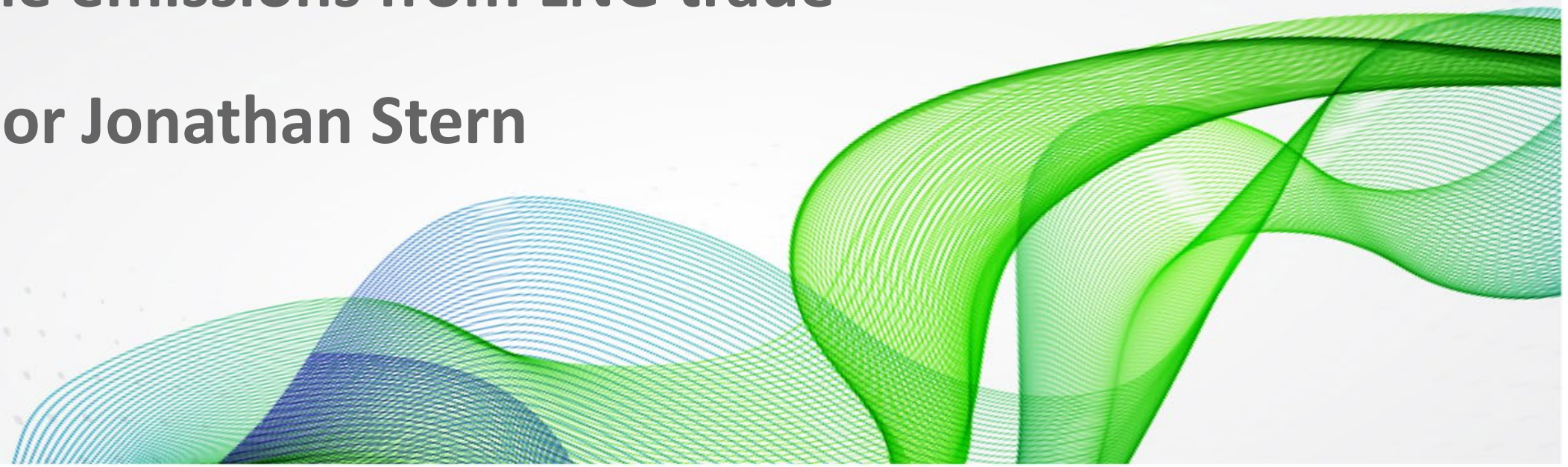
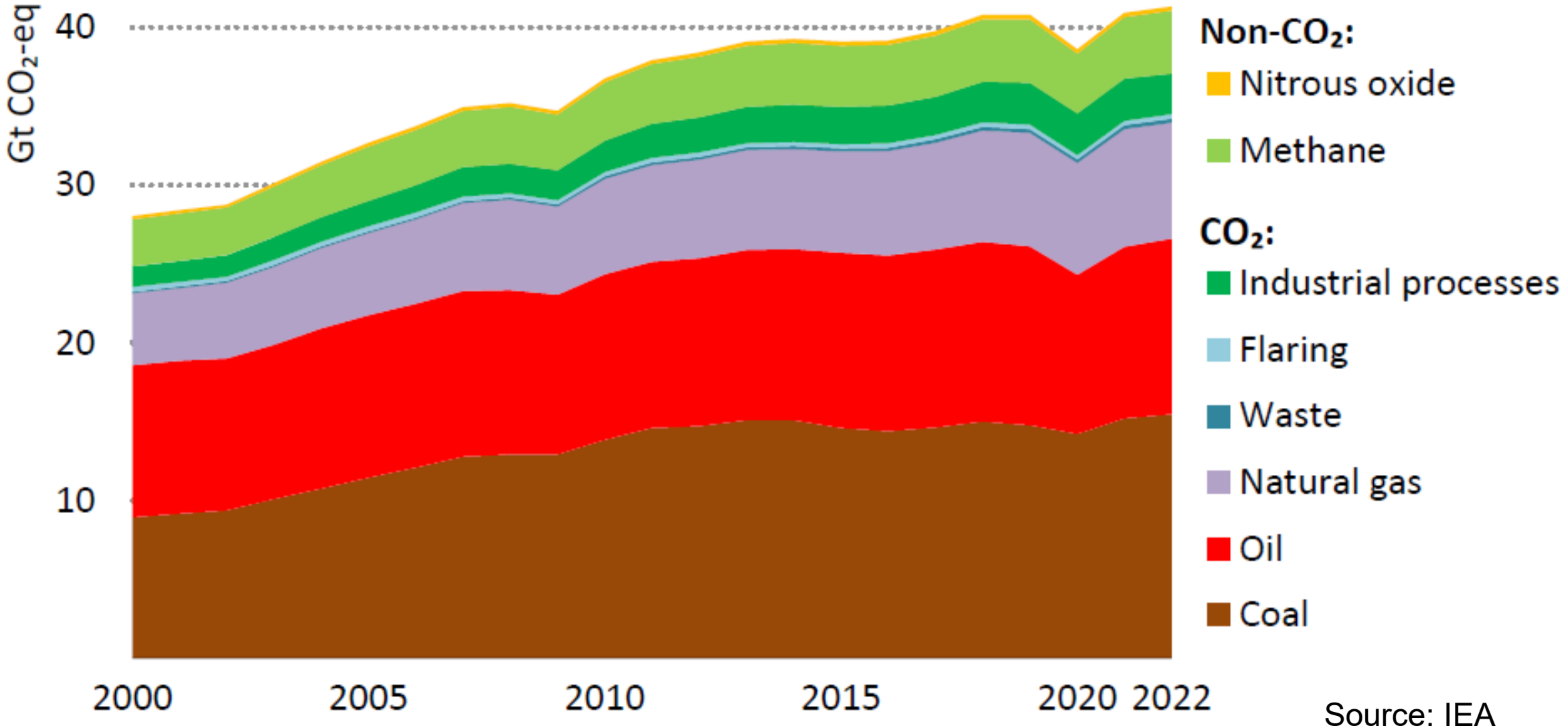
THE OXFORD INSTITUTE FOR ENERGY STUDIES

