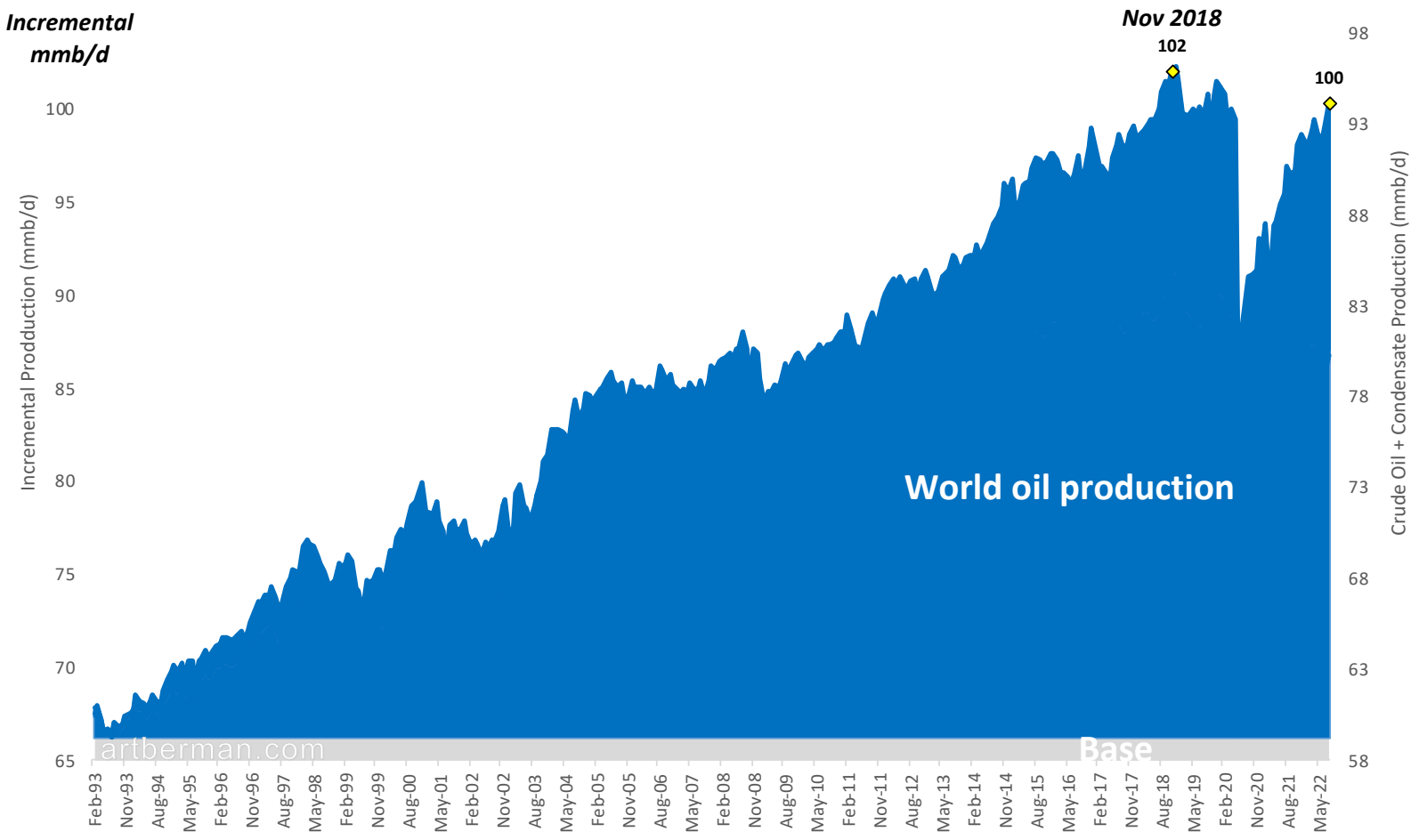
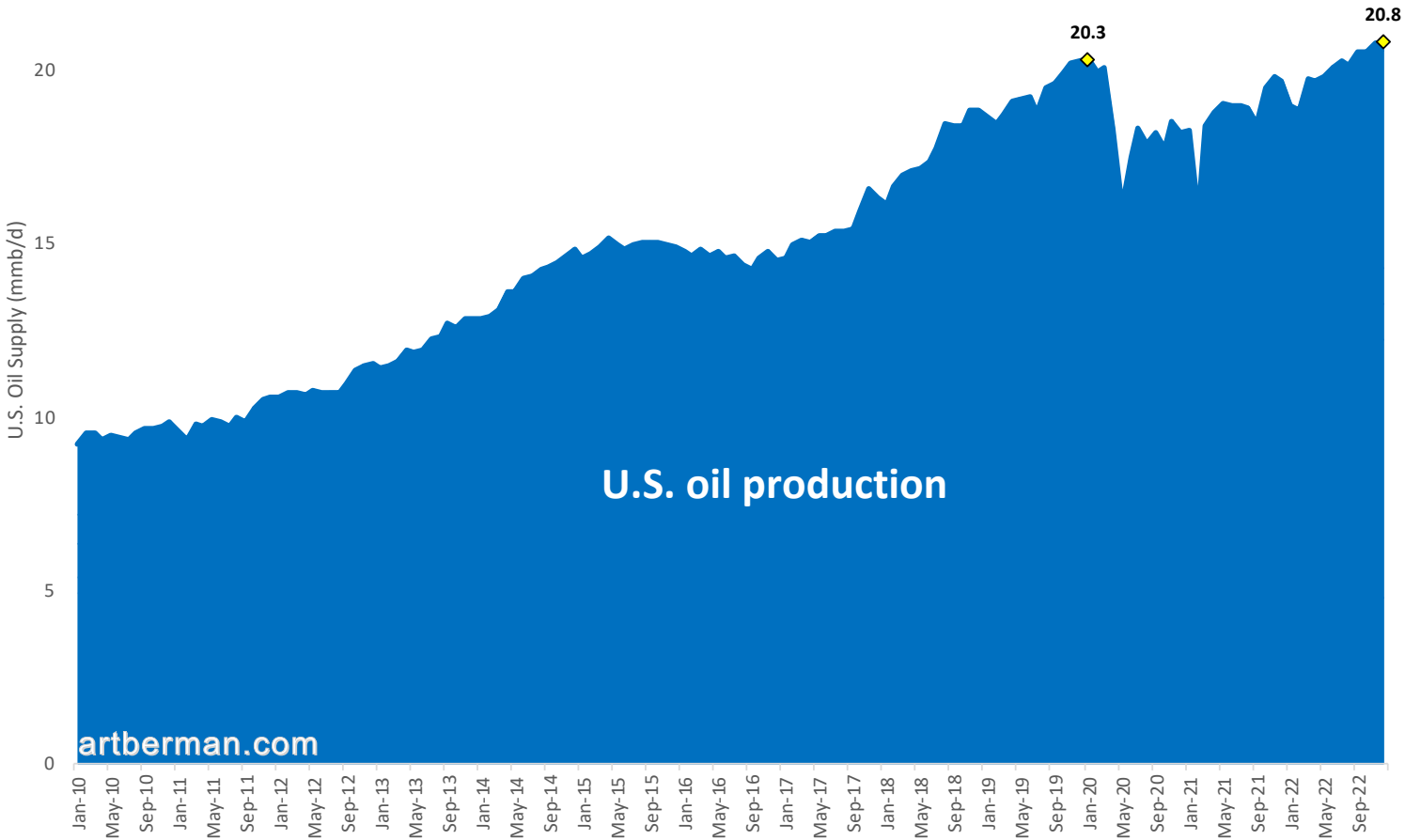
World liquids production has recovered to 99% of 2018 level



