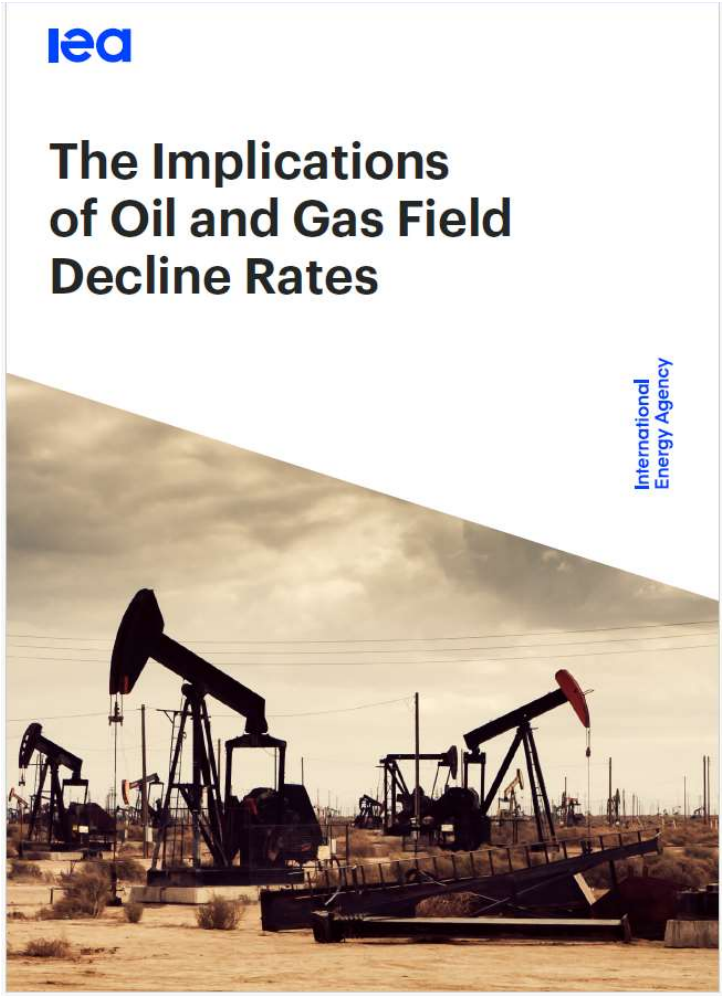
The Implications of Oil and Gas Field Decline Rates, IEA 2025

P. Brocorens

14 october 2025



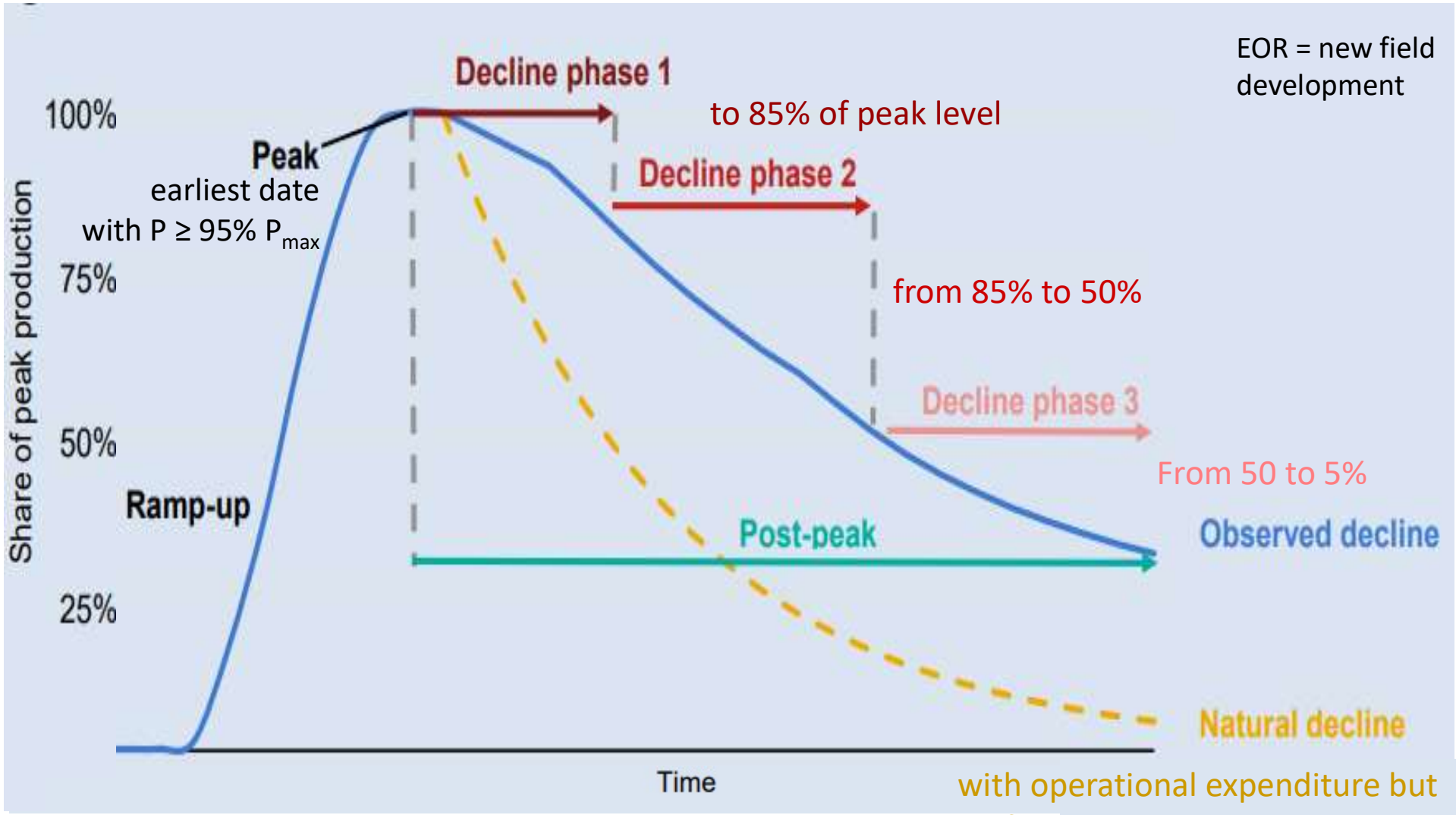
This study was prepared by the World Energy Outlook (WEO) team.
Christophe McGlade, Head of the Energy Supply Unit, co-ordinated the work and was the lead author; he designed and directed the report together with **Tim Gould**, Chief Energy Economist.

	weo2008	weo2013	this study 2025
Source	IHS	Rystad	Rystad
Fields: super-giants	54	52	15
giants	263	306	141
all	651	1634	1650
Info		no information about data quality	excludes fields with low quality data
		phase data only from fields that were currently in that phase	data from all phases, including from closed fields

This study uses a much lower number of super-giant and giant fields, likely reflecting the poor quality of the data of those fields.

