Jean Laherrere 17 February 2025

ASPO France

# Forecast of world and US energy production

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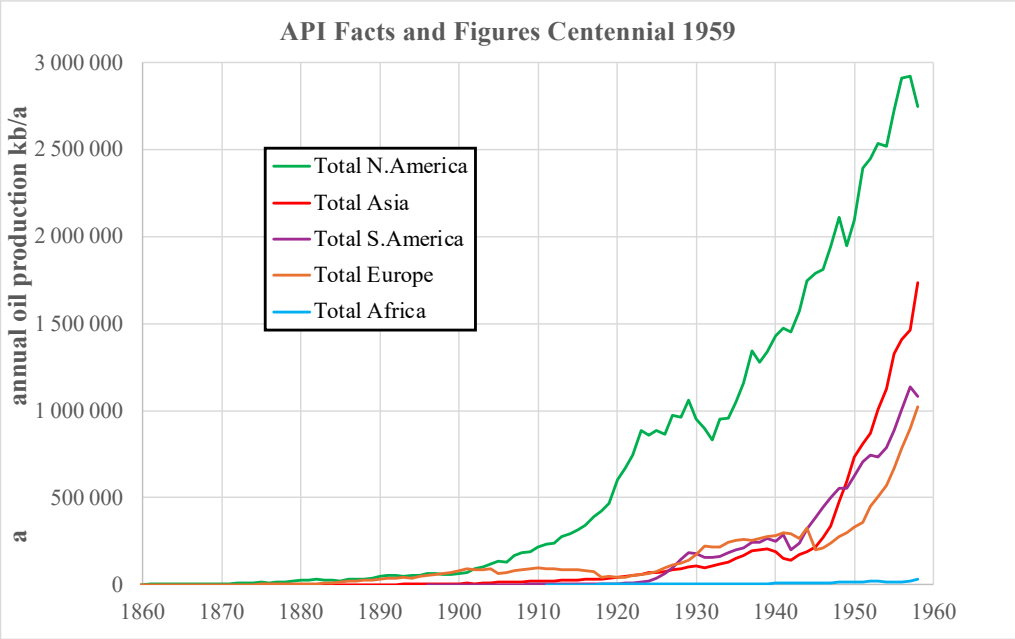
## -world

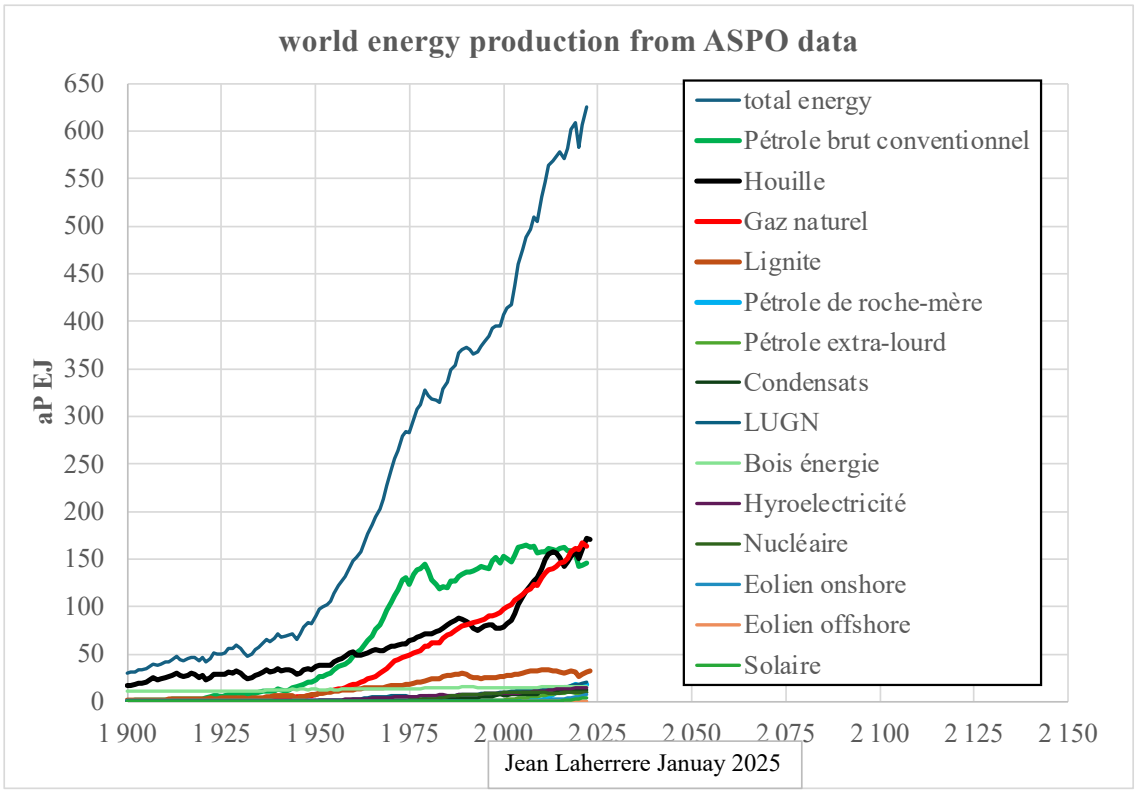
This paper uses ASPO data which reports in French world energy production 1900-2023
Other energy data reports freely on a shorter period: OPEC ASB 1960-2023, Energy Institute 1965-2023, EIA international browser 1973-2023, IEA browser 1990-2022.
It is impossible on the web to find any historical series from national information agencies as EIA in US or INSEE in France.
API reported in 1959 the historical oil data 1857-1958 "Facts and Figures Centennial" showing that North America oil production was about twice the volume of Asia, South America and Europe, when Africa oil production was peanuts!



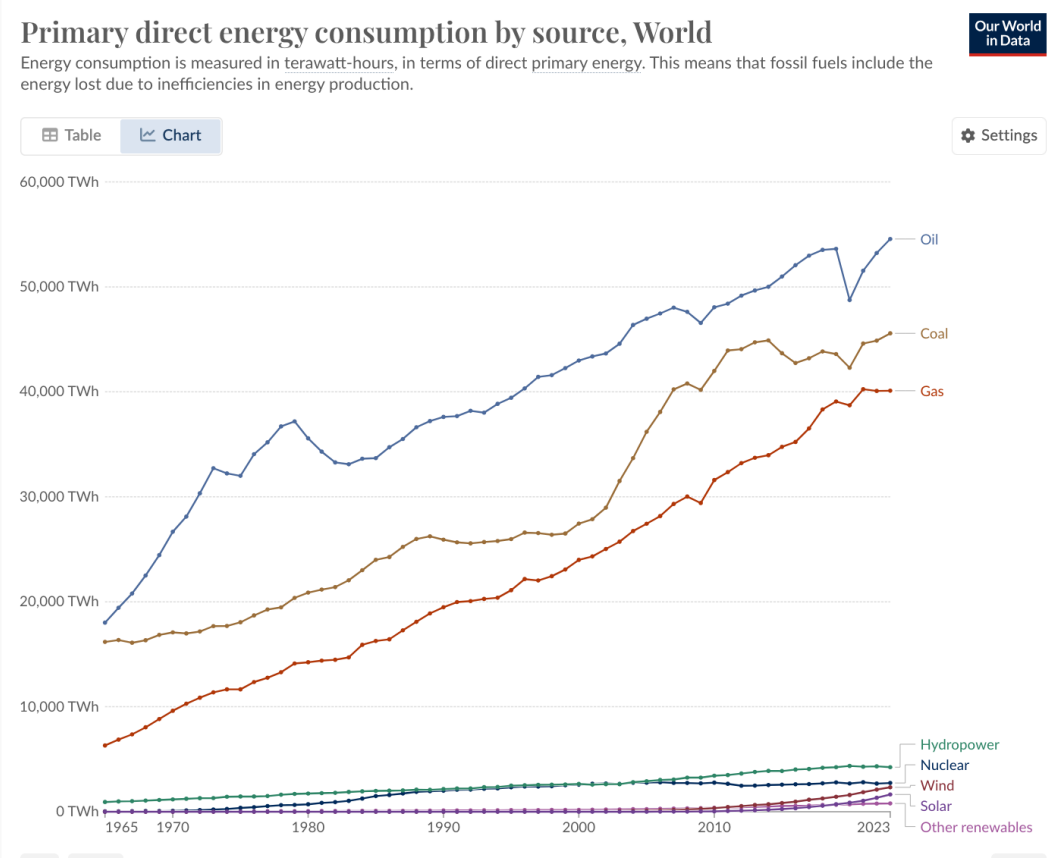

Scout companies (former Petroconsultants = IHS = S&P, Rystad) sell energy data, mainly exploration and production since 1947 with data by fields and by company and maps (updated every month).
Every country except US and Liberia buys gasoline by liter and use the SI = Systeme International of Units which rules the use of units. In France by law, you must use the SI units. SI is today used by 95% of the world population, but US oil barrel (world oil producers: in 2022 United States 14.7%, Saudi Arabia 13.2%, Russia 12.7%) and dollar prevail (64% of world debt is denominated in dollars)!
ASPO data is given with products titled in French: I will use them.
The unit is EJ = 10e18 joule
For large and varying units, it is convenient to use units that differ by 1000-fold: e.g. Joule, kilojoule kJ (10e3), megajoule MJ (10e6), gigajoule GJ (10e9), terajoule TJ (10e12), petajoule PJ (10e15), exajoule EJ (10e18), zettajoule ZJ (10e21), yottajoule (10e24).
E=exa=18=6x3 from hexa (=6) after removing the letter h, as P=peta=15=5x3 from penta (5) after removing the letter n, T=tera=12=4x3 (monster) from tetra (4) after removing the letter r, G= 9=3x3 from giga (giant) = 3, M =6=2x3 from mega (grand) and k = 3 from kilo (thousand).
The heat content of crude oil varies with field (as weight given in °API), the average varies with sources: Wikipedia barrel oil equivalent = 1 boe = 6 GJ = 5.7 MBtu. Investopedia 1 boe= 5.8 MBtu. EIA US crude oil barrel = 5.8 MBtu from 1950 to 2014, decreasing because LTO =5.717 in 2015 = 5.689 in 2023
Decimals are after either a dot (English) or a comma (French).

**-energy**

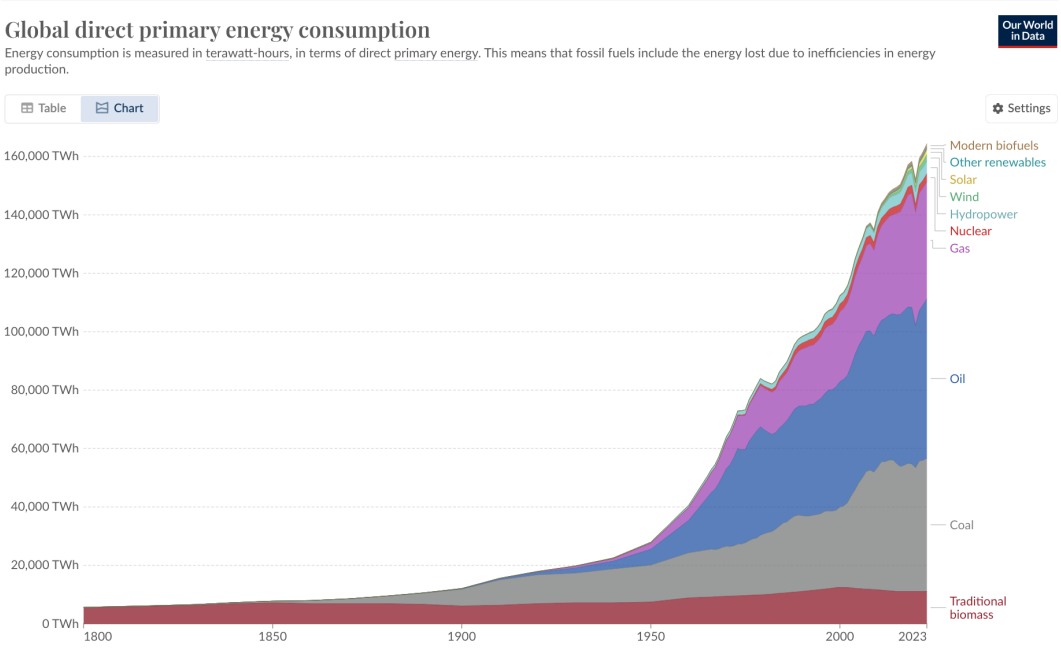
ASPO data reports world energy production in EJ from 1900 to 2023



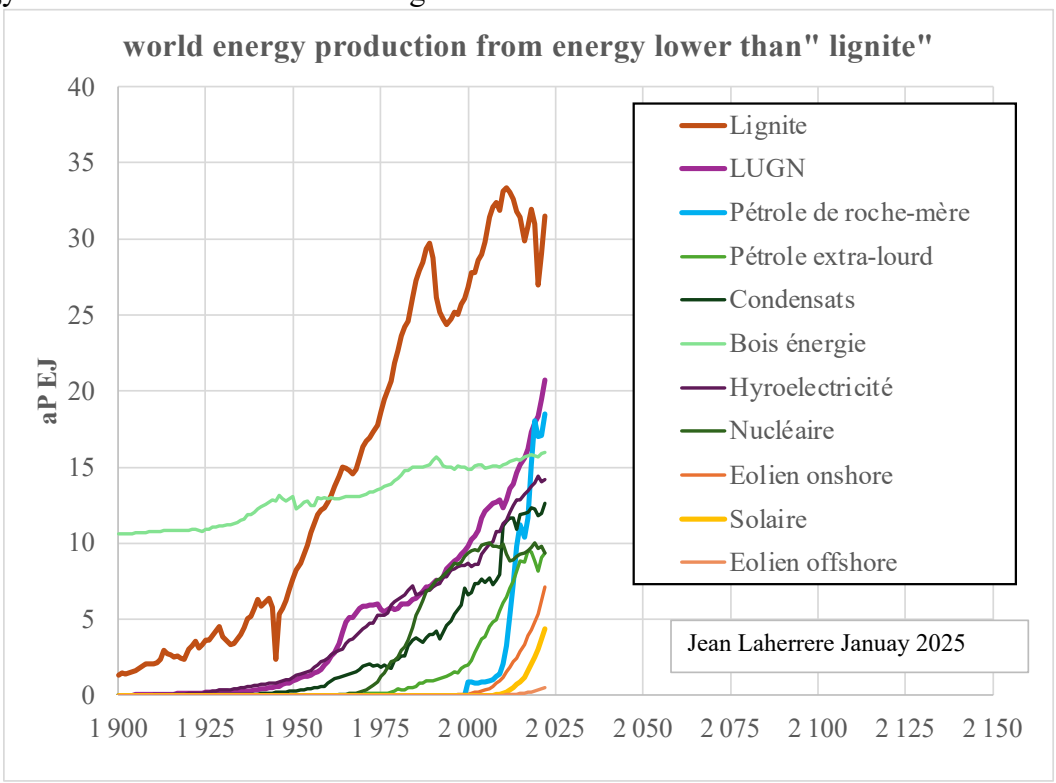

To be compared with "our world in data" consumption graph in TWh (0,0036 EJ) where oil (liquids) is the largest in 2023. The sharp increase since2003 in coal consumption comes from China.



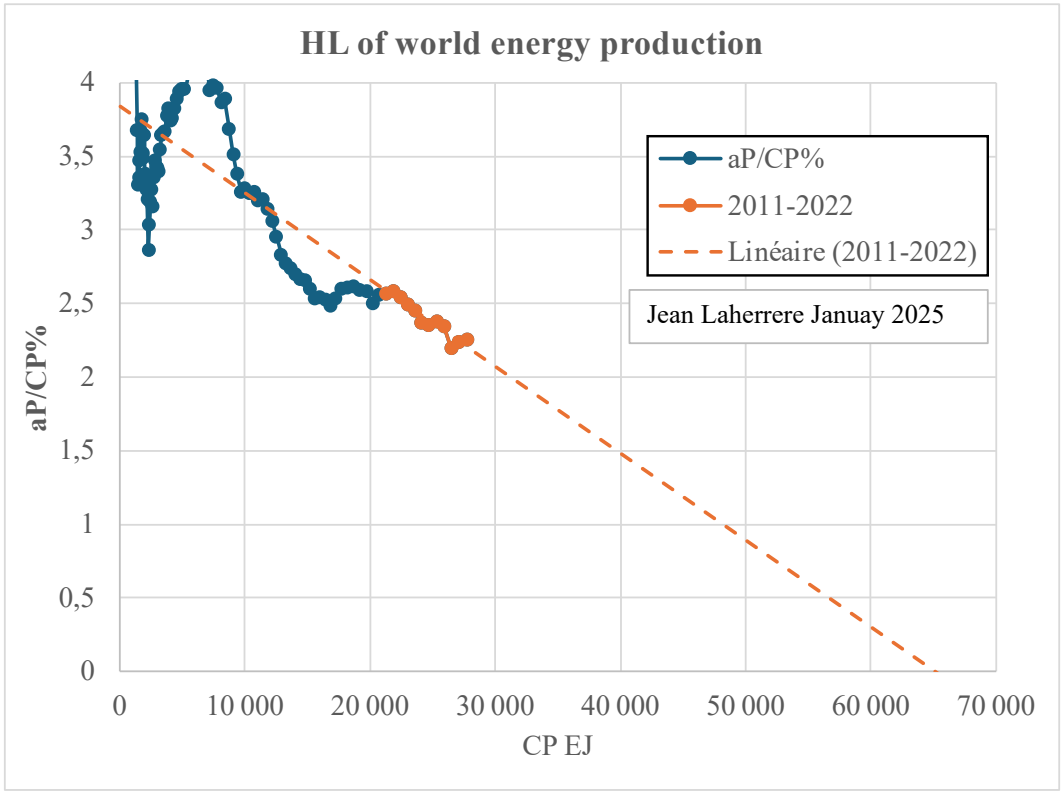

Same graph but cumulated.



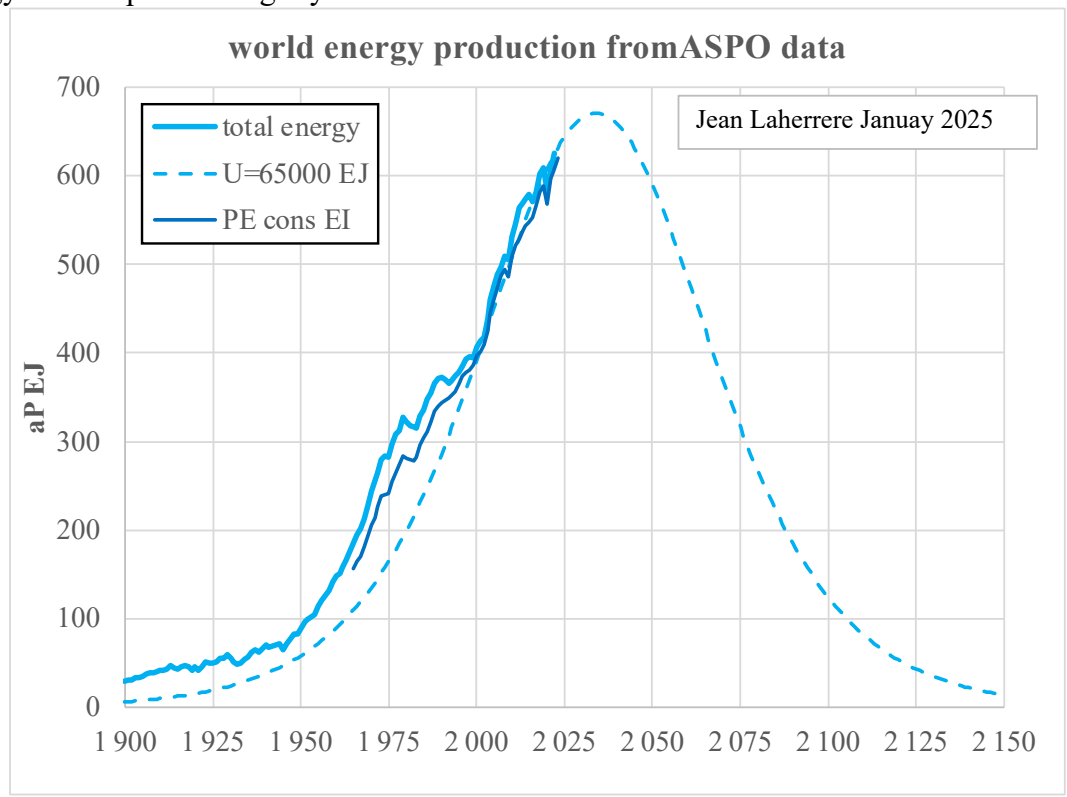

Energy sources that are lower than “lignite”



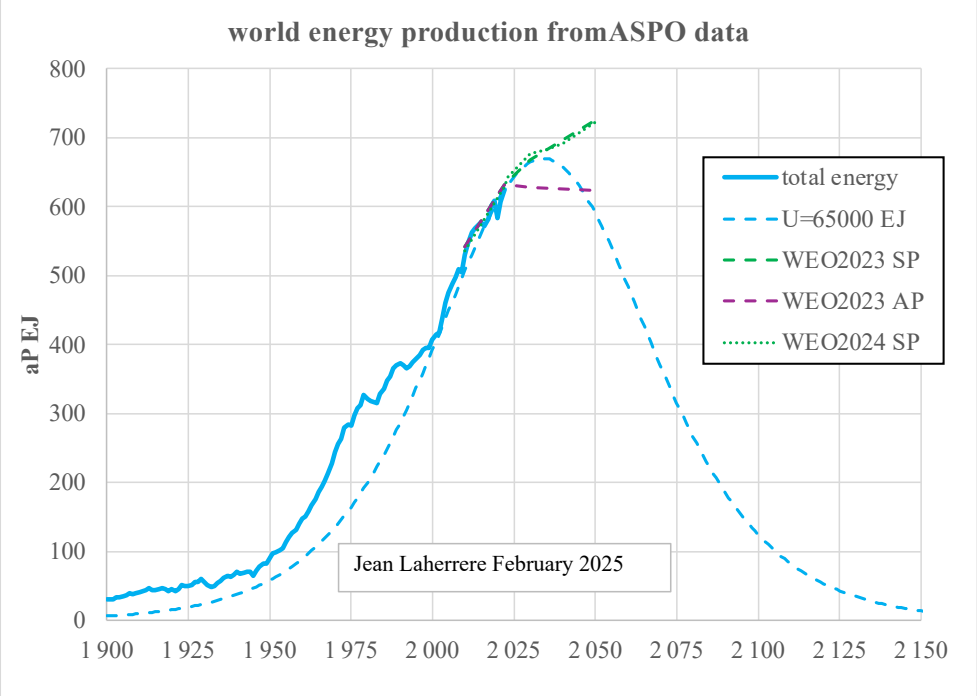

HL of world energy production trends fairly towards 65 000 EJ




With an ultimate of 65000 EJ world energy production will peak around 2035. Past world energy consumption is slightly below because of losses!