Source: EIA,& Labyrinth Consulting Services, Inc

EIA/EIA International/International_data MASTER_2022.xlsx

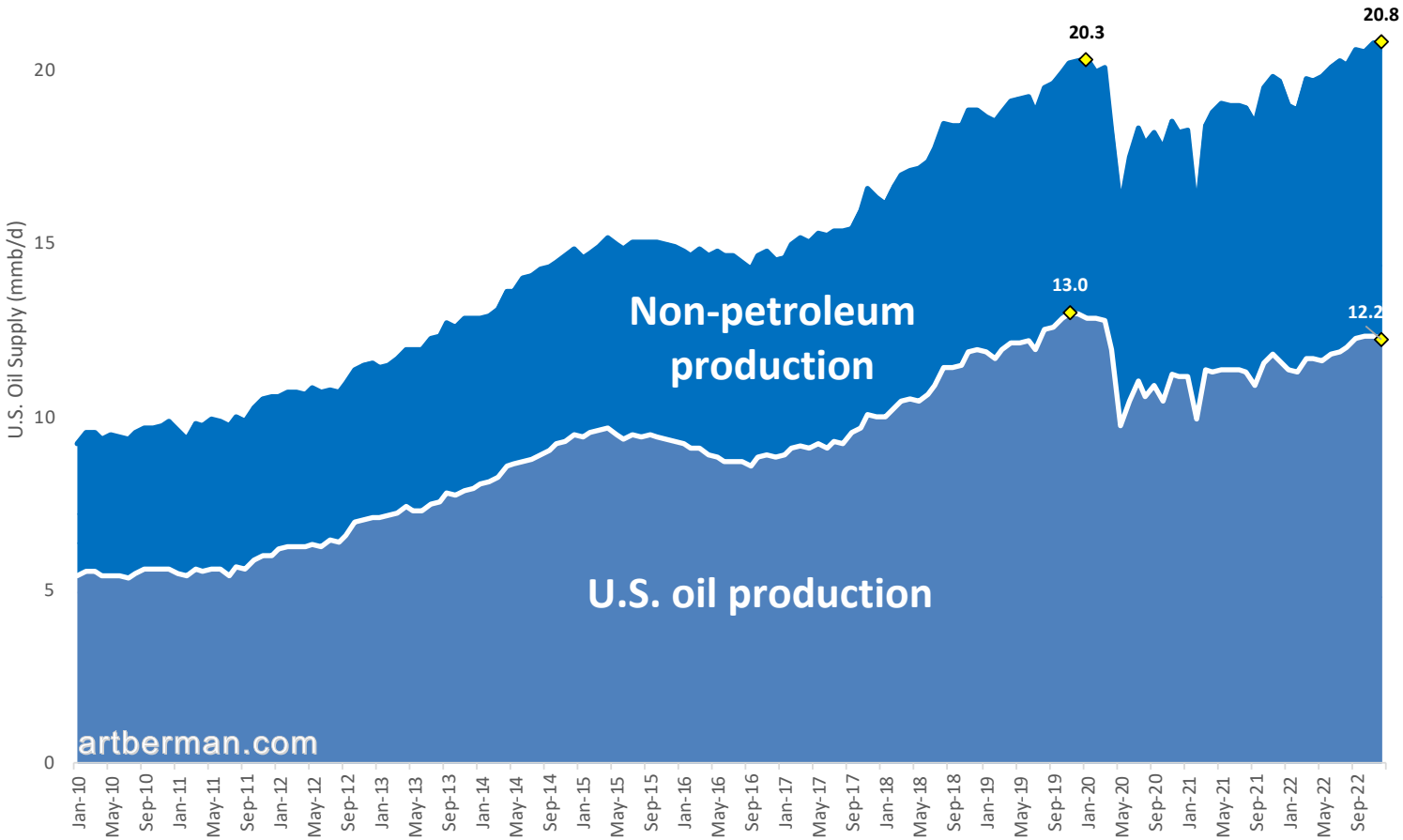
U.S. oil production is expected to exceed pre-pandemic peak in December 2022



Source: EIA STEO & Labyrinth Consulting Services, Inc.

EIA Current/STEO/STEO Master 2022

Less than 60% of U.S. "oil" production is really oil
The rest is non-petroleum and comes from natural gas, plants & refinery gain



Source: EIA STEO & Labyrinth Consulting Services, Inc.

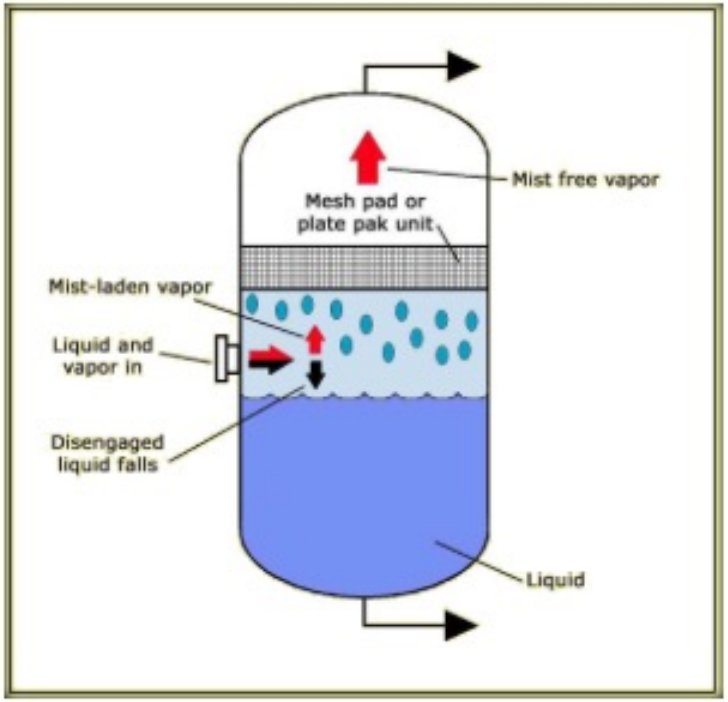
EIA Current/STEO/STEO Master 2022

What are natural gas liquids (NGLs)?

Hydrocarbons in ***natural gas*** that are separated as liquids at natural gas processing, fractionating, and cycling plants. Products obtained include ethane, liquefied petroleum gases (propane, normal butane, and isobutane), and natural gasoline (pentane).

