SUSTAINABILITY IMPACT ON THE OIL & GAS INDUSTRY

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OFS Portal Conference

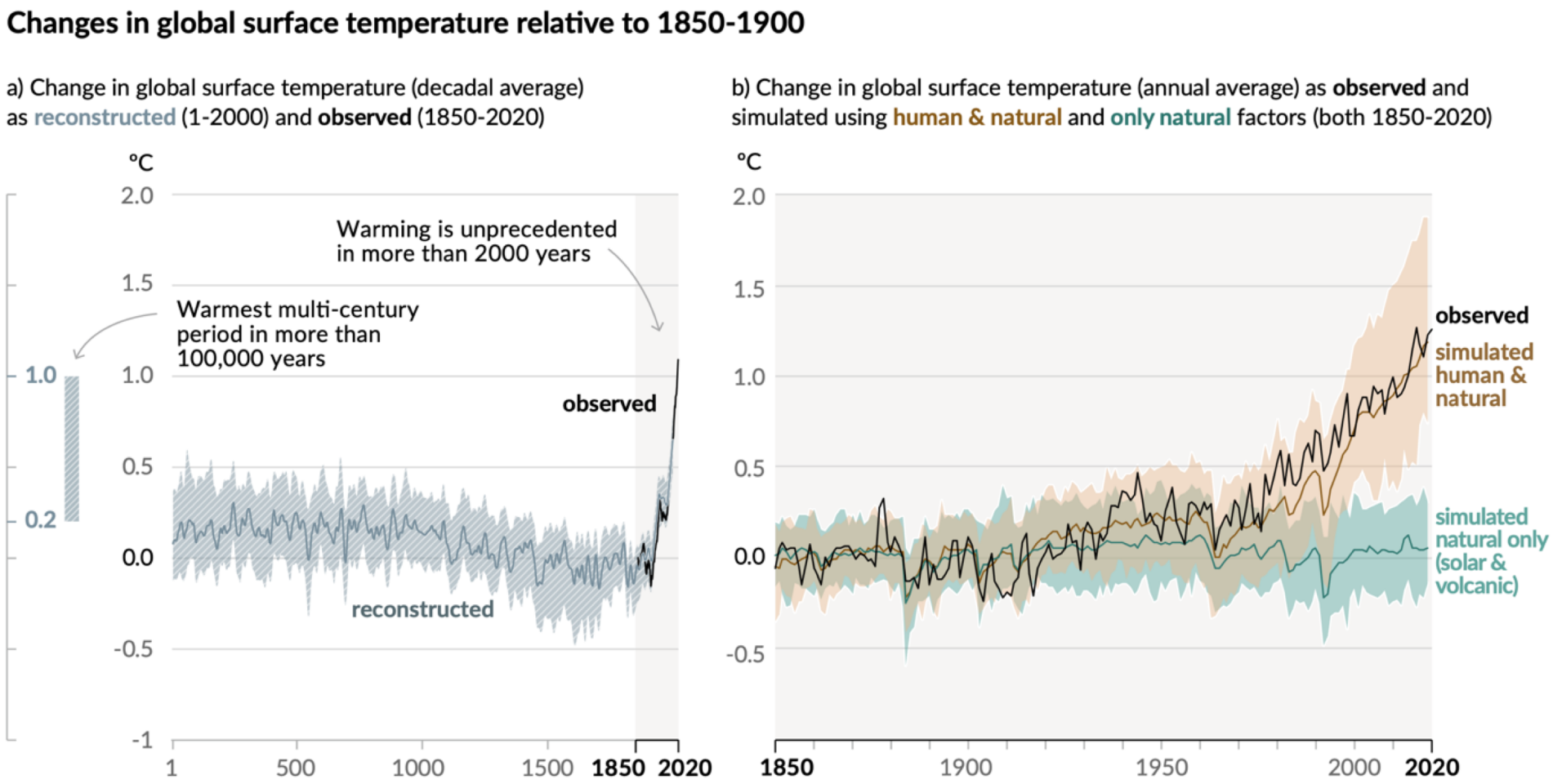
September 2021

AGENDA

1. The Climate Challenge
2. How the world is responding
3. Considerations for Oil & Gas
4. Options to move forward
5. Conclusion

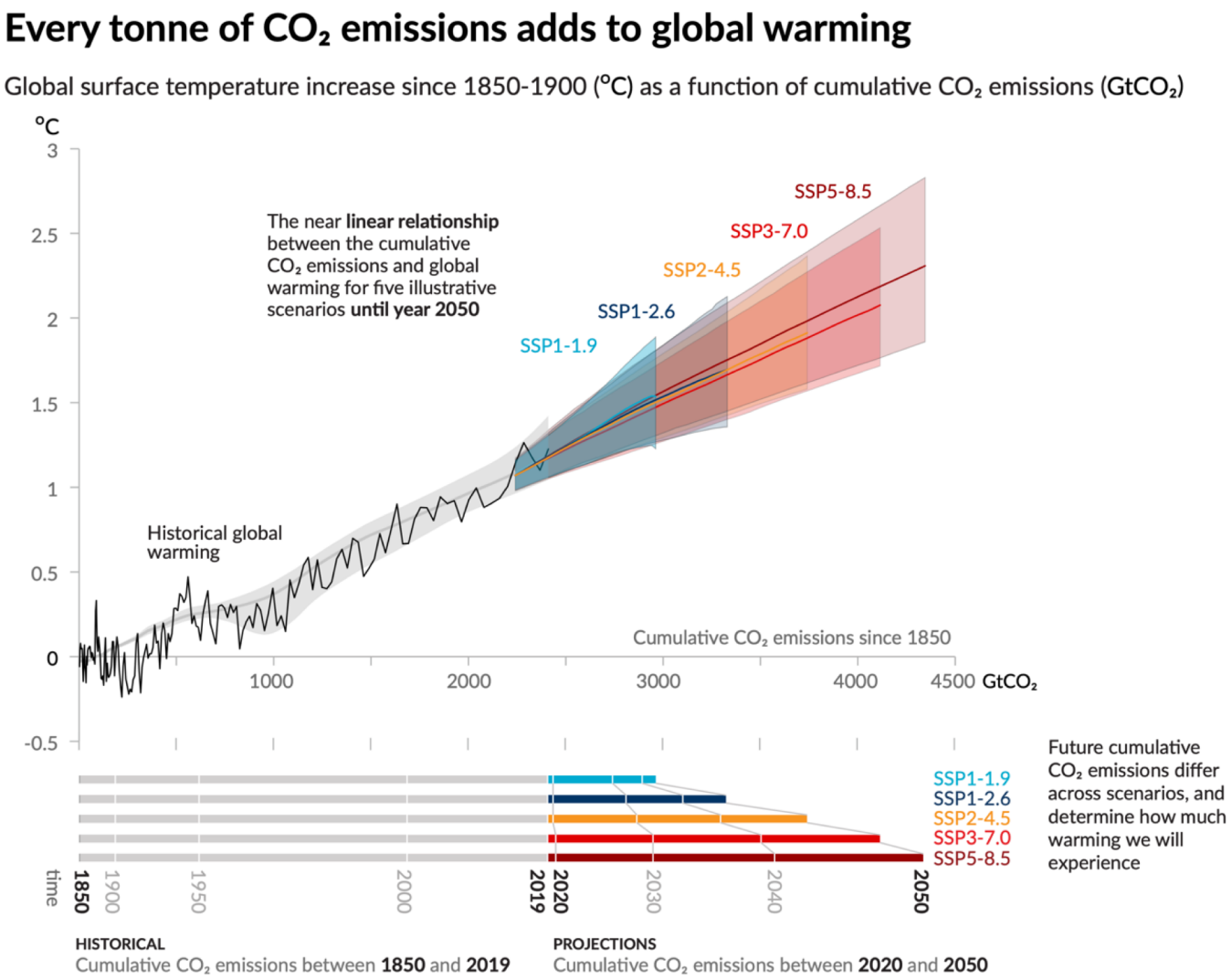
WHICH SUSTAINABILITY GOAL IS MOST CRITICAL FOR OIL & GAS?

WHAT IS HAPPENING TO THE CLIMATE?



Source: UN Intergovernmental Panel on Climate Change Sixth Assessment Report

WHAT IS CAUSING THESE CHANGES TO OUR CLIMATE?



Source: UN Intergovernmental Panel on Climate Change Sixth Assessment Report

WHAT DOES THE UN IPCC SIXTH ASSESSMENT SAY?

1. Human activities, principally the combustion of fossil fuels are indisputably causing climate change making heat waves, heavy rainfall, and droughts more frequent and severe
2. Changes in the climate are widespread, rapid, intensifying, and unprecedented
3. Climate change is already affecting every region in multiple ways. The changes we are experiencing will increase further warming
4. There's no going back from some changes in the system. However, some could be slowed, and others could be stopped by limiting warming
5. Unless there are immediate and large-scale greenhouse gas emissions reductions, limiting warming to 1.5°C will be beyond reach.

HOW ARE GOVERNMENTS RESPONDING?

Rank	Country	Share of global emissions	2030 emissions reduction commitment from 2005 levels	Net zero commitment
1	China	~27%	60-65% per unit of GDP	by 2060
2	United States of America	~15%	50-52%	by 2050
3	Europe	~9%	44%	by 2050
4	India	~7%	33-35% in intensity	-
5	Russia	~5%	51%	-
6	Japan	~3%	45%	by 2050
7	Canada	~2%	50%	by 2050
8	United Kingdom	~1%	66%	by 2050
9	Brazil	~1%	43%	by 2060

HOW ARE INVESTORS RESPONDING?

>$1 Trillion

Wind and solar asset financing since 2016

100%

Advance of the S&P Global Clean Energy Index since the start of 2020

Source: Bloomberg, MCSI

HOW ARE COMPANIES ARE RESPONDING?

POWER

310 companies have joined RE100. Collectively, these companies have a combined revenue of more than 7% of global GDP, a combined demand for renewable electricity of 334 TWh, cutting carbon emissions equivalent to 59 coal plants.

TRANSPORTATION

Volkswagen, Daimler Mercedes, General Motors, Ford, Volvo, and Honda have announced they will end production of fossil-fueled vehicles and trucks, joining Tesla, Rivian, and Arrival in electric transportation

Source: RE100, EV100.

HOW IS SOCIETY RESPONDING?

The bright minds of tomorrow want to pursue careers at Tesla, not ExxonMobil.

Sixty-two percent of teens ages 16 to 19 say a career in oil and gas is unappealing, according to a survey of 1,200 young Americans that was released this week by EY. That includes 39% who say the industry is very unappealing.

The numbers are a bit better among Millennials. Forty-five percent of those aged 20 to 35 said they are attracted to oil and gas jobs, while 44% are not. The poll asked respondents to rate how appealing a career in the industry is for them.

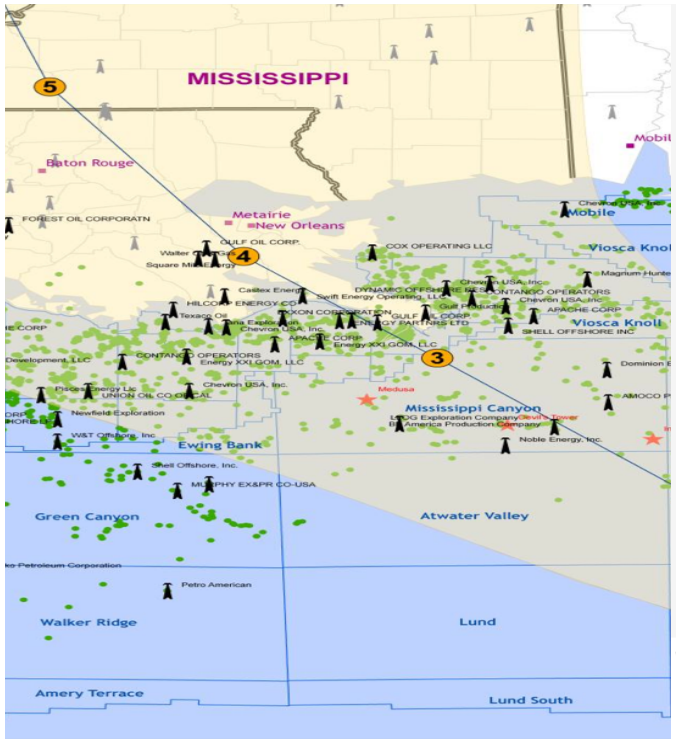
The findings suggest Big Oil's environmental challenges and boom-to-bust nature have created a negative stigma that will make it difficult to attract talent in the future.

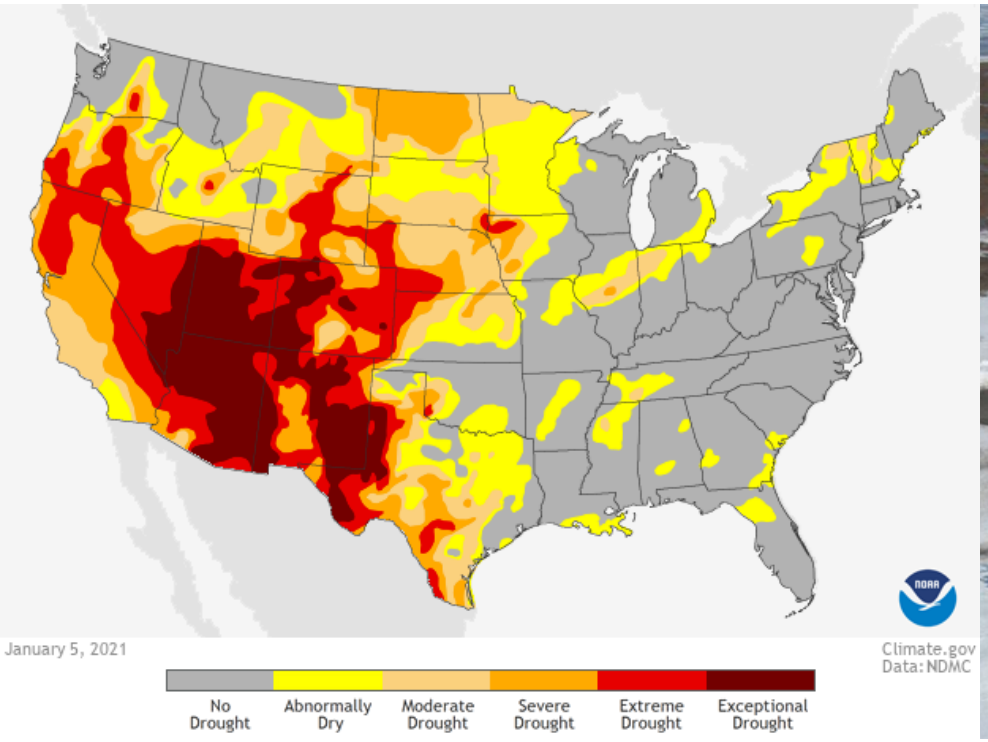
Younger generations "see the industry's careers as unstable, blue-collar, difficult, dangerous and harmful to society," the EY report concluded.

For instance, two out of three teens polled believe the oil and gas industry causes problems, rather than solves them.

More alarming for oil execs, young people "question the longevity of the industry, as they view natural gas and oil as their parents' fuels."

CONSIDERATIONS FOR OIL & GAS – PHYSICAL RISKS





Source: National Oceanographic and Atmospheric Association (NOAA)

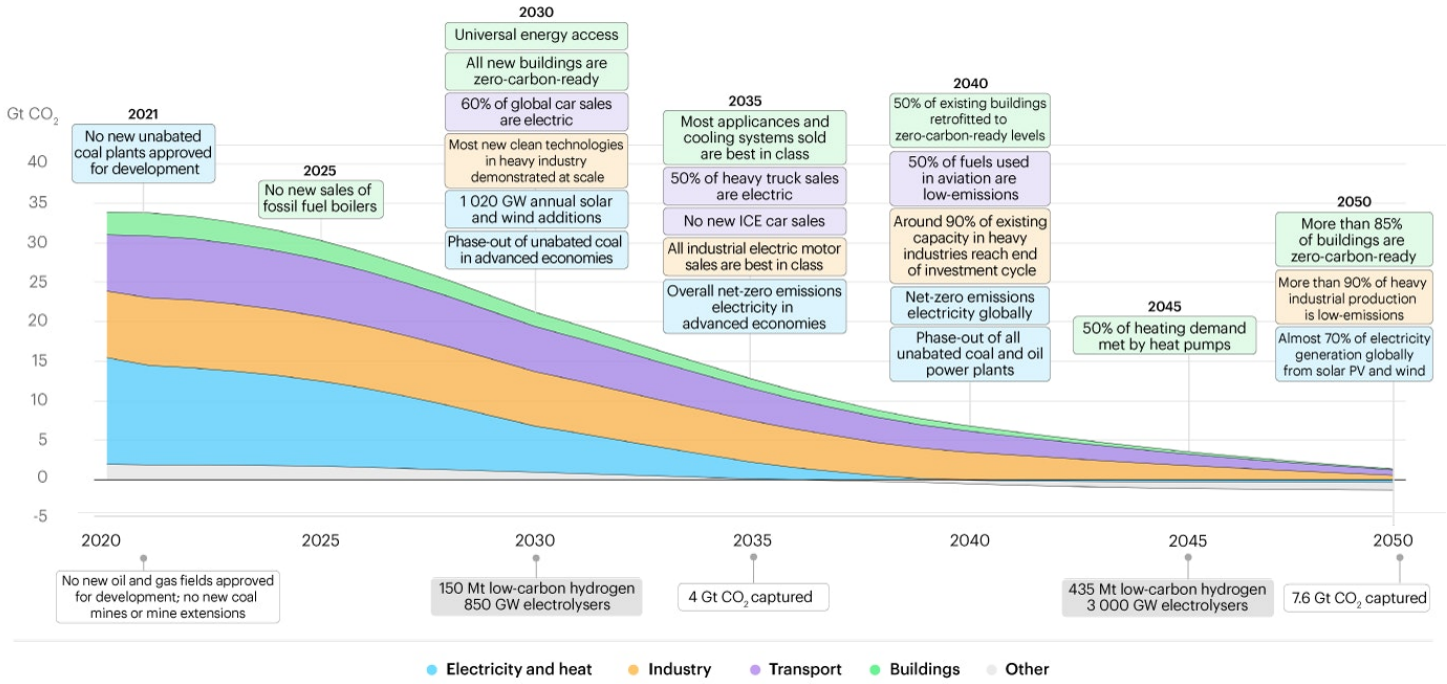
CONSIDERATIONS FOR OIL & GAS – TRANSITION RISKS

Will the transition be orderly or disorderly?