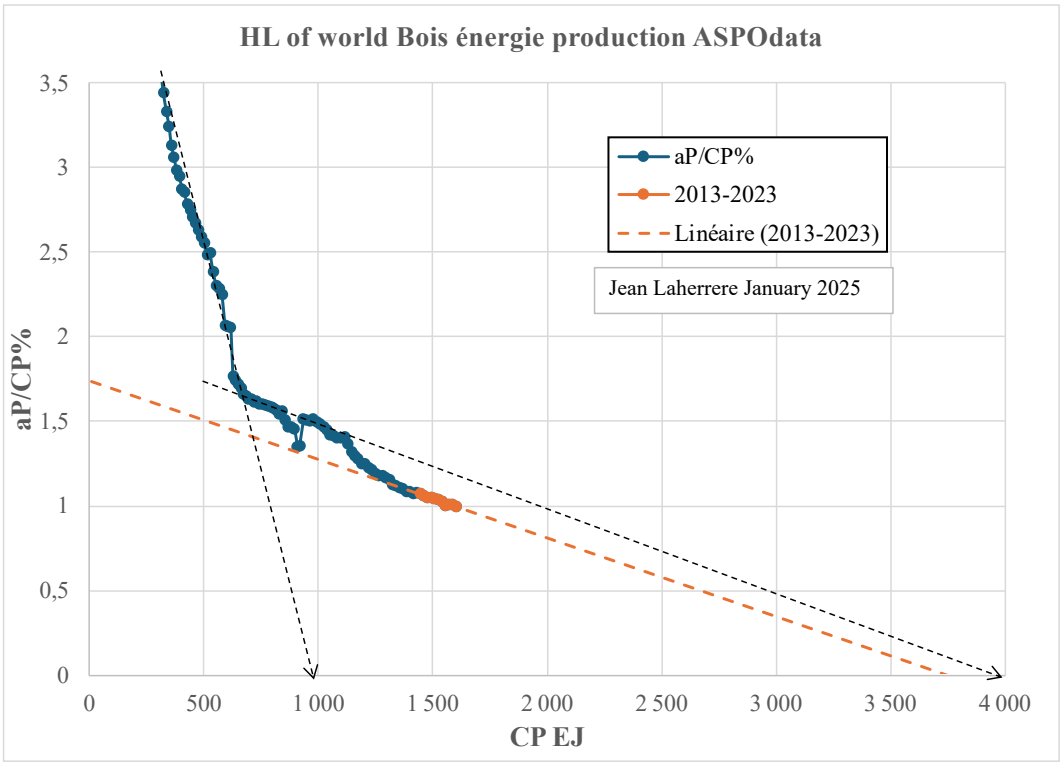



When I compare my forecast with IEA/WEO2023: IEA scenario Stated Policies there is close agreement for 2030 and Announced Pledges for 2050, WEO2024 SP is very close but not for 2050!

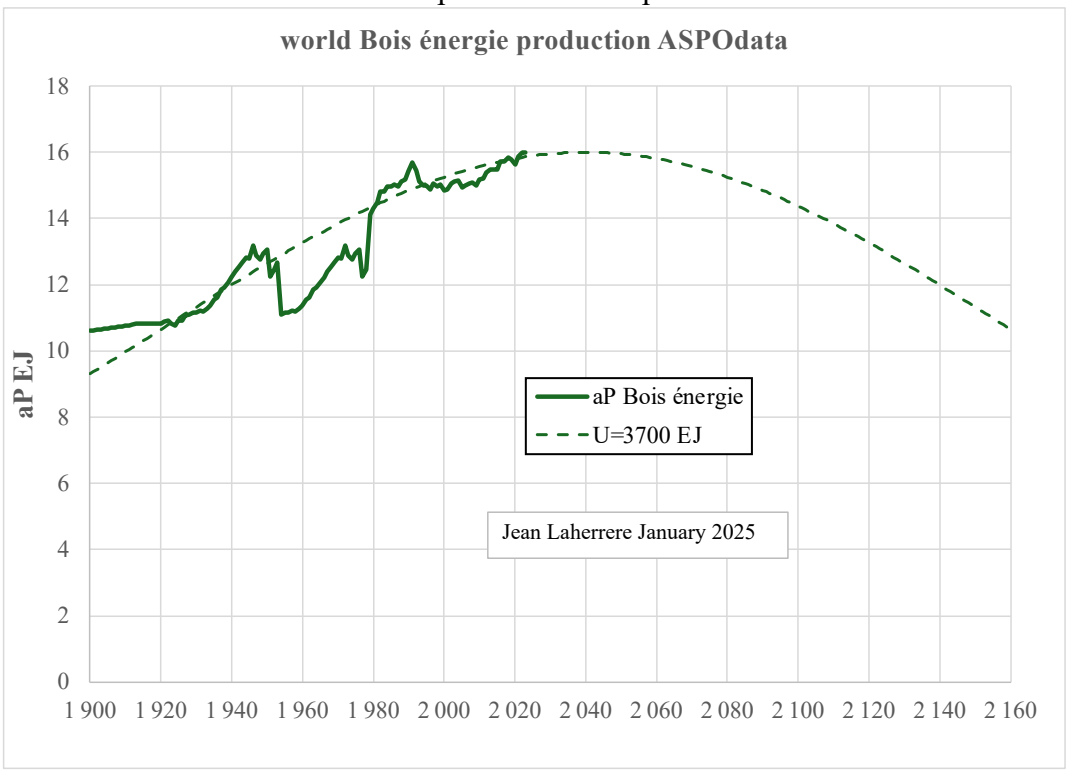



Physicists speak about “dark energy” and “dark matter” without knowing what they are and where they are!
Nasa: *Dark matter and dark energy are mysterious substances that affect and shape the cosmos, and scientists are still trying to figure them out.*
*In the 1970s, astronomer Vera Rubin confirmed the existence of dark matter by studying how individual galaxies rotated.*

**-Wood = Bois énergie**
HL of wood production trends fairly towards 3700 EJ



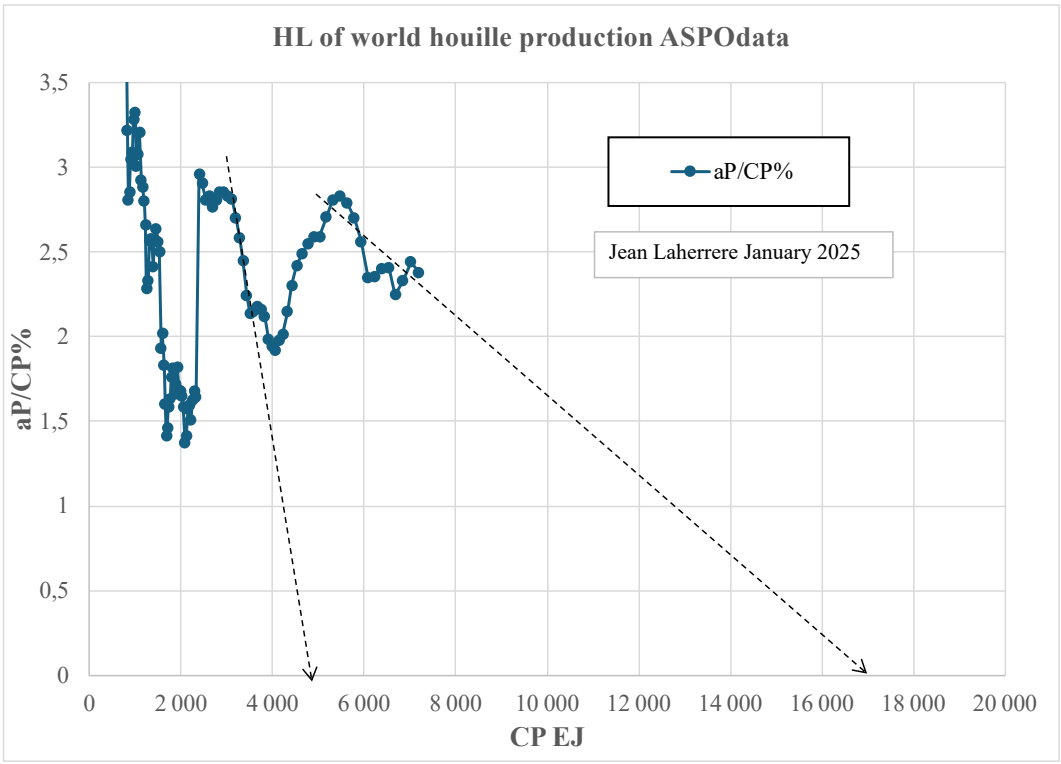

For an ultimate of 3700 EJ world wood production will peak around 2040




**-coal**

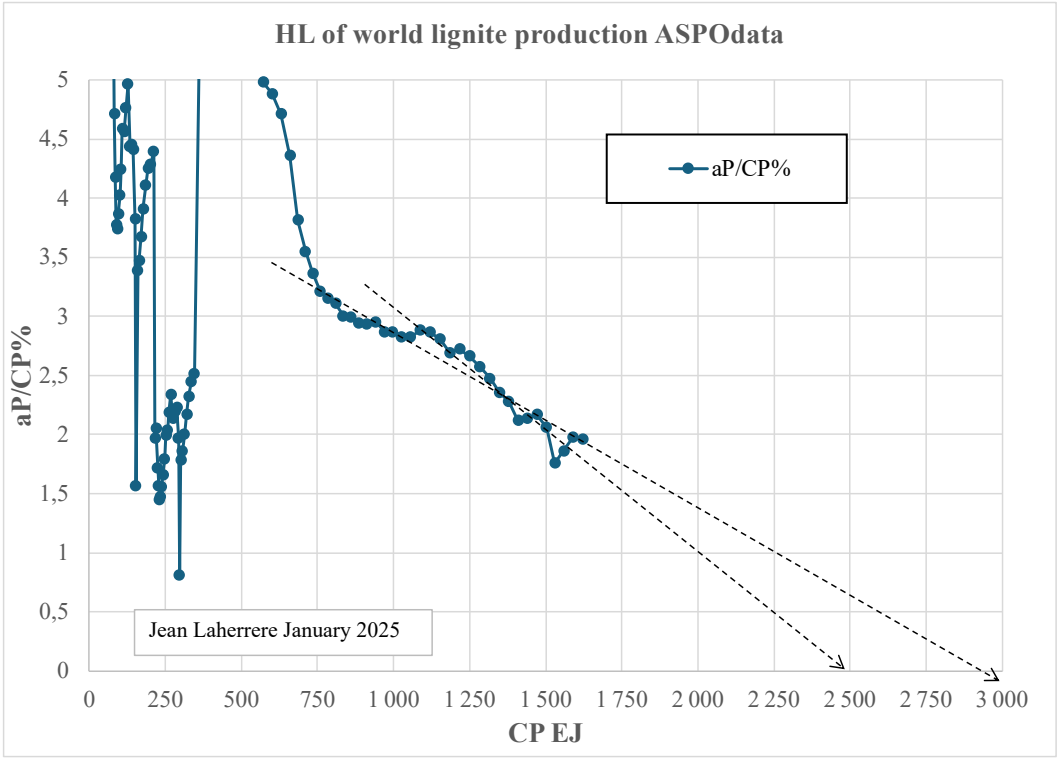
**-hard coal = houille**

HL of hard coal production trends very poorly towards 17000 EJ

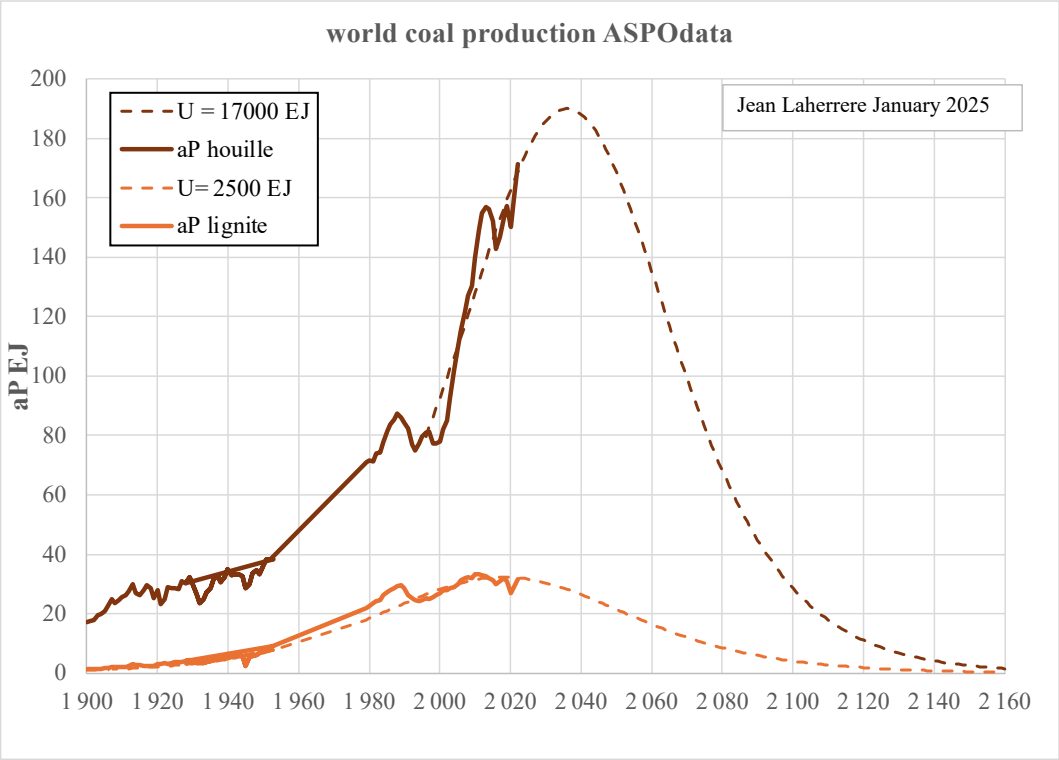



**-lignite**

HL of world lignite production trends poorly towards 2500 EJ
Covid impact could be seen.

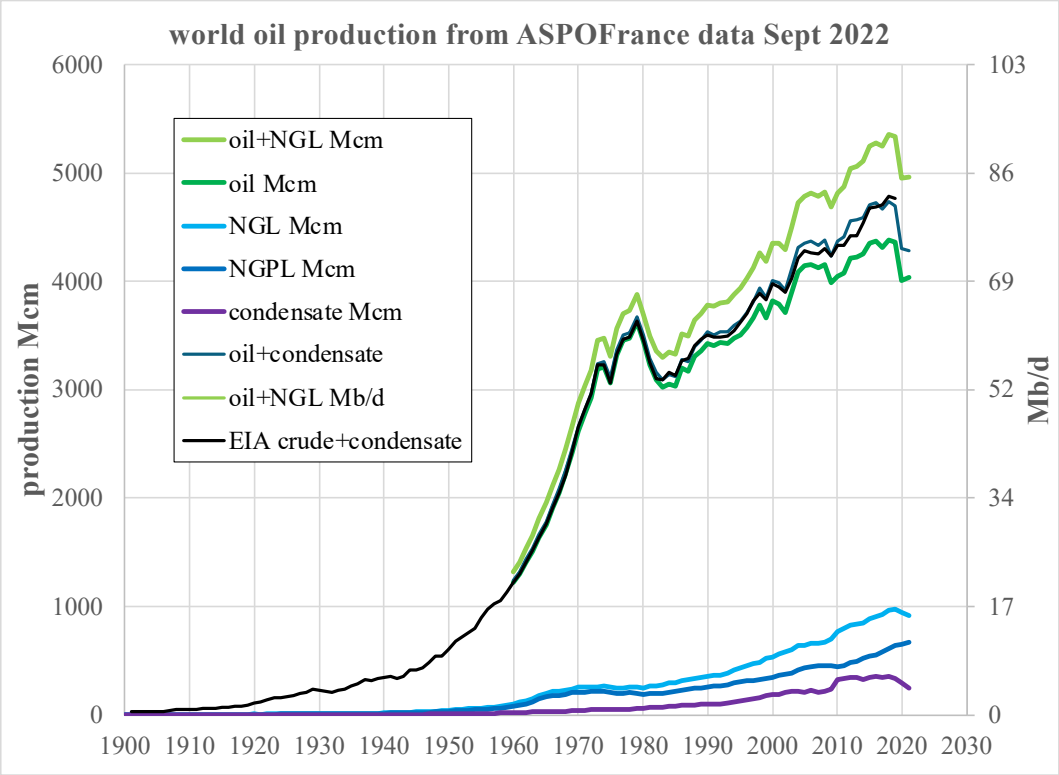



The peak of hard coal is around 2035 and of lignite 2018



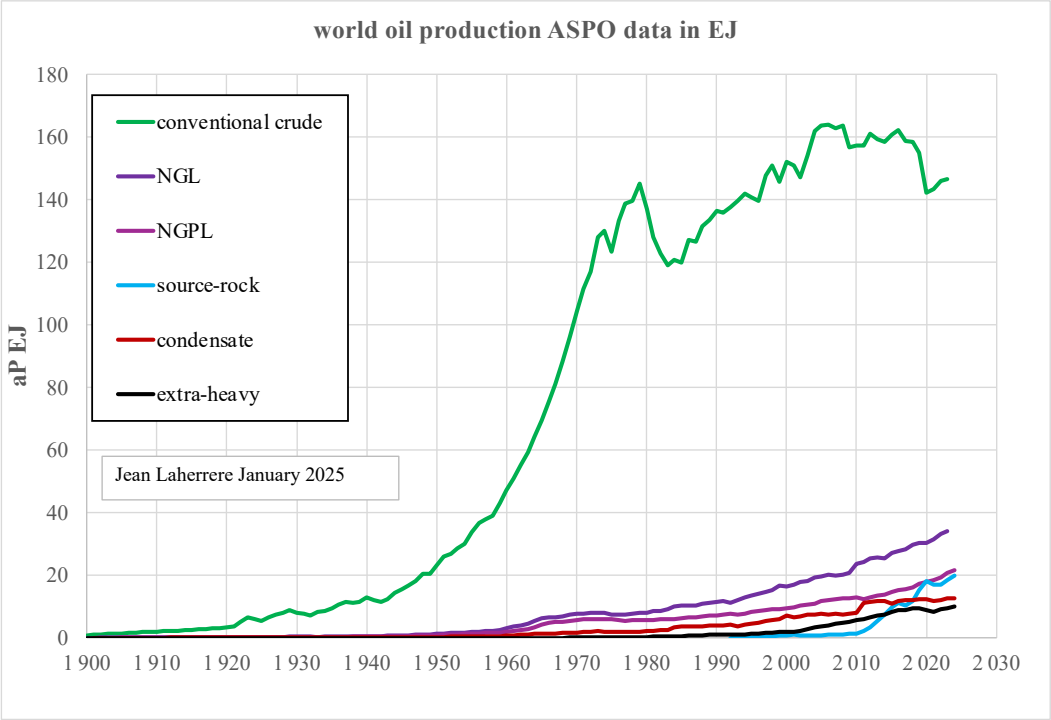

**-oil**

ASPO data on world oil production from 1900 to 2021 in volume (M cubic meter)



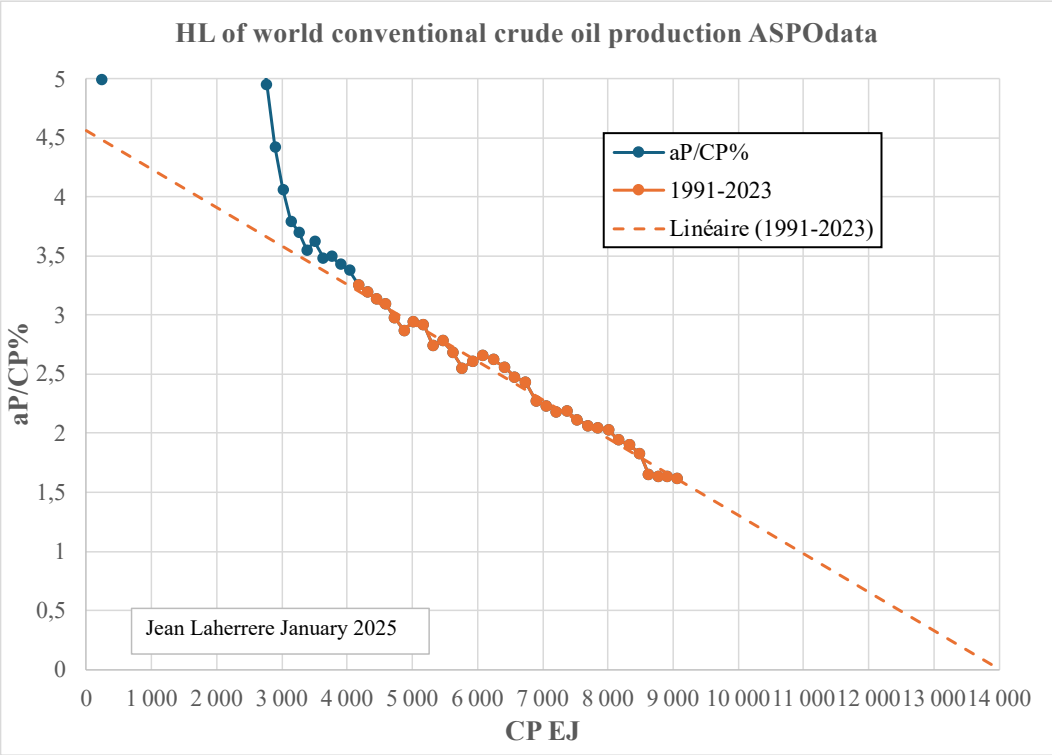

ASPO data in energy (EJ) from 1900 to 2023

Source-rock = LTO = shale plays




**-Conventional crude oil**

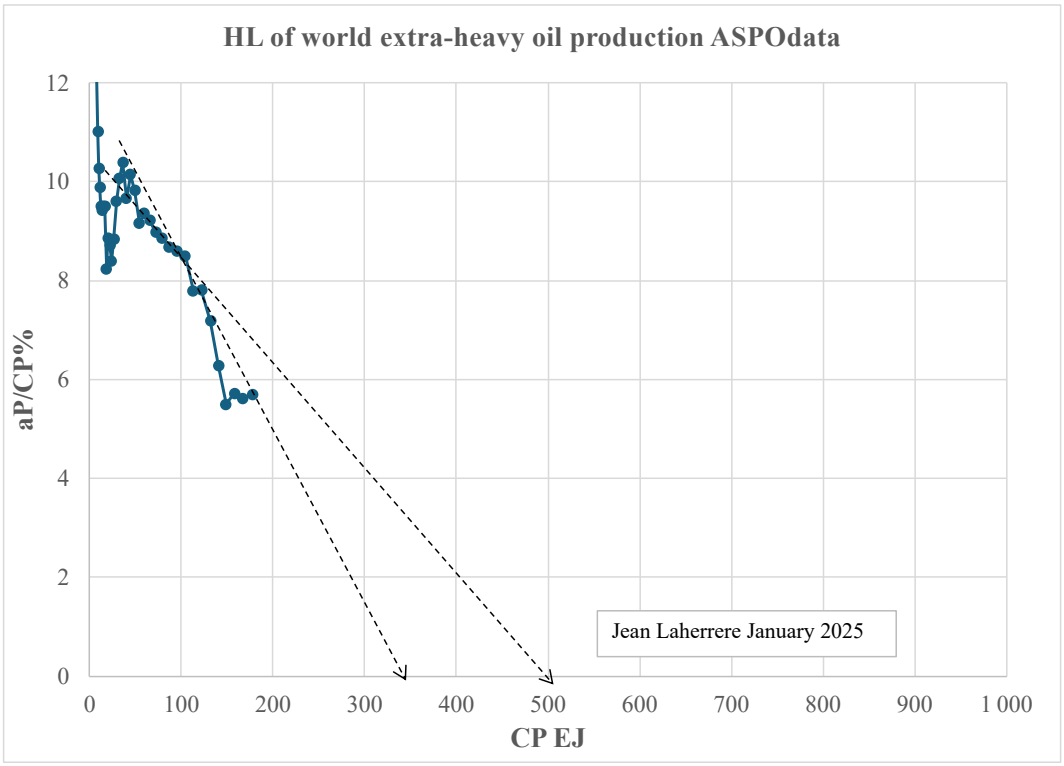
HL trends with a long period (30 years) towards 14 000 EJ: the estimate could be considered as good quality because conventional oil production is past peak!



