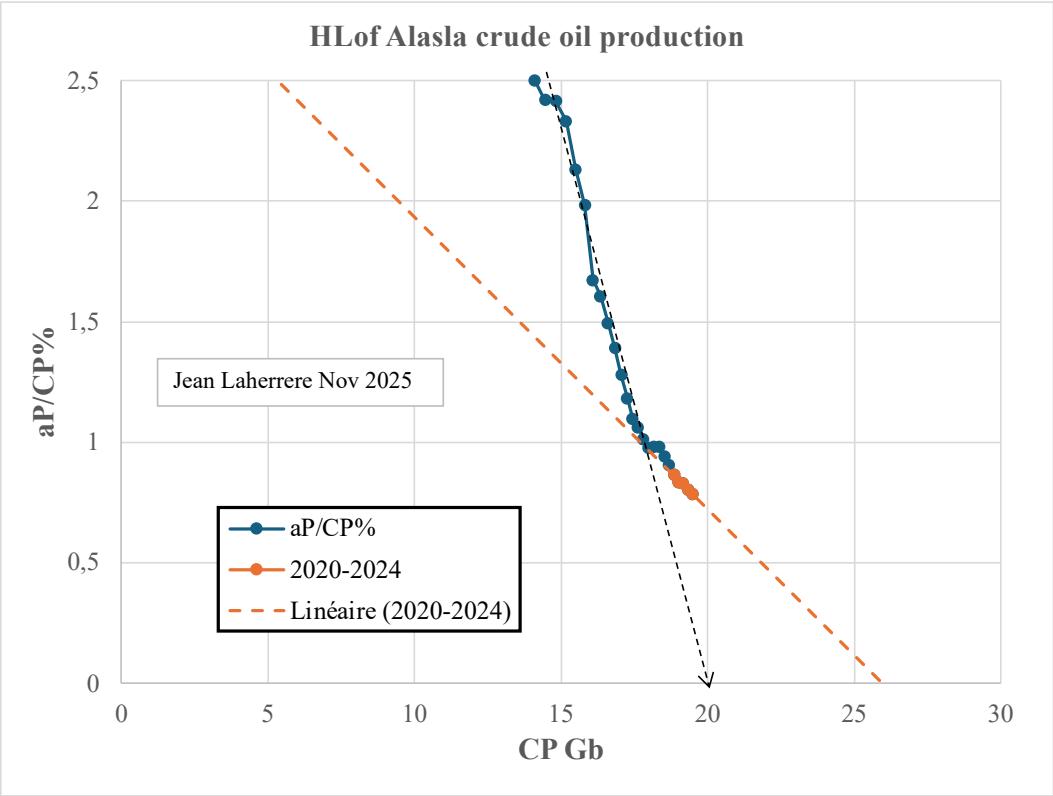




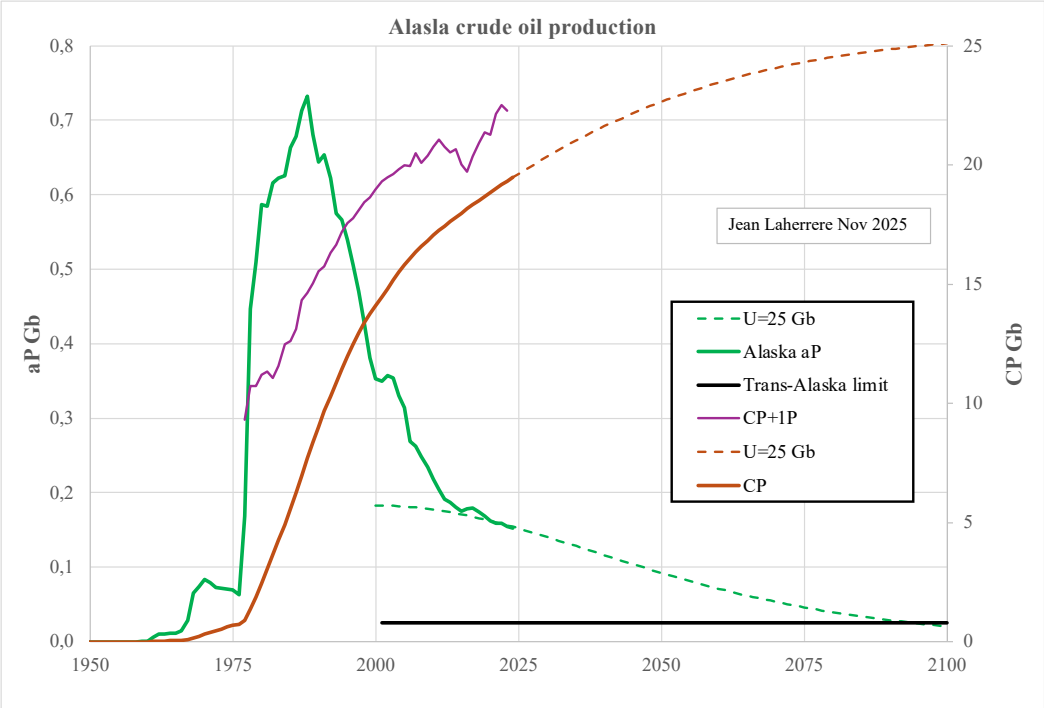
It is then impossible to get reliable data!
It is very disappointing
With 2016 data cumulative discoveries (creaming curves) were almost flat, guessing few future discoveries, with 2023 data (dots) it is more encouraging!

-Alaska oil

HL of Alaska crude oil production 2020-2024 trends towards 26 Gb



For an ultimate of 25 Gb, Alaska crude oil production could be produced until over 2100, but its production will be limited by the life of Trans-Alaska pipeline starting in 1977, because the flow could stop (freezing) when the flow is too little as the pipeline is built over permafrost and climate warming could be a problem!
The minimum is estimated at 70 000 b/d or 0,025 Gb/a



Trans-Alaska pipeline could stop the flow in 2100 as being too low (too cold) to keep the pipeline running!
EIA Alaska oil reserves CP+1P is below the 25 Gb ultimate

BOEM reports for Alaska OCS = offshore holds only 24.69 Gb and 124.03 Tcf

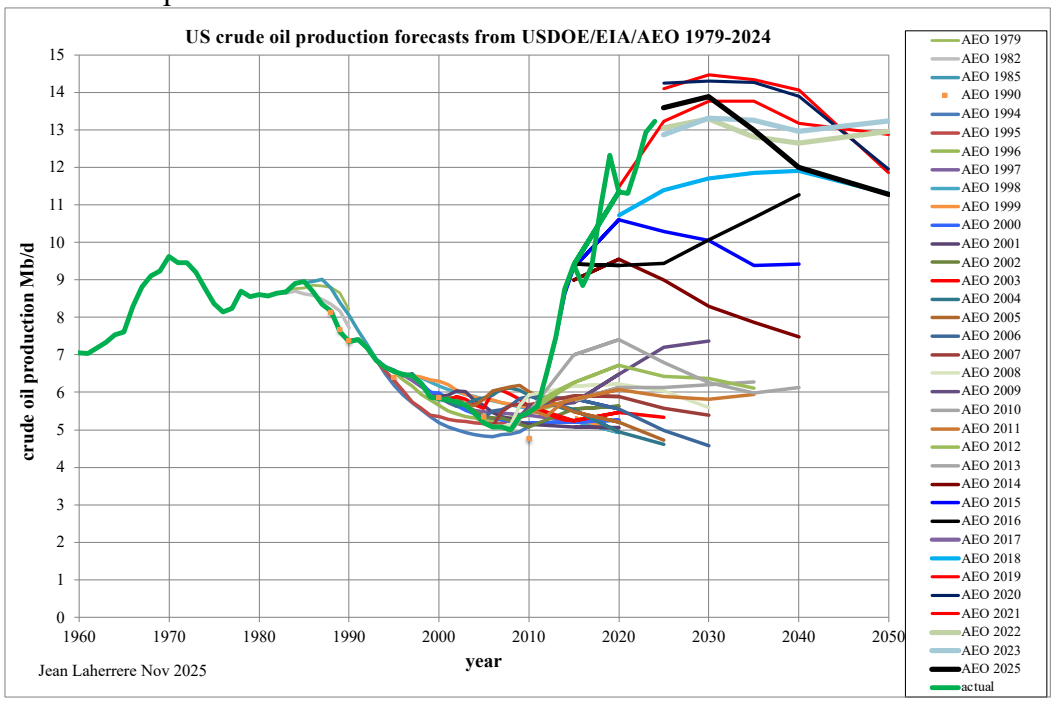
Key Regional Information

- **Conventional Energy:** The Alaska OCS is estimated to hold 24.69 billion barrels of oil, and 124.03 trillion cf of natural gas.

These 5 significant digits for Alaska reserves look suspicious!

-EIA/AEO oil production forecast evolution

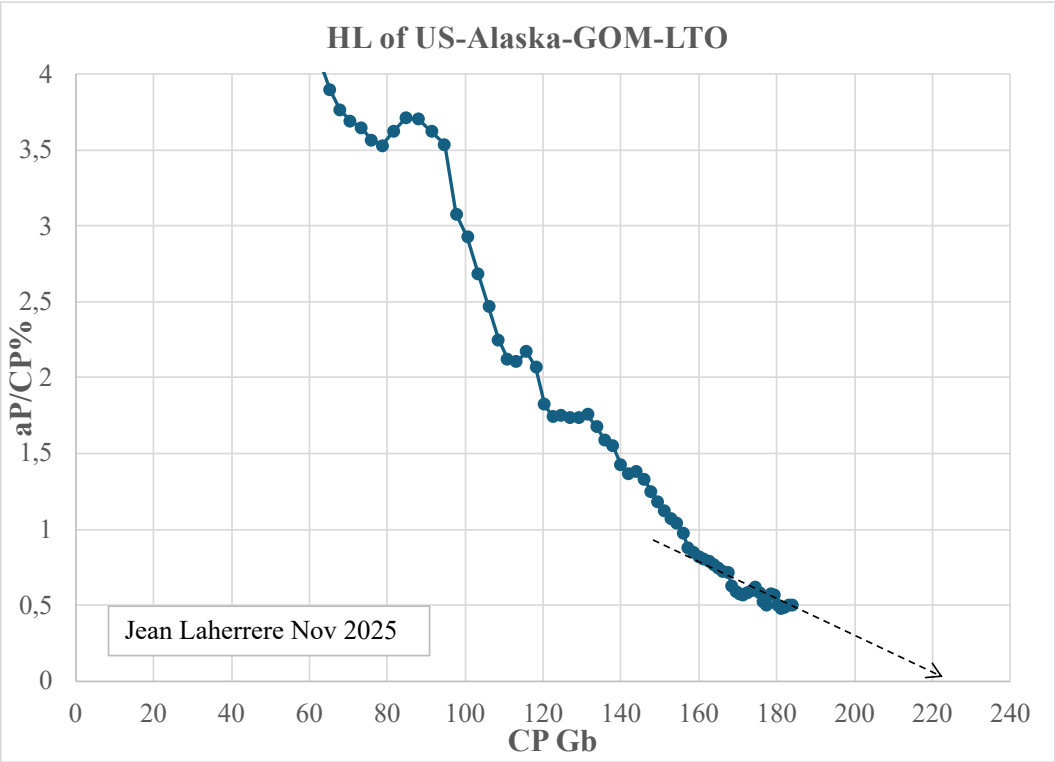
AEO2025 forecast (fat black) a peak of US crude oil production in 2030, mine is 2026!
This graph displays many past forecasts proven wrong, meaning that the reliability of EIA future forecasts is poor!



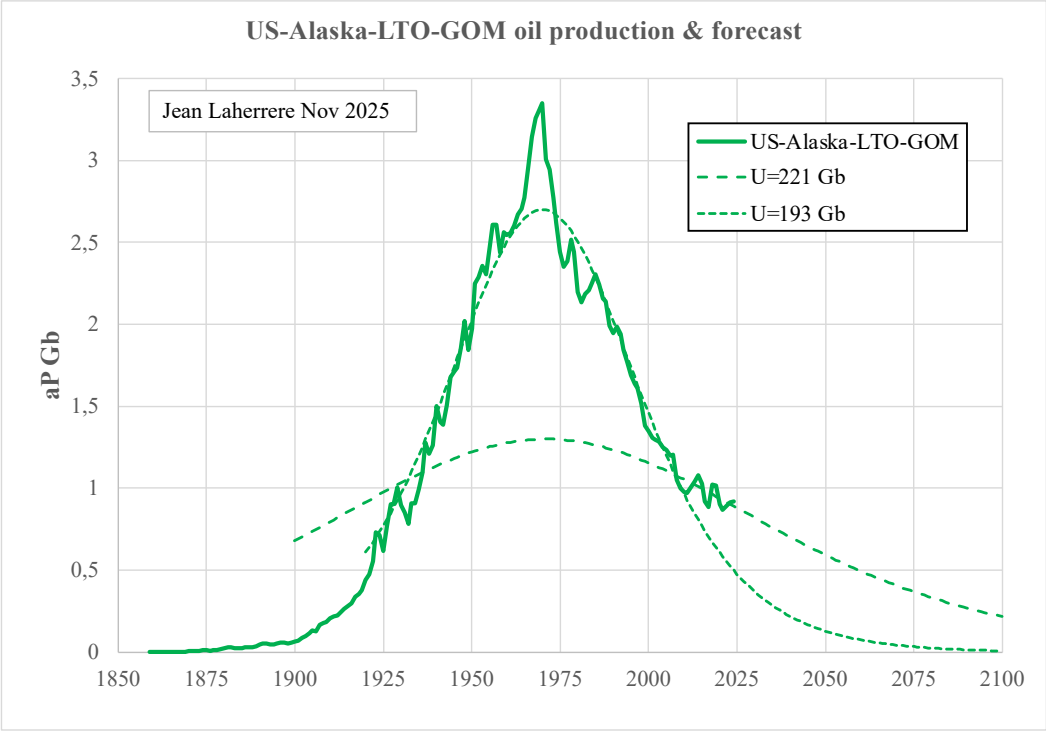
EIA does not compare its past forecasts with real data: it is a pity as you learn from your past mistakes!

-US less Alaska, GoM & LTO oil production

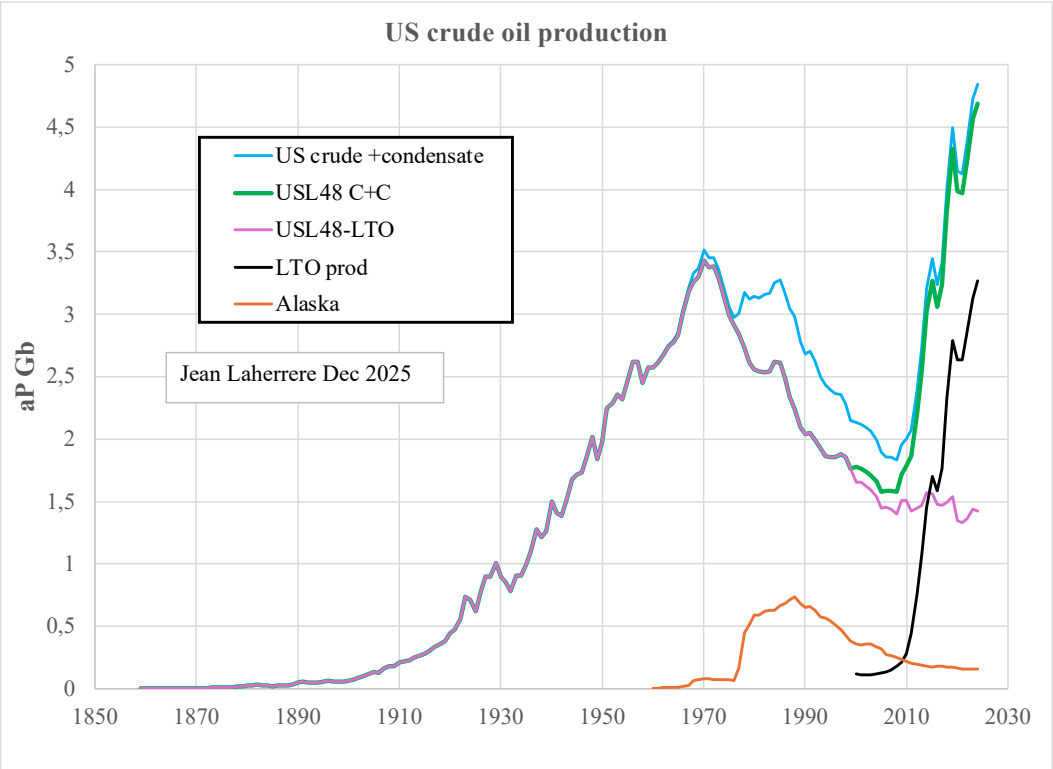
HL of less Alaska, GoM & LTO oil production trends fairly towards 220 Gb



Despite a sharp peak, far from a smooth Hubbert peak, **the symmetry of US less Alaska+GoM+LTO production is amazing** and confirms my modeling assumption described above: a modeling of 221 Gb is displayed, showing that the new fracking for LTO is also effective on the conventional oil reservoirs.
A modelling of 193 Gb is also displayed for the production before 2008 which is the start of LTO fracking. This 193 Gb is close to the 1956 King Hubbert assumption of 200 Gb (together with also 150 Gb!).