Upstream investments in energy transition and reducing greenhouse gas emissions from fossil fuels: MRV of methane emissions from LNG trade

Professor Jonathan Stern



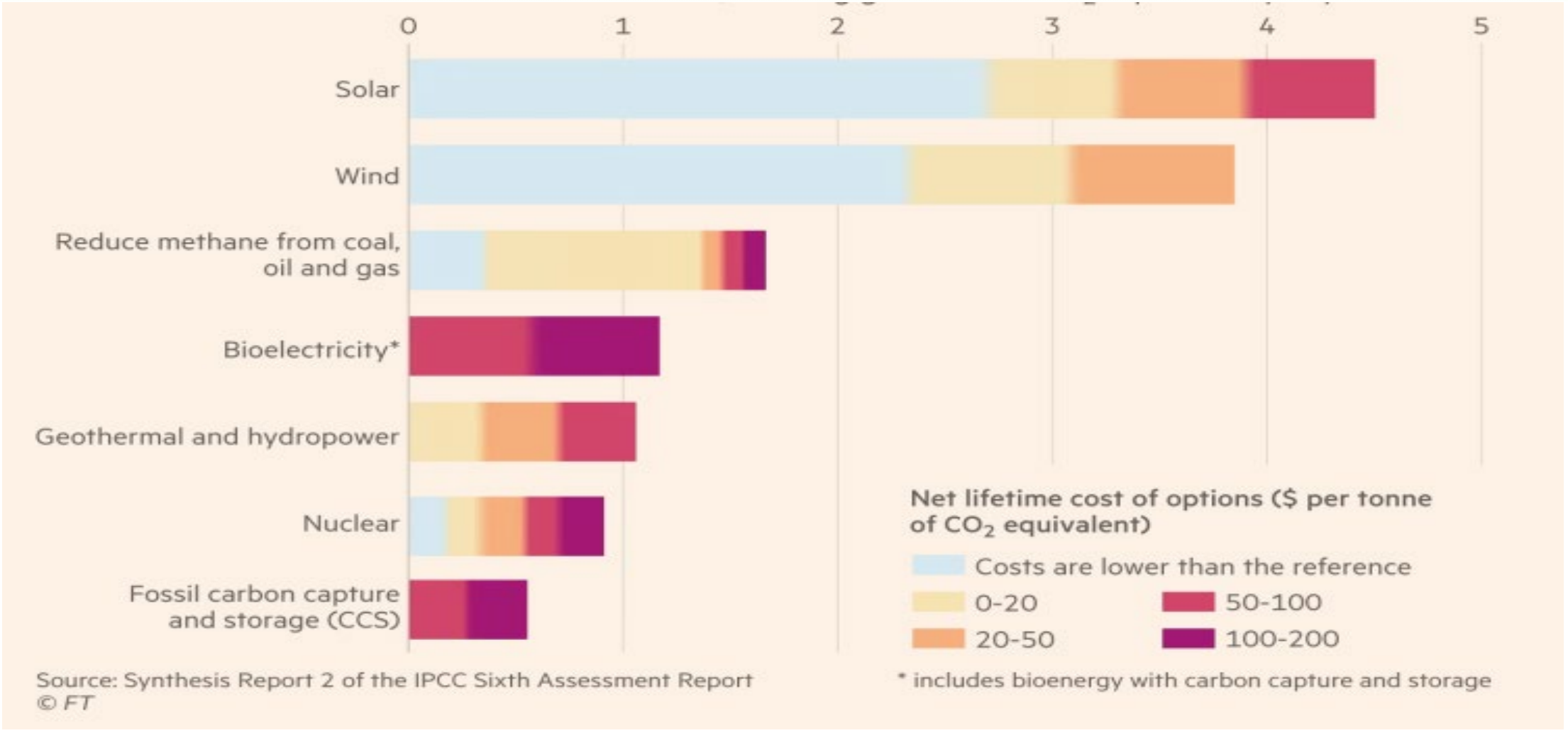
