Climate Change and the Oil & Gas Industry: Transitioning to a Zero-Carbon World

Prof. Robert K. Perrons
www.perrons.net
Queensland University of Technology
Brisbane, Australia

RESOURCE MANAGEMENT WEEK 2021

ENABLING SUSTAINABILITY PRINCIPLES IN RESOURCE MANAGEMENT

UNECE

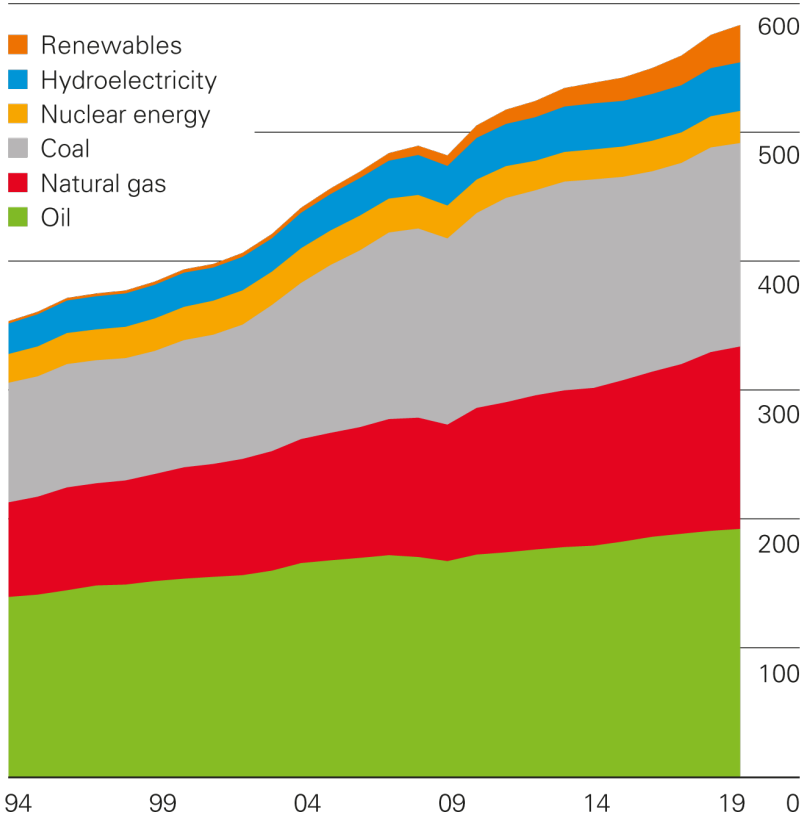
Research Collaborators

UNECE

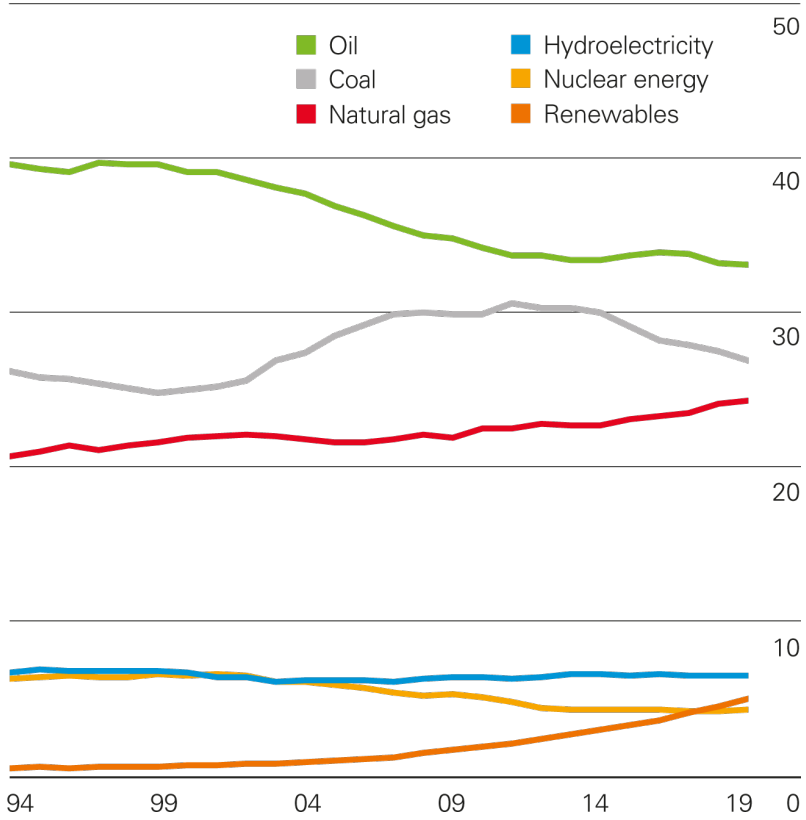
Oil & Gas Still Have Significant Roles

UNECE

World Consumption [Exajoules]



Share of Global Primary Energy [%]



Source: BP Statistical Review of World Energy 2020
https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

… and Probably Will for Years to Come

UNECE

> “Solar becomes the new king of electricity…
>
> …but without an additional policy push, it is too soon to see a rapid decline of oil”

- IEA World Energy Outlook 2020

Source: International Energy Agency (IEA) World Energy Outlook 2020
https://www.iea.org/reports/world-energy-outlook-2020

Can’t Forget about Existing Energy Infrastructure

UNECE

> “Avoiding new emissions is not enough: if nothing is done about emissions from existing infrastructure, climate goals are surely out of reach”