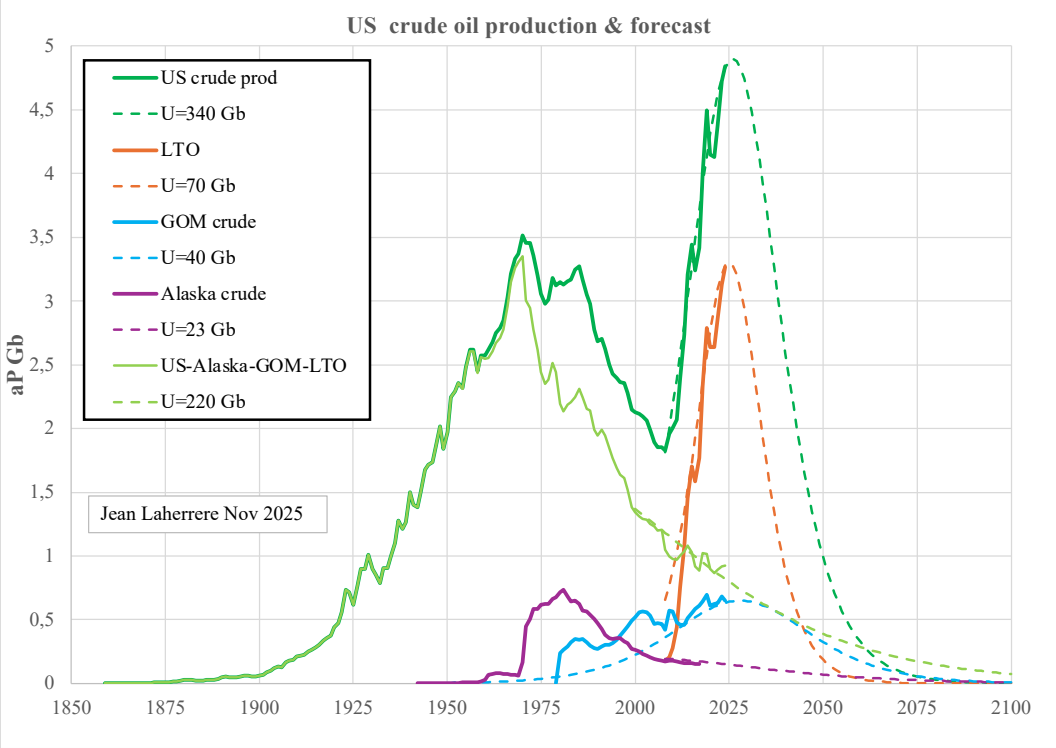


USL48 less LTO (purple)in this graph is a better symmetrical display



-US, LTO, GOM, Alaska crude oil production

US, LTO, GOM, Alaska crude production is displayed:

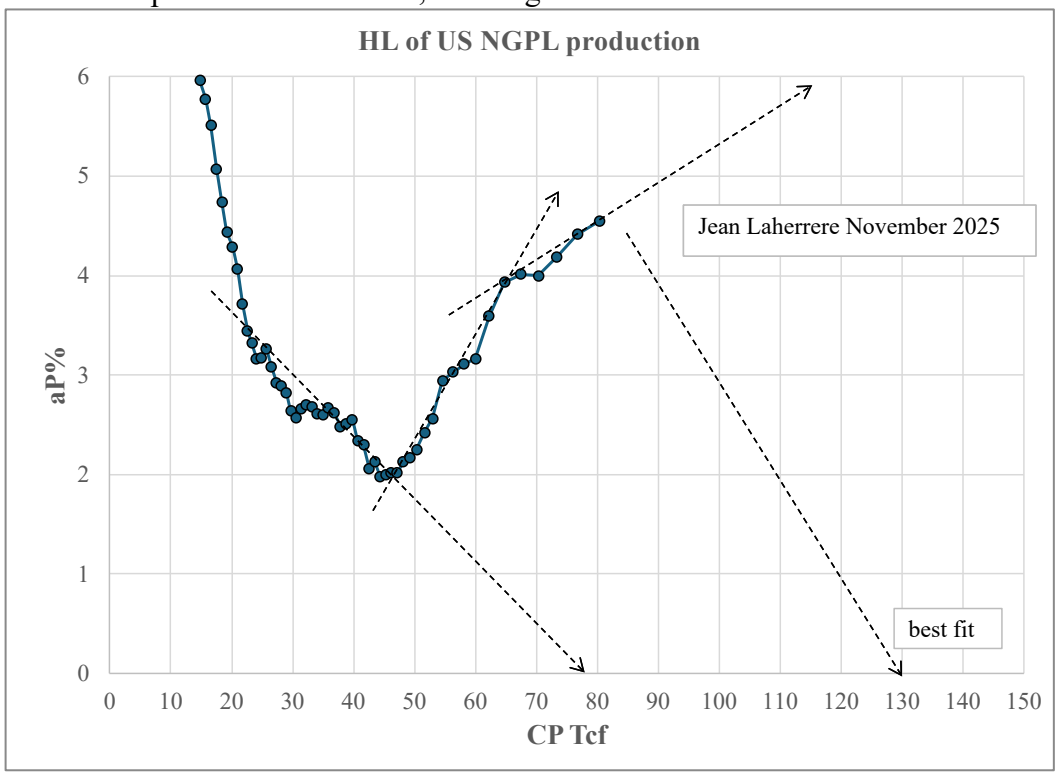


The ultimates are: Alaska 23 Gb, GOM 40 Gb, LTO 70 Gb, US 340 Gb

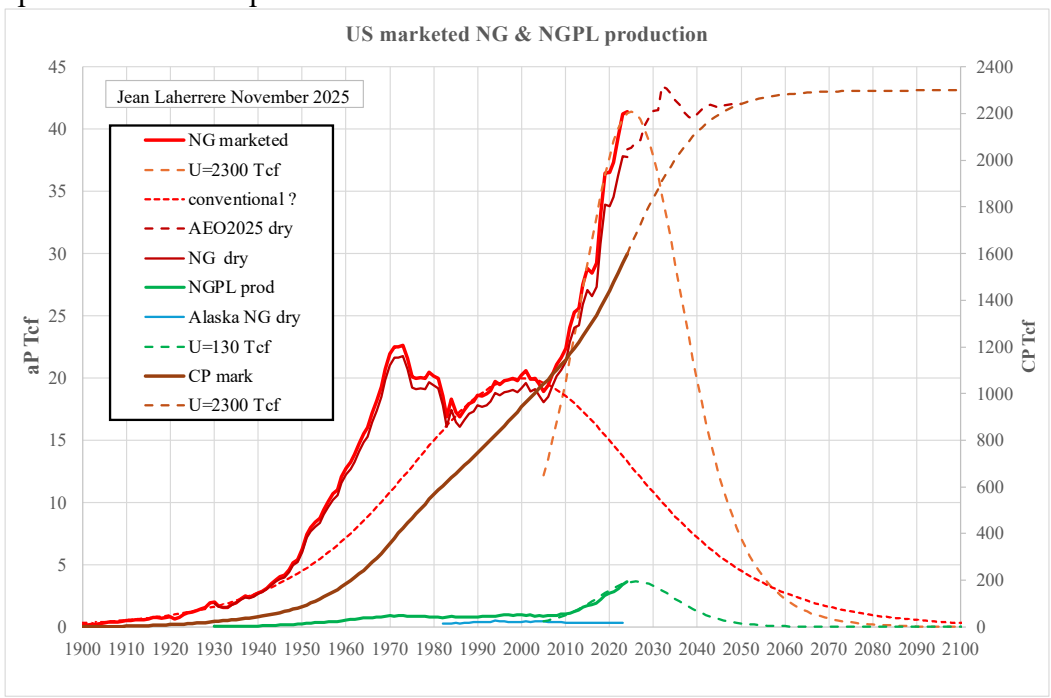
Future declines are steep for LTO less for Alaska and GoM!

-NGPL

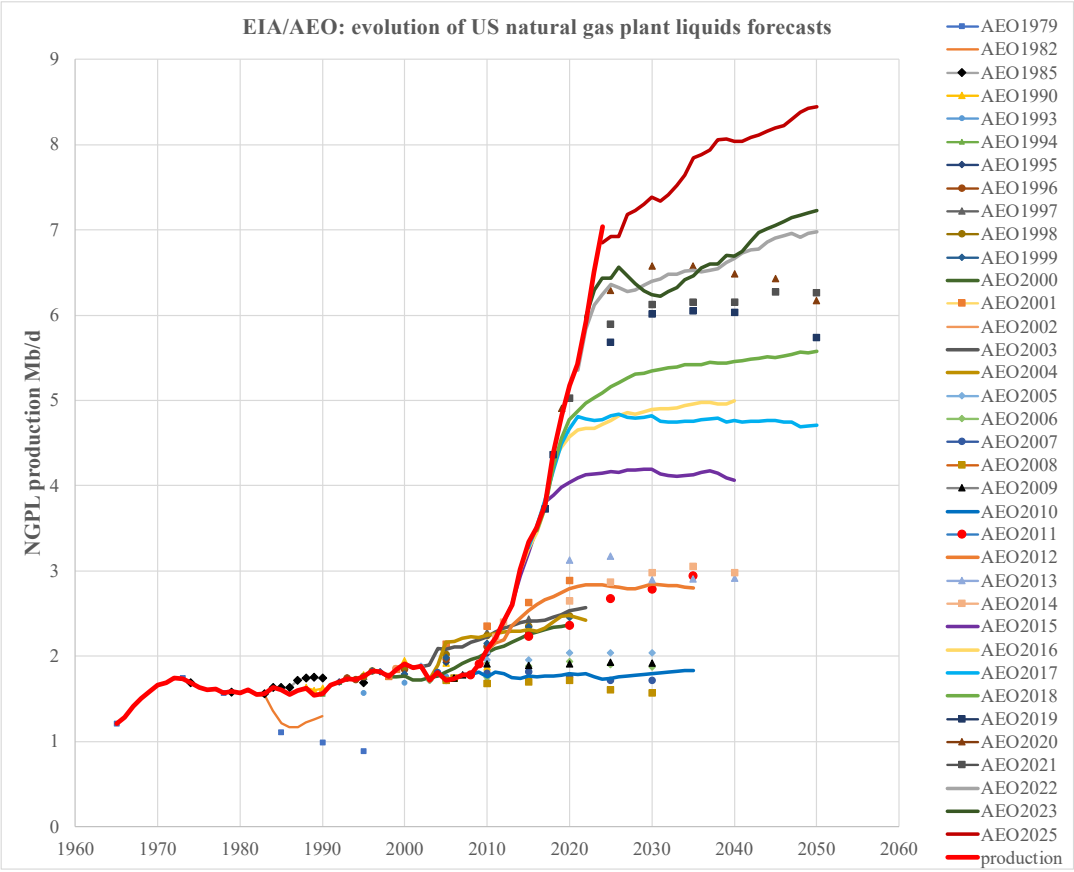
NGPL increased sharply in 2008 as shale gas production contains more liquids than conventional gas!
HL of US NGPL production is useless, trending towards infinite!



An ultimate of 130 Tcf is estimated for NGPL production by best fitting!
NGPL production is compared with NG marketed



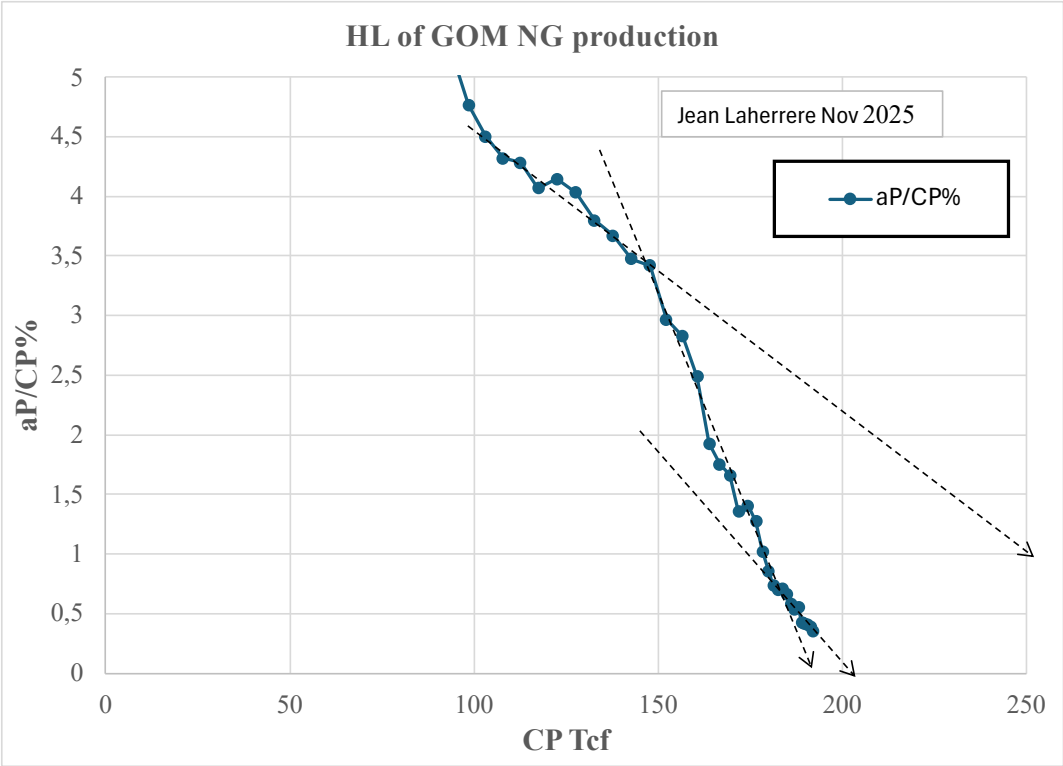
AEO2025 forecasts for 2050 US dry NG production at 42 Tcf when my forecast is 7 Tcf! It is 6 times less!
Evolution of AEO production forecasts of US NGPL production