Global Energy-Related Greenhouse Gas Emissions 2000-2022



Source: IEA

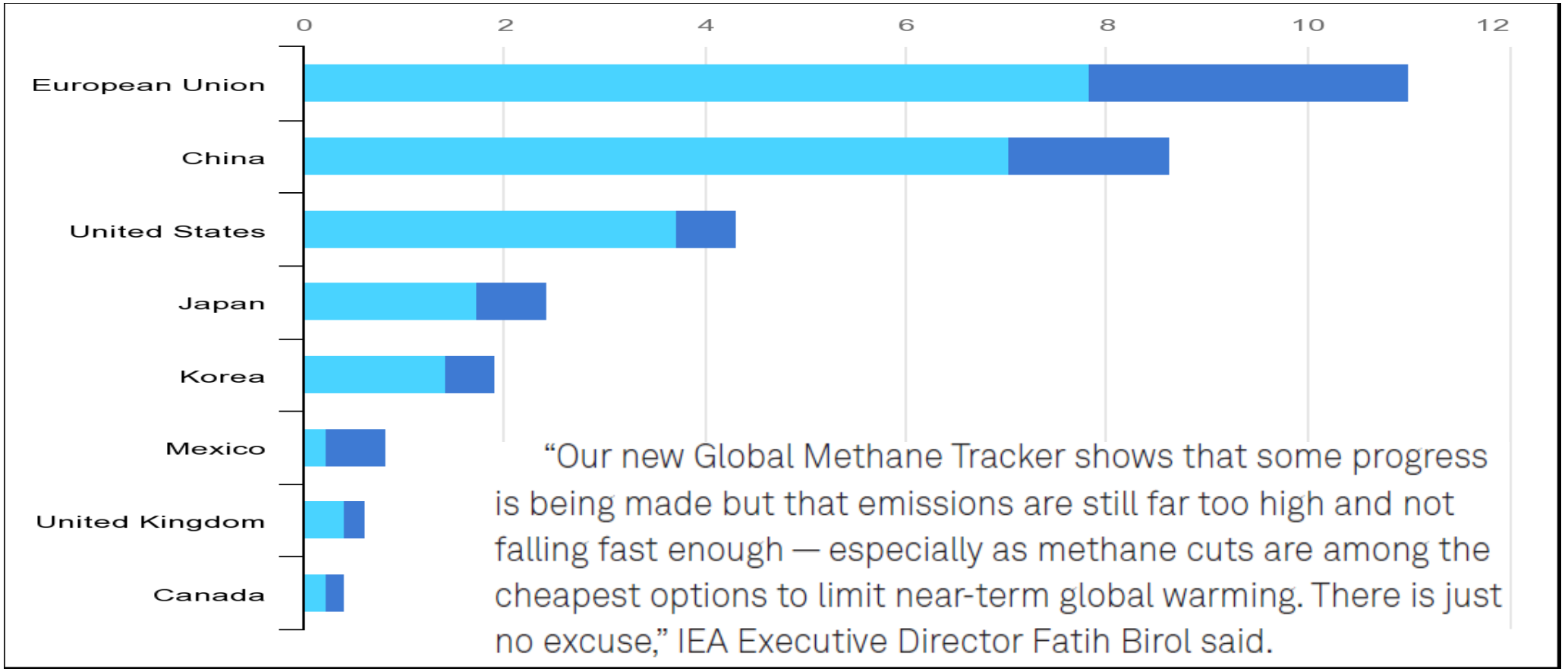
Reducing methane emissions can have a major impact on warming before 2050