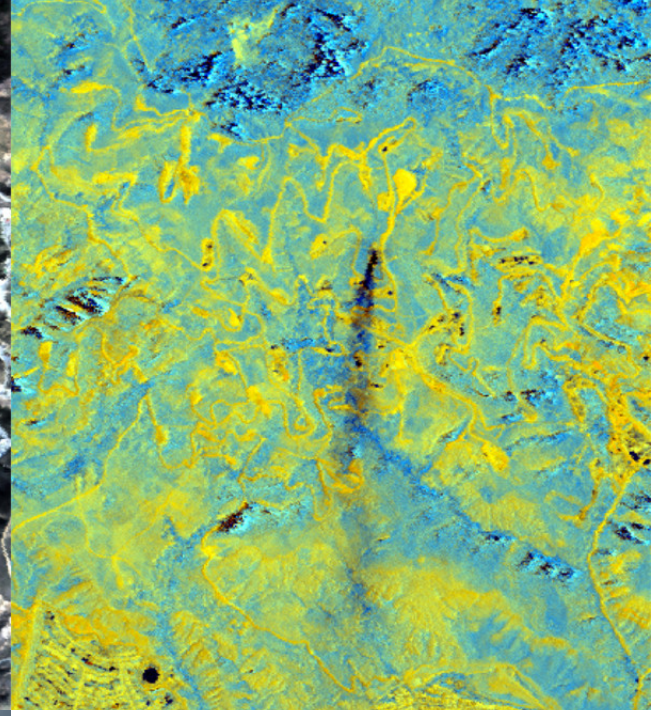
What will be the future price of Oil & Gas?

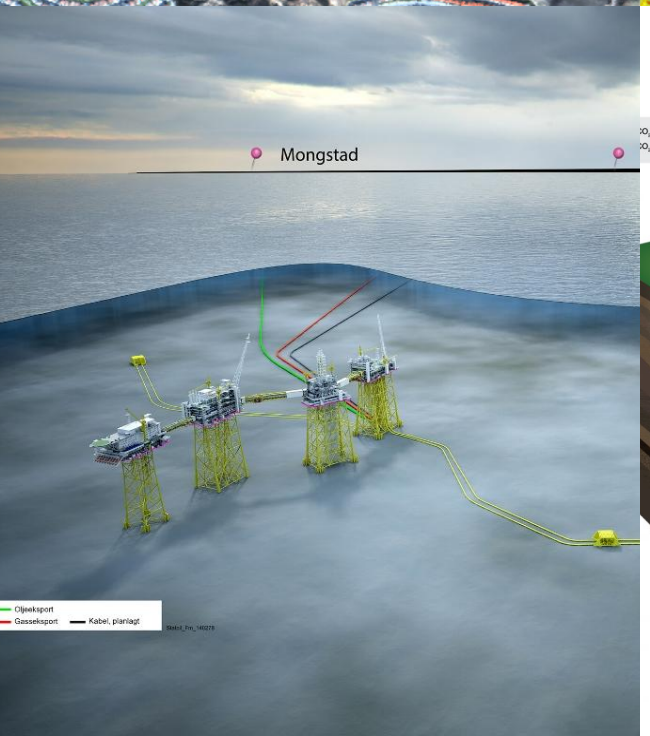
What will happen to the price of carbon?

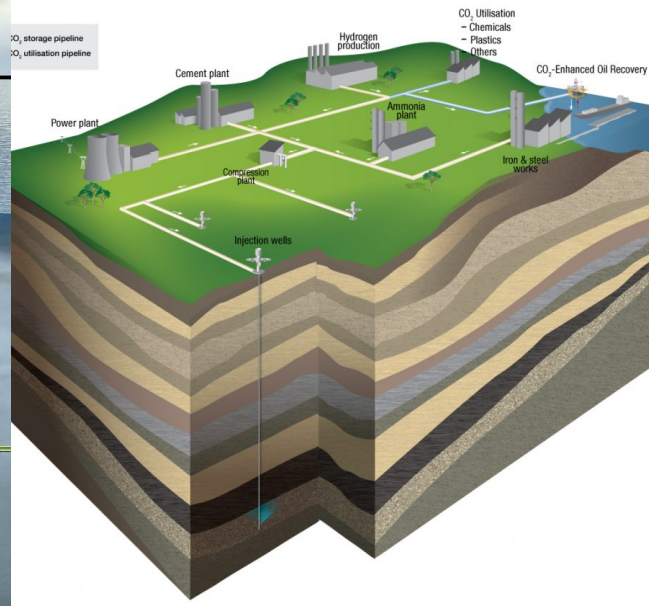
How will legislation change?



Source: IEA Net Zero by 2050, A Roadmap for the Global Energy Sector







REUCING EMISSIONS – OPERATIONAL EXCELLENCE

Flaring

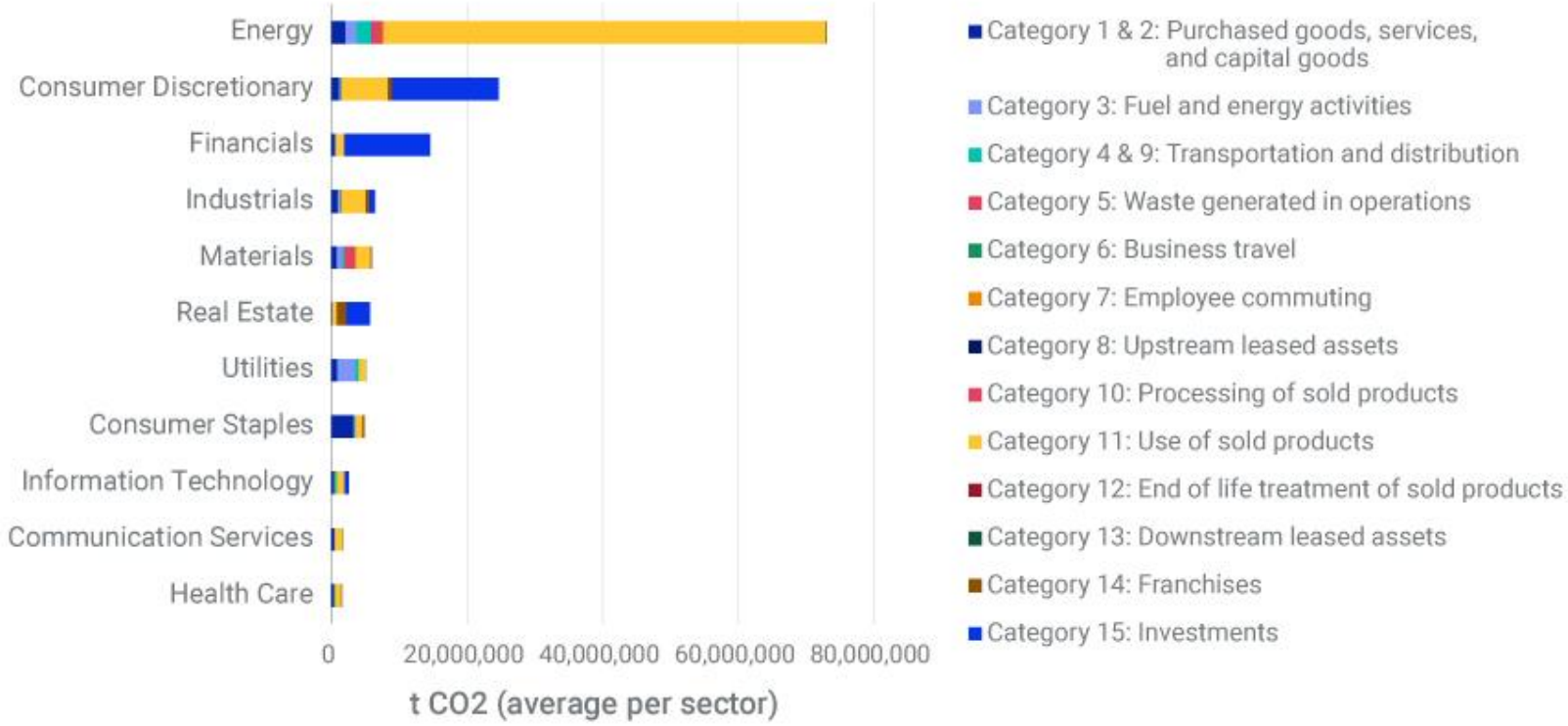
Leak detection and repair

Power from shore

Carbon capture, use and storage

Sources: Satelytics, IEA, Equinor, CO2CRC

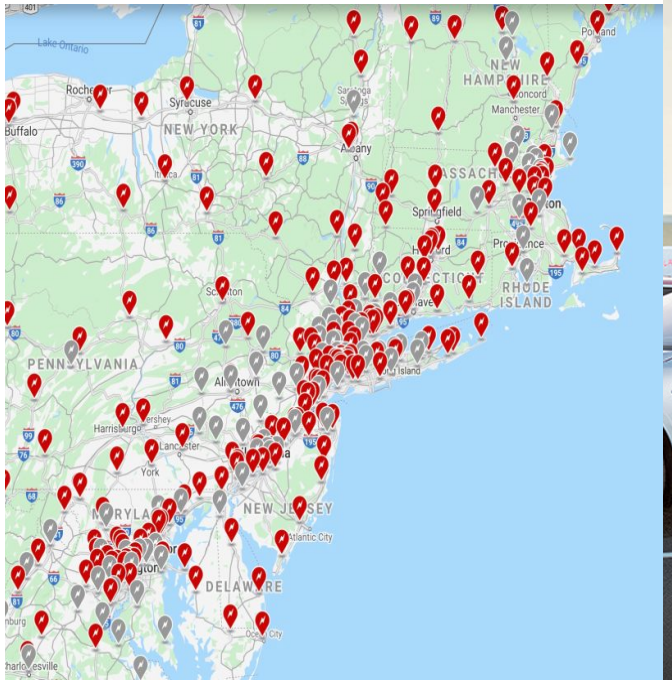
WILL OPERATIONAL IMPROVEMENTS BE SUFFICIENT? 90% OF OIL AND GAS EMISSIONS ARE SCOPE 3



Source: Climate Action

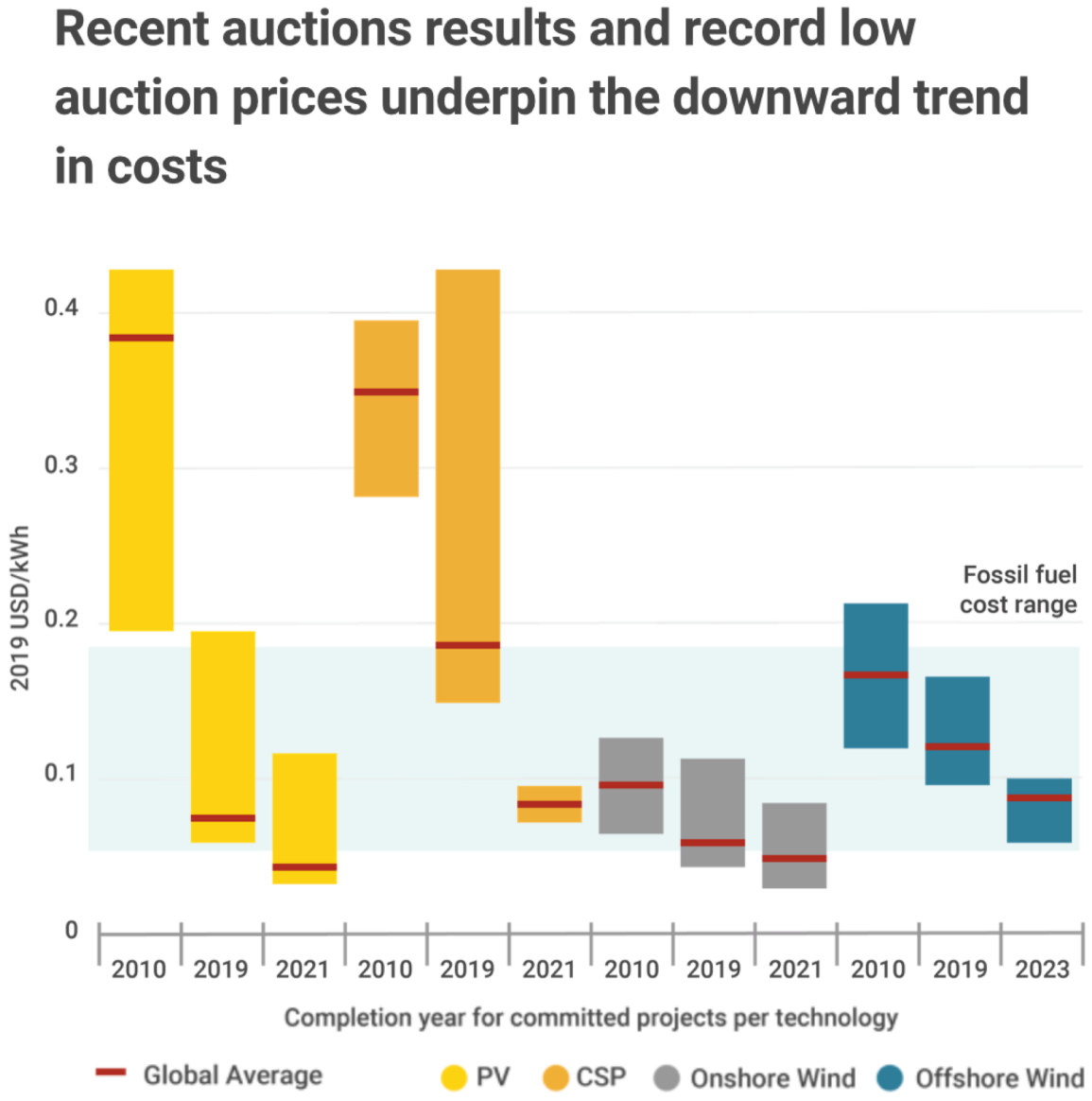
REDUCING EMISSIONS – INVESTING IN NEW ENERGY

AND HELPING CONSUMERS TO MAKE THE TRANSITION



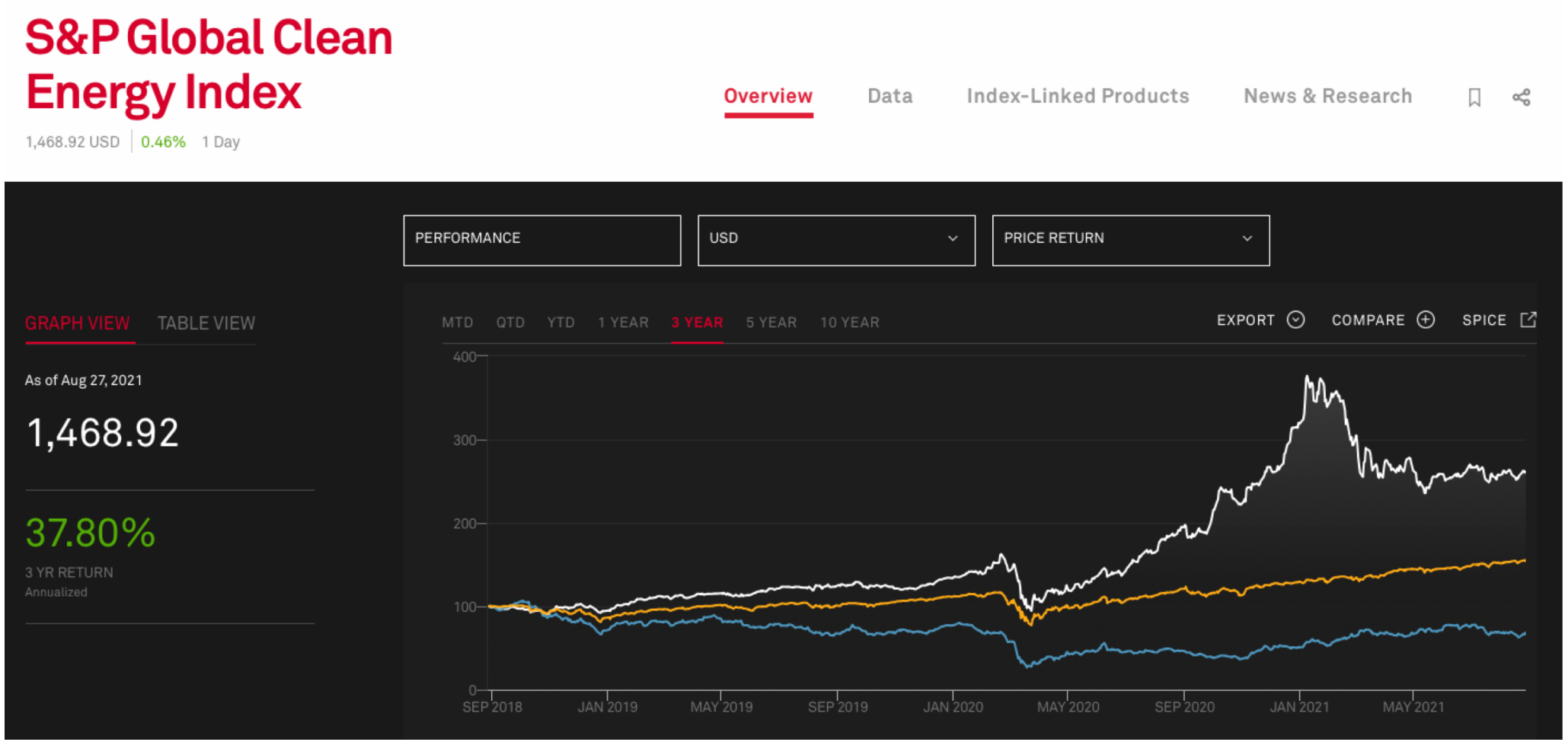
Source: Tesla, Airbus

A WIN FOR CONSUMERS



Source: IRENA

A WIN FOR INVESTORS



Source: Bloomberg

A WIN FOR SUSTAINABILITY

Energy Transition: the Key Drivers and Challenges for Operators To Achieve Net Zero Emission

Lily Chen – CEO of Diamond Key International

contents.