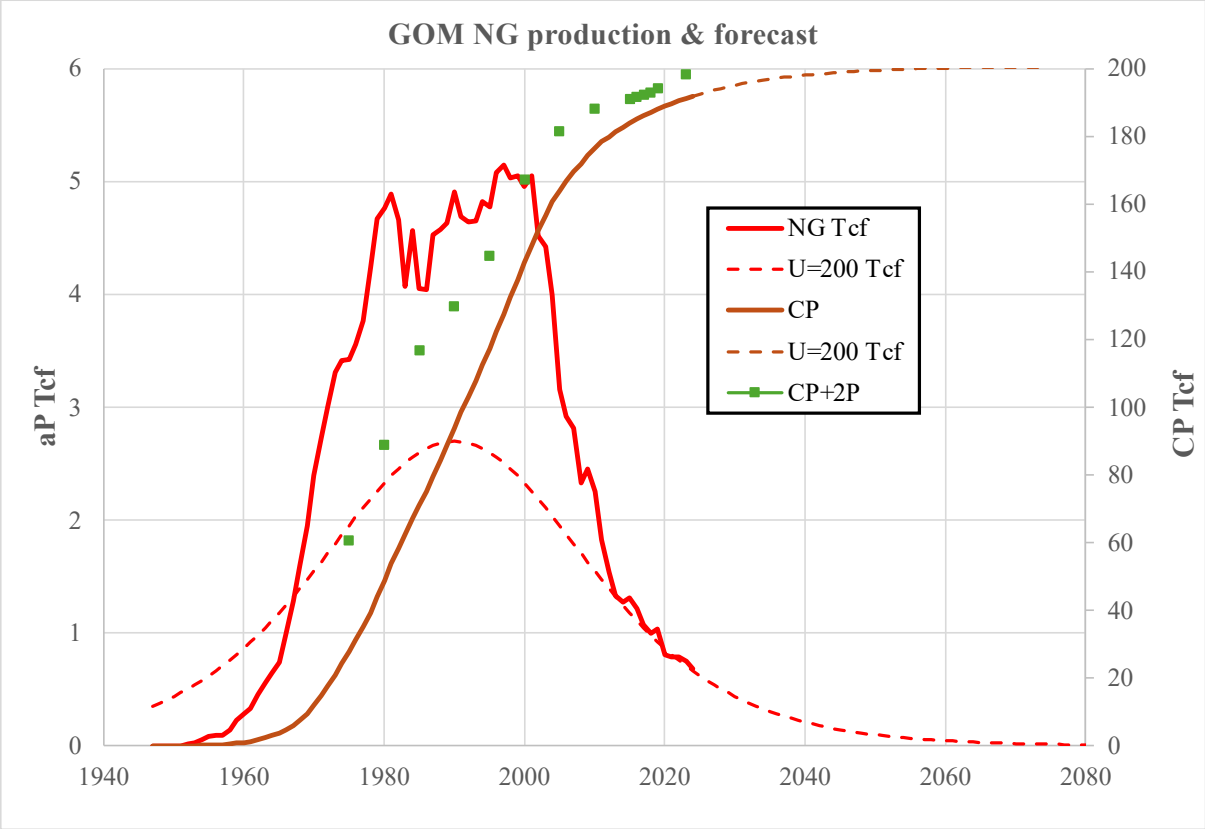
AEO2025 is much more optimistic than AEO2023

-GoM NG

HL of GoM NG production trends towards 200 Tcf

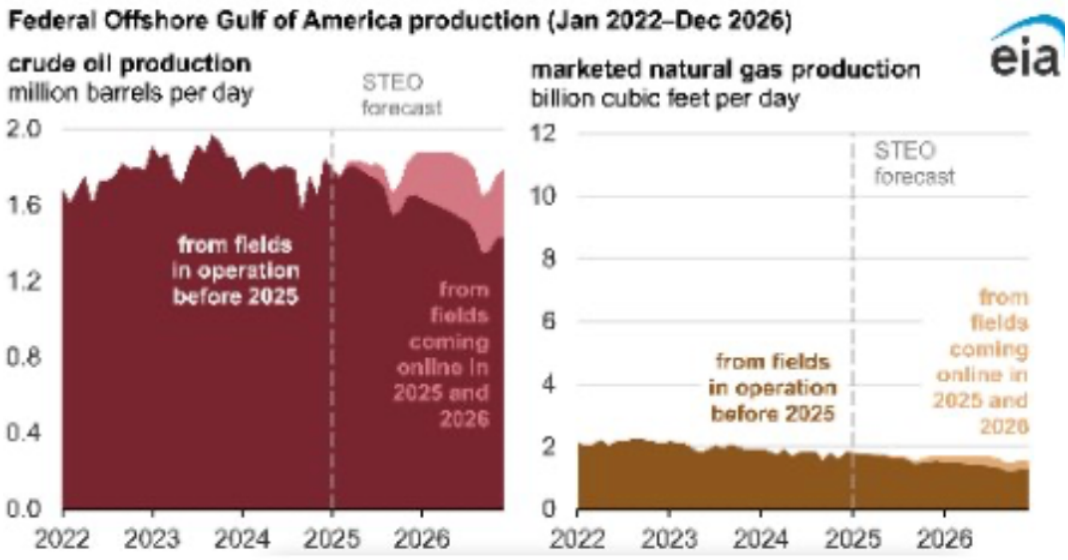


GoM NG production forecast: the ultimate is 200 Tcf when CP 2024+2P is 199 Tcf
BOEM report reserves as 2P, when oil producers listed on the US stock market are obliged by the SEC to report only 1P. BOEM is not listed on the US stock market!
BOEM reports end 2019 ultimate at 201.17 Tcf

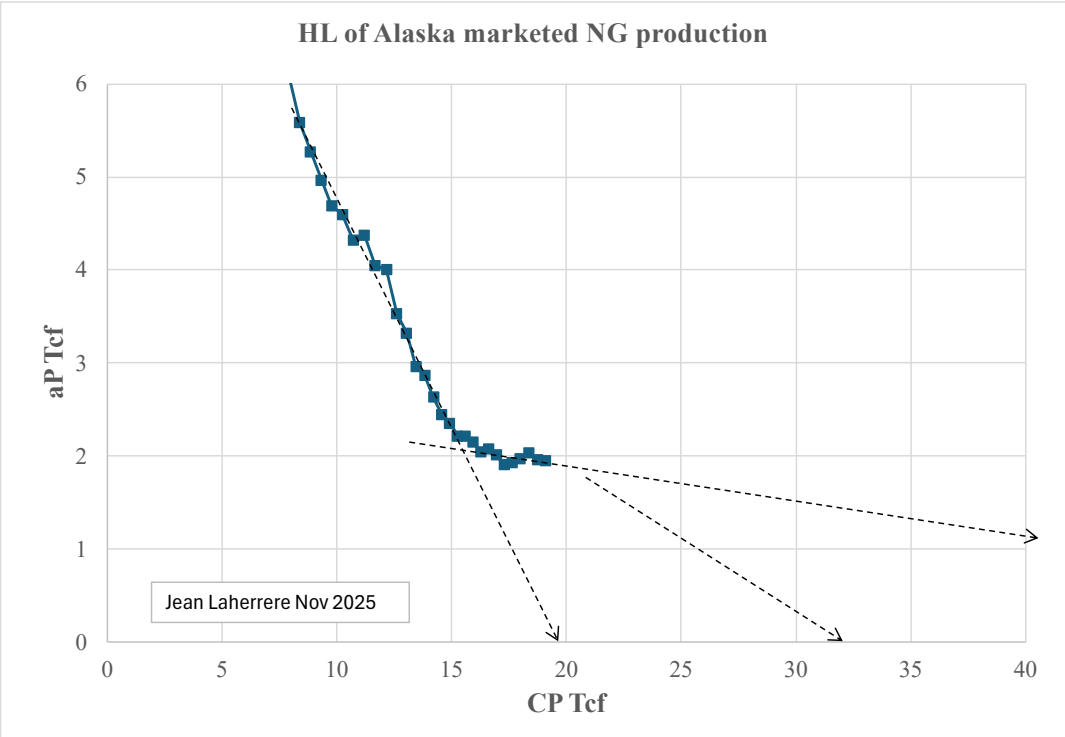


GoM NG production will decline slowly until depletion in 2080

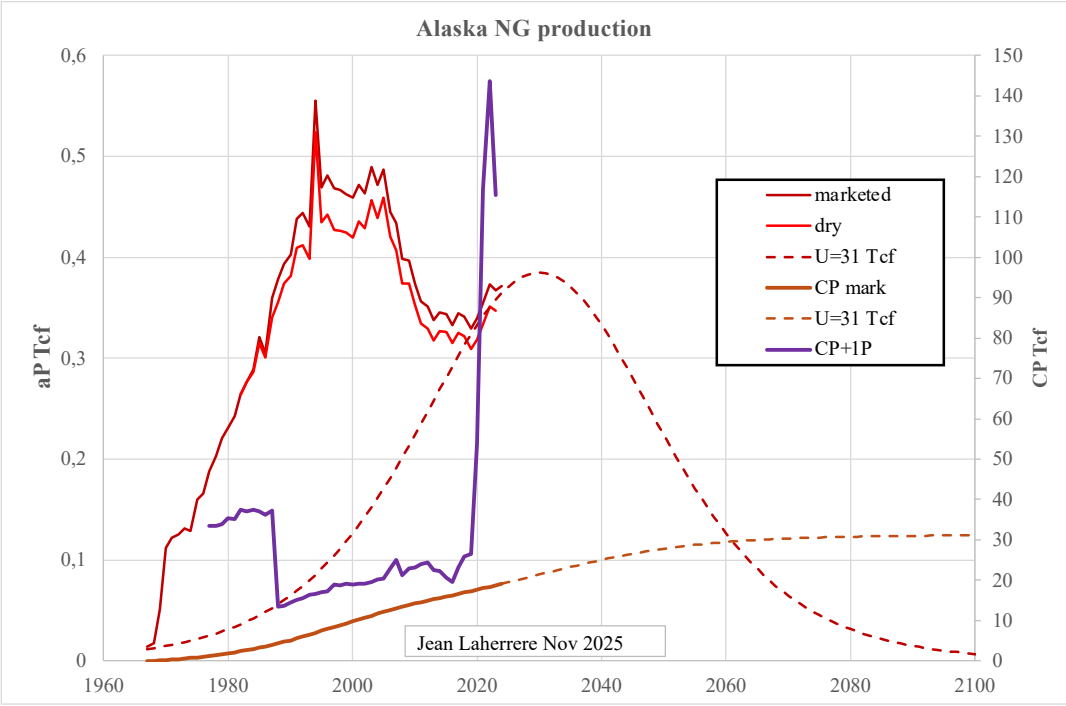
EIA forecast for GoM: small decline for the next 2 years



-Alaska NG
HL of Alaska NG production trends towards infinite

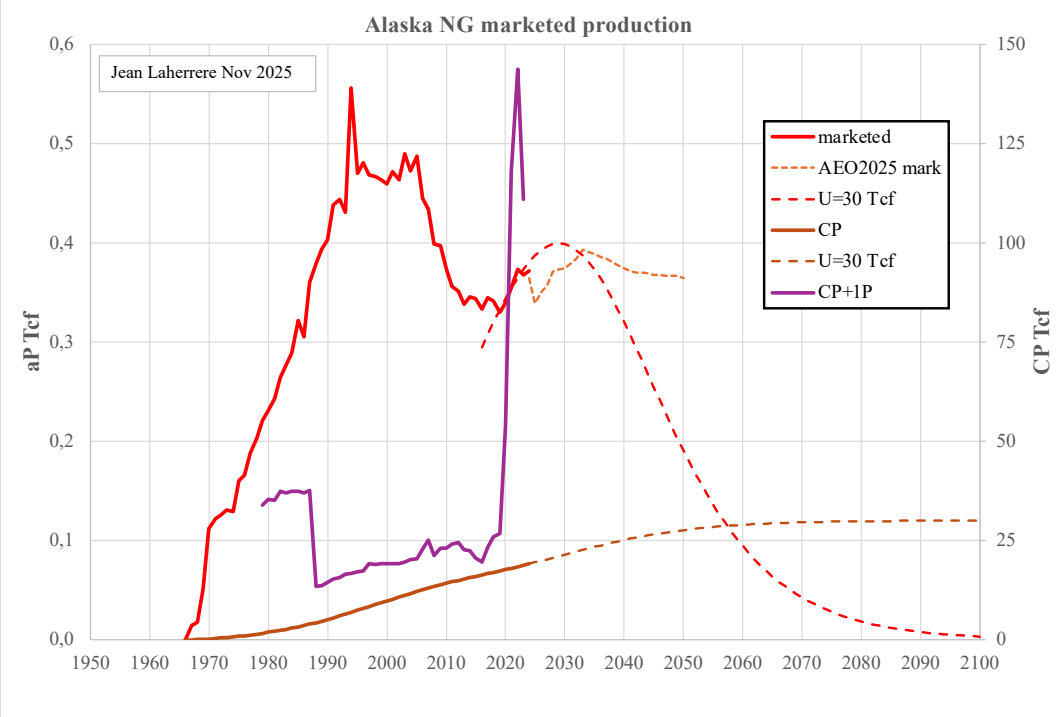


A best fit is chosen at 31 Tcf for ultimate



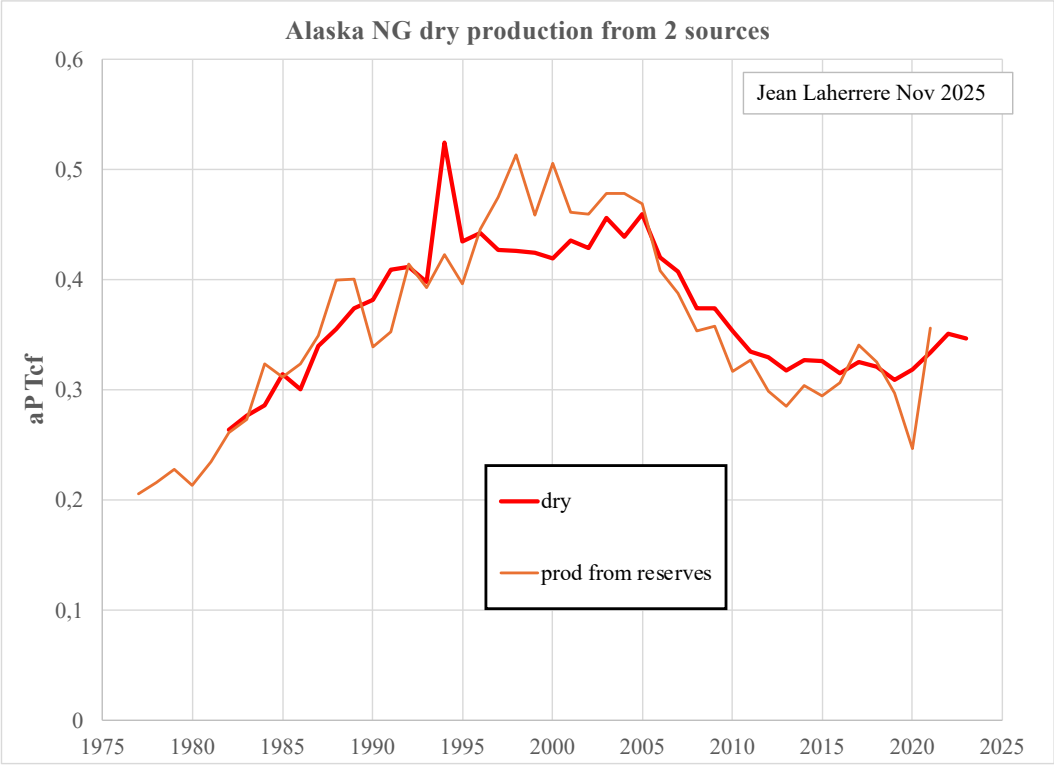
This 31 Tcf ultimate is compared with CP+1P which jumped suddenly in 2021 to over 140 Tcf
The site https://agdc.us/alaskas-lng-project/alaskas-natural-gas-supply/ reports *The North Slope contains approximately 35 trillion cubic feet of proven natural gas reserves, and a potential resource of another 200 trillion cubic feet of natural gas. Advancements in drilling technology will allow tapping of an additional 590 trillion cubic feet of shale, tight gas, and gas hydrates.* It looks quite a promotion publicity! Gas hydrates are not concentrated see my 1999 paper https://www.energycrisis.com/laherrere/hydrates/ « Oceanic Hydrates: an Elusive Resource » Part 1: "Gas Hydrate, Uncertain resource size enigma" Offshore, August 1999, p140-141,160-162, Part 2: "Data shows oceanic methane hydrate resource over-estimated" Offshore, September 1999, p156-158 http://www.hubbertpeak.com/laherrere/hydrates/

As the best fit is very unreliable, a round ultimate of 30 Tcf is chosen with a peak in 2030, giving a curve not far from AEO2025 up to 2035, but declining faster but in line with the NG decline 2005-2013. CP+1P (purple) jump in 2021 looks much too high!