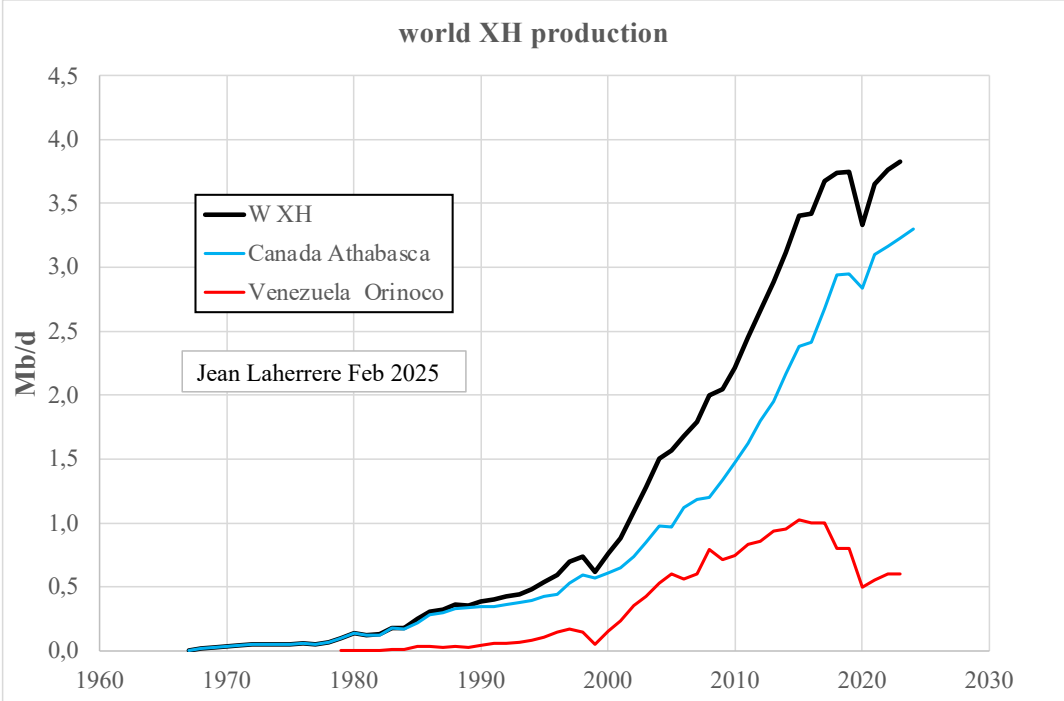

**-Extra-heavy**

HL trend is poor because Venezuela Orinoco production is constrained by the communist policy of the President Maduro: only Chevron, Total (not on Orinoco), Repsol, Rosneft, PDVSA operate in Venezuela.

An ultimate of 500 EJ is taken: see the peak on page 13



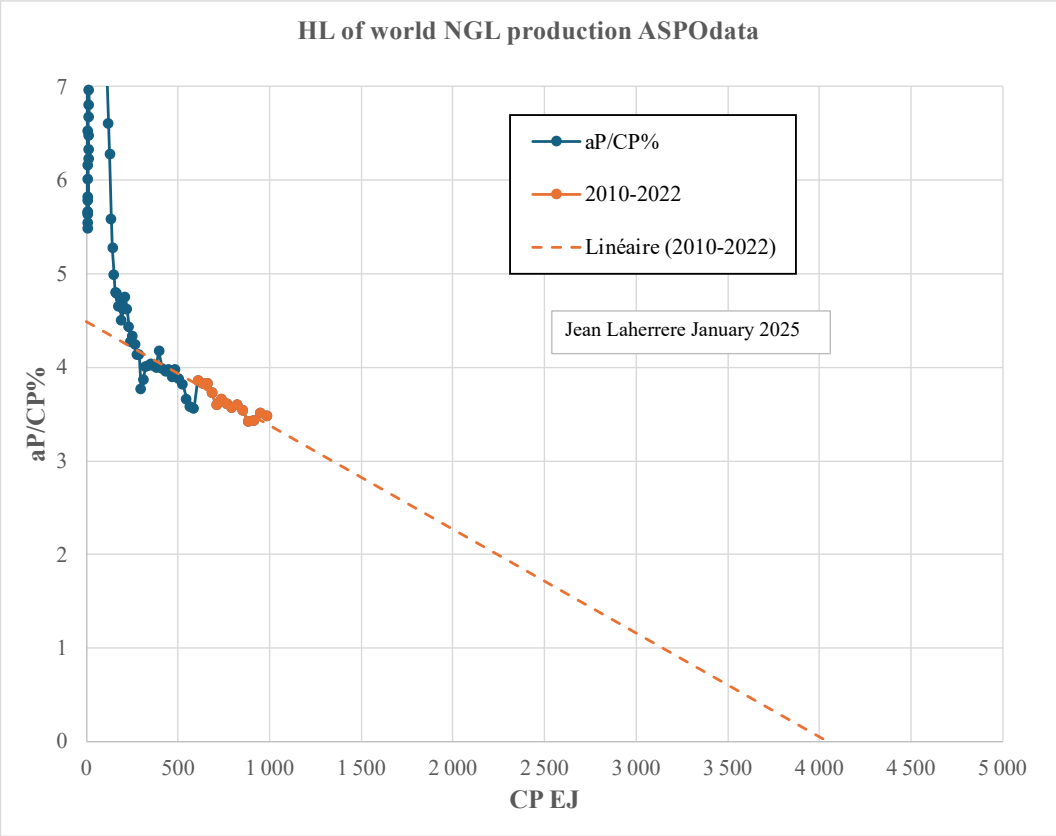

World XH production in Mb/d: see the forecast of peak on page 13



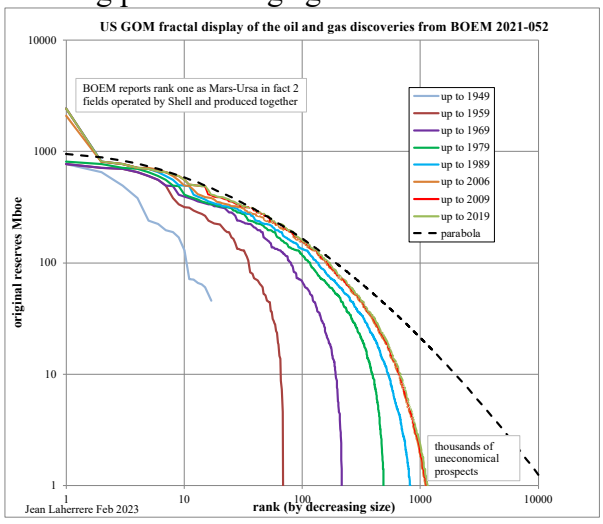

US needs Canadian oilsands production as US LTO production is too light for US refineries!

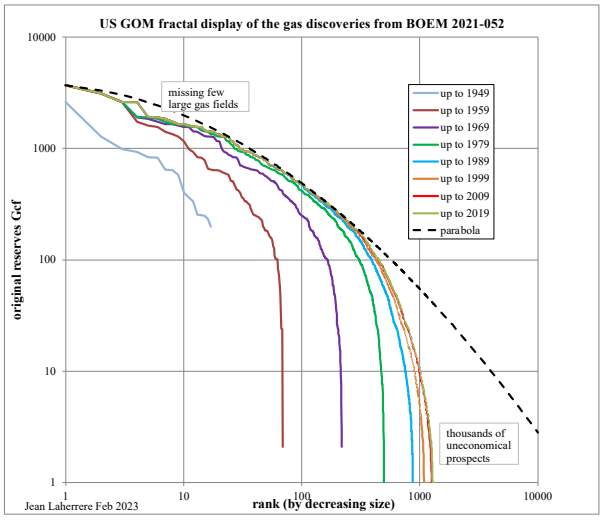
**-NGL =NGPL +condensate**

HL trends fairly for 2010-2023 towards 4000 EJ which is chosen for ultimate.
See the peak on page 13

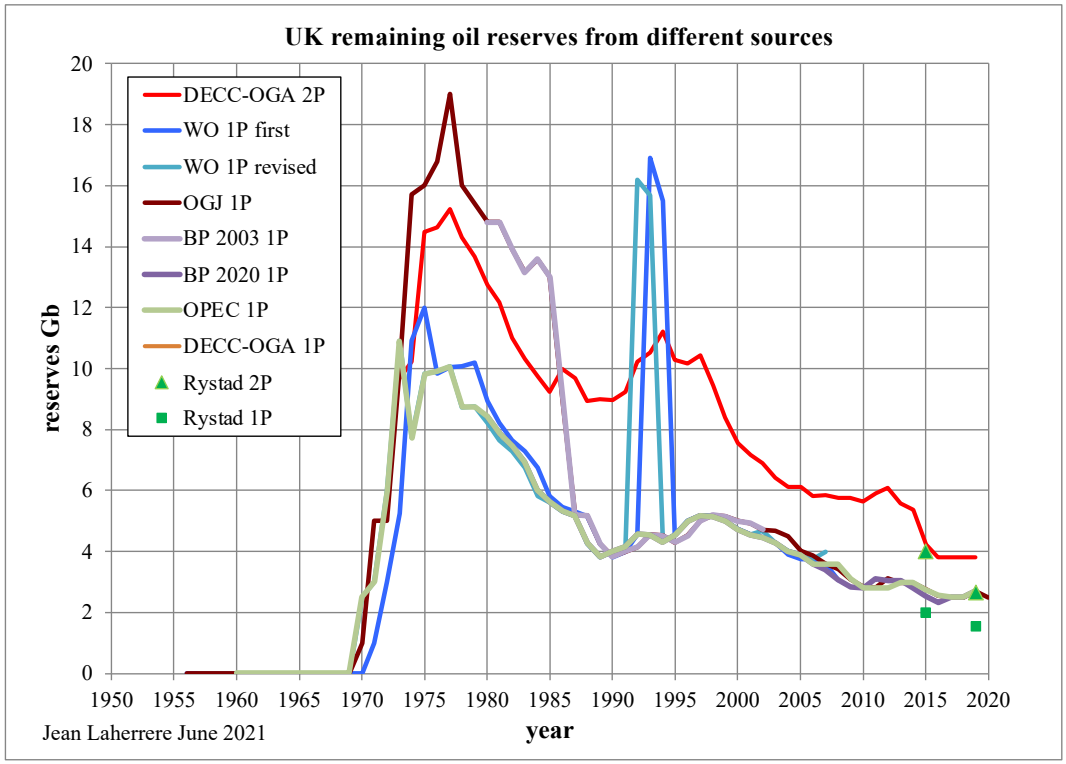



Ultimate estimate from HL can be compared with the value at end 2022 of cumulative production +proven reserves (available on the web), but SPE considers that the aggregation of proven reserves is incorrect, only the aggregation of reserves is correct for 2P reserves. Unfortunately, 2P reserves are confidential except in UK and the Gulf of Mexico.
In the GOM the oil and gas 2P discoveries display an interesting fractal distribution in 2021, showing possible large gas fields to discover!



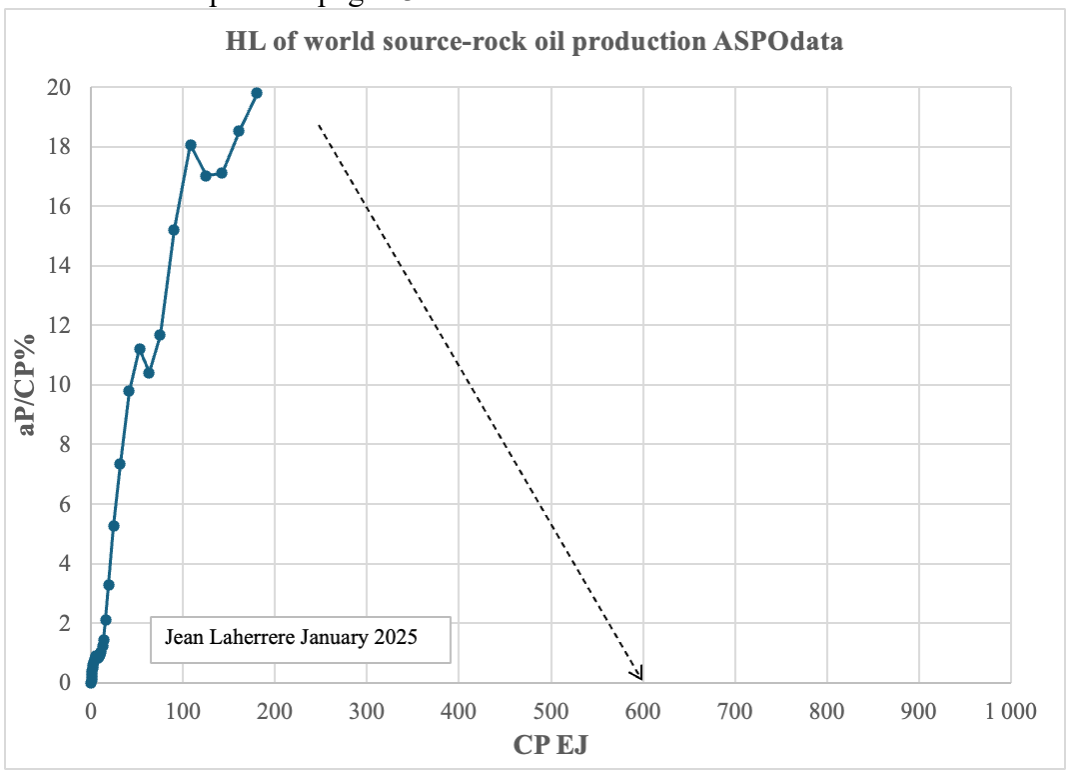




In UK there is a huge difference between 2P and 1P



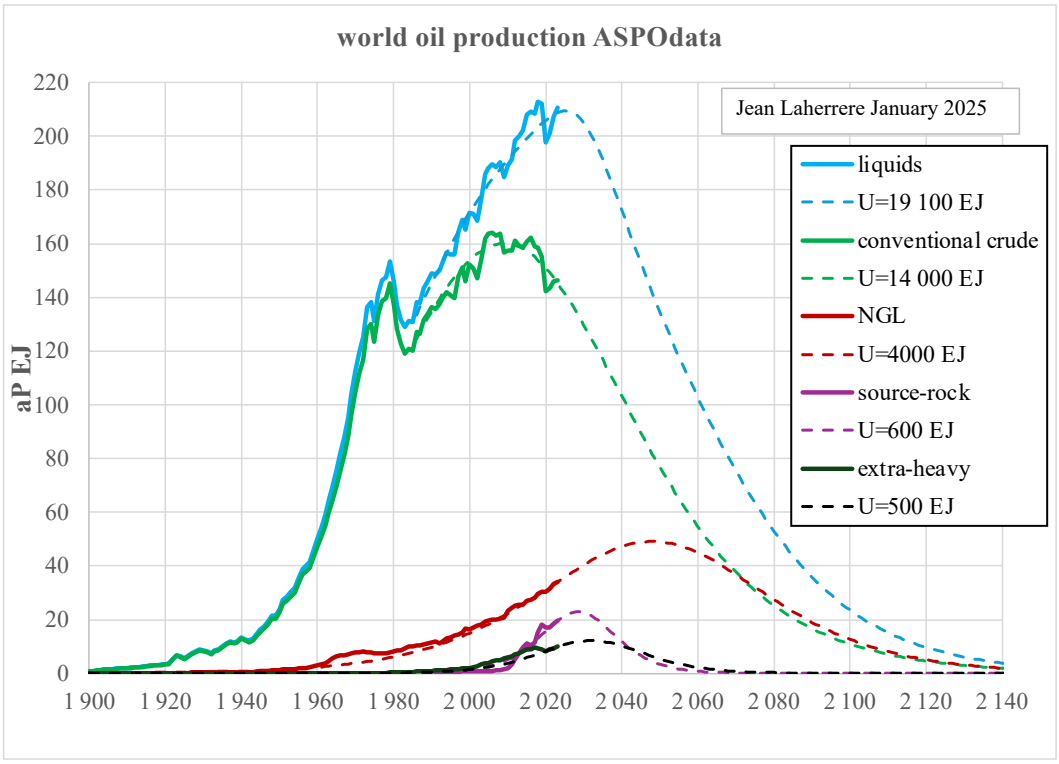

**- LTO = Source-rock**

HL is useless: an ultimate of 600 EJ is taken for being the best fit of past data but is very questionable! See the peak on page 13



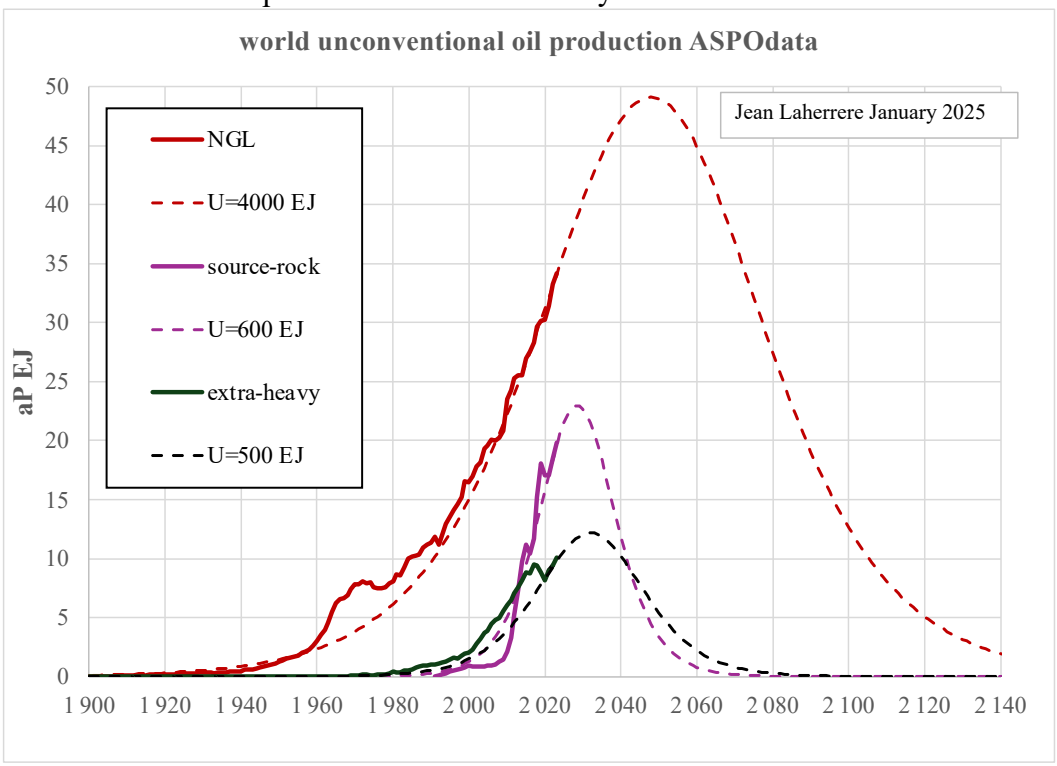

**-world oil production**

Forecasts from estimated ultimates show that conventional crude will continue to decline, that NGL production will peak around 2040 and source-rock around 2038




World liquids production has peaked in 2018 and with an ultimate of 19100 EJ will decline in the future

World unconventional oil production is dominated by NGL




**-Art Berman's papers**

Art Berman (Jan. 21, 2025) - Lazy Thinking: How Memes Get Oil All Wrong

https://www.artberman.com/blog/lazy-thinking-how-memes-get-oil-all-wrong/
*There are nearly 2 trillion barrels of proven oil reserves worldwide, with about the same amount in technically recoverable conventional crude resources (Figure 1). At current consumption rates, that's 60 years of oil that's for sure at today's prices—plus another 70 years that is probably there but may require a higher price to become viable. Then, add another 80 years from tight and heavy oil, and maybe a century from NGLs (natural gas liquids). Even with a skeptical take, it's hard to argue there's not enough oil to get us to whatever cliff civilization is headed for—whether in 5 years or 50.*
*Figure 1*

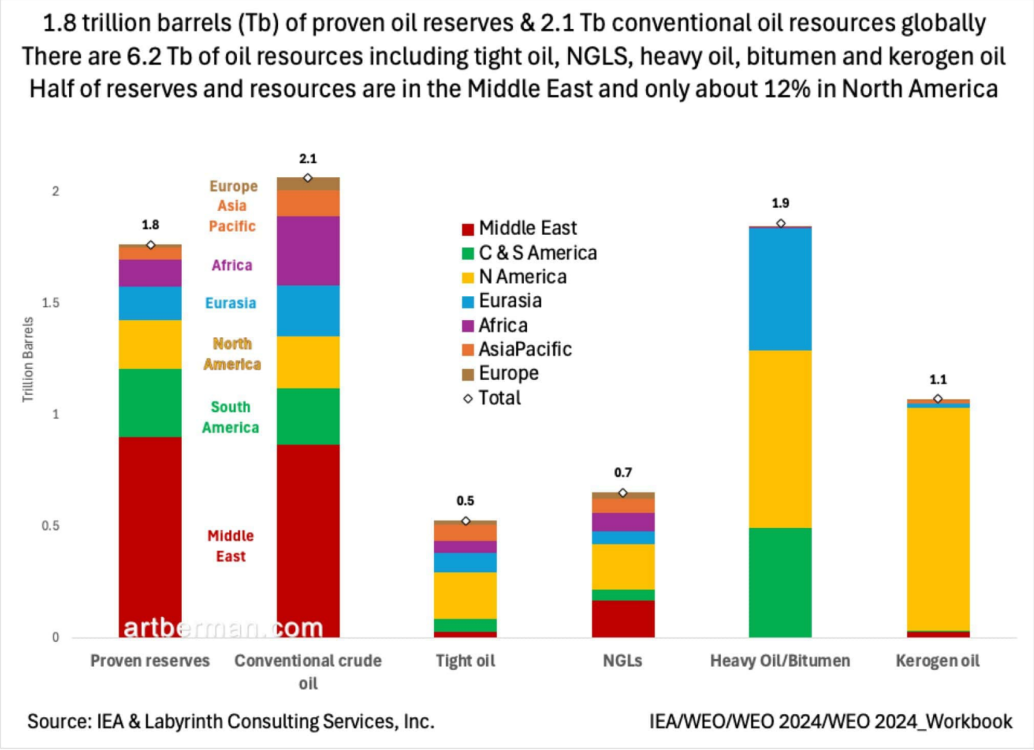


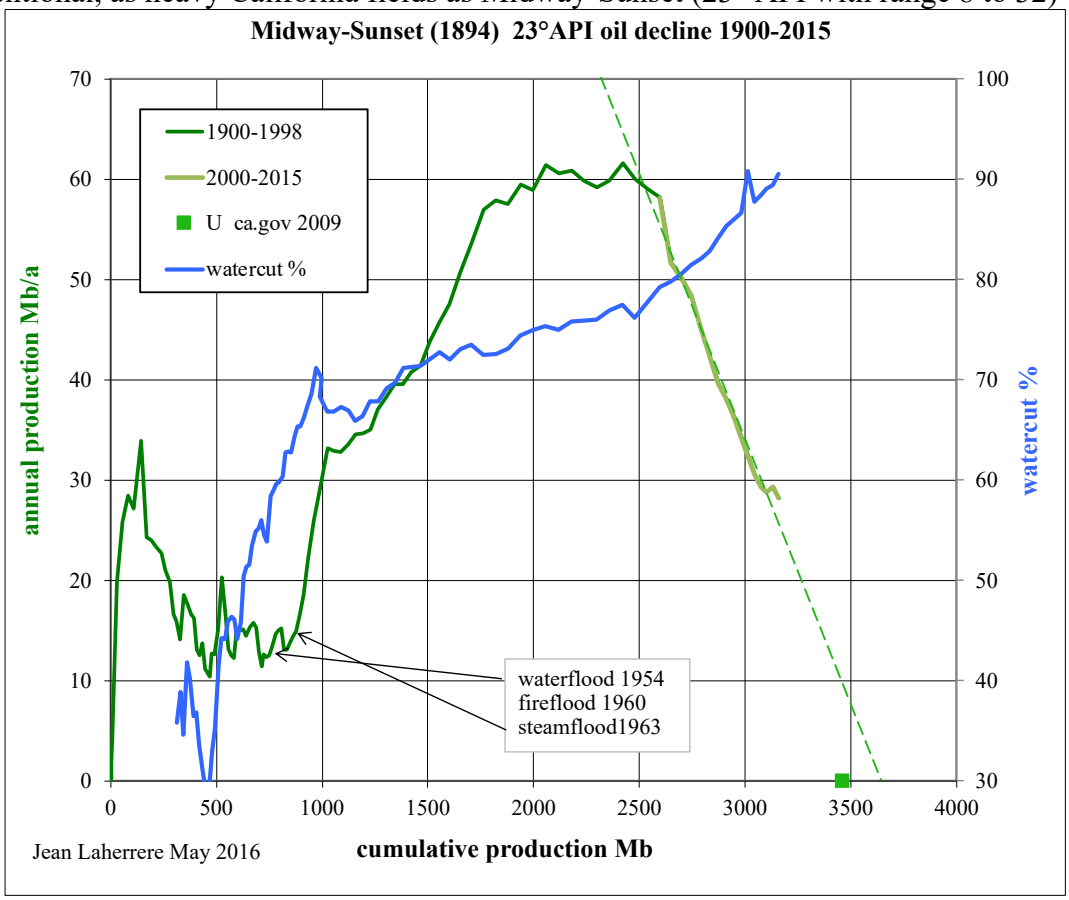

Figure 1. 1.8 trillion barrels (Tb) of proven oil reserves & 2.1 Tb conventional oil resources globally. There are 6.2 Tb of oil resources including tight oil, NGLS, heavy oil, bitumen and kerogen oil. Half of reserves and resources are in the Middle East and only about 12% in North America. Source: IEA & Labyrinth Consulting Services, Inc.