OCEANIA APAC CHINA EMEA LATAM

DKI as End-to-End Solution Provider to Supply, Storage and Distribution of Petrochemical Industry

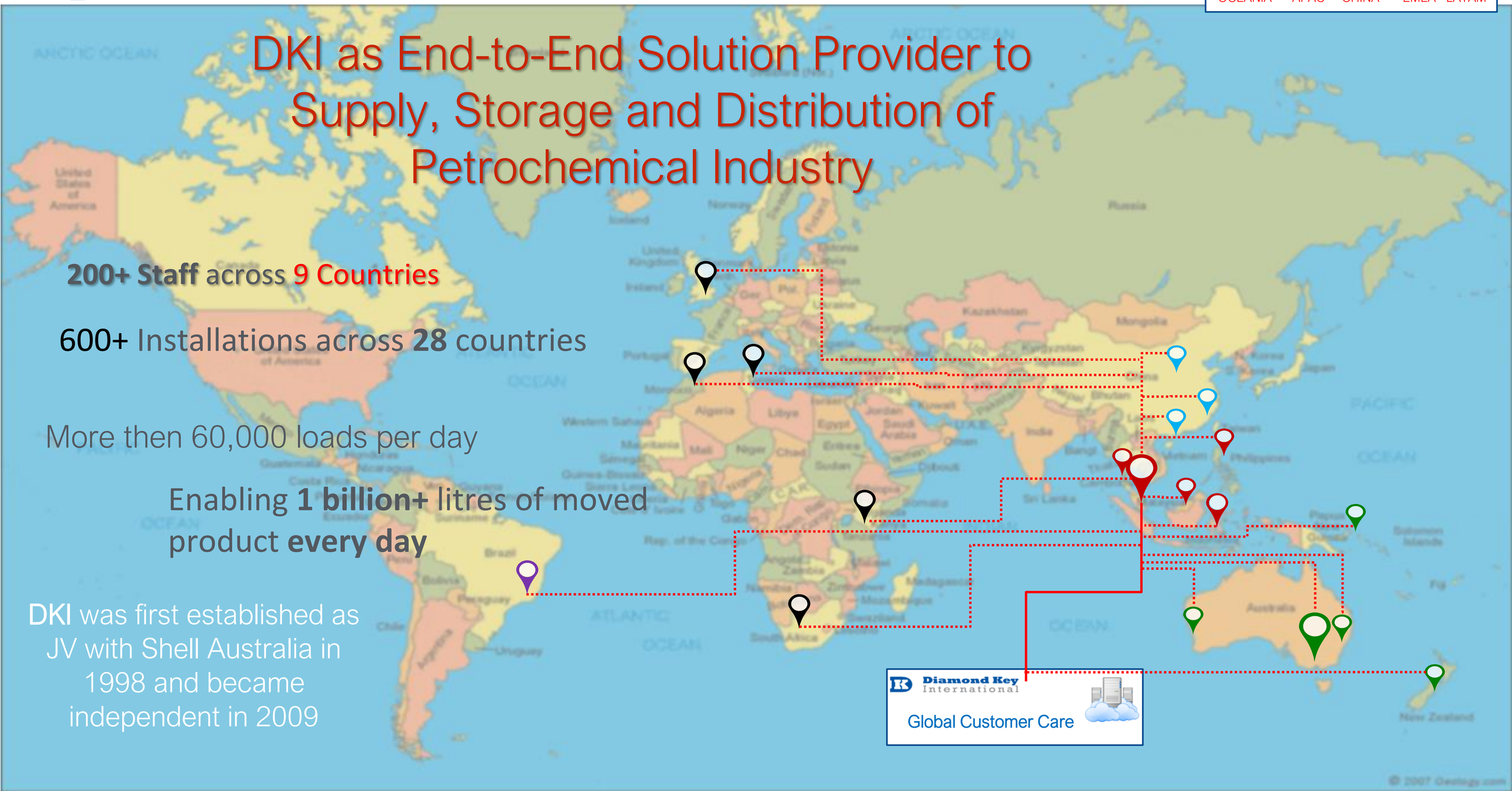
200+ Staff across 9 Countries

600+ Installations across **28** countries

More then 60,000 loads per day

Enabling **1 billion+** litres of moved product **every day**

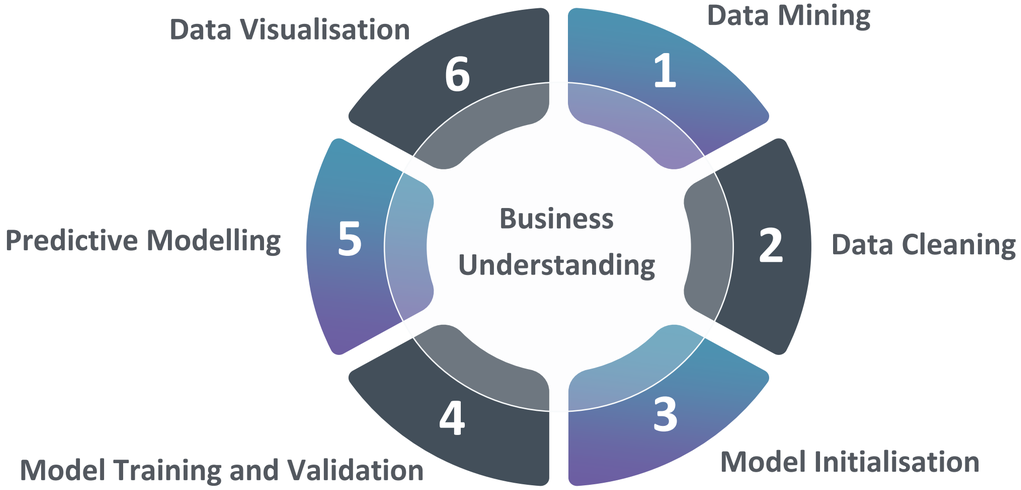
DKI was first established as JV with Shell Australia in 1998 and became independent in 2009



DKI as Technology Leader in Digital Transformation:

In 2020, Energy CIO Insights named DKI a Top 10 Asia Pacific Oil and Gas technology Company.

This award recognizes DKI to be at the forefront of providing **long term solutions** and **transforming businesses**.



TIBE — Terminal Information Data Exchange

Omega 5000 — Terminal Automation System

DKI Data Analytics — Business Intelligence and Terminal Modelling

guardAIn PREDICTIVE MONITORING SYSTEM — IIOT – Real Time Monitoring and Failure Prediction

Industry Reach

Shell

VIVO ENERGY

ARC ARC ENERGY ARC ENERGY LIMITED

AUSTRALIAN HYDROGEN COUNCIL

ExxonMobil

PERTAMINA

AMPOL

agl

Australian Government
National Measurement Institute

ORYX ENERGIES

bp

Vopak

Coogee

VIVA EnergyAustralia

wosl

Shell Chemicals

NZOSL VALUE WITH CONFIDENCE

PETRONAS

中国石化 SINOPEC

ENERGY

ATOM

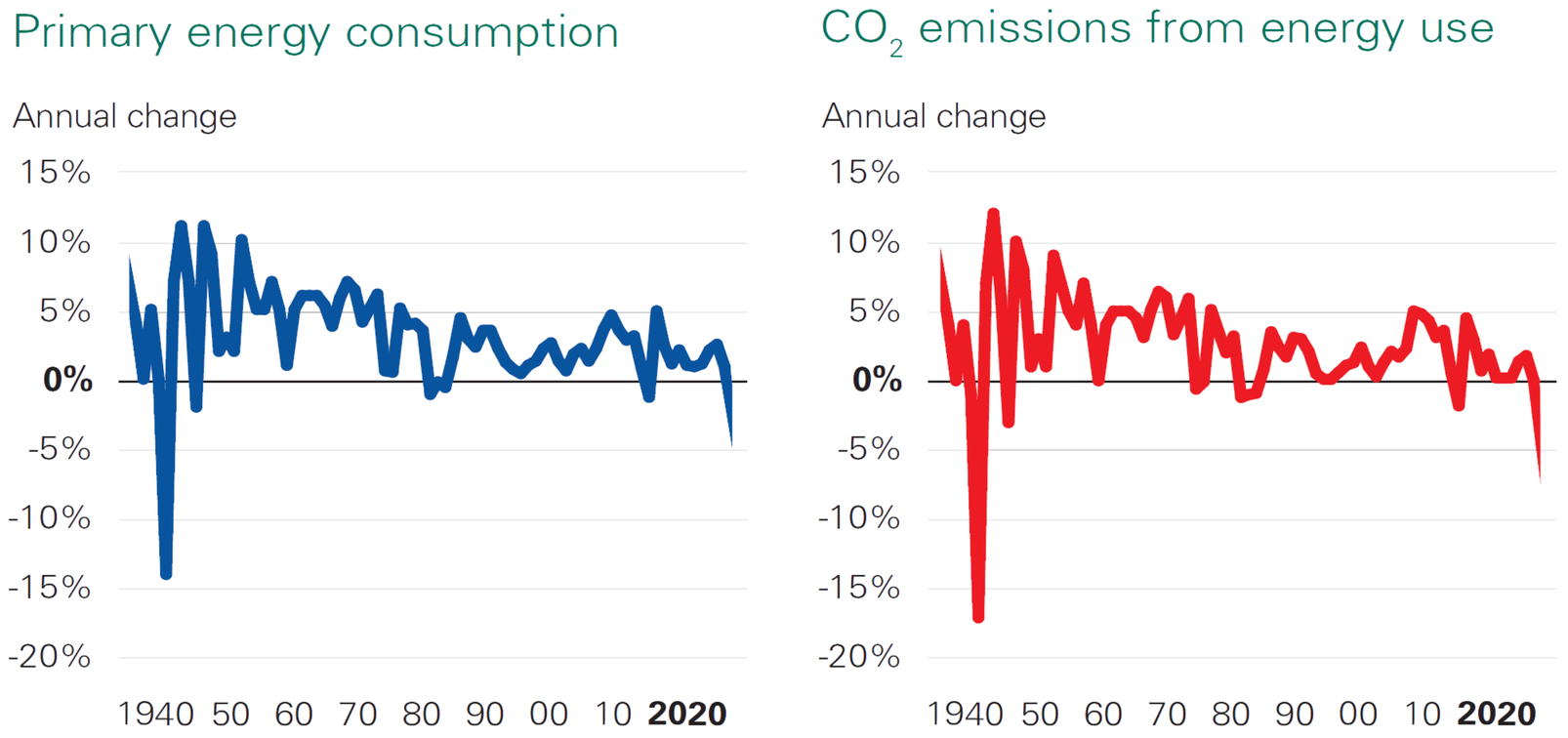
origin

CNPC

01 The Dilemma of Energy Reality

Historical Snapshot of CO_2 Generation:

Global energy demand and carbon emissions

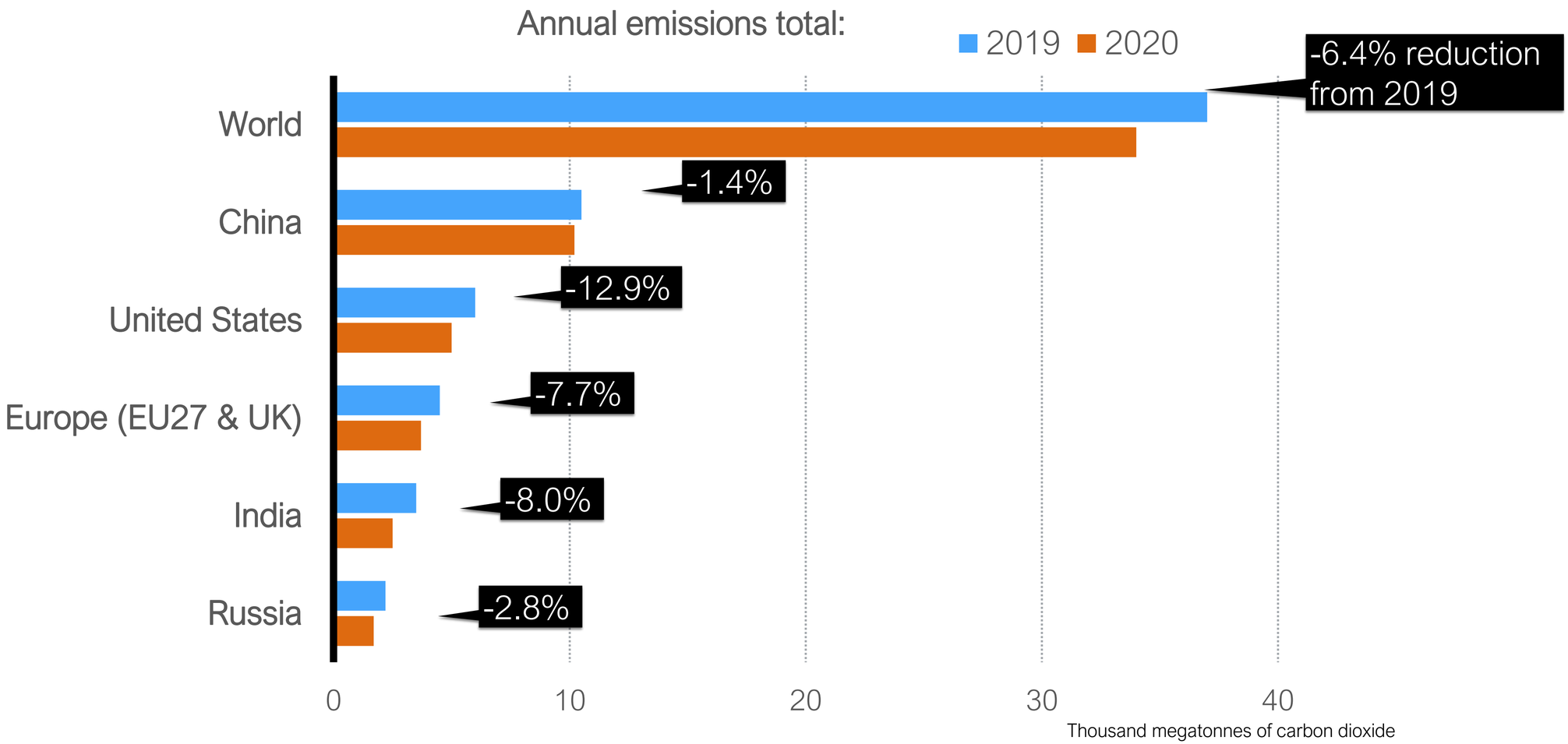


1971: 13.9bMt 2109: 33.3bMt 139% increase

Average yearly growth of 1.8% up

2020 6.4% down the largest single year reduction since World War II

COVID - the key driver for CO_2 reduction in 2020 as many parts of the world came to a forced standstill



Source: Carbon Monitor programme/*Nature* analysis

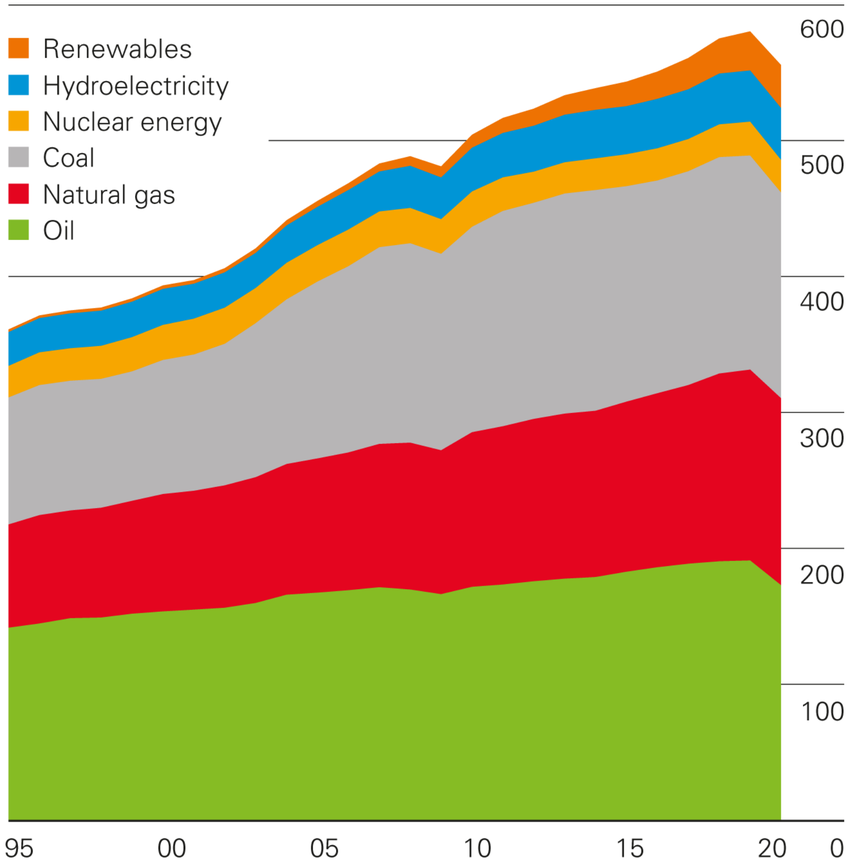
Energy Transition, or Evolution or Revolution

The United Nations Environment Programme estimates that the world would need to cut carbon emissions by 7.6% year on year for the next decade to prevent the global from warming more than 1.5 ° C above pre-industrial levels – a goal set in the 2015 Paris Climate agreement.

TODAY's Reality: Oil (31%) and Gas (25%) Remain the Primary Energy and Renewables have a steep road ahead (5.7%)