Alaska Gasline Development Corpo writes: *The North Slope contains approximately 35 trillion cubic feet of proven natural gas reserves, and a potential resource of another 200 trillion cubic feet of natural gas*
EIA confuses proven and potential!

Alaska data looks unreliable; the difference for NG dry production from DPR and reserves data is significant for the period 1997-2001!

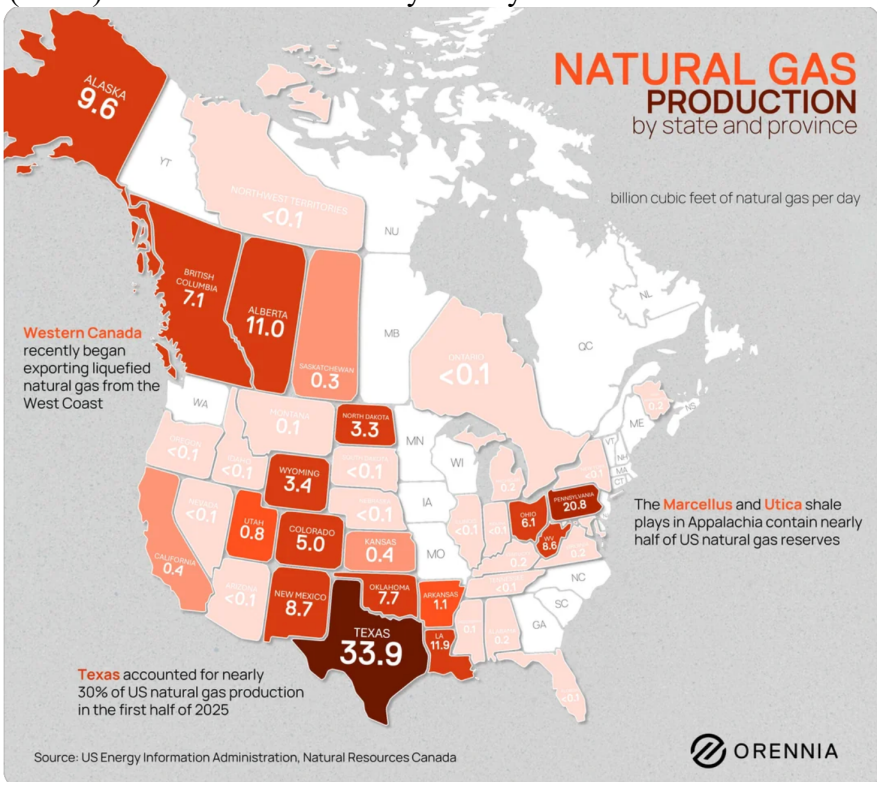


Discrepancy looks natural in the USL48 with many oil and gas fields and many State policies, not in Alaska with few fields and on state policy!

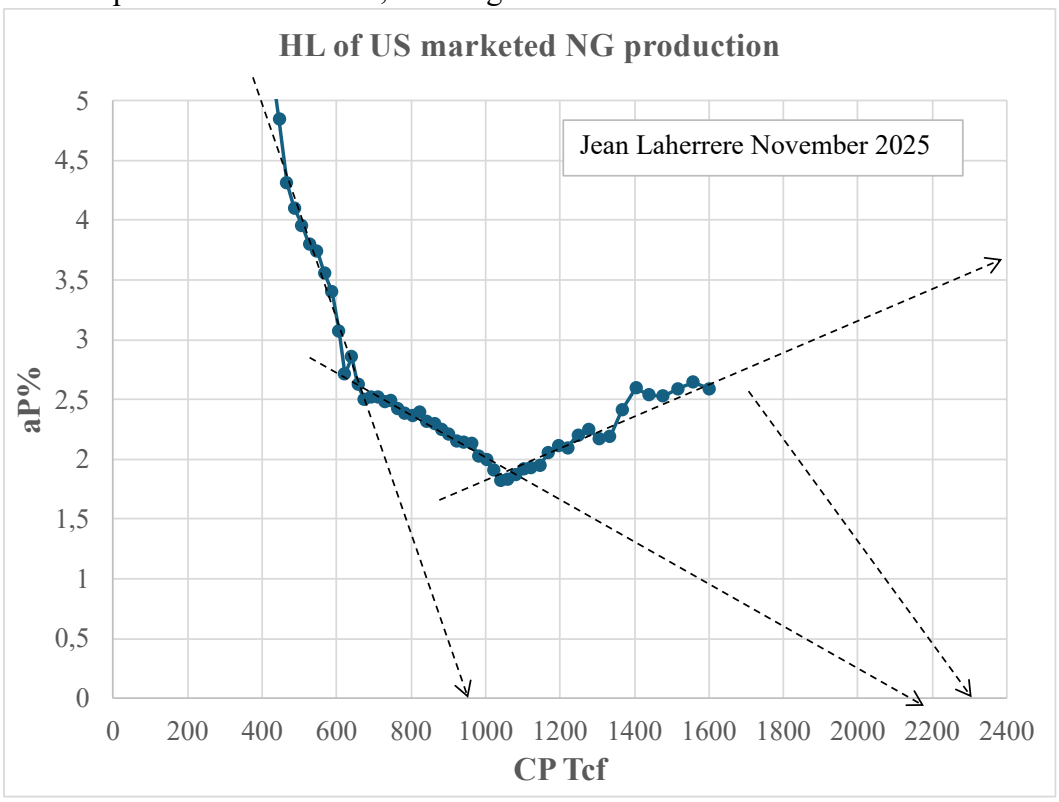
-US NG

US NG production by State from

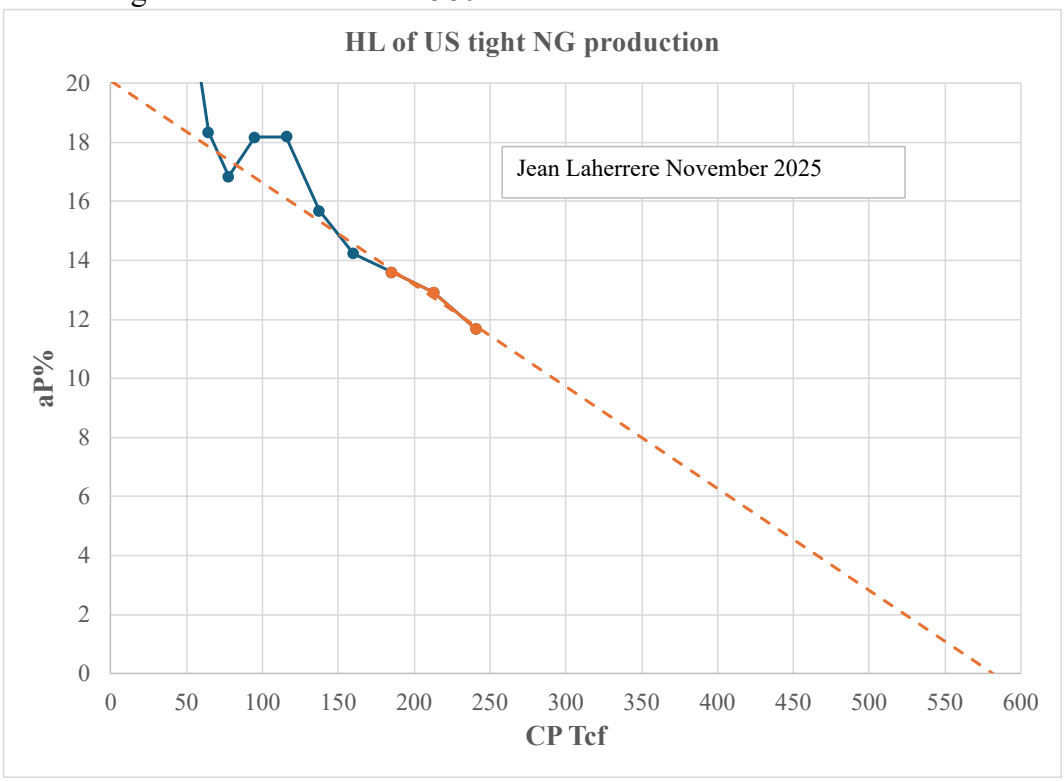
https://www.reddit.com/r/dataisbeautiful/comments/1mwex88/north_american_natural_gas_production_by_state/ the largest State NG producer (Gcf/d) is the Texas followed by Pennsylvania and Alaska



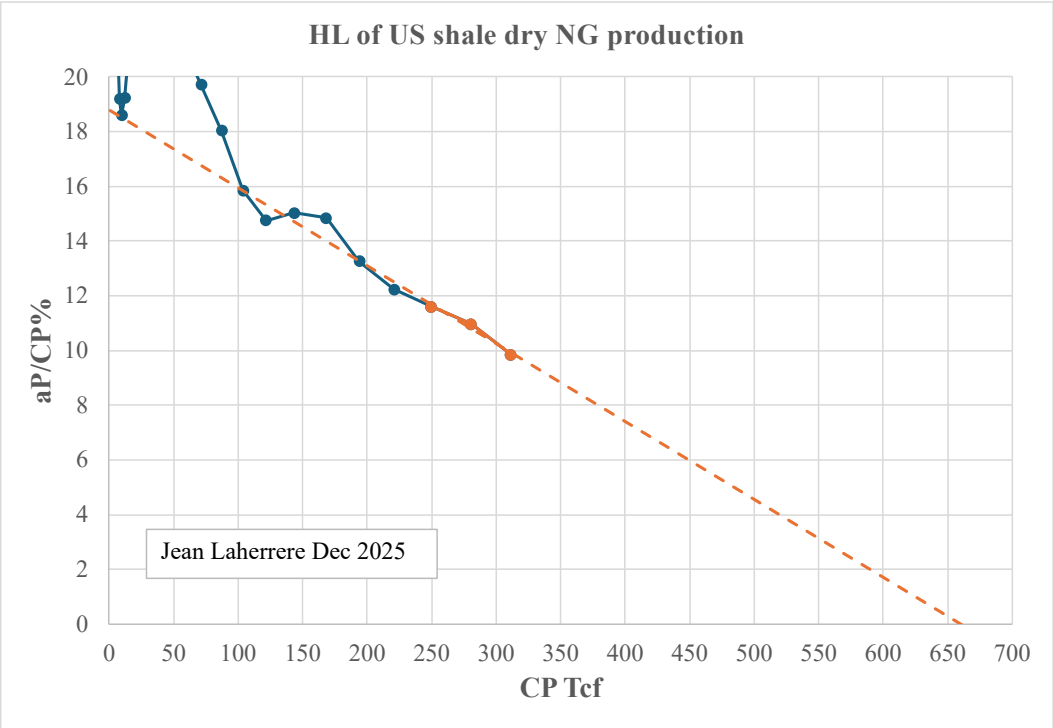
HL of US NG production is useless, trending towards infinite



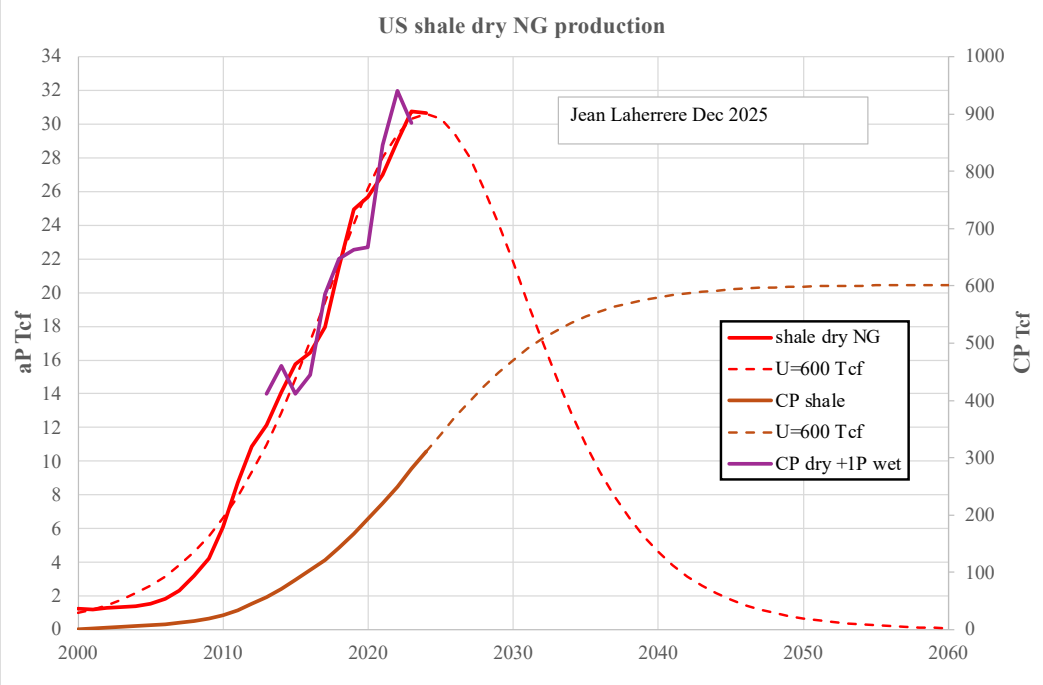
But HL of US tight NG trends towards 580 Tcf



But HL of US shale NG dry trends towards 660 Tcf

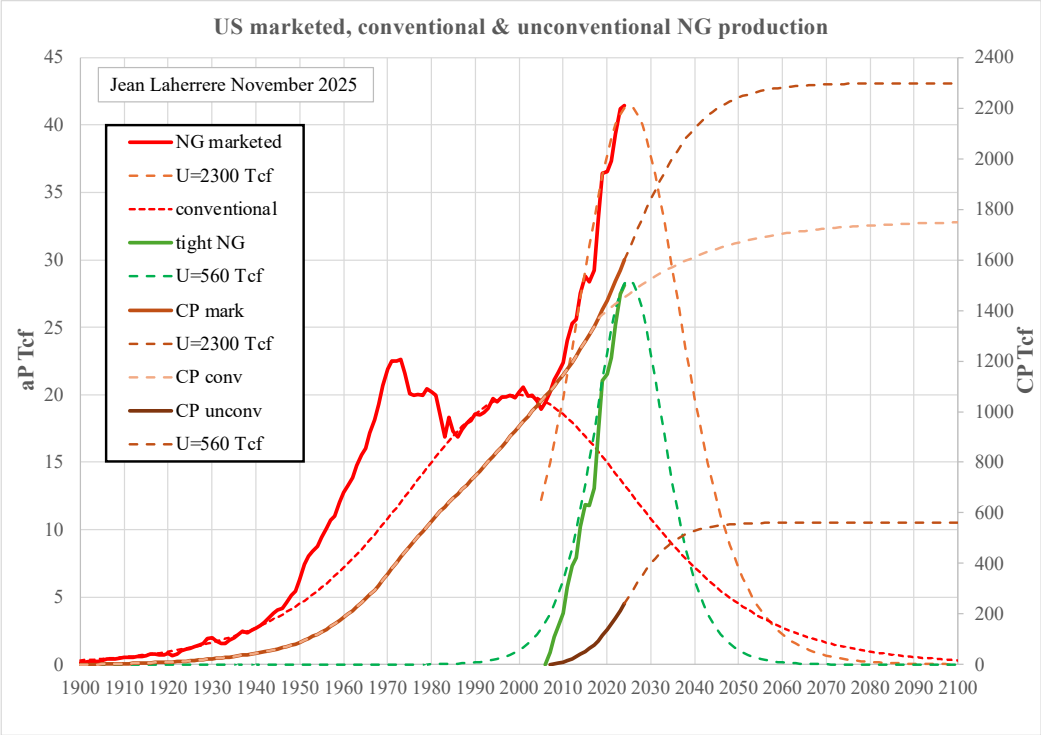


But a best fit of 600 Tcf for shale dry gas production is displayed, but CP+1P is well over at 900 Tcf