Observed and natural decline rates in oil fields

Definitions



Natural decline calculation: upstream capital expenditure divided by capital efficiency per vintage to estimate production associated with the capital expenditure, then subtract this from actual production to derive the natural decline in production.

Observed post-peak decline rates of conventional oil fields (%)

Decline rate increasing from phase 1 to 2, then slightly declines in 3, as most likely period to introduce secondary recovery techniques

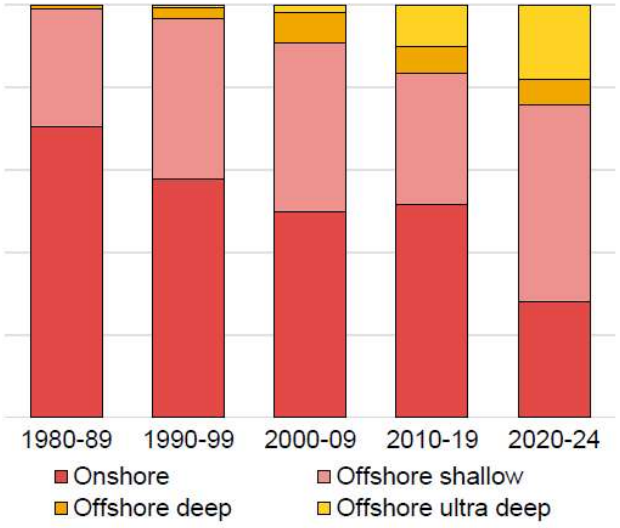
		Decline phase 1	Decline phase 2	Decline phase 3	Average post-peak
Onshore		3.6	7.9	7.3	4.2
Shallow offshore		8.0	12.6	10.4	8.5
Deep and ultradeep offshore		10.2	16.2	12.5	10.3
Supergiant	*> 5000*	1.4	4.6	6.8	2.7
Giant	*500-5000*	5.4	10.0	7.9	6.3
Large	*100-500*	10.1	15.4	10.1	9.4
Small	*< 100*	14.0	18.6	12.8	11.6
Africa		10.6	12.1	9.6	8.1
Asia Pacific		5.2	10.2	8.3	5.9
Central and South America		6.4	9.6	10.9	7.7
Eurasia		4.5	10.8	7.2	6.5
Europe		8.1	14.7	10.5	9.7
Middle East		1.7	3.3	5.7	1.8
North America		7.6	13.6	9.1	8.3
OPEC		3.0	4.8	7.9	2.9
Non-OPEC		6.6	12.4	8.8	7.6
All fields		**5.0**	**9.8**	**8.5**	**5.6**

Note: compound average weighted by cumulative production

Offshore optimized for quick payback, high cost of well intervention.

In the future, world decline rate expected to rise, as production is becoming more offshore.

Conventional oil and gas project approvals by field type



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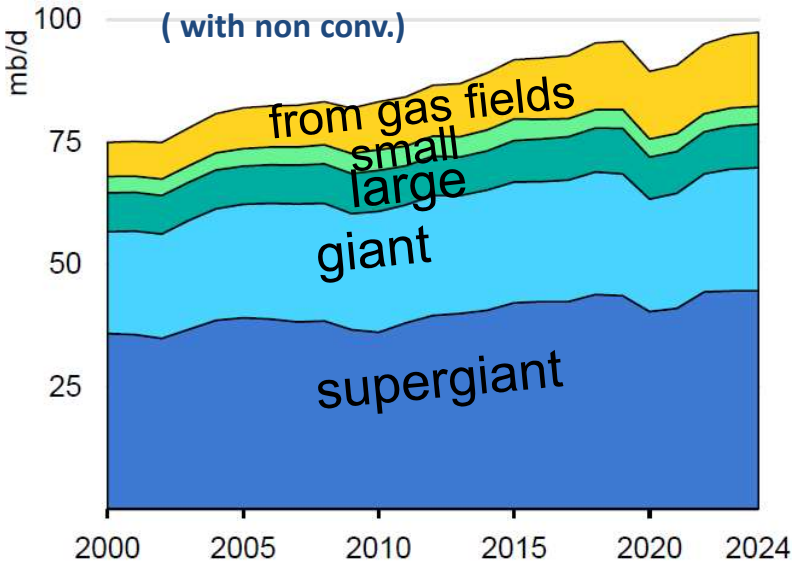
Note: compound average weighted by cumulative production

Decrease with field size (higher natural pressure, economies of scale, multiple reservoirs developed in successive tranches.

In the future, world decline rate expected to rise, as new discoveries tend to be smaller.

Oil production by field size
(with non conv.)



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Offshore optimized for quick payback, high cost of well intervention

Decrease with field size (higher natural pressure, economies of scale, multiple reservoirs developed in successive tranches)

Explains EU vs ME

Observed post-peak decline rates of conventional oil fields (%)

Comparing weo2008 to 2013, there is a degradation of the decline rate,
as expected by the trend. (! different sources !)

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Weo2013 (Rystad)	Weo2008 (IHS data)
5.4	4.3
7.5	6.6
12.7	13.3
4.0	3.4
8.0	6.5
9.3	10.4
4.5	3.1
7.8	7.1
6.2	5.1

Note: compound average weighted by cumulative production

Fields: super-giants	52	54
giants	306	263
all	1634	651

Observed post-peak decline rates of conventional oil fields (%)

Comparing weo 2008 and 2013 to this study, there is an improvement of the decline rates.
Is it real or apparent (due to important fields removed from the analysis ?)