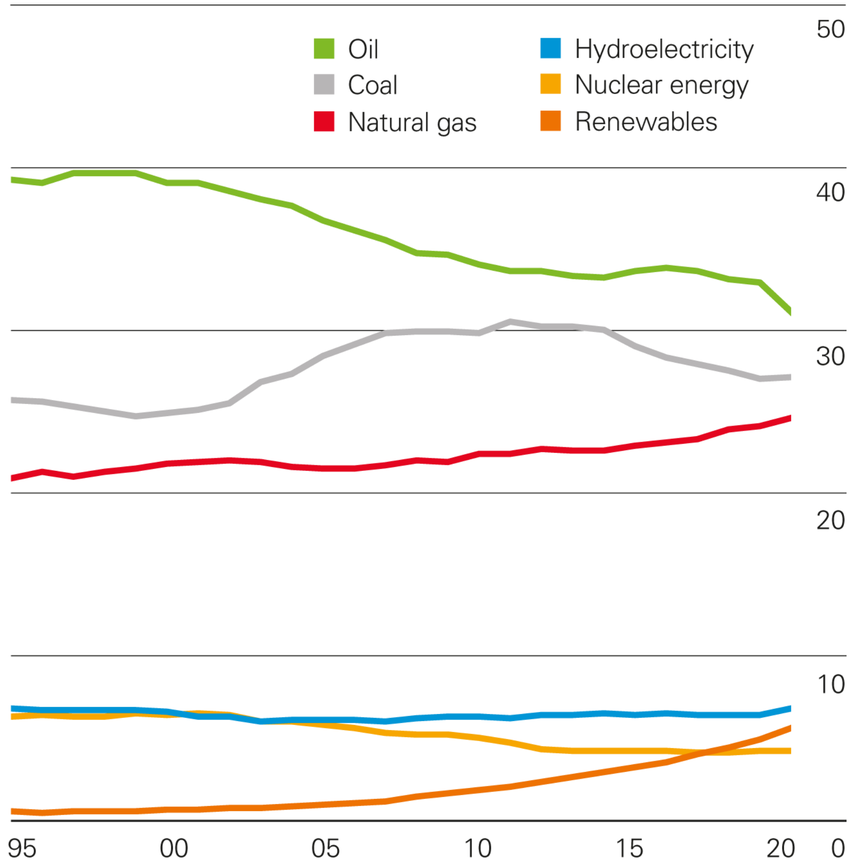
World consumption

Exajoules



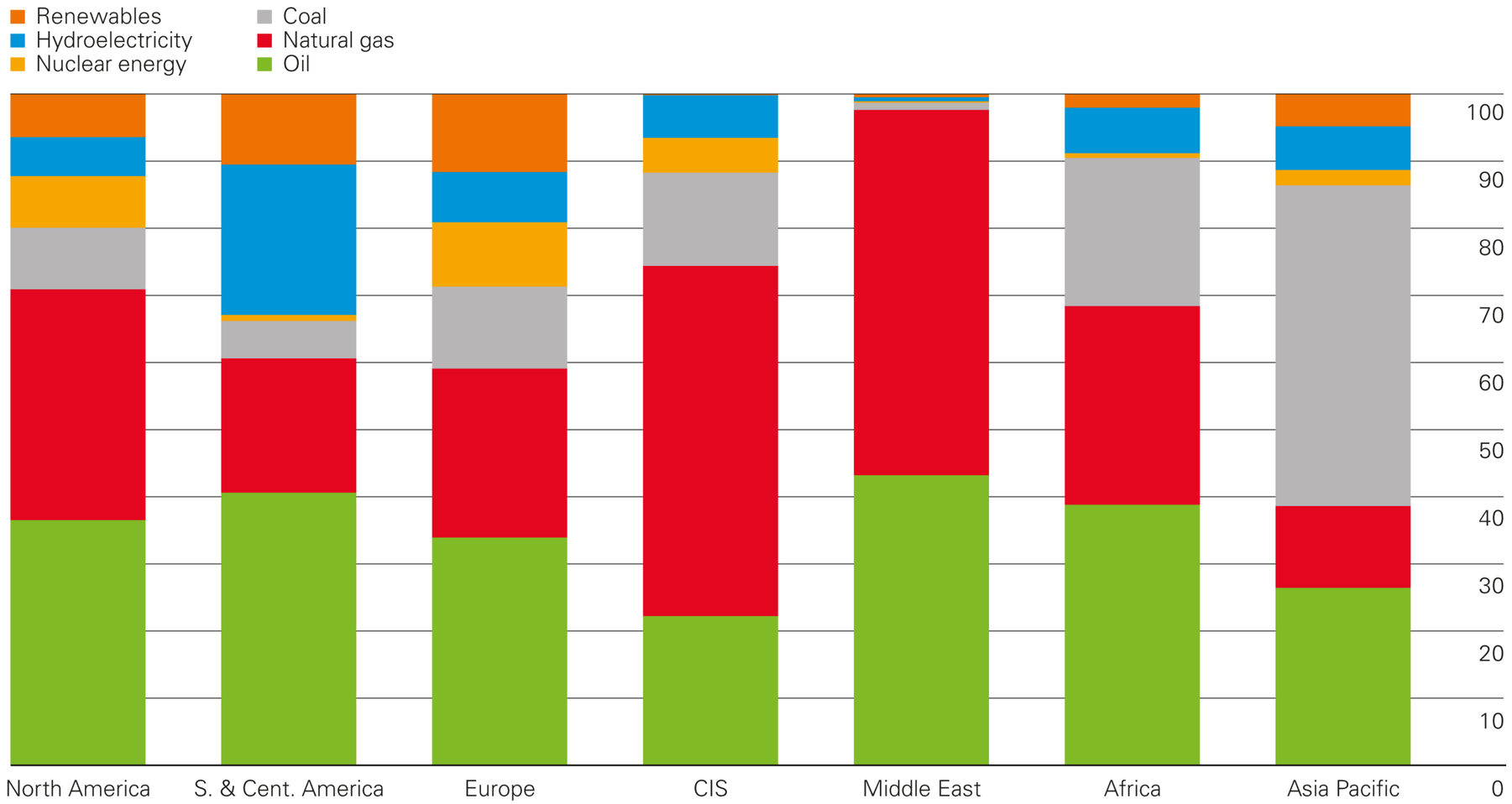
Shares of global primary energy

Percentage



Statistical Review of World Energy 2021

Different Regions Face Different CO_2 Reduction Challenges



Statistical Review of World Energy 2021

2020 marked the significant drop of oil consumption and the highest renewable growth

Energy Mix Movements (2019 - 2020)

Oil Consumption 9.3% down

Coal Consumption (OECD) countries 4.2% down

Coal Consumption (China) 1.2% down

Gas Consumption 2.3% down

Solar Consumption 20.5% up

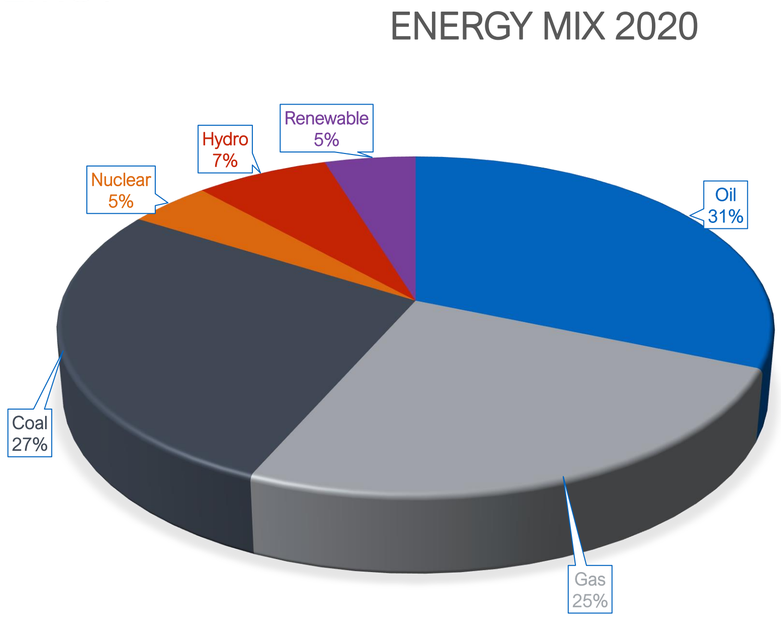
Wind Power 11.9% up

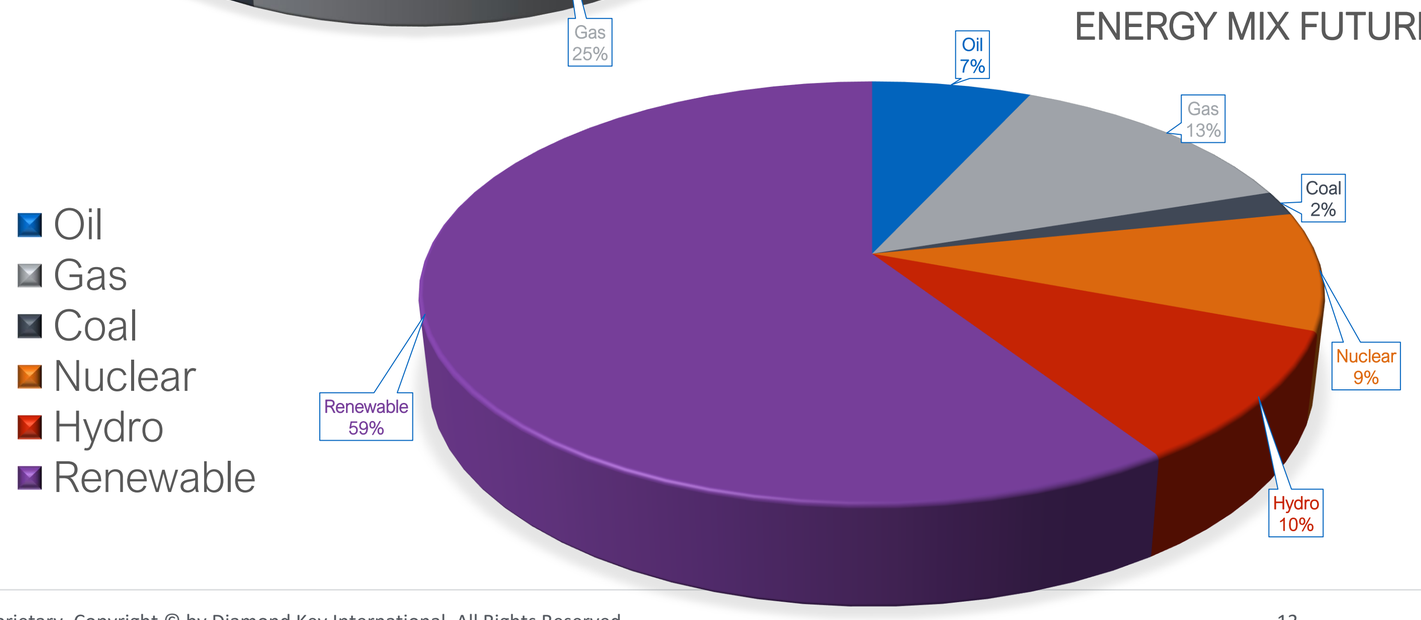
In order to achieve CO_2 7.7% down, much bigger drop compared to 2020 6.4% down

More dramatic energy mix movements are required

How does the Future Energy Mix Look Like?

	2020	Future
Oil	31%	6.8%
Gas	25%	13%
Coal	27%	1.9%
Nuclear	4.3%	9%
Hydro	6.9%	10%
Renewable	5.7%	59%





The Dilemma faced by Oil Companies in Energy Transition:

Fate of Fossil Fuel: does it have a continuing role to play in global energy and for how long?

In order to achieve Net Zero Emission by 2050

- What measures do we need to reduce further oil output from the energy mix in 2020
- How are we travelling to reach the goal while sustaining the energy supply
- Do we have a feasible roadmap?

Global Consumption Changes:

	1980	2019
Asia Pacific	21%	43%
North America	36%	20%
EU	21%	19%

02 Roads leading to Net Zero Goal

Committed Path Started in 2015: Reduce Coal from 27% to 1.9% :

2015 is the significant year for international major oil companies who used to own major COAL assets.

Shell, BP and Total with 10 top oil companies joined forces to make sure coal is on its way out and abandon coal mining, transition into production and trading of gas as a cleaner alternative energy.

Introduction of carbon pricing systems to discourage any growth of coal in the energy mix alongside renewables

Transition from Coal to Natural Gas

Majority of oil companies have significantly increased the production and trading of natural gas as low emission energy replacing coal for power generation and industrial usage.

Long and Bumpy Road: Reduce Oil from 31% to 6.8%

2020 data shows Oil remains the largest share of the primary energy. It continues to play a significant role in transportation and chemical industry.

What have the major oil companies done in recent 5 years:

- Divest Oil Production assets
- Divest Oil Retail assets and Downstream assets in non strategic markets
- Shut down refineries
- Consolidate operation to improve efficiency
- Optimize the existing assets and infrastructure
- Reengineering global organizations and supply chain

Oil will not go away till 2050 and continues to play a critical role in sustaining the energy supply while renewable become more available and sustainable to meet the global consumption.

Innovative and Smart Fast Track: Increase Renewables from 5.7% to 59%

Major Capital Investments in Non-Oil Low Carbon Business

Reinventing and Repositioning as Integrated Green Energy Company:

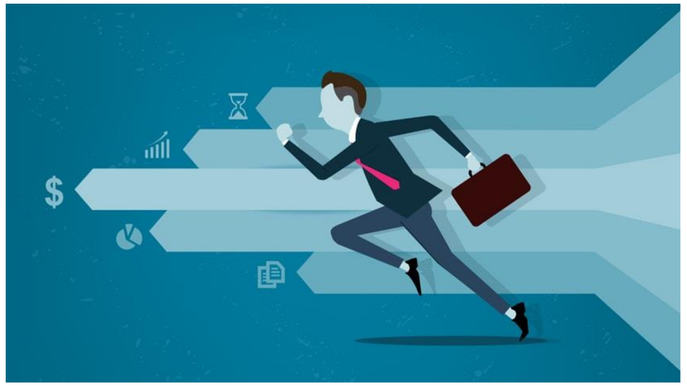
Power Generation: Wind and Solar

Transport: EV

Hydrogen

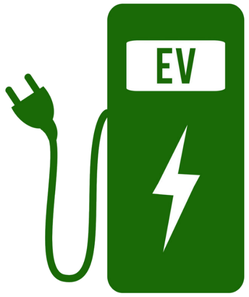
BioFuel

Industrial/Commercial: Natural Gas



Assets in New Business:

Retail Electricity (eg.MP2; ERM Power; Inspire Energy)



EV Charging Stations

Wind Farm Operations

Committed Decarbonization Measures from Existing Operators:

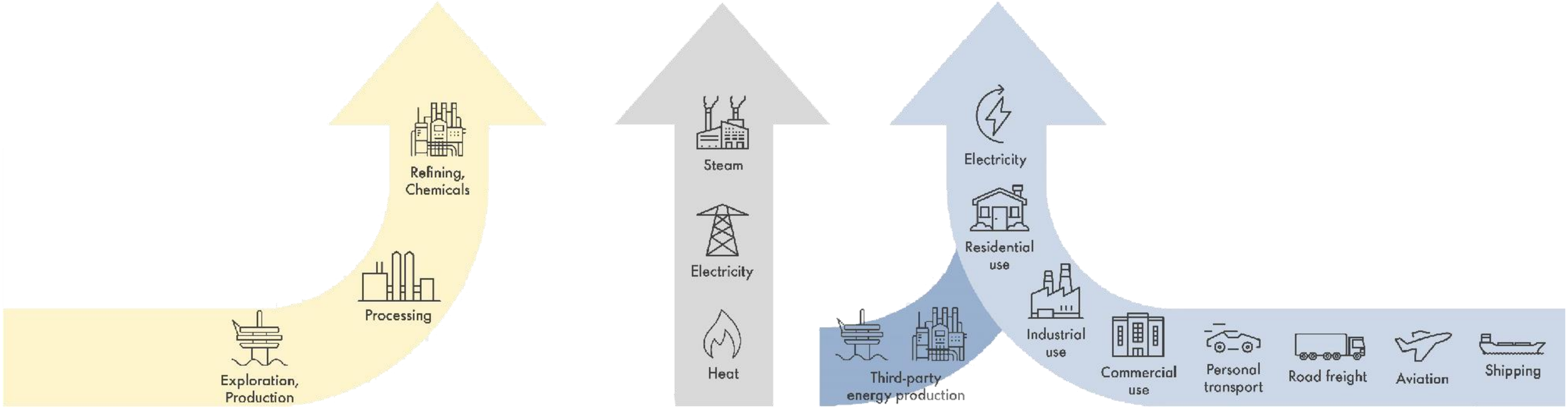
Scope 1 (direct) : **methane emission / flaring in upstream**

Stage 1 and 2 VRU in downstream

Scope 2 (indirect): purchase renewable power

install solar panels

Scope 3 (Complimentary) : Carbon Intensity from the Products Sold



03 Challenges vs Opportunities

Challenges of Meeting the Complex shareholder and Social Expectations while Sustaining the Energy Supply

No.1: ROI on all capital investments measurable in terms of CO_2 reduction

No.2: Profit and Dividends with Immediate cash generation

No.3: Carbon offsetting perceived by environmental organizations as social “PR”

No.4: Different legal and regulatory compliances creating uncertainties

The Pain:

80-90% of Emissions in Scope 3 –

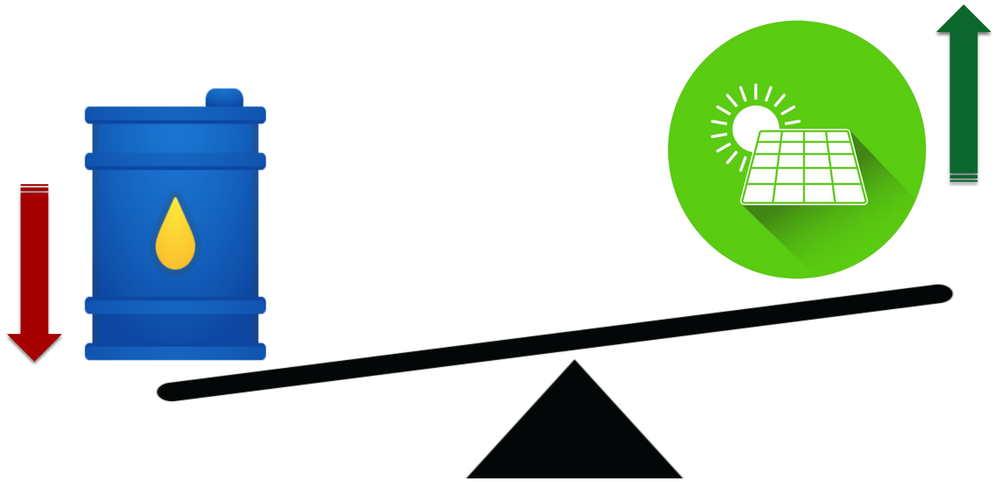
Lack of standards

No tracking

No reporting

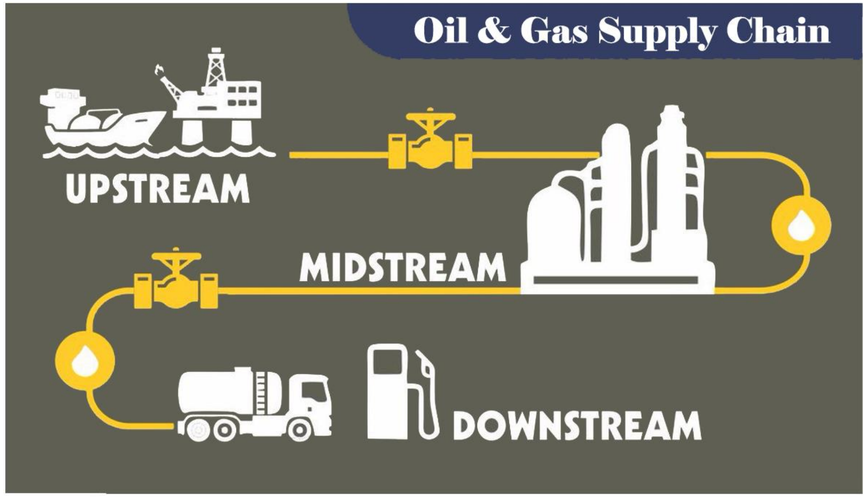
The Balance:

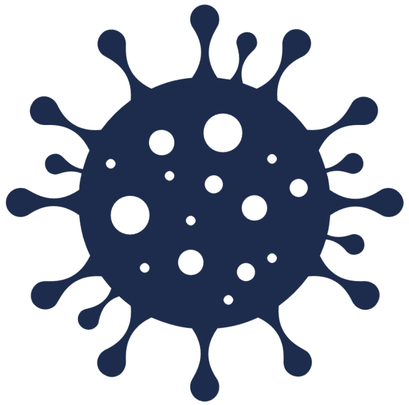
Sustain Security of Supply vs **Renewables Investment**

