

An Introduction to Energy Subsidies

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Most Government Actions Are Subsidies; Only Some Subsidies are a Problem

- Powers of Governments:
 - **Raise revenues** through taxes and fees.
 - **Allocate government revenues** to selected activities and entities; investments, administration, redistribution.
 - Establish entities for **direct provision of goods or services**.
 - **Set rules** for economic and other activity in marketplace:
 - Who bears risk and to what degree.
 - Baseline requirements for health, safety, other social goals.
 - Rules may or may not be consistent across geography, sectors, time.
- Subsidies can arise from all of these areas; **only some are a problem**.
- My focus is on Environmentally Harmful Subsidies (EHS).

Overview

Everybody Wants Special Benefits from Government

Mr James Burnham of Ipswich One of the Collectors of Excise upon Wheelcarriages in the County of Essex for the year 1789

For We the Subscribers Give it as Our Opinion that the Chaise belonging to ~~the~~ Widow Eleanor Spofford is utterly unfit to be Taxed as they are gone greatly to Decay & upon A Mistake they were returned yet we think the Taxes ought to be Abated that the Wid^w might be releas^d of the Burden Which is the Minds of us your Humble Serv^{ts}

Rowley Jan^y 6th 1791

Moody Spofford
Thomas Lambert
Phineus Dodge

Select Men of Rowley

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Rowley January 6th 1791

Source: Massachusetts State Archives.

Massachusetts implemented an excise tax on wheelcarriages in November 1781, then considered a luxury good. Requests for exemptions soon followed. The tax lasted until June 1794. A federal tax was implemented that year (promoted by Alexander Hamilton), though didn't take effect until a few years later due to a challenge before the Supreme Court.

Government as a Factor of Production

Four Factors of Production: Examples

In economics, factors of production are the resources people use to produce goods and services.



Land

Includes any natural resource.



Labor

The effort that humans contribute.



Capital

Includes machinery, tools and buildings.



Entrepreneurship

Combines land, labor and capital in new ways.



- “Political entrepreneurship” leverages the power of government to access additional resources, improve the terms of access, or create a market advantage (disadvantage) for your (your competitor’s) activity.
- Returns can be higher than for standard types of investments.
- Government protections from down-side risks are particularly valuable.

Overview

Why Subsidies Matter

- Often **support environmentally damaging** activities:
 - Polluting energy, mining, primary materials.
 - Excess fishing, timbering, agriculture, water use.
 - Sprawl and land conversion.
- Create **competitive impediments to cleaner substitutes**, GHG reduction strategies, more controlled development.
- **Politically-allocated**
 - Often flow to the powerful, who invest to keep and expand them.
 - Divert limited public funding from key social objectives.
- **Whack-a-mole**: many forms and sources, at all levels of government
 - Hard to see, track and value, challenge and reform.
 - Data fragmentation means that often only the recipient firm knows the full subsidy picture.

Overview

Many Mechanisms Used to Transfer Value

Intervention Category and Description
Direct spending. Government programs, public grants to private parties, funding for energy R&D.
Tax expenditures. Special exemptions, deductions (included accelerated), credits or tax-favored corporate structures.
User fees. Energy-related fees applied to fund sector-related activities, albeit often only partially.
Terms of access to resources. Auction competitiveness, royalty rates, favorable lease terms or risk sharing.
Credit. Primarily below market loans, loan guarantees. Includes favorable interest rates, terms, repayment schedules, or fees.
Risk. Government-provided market insurance or indemnification at below-market prices; statutory caps on private market responsibility for damages.
Induced transfers. Government rules that direct specific purchases or force above-market prices. Includes purchase mandates (RPS, RFS, FIT); price controls; import or export restrictions, tariffs; cross-subsidies.
Regulations and Externalities. Differential rules applied to activities with similar environmental or health impacts.
State-owned enterprises. SOEs often entail multiple levels and types of subsidy.

- ✓ Not just cash.
- ✓ Often pyramided.
- ✓ Opacity is a feature, not a bug.
- ✓ Recipients organize to retain, expand support.