Comparison with my forecasts

| | EJ | EJ | EJ | | EJ | Gb | EJ | | Gb | EJ/Gb | Mb/d | kJ=0,95 Btu |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| world | aP2023 | CP2023 | U | qualtyHL | RR2023 | Art resour | Art resou | Art/HL | aP2023 | | aP2023 | EIA GBtu/b |
| liquids | 210 | 10401 | 19100 | ? | 8640 | | | | 35,1 | 6,0 | 96,3 | 5,69 |
| conv crude | 146 | 9062 | 14000 | good | 4900 | 2100 | 12600 | 2,6 | | | | |
| NGL | 34 | 982 | 4000 | fair | 3000 | 700 | 4760 | 1,6 | 5,0 | 6,8 | 13,6 | 3,58 |
| LTO | 20 | 180 | 600 | useless | 420 | 500 | 3500 | 8,3 | | | | |
| XH | 10 | 177 | 500 | poor | 320 | 1900 ? | 13300 ? | 40 | | | | |

Art Berman's estimates are less than the double of our estimates NGL, more than the double for conventional crude, but are 8 times for LTO and 40 times for extra-heavy (XH) when in fact it was heavy + bitumen (=XH)). Art should mention the definition of heavy: Wikipedia defines heavy as *any liquid petroleum with an API gravity less than 20°*. But SLB https://www.slb.com/resource-library/oilfield-review/defining-series/defining-heavy-oil
*Heavy oil is a crude oil that has a viscosity typically greater than 0.01 Pa.s [10 cP] and a high specific gravity. The World Petroleum Congress classifies heavy oils as crude oils that have a gravity below 22.3 degree API.*

It is obvious that there is no consensus on heavy oil definition API value should be used and not with a word as heavy! Heavy oil trapped in oil field above water is quite different from extra-heavy (heavier than water) field trapped near the surface by its viscosity.
It is wrong to compare XH and heavy oil/bitumen: some of this should be in fact in conventional, as heavy California fields as Midway-Sunset (23 °API with range 8 to 32)

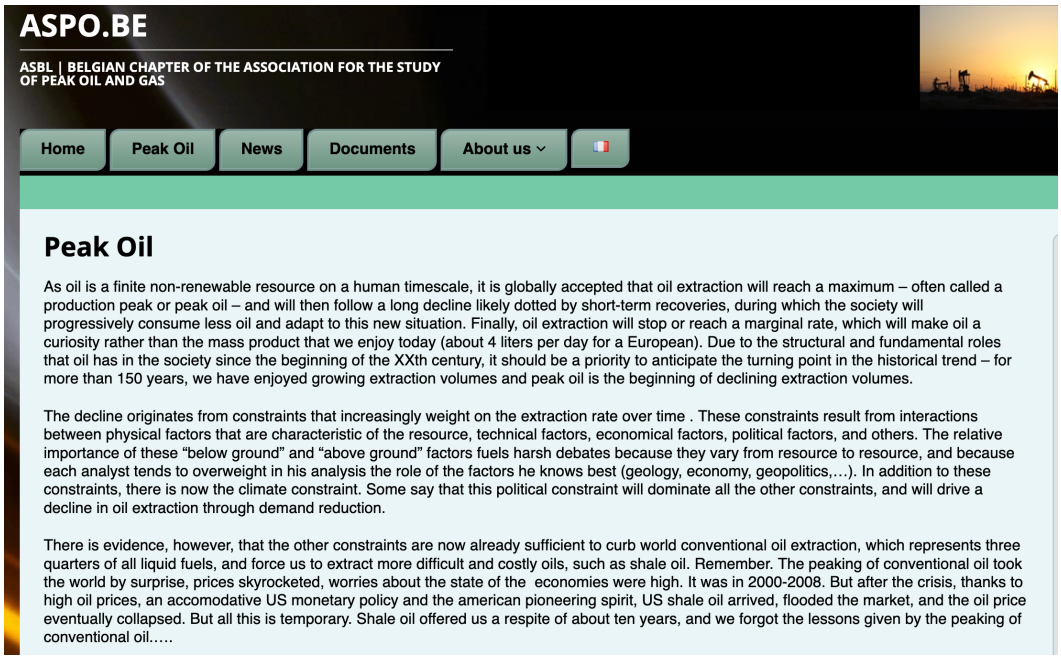



Art reports kerogen oil resources as 1900 Gb, but without defining kerogen oil: for Britannica it is synthetic crude from oil shale!

Art has posted a new paper attacking the peak oil
https://www.artberman.com/blog/peak-oil-requiem-for-a-failed-paradigm/
Art considers Peak oil as an entity (a person ?) when in fact it is a “point”
Wikipedia
*Peak oil is the point when global oil production reaches its maximum rate, after which it will begin to decline irreversibly.*

ASPO (founded by Colin Campbell) means Association for the Study of Peak oil and gas
“Peak oil” was introduced for the first time in 2001 by Colin Campbell. Then I asked Colin why the peak of oil production is called “peak oil” and not “oil peak”. He replied: English is less precise than French, ”peak oil” or “oil peak” are the same, but ASPO sounds better than ASOP!

ASPO Belgium explains what Peak oil is



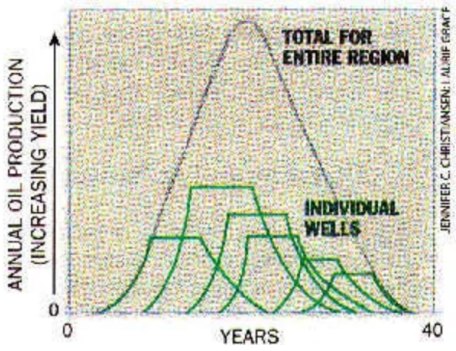

Our 1998 article with Colin Campbell was "The end of cheap oil" Scientific American March volume 278 page 78 https://www.scientificamerican.com/article/the-end-of-cheap-oil/

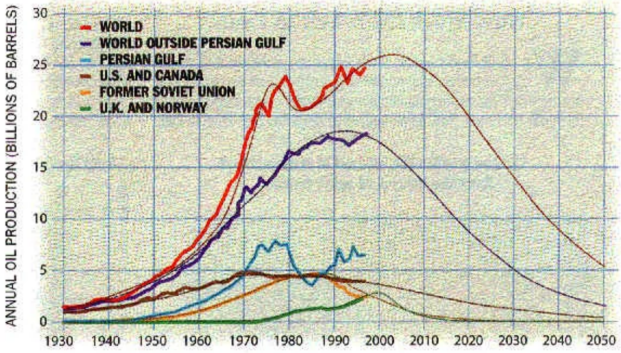
**The End of Cheap Oil**

Global production of conventional oil will begin to decline sooner than most people think, probably within 10 years

COLIN J. CAMPBELL, JEAN H. LAHERRRE

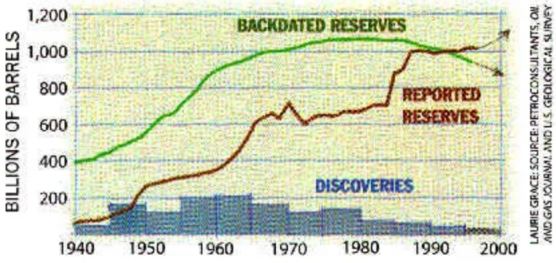
In this 1998 paper the term Peak oil is not mentioned, only these 2 graphs showing a peak

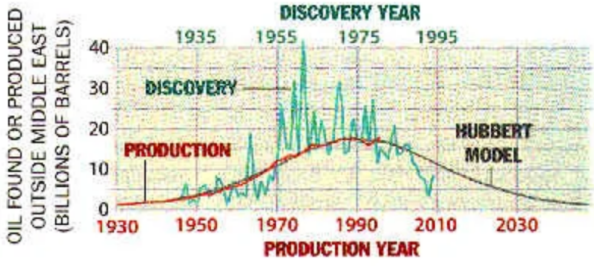



Backdated reserves (2P) were showing a peak in contrary with reported 1P

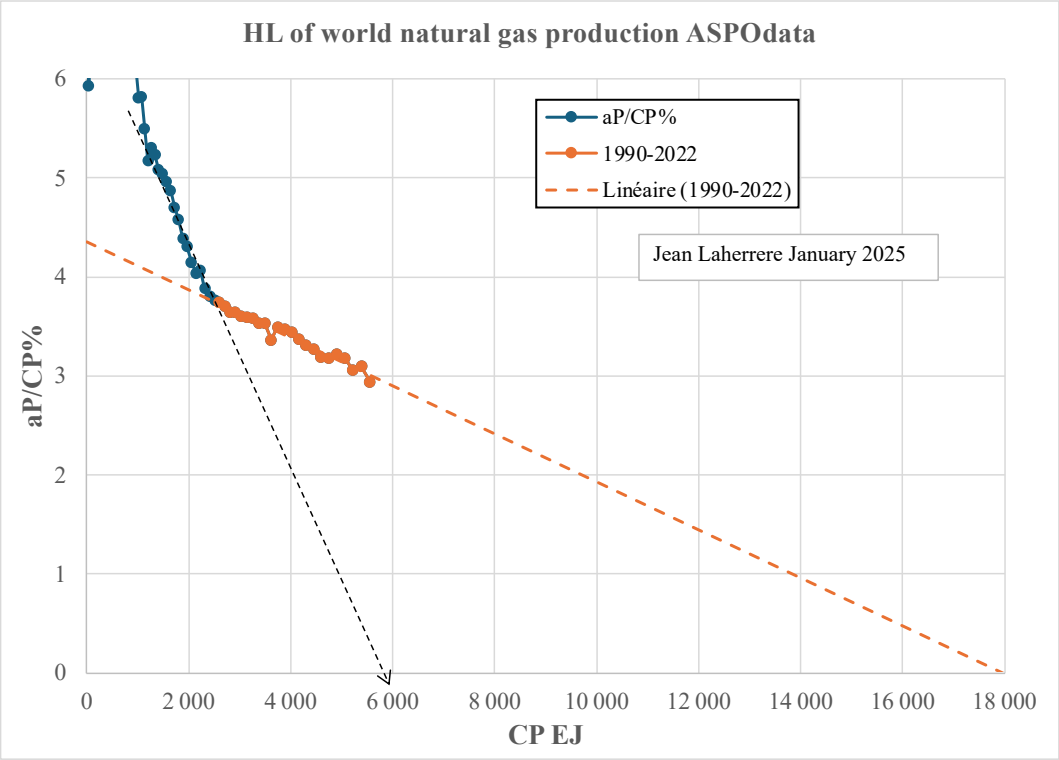
Oil discovery & oil production



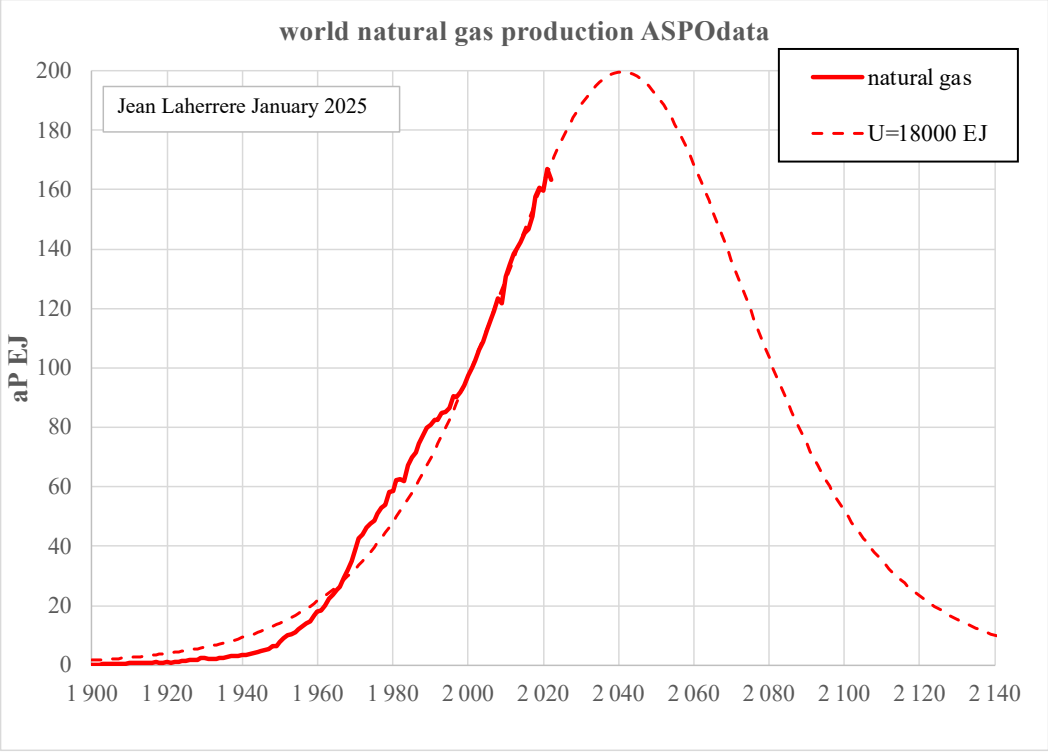




**-Natural gas**

Hl production trend fairly towards 18000 EJ




For ultimate of 18000 EJ, world NG production will peak around 2040 at 200 EJ




**-Storage of data**

All data is stored as magnetic binary digit.

In my 2005 paper *"Memories and thoughts on 50 years of oil and gas geophysics"*

*-data storage*

*The first films or playbacks from Carter tapes, which was burning a special paper, were very cumbersome but easier than the first magnetic tapes, as their drivers do not exist anymore.*

*Magnetic tape, optical disk, CD and all modern storage supports, despite advertisements say, deteriorate with timed and suffer the obsolescence of drivers and software. Data storage is the major problem unsolved for a long-term preservation*

What is the lifespan of magnetic storage?
*Some manufacturers claim that tape can last up to thirty years, making it a suitable medium for archiving. The problem with that number is that magnetic tapes only last that long under absolutely optimum environmental conditions. That means storing magnetic tapes in environments with stable humidity and temperatures. A more realistic lifespan for magnetic tape is about ten to twenty years. And it's important to note that tape is more susceptible to wear and tear if used frequently.*
https://www.arcserve.com/blog/data-storage-lifespans-how-long-will-media-really-last
But they forget about the impact of solar magnetic storms:
https://www.planetary.org/articles/should-you-be-worried-about-solar-storms
Quebec learned this lesson in 1989, when a solar storm knocked out the province's power for nine hours. The U.S. military experienced it in 1972, when solar activity triggered dozens of mines floating off the coast of Vietnam. And almost the entire world witnessed it in 1859 *when, for about a day, the aurora borealis glowed so bright that it could be seen as far south as Colombia. People in the U.S. read newspapers by the light in the sky. Gold miners woke up in the middle of the night, thinking it was morning, and started making breakfast.*

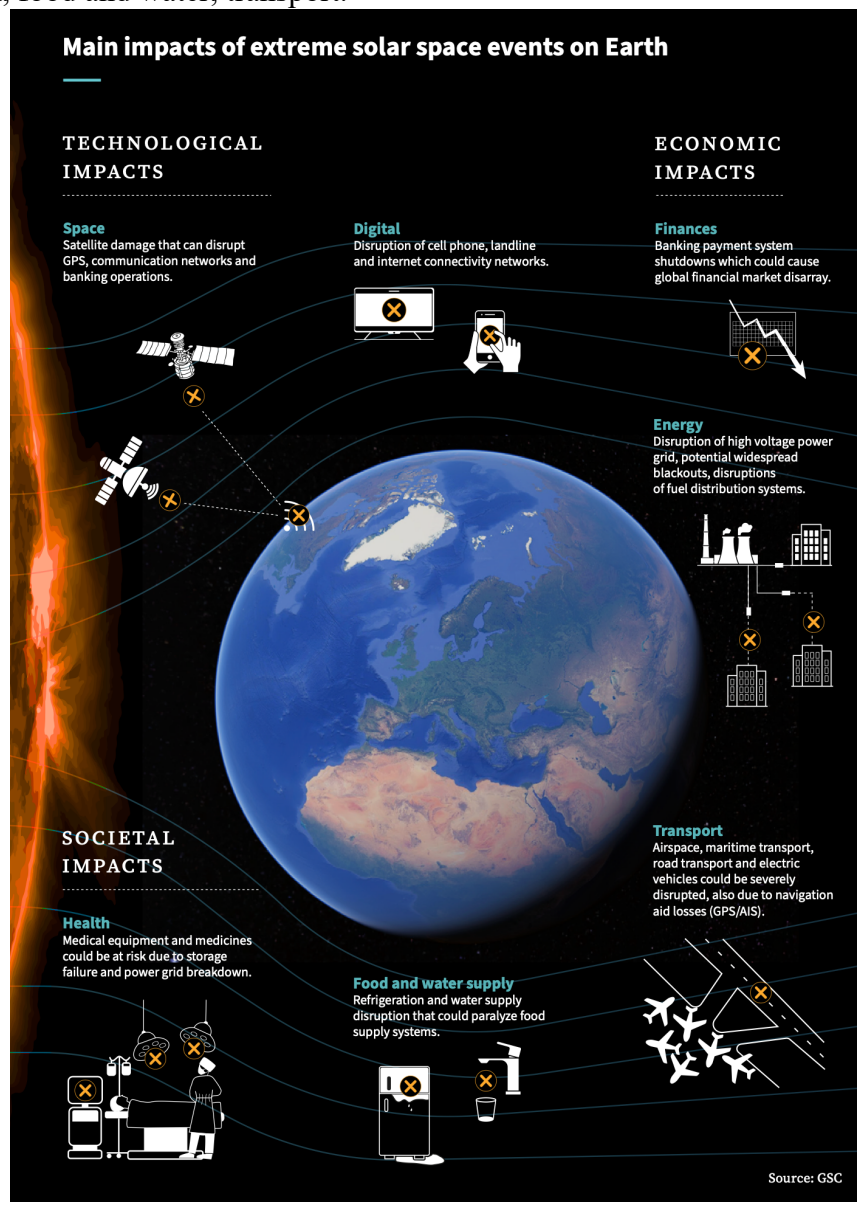
The 1859 geomagnetic storm, now known as the Carrington Event, was the strongest in recorded history. *It was caused when a wave of magnetized plasma launched from the Sun, traveling at over 2,000 kilometers per second (about 1,500 miles per second), and then hit Earth. The wave of plasma, called a coronal mass ejection (or CME), led Earth's magnetic field to release terawatts of power in response.*
But predictions for this solar cycle vary greatly: some scientists have put the odds of a roughly Carrington-level storm at about 1%, while others have gone as high as around 25%.
*How likely is it that we're actually hit by such a powerful solar storm?*
*As the Earth's magnetic field changes in response to a solar storm, it can cause huge currents in power lines that blow out transformers and compromise electrical grids. Studies of the United States alone have predicted that a major solar storm would leave tens of millions of people without power, some for weeks, months, or even years. The economic damage would be in the range of trillions of dollars.*
*According to Rawafi, these estimates don't go far enough. The real impact is "beyond the scale of our comprehension," he says. "It's way, way beyond that."*
*A huge solar storm would disable satellites, especially communications satellites in higher orbits. It would mess with GPS signals, which are used by everything from cell phone networks to power grids. Taken alongside wide-ranging blackouts, which would also knock out pumps essential to the water supply, a Carrington-like storm could simultaneously damage almost all major aspects of modern infrastructure: power, food, water, transportation, security, and communication. With that much impaired, it's easy to imagine problems in different sectors magnifying each other — and that's on a sunny day. What if the storm hit during winter, when people rely on the power grid to stave off potentially deadly cold?*

The 1872 solar event was named the Chapman-Silverman storm. "*Our findings confirm the Chapman-Silverman storm in February 1872 as one of the most extreme geomagnetic storms in recent history. Its size rivaled those of the Carrington storm in September 1859 and the NY*

*Railroad storm in May 1921*" https://www.universetoday.com/164668/in-1872-a-solar-storm-hit-the-earth-generating-auroras-from-the-tropics-to-the-poles/
*Another very strong solar storm occurred in May 1921. Dubbed the New York Railroad Storm, it lasted for three days as the result of an extremely powerful coronal mass ejection from the Sun. Electrical currents stirred up in our atmosphere by the storm sparked several fires, including one close to New York's Grand Central Terminal.*

Were knocked down by a solar storm:
-In 1972 dozens of mines floating off the coast of Vietnam -
-In 1989 Quebec's power.
-In 2022 40 newly launched SpaceX satellites.
https://www.spaceweatherlive.com/en/solar-activity/top-50-solar-flares.html lists the 3 biggest solar flares since 1996: November 2003, April 2001 and October 2003

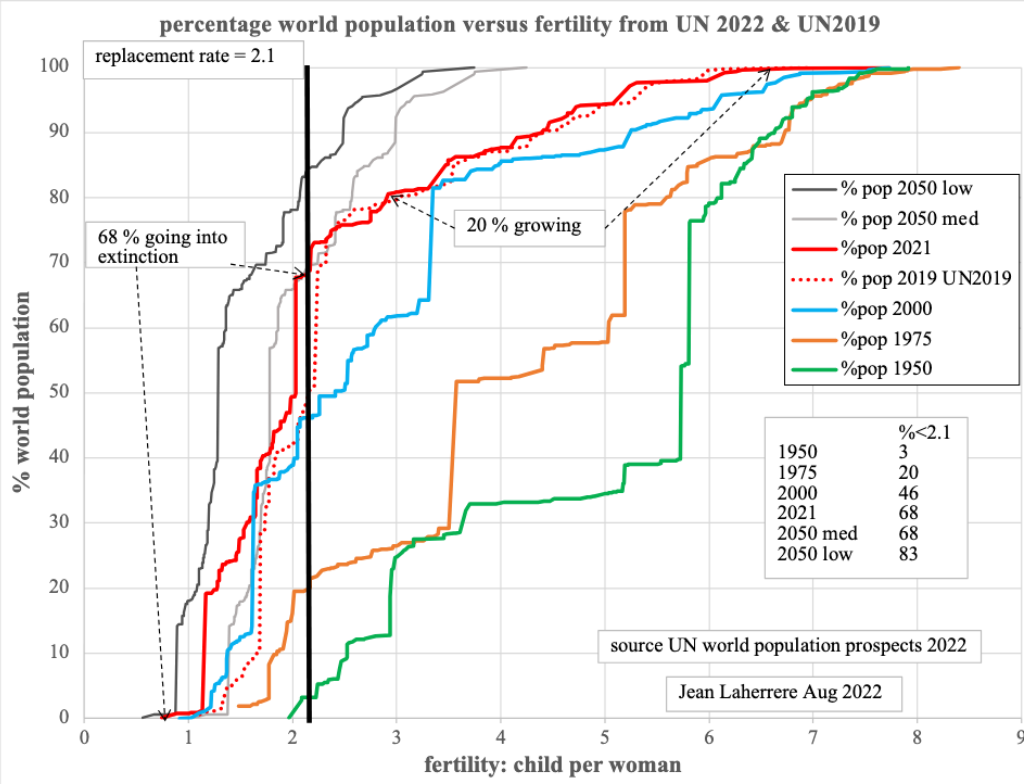
The Council of the European Union has written in December 2023: "Solar storms a new challenge on the horizon?" showing in this graph the main impacts on space, digital, finances, energy, health, food and water, transport.