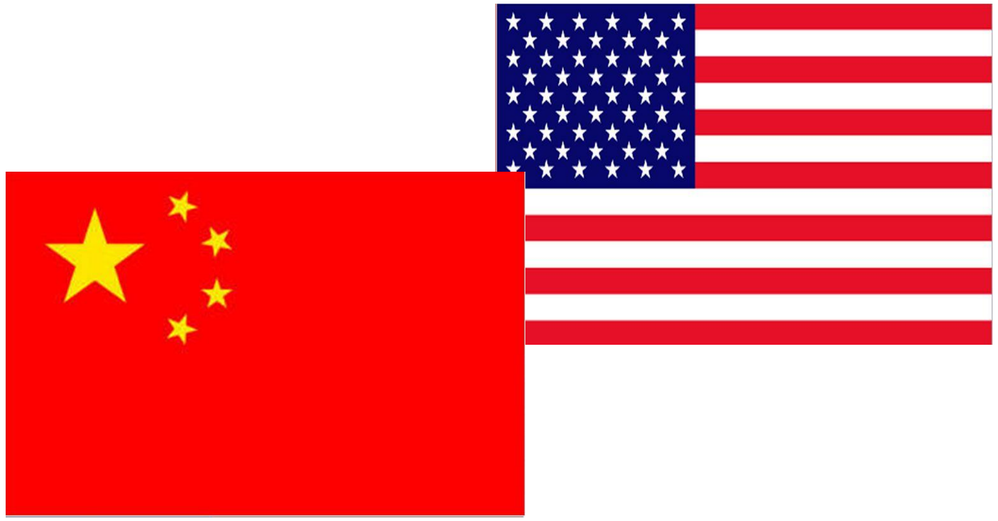


Challenges of Global Supply Chain Disruption

- Divestments created segmented, inefficient and problematic supply chain
- Pandemic Risks
- Political conflict and trade wars



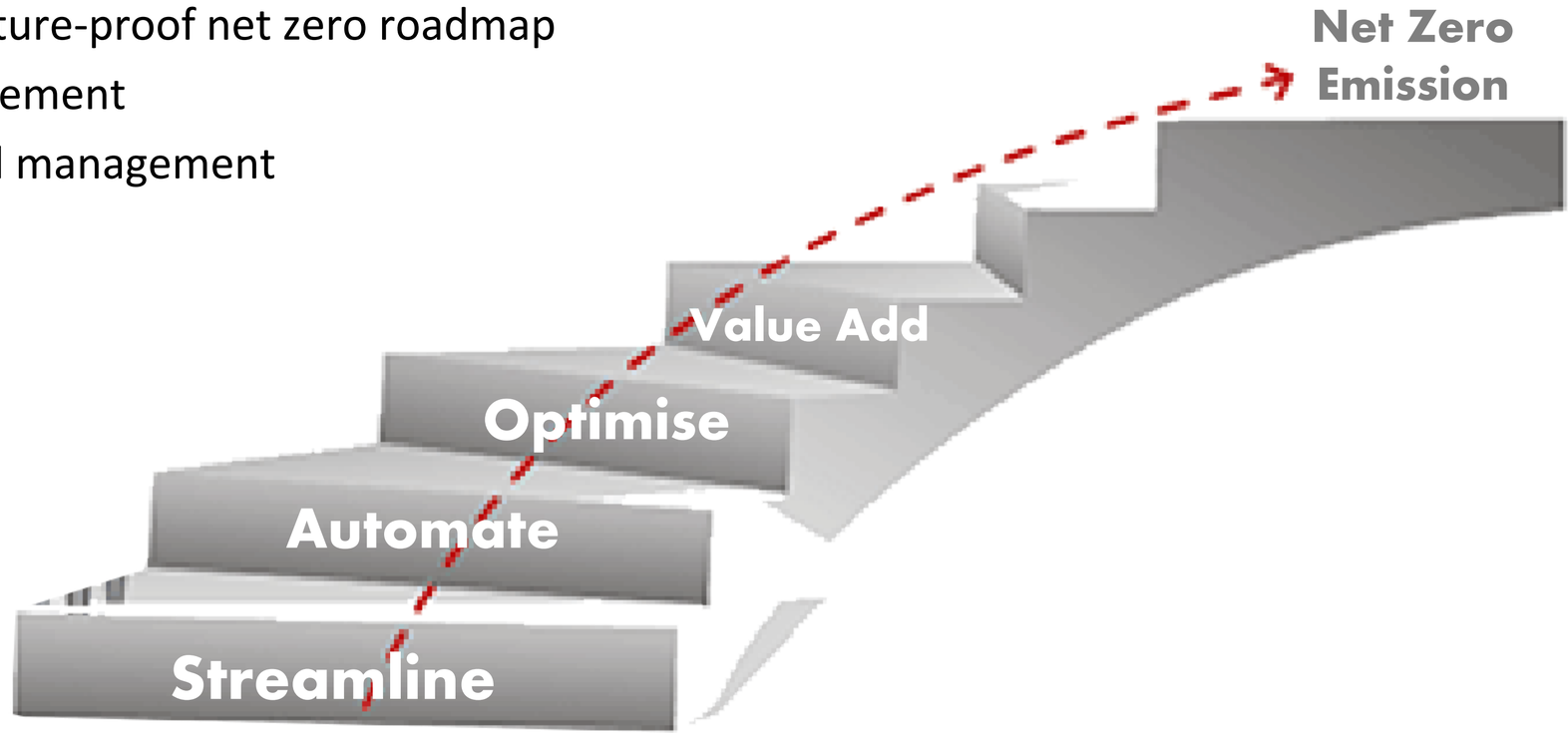




Capturing Decarbonisation Opportunities – Digital Transformation

Pragmatic and Proven technology to achieve

- energy efficiency
- optimize the existing assets and infrastructure
- no regret costs in building a future-proof net zero roadmap
- security in supply chain management
- Scope 3 reduction tracking and management



Capturing Decarbonisation Opportunities – Carbon Capture, Utilization and Storage (CCUS)

CCUS can facilitate the transition to net zero goal

- tackling the emissions from the existing assets

- providing cost-effective pathway to scale up hydrogen production rapidly

- allowing the CO_2 removal from atmosphere through BECCS and DACCS

Key global milestones for CCUS

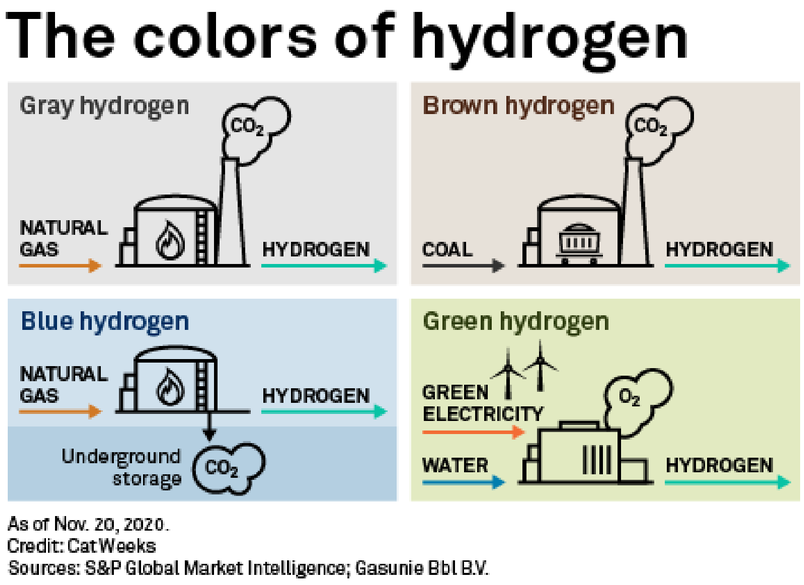
	2020	2030	2050
Total CO_2 captured (Mt CO_2)	**40**	**1 670**	**7 600**
CO_2 captured from fossil fuels and processes	39	1 325	5 245
Power	3	340	860
Industry	3	360	2 620
Merchant hydrogen production	3	455	1 355
Non-biofuels production	30	170	410
CO_2 captured from bioenergy	1	255	1 380
Power	0	90	570
Industry	0	15	180
Biofuels production	1	150	625
Direct air capture	0	90	985
Removal	0	70	630

Source: *International Energy Agency* – IEA 2021

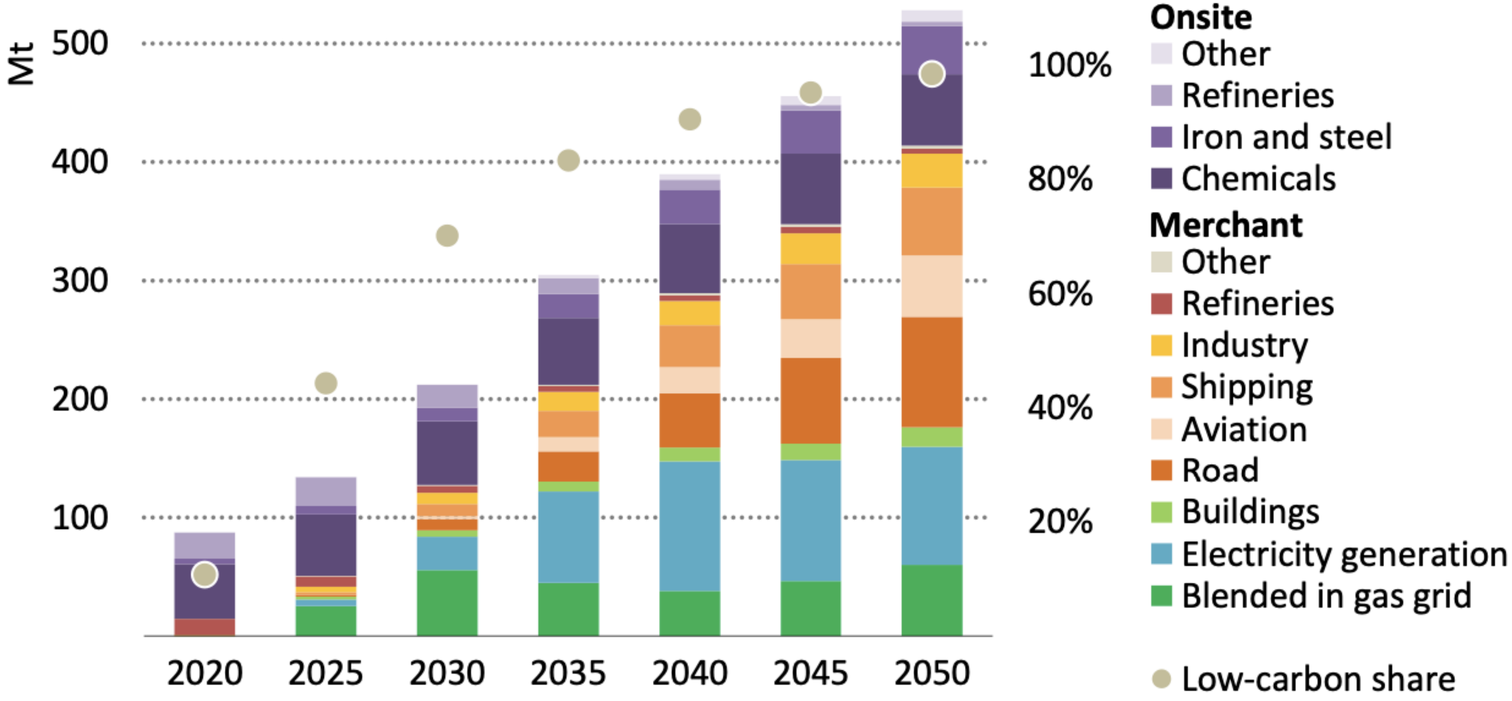
Capturing Decarbonisation Opportunities – Hydrogen as Viable Source of Fuel

Rapid growth to replace the current fossil fuel

- existing infrastructure utilization
- cost competitiveness in large volume scale to end user



Key global milestones for CCUS

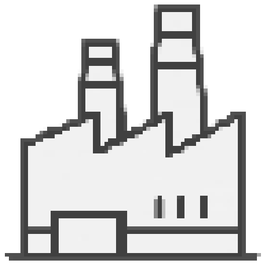


Source: *International Energy Agency* – IEA 2021

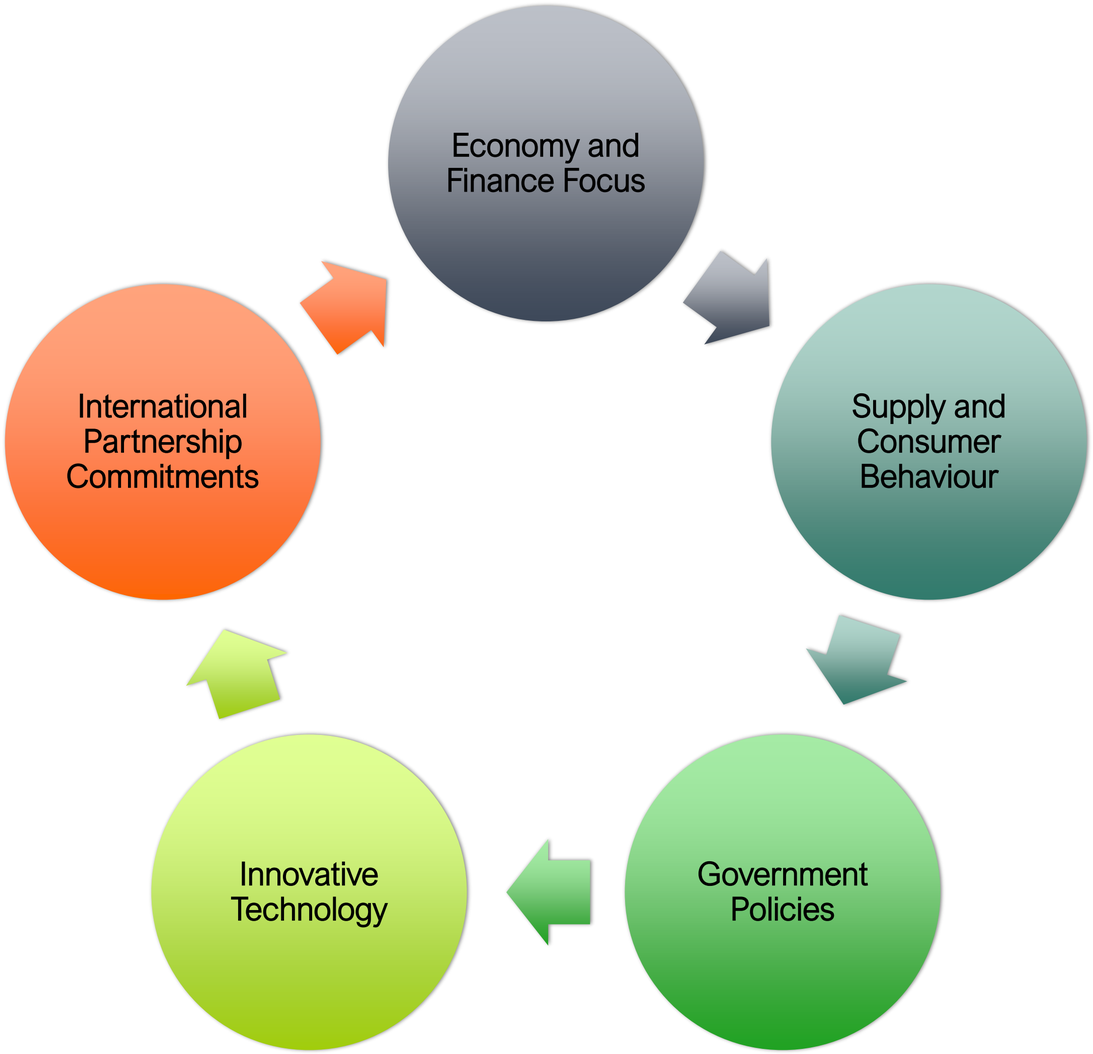
Capturing Decarbonisation Opportunities – Investments into Renewables

Biggest structure shift in energy mix movements

- Impressive growth in power generation with reduced costs of solar and wind facilities
- Transport biofuel relied on limited supply of ethanol and biodiesel
- EV and Hydrogen as future replacement (need further investments)
- Oil and gas companies need to move faster into renewables with current advantages



The Biggest Global Collaboration in Energy History with Far Wider Implications to our World



Turning Challenges into Opportunities in Powering the Low Carbon Future

We are here for you

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Tunis, Tunisia
Cape Town, South Africa
Kenya,
Bristol, UK
Morocco

IDS
INDEPENDENT DATA SERVICES

TURNING **DATA** INTO **KNOWLEDGE**

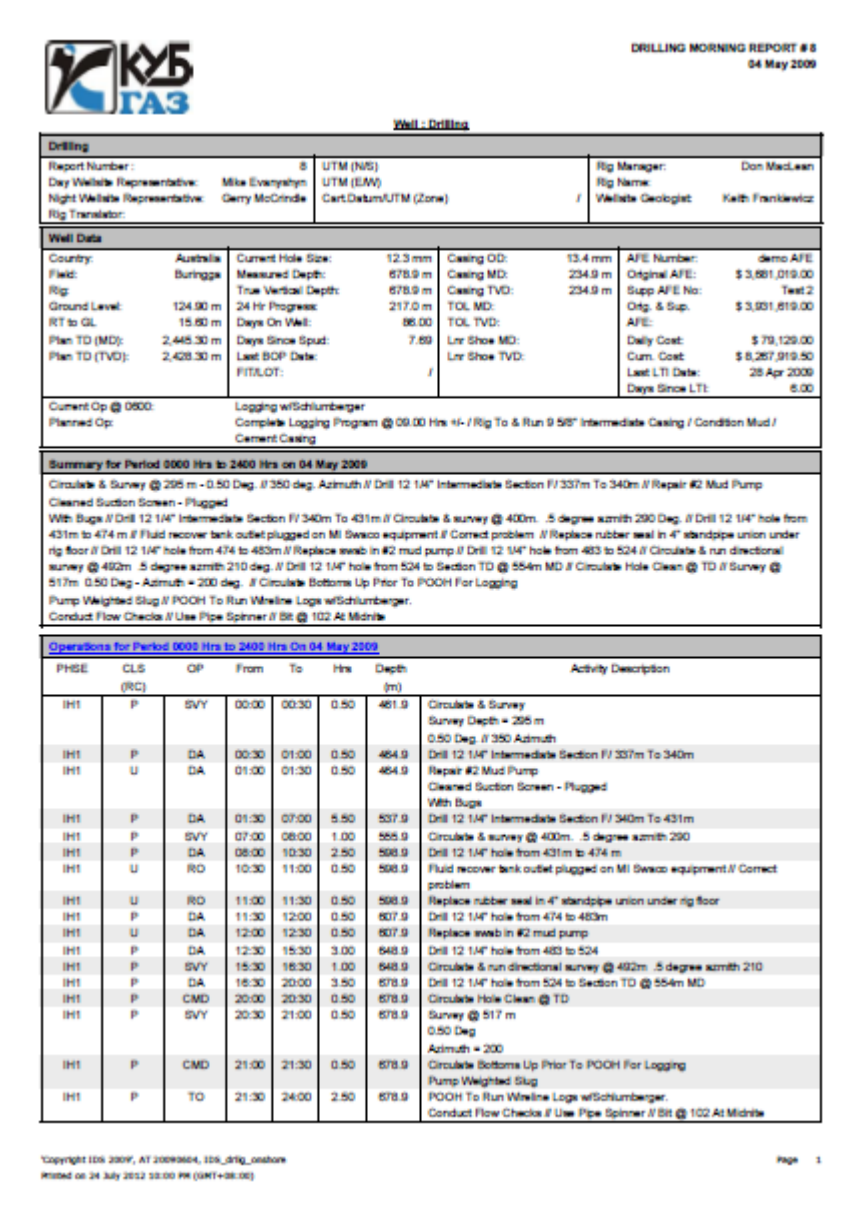
Reducing Footprint though Automated Reporting, Analytics, …and Settlement

