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Congressional Testimony

House Subcommittee on Energy and Power hearing on **The Energy Policy and Conservation Act of 1975: Are We Positioning America for Success in an Era of Energy Abundance?**

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Subcommittee Chairman Whitfield, Ranking Member Rush, distinguished members of the Subcommittee, thank you for the opportunity to testify today to examine the Energy Policy Conservation Act of 1975 in an era of energy transition.

I am the Director of the Energy and Climate program at the Carnegie Endowment for International Peace, a non-partisan policy think tank. I began my career with Chevron as a chemical engineer and then spent over two decades researching transport energy policy at Yale University, the Union of Concerned Scientists, and for a wide array of non-profit, public, and private sector clients. I have authored several books and numerous reports on transportation, oil, and climate policymaking.

In my remarks today, I will make three key points: the need to understand the changing conditions influencing today's crude oil market; the need for better information about the chemical characteristics, quality and operational specifications of U.S. oils; and the need to deal with the environmental consequences from an unconditional lifting of the oil export ban.

The bottom line is that oils are changing. A more complex array of hydrocarbon resources is replacing conventional oils. (Attachment 1). The truth is we know precious little about these new resources. The nation needs reliable, consistent, detailed, open-source data about the composition and operational elements of U.S. oils. Significant information gaps have accompanied the nation's increase in oil production, impeding sound decision making. Public and private stakeholders need to fully understand the environmental impacts inherent to different oils. The best way to position America for success in an era of energy abundance is generate the information necessary to make wise decisions among the many oil options. Without this information, the debate over lifting the ban on U.S. crude oil exports is taking place in a context in which we are essentially operating blind.

The Energy Policy Conservation Act of 1975 (EPCA) can serve as a template for addressing some of the shortcomings that exist today as America struggles to manage the economic, geopolitical, and climate impacts of its new bounty of oils.

Historical Context

EPCA is noteworthy for its breadth. Its five titles cover domestic supply availability, energy authority, energy efficiency, petroleum pricing, and general provisions (energy information collection and accounting practices).[1] EPCA has been amended over the years, including in the 113th Congress.[2]

Several EPCA provisions are relevant to this hearing, including:

1 http://thomas.loc.gov/cgi-bin/bdquery/z?d094:SN00622:@@@D&summ2=m&
2 http://legcounsel.house.gov/Comps/EPCA.pdf

- Presidential authorization to **restrict exports** of all fossil fuels, including crude oil and petroleum products (Title I)[3]
- Establishment of the **Strategic Petroleum Reserve** (Title I)
- Transmittal of information to the **international energy program** (Title II)
- Corporate Average Fuel Economy Standards for motor **vehicles and industrial efficiency improvements** (Title III)
- Energy **information submittal** to DOE precursor agencies (Title V)
- Energy **accounting practices** by the Security and Exchange Commission (Title V)

EPCA was adopted in response to a specific set of oil problems existing in the 1970s: supply shortage from the Arab oil embargo and resulting price shocks. The present context is vastly different. Today's oil markets are highly uncertain. Conventional oil production has peaked, but new oils are serving as replacements. What new rules will be established to address the unintended consequences for the array of new oils surfacing in the U.S. and around the globe?

It is important for policymakers to think comprehensively about the full range of current oil issues. Several EPCA provisions merit careful review and updating. These include: (1) widely expanding oil data collection and making new information publicly available, (2) increasing heavy-duty vehicle efficiency standards for the trucks and marine vessels that move oil and petroleum products, and (3) revisiting oil accounting practices so that the Security and Exchange Commission is fully informed about the new oils now bolstering U.S. markets.

Assessing the Current Situation

America is one of the first in line to win the unconventional oil lottery. Despite newfound energy resources at home, however, the U.S. will never be free from foreign supplies in an increasingly oil-interdependent world. As such, if U.S. policymakers enact effective safeguards to minimize unintended consequences, America will be well positioned to chart a path that others can follow. Two questions require urgent attention:

Question 1: Do policymakers and the public have sufficient information about America's new oils?