Benefits of Reform

Subsidies and Carbon Taxes: Stop Digging

Fossil fuel subsidies are much higher than carbon taxes

	2020	2020	2021	2022
	OECD-IEA	IMF	OECD-IEA	OECD-IEA
Global carbon revenues (Bils USD)	53	53	84	No data
Fossil fuel subsidies (Bils USD)	362	5,900	697	~1,166
Share of global fossil fuels facing <i>any</i> carbon price	13%	13%	23%	23%
Ratio of fossil fuel subsidies to carbon revenues	6.8x	111.3x	8.3x	n/a

Sources: World Bank (2021, 2022); OECD (2021, 2022); IEA (2021, 2023).

Note: Fossil fuel subsidy estimate for 2022 using updated data from IEA and assumes producer subsidies grew at the same rate as they did between 2020 and 2021.

- Subsidy elimination should be central strategy for global decarbonization.
- Carbon revenues up 60% from 2020 to 2021 per WB, but FF subsidies nearly doubled (OECD and IEA).
- For 2021, **FF subsidies were ~8.3x carbon revenues**, despite many support types not yet quantified.
- IEA subsidy estimates for 2022: > \$1 trillion.
- Joint removal subsidies plus carbon price reflecting environmental costs would be best to spur decarbonization.

Benefits of Reform

Limited Public Funds Diverted from Better Uses

Subsidies to fossil fuel consumers crowd out other spending priorities

Country counts	Fossil fuel subsidy amount as percentage of:		
	GDP	Federal revenues	Public spending on health care
Total countries	37	38	37
Subsidies > 100% of metric	0	0	18
Subsidies > 50% of metric	0	2	26
Subsidies > 25% of metric	0	5	32
Subsidies > 10% of metric	6	22	33

Source: Koplow, Doug (2015). "Global energy subsidies: Scale, opportunity costs, and barriers to reform." In *Energy Poverty: Global Challenges and Local Solutions*, edited by Antoine Halff, Benjamin K. Sovacool, and Jon Rozhon, Oxford: Oxford University Press.

Subsidy Measurement

Primary Sources of Global Data on FFS*

OECD

- Producer Subsidies (annual or biennial); integration of IEA data to produce combined estimate
- Direct spending, tax (mostly reduction in excise)
- **Needed: other tax expenditures, credit, risk, leasing, state-owned enterprises**

IEA

- Consumer Subsidies (annual data using price gap approach)

IMF

- Producer and consumer subsidies, additional imputed taxes; irregular update cycle
- Environmental externalities: air pollution, global warming
- Transport externalities: congestion, accidents