NGL Attribute Summary

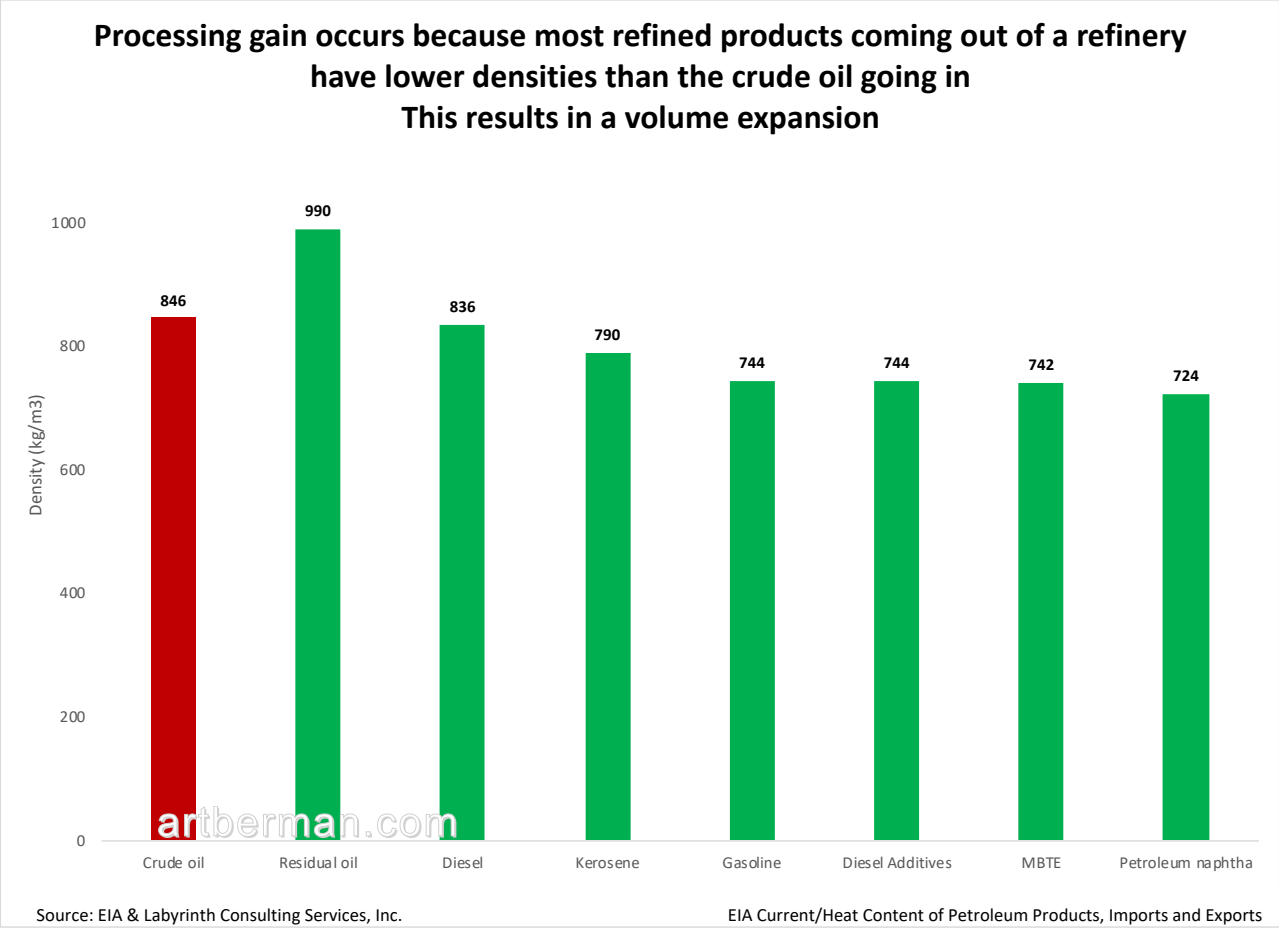
Natural Gas Liquid	Chemical Formula	Applications	End Use Products	Primary Sectors
Ethane	C_2H_6	Ethylene for plastics production; petrochemical feedstock	Plastic bags; plastics; anti-freeze; detergent	Industrial
Propane	C_3H_8	Residential and commercial heating; cooking fuel; petrochemical feedstock	Home heating; small stoves and barbeques; LPG	Industrial, Residential, Commercial
Butane	C_4H_{10}	Petrochemical feedstock; blending with propane or gasoline	Synthetic rubber for tires; LPG; lighter fuel	Industrial, Transportation
Isobutane	C_4H_{10}	Refinery feedstock; petrochemical feedstock	Alkylate for gasoline; aerosols; refrigerant	Industrial
Pentane	C_5H_{12}	Natural gasoline; blowing agent for polystyrene foam	Gasoline; polystyrene; solvent	Transportation
Pentanes Plus*	Mix of C_5H_{12} and heavier	Blending with vehicle fuel; exported for bitumen production in oil sands	Gasoline; ethanol blends; oil sands production	Transportation



Ethane is the largest share (~55%) of NGL production. It is used almost exclusively to produce ethylene, which is then turned into **plastic bags**, anti-freeze and detergent.

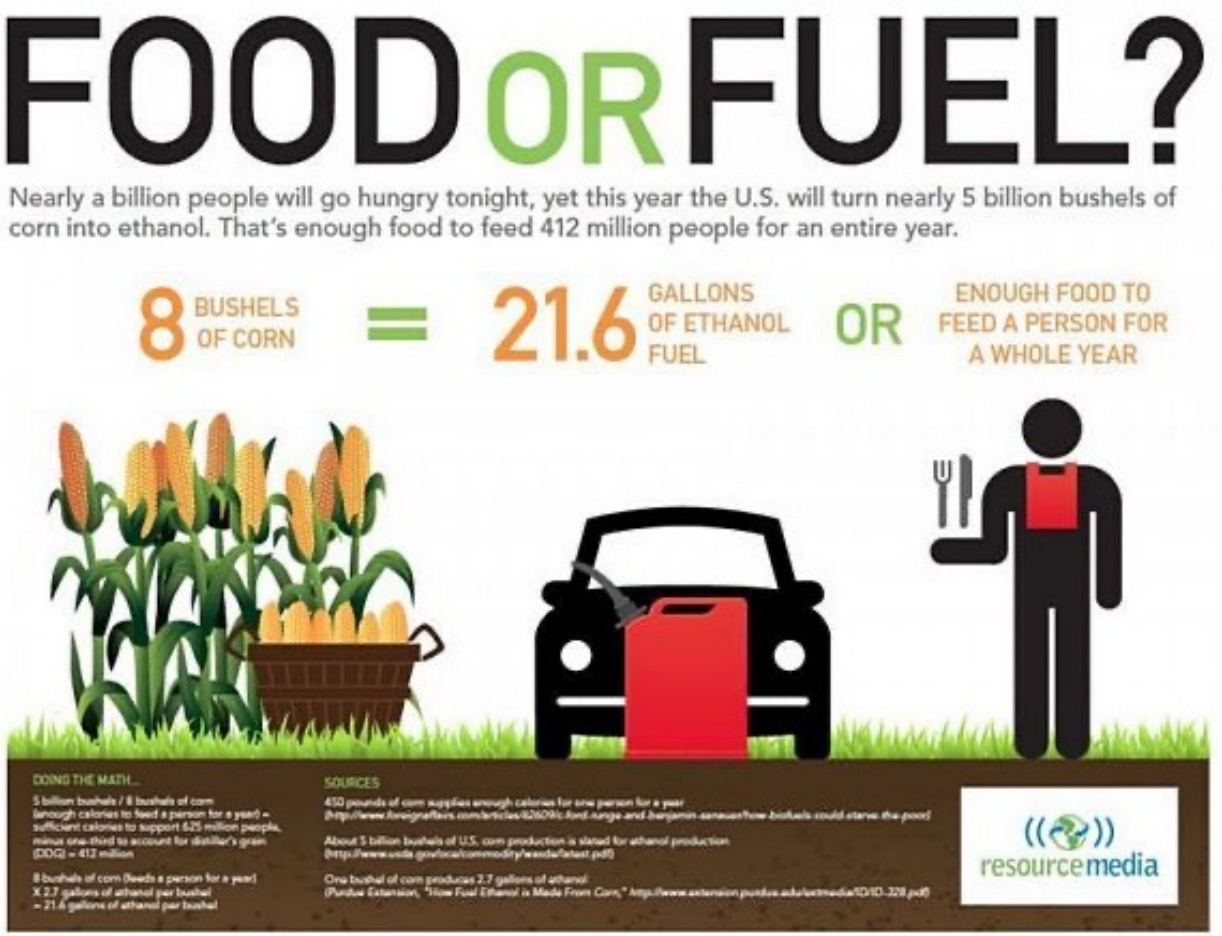
What is refinery gain?