Unfortunately, they do not. America's boom in oil production has been accompanied by far too little relevant information about new U.S. oil resources and their operations. Ironically, *there is more detailed open data available about OPEC crudes than those oils in the Bakken, Permian, or Eagle Ford basins*. What's more, these U.S. oils are very different from one another. And compared to Canadian oil sands, Gulf of Mexico ultra-deep offshore oils, Arctic oils, or Mexican heavy oils, the disparity between oils and their societal impacts

[3] Although it has been amended numerous times, EPCA originally permitted the President to restrict exports of coal, petroleum products, natural gas, or petrochemical feedstock, and supplies of materials or equipment for exploration, production, refining, or transportation of energy supplies. Authorized the President to exempt crude oil and naturalgas exports from such restriction where he deems such exemption to be in the national interest, such as in recognition of the historic trading relations with Mexico and Canada. Required quarterly reports to the Congress on any such restrictions made.

widen further. We need consistent and publicly available information, which at a minimum contains the expanded data collection summarized in Attachment 2.

In seeking to obtain and verify these needed oil data, Carnegie has encountered several obstacles, including:

1. Oil Data Inconsistencies: There are hundreds of different global oils. In order to be commercially viable, among other things, the oil must be assessed using an *assay* that analyzes its chemical and physical make up. The problem is that there is no standardized format for oil assays. For example, companies use different temperature settings while others omit information altogether. This makes it virtually impossible to compare oils to one another.
2. Data Cannot Be Used Without Company Permission: The oil industry publishes assays. Despite data inconsistency, another issue is the fine print. For example, users who wish to comply have to obtain permission to reproduce oil data in any format. Therefore, some of the oil data that is available for viewing is not truly "open source" in practice.
3. Data Not for Sale: Up to date, comprehensive oil databases are held by the private sector, often by oil consultancies. The price to obtain oil data is typically very high. Even if think tanks and academics can afford the hundreds of thousands of dollars to purchase oil data, it is not necessarily for sale. For example, after lengthy negotiations, a firm would not sell oil data to our academic partner at any price because they were viewed as a competitor.
4. Government Limitations Collecting Data: The Department of Energy is limited in its reach to expand oil-reporting requirements. For example, Carnegie was told that DOE could not establish consistent reporting requirements for oil data because OMB considers oil data collection a duplication of effort. This means that policymakers and the public are at the behest of industry to divulge information that may not be timely, accurate, or consistent.

Oil markets cannot function efficiently without transparent, high-quality information. Full information is also a necessary condition for effective policymaking. With a surplus of U.S. and other global crudes to choose from, we need to know oils' inherent chemical characteristics, their operational specifications, and how oils differ from one another under set conditions.

Question 2: What environmental risks do new oils pose?

The Carnegie Endowment is developing an **Oil-Climate Index** that compares global oils to one another in terms of their total greenhouse gas (GHG) impacts. Together with Stanford University and the University of Calgary, we are modeling the entire oil value chain, from upstream oil extraction through downstream refining, transport, and petroleum product combustion. **Our preliminary findings (based on 28 sample oils) are that oils' GHG footprints vary by at least 80 percent. In other words, replacing high GHG oils with**

lower ones could almost halve climate impacts for every barrel consumed. Several contributing factors make certain oils more emission intensive than others, including:

1. Gassy Oils: Oil fields typically have some natural gas associated with them. The more gas that is present, the more challenging and costly to safely manage these commodities. Producing gassy oil without gas-handling infrastructure leads to burning or flaring the gas as a waste byproduct. Oils that rely on flaring can result in as much as 75 percent larger greenhouse gas (GHG) footprints than comparable light oils that do not flare.[4]
2. Heavy Oils: The heavier the oil, the more heat, steam, and hydrogen required to extract, transport, and transform into high-value petroleum products like gasoline and diesel. These high-carbon oils also yield higher shares of bottom-of-the-barrel products like petroleum coke that are often priced to sell. The heaviest oils have GHG footprints that can be nearly twice as large as lighter oils.
3. Watery Oils: Oils that contain a lot of water take a lot of energy to bring to the surface. If an oil field has a water-oil ratio of 10 to one, that adds nearly two tons of water for every barrel of oil produced. Certain oils in California's San Joaquin Valley, for example, have 25 or 50 barrels of water per barrel of oil. Oils with high water-oil ratios can have a GHG footprint that is as much as 50 percent higher than such unencumbered oils.
4. Enhanced Recovery and Extreme Oils: Some oils are difficult to access. For example, it takes a lot of energy to reach extremely deep oils like Russia's seven-mile deep Sakhalin field. Likewise, depleting oil fields can require injection of substances with significant energy inputs. Still other oils are located in areas that sequester GHGs like permafrost, boreal peat bogs, and rainforests. Unearthing these oils can release large volumes of climate-forcing gases. GHG footprints may be least 50 percent larger for oils that are difficult to access or located in climate-sensitive environments.

If handled properly especially with regard to flaring, U.S. light tight oil (LTO) may have GHG impacts at the lower end of the climate spectrum. But in order to determine this, we need to run oils from North Dakota, Texas, and elsewhere through the Oil-Climate Index models. This will require a far greater degree of information transparency than is currently available about U.S. oils.

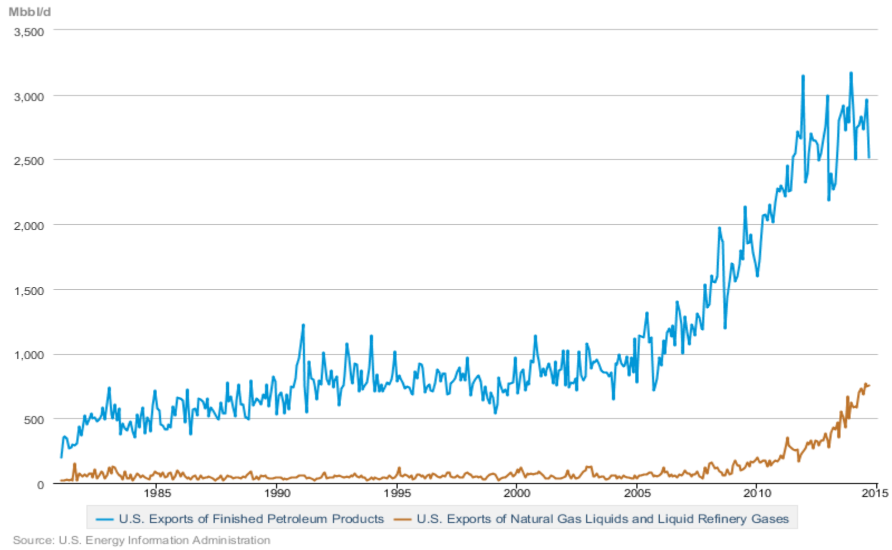
Understanding and Managing the Next Century of Oil

As one of the world's fastest-growing oil producers, the United States has the opportunity and responsibility to be a global leader in the energy sector. A strong, balanced, energy policy that is informed by oil transparency is needed to guide energy decision-making in ways that satisfy the energy needs of U.S. consumers, strengthen the American economy, protect the climate, and enhance national and global energy security.

[4] Norway produces some of the world's lowest GHG oils because it is illegal to flare associated gas. This is not the case today in the Bakken and other U.S. LTO fields.