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11.9	
	5.1
	6.1 (Asia) 11.6 (pacific)
	6.0
	5.1
	11.5 (OECD)
	2.7
	12.1
4.5	3.1
7.8	7.1
6.2	5.1

Note: compound average weighted by cumulative production

Fields: super-giants	15	52	54
giants	141	306	263
all	1650	1634	651

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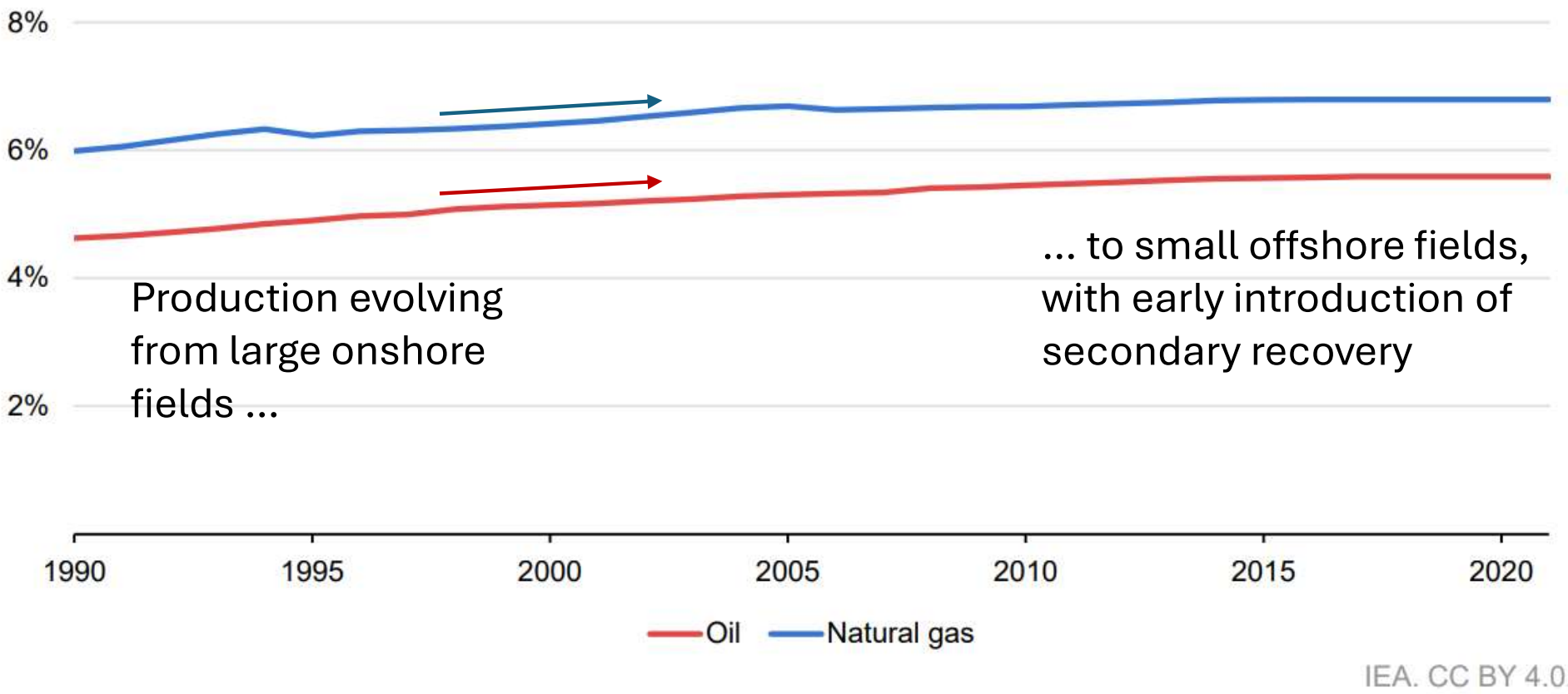
Highest decline rate for LTO.

LTO	12% (to 2035)
EHOB	-

In the future, world decline rate expected to rise, as LTO outside US must be developed to compensate the decline of conventional fields