David Shackleton
Head of Carbon Data Management & Regional Manager, Americas
Independent Data Services, September 2021

IDS's Story

- 1996 – What's happening at the rig? Drilling Data Package
- 2001 – Avoid the install? Data**Net**
- 2006 – Avoid all this typing? WITSML
- 2015 – All devices? HTML5
- 2015 – How can we do better? ANOVA Analytics Performance Management
- 2016 – Less typing, more accurate and complete data? Lean Automated Reporting
- 2020 – Get paid for the work we do? Automated 'Sensor to Payment' performance smart contracts
- 2021 – Optimize though connection to planning & ops tools? IDS integrates with major energy services companies

Conventional Operational Reporting



КУБ ГАЗ

DRILLING MORNING REPORT # 8
04 May 2009

Well : Drilling

Drilling

Report Number:	8	UTM (N/S)		Rig Manager:	Don MacLean
Day Wellsite Representative:	Mike Evanyshyn	UTM (E/W)		Rig Name:	
Night Wellsite Representative:	Gerry McCrindle	Cart.Datum/UTM (Zone)	/	Wellsite Geologist:	Keith Frankiewicz
Rig Translator:					

Well Data

Country:	Australia	Current Hole Size:	12.3 mm	Casing OD:	13.4 mm	AFE Number:	demo AFE
Field:	Buringga	Measured Depth:	678.9 m	Casing MD:	234.9 m	Original AFE:	$ 3,681,019.00
Rig:		True Vertical Depth:	678.9 m	Casing TVD:	234.9 m	Supp AFE No:	Test 2
Ground Level:	124.90 m	24 Hr Progress:	217.0 m	TOL MD:		Orig. & Sup. AFE:	$ 3,931,619.00
RT to GL:	15.60 m	Days On Well:	86.00	TOL TVD:		Daily Cost:	$ 79,129.00
Plan TD (MD):	2,445.30 m	Days Since Spud:	7.69	Lnr Shoe MD:		Cum. Cost:	$ 8,267,919.50
Plan TD (TVD):	2,428.30 m	Last BOP Date:		Lnr Shoe TVD:		Last LTI Date:	28 Apr 2009
		FIT/LOT:	/			Days Since LTI:	6.00

Current Op @ 0600: Logging w/Schlumberger
Planned Op: Complete Logging Program @ 09.00 Hrs +/- / Rig To & Run 9 5/8" Intermediate Casing / Condition Mud / Cement Casing

Summary for Period 0000 Hrs to 2400 Hrs on 04 May 2009

Circulate & Survey @ 295 m - 0.50 Deg. // 350 deg. Azimuth // Drill 12 1/4" Intermediate Section F/ 337m To 340m // Repair #2 Mud Pump Cleaned Suction Screen - Plugged
With Bugs // Drill 12 1/4" Intermediate Section F/ 340m To 431m // Circulate & survey @ 400m. .5 degree azmith 290 Deg. // Drill 12 1/4" hole from 431m to 474 m // Fluid recover tank outlet plugged on MI Swaco equipment // Correct problem // Replace rubber seal in 4" standpipe union under rig floor // Drill 12 1/4" hole from 474 to 483m // Replace swab in #2 mud pump // Drill 12 1/4" hole from 483 to 524 // Circulate & run directional survey @ 492m .5 degree azmith 210 deg. // Drill 12 1/4" hole from 524 to Section TD @ 554m MD // Circulate Hole Clean @ TD // Survey @ 517m 0.50 Deg - Azimuth = 200 deg. // Circulate Bottoms Up Prior To POOH For Logging
Pump Weighted Slug // POOH To Run Wireline Logs w/Schlumberger.
Conduct Flow Checks // Use Pipe Spinner // Bit @ 102 At Midnite

Operations for Period 0000 Hrs to 2400 Hrs On 04 May 2009

PHSE	CLS (IRC)	OP	From	To	Hrs	Depth (m)	Activity Description
IH1	P	SVY	00:00	00:30	0.50	461.9	Circulate & Survey Survey Depth = 295 m 0.50 Deg. // 350 Azimuth
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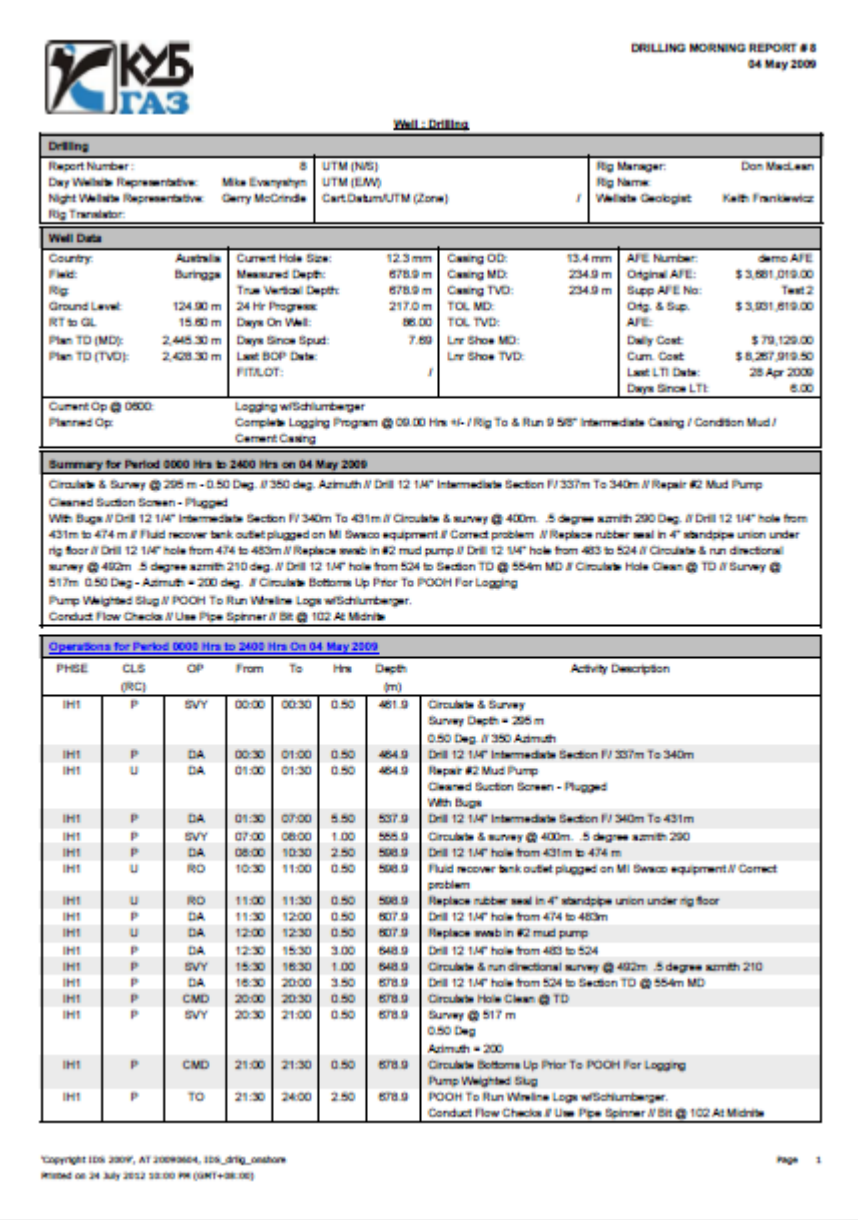
IH1	U	DA	01:00	01:30	0.50	464.9	Repair #2 Mud Pump Cleaned Suction Screen - Plugged With Bugs
IH1	P	DA	01:30	07:00	5.50	537.9	Drill 12 1/4" Intermediate Section F/ 340m To 431m
IH1	P	SVY	07:00	08:00	1.00	555.9	Circulate & survey @ 400m. .5 degree azmith 290
IH1	P	DA	08:00	10:30	2.50	598.9	Drill 12 1/4" hole from 431m to 474 m
IH1	U	RO	10:30	11:00	0.50	598.9	Fluid recover tank outlet plugged on MI Swaco equipment // Correct problem
IH1	U	RO	11:00	11:30	0.50	598.9	Replace rubber seal in 4" standpipe union under rig floor
IH1	P	DA	11:30	12:00	0.50	607.9	Drill 12 1/4" hole from 474 to 483m
IH1	U	DA	12:00	12:30	0.50	607.9	Replace swab in #2 mud pump
IH1	P	DA	12:30	15:30	3.00	648.9	Drill 12 1/4" hole from 483 to 524
IH1	P	SVY	15:30	16:30	1.00	648.9	Circulate & run directional survey @ 492m .5 degree azmith 210
IH1	P	DA	16:30	20:00	3.50	678.9	Drill 12 1/4" hole from 524 to Section TD @ 554m MD
IH1	P	CMD	20:00	20:30	0.50	678.9	Circulate Hole Clean @ TD
IH1	P	SVY	20:30	21:00	0.50	678.9	Survey @ 517 m 0.50 Deg Azimuth = 200
IH1	P	CMD	21:00	21:30	0.50	678.9	Circulate Bottoms Up Prior To POOH For Logging Pump Weighted Slug
IH1	P	TO	21:30	24:00	2.50	678.9	POOH To Run Wireline Logs w/Schlumberger. Conduct Flow Checks // Use Pipe Spinner // Bit @ 102 At Midnite

Printed on 24 July 2012 10:00 PM (GMT+08:00)

DDR Data Type	Data Source
• Basic Well Data	Well plan
• Activities • BHA • Bits • Casing and Cementing • Drilling Parameters • Formation Tops • Fluid Properties • Fluid Volumes • Rig Pumps • Surveys • Bulk Stocks • Personnel on Board (PoB) • Rig Information • Weather and Environment • HSE	Manual, collaborative entry

Lean Automated Reporting



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Printed on 24 July 2012 10:00 PM (GMT+08:00)

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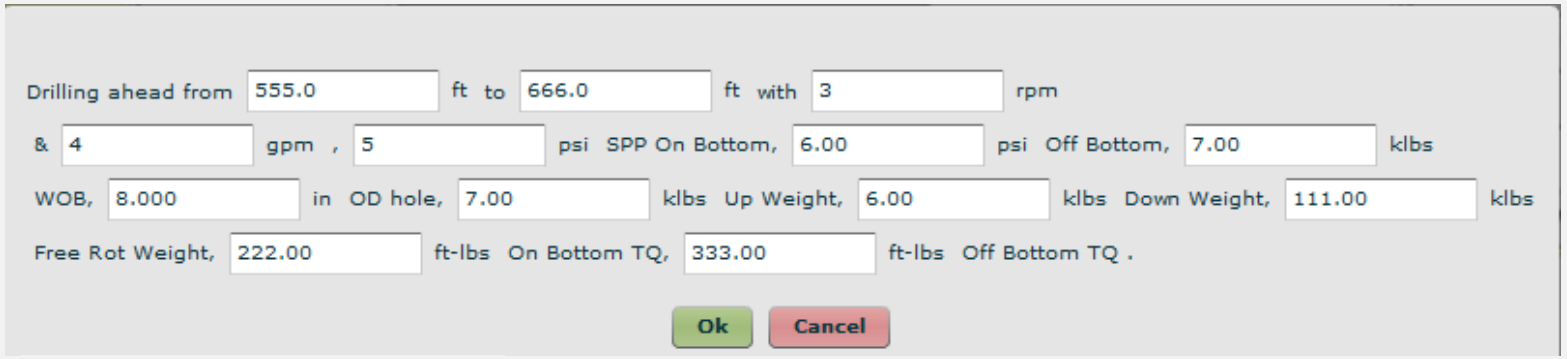
• Weather and Environment • HSE	Collaborative entry	

Automating Activities

Fixed text remarks:



WITSML 1.4.1.1

1. well
2. wellbore
3. bhaRun
4. tubular
5. fluidsReport
6. opsReport
7. formationMarker
8. **log** →
9. mudLog
10. wbGeometry
11. trajectory
12. Attachment
13. CementJob
14. Risk Object

Key Sensor data
Bit Depth
Hole Depth
Hook Position
Hookload
Mud Flow Rate In
Pump Stroke Rate # 1, 2, 3, 4
Rotary Speed (surface)
Motor RPM (downhole)
Standpipe Pressure
Weight-on-bit
Torque

→

[ID] Rig State Detection Code
[1]Drilling
[2]Tripping In
[3]Tripping Out
[4]Circulating
[5]Casing Run
[10]Surface
[12]Rotary Drilling (Surface and DH)
[13]Turbo Drilling
[14]Sliding Drilling
[15]Connection
[17]Circulating Static
[18]Wash Down
[19]Pump out of hole
[20]Cut/Slip Drill Line
[22]In-Slip - Trip-In
[23]Rotating
[24]Circulating while Reciprocating
[28]In Slips - Trip Out
[29]Back Reaming
[30]Reaming Down
[31]In Slips - Casing
[35]Pump Off - In Slips
[36]Connection - In Slips
[38]Weight to Weight
[40]Weight to Slip
[41]Slip to Weight
[42]Slips to Slips - Trip In
[43]Slips to Slips - Trip Out
[44]Slips to Slips - Casing
[45]Rotary Drilling (Surface)
[47] Casing Block(Up/Down)
[50] Sliding Drilling Oscillating
[51] RIH BHA

Automated Activities

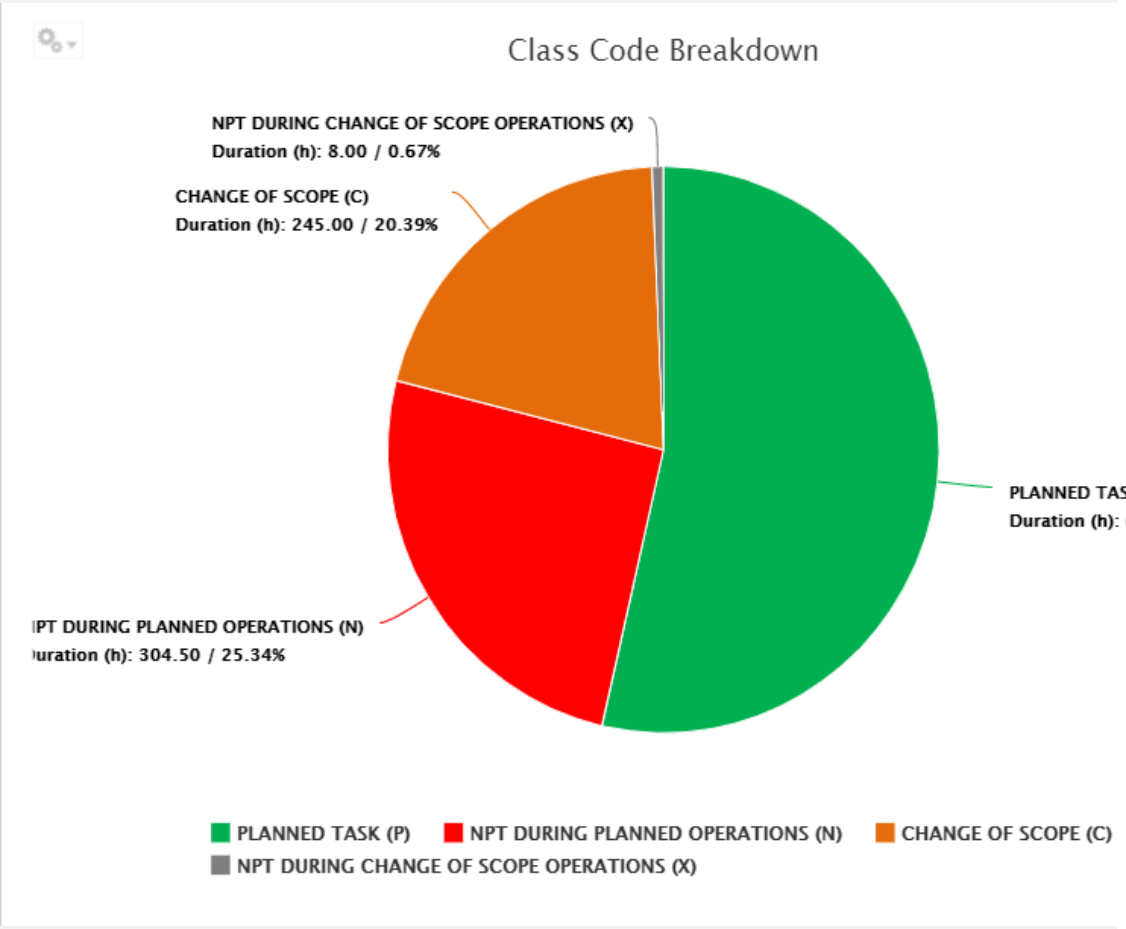
Operations for Period 0000 Hrs to 2400 Hrs On 15 Feb 2020