World Bank

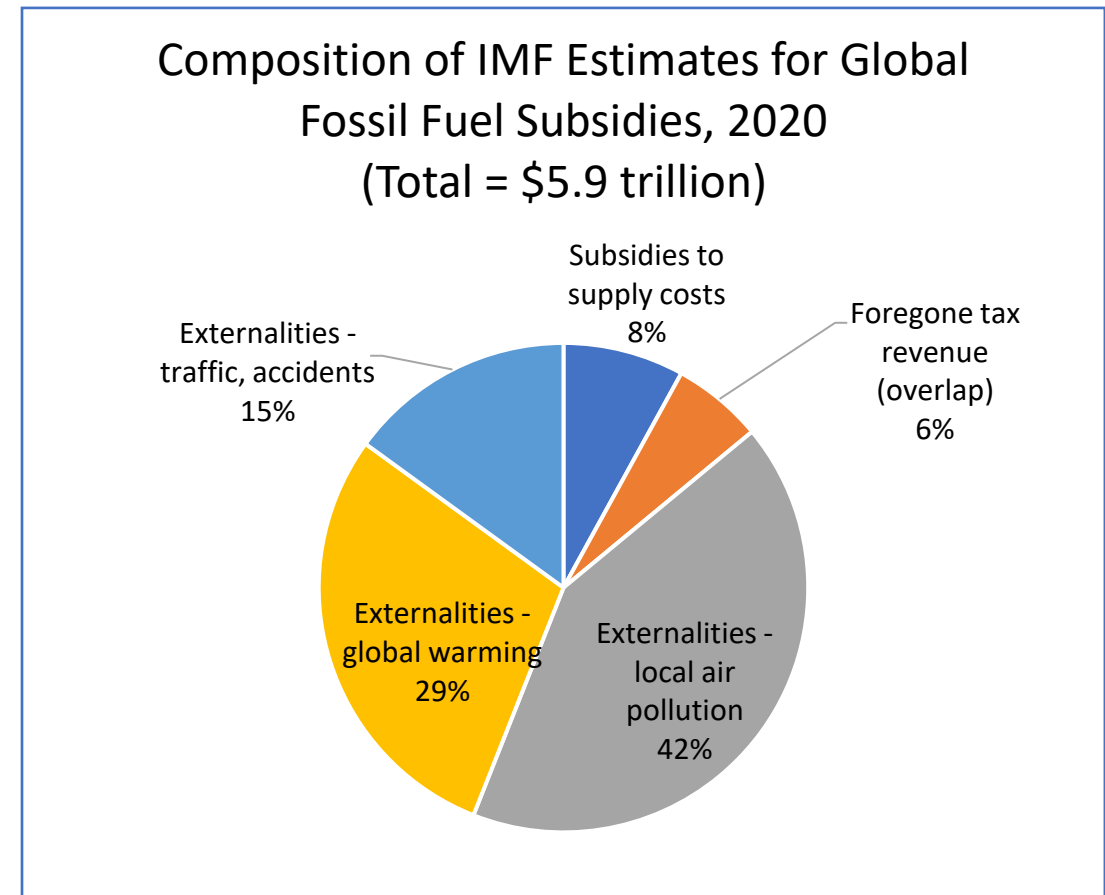
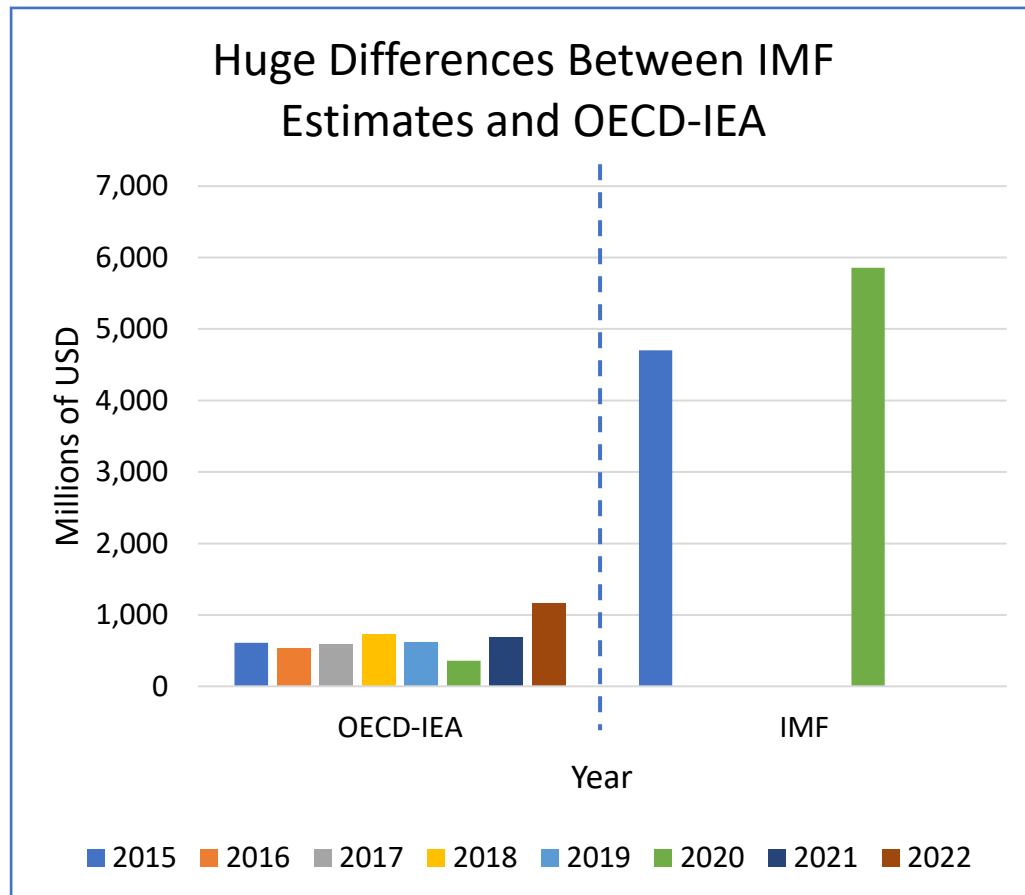
- Source of the initial estimates of consumer subsidies; now data tools and partnership model
- Current work on reform: modeling strategies, mitigating impacts
- Carbon Pricing Assessment Tool, Energy Subsidy Reform Facility