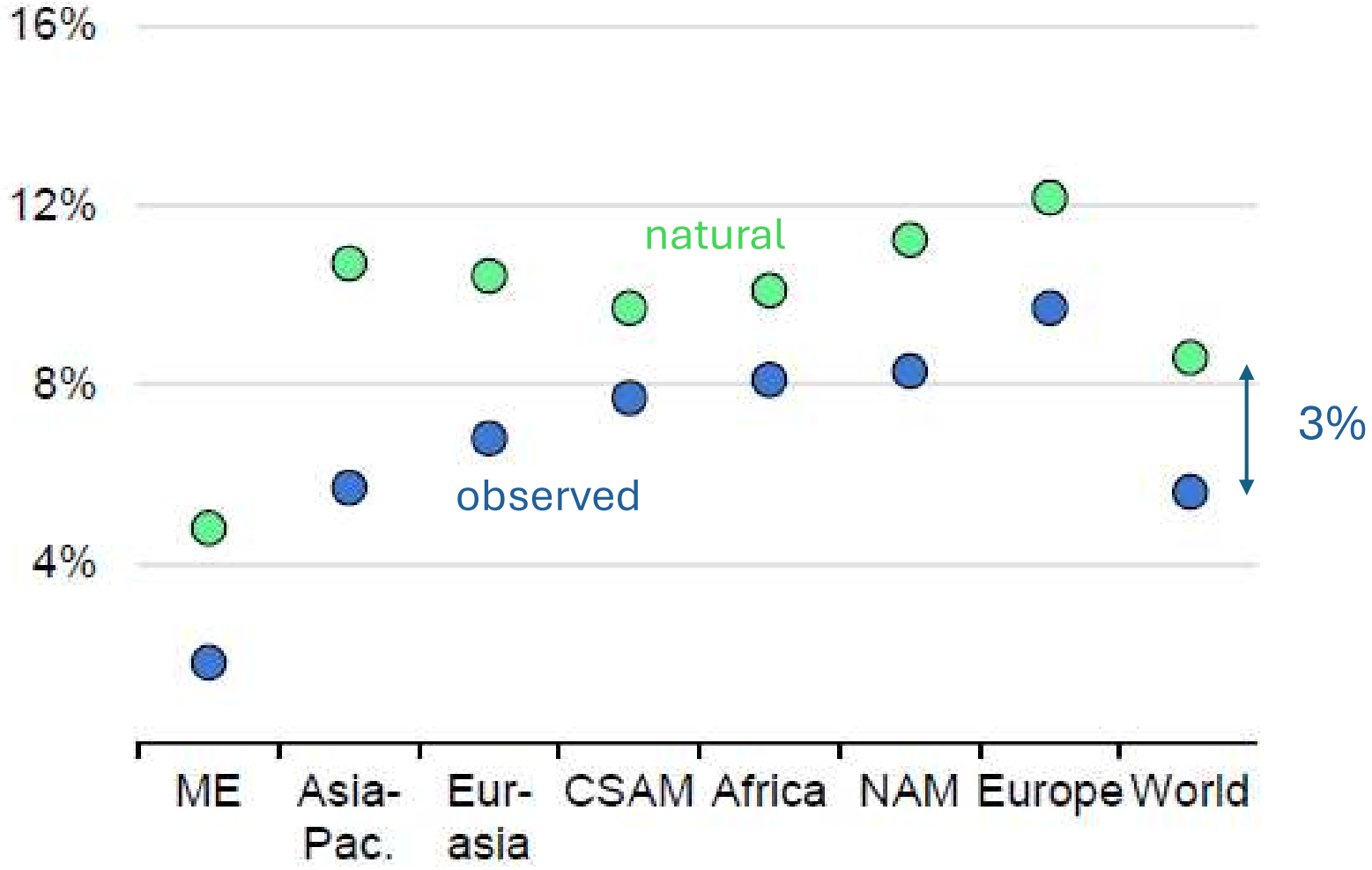
Changes in observed post-peak decline rates of conventional oil and gas fields



Note: compound average weighted by cumulative production

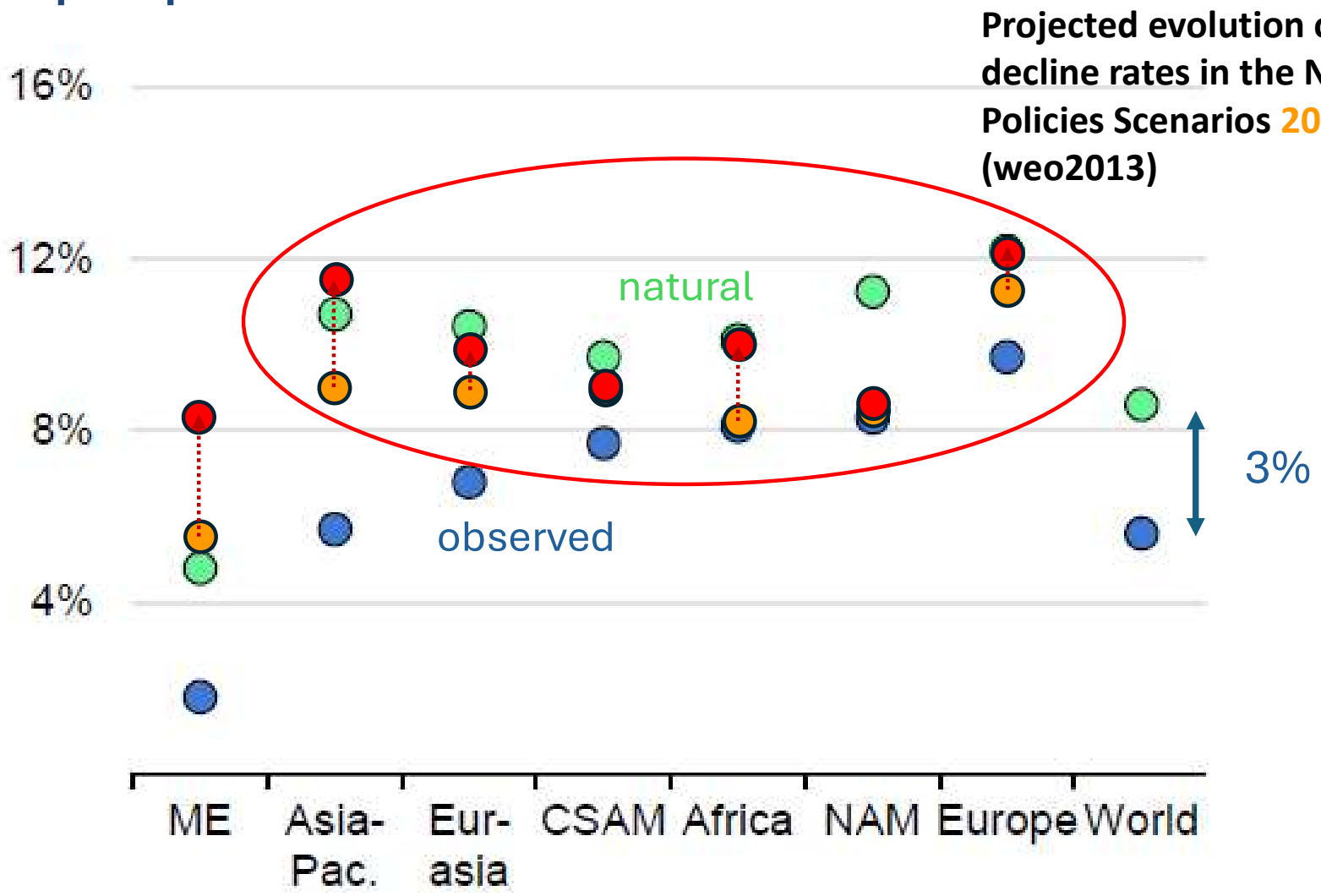
In the future, a production becoming more offshore, from smaller fields, with more LTO and with early introduction of secondary recovery will tend to increase the global observed decline rate.