Gain is the refining phenomenon in which the volume of refined product coming out of a refinery or conversion unit is greater than the volume of product going in.



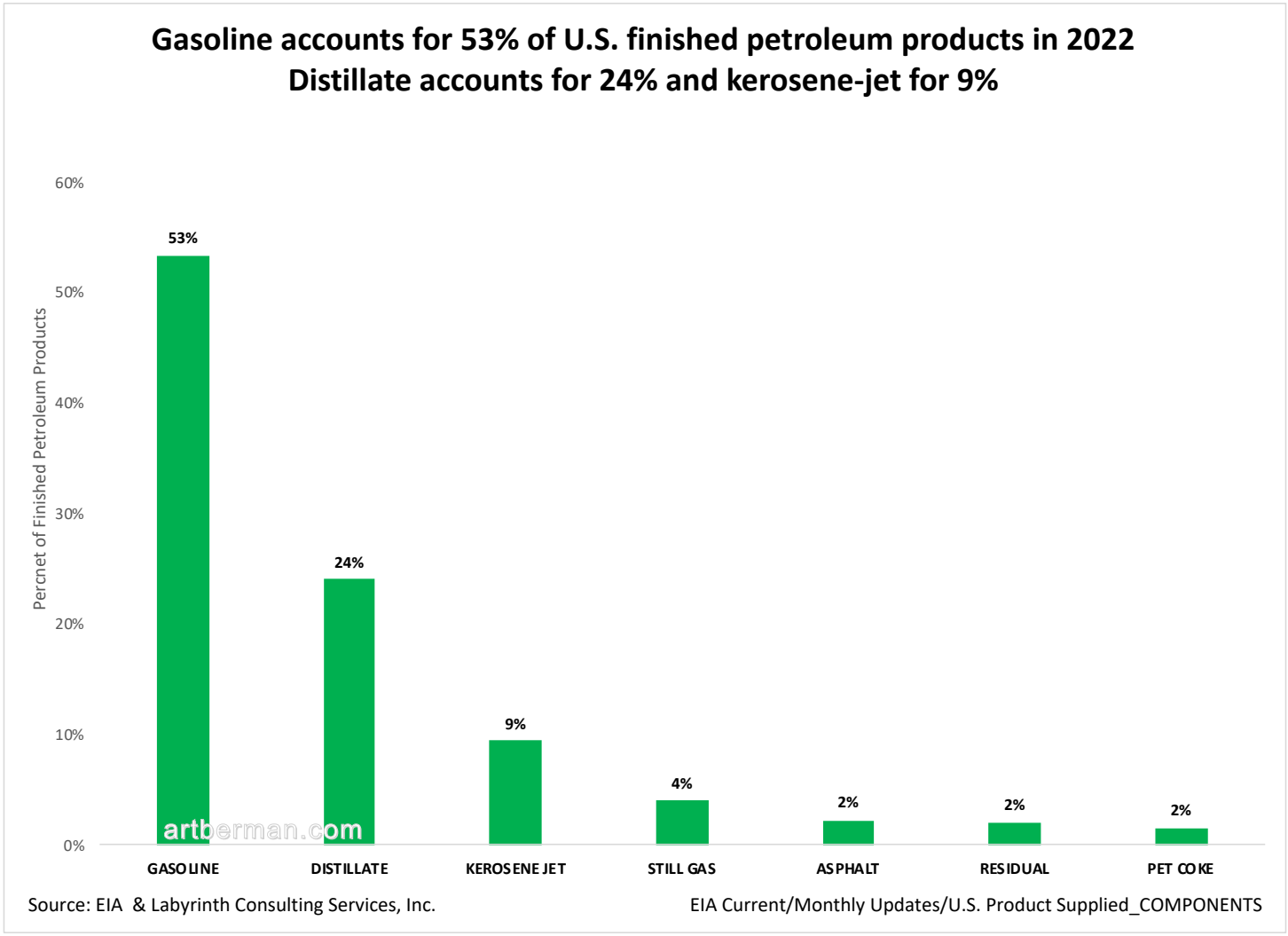
What is fuel ethanol?

Fuel ethanol is denatured alcohol made by fermenting the sugar in the starches of grains like corn. It is blended with gasoline to extend the use of that fuel.