A 2013 NASA study describes *how extreme solar eruptions could have severe consequences for communications, power grids and other technology on Earth. Whether it is terrestrial catastrophes or extreme space weather incidents, the results can be devastating to modern societies that depend in a myriad of ways on advanced technological systems,"*
Stanford Solar Center believes that *the Earth's atmosphere acts as a shield to prevent the cosmic radiation from reaching us,* but they do not mention the 1859 storm!

About 1990 when in charge of Total techniques, I converted all magnetic tapes in optical disks to secure past data!

Another pessimistic view of the world's future:
My 2022 paper says: in 2021, 68% of the world is going into extinction"
https://aspofrance.org/2022/09/18/in-2021-68-of-the-world-is-going-into-extinction/

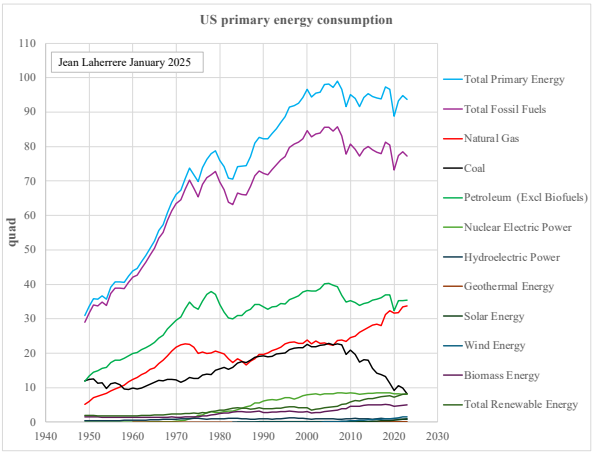


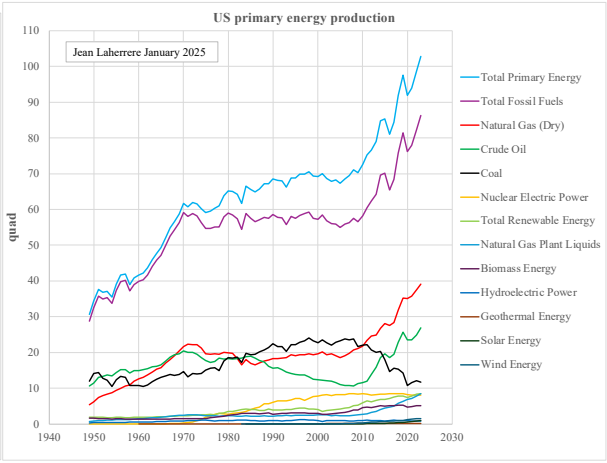

The world will disappear by lack of fertility (except South Sahel?), but it could be from a new 1859 solar magnetic storm!

**-Conclusion**
From ASPO data 1900-2023 and HL, the occurrence of peak is estimated to be in 2015 for conventional oil, 2018 for liquids, 2028 for LTO, 2032 for XH, 2035 for total energy, 2040 for wood and natural gas, but 2048 for NGL.
Data storage is the major problem unsolved for a long-term preservation.
The world could disappear if a new 1859 solar magnetic storm occurs! If not, it will be by lack of fertility!

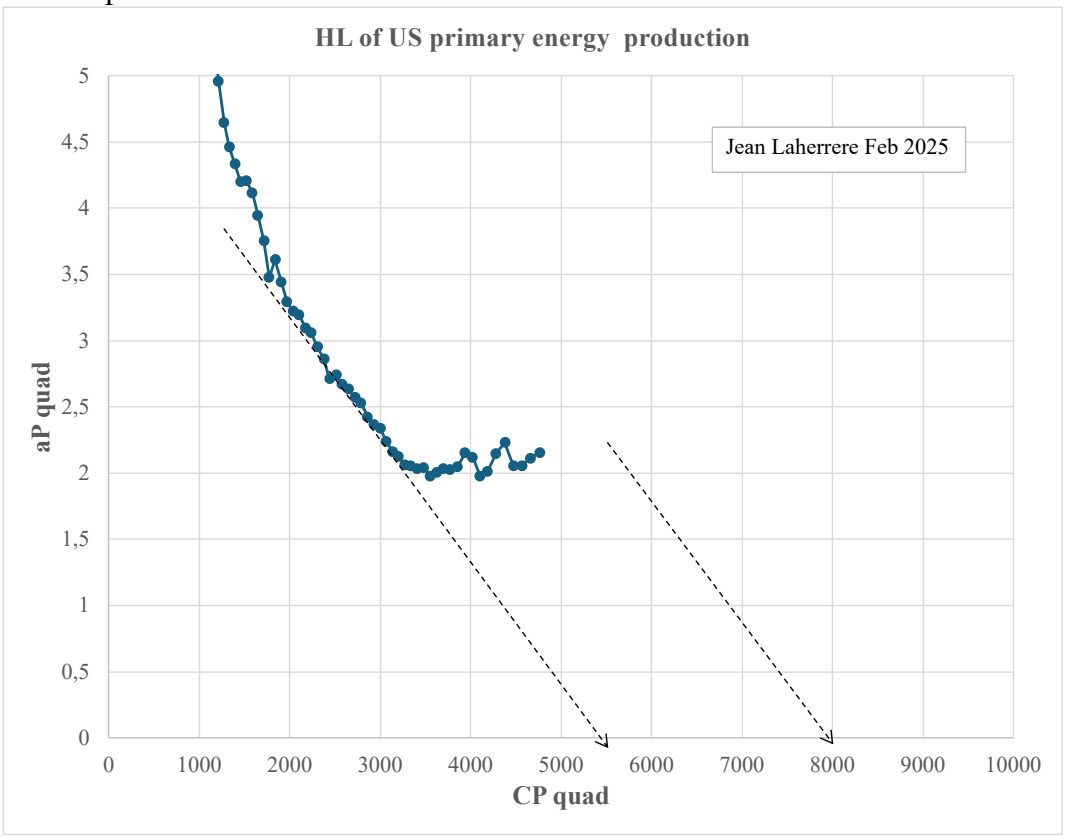
**-US primary energy production & consumption**

EIA provides excel data on US primary energy consumption and production per sources in quad.



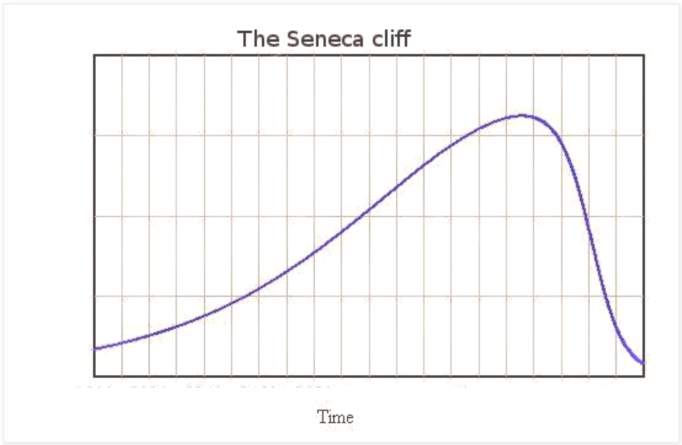




HL of US PE production is useless



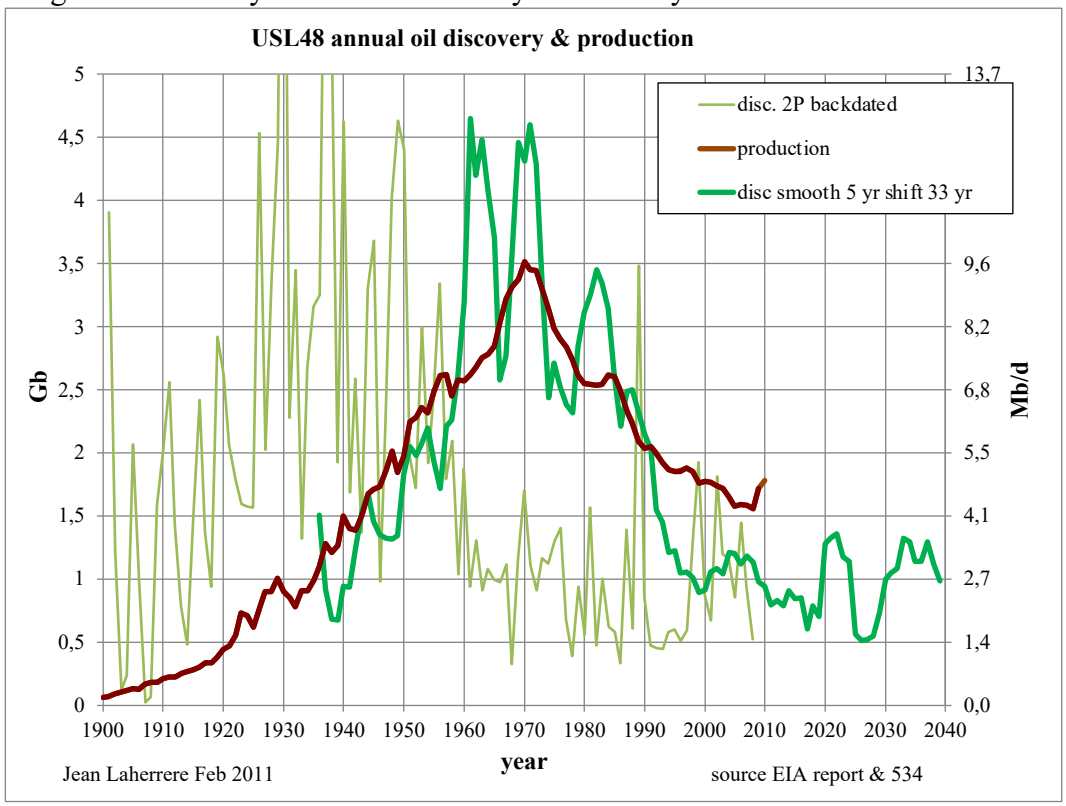

A 10 000 quad ultimate is chosen by modeling the future with a decline symmetrical with the recent rise. It is reasonable assumption but there are other possibilities, as the Seneca cliff (Ugo Bardi)!

**The Seneca effect: why decline is faster than growth**



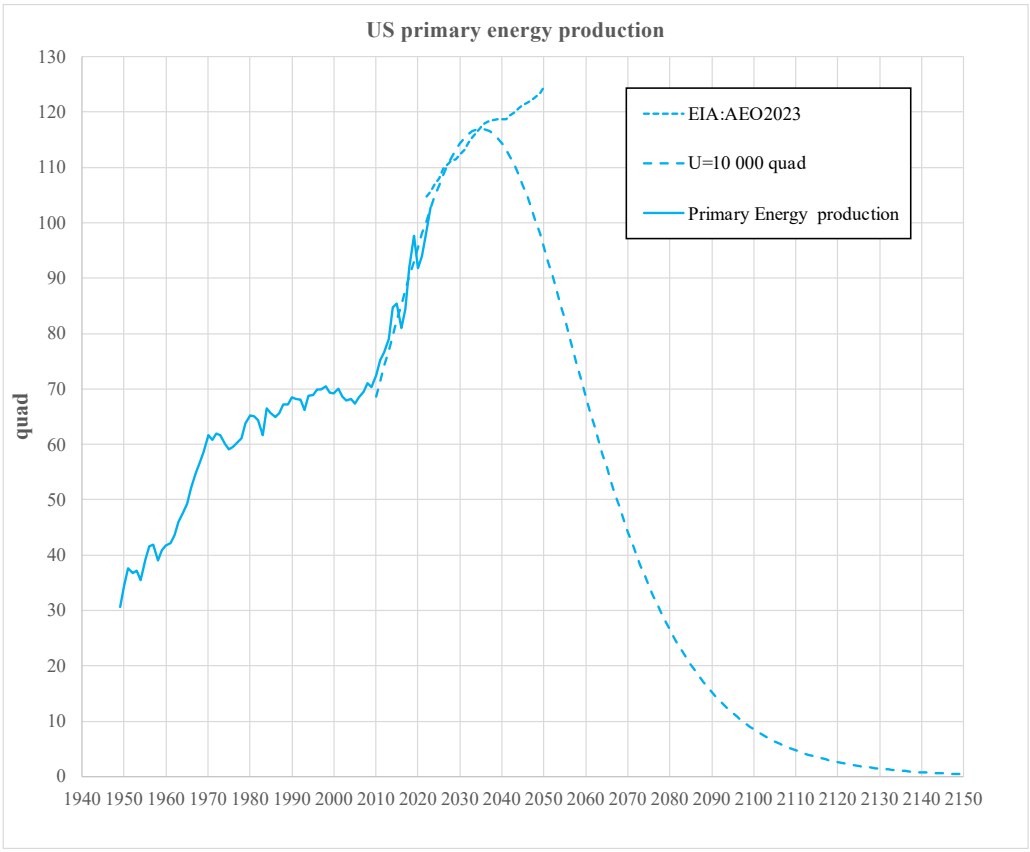

Cassandra has moved. Ugo Bardi publishes now on a new site called "The Seneca Effect."

But USL48 crude oil production displays before 2005 (LTO) an amazing symmetry correlating with an also symmetrical discovery shifted 33 years

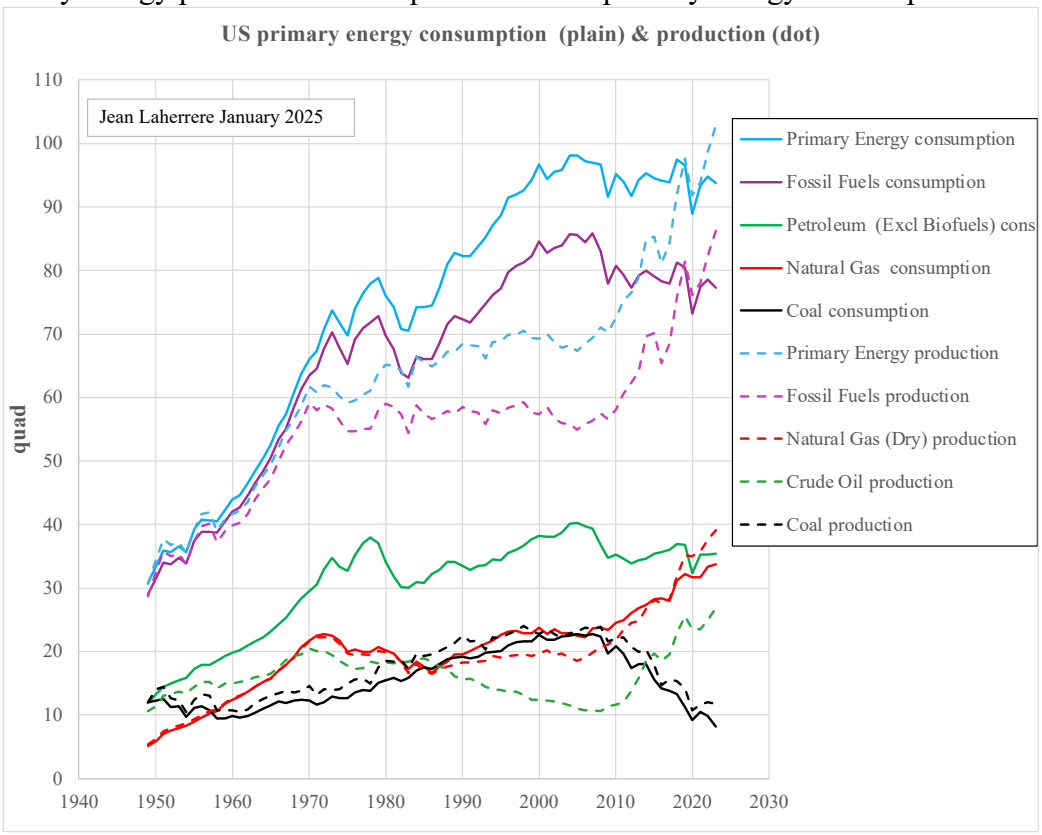



This symmetry could be due to a large number of oil producing companies (9000), then the production follows the law of large numbers which is symmetrical.
The question is that the US LTO decline could be sharper than the rise, but there is today no data to confirm the symmetry

For an ultimate of 10 000 quad US PE production will peak in 2035 in my forecast, but beyond 2050 for EIA/AEO2023

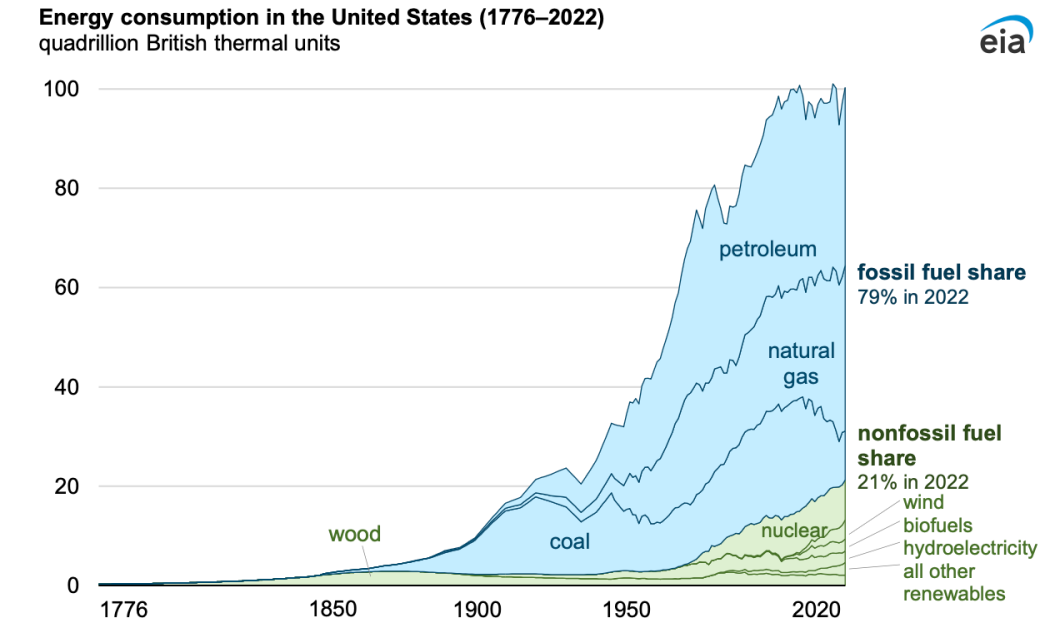



US primary energy production is compared with US primary energy consumption

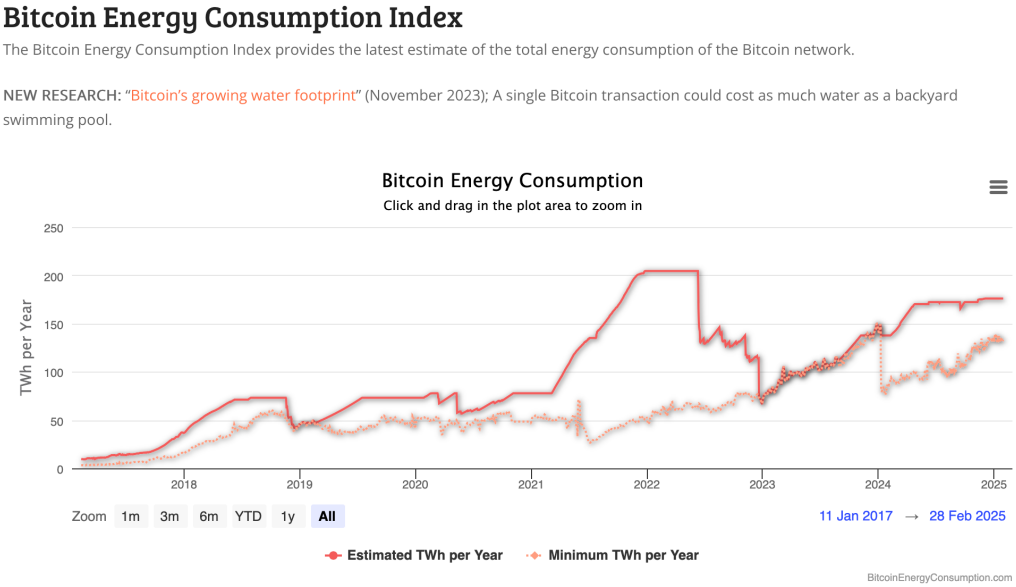



EIA displays US energy consumption 1776-2022 in quad by fuel

June 29, 2023

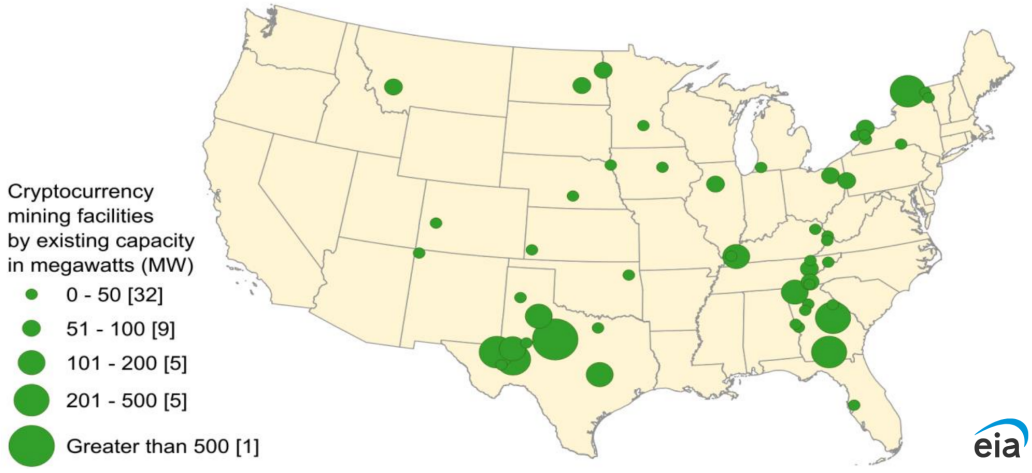



The bitcoin uses a lot of energy, but its consumption has a low in 2023 in this graph for the world



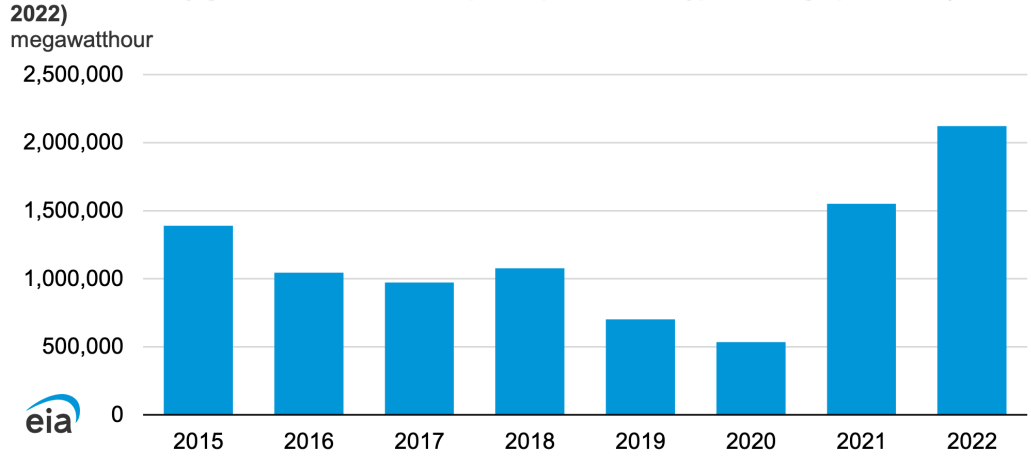

For US EIA graph on bitcoin plants: EIA says that getting data is difficult
Location: no plant in California where energy is scarce, most in Texas and Florida

**Locations of 52 U.S. cryptocurrency mining operations, as of January 2024**




**Data source:** U.S. Energy Information Administration
**Note:** The representative size shown for a facility is based upon estimates contained in our bottom-up approach. Number in brackets represents the number of facilities.