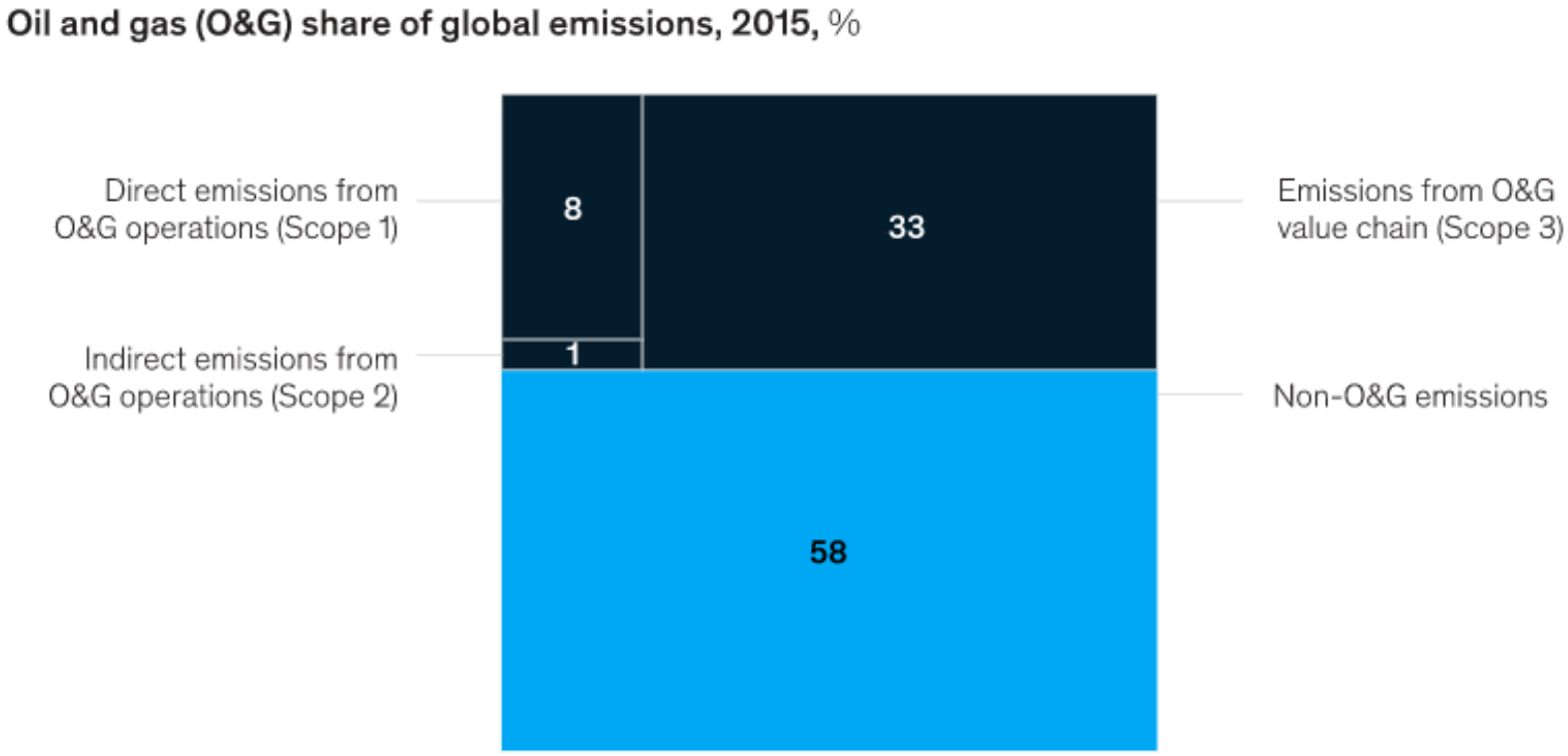
- IEA World Energy Outlook 2020

Source: International Energy Agency (IEA) World Energy Outlook 2020
https://www.iea.org/reports/world-energy-outlook-2020

Oil & Gas Industry's Role in GHG Emissions

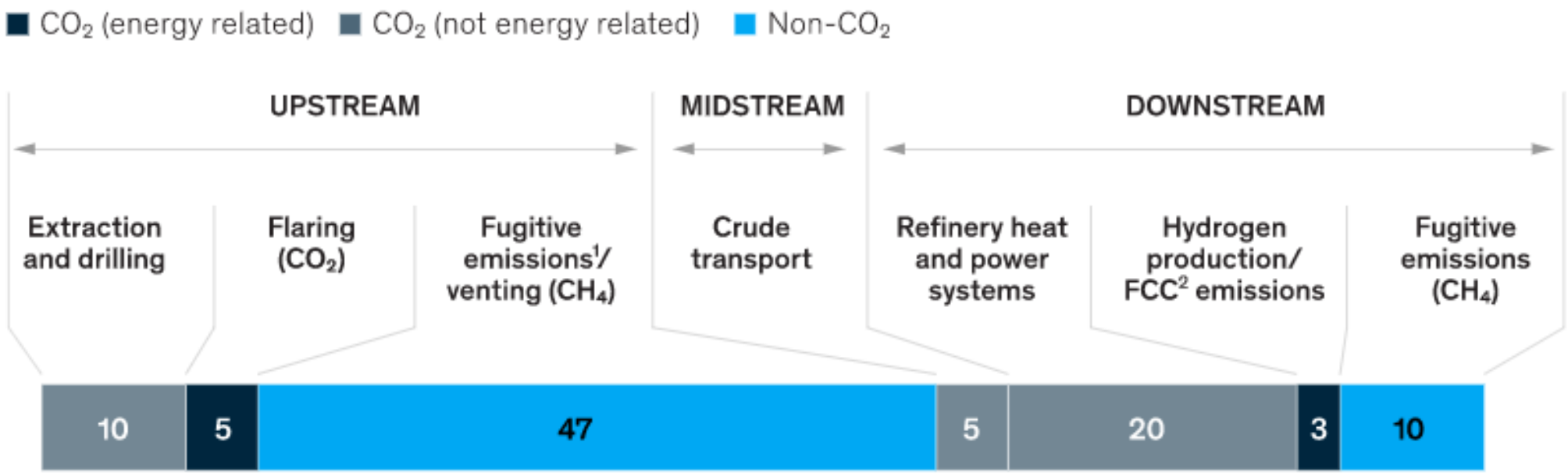
UNECE

- Oil & gas industry's operations account for 9% of all human-made greenhouse gas (GHG) emissions
- In addition, it produces fuels that create another 33% of global emissions
- "If the world is to come anywhere near to meeting its climate change goals, the oil & gas industry will have to play a big part" (McKinsey & Co., 2020)