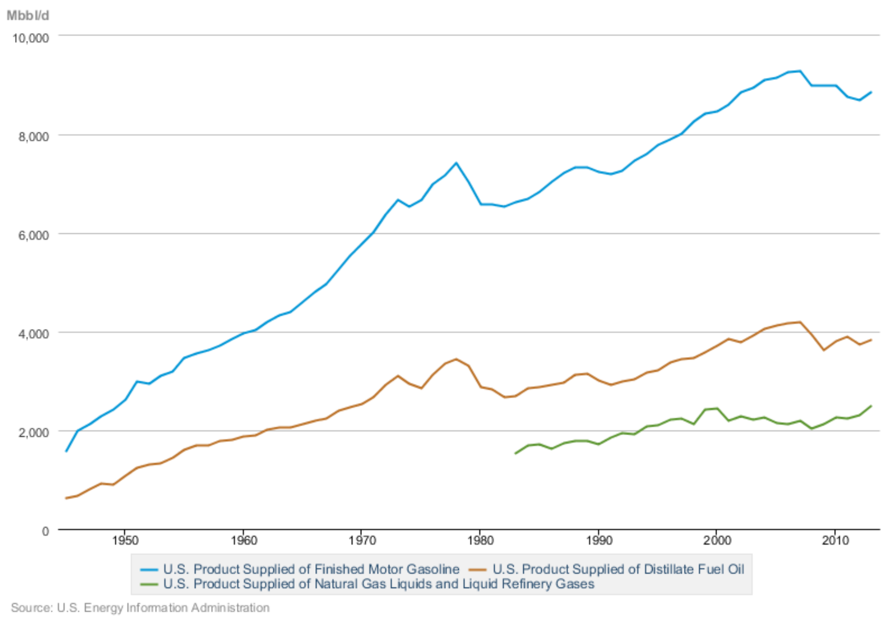
There is tremendous uncertainty at present in oil markets. With Asian growth slowing down, demand for U.S. petroleum product exports (which have ramped up markedly in recent years) may cool off. (Figure 1). It is unclear what this might mean for potential crude oil exports if the ban is lifted. Balancing global liquid fuel trade with an increasing number of players will be an ongoing challenge. But this will be critical in order to minimize market disruptions and price volatility.