**Annual electricity generation at five select power plants with crypto-mining operations (2015–2022)**

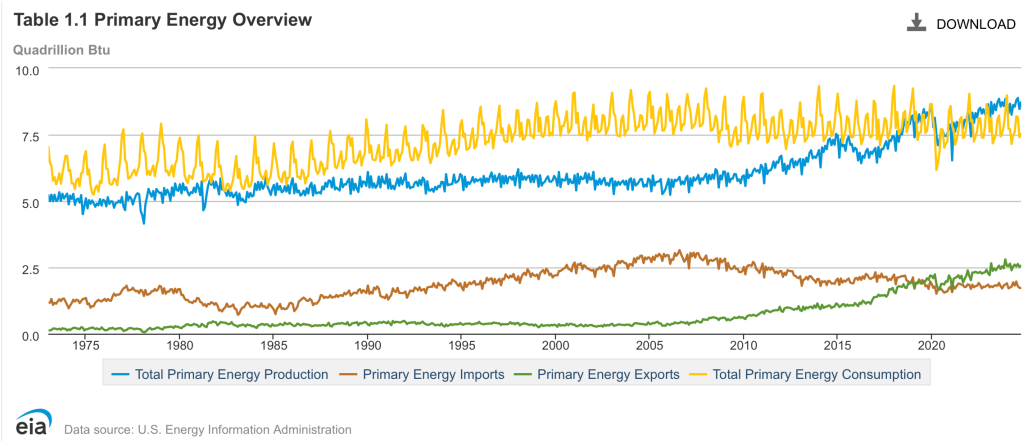



**Data source:** U.S. Energy Information Administration
**Note:** U.S. Energy Information Administration, Form EIA-923, *Power Plant Operations Report*

July 2024 https://www.utilitydive.com

> EIA's preliminary estimates suggest that electricity used for cryptocurrency mining likely represents between 0.6% and 2.3% of total U.S. electricity consumption, Steve Harvey, senior advisor to the EIA administrator, said Wednesday in a discussion with the crypto industry. "That's a significant piece, and suggests understanding it could be important as we go forward," he said.

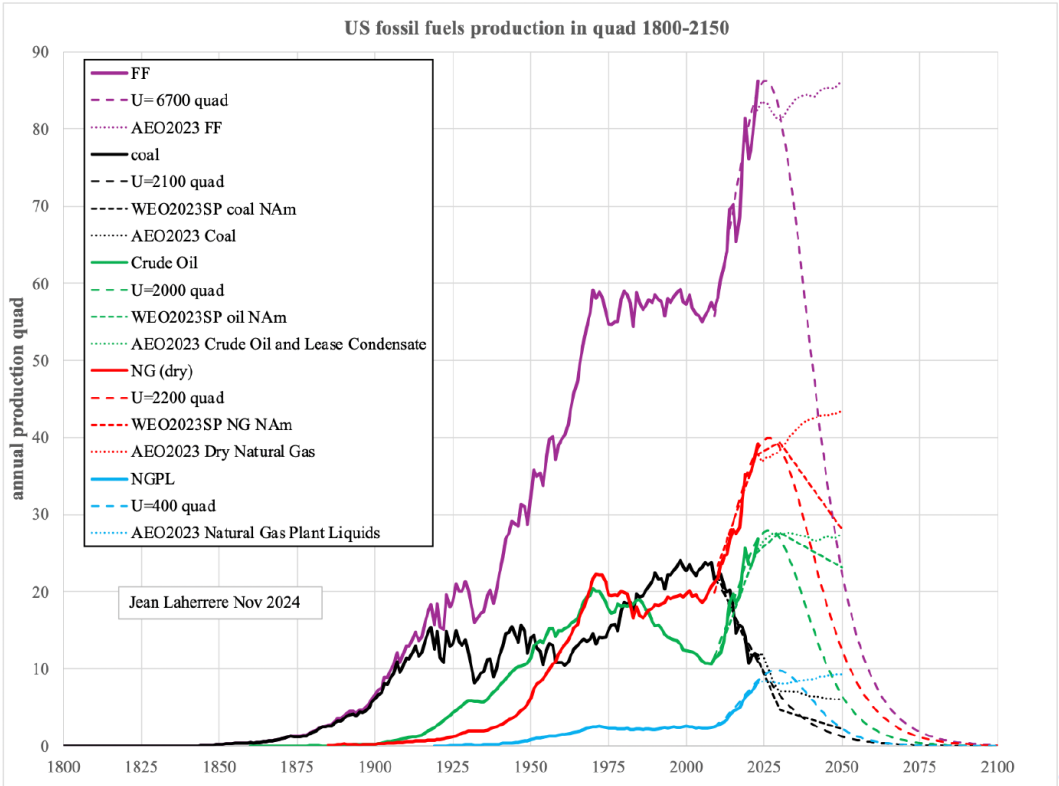
EIA graph on primary energy




In 2020 US starts to export energy with primary energy production (blue) is higher than primary energy consumption (yellow) and primary energy exports (green) are higher than primary energy imports (brown)

But this happy situation occurs only because the shale plays: in my 2024 paper US fossil fuel production forecast I displayed a sharp increase from 207 to a peak in 2025 followed by a sharp decrease: the problem is where to find the energy to mine bitcoin, to use ChatGPT (or even DeepSeek) and to keep driving!
Deloitte says that AI uses1.4% of world electric consumption and likely 3% by 2030. Gartner predicts power shortage will restrict 40% of AI data centers by 2027.

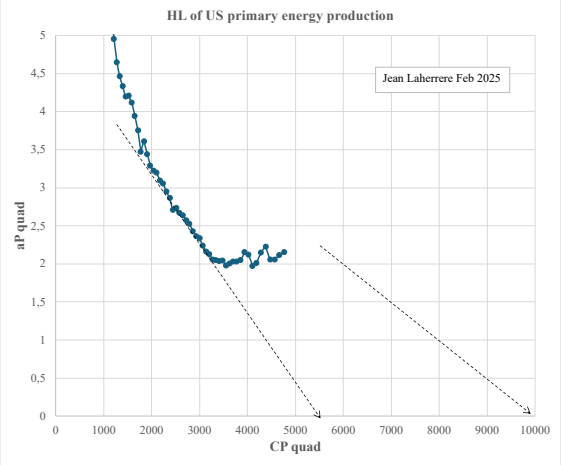
But EIA forecast AEO2023 (doted curve) is much more optimistic with peak beyond 2050 for natural gas and fossil fuels

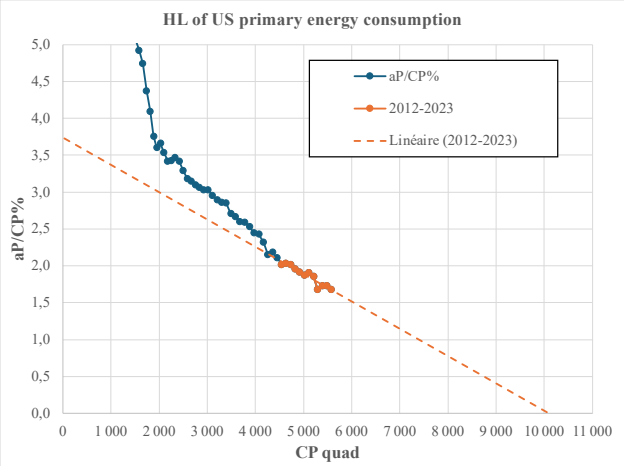



It is likely that President Trump will see this sharp fossil fuel production decline during his administration despite his “drill, baby drill”: the goal is not to drill on poor locations, but to produce more wells to replace the steep decline of shale wells!
https://www.theguardian.com/business/2024/nov/19/trump-oil-gas-prices

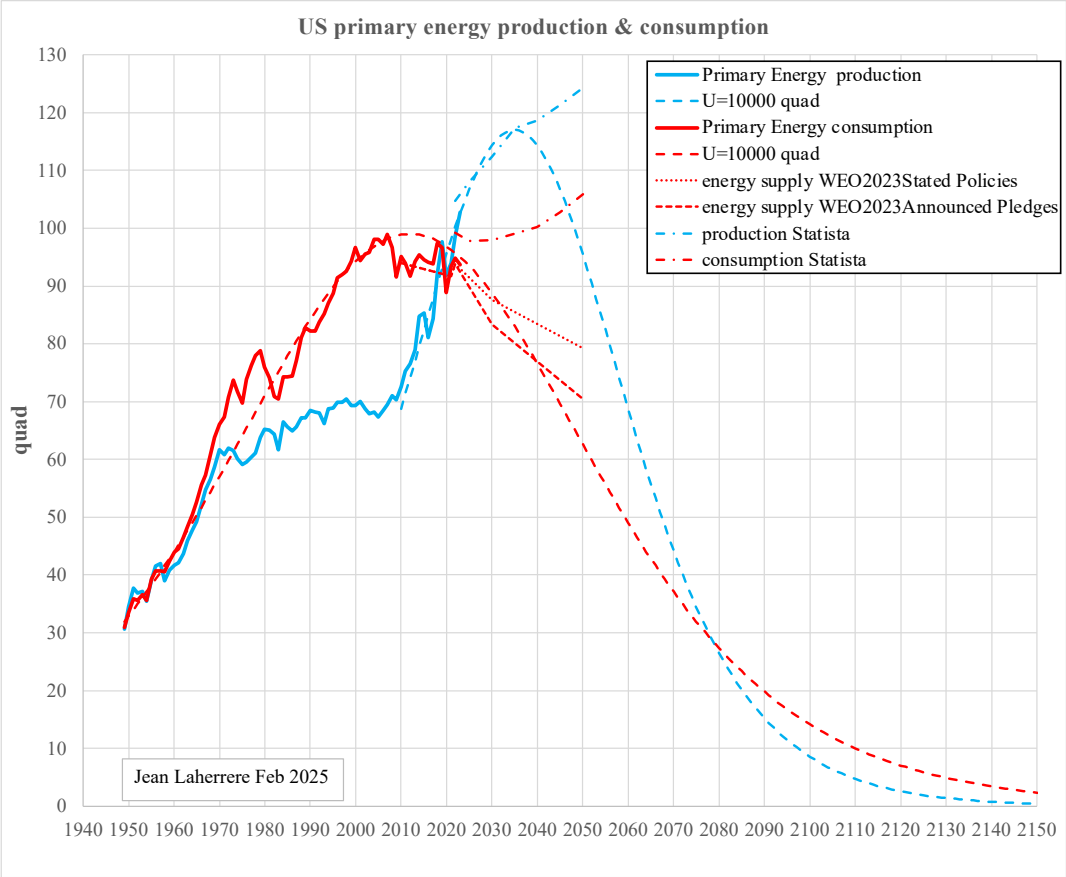
*Darren Woods, CEO of ExxonMobil, the largest US oil and gas company, is also skeptical of Trump's plan. "I'm not sure how 'drill, baby, drill' translates into policy," he told CNBC after its latest results.*
*There are also technical specifications for how much US shale oil gasoline refiners can accept, as refiners blend different types of crude oil. Before shale oil became so abundant, refiners had invested heavily to refine mostly the heavier oils the US imports from Canada and a few other countries, rather than to refine the lighter shale oil, Thummel noted.*
Refracking is now very efficient: https://worldoil.com/news/2024/8/20/bakken-operators-could-unlock-3-000-additional-drilling-locations-with-refracs-enverus-reports/
*Bakken operators could unlock 3,000 additional drilling locations with refracs, Enverus reports*
US production engineers are very good in improving shale production techniques!

The HL of US PE production is hopeless but not on US PE consumption which trends fairly to 10 000 quads. A 10 000 quad ultimate is also chosen for production to get a best fit

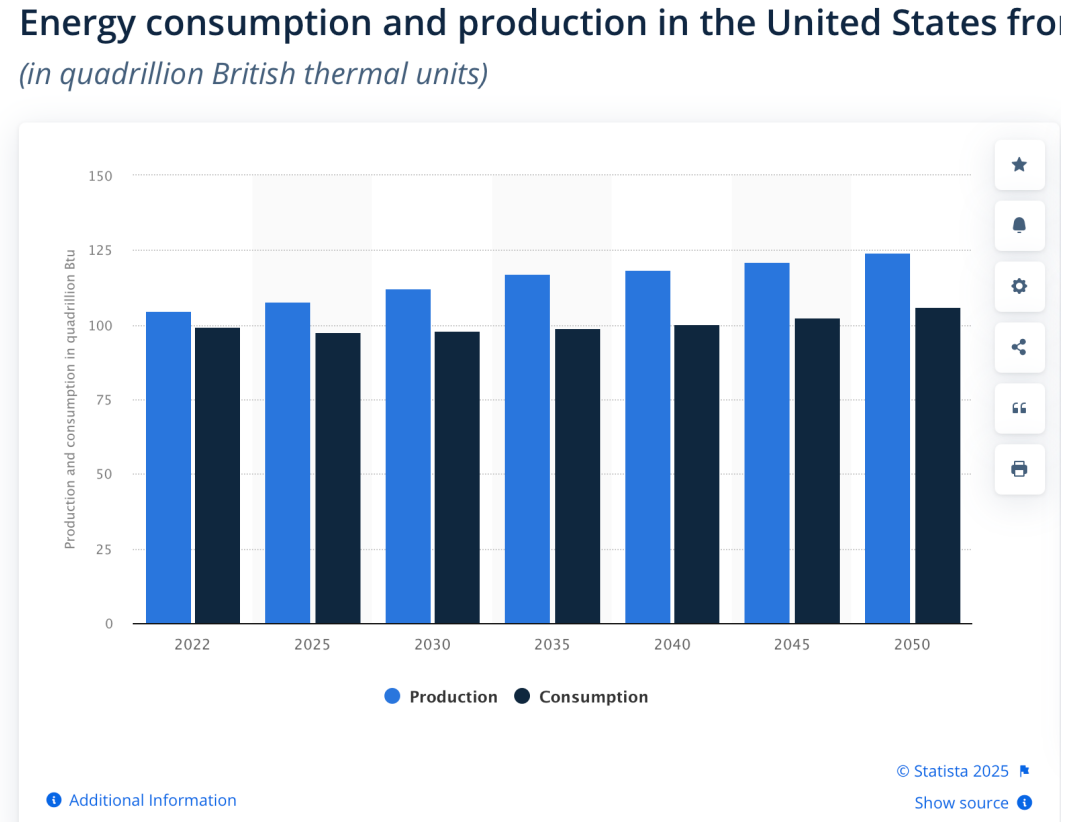


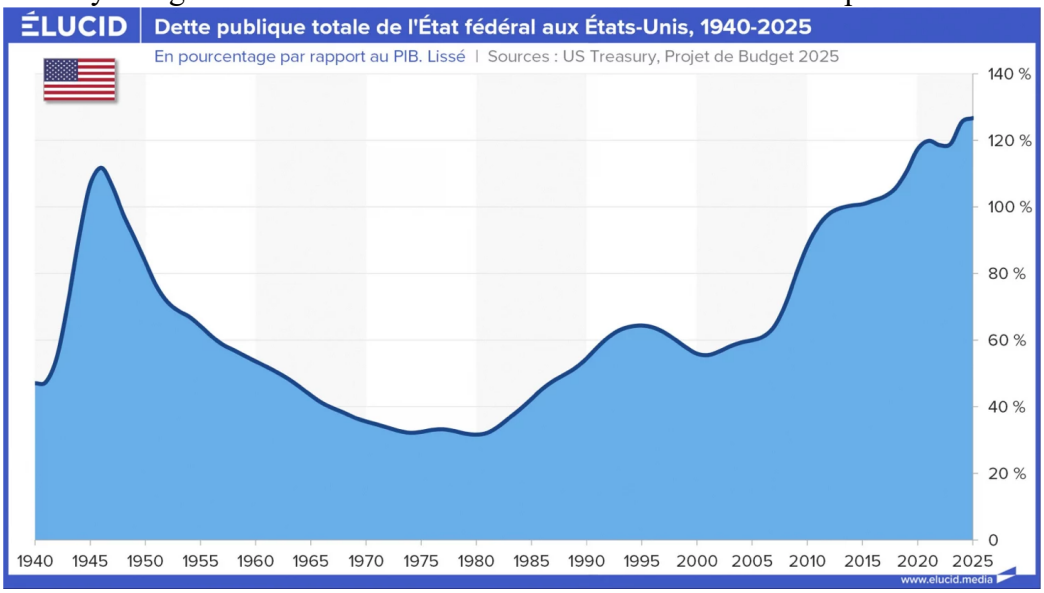

US PE forecast from HL displays a peak in 2007 for consumption and in 2035 for production, but it looks queer to see US PE consumption (red) declining, as for IEA/WEO2023 forecasts
I wonder about the reliability of these HL forecasts, but I do know a better approach with the data I have!
IEA/WEO2023 forecasts 2 scenarios Stated Policies and Announced Pledges




Statista displays US PE consumption & production forecast 2022-2050 with production increase and consumption low in 2025-2030



ELUCID (Olivier Berruyer) displays this graph on US debt in % GDP 1940-2025
US debt today is higher than in 1945 and the increase since 2008 is sharp




US oil and gas production is connected to the amount of drilling (wells & footage)

**-North Dakota Bakken crude oil production**

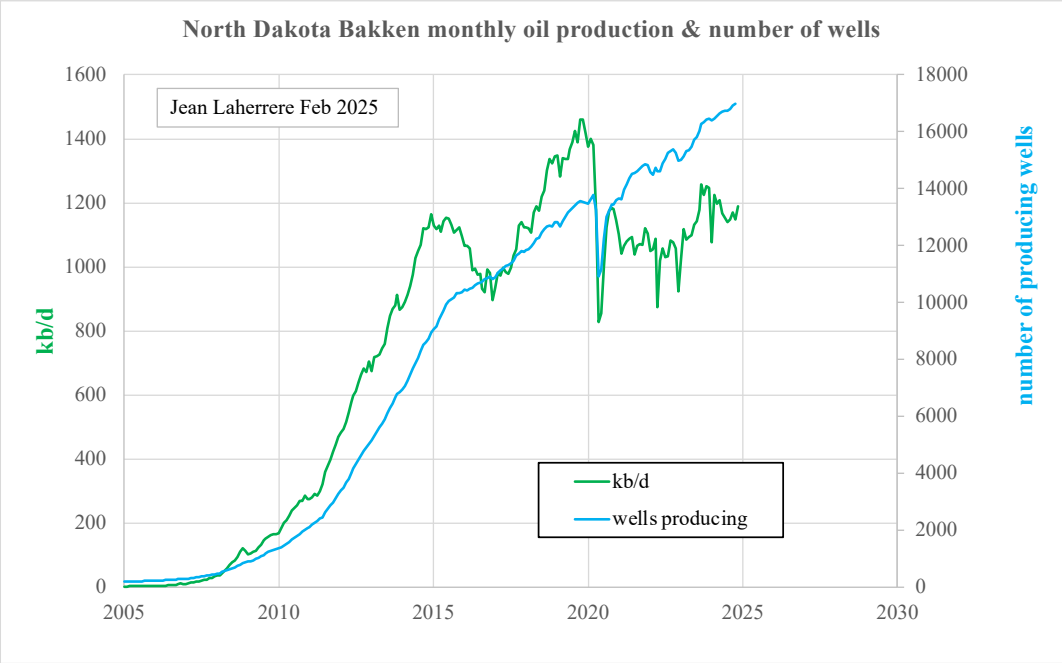
**-monthly data**

North Dakota is a good example of shale oil play with reliable monthly data provided by the State
The next table shows the difference between sources 914 state and Enverus