Source: https://www.mckinsey.com/industries/oil-and-gas/our-insights/the-future-is-now-how-oil-and-gas-companies-can-decarbonize

Oil & Gas Industry's GHG Emissions by Source



Source: https://www.mckinsey.com/industries/oil-and-gas/our-insights/the-future-is-now-how-oil-and-gas-companies-can-decarbonize

Oil & Gas Industry's Methane Emissions

UNECE

Oil & Gas industry + Add to myFT

Methane pollution soars in US as shale drilling resumes

Emissions of greenhouse gas return to pre-pandemic levels despite industry pledges

- Methane is 28-80 times more potent than CO_2 as a greenhouse gas[1-2]
- Methane represents only 3% of total greenhouse gases by mass, but historically responsible for 23% of radiative forcing (i.e., key mechanism behind global warming)[2]
- Oil & gas industry responsible for 20% of global human-made methane emissions[3]

Sources:
1) https://www.ft.com/content/667cd344-a222-4002-9e2a-dce13d669d33
2) https://ourworldindata.org/greenhouse-gas-emissions
3) https://www.globalmethane.org/documents/analysis_fs_en.pdf

The Energy Industry's "Other Challenge"

- What can digital technologies do to help the energy sector to reduce emissions in the short- to medium-term with these legacy energy sources?

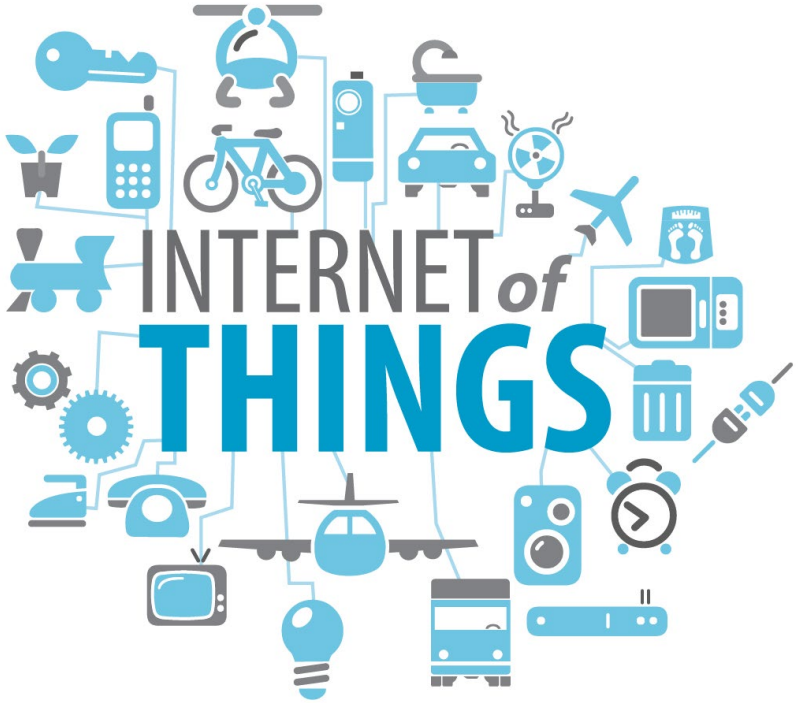
Image source: https://globuc.com/news/exxonmobil-digital-transformation-a-means-for-thriving-during-turbulent-oil-markets/

Continuing Journey to “Smartness”

- Digital “smart fields” technologies and design principles have already been widely adopted throughout the oil & gas industry
- Delivered significant operational efficiencies and cost savings
- Focus increasingly shifting towards reducing emissions, being greener

Image source: https://www.oilandgasmiddleeast.com/drilling-production/33281-the-company-behind-adnocs-panorama-command-centre-on-digitalisation-in-the-region