UNEP

- Emerging role to collect data on FFS under SDG Indicator 12.c.1., FFS/unit GDP
- Scope of coverage currently follows OECD and IEA, with similar gaps.

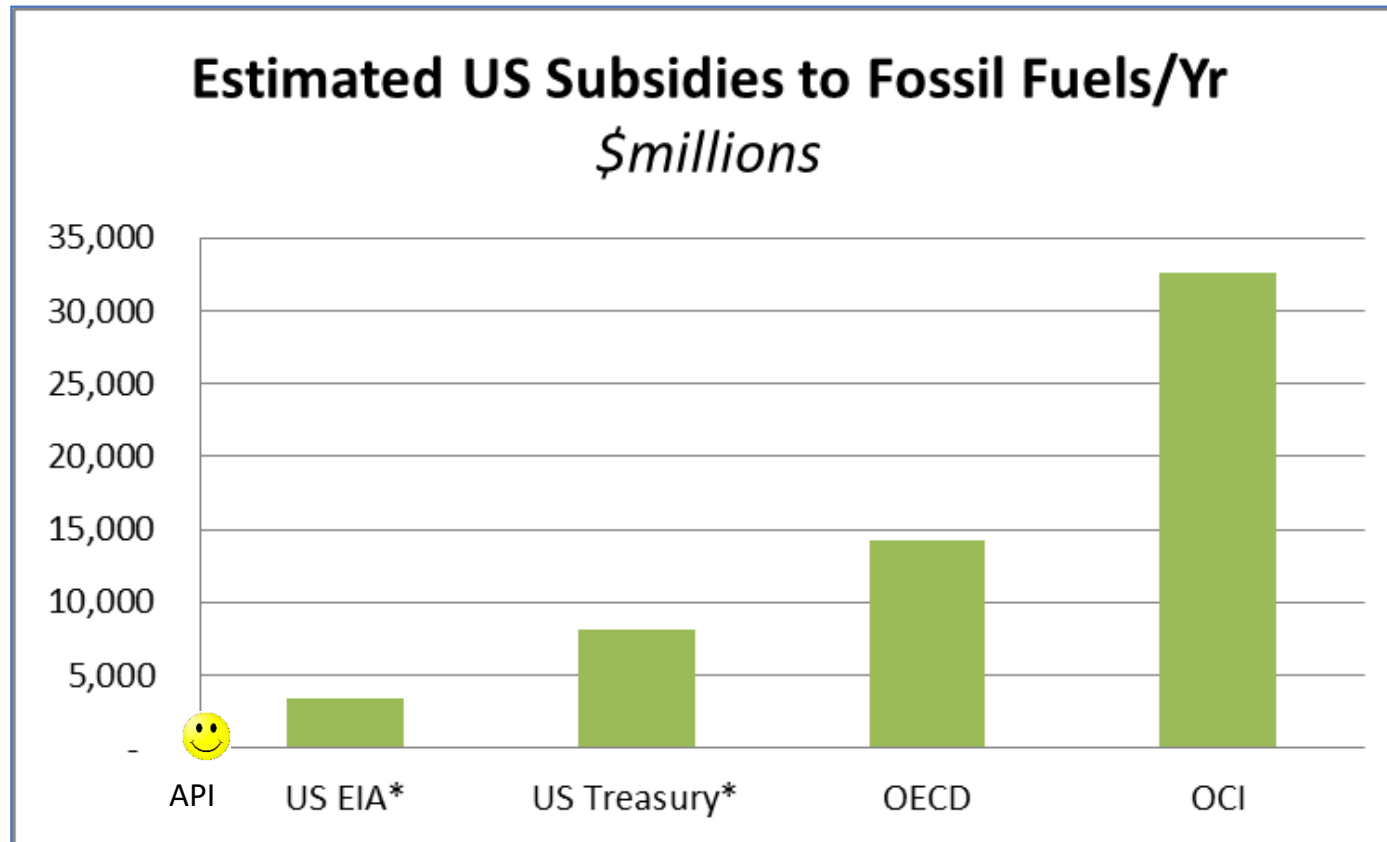
*None of these mandate reporting. Additional reporting opportunities under the WTO Agreement on Subsidies and Countervailing Measures; reform expectations with targets under G20 and APEC. Limited impact thus far.