Lifetime Costs of Methane Reduction Measures



After wind and solar, methane reductions from fossil fuels are the most effective and least cost measures

Methane Emissions Associated with Imported Oil (light blue) and Gas (dark blue) - mt methane



Source: IEA, Methane Tracker, February 2023

Emissions from oil imports are larger than those from natural gas for most major importers; flaring is a big issue for oil – recent research has shown the traditional assumption of 98% combustion is way over-stated

LNG is the most straightforward supply chain for MRV and therefore a good starting point for action on emissions

WELLHEAD TO BORDER

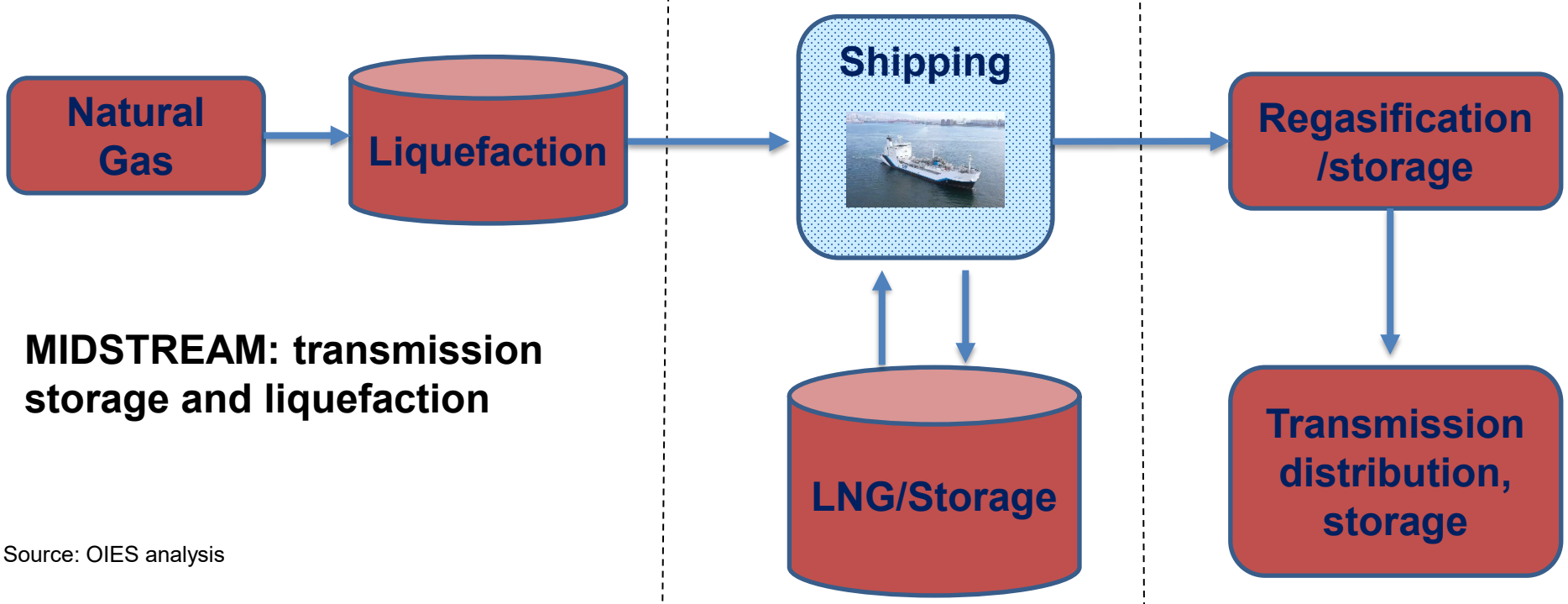
UPSTREAM: exploration, production, processing