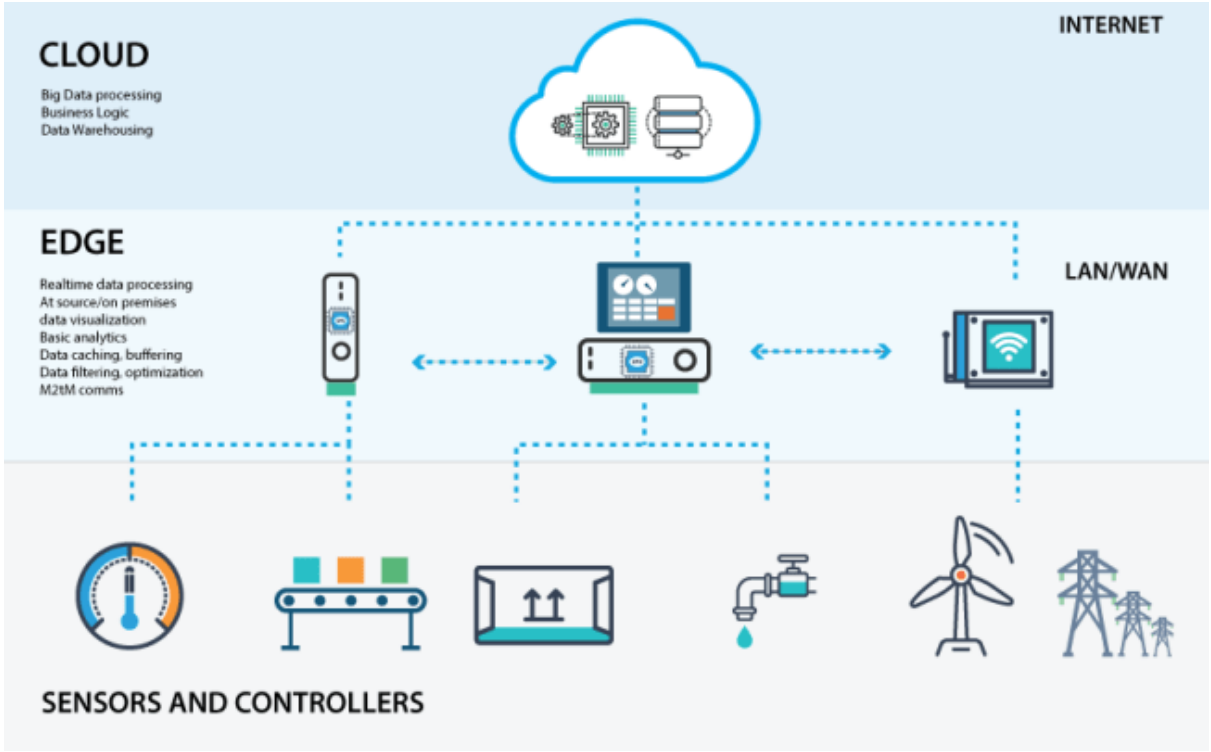
Goal: Total Transparency and Visibility



- Precipitous decline in price of sensors
- Internet of Things (IoT) makes it increasingly possible to collect vast amounts of operational data from oil & gas production facilities
- A bridge between the physical world and the digital world
- Improves visibility and enterprise-wide transparency

Image source: https://ayehu.com/how-the-internet-of-things-will-complicate-incident-response/

Edge Computing



- Moving computation to the “edge” of the network—that is, closer to where the data is being collected
- Reduced latency allows smartness of system to occur in near real-time
- Simpler to audit data

Image source: https://openautomationsoftware.com/blog/iiot-edge-computing-vs-cloud-computing/

Emergence of a Global Data Standard

UNECE

- Reference architecture and data standard for all industries, including the oil & gas sector
- Widespread support from many international oil companies, national oil companies, service companies, and digital vendors
- Facilitates interoperability and storing, defining, and sharing GHG data within supply chain and with external stakeholders
- An open source-based reference implementation

THE OPEN GROUP
OPEN FOOTPRINT™ FORUM

Image source: https://www.opengroup.org/openfootprint-forum

Thank you!

Prof. Robert K. Perrons
www.perrons.net

Queensland University of Technology
Brisbane, Australia

RESOURCE MANAGEMENT WEEK 2021

ENABLING SUSTAINABILITY PRINCIPLES IN RESOURCE MANAGEMENT

UNECE