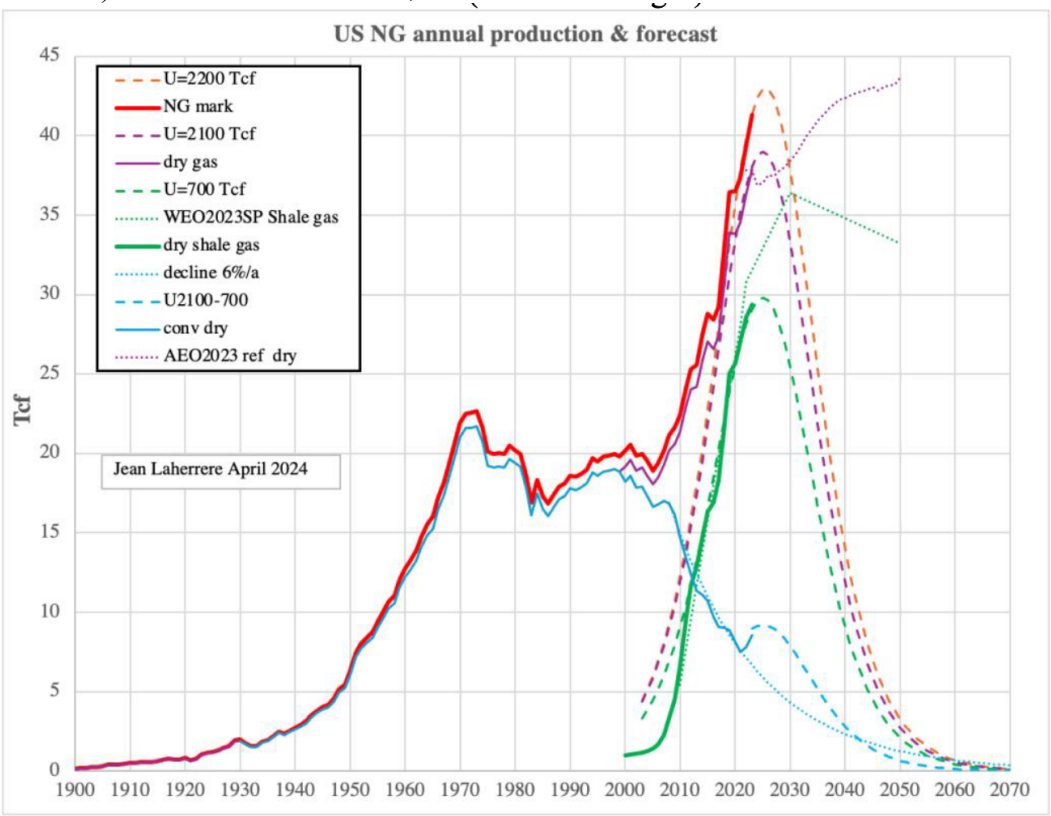


It is obvious that the unconventional NG production as tight or shale is badly reported

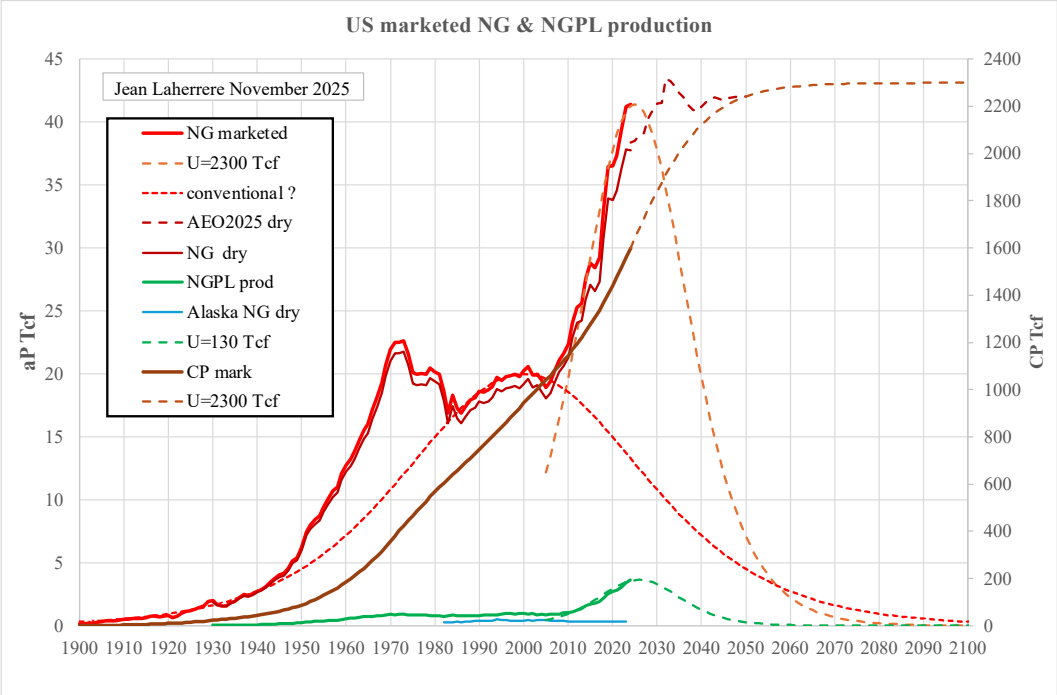
By best fitting ultimates of 560 Tcf and 2300 Tcf are estimated for tight NG and NG marketed, giving a peak in 2025.
NG production from 1985 to 2005 peaks in 2000 and could be considered as the conventional NG with an ultimate of about 1750 Tcf.



In April 2024 my estimate was slightly different (also as dry gas is compared with marketed=wet) with 700 and 2100 Tcf, when 2300 Tcf



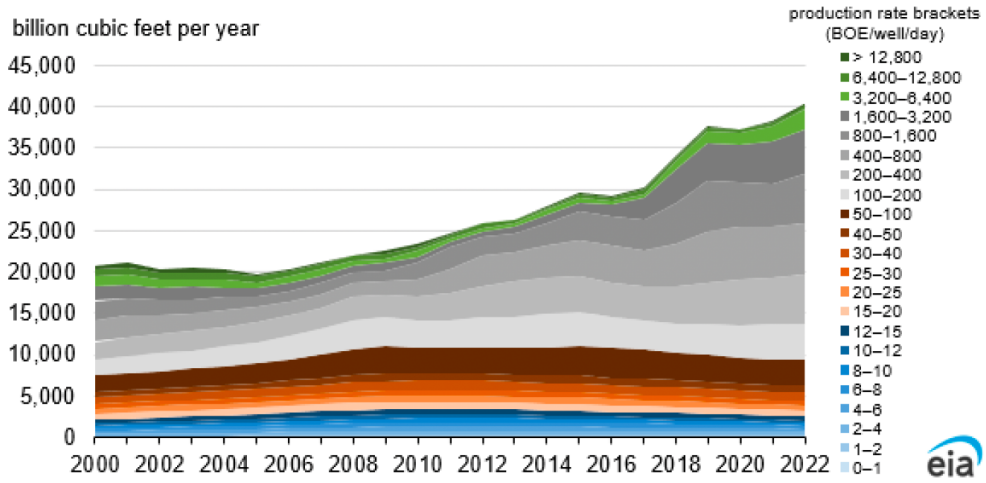
For an ultimate of 2300 Tcf US NG production is peaking now and in 2050 will produce 7 Tcf when AEO2025 forecasts 42 Tcf!



Alaska NG production is negligeable, compared with USL48!

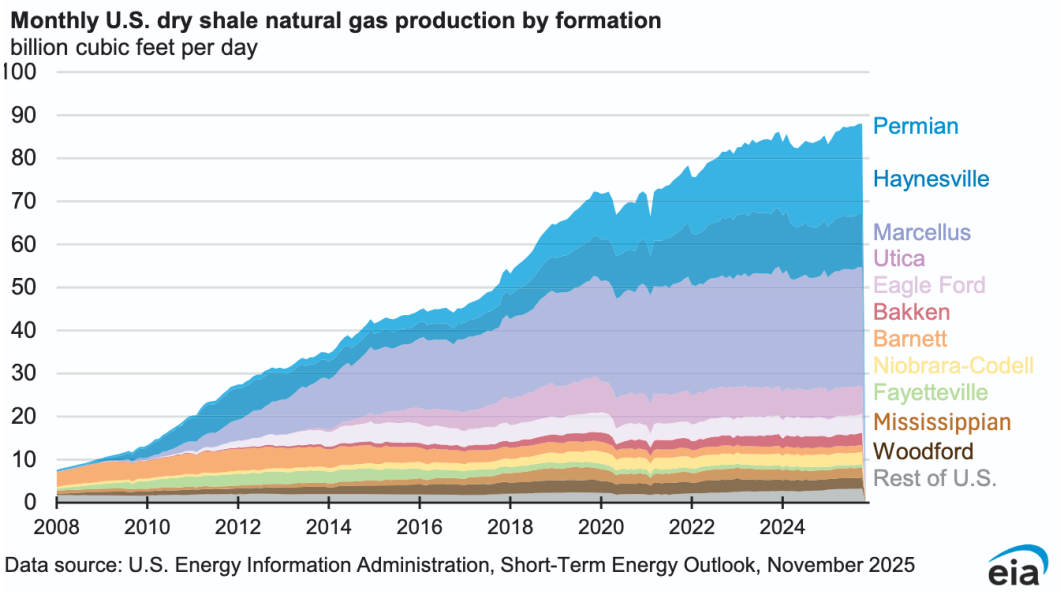
EIA displays this graph of US NG production from wells by production rate brackets: The low production wells (dark brown) peaked in 2015, when the high production wells increase since 2010!

Figure 4. Natural gas production from U.S. wells by production rate brackets



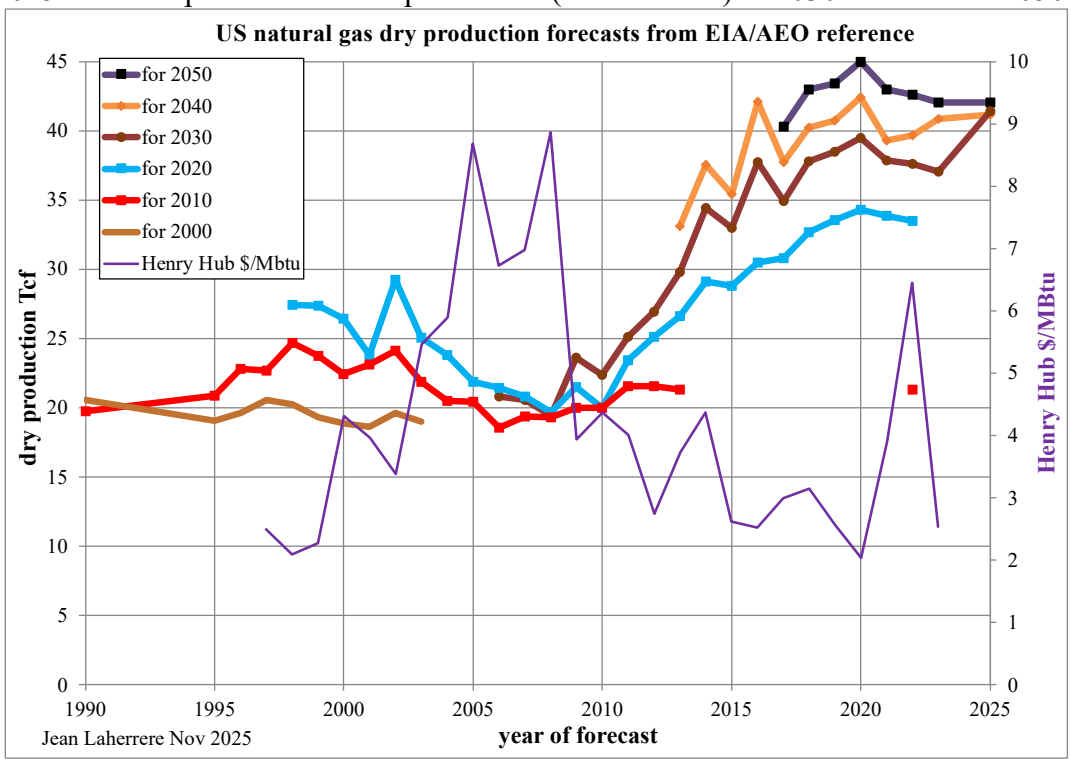
Data source: U.S. Energy Information Administration and Enverus
Note: BOE=barrels of oil equivalent

EIA graph 2008-2026 dated November 2025 on NG shale production showing production still growing in 2026 in line with AEO2025

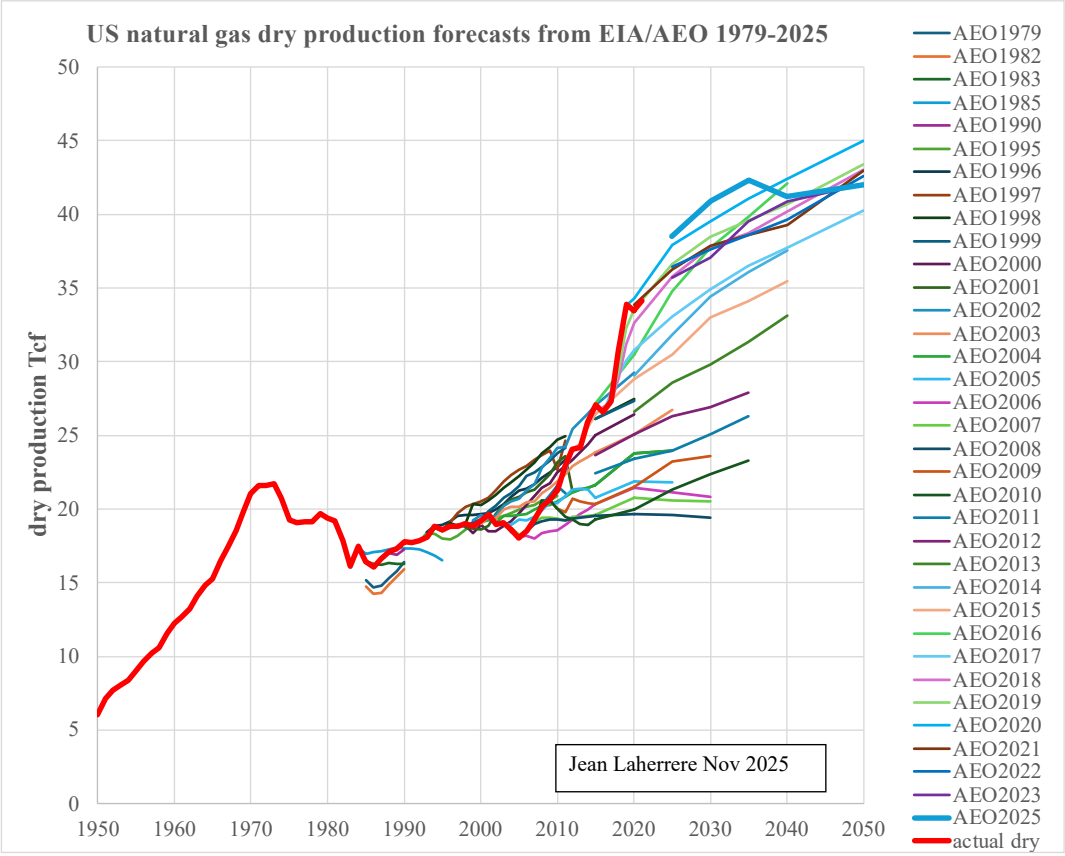


-EIA AEO forecast evolution

AEO2025 is more optimistic for NG production (brown curve) in 2030 and less for 2050!