MIDSTREAM: transmission storage and liquefaction

SHIPPING & STORAGE

WITHIN IMPORTING COUNTRY

DOWNSTREAM:



Source: OIES analysis

Need to address issues faced by asset owners responsible for emissions in upstream, midstream, shipping and downstream segments

The next few years will see a boom in LNG imports, especially in Europe but emissions, especially methane, from these imports are becoming a major problem

Differences in Complexity of LNG Export Supply Chains and Boundaries

Qatar – the simplest LNG supply chain:

- One major gas field with..
- relatively short pipelines to..
- LNG terminals in a limited geographical area/established shipping routes

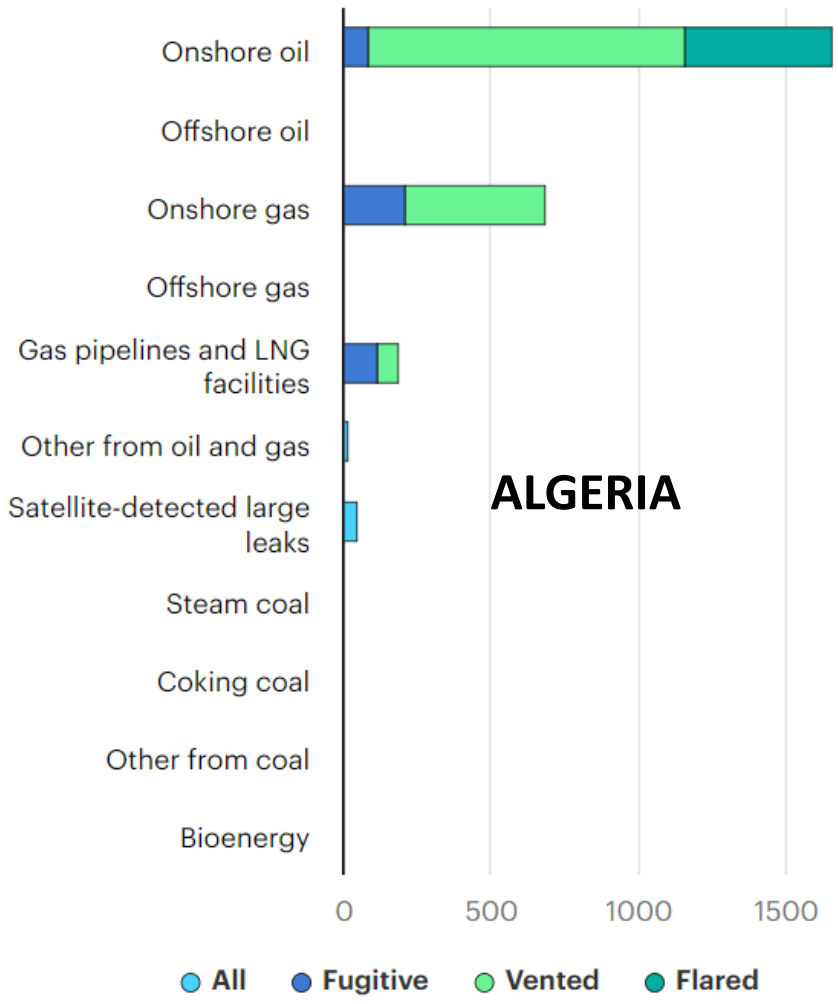
US as the most complex LNG supply chain:

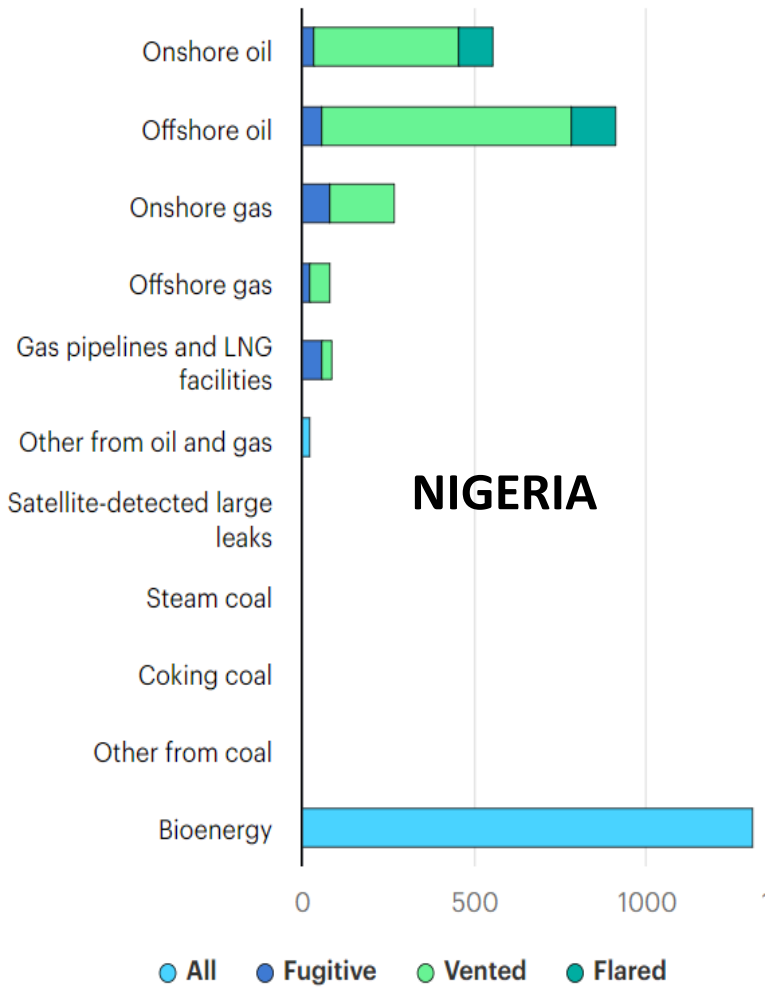
- Exploration and production – individual fields
- Gathering/boosting lines
- Transmission pipelines, processing plants, storages,
- Many liquefaction terminals in different regions/ships delivering to different markets