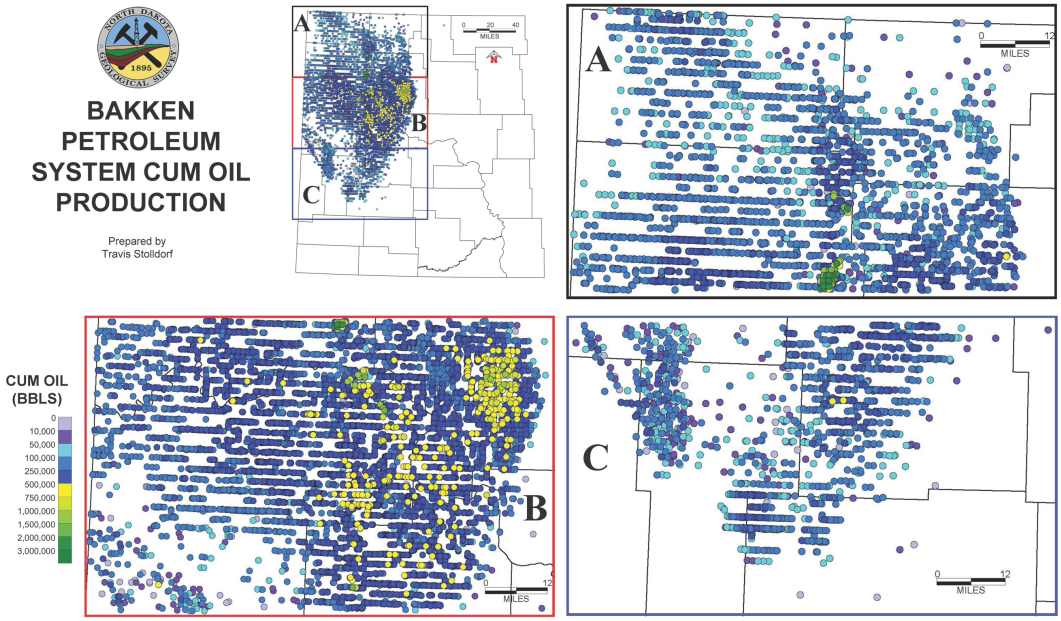
**North Dakota**

| Report Month | 914 Survey Reported mbbls/d | 914 Estimate mbbls/d | Final mbbls/d | Current Reported State Data mbbls/d | Current Enverus Data mbbls/d |
|---|---|---|---|---|---|
| janv23 | 978 | 1 049 | 1 053 | 1 053 | 1 058 |
| févr23 | 1 040 | 1 128 | 1 147 | 1 147 | 1 153 |
| mars23 | 1 007 | 1 094 | 1 112 | 1 112 | 1 119 |
| avr23 | 1 016 | 1 108 | 1 122 | 1 122 | 1 129 |
| mai23 | 1 025 | 1 122 | 1 127 | 1 127 | 1 134 |
| juin23 | 1 050 | 1 166 | 1 160 | 1 160 | 1 168 |
| juil23 | 1 062 | 1 187 | 1 173 | 1 173 | 1 180 |
| août23 | 1 096 | 1 229 | 1 207 | 1 206 | 1 214 |
| sept23 | 1 165 | 1 308 | 1 287 | 1 287 | 1 289 |
| oct23 | 1 134 | 1 273 | 1 253 | 1 253 | 1 257 |
| nov23 | 1 149 | 1 288 | 1 278 | 1 278 | 1 282 |
| déc23 | 1 145 | 1 274 | 1 275 | 1 273 | 1 277 |
| janv24 | 993 | 1 102 | 1 102 | 1 100 | 1 105 |
| févr24 | 1 125 | 1 248 | 1 248 | 1 251 | 1 255 |
| mars24 | 1 102 | 1 215 | 1 215 | 1 226 | 1 231 |
| avr24 | 1 111 | 1 227 | 1 227 | 1 238 | 1 242 |
| mai24 | 1 072 | 1 184 | 1 184 | 1 195 | 1 198 |
| juin24 | 1 064 | 1 175 | 1 175 | 1 186 | 1 185 |
| juil24 | 1 048 | 1 161 | 1 161 | 1 169 | 1 168 |
| août24 | 1 058 | 1 176 | 1 176 | 1 180 | 1 179 |
| sept24 | 1 084 | 1 208 | 1 208 | 1 200 | 1 198 |
| oct24 | 1 074 | 1 156 | 1 156 | 1 178 | 1 158 |
| nov24 | 1 107 | 1 197 | 1 197 | 1 221 | 1 |

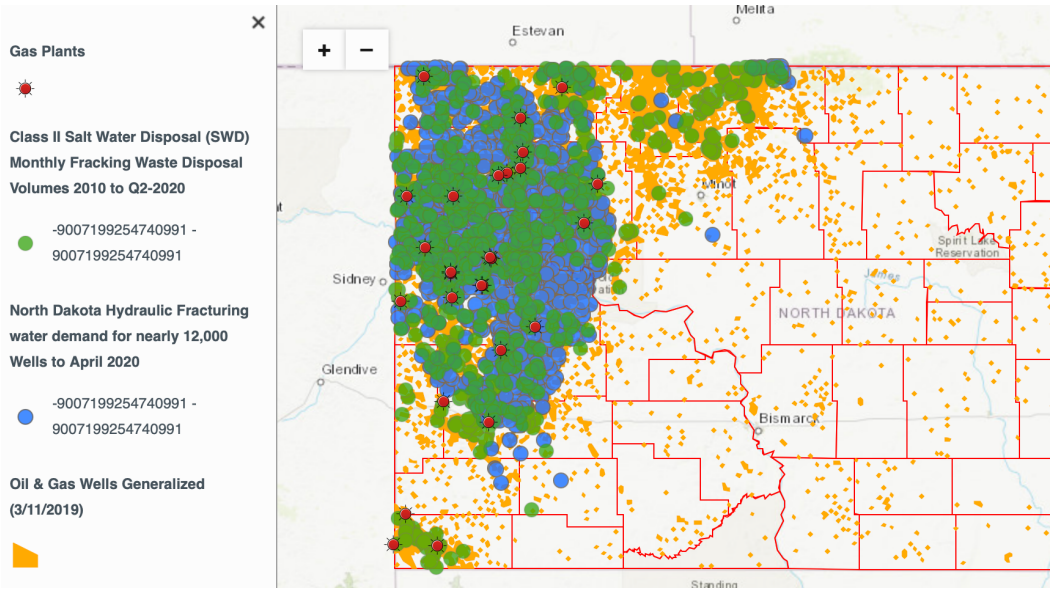
North Dakota State provides reliable production data on
https://www.dmr.nd.gov/oilgas/mprindex.asp
Oil producers very good in increasing the number of producing wells




It is hard to find on the web a good map of present Bakken wells with a date!
This one by Stolldorf is undated

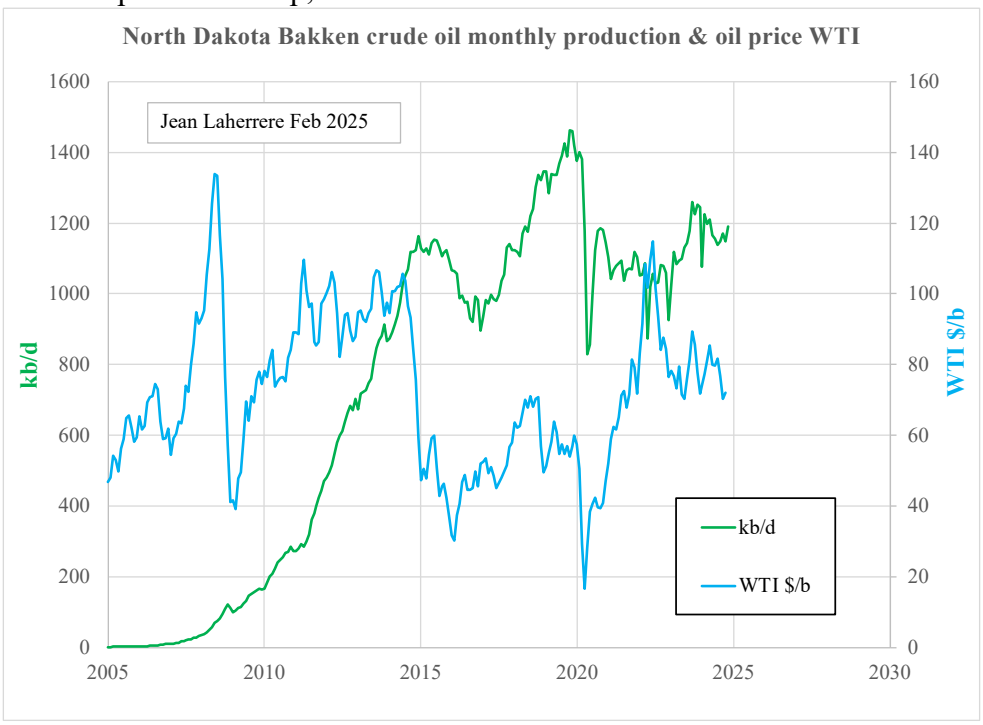



Maps.fractracker.org at end 2020

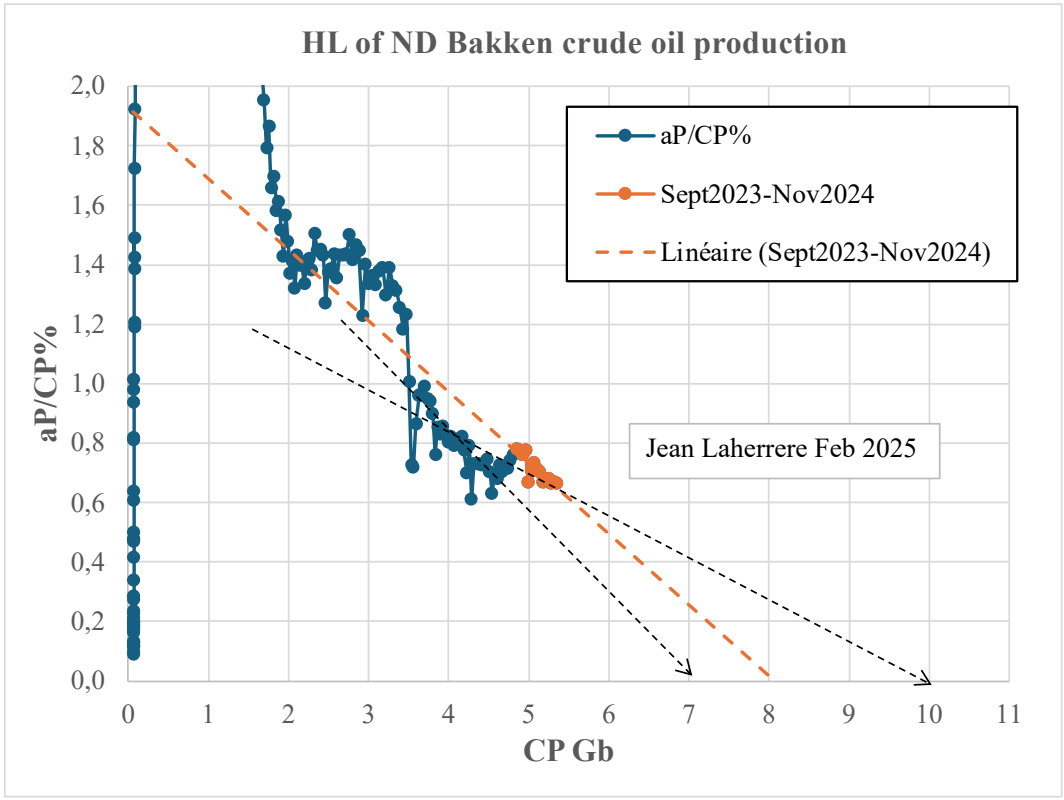



NG producers has increase sharply in 2024 the average proppants per well: about 40% more from first quarter to fourth quarter.

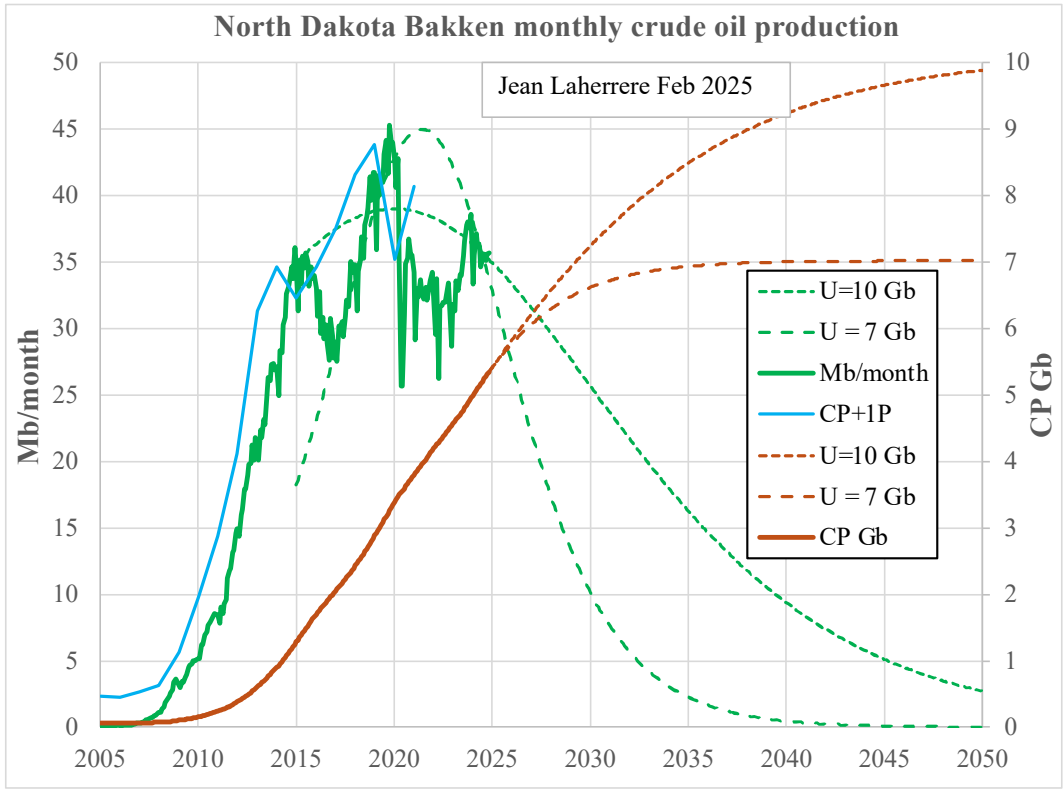
The comparison of oil production and WTI oil price shows the impact of price on production, but COVID impact was sharp, but shorter.




HL of ND Bakken crude oil production trends poorly towards 8 Gb, but a range from 7 Gb to 10 Gb

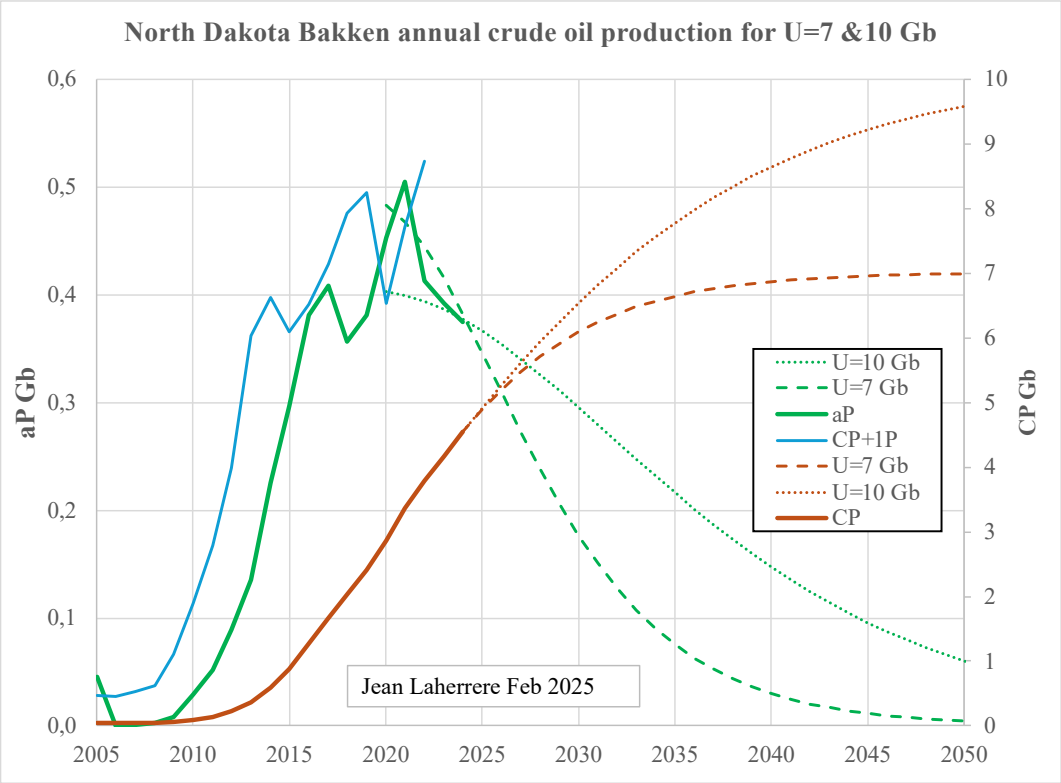



With an ultimate of 7 Gb the future monthly production will decline to 10 Mb/month in 2030, but to 25 Mb/month for an ultimate of 10 Gb




**-annual data**

Annual data comes from the monthly data using the same ultimates




**-Texas crude oil production**

I do not trust EIA production data which are not measures but estimates (form 914) I rely on RRC data

The next EIA table shows the discrepancy between sources and between 914!:

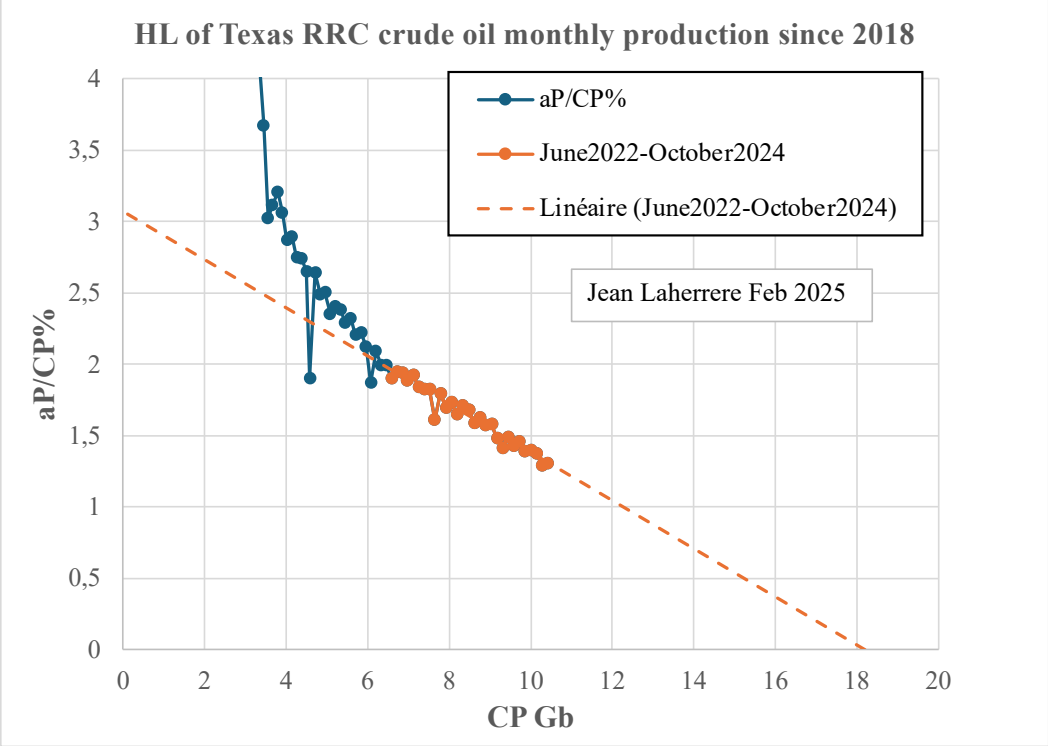
For October 2024 form 914 = 5831 kb/d when State =4672 kb/d, 25% discrepancy!

**Texas**

| Report Month | 914 Survey Reported mbbls/d | 914 Estimate mbbls/d | Final mbbls/d | Current Reported State Data mbbls/d | Current Enverus Data mbbls/d |
|---|---|---|---|---|---|
| déc22 | 4 603 | 5 195 | 5 216 | 5 217 | 5 236 |
| janv23 | 4 672 | 5 318 | 5 316 | 5 326 | 5 342 |
| févr23 | 4 627 | 5 306 | 5 291 | 5 304 | 5 322 |
| mars23 | 4 786 | 5 454 | 5 454 | 5 459 | 5 483 |
| avr23 | 4 770 | 5 408 | 5 408 | 5 414 | 5 443 |
| mai23 | 4 821 | 5 500 | 5 500 | 5 441 | 5 485 |
| juin23 | 4 893 | 5 538 | 5 538 | 5 410 | 5 475 |
| juil23 | 4 955 | 5 560 | 5 560 | 5 488 | 5 560 |
| août23 | 5 010 | 5 603 | 5 603 | 5 502 | 5 581 |
| sept23 | 4 983 | 5 570 | 5 570 | 5 478 | 5 565 |
| oct23 | 5 035 | 5 586 | 5 586 | 5 498 | 5 596 |
| nov23 | 5 118 | 5 658 | 5 658 | 5 566 | 5 675 |
| déc23 | 5 110 | 5 631 | 5 631 | 5 497 | 5 614 |
| janv24 | 4 867 | 5 373 | 5 373 | 5 235 | 5 351 |
| févr24 | 5 025 | 5 548 | 5 548 | 5 414 | 5 545 |
| mars24 | 5 037 | 5 583 | 5 583 | 5 420 | 5 578 |
| avr24 | 5 068 | 5 637 | 5 637 | 5 439 | 5 619 |
| mai24 | 5 098 | 5 688 | 5 688 | 5 424 | 5 650 |
| juin24 | 5 154 | 5 756 | 5 756 | 5 364 | 5 678 |
| juil24 | 5 126 | 5 700 | 5 700 | 5 265 | 5 629 |
| août24 | 5 201 | 5 805 | 5 805 | 5 242 | 5 668 |
| sept24 | 5 207 | 5 798 | 5 798 | 5 089 | 5 602 |
| oct24 | 5 237 | 5 831 | 5 831 | 4 672 | 4 843 |
| nov24 | 5 174 | 5 761 | 5 761 | NA | 0 |