Subsidy Measurement - Global IMF Estimates – Externalities, Imputed Taxes Dominate



Subsidy Measurement – United States

Numerical Friction: Scope, Definitions, Valuation



Sources: EIA (2015); US Treasury (2015); OECD (2015); OCI (2014); API (1993-2016).

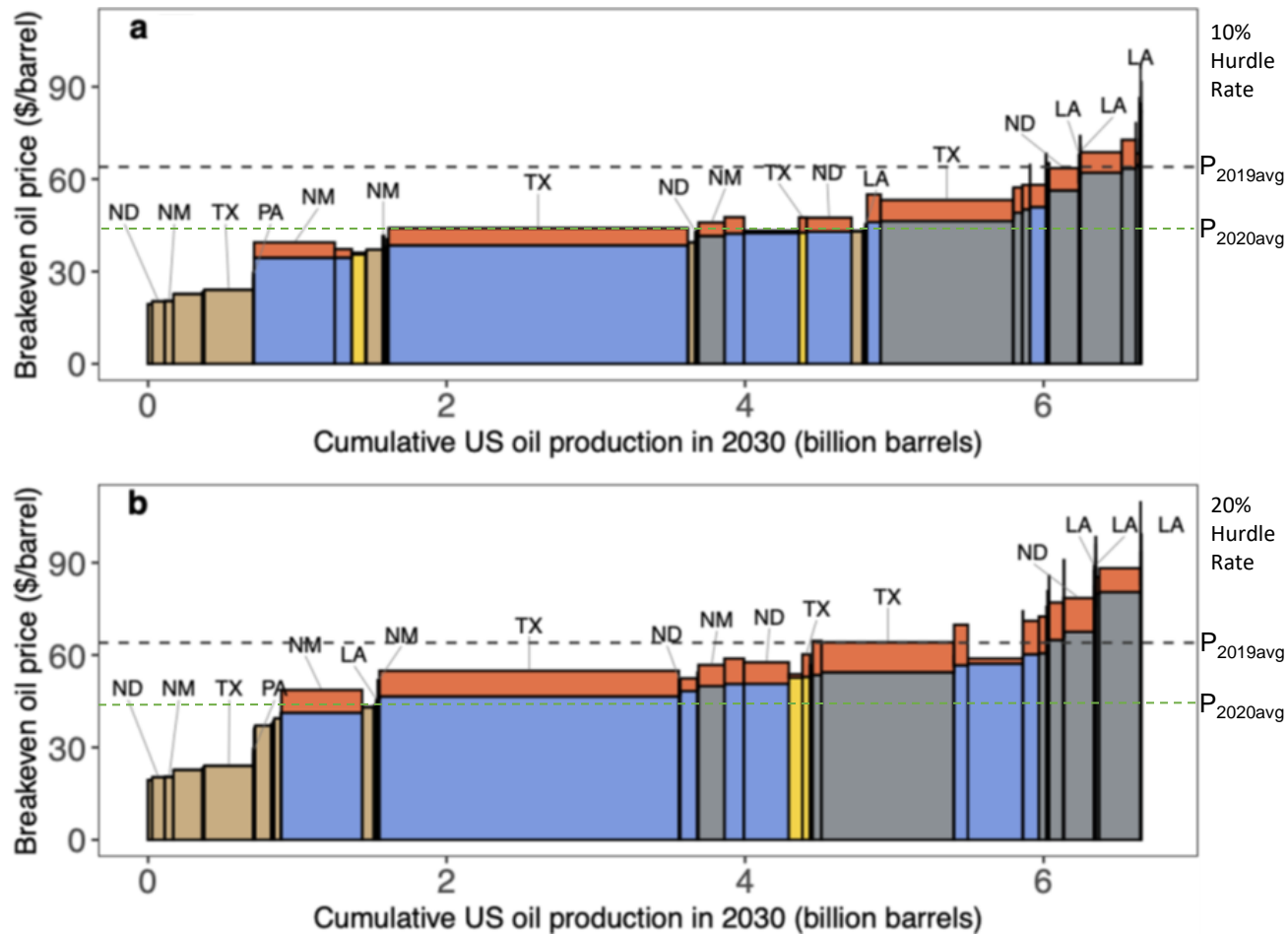
*Federal subsidy estimates only; no sub-national data in totals.