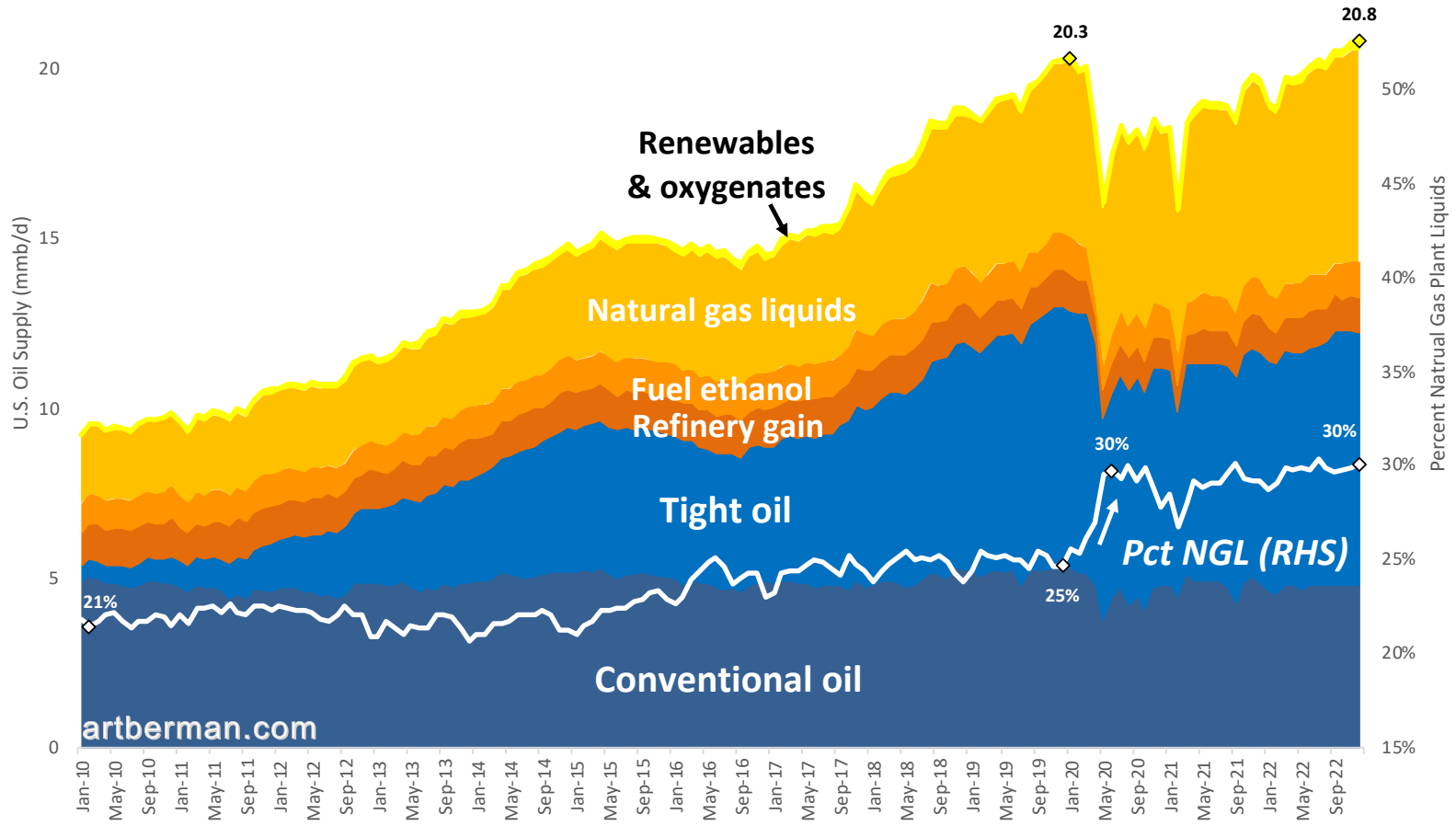


What are refined petroleum products?

Refined petroleum products are derived from crude oils through processes such as catalytic cracking and fractional distillation



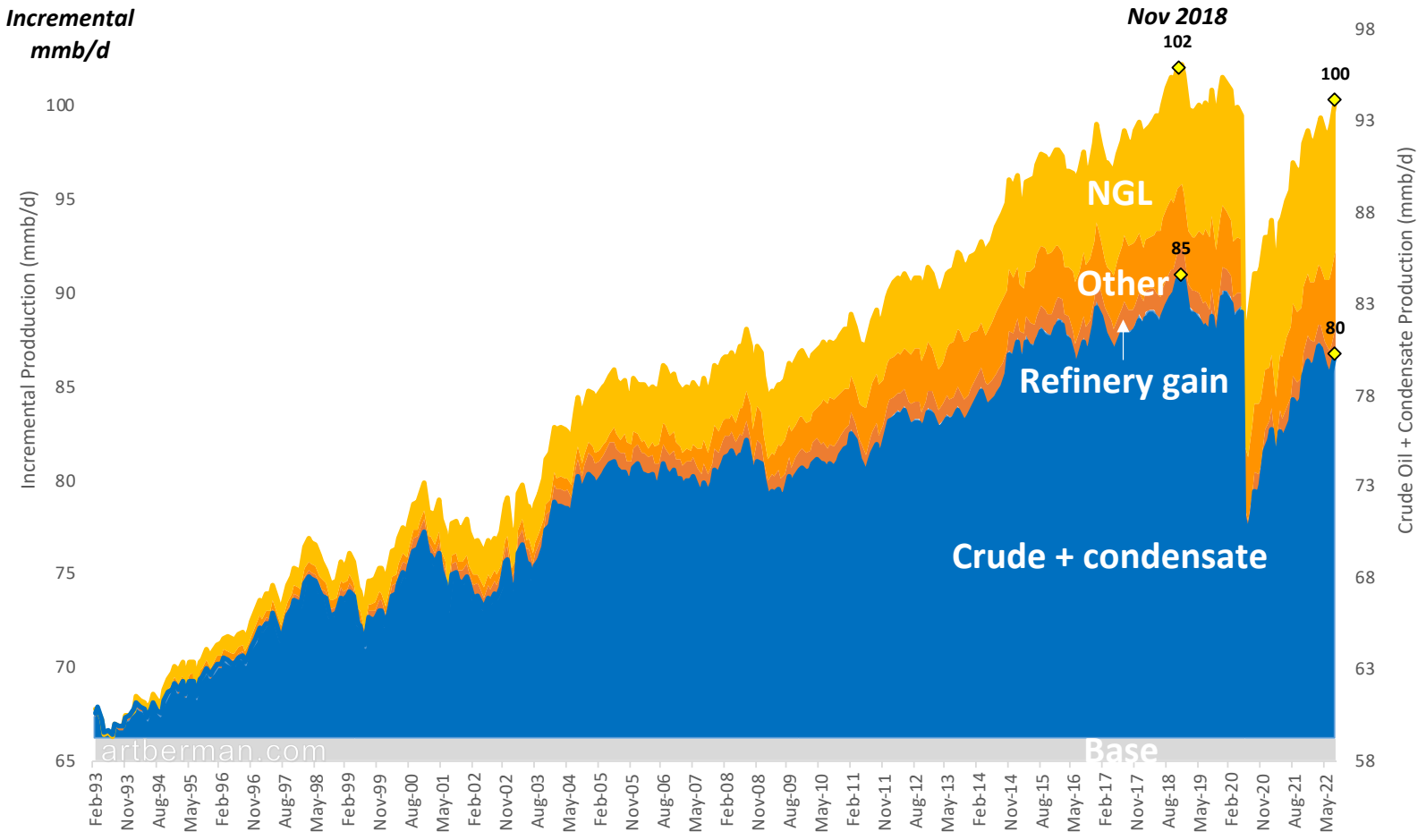
Natural gas liquids account for 6 mmb/d (30%) of 2022 U.S. "oil" production
NGL relative portion of total increased 5% in 1H 2020 as crude production fell
Tight oil increased from 9% to 61% of crude + condensate from 2010 to 2022



Source: EIA STEO & Labyrinth Consulting Services, Inc.