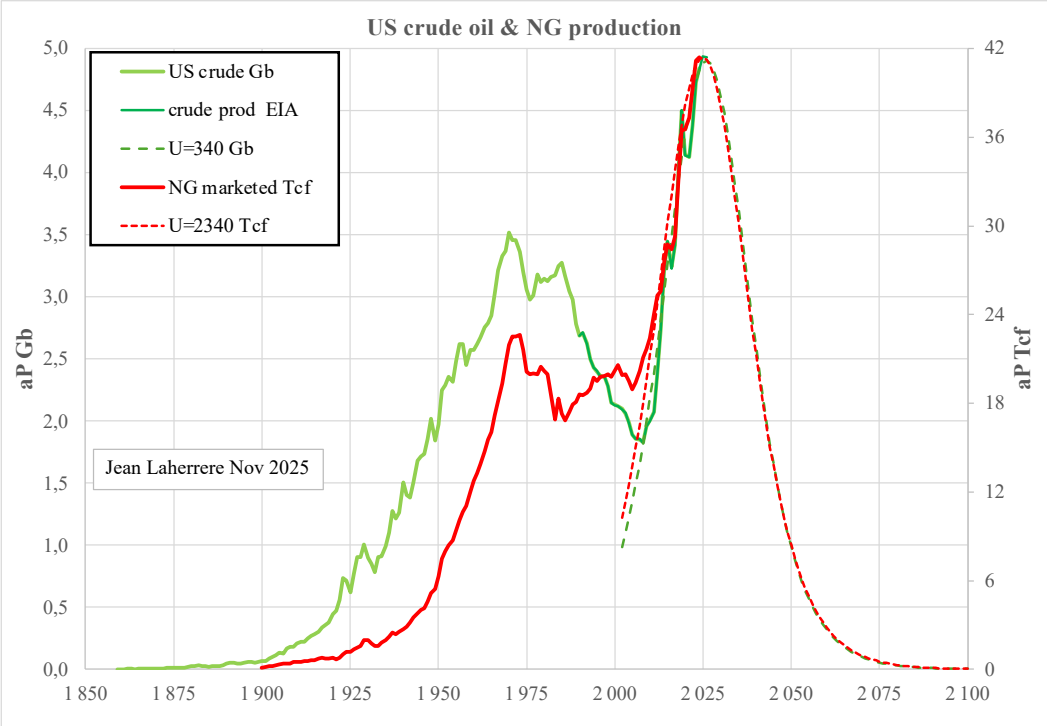


The display of EIA/AEO dry NG production from 1979 to 2025 shows that **EIA was not very good in their past forecasts, meaning that their future forecasts could be also bad!**



-oil & NG production & forecast in volume

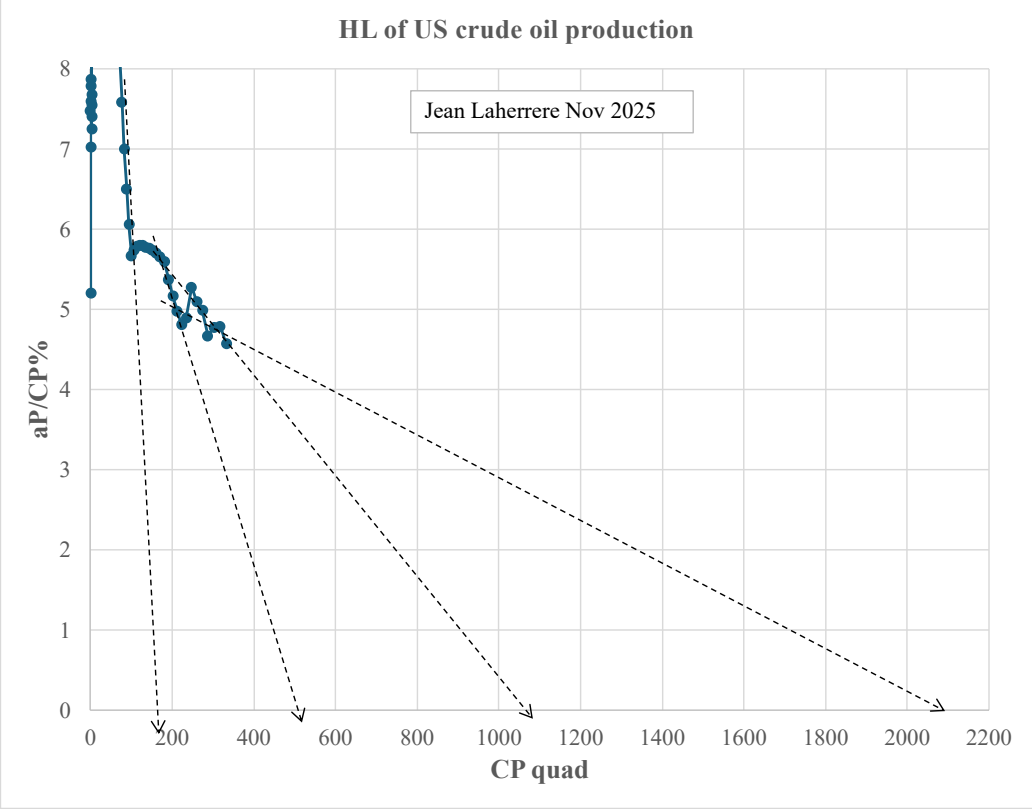
Oil and NG production are in line since 2008 as their forecasts: both peaking now and declining the same way! It is fascinating to find such similarity within oil and natural gas in the US, but it is not the case for the rest of the world!



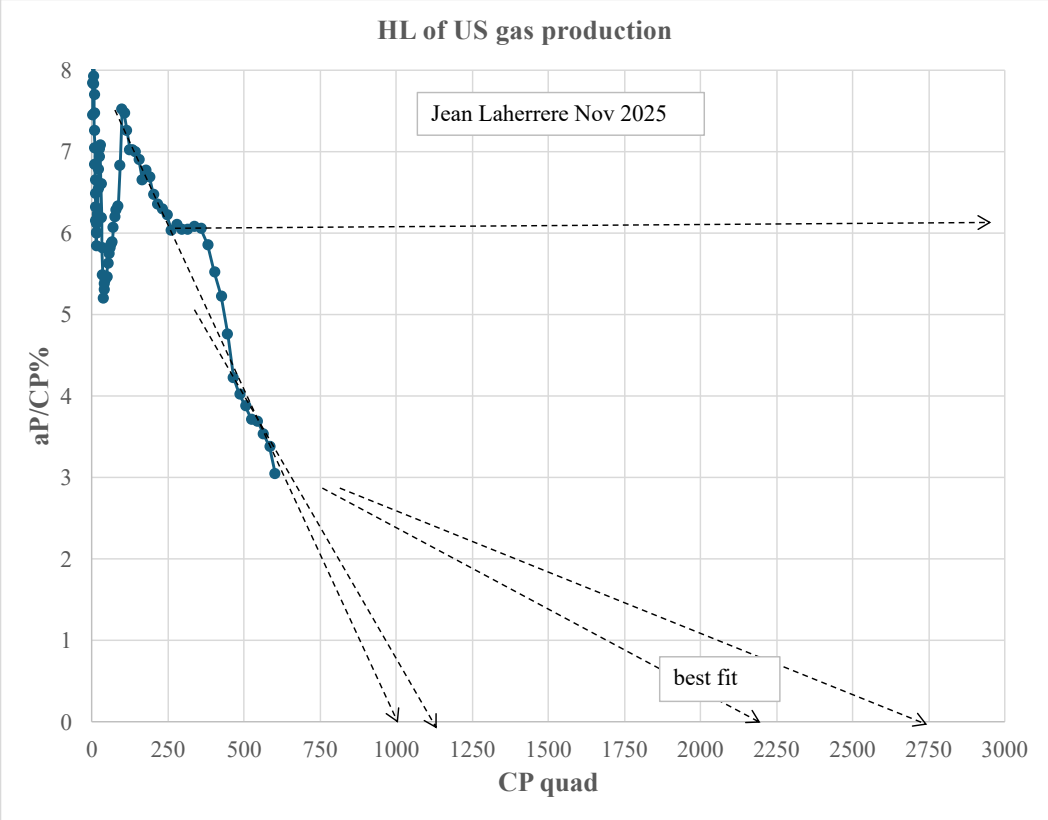
In 2050 oil production will be as in 1935 and NG production as in 1955!

-production in energy = quad

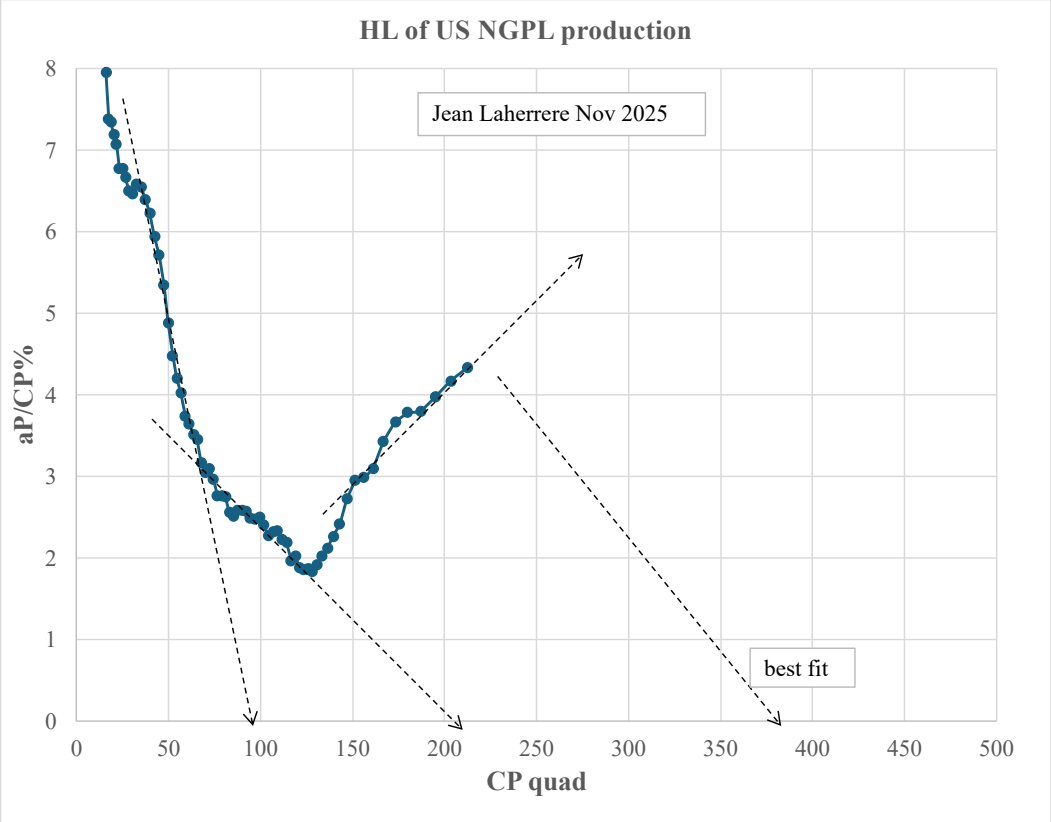
HL of US crude oil production is hard to extrapolate, towards either 100 quad or 2000 quad



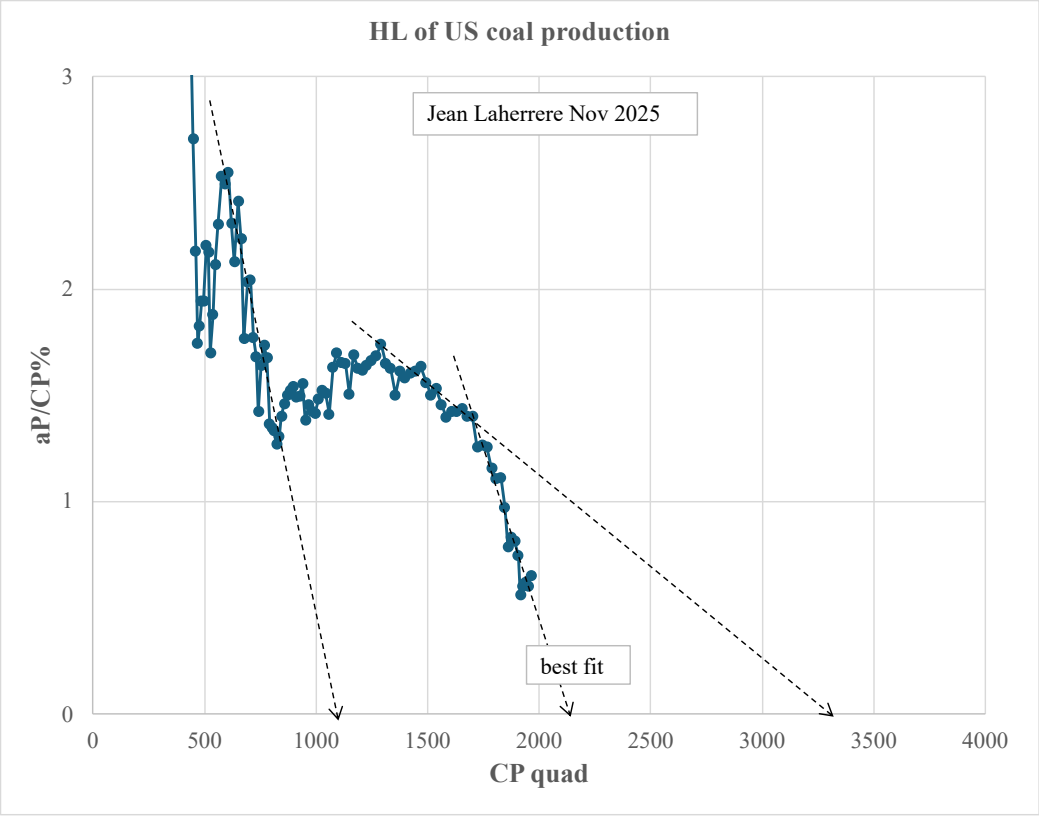
HL of US gas production trends towards about 1000 quad



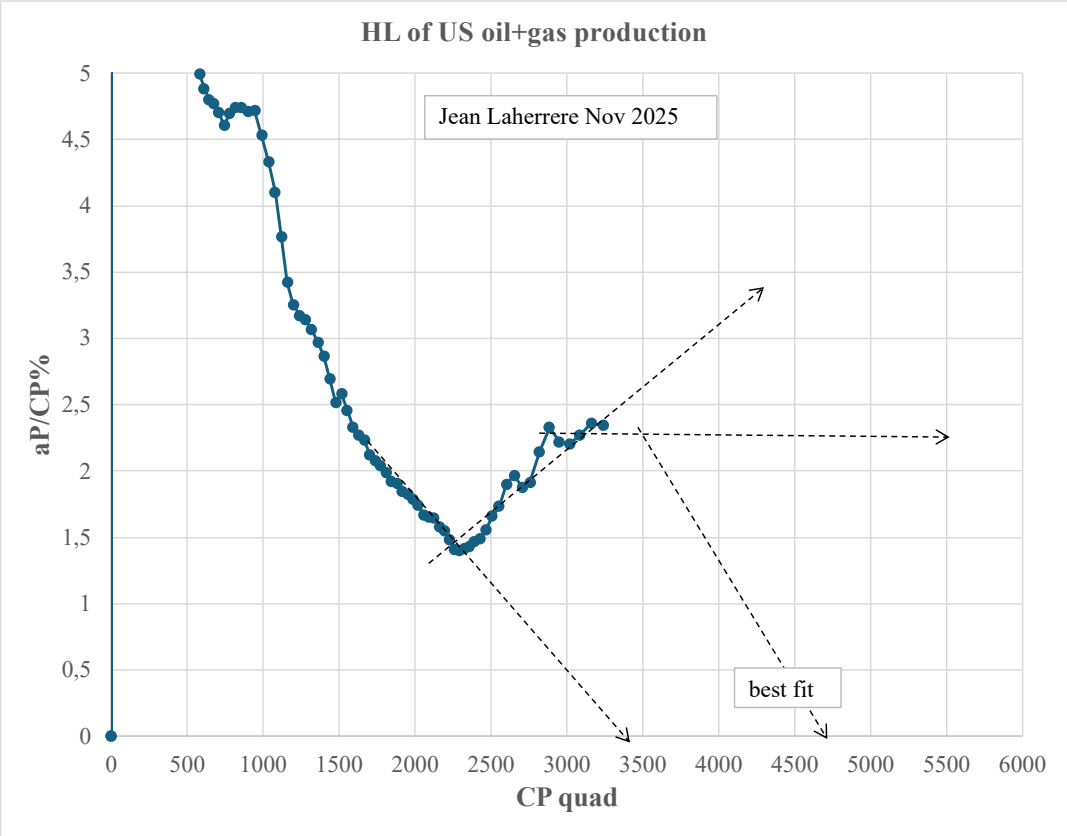
HL of US NGPL production trends towards infinite