Data years: 2013 (EIA, OCI); 2014 (OECD); Average projected 2016-25 (US Treasury).

Common Causes of Variance

- Policy capture (types, subnational).
- Production and price levels.
- Valuation: cost to gov't versus risk-based value.
- Changes in baseline tax rules.
- Tax court decisions.
- New legislation, e.g. IRA
 - ~\$370b for 'Energy Security and Climate Change'
 - Weak guardrails on 45Q (\$60 ton/EOR; up to \$180/ton for DAC).

Subsidy Patterns – United States Boosting Profits in US Oil

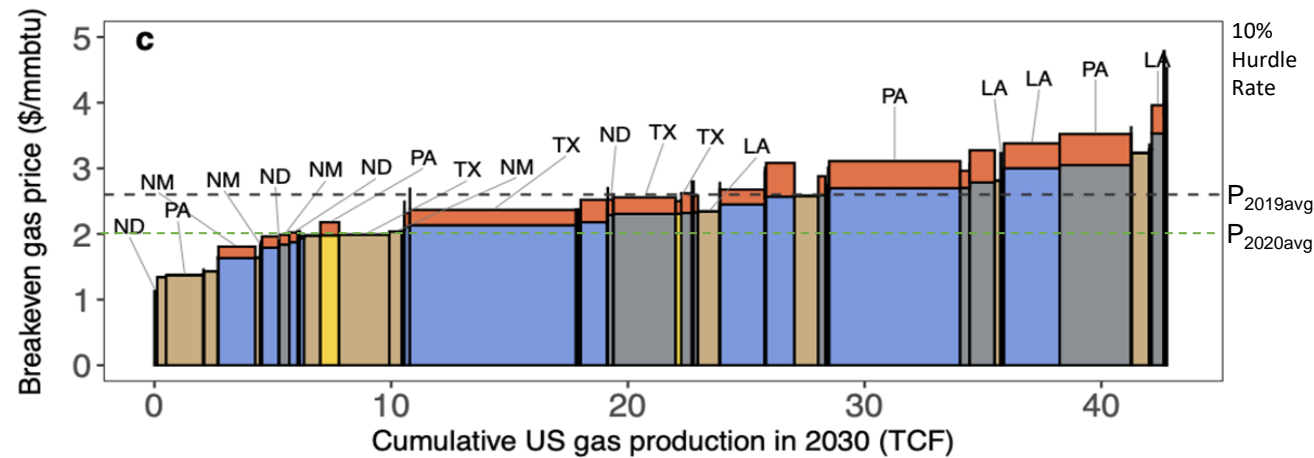


- Full capital cycle for discovery fields (blue).
- At 2019 prices, subsidies boost average rate of return by 55% (current prices are similar).
- At lower 2020 prices, and higher hurdle rate, 61% of new oil subsidy-dependent.
- Leakage: high prices would mean that nearly all fields economic with no subsidies & public money pads profits.