EIA Current/STEO/STEO Master 2022

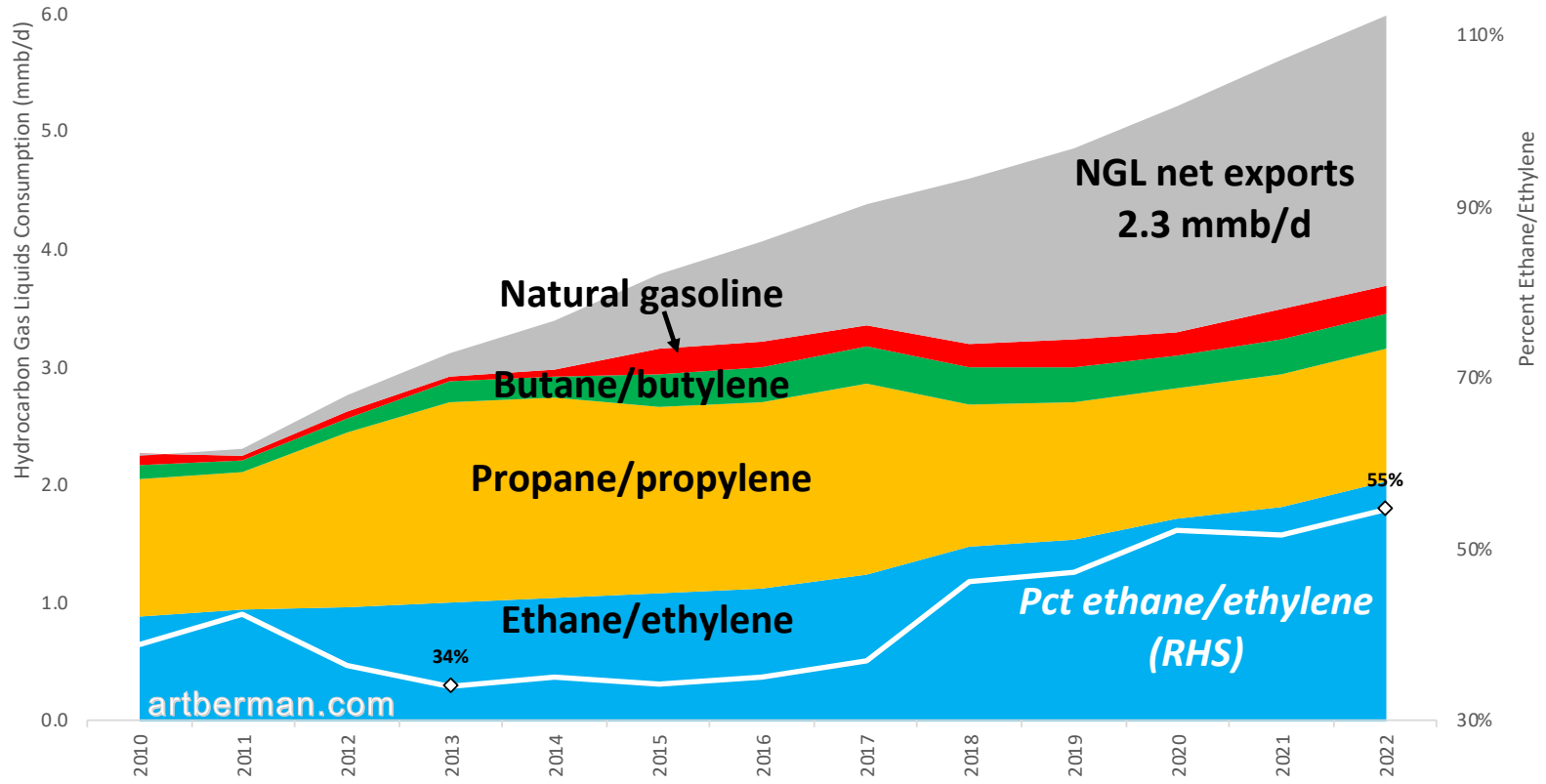
World liquids production hasrecovered to 99% of 2018 level but crude oil to only 96%
Natural gas liquids output has recovered to 114% of 2018 level



Source: EIA,& Labyrinth Consulting Services, Inc

EIA/EIA International/International_data MASTER_2022.xlsx

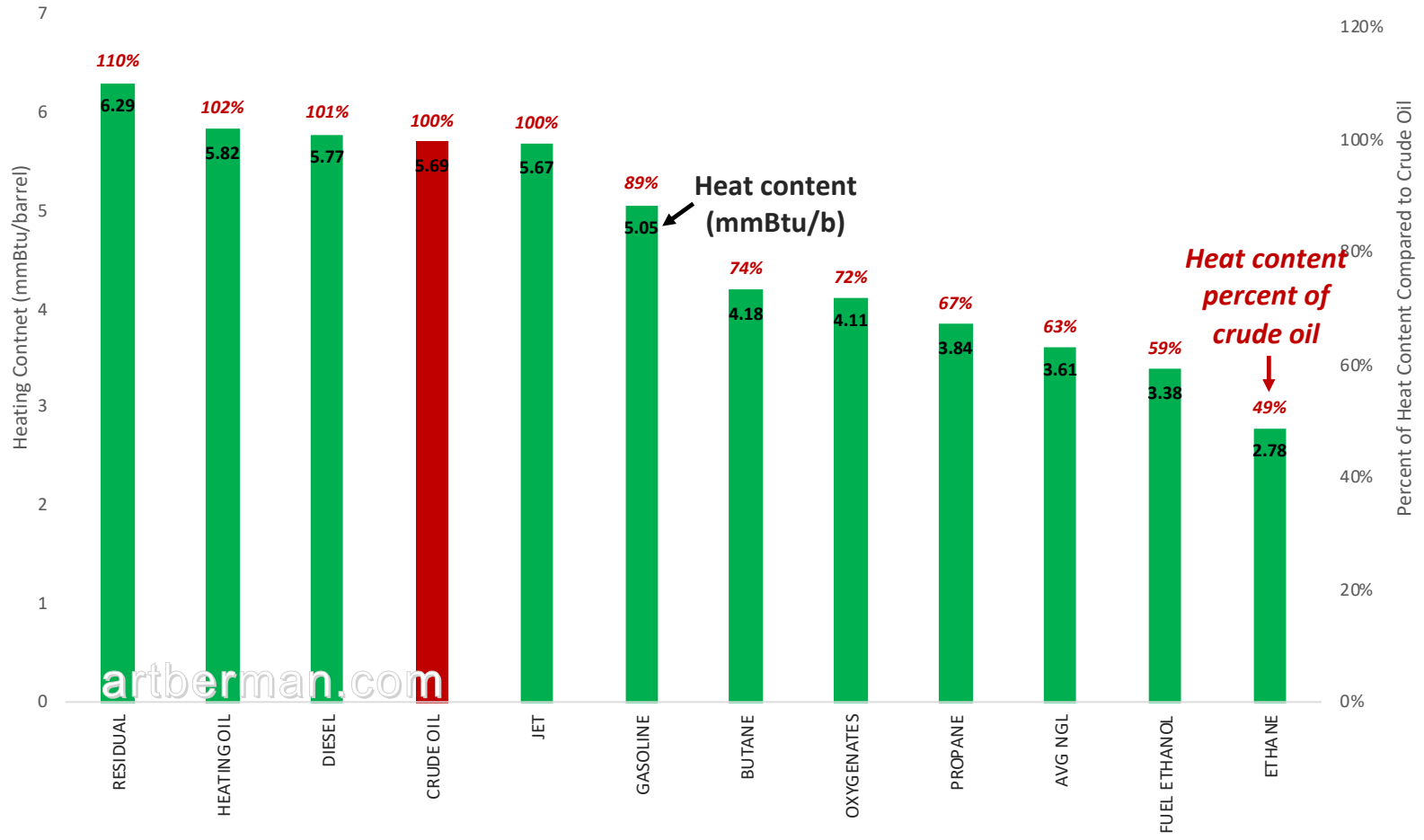
U.S NGL consumption increased 1.4 mmb/d (+63%) from 2.3 mmb/d in 2010 to 3.7 mmb/d in 2022; 55% was ethane/ethylene
Net exports increased 2.3 mmb/d since 2010