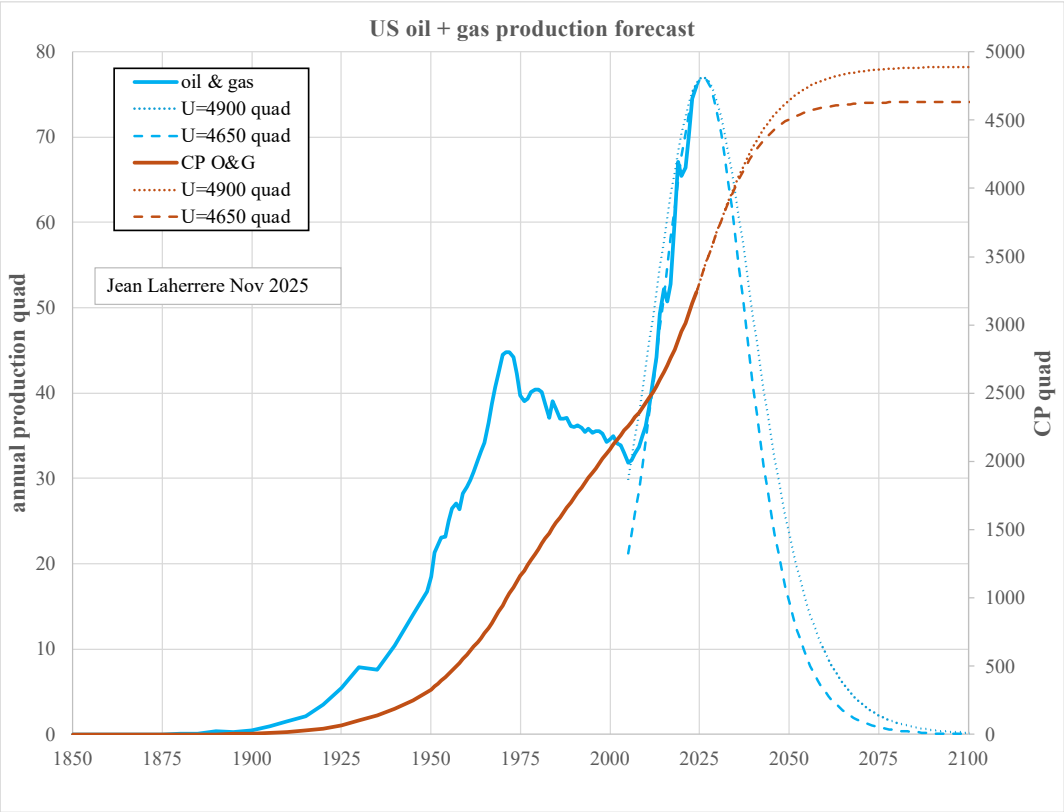
HL of US coal production trends towards 2100 quad



HL of US oil+gas production trends towards infinite

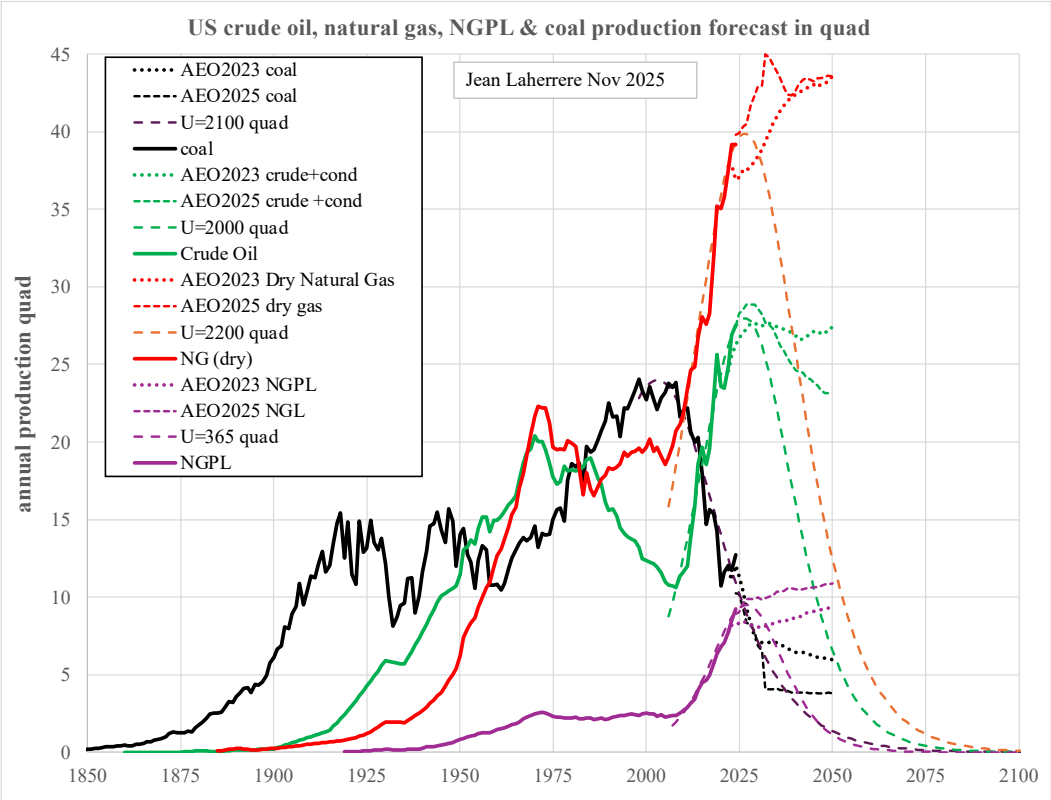


US oil+gas production is forecasted (best fit) with 4650 quad ultimate, with a peak in 2026 and a sharp decline: in 2050 production is forecasted to be equal to 1950!



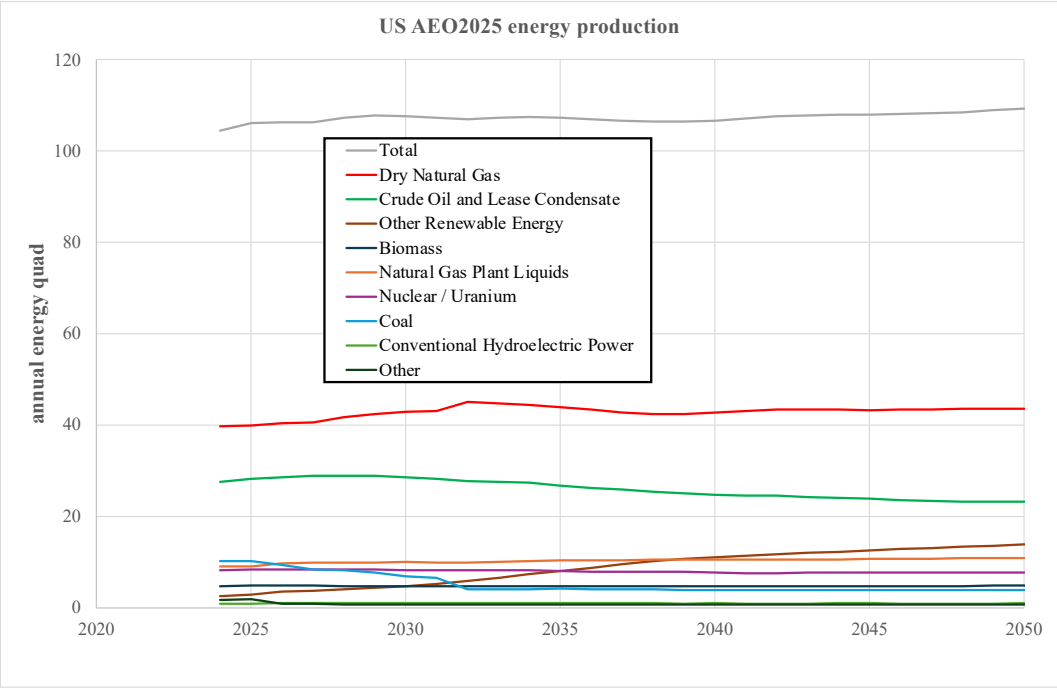
A 4900 quad ultimate is also displayed not far from 4650 quad!

My forecast on fossil fuel is compared with EIA forecasts AEO 2023 and AEO 2025

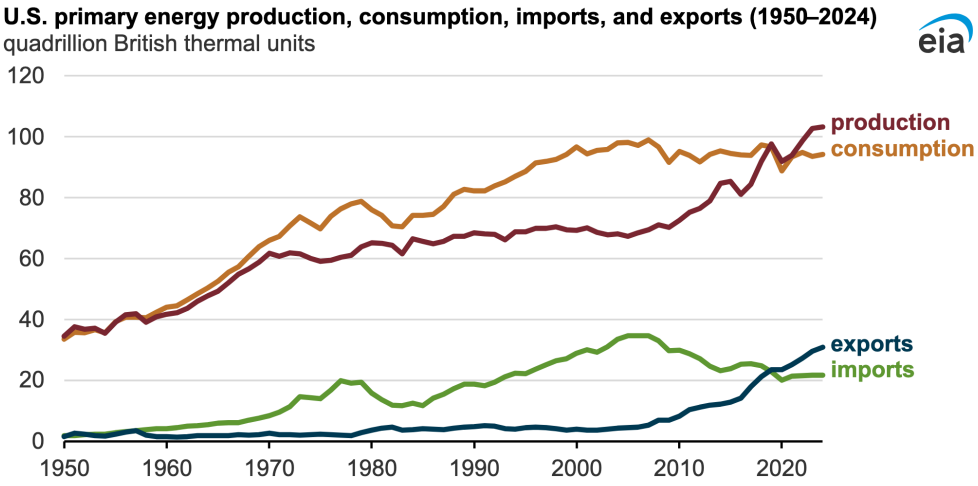


In 2050 EIA forecasts US NG production climbing at 43 Tcf when my forecast is only 13 Tcf

AEO2025 forecasts a decrease in crude production and a small increase in NG, the main increase is “other renewable”!

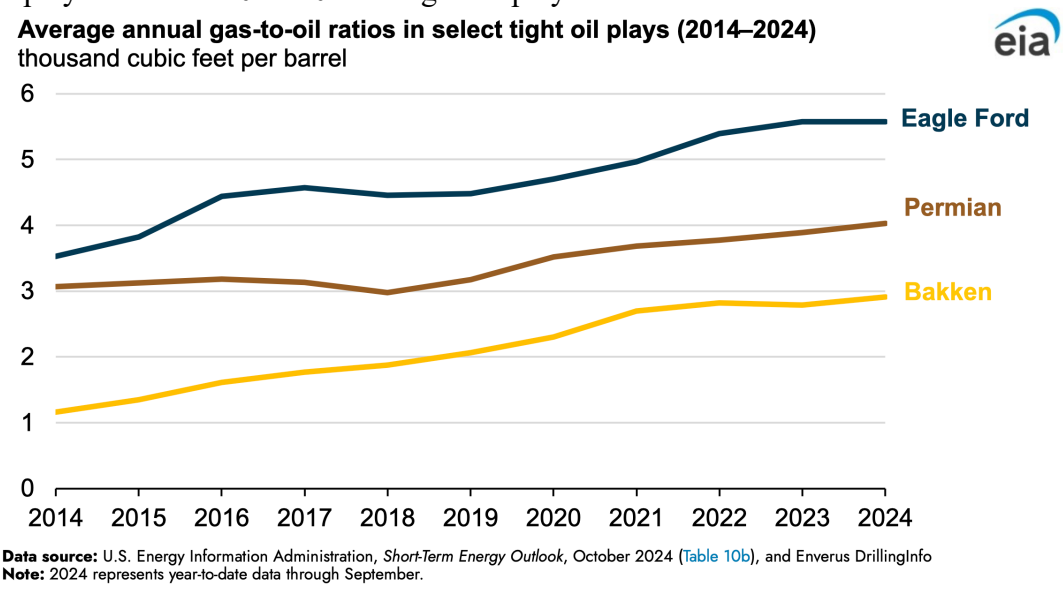


US production was lower than consumption up to 2022, in 2024 US exports energy, but it could be for a short time!



-Gas to oil ratio = GOR

EIA displays the GOR 2014-2024 of tight oil plays



Eagle Ford is gassier than Bakken, Permian in the middle!

GOR is increasing

-comparison with previous study

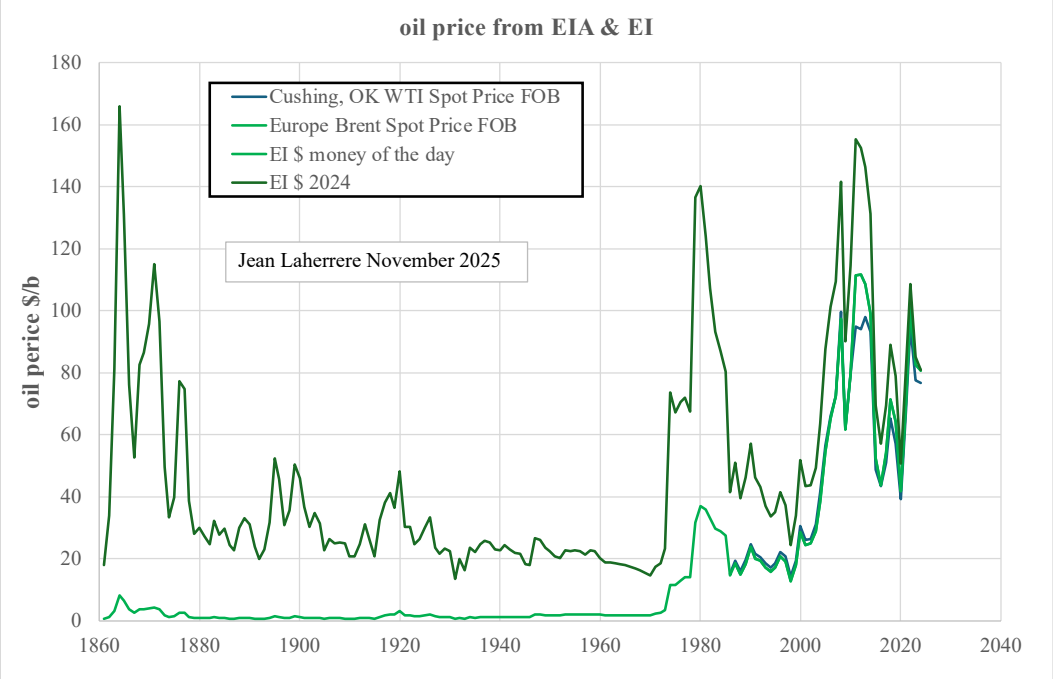
Six months ago, in May 2025 I published: "US crude oil and natural gas production update 2025" https://aspofrance.org/2025/05/12/us-crude-oil-and-natural-gas-production-forecast-2025-update-jean-laherrere-12th-may-2025/

The comparison of the data estimates is below:

US	aP24	CP24	CP22+1P	ultimates	ultimates	ultimates	ultimates	ultimates	ultimates	ultimates
unit	Gb	Gb	Gb	Tcf	Gb	Gb	Tcf	Tcf	quad	quad
date				Ap 2024	May 2025	nov-25	May 2025	nov-25	May 2025	nov-25
crude	4,8	253	292		370	340	370	560		2000
LTO	3,3	29			80	70				
NGL						94				
NGPL								130		365
NG mark				2200				2300		
NG dry				2100					2100	2200
NG tight				700				560		
coal										2100
oil+gas								4650		4650
Alaska						25		30		
GoM						28		200		