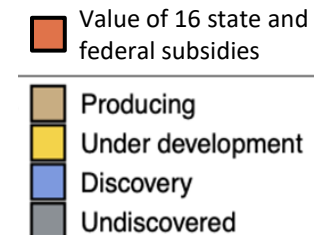
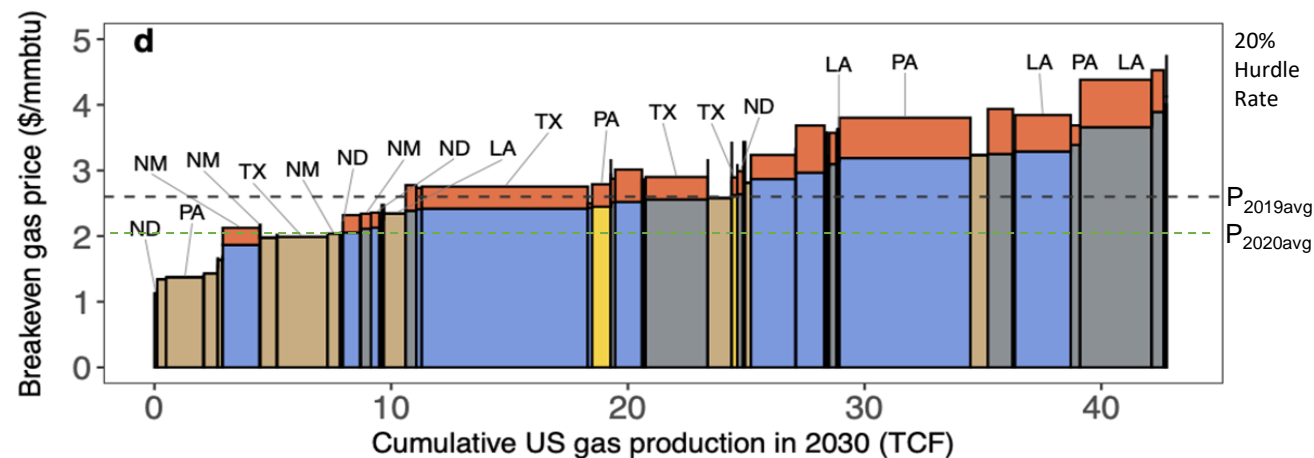
Source: Achakulwisut, Erickson and Koplow, *Environmental Research Letters*, 2021 using cost data from Rystad.

Subsidy Patterns – United States

US NG: Substantial Reserves Subsidy-Dependent



- Full capital cycle for discovery fields (blue).
- At 2019 prices, subsidies boost average rate of return by 68%.
- At lower 2020 prices, and higher hurdle rate, 74% of new NG subsidy-dependent.
- Leakage: prices reached \$8.80/mmbtu in Aug. 2022; now down to ~\$2.40/mmbtu.



Field count: 7,594 total of which 1,076 discovered but not yet producing.