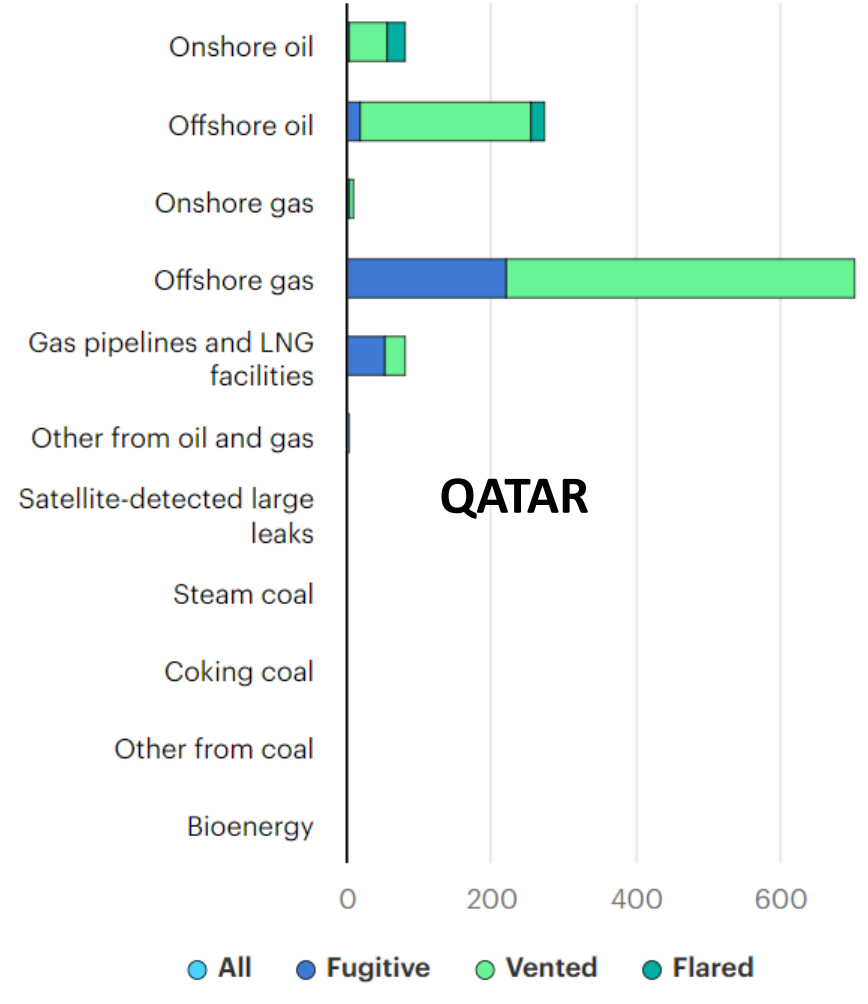
Public domain data are usually based on (usually US EPA) engineering estimates – not empirical measurements – of emissions; there is very little detailed data from other countries/regions. UNFCCC data is usually old and undefined

A Comparison of Methane Emissions from Energy Production: Algeria, Nigeria and Qatar (Kt)

Source: IEA Methane Tracker 2023







Majority of Algerian and (especially) Nigerian emissions are venting and flaring from oil; majority of Qatari emissions are from gas venting

Evolving regional and national regulatory regimes and international fossil methane reduction initiatives

- US IRA: (domestic) methane fee from 2024 based on EPA Subpart W returns, but empirical measurement by 2026:
  - $900 rising to $1500/ton by 2026: 0.2% for production, 0.11% for compression, transmission and storage; 0.05% for processing, LNG (export, import and storage), gathering/boosting
- Strong evolution of policy and targets in Canada
- EU regulation of methane emissions from imported fossil fuels:
  - progress of proposed EU Methane Regulation: requirements on importers to report emissions
  - emissions from shipping to include methane from 2024 in the MRV Regulation and from 2026 in the ETS
  - possible extension of EU **Carbon Border Adjustment Mechanism (??)**
- **MRV frameworks in Asia: future of `carbon neutral' (oil and) LNG cargos; some action on coal emissions in China**
- MANY GOVERNMENT AND CORPORATE INITIATIVES: Global Methane Pledge, Net Zero Producers Forum, Oil and Gas Methane Partnership 2.0/International Methane Emissions Observatory, Methane Guiding Principles, Joint Declaration Energy Importers and Exporters on Reducing GHG Emissions