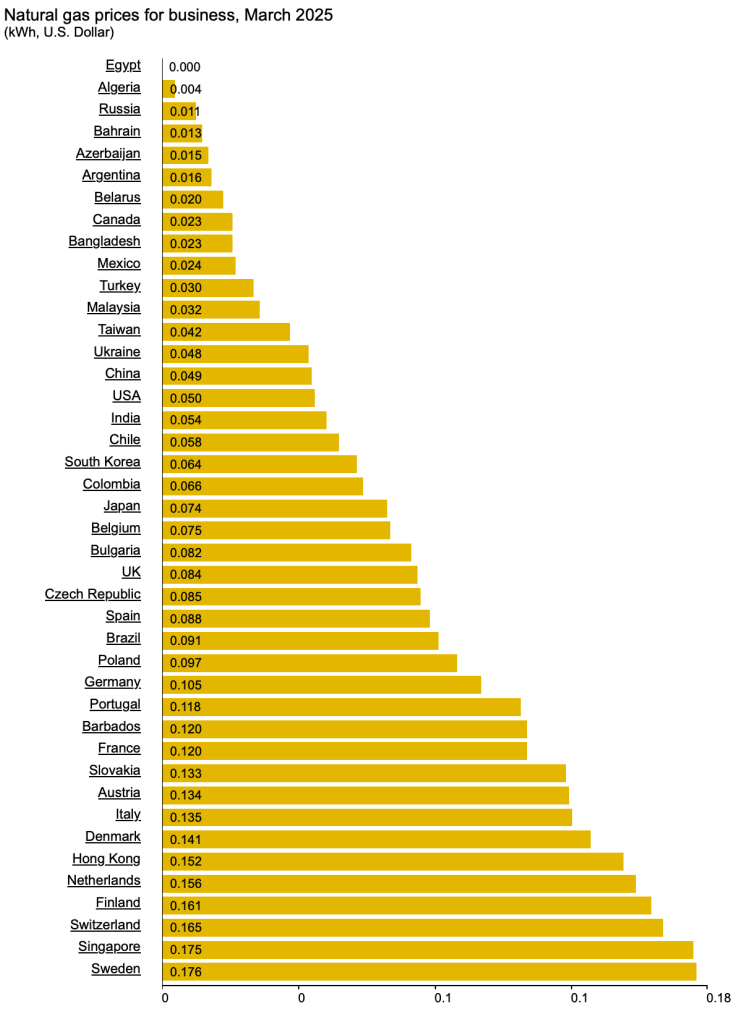
-oil and gas price

Oil price in money of the day and $2024

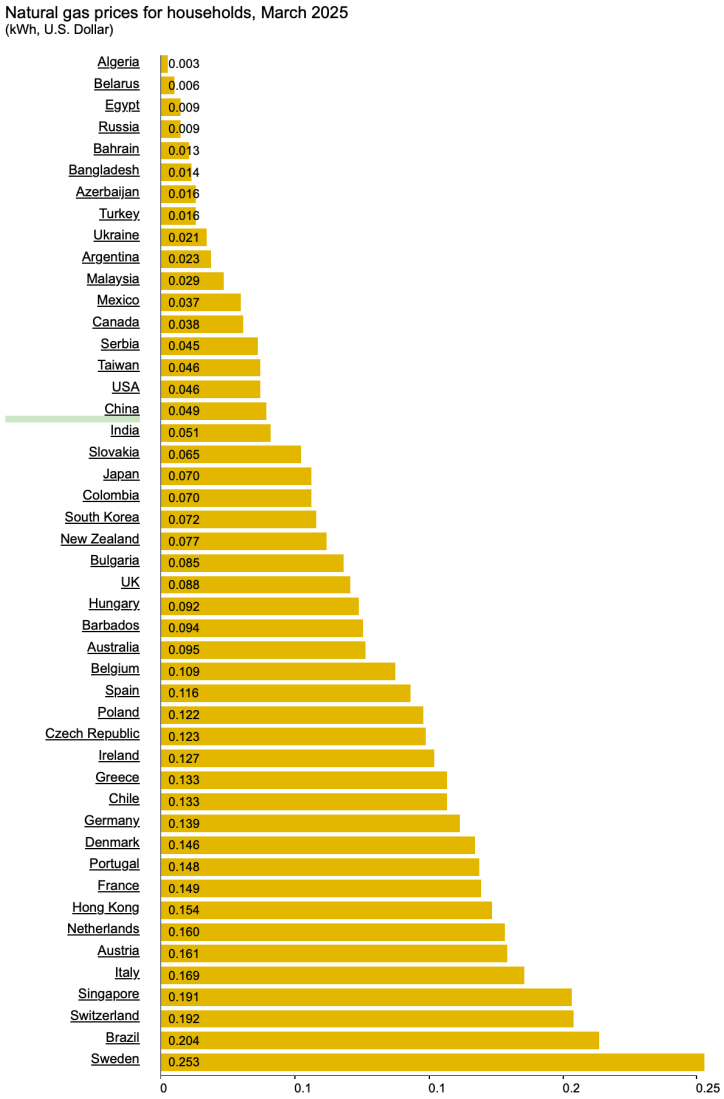


In 1864 oil price was 164 $2024/b= double of 2024 price!
In 1980 oil price was 140 $2024/b more than double of today oil price!

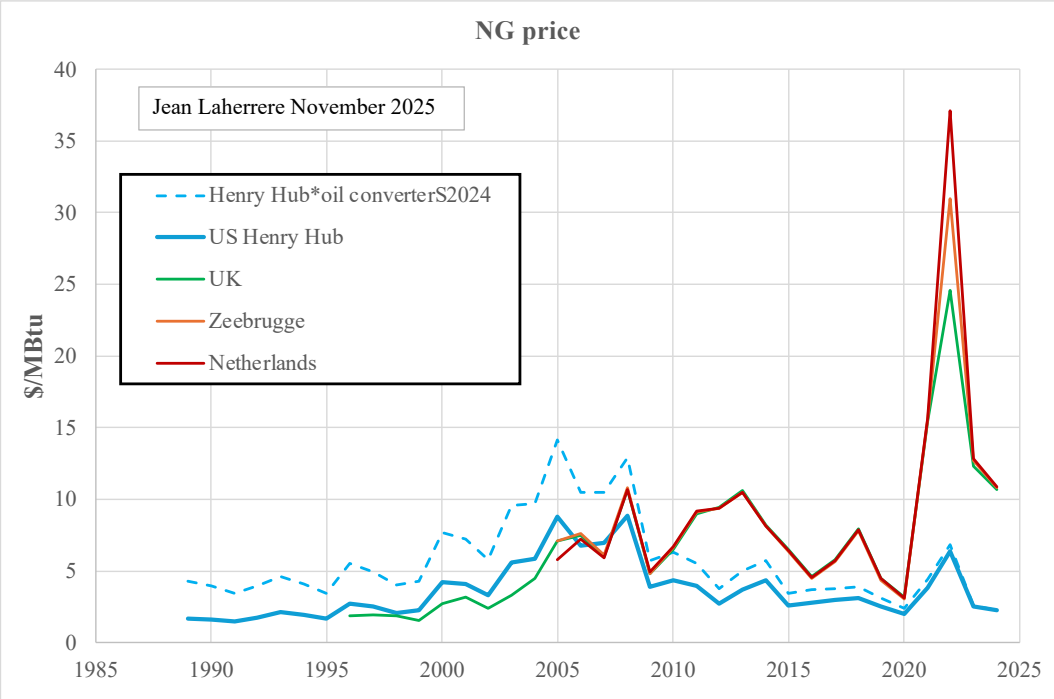
NG price
In 2025 NG price for business and for household is reported by
https://www.globalpetrolprices.com/natural_gas_prices/
and the range is huge from 0.000 $/kWh in Egypt to 0.176 $/kWh in Sweden for business with 0.050 $/kWh for the US (rank 16th)



from 0.003 $/kWh in Algeria to 0.253 $/kWh in Sweden for households with 0.048 $/kWh (rank 16th) for the US



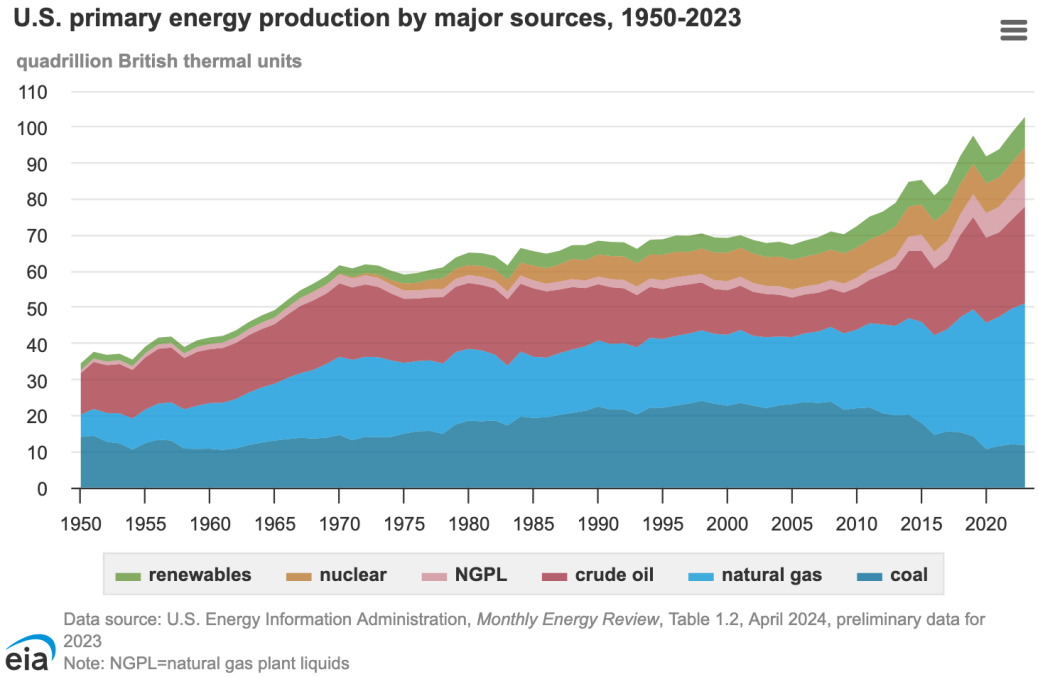
NG price is displayed 1984-2024 for Henry Hub in US, UK, Belgium and Netherlands, Henry Hub is reported in $2024 using EI oil converter
Henry Hub is worth 2.2 $/kWh in 2024 but 4.3 $2024/kWh
NG price is declining, worth in 2005 8.8$ or 14 $2024/kWh



In 2022 NG price jumped in the world except in the US!

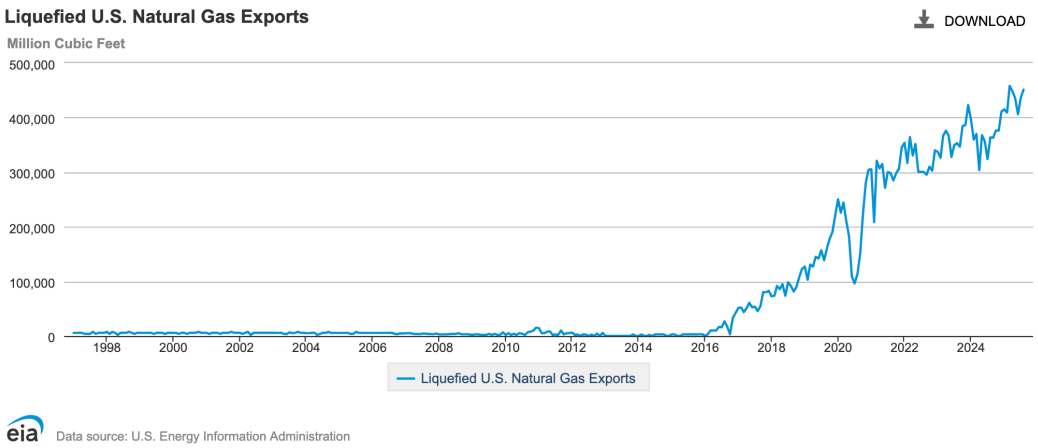
Since 2022 US gas price is four times lower than in the rest of the you

The US using NG for about one third of the energy has a huge energy advantage compared with the rest of the world: when is the end of US cheap natural gas?

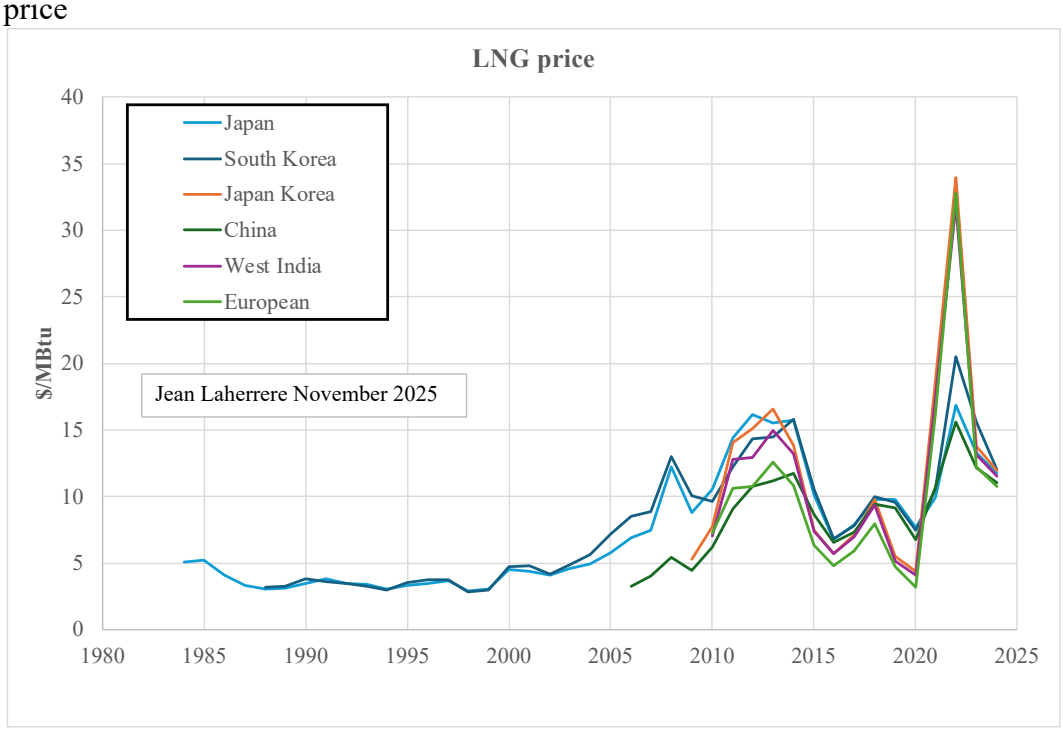


-LNG = Liquified Natural Gas:

US LNG export started really in 2016, today at 0.45 Tcf



LNG price



After a sharp burst in 2022 LNG price is in 2024 as in 2014!

-conclusion

US oil production data is reported by EIA from estimates, and some data could be poorly reported. Then EIA data is poorly reliable!

GoM data reported by BOEM looks more reliable coming from fields real data, but the data changes also with time for the dates of GoM fields! It is very disappointing!

Modelling is based on symmetry of future decline with past increase, based on the large number of fields and producers and by the past production of US less Alaska + GoM + LTO.

Thanks to hydraulic fracking, since 2008 oil and NG production are bursting but, after peaking now, their decline will be as sharp as their increase.

In 2050 oil production will be as in 1935 and NG production as in 1955!

EIA forecasts are more optimistic than mine.

President Trump' claim: "drill baby drill" will not succeed in fighting the coming US oil sharp decline.

US NG price is four times cheaper than the rest of the world = huge advantage!