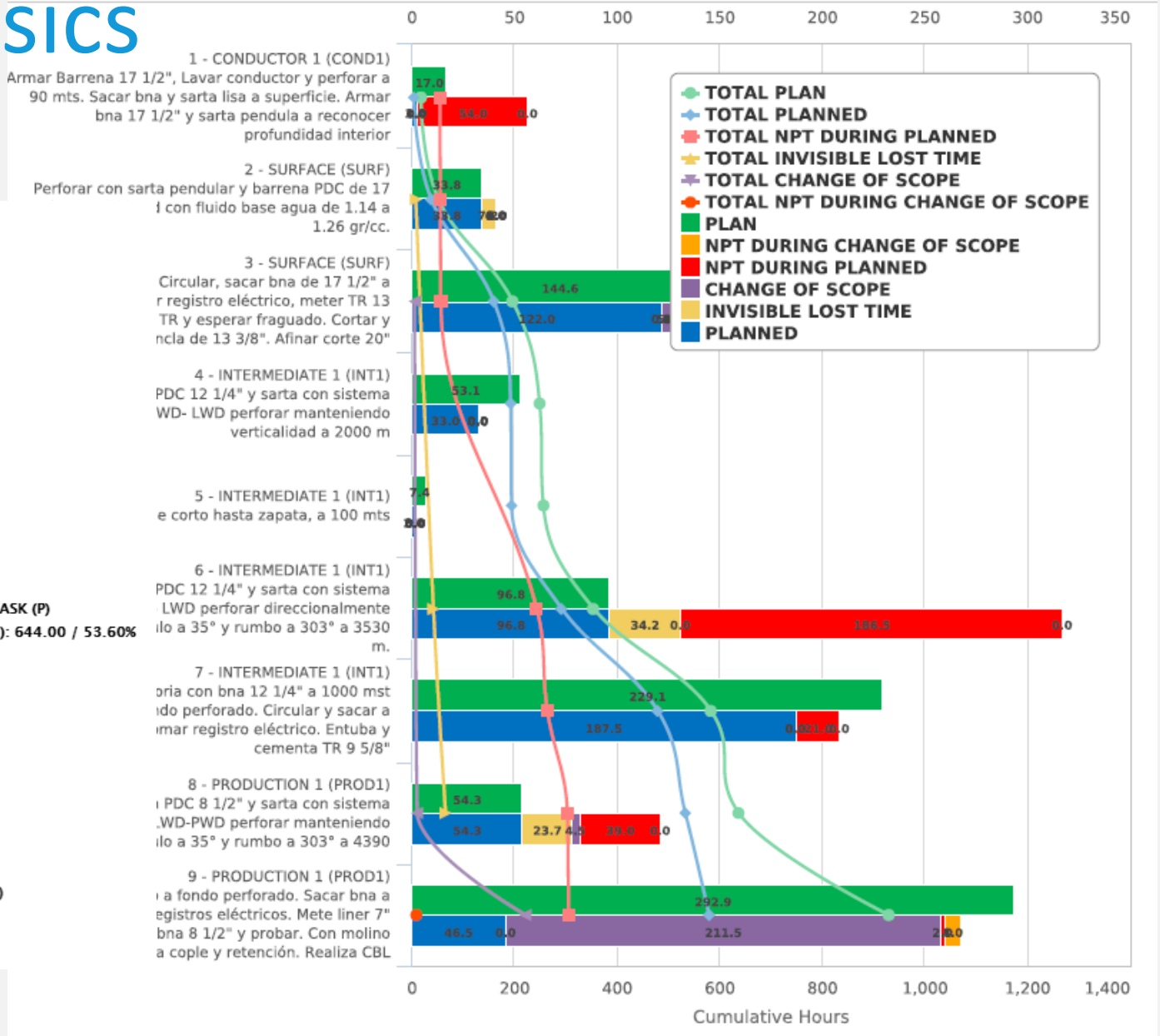
PH	OPN	WS OPN	From	To	Depth (m)	NPT Level	Description
D12	WAIT	WOO	00:15	03:31	12.5	1	Handling delay when making a Drilling Connection
D12	DRM	ROT	03:31	08:30	53.4	0	Drill ahead rotary (Surface) from 9.3 m to 53.4 m with Avg Surface RPM - 26 rpm , Avg Flow 1,260 L/min , Avg SPP On Bottom 1,937 kPa , Avg WOB 8.51 KdaN, Avg ROP 8.44 m/h
D12	DRTO	OPH	08:30	08:52	53.4	0	Tripping out from 52.1 m to depth 15.6 m
D12	WAIT	WOO	08:52	09:39	53.4	1	Handling delay when making a Drilling Connection
D12	DRTO	OPH	09:39	10:31	53.4	0	Tripping out from 15.3 m to depth 2.7 m
D12	WAIT	WOO	10:31	11:23	53.4	1	Handling delay when making a Drilling Connection
D12	DRTO	OPH	11:23	11:32	53.4	0	Tripping out from 2.1 m to depth 0.0 m
D12	DRTI	OPH	11:32	12:19	53.4	0	Tripping in from 0.0 m to depth 1.8 m
D12	WAIT	WOO	12:19	12:36	53.4	1	Handling delay when making a Drilling Connection
D12	DRTI	OPH	12:36	12:37	53.4	0	Tripping in from 1.8 m to depth 20.3 m
D12	WAIT	WOO	12:37	12:59	53.5	1	Handling delay when making a Drilling Connection
D12	DRM	ROT	12:59	14:21	78.2	0	Drill ahead rotary (Surface) from 48.9 m to 78.2 m with Avg Surface RPM - 26 rpm , Avg Flow 1,294 L/min , Avg SPP On Bottom 3,395 kPa , Avg WOB 10.75 KdaN, Avg ROP 18.50 m/h
D12	WAIT	WOO	14:21	14:43	78.6	1	Handling delay when making a Drilling Connection
D12	DRM	ROT	14:43	17:00	133.4	0	Drill ahead rotary (Surface) from 76.5 m to 133.4 m with Avg Surface RPM - 23 rpm , Avg Flow 1,359 L/min , Avg SPP On Bottom 4,337 kPa , Avg WOB 8.27 KdaN, Avg ROP 25.12 m/h
D12	WAIT	WOO	17:00	17:38	133.6	1	Handling delay when making a Drilling Connection
D12	DRM	ROT	17:38	24:00	319.7	0	Drill ahead rotary (Surface) from 133.6 m to 319.7 m with Avg Surface RPM - 39 rpm , Avg Flow 1,965 L/min , Avg SPP On Bottom 8,159 kPa , Avg WOB 2.88 KdaN, Avg ROP 30.40 m/h

Performance Summary

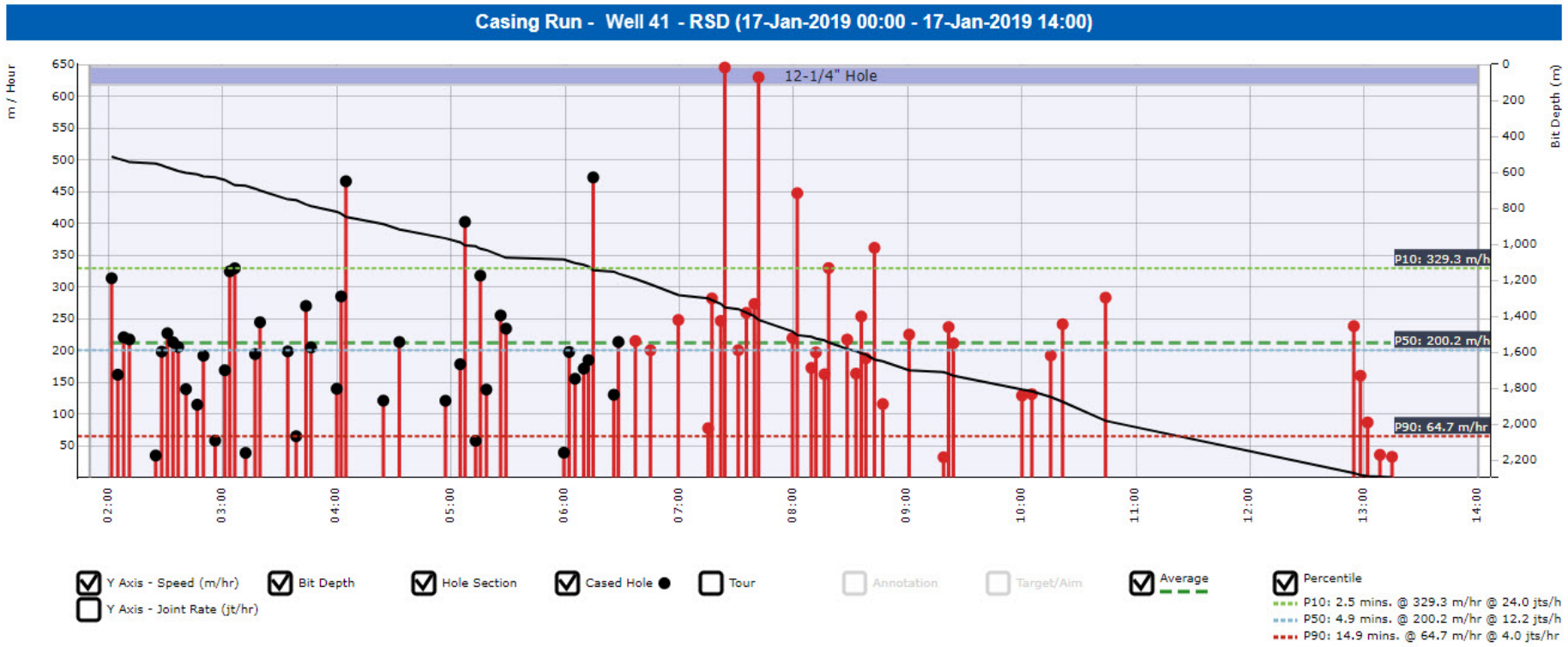
	Daily		Cumulative Well	
	Hrs	%	Hrs	%
0	17.2	72.4	17.2	72.4
1	6.6	27.6	6.6	27.6
Undefined	0.0	0.0	0.0	0.0
Total	23.7	100.0	23.7	100.0

Performance Forensics



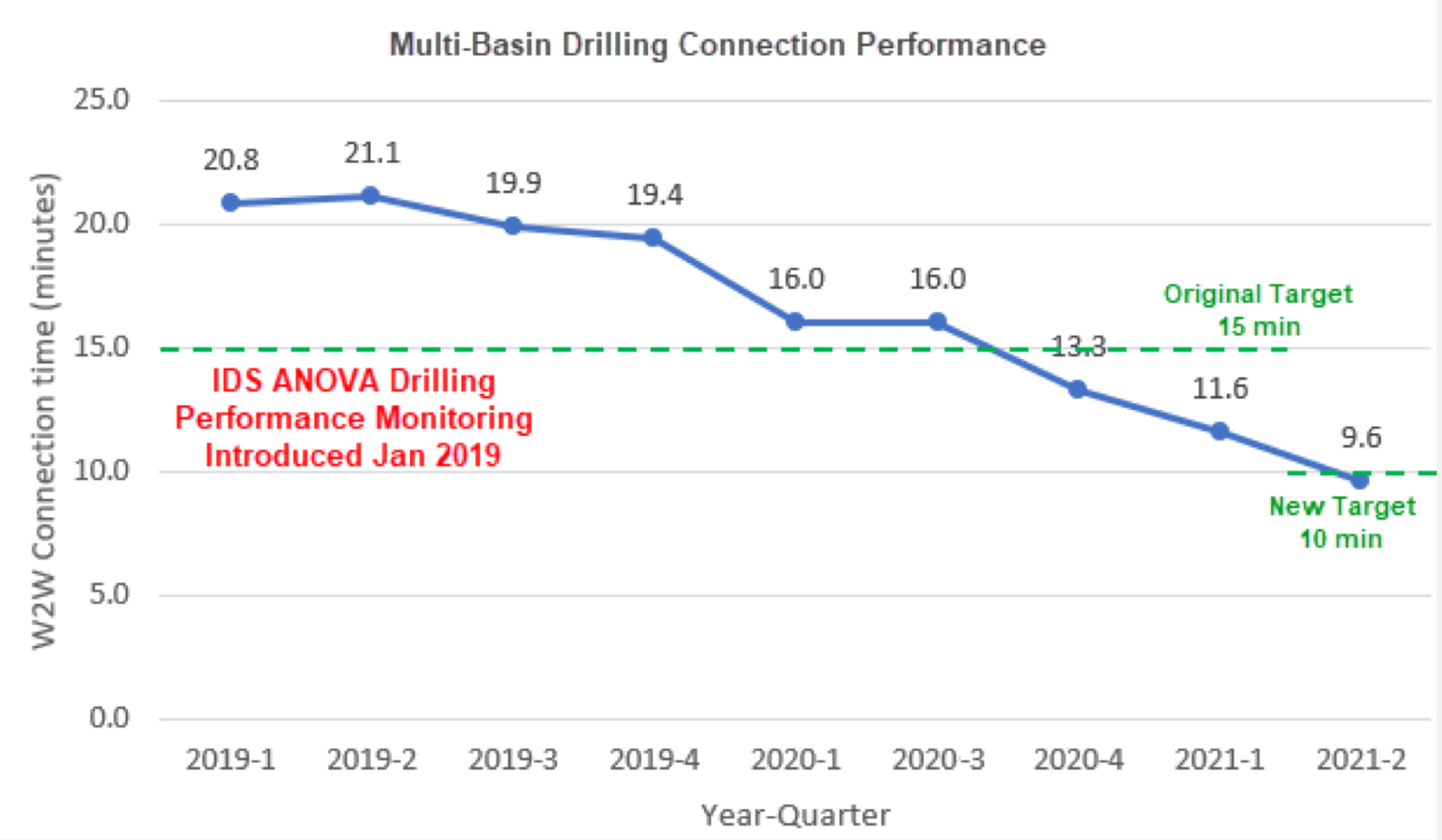


Automated Performance Analytics



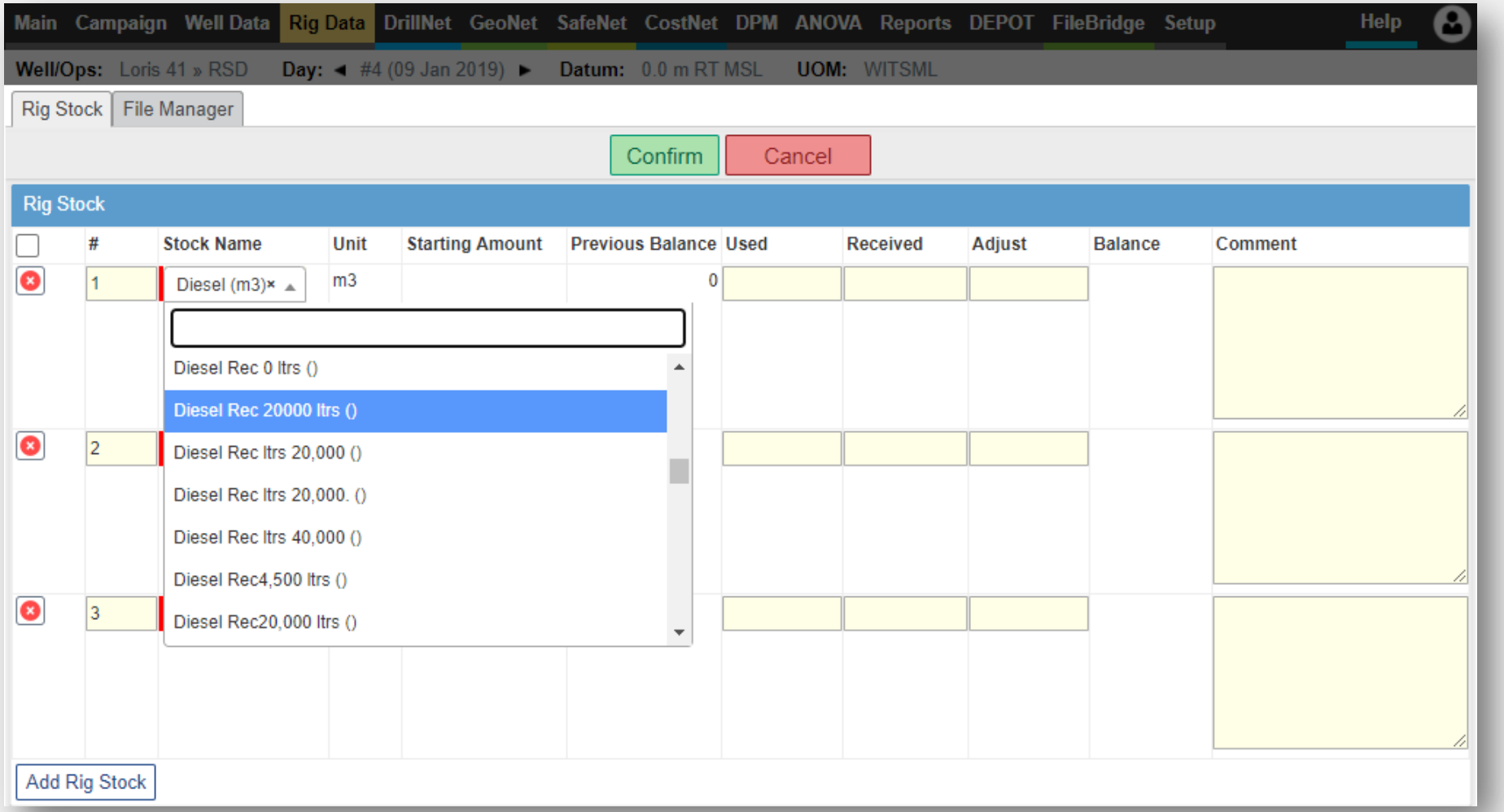
Hole Size (in)	12.25"					
CH/OH	CH			OH		
No. of Stands	44			37		
Total Duration (min)	267			398		
	Duration (min)	Joint/hr	Speed (m/hr)	Duration (min)	Joint/hr	Speed (m/hr)
AVG	6.63	14.42	200.51	8.23	12.82	225.27
MAX	33.33	25.71	472.39	36.17	32.73	645.45
MIN	2.33	1.8	34.35	1.83	1.66	31.65
Std. Deviation	6.31	7.33	100.64	7.01	8.83	130.86

Automated Performance Analytics

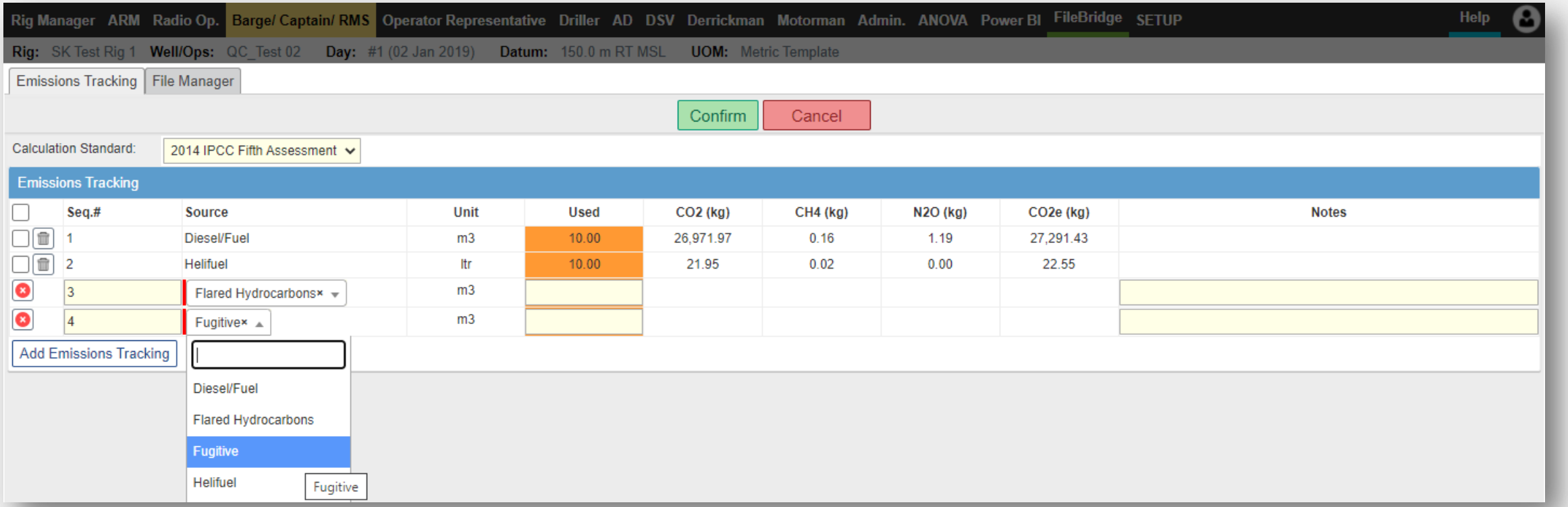


Emissions at the Rig

Record, Report, Reduce



Emissions at the Rig



Emissions – Key Initiatives

- SPE Gaia program – ‘Measuring what Matters’
- Open Group ‘Open Footprint’ forum – standard data model
- PIDX ‘Emissions Transparency Data Exchange (ETDX)’ – emissions in the supply chain
- IADC ESG, ‘Energy Efficiency’ & ‘Smart Contracting’ Work Groups
- PPDM ‘What is a Facility’
- API ‘Template for GHG Reporting’
- ISO 14064 – GHG Emissions