Observed post-peak and natural decline rates for oil



Since decline rates are expected to deteriorate over time, estimating their future values is essential to evaluate the production replacement needed as fields deplete. This study did not make such an assessment, but **WEO 2013** did so for natural decline rates (see next page).

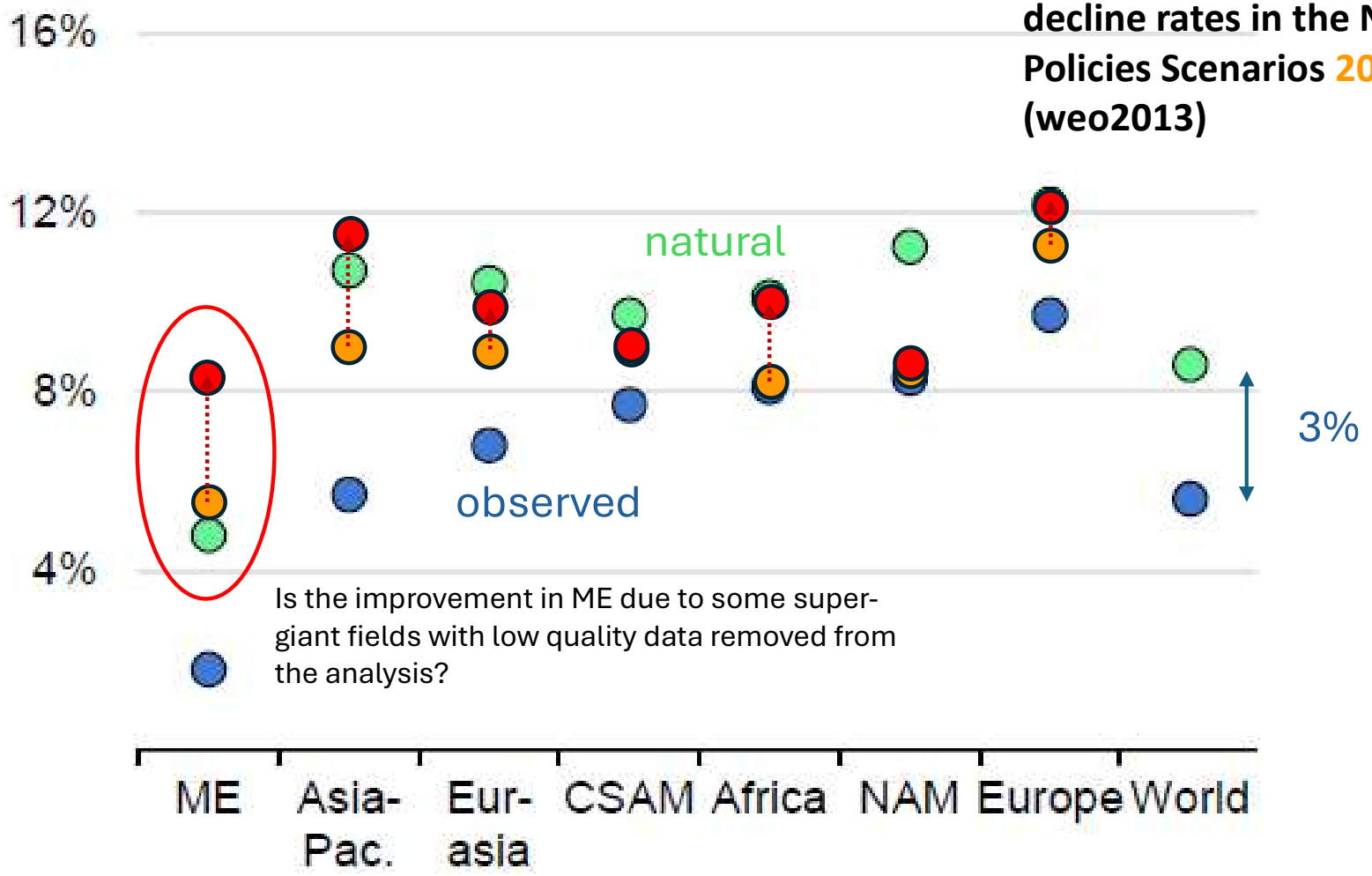
Observed post-peak and natural decline rates for oil



This study has 2024 data, i.e. right in the middle of the time window of the weo2013 study.
Though the comparison must be interpreted with some caution due to different data,
for all regions except ME, the natural decline rate is less good now than in 2012,
as expected by the trend, with sometimes a level worse than what was expected for 2035.