Figure 1: U.S. Exports of Petroleum and Other Liquids



And, if oil prices remain low, recent downward trends could reverse and petroleum products may be consumed in greater volumes at home. (Figure 2). For example, in November, U.S. light truck sales were up dramatically over a year earlier. The GMC Sierra (up 57%) posted the largest sales gains compared to the Honda Civic (down 12%), which uses half as much gasoline per mile.

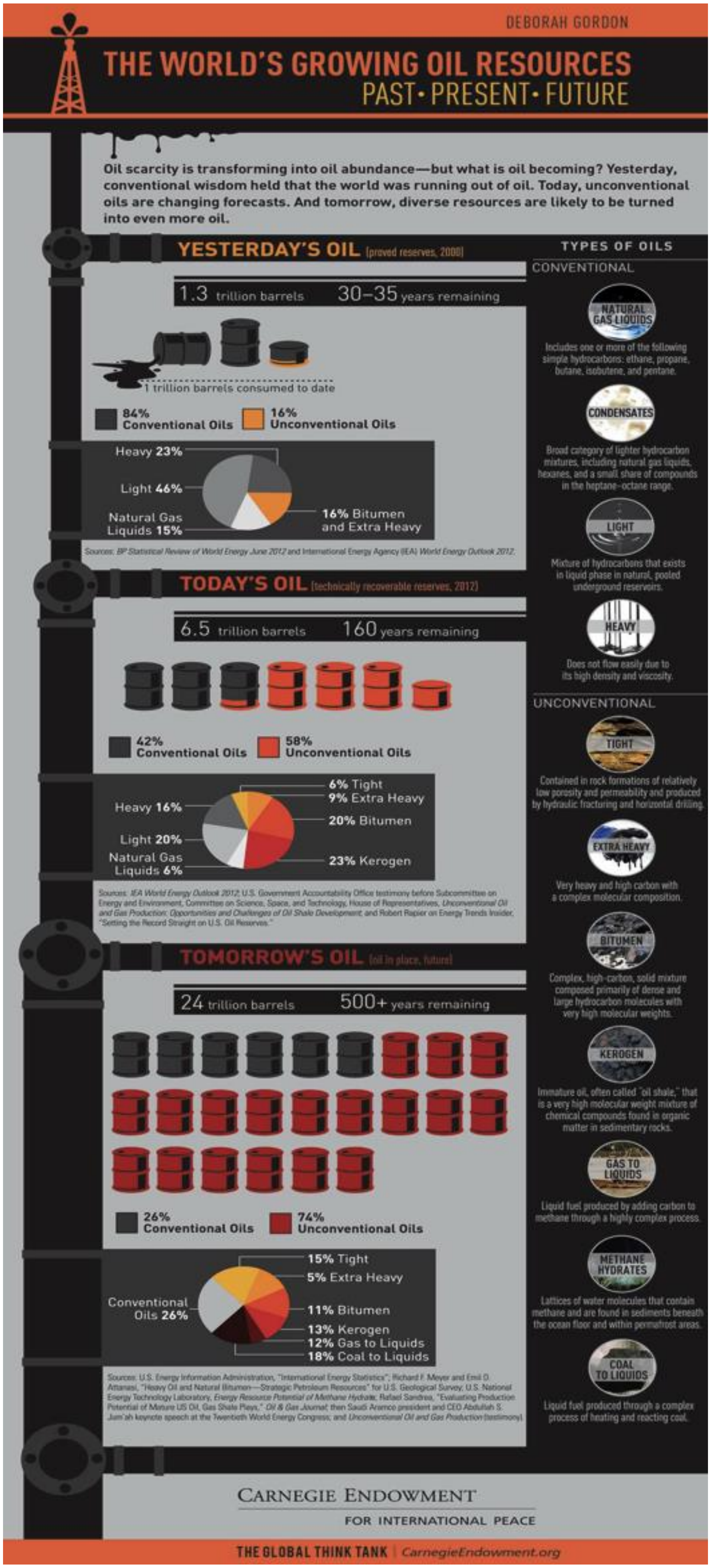
Figure 2: U.S. Consumption of Petroleum Products