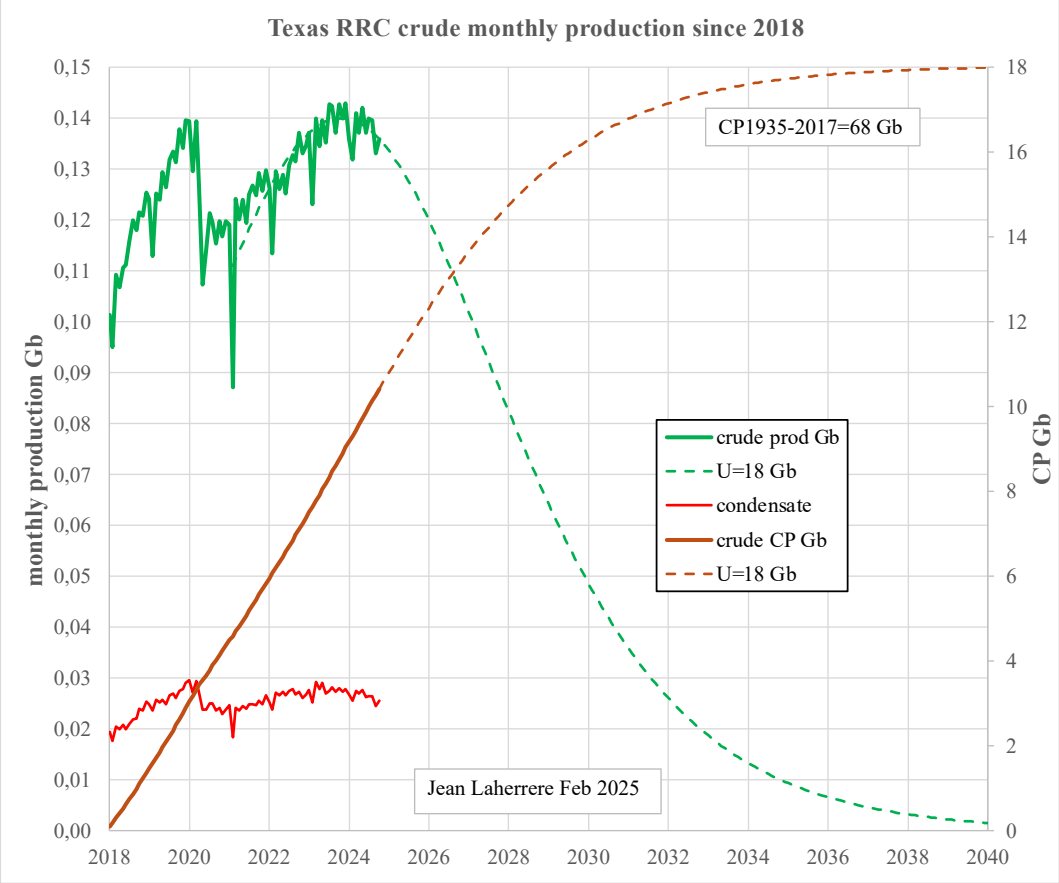
**-monthly crude oil production**

HL of Texas crude oil monthly production (since 2018) trends towards 18 Gb



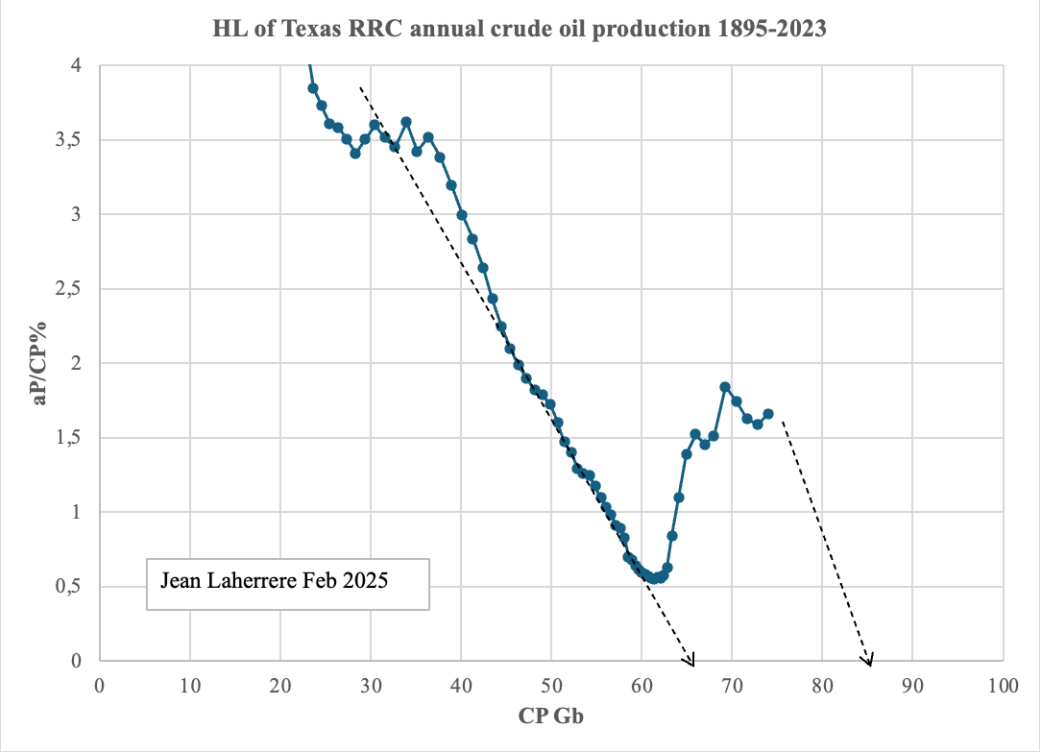

The cumulative production (see below) 1895-2017 is 68 Gb

Texas future crude oil production has peaked in 2023 and will decline in future

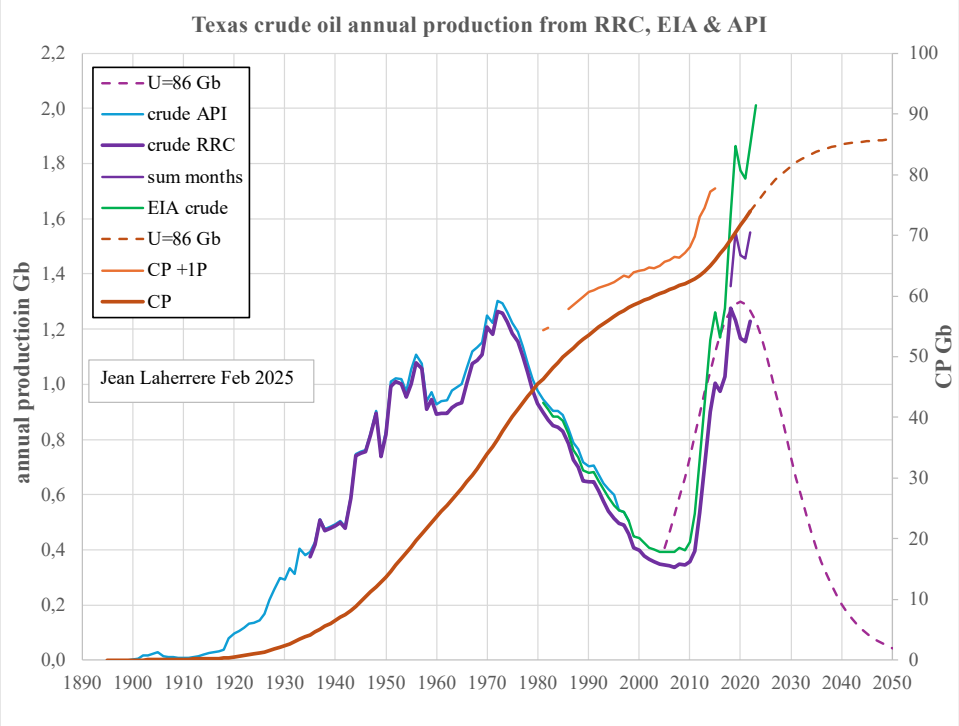



**-annual crude oil production 1895-2023**

HL of Texas crude oil annual production is useless, but monthly production has given an ultimate of 18 Gb since 2018 and the CP2017= 68 Gb giving a total 86 Gb

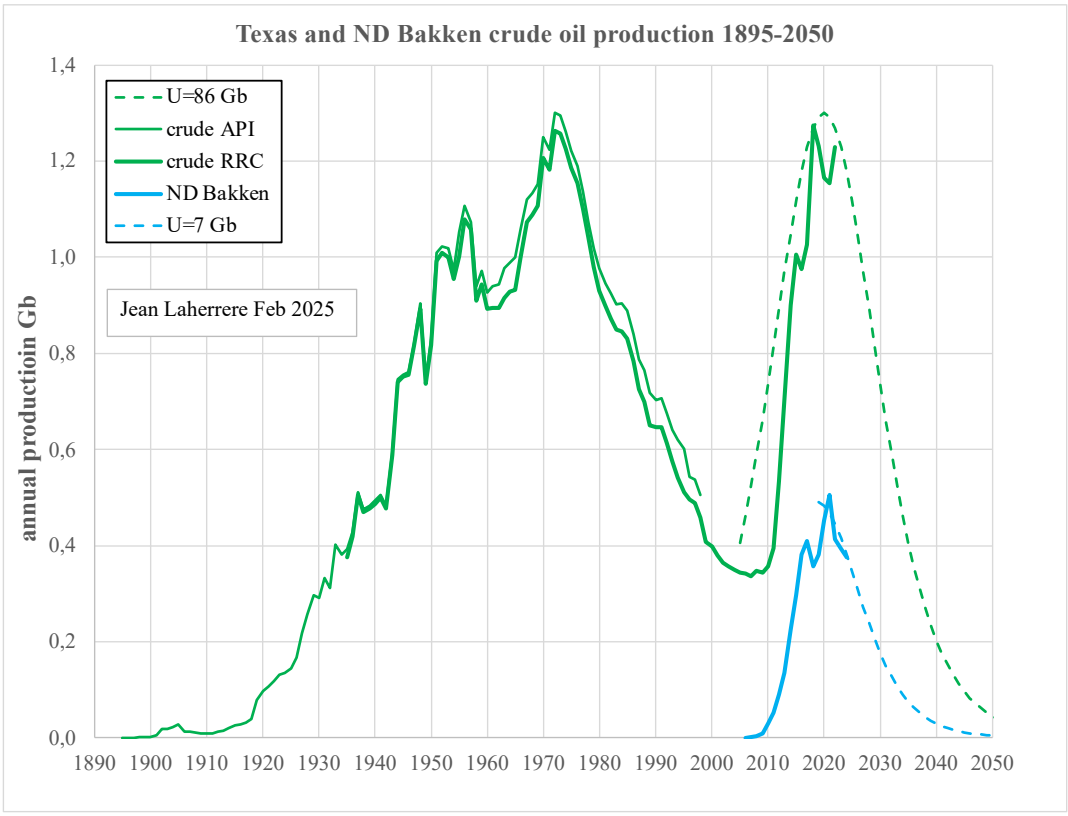



An ultimate of 86 Gb means a future decline: Texas crude oil production will be in 2030 about 700 Mb/a as in 1944 and 1988.



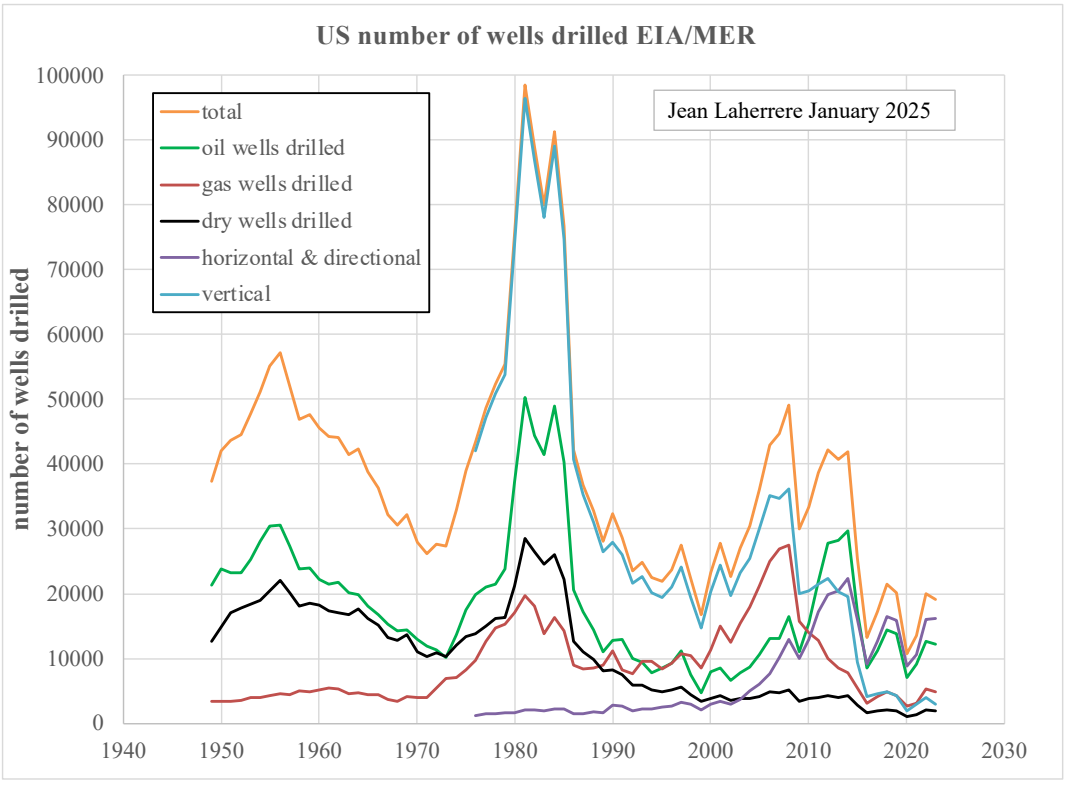

**-Comparison Texas and ND Bakken oil production**

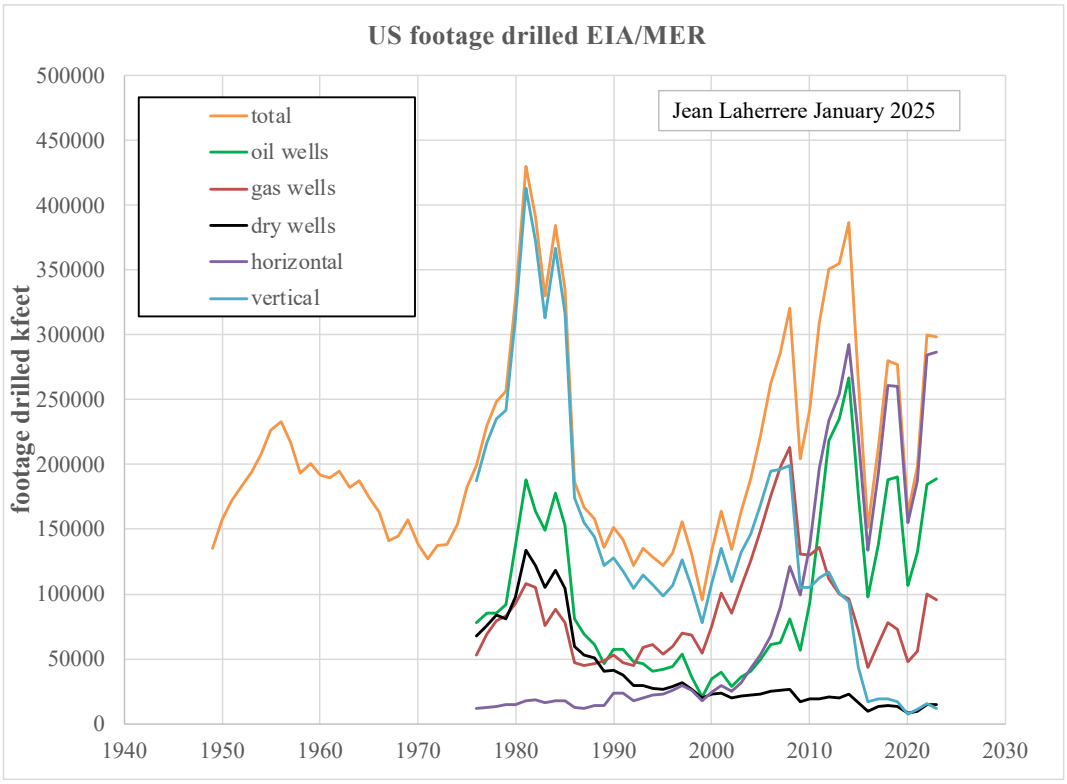
Crude oil production forecasts are compared between Texas and ND Bakken



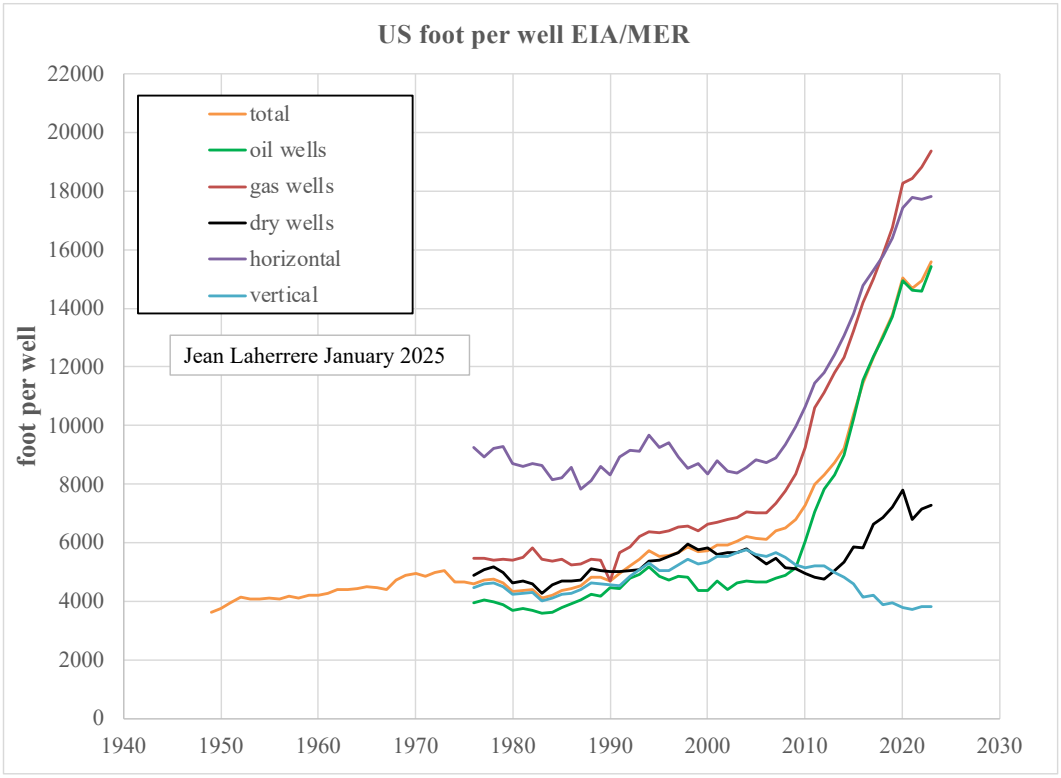

**-US drilling**

MER Table 5.02

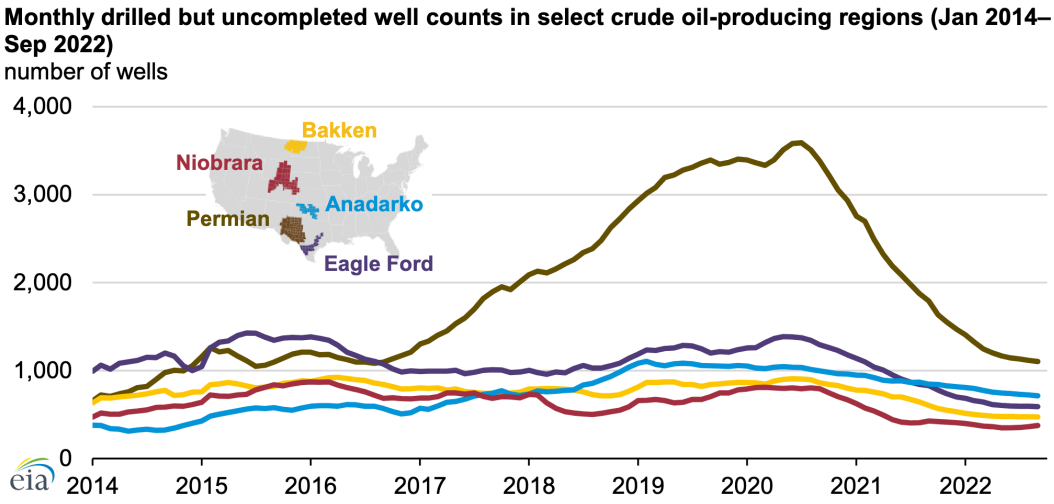




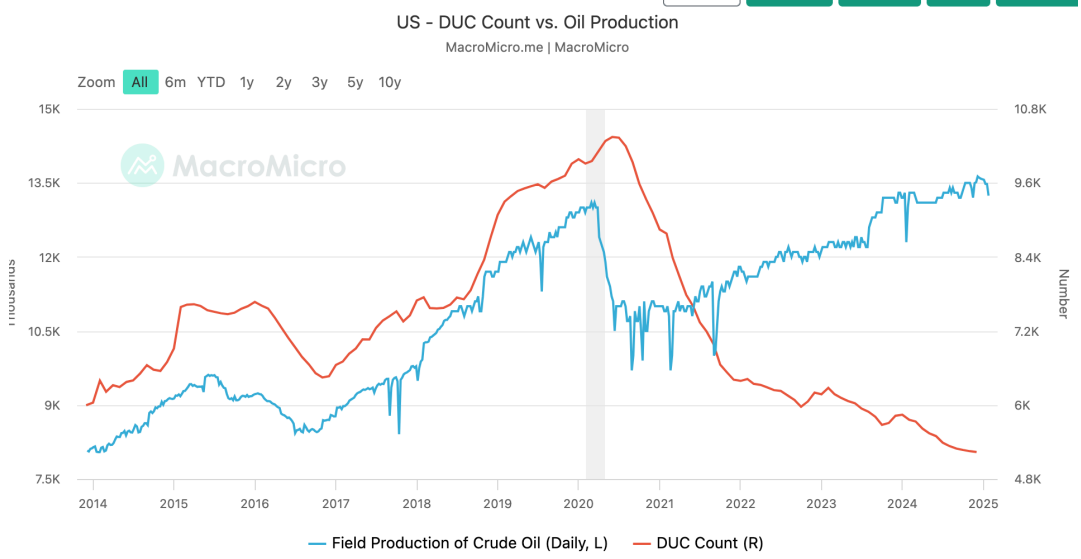

Since 2009 the footage per well has increased sharply with large horizontal extents, expecially for gaswells



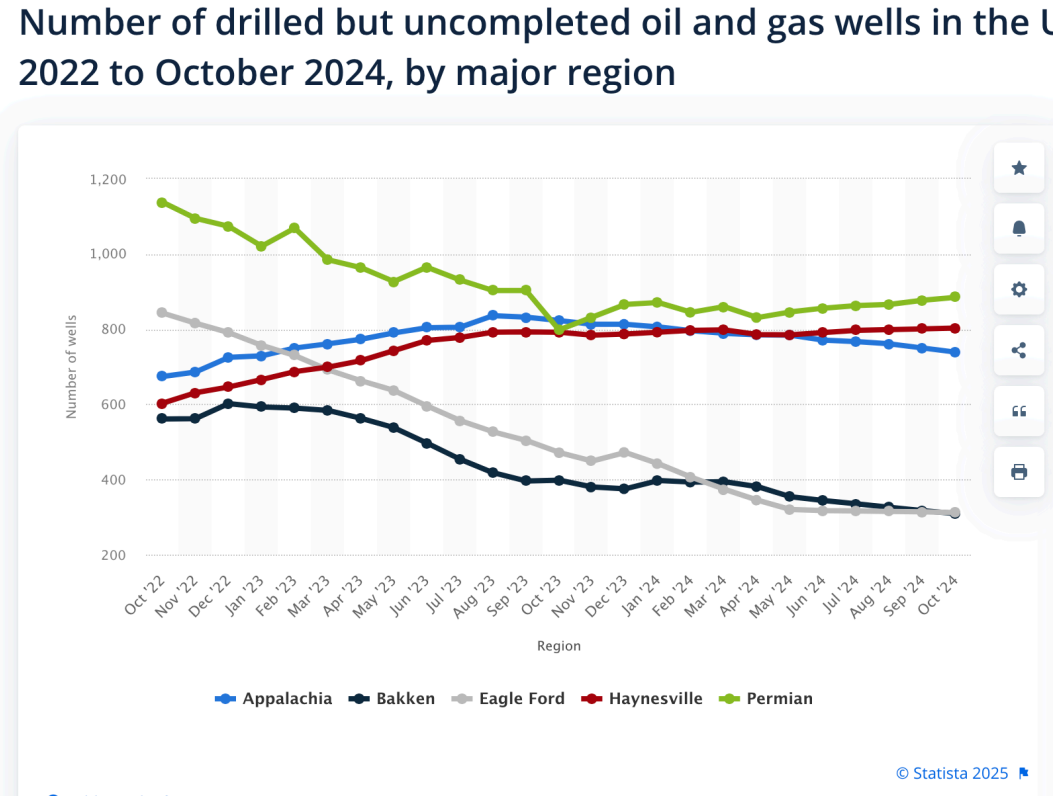

The number of drilled but uncompleted wells is declining, mainly on Permian:
DUC by region




US DUC and oil production: in 2020, DUC (red) declines and oil production (blue) increases:




Is DUCs decline going to continue?
Permian DUCs are slightly on the increase




**-conclusion**

The forecast reliability relies upon the truth of good data on the past and on the resources. But real past data are confidential and what is published is manipulated or badly estimated or measured!

The only country publishing oil production and 2P reserves by field are UK and Norway (but under their definitions), as also BOEM for the Gulf of Mexico.

Historical real data are scarce (most information national agencies (EIA, INSEE) report only limited time series), then forecasts are poor. The only way to improve the forecast is to improve the historical data.

But countries are reluctant (or too lazy) to show what they have done; it means that they are not very proud of it!