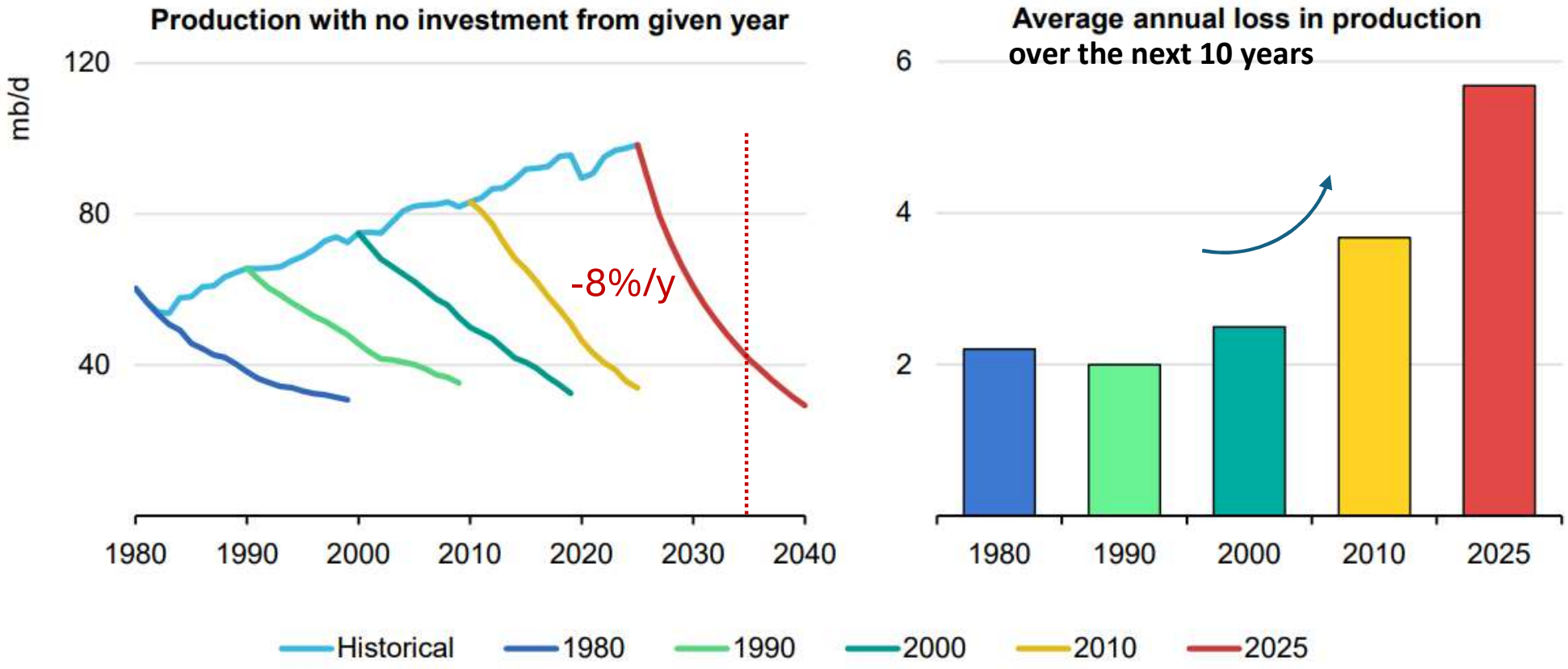
Observed post-peak and natural decline rates for oil

Projected evolution of natural decline rates in the New Policies Scenarios 2012-2035 (weo2013)



The WEO 2013 anticipated a sharp increase in natural decline rates in the Middle East, which has not occurred so far — whether this reflects reality or exclusion of major fields from the analysis remains uncertain. But this study warns that a potential risk for markets is tied to the supergiant fields. Percentage losses are up to five-times faster in phases 2 and 3 than in phase 1. It is largely uncertainty when the supergiant OPEC fields might enter phases 2 or 3; the rapid drop in output could compromise their ability to provide spare capacity buffers.

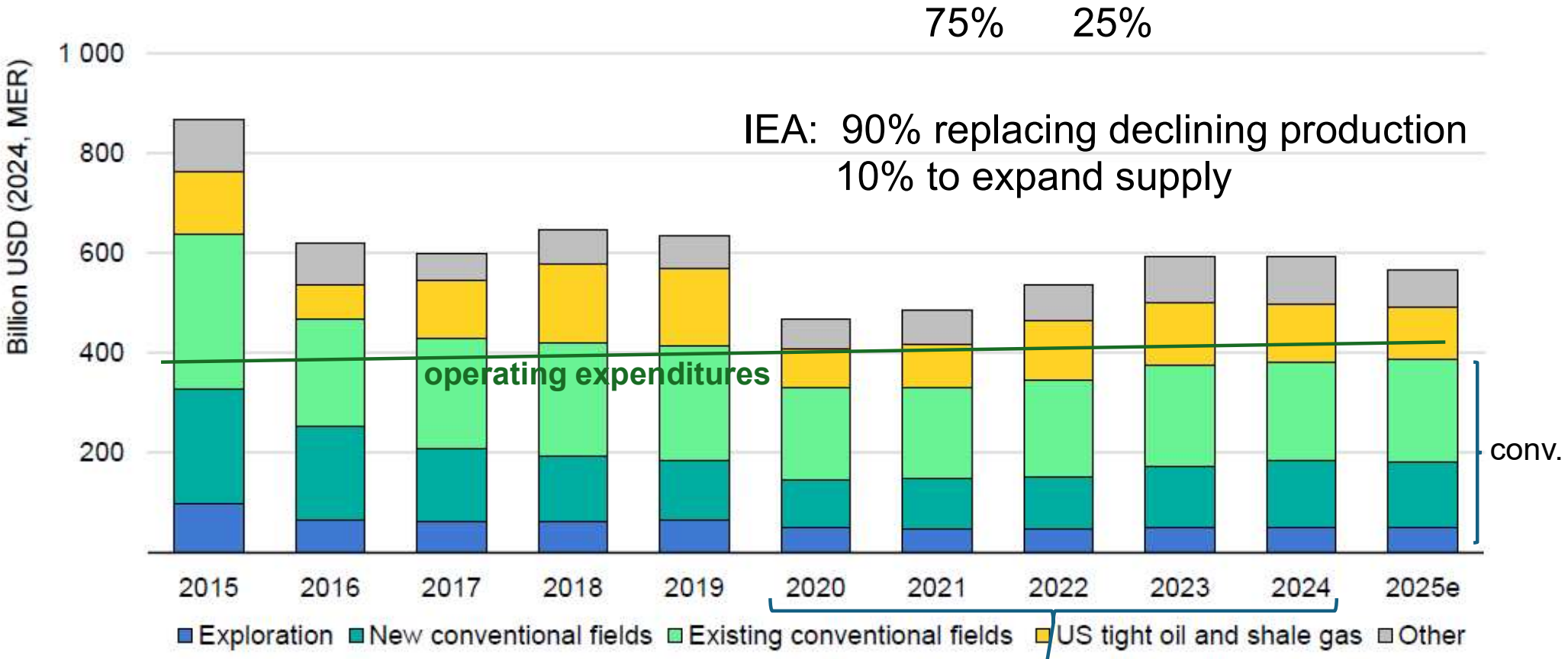
Oil production under natural declines



Increase of annual production losses due to:

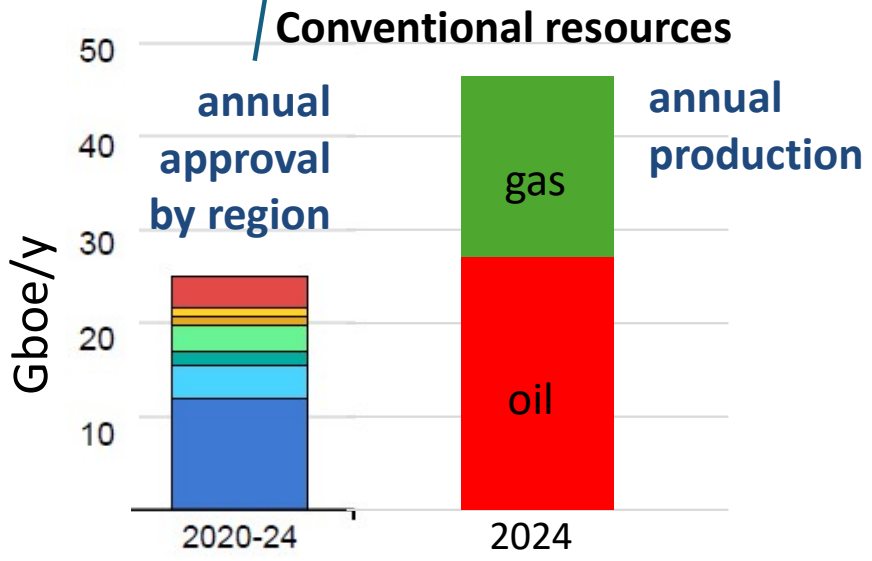
- Higher overall production
- Higher shares of unconventional oil and gas
- Changes in the composition of conventional oil and gas production (NGL, offshore)

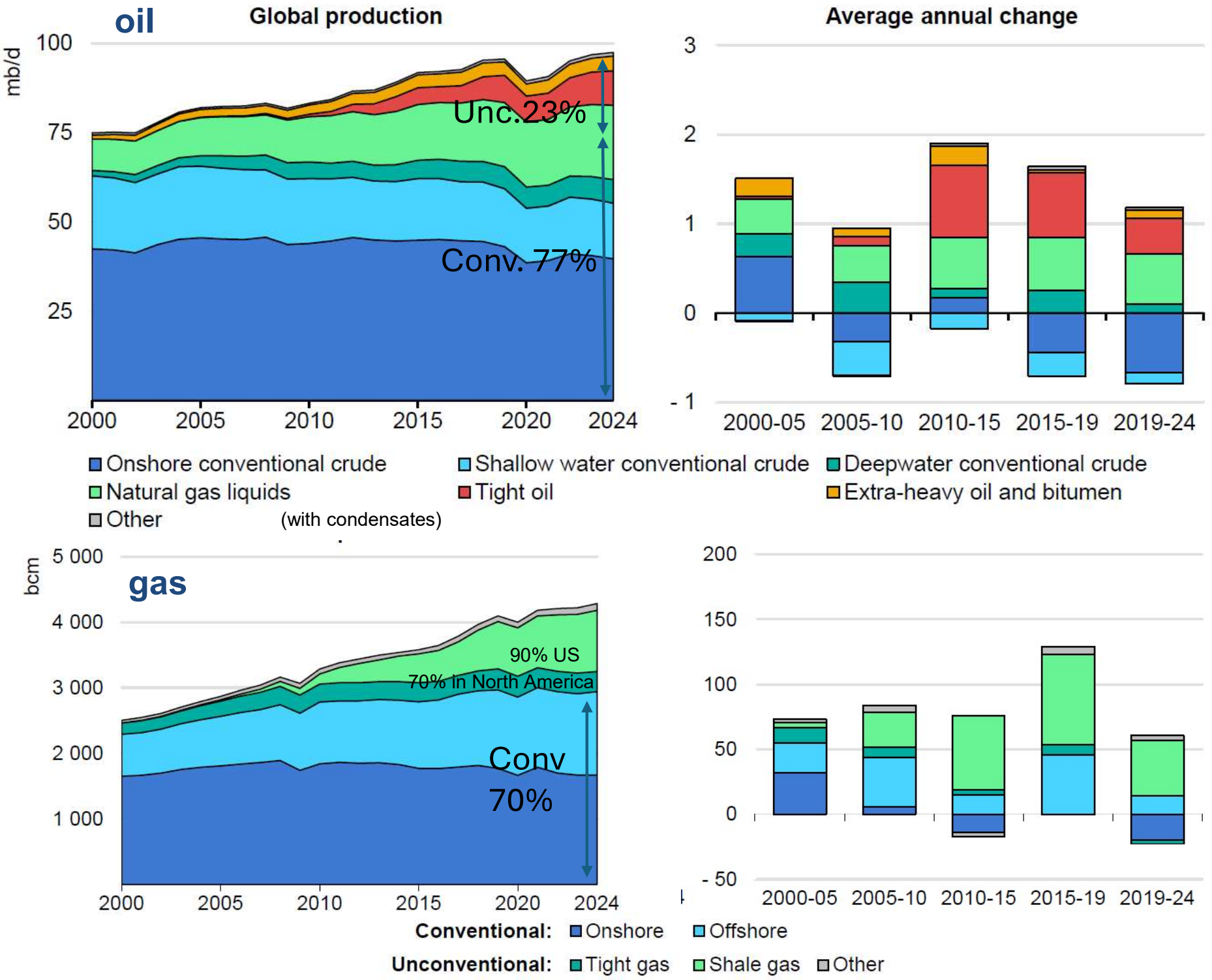
Upstream capital and operating expenditures in oil and gas



In the last five years, conventional oil and gas approvals replaced only ~55% of production…