We will very likely continue to export petroleum products. Light condensate may be allowed next. But what will it take to entirely reverse the 1975 EPCA decision to ban U.S. crude oil exports? This decision should be informed by full knowledge about the evolving oils America is producing now and into the future.

Should we encourage (or discourage) the development of all unconventional oils that could be transformed into petroleum products? The right answer to this question is far murkier than many people suppose. In reality, the answer depends on what the new rules are for the array of new oils surfacing in the United States and around the globe. Given the contentious geopolitics surrounding these decisions – and the huge stakes for consumers and for the planet—**a transparent debate, informed by reliable, open-source data about the composition, quality, and environmental profile of new oils**, is key to making effective and sustainable decisions.

Attachment 1



DEBORAH GORDON
THE WORLD'S GROWING OIL RESOURCES
PAST • PRESENT • FUTURE
Oil scarcity is transforming into oil abundance—but what is oil becoming? Yesterday, conventional wisdom held that the world was running out of oil. Today, unconventional oils are changing forecasts. And tomorrow, diverse resources are likely to be turned into even more oil.
YESTERDAY'S OIL (proved reserves, 2000)
1.3 trillion barrels
30–35 years remaining
1 trillion barrels consumed to date
84% Conventional Oils
16% Unconventional Oils
Heavy 23%
Light 46%
Natural Gas Liquids 15%
16% Bitumen and Extra Heavy
Sources: BP Statistical Review of World Energy June 2012 and International Energy Agency (IEA) World Energy Outlook 2012.
TODAY'S OIL (technically recoverable reserves, 2012)
6.5 trillion barrels
160 years remaining
42% Conventional Oils
58% Unconventional Oils
Heavy 16%
Light 20%
Natural Gas Liquids 6%
6% Tight
9% Extra Heavy
20% Bitumen
23% Kerogen
Sources: IEA World Energy Outlook 2012; U.S. Government Accountability Office testimony before Subcommittee on Energy and Environment, Committee on Science, Space, and Technology, House of Representatives, Unconventional Oil and Gas Production: Opportunities and Challenges of Oil Shale Development; and Robert Rapier on Energy Trends Insider, "Setting the Record Straight on U.S. Oil Reserves."
TOMORROW'S OIL (oil in place, future)
24 trillion barrels
500+ years remaining
26% Conventional Oils
74% Unconventional Oils
Conventional Oils 26%
15% Tight
5% Extra Heavy
11% Bitumen
13% Kerogen
12% Gas to Liquids
18% Coal to Liquids
Sources: U.S. Energy Information Administration, "International Energy Statistics"; Richard F. Meyer and Emil D. Attanasi, "Heavy Oil and Natural Bitumen—Strategic Petroleum Resources" for U.S. Geological Survey; U.S. National Energy Technology Laboratory, Energy Resource Potential of Methane Hydrate; Rafael Sandrea, "Evaluating Production Potential of Mature US Oil, Gas Shale Plays," Oil & Gas Journal; then Saudi Aramco president and CEO Abdullah S. Jum'ah keynote speech at the Twentieth World Energy Congress; and Unconventional Oil and Gas Production (testimony).
TYPES OF OILS
CONVENTIONAL
NATURAL GAS LIQUIDS
Includes one or more of the following simple hydrocarbons: ethane, propane, butane, isobutene, and pentane.
CONDENSATES
Broad category of lighter hydrocarbon mixtures, including natural gas liquids, hexanes, and a small share of compounds in the heptane–octane range.
LIGHT
Mixture of hydrocarbons that exists in liquid phase in natural, pooled underground reservoirs.
HEAVY
Does not flow easily due to its high density and viscosity.
UNCONVENTIONAL
TIGHT
Contained in rock formations of relatively low porosity and permeability and produced by hydraulic fracturing and horizontal drilling.
EXTRA HEAVY
Very heavy and high carbon with a complex molecular composition.
BITUMEN
Complex, high-carbon, solid mixture composed primarily of dense and large hydrocarbon molecules with very high molecular weights.
KEROGEN
Immature oil, often called "oil shale," that is a very high molecular weight mixture of chemical compounds found in organic matter in sedimentary rocks.
GAS TO LIQUIDS
Liquid fuel produced by adding carbon to methane through a highly complex process.
METHANE HYDRATES
Lattices of water molecules that contain methane and are found in sediments beneath the ocean floor and within permafrost areas.
COAL TO LIQUIDS
Liquid fuel produced through a complex process of heating and reacting coal.
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Attachment 2

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Open Source Oil Modeling
Oil Data Gaps

OPGEE Upstream Production Data

1. Extraction method *(primary, secondary, EOR, other)*
2. Level of activity per unit production
   - Water-oil ratio *(for primary and secondary production)*
   - Steam-to-oil ratio *(for tertiary production)*
3. Location *(onshore, offshore, with GIS coordinates)*
4. Flaring rate
5. Venting rate *(level of fugitive emissions)*

PRELIM Downstream Refining Data

1. Reporting on updated refinery process energy requirement data.
2. Oil assay parameters (specified below) and reported consistently for each global oil.

   Each parameter (except MCR/CCR) must be specified at each cut temperature* and cut temperature ranges must be standardized, as specified below or in another consistent format. *Note: Cut temperatures are currently reported out using a variety of inconsistent formats.*

   - API Gravity
   - Density
   - Sulphur content (wt %)
   - Nitrogen content (mass ppm)
   - Hydrogen content
   - Volume/Mass Flow (% recovery)
   - Micro-carbon residue (MCR) or Conradson carbon residue (CCR)
   - Viscosity (cST at 100 ºC) for Vacuum Residuum

**The cut temperatures and products currently used in the PRELIM refining model are:*

Temperature (ºC)	Product Cut Name
80	LSR
180	Naphtha
290	Kerosene
343	Diesel
399	Atmospheric Gas Oil (AGO)
454	Light Vacuum Gas Oil (LVGO)
525	Heavy Vacuum Gas Oil (HVGO)
525+	Vacuum Residue (VR)
399+	Atmospheric Residue (AR)