MRV of LNG: GIIGNL and SGE methodologies published in November 2021 plus the Cheniere cargo tags

MEASUREMENT of all GHGs:

- GIIGNL is full lifecycle i.e., production to end-use and allows for `stage' statements
- SGE is production to delivery at border
- Cheniere reports separate segments and attaches `cargo tags'

REPORTING:

- GIIGNL and SGE focus on 100 year time horizons (25-29xCO_2 impact), but allow for shorter durations (25 year ~ 80x CO_2 impact)
- SGE and GIIGNL use `reasonable' and `limited' levels of assurance under ISO14064:2019
- Confidentiality: GIIGNL and SGE are confidential, Cheniere tags are confidential

VERIFICATION:

- SGE and GIIGNL set out qualifications for `accredited verifiers' performing according to standards ISO14065:2020;
- These must have technical qualifications (i.e. not accountancy firms)

Carbon-Neutral LNG 2019- February 2023: ~60 Cargos; 1 GIIGNL and 1 SGE cargo

Deliveries to Japan 27, China 15, Taiwan 7, Others 11:

- **Information very difficult to obtain: registries do not ask for documentation of emissions, or details of the project to which the offset is applied)**
- **Data from registries show there is no `standard cargo', or a standard offset profile:**
- **Carbon credit size generally 200,000-250,000 but no data on calculations for different gases, or time horizons if methane is included**
- **Credit vintage dates can be as early as 2010**

GIIGNL GHG-neutral cargo, September 2022, Australia to Taiwan: 190,000 credits, no other information available

`Offset-Paired' (SGE) cargo, September 2022, Chevron-Taiwan – credit information available

Lack of information undermines environmental credibility. Essential to separate MRV issues from offsets ie claims of GHG neutrality

How should we identify upstream investments through energy transition while we, for the years to come, will continue relying on fossil fuels for energy security?

What will mobilize efforts to reduce carbon emissions from fossil fuels as well as transition finance capitals to assist those attempts?

Answers to both these questions are:

PROMOTE MRV TRANSPARENCY TO ACHIEVE CREDIBILITY

The Road Ahead to Credibility

- General pledges for long term dates: eg 2050 do not inspire credibility
- Establishing responsibility for accuracy of measurement for assets within supply chain segments
- Independent verification of MRV by recognised technical experts
- Progress towards pledges/targets can only be judged by transparent ongoing measurement, reporting and verification THIS MEANS…
- Publicly available information on methodologies and emissions data

The greater the accuracy, transparency and independent verification of emissions of fuels delivered to customers, the greater the certainty of future regulatory impacts and competitive advantage

Canadian Methane Emissions Reduction Plan (megatonnes of CO2e)

Sector/Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Agriculture	27.37	27.36	27.38	27.40	27.41	27.39	27.37	27.34	27.33	27.29	27.22
Buildings	1.30	1.28	1.24	1.20	1.16	1.12	1.08	1.05	1.01	0.97	0.94
Electricity & Steam	0.17	0.19	0.24	0.23	0.25	0.24	0.26	0.23	0.20	0.19	0.18
Heavy industry	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20
Oil and Gas	34.06	33.10	30.67	26.61	25.87	23.87	23.43	21.99	18.64	15.30	11.94
Others	1.34	1.26	0.47	0.46	0.42	0.40	0.40	0.39	0.40	0.40	0.41
Transportation	0.59	0.61	0.62	0.63	0.66	0.66	0.66	0.66	0.67	0.68	0.68
Waste	26.98	26.95	25.76	24.39	22.92	21.54	20.10	18.82	17.49	16.22	14.90
Grand Total	**91.99**	**90.93**	**86.57**	**81.11**	**78.89**	**75.41**	**73.50**	**70.68**	**65.93**	**61.26**	**56.46**

Source: Environment and Climate Change Canada, *Faster and Further: Canada's Methane Strategy*, September 2022, Table 1, p.13.

Detailed methane emissions reduction plans are essential for credibility; otherwise progress towards meeting targets is impossible to judge

Thank you

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