Source: EIA STEO & Labyrinth Consulting Services, Inc.

EIA Current/STEO/STEO Master 2022

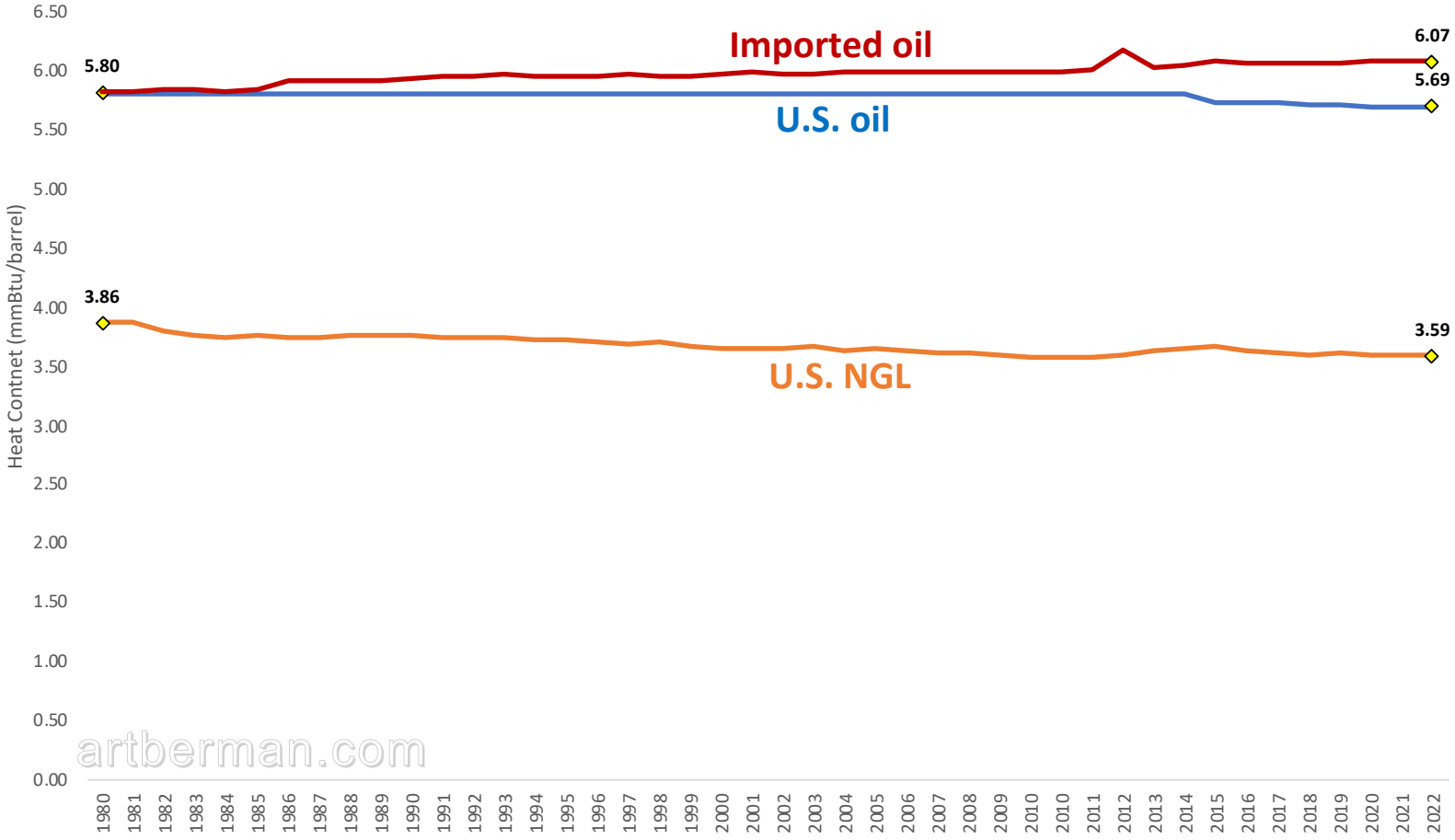
Ethane is the main component of NGL & has only 49% of the heating content of crude oil
Its primary use is not as a fuel but making plastic bags



Source: EIA & Labyrinth Consulting Services, Inc.