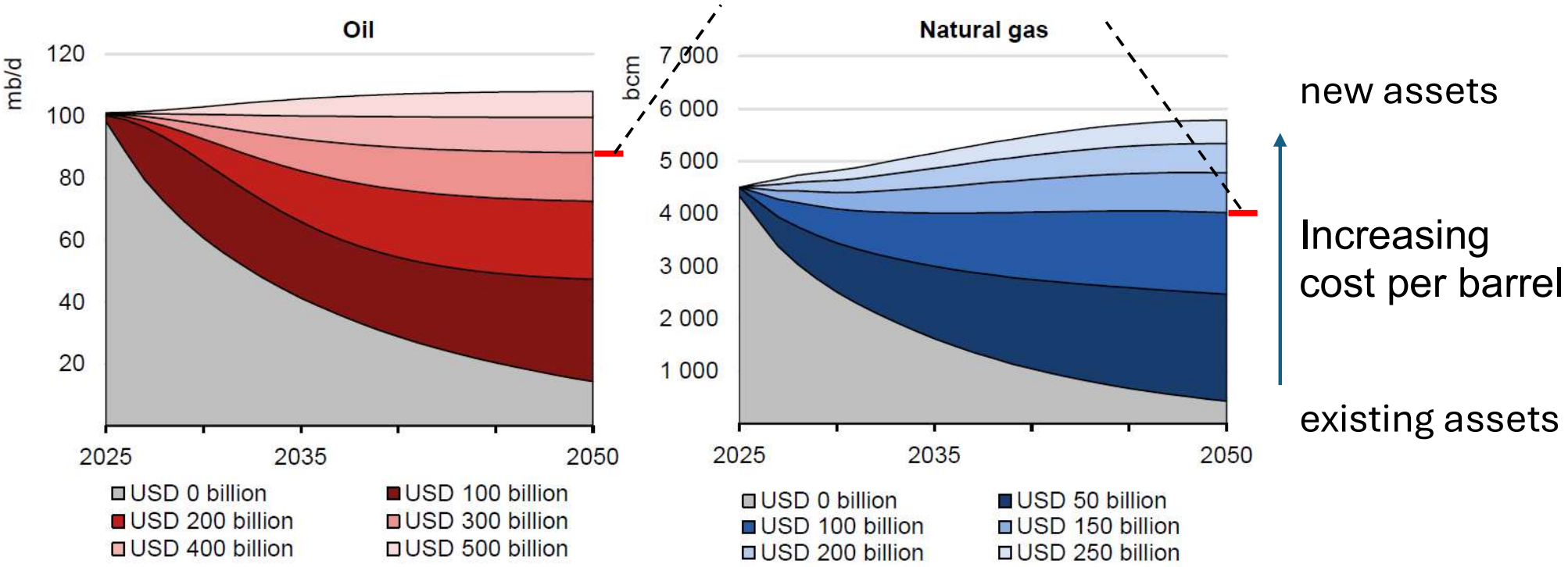
As a result, conventional oil production has passed its peak, gas has plateaued, with declines mainly onshore and in shallow waters (see next page)




oil
Global production
Average annual change
mb/d
100
75
50
25
Unc.23%
Conv. 77%
3
2
1
0
- 1
2000
2005
2010
2015
2020
2024
2000-05
2005-10
2010-15
2015-19
2019-24
Onshore conventional crude
Shallow water conventional crude
Deepwater conventional crude
Natural gas liquids
Tight oil
Extra-heavy oil and bitumen
Other
(with condensates)
gas
bcm
5 000
4 000
3 000
2 000
1 000
90% US
70% in North America
Conv
70%
200
150
100
50
0
- 50
Conventional:
Onshore
Offshore
Unconventional:
Tight gas
Shale gas
Other

Global oil and natural gas production at varied average annual upstream investment levels to 2050

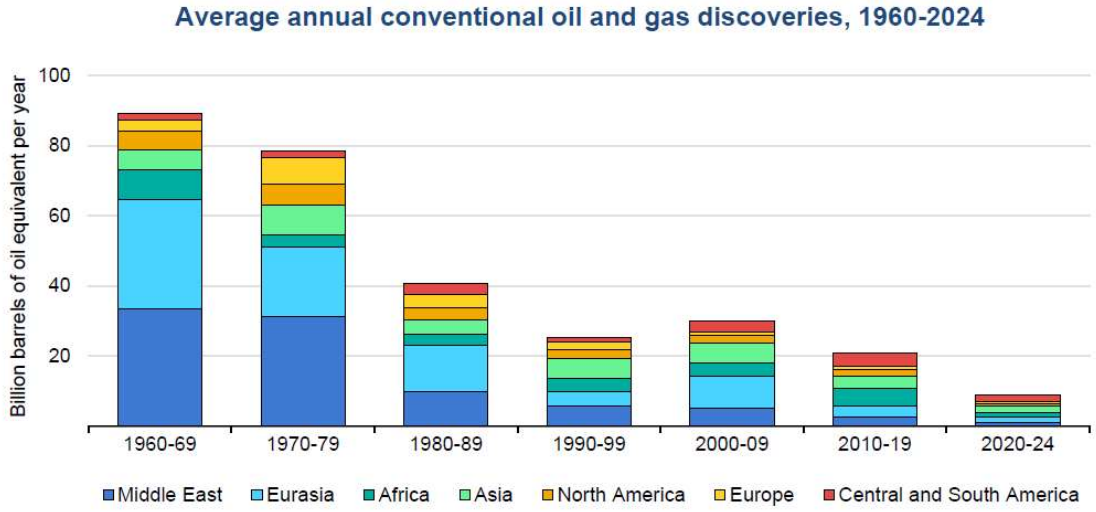
Scenario with total investment corresponding to current investment in conventional.



These scenarios are based on the assumption that the geographical distribution and types of resources, and OPEC production/capacity ratio remains constant.

No degradation of the decline rate considered ?

Conclusions



- This IEA report can be seen as an addition to similar IEA studies made in 2008 and 2013. All three studies are major contribution to the understanding of the exhaustion of oil and gas resources.

- This report presents well-identified trends such as declining conventional oil and gas discoveries, conventional oil production having passed its peak, and increasing decline rates over time.

- The projected production scenario relies on assumptions indicating that further work remains necessary. Unlike the *World Energy Outlook 2013*, it does not assess potential future increases in decline rates. The report also underscores several risks that could undermine its scenario — for instance, the timing of when OPEC's supergiant fields might enter decline remains uncertain. It thus calls for greater transparency, standardization, and accessibility of data on decline rates and reservoir characteristics in order to better anticipate future supply–demand balances.