Subsidy Patterns – A Colorado Example

O&G Well Plugging Bonding Shortfalls

Unplugged O&G wells in CO, as of December 2020

# wells	59,711
No production > 2yrs	6%
No production > 5 yrs	3%
Low yield stripper wells	48%

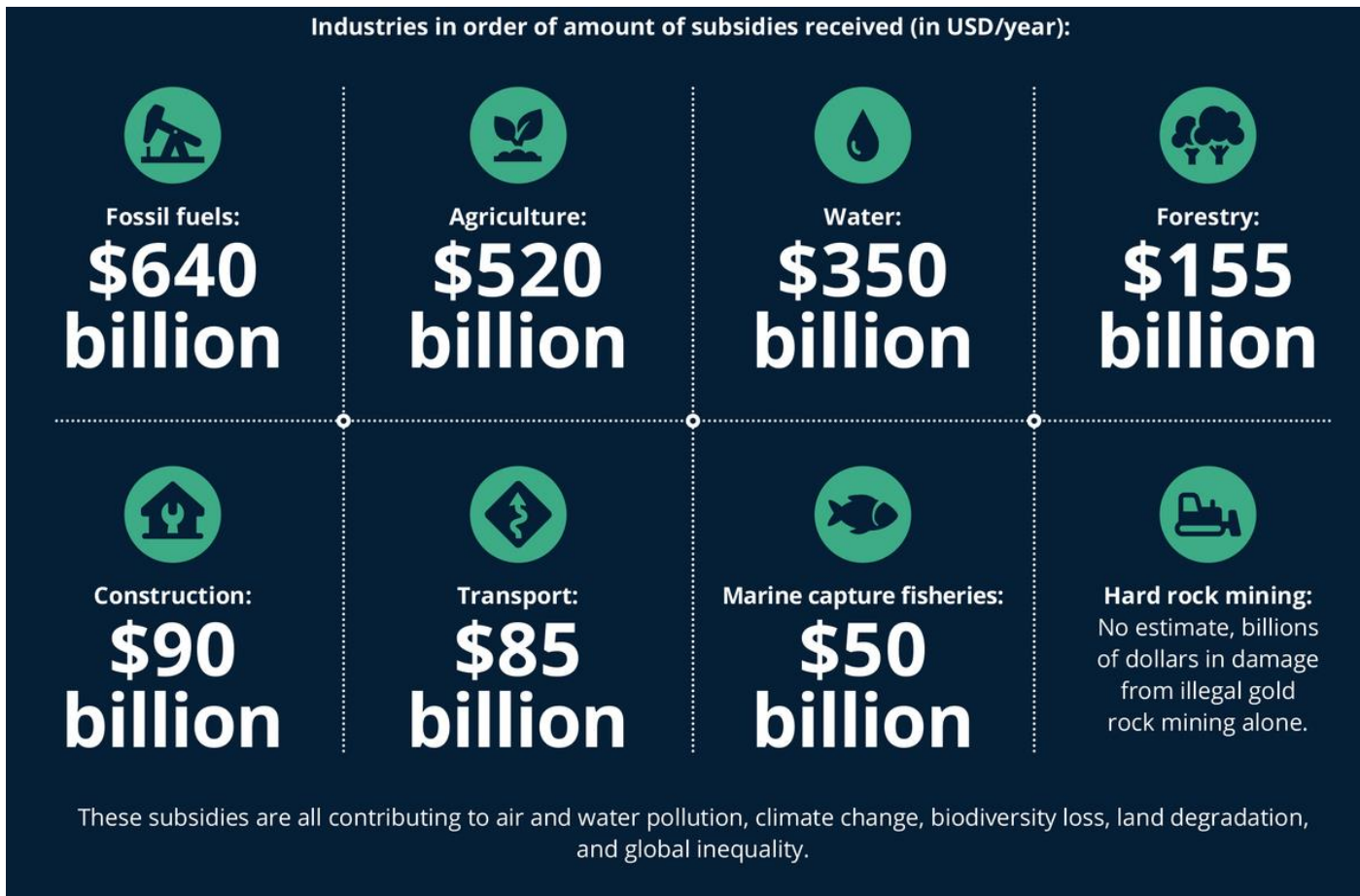
Well closure liabilities and bonding

All CO unplugged wells	\$8,300 million
Amount bonded	\$162 million (2%)
Blanket bonding, 10 largest firms in CO	
Share of total unplugged wells	62%
Average bond value/well	\$32
Associated annual premium	\$0.320

Source: Carbon Tracker Asset Retirement Obligation Portal

Subsidy Patterns – Global EHS

Global EHS at Least \$1.8 trillion/year; ~2% of GDP



- ✓ Multi-sector views critical for ecosystem-wide concerns such as biodiversity and climate change.
- ✓ Figures here do not include externalities.
- ✓ Sectors often interact (e.g., irrigation in agriculture, bulk fuel shipments and transport subsidies, road building and deforestation).

Source: Koplou and Steenblik (2022).

Subsidy Patterns – Global Multi-sector Subsidies and Biodiversity: Stop Digging

- Two historic biodiversity agreements in the past three months:
 - The **Kunming-Montreal Global Biodiversity Framework (GBF)** was adopted on December 19, 2022, to protect and restore nature.
 - A **deep seas agreement** was signed on March 4, 2023, to protect marine life in international waters.
- Target 18 of the GBF:
 - Reduce EHS by **\$500 billion** annually by 2030.
 - But even with massive data gaps and no inclusion of externalities, subsidies to EHS at least **\$1.8 trillion** per year.



Subsidy Reform

Where are Our Leverage Points?

- Increased collaboration on subsidy data collection: IGOs, NGOs, some governments, accounting standards boards.
- Expand international reporting to all subsidy types; establish workgroups on issue-specific reporting challenges (as happens with accounting standards).
- Formalize sharing of lessons learned from World Bank partnerships with countries on subsidy reform.
- Mandated disclosure of tax credit recipients in US (aligned with GASB 77).
- Disclosure of receipt of EHS by corporations to align with ESG commitments.
- Key constraints: some technical, but mostly political resistance to adequate disclosure within both governments and firms.