EIA Current/Heat Content of Petroleum Products, Imports and Exports

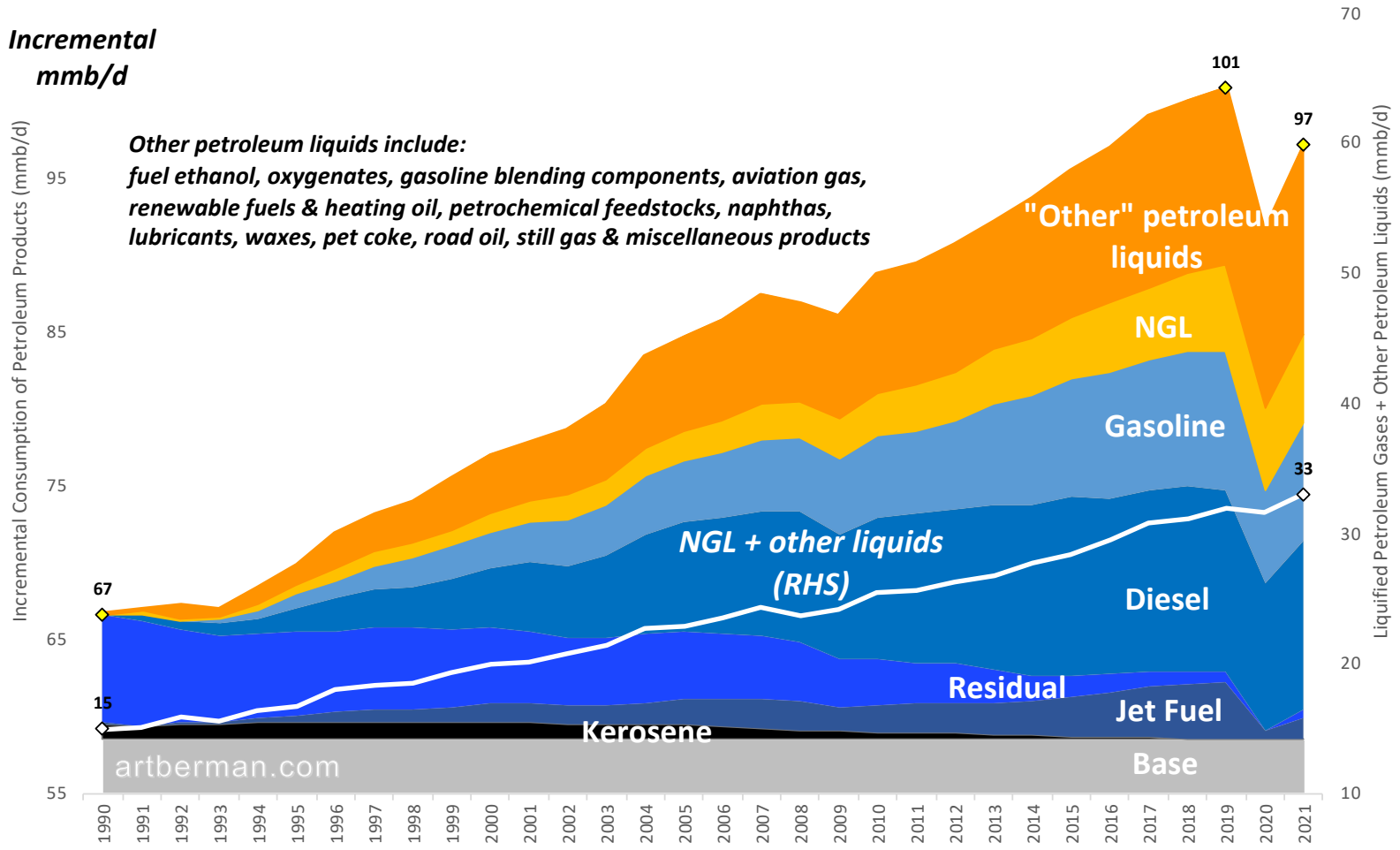
U.S. natural gas liquids have about 37% less heat content than U.S. crude oil
U.S. crude oil has about 5% less heat content than imported oil



Source: EIA & Labyrinth Consulting Services, Inc.

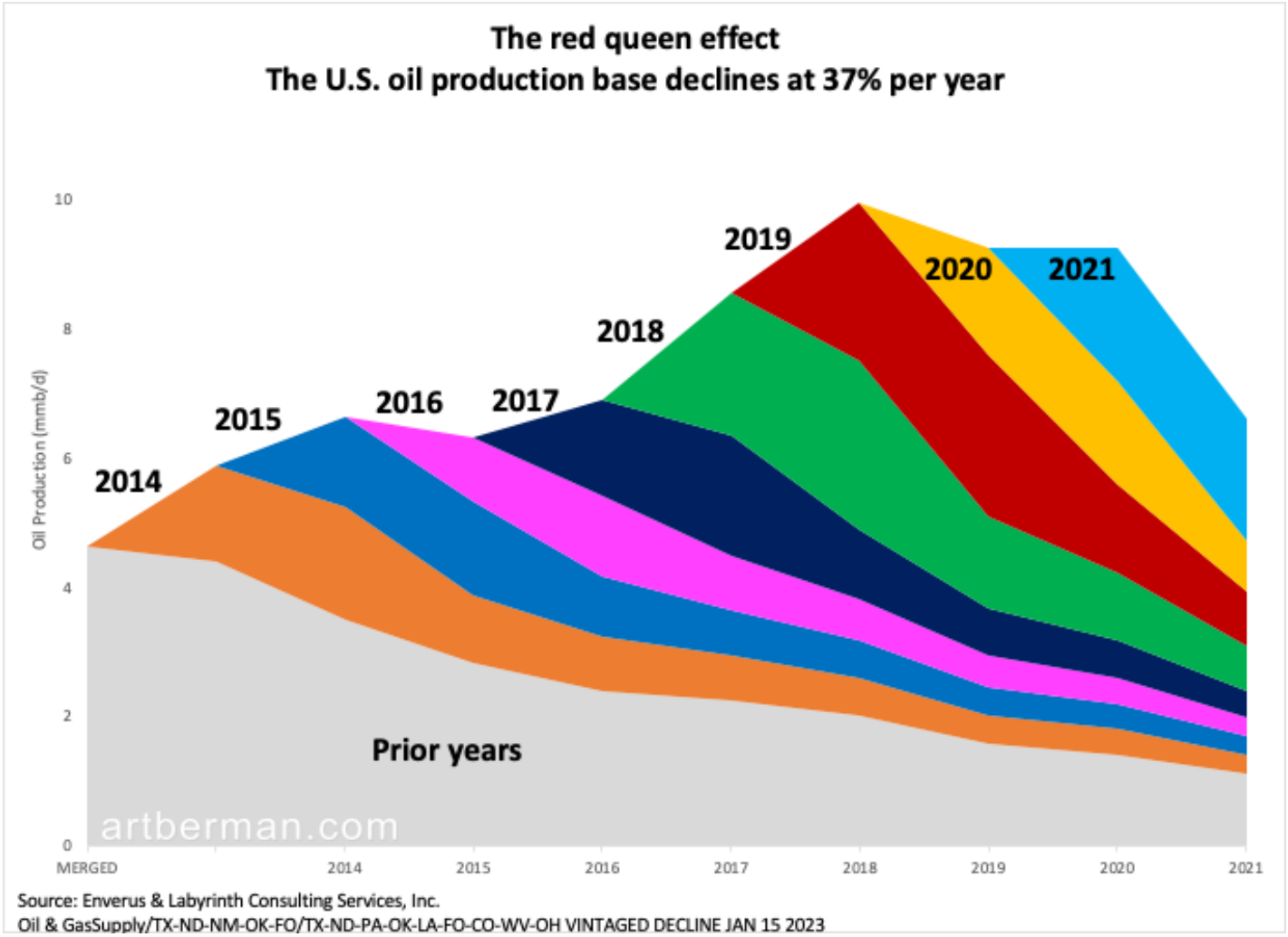
EIA Current/Heat Content of Petroleum Products, Imports and Exports

One-third of world "oil" consumption is not oil
33 mmb/d (34%) was natural gas liquids and "other petroleum liquids" in 2021



Source: EIA & Labyrinth Consulting Services, Inc.

EIA International/International_data CONSUMPTION


The red queen effect
The U.S. oil production base declines at 37% per year
Oil Production (mmb/d)
10
8
6
4
2
0
2014
2015
2016
2017
2018
2019
2020
2021
Prior years
artberman.com
MERGED
2014
2015
2016
2017
2018
2019
2020
2021
Source: Enverus & Labyrinth Consulting Services, Inc.
Oil & GasSupply/TX-ND-NM-OK-FO/TX-ND-PA-OK-LA-FO-CO-WV-OH VINTAGED DECLINE JAN 15 2023