Sensor… to Payment

WOB
RPM
SPM
ROP

Aggregation

Emissions &
Operational reporting

Operational data

Performance Facts

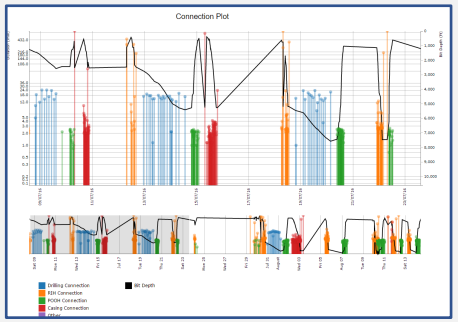
Graph QL

Validates performance facts against client configured benchmarks in smart contract, executes payment authorisation

Smart Contract

Bank pays

Smart Contract executes against new fact and triggers payment to service co. through traditional payment rails/PSP's (interbank transfer, SWIFT, etc)



Reporting & Analytics

Performance Scorecard

Integrating with Ops & Planning Tools

- Performance forensics can feed back to optimize future practice

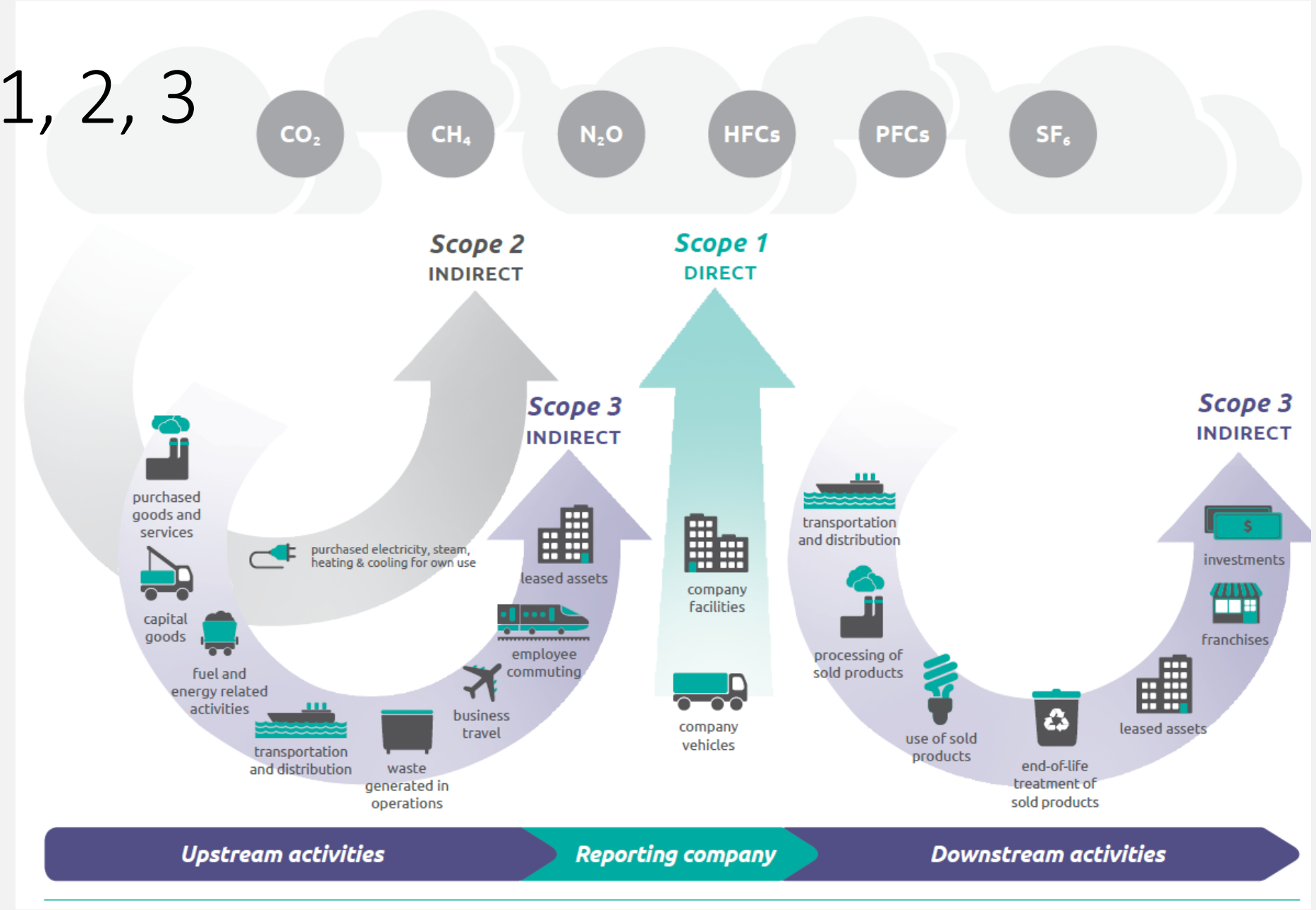
IDS
INDEPENDENT DATA SERVICES

TURNING **DATA** INTO **KNOWLEDGE**

Reducing Footprint though Automated Reporting, Analytics, …and Settlement

David Shackleton
Head of Carbon Data Management & Regional Manager, Americas
Independent Data Services, September 2021

Scope 1, 2, 3



Source: Greenhouse Gas Protocol - ***Corporate Value Chain (Scope 3) Accounting and Reporting Standard, 2011, p 5***

Risks of not Reporting Scope 3 Emissions?

Type of risk	*Examples*
Regulatory	GHG emissions-reduction laws or regulations introduced or pending in regions where the company, its suppliers, or its customers operate
Supply chain costs and reliability	Suppliers passing higher energy- or emissions-related costs to customers; supply chain business interruption risk
Product and technology	Decreased demand for products with relatively high GHG emissions; increased demand for competitors' products with lower emissions
Litigation	GHG-related lawsuits directed at the company or an entity in the value chain
Reputation	Consumer backlash, stakeholder backlash, or negative media coverage about a company, its activities, or entities in the value chain based on GHG management practices, emissions in the value chain, etc.

Source: Greenhouse Gas Protocol - ***Corporate Value Chain (Scope 3) Accounting and Reporting Standard, 2011, p 13***

Opportunities Reporting Scope 3 Emissions?

Type of opportunity	*Examples*
Efficiency and cost savings	A reduction in GHG emissions often corresponds to decreased costs and an increase in companies' operational efficiency.
Drive innovation	A comprehensive approach to GHG management provides new incentives for innovation in supply chain management and product design.
Increase sales and customer loyalty	Low-emissions goods and services are increasingly more valuable to consumers, and demand will continue to grow for new products that demonstrably reduce emissions throughout the value chain.
Improve stakeholder relations	Improve stakeholder relationships through proactive disclosure and demonstration of environmental stewardship. Eg, demonstrating fiduciary responsibility to shareholders, informing regulators, building trust in the community, improving relationships with customers and suppliers, and increasing employee morale.
Company differentiation	External parties (eg, customers, investors, regulators, shareholders, and others) are increasingly interested in documented emissions reductions. A scope 3 inventory is a best practice that can differentiate companies in an increasingly environmentally-conscious marketplace.

Source: Greenhouse Gas Protocol - ***Corporate Value Chain (Scope 3) Accounting and Reporting Standard, 2011, p 13***

Why Now?


CEOs
for
S&P warns Exxon,
oil firms it may cut their credit ratings
thanks to the push to zero-carbo
BlackRock boss Larry
worldwide to disclose co
reaching net zero by 2050
Exxon Discloses Full Scope of Fuel Emissions for First Time
Oil giant has come under pressure from activist investors
Company doesn't provide forward-looking emissions estimates
evron and other
Companies' plans should help eliminate net greenhouse gas emissions by 2050, Fink wrote.
"I urge companies to move quickly to issue them rather than waiting for regulators to impose them," he said.
Greta Thunberg @GretaThunberg · 7h
"On current trends, the probability of
5%, but if all countries meet th
continue to reduce em
As if a 2
climate
eet their nationally ...
172
7.9K
Pensions&Investments
July 02, 2020 01:25 PM
Global ESG-data driven assets hit $40.5 trillion
By SOPHIE BAKER

Net-zero – How?

- Many companies are estimating their scope 1 direct emissions, and scope 2 emissions that include indirect emissions from power sources
- Few companies are *measuring* emissions, but they have ambitions
- Very few companies have a clear idea on scope 3 emissions
- No standard exists for calculating, recording, reporting, or sharing scope 3 emissions.

Emissions Reporting

NOW:

- Estimations
- No standard method

FUTURE:

- Actual calculations of emissions from fuel used, machines, flaring, electricity use from invoices.
- Global industry standards employed
- Blockchain trust


SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS

SPE Gaia SUSTAINABILITY PROGRAM

Four Principles

Mobilization

The oil and gas industry is under unprecedented pressure related to its role in society. All businesses are faced with the immense challenge of integrating the UN Sustainable Development Goals. Societies such as SPE can reach hundreds of thousands of individuals, providing resources and mobilizing professionals to take appropriate actions within their roles.

Aggregation

Due to the complex and competitive nature of the industry, many professionals are left wondering, "Are we doing enough, fast enough?" SPE can help provide virtual and in-person spaces for sharing what is working and not working, as well as realities vs. goals.

Engagement

Leaders at the inaugural Gaia Summit determined that other forms of engagement are needed to encourage solutions and collaboration. SPE—as well as companies supporting SPE activities—can help facilitate the collection of new ideas and increase accountability throughout the industry and beyond.

Collaboration

The fourth and final principle relates to how the industry collaborates. The idea is to collaborate in ways consistent with the scale and urgency of the challenges until new universal practices are built. Companies can then compete when the practices are mature and measurable.

Four Pathways

Innovation

How do we leverage innovation and our best brainpower in service of sustainable socio-economic development that is within planetary boundaries?

Measuring What Matters

How can we best prioritize and measure which sustainability factors matter most? How do we support the generation of "fit-for-decision" content to support internal and external stakeholders?

Listening and Communicating

Creating the conditions for new ways of listening and communicating that generate trust and underpin collaboration.

Collaboration

Apply the collaboration principle to find affinities and synergies with all stakeholders working to redefine the role of oil and gas in serving humanity.

Future Press Release

Exercise. By David Shackleton

SPE Gaia SUSTAINABILITY PROGRAM

World's Sub-surface Engineers and Scientists Well Ahead on Net-zero Ambitions

COP 30, Houston, TX – 1 November 2025 – The Society of Sub-surface Engineers & Scientists (SSES) reports that the world is ahead of schedule to meet net-zero targets laid out by the Paris Agreement - which aims to avoid the worst effects of climate change. Since 2020, SSES's members' companies have reduced their CO2e emissions by 50% leading to an annual reduction in CO2e emissions of 5 billion tonnes – equivalent to more than the US's emissions in 2020. Those companies are also responsible for removing 20 billion tonnes of CO2 from the atmosphere since 2020, equivalent to over 50% of annual global emissions.

In 2022, collaboration between the SSES and UN Climate Change, lead to the development of a fiduciary standard for measuring, recording, and reporting carbon, and rapidly accelerated efforts to reduce CO2e emissions and capture CO2 to store it underground. UN Secretary General Greta Thunberg said, "If engineers and scientists continue these amazing efforts, average global temperatures will rise by less than the critical 1.5C".

SSES President Johana Dunlop said "these remarkable achievements were only possible through the collaboration of sustainability-focussed engineers willing to take radical steps to align the industry in measuring what matters to solve this global climate crisis. With the 2022 standards, our members had the basis upon which to drive transparent operational efficiencies, and work towards reversing the levels of CO2 in the atmosphere through carbon capture and developing lower carbon energy sources".

To further global sustainability, the SSES urges collaboration with a diverse range of international organizations, and all industries from mining and agriculture, to manufacturing and space engineering. Please get involved www.SSES.org/globalsustainability.

Record, Report, Reduce

Annex C
(informative)

Guidance on the selection, collection and use of data for GHG quantification approach for direct emissions

C.1 General

According to the requirements in Clause 6, this annex describes several approaches focusing on how to quantify direct emissions (see Figure C.1). Examples are provided to illustrate a wide range of practices usually implemented by organizations.

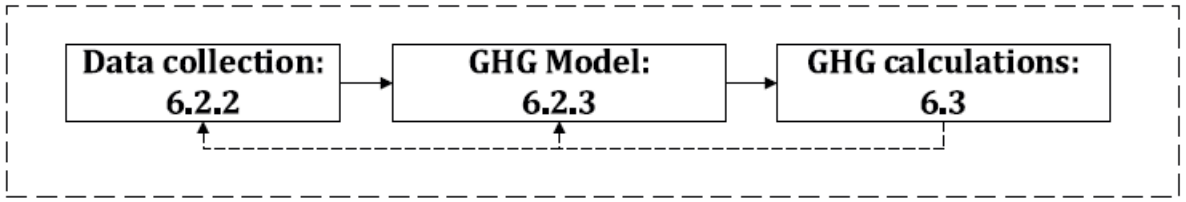


Figure C.1 — Quantification approach steps

Often some of these data are embedded within model assumptions. Sometimes data have to be collected on site as primary data. This will depend on the admissible uncertainty requirements, which might be reflected in different tiers of application of the model (see Box 1 for an example).

Box 1 — Illustrative examples

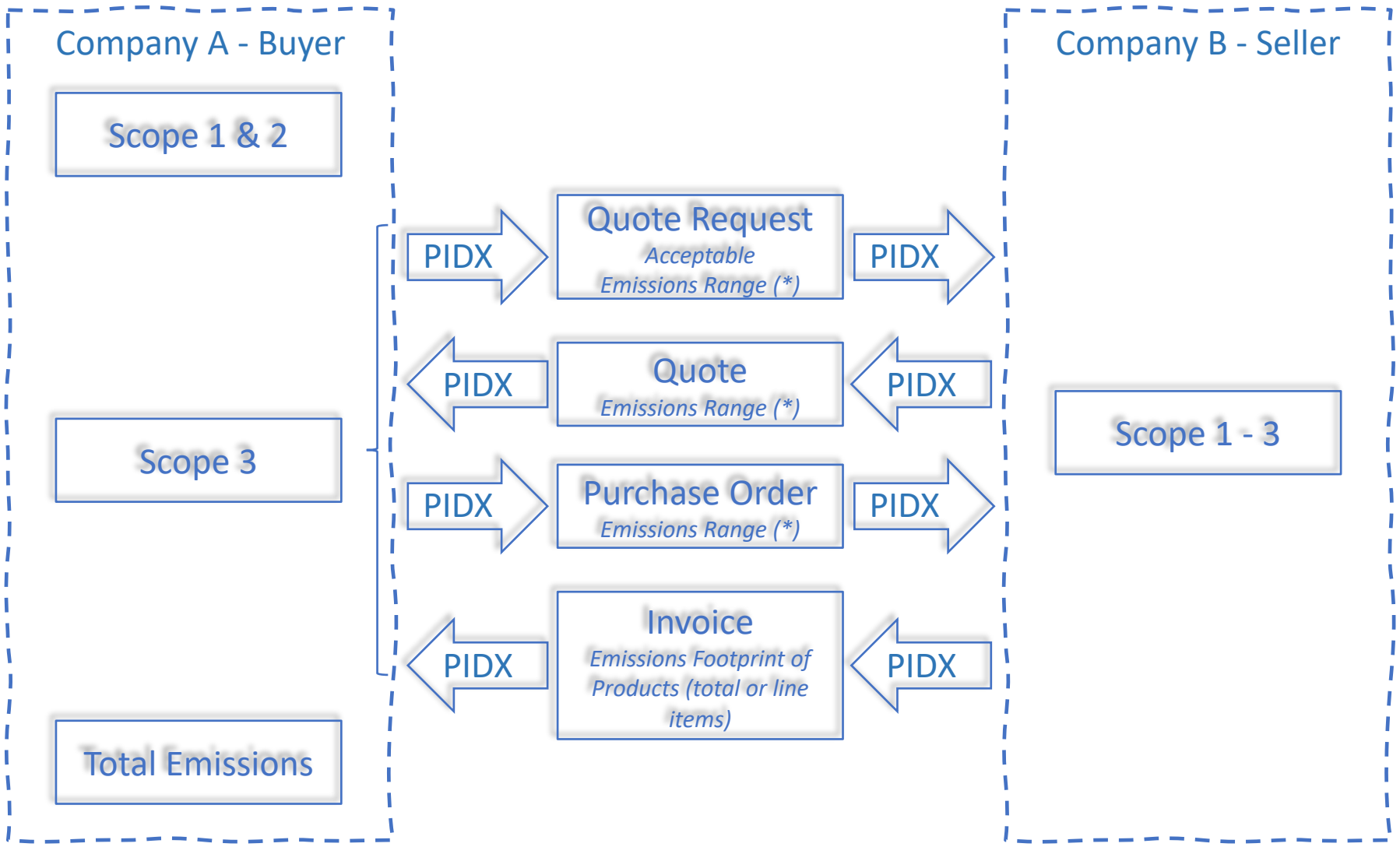
Combustion is the most common process that leads to direct CO_2 emissions. Nevertheless, quantification approaches for combustion emissions can range from the very simple to the very complex. This is often reflected in tier systems, which typify some of the key choices that an organization can make in deciding its quantification approach. Below is an example of two different tiers, one simple and the other complex.

Simple tier: The activity data (volume of fuel) is collected from receipts of fuel supply. From these, the total volumes for a year are calculated by adding them. The emission factor of fuel is taken from IPCC default values. No consideration is taken for unburnt quantities of carbon or for the emission of other gases (e.g. CH_4). The emissions result from the multiplication of the annual fuel volume taken from the receipts times the default emission factor.

Complex tier: The volume flow of natural gas is continuously monitored through two parallel measurement lines equipped with a turbine gas meter coupled with temperature and pressure readings and an electronic device converting measurements to gas volume (Nm_3), with an overall uncertainty < 1,5 %. The emission factor is determined using a gas chromatograph designed to separate and identify the components in natural gas samples. The system takes four to eight samples per hour and conforms with ISO 10715. Hourly and daily emission factors (on a tCO_2/net calorific value) are calculated based on the measured % composition of CH_4 and ten other gases present in the flow. The entire measurement system self-calibrates on a daily basis and is subject to regular monthly calibration checks. All calibration gases are certified to ISO/IEC 17025 and the operation of the gas chromatograph is performed by an entity that is ISO 9001 certified. Additionally, there is an annual validation of the gas chromatograph in accordance with ISO 10723 by an ISO/IEC 17025 accredited laboratory.

ISO_14064-1_2018 – p25/26

Use Case 1



* Today the acceptable emissions range is provided in free text field, it has to be provided in the schema

PIDX - Why Participate?

- PIDX has formed the **EMISSIONS TRANSPARENCY DATA EXCHANGE (ETDX)** to address a growing issue in the industry today.
- As more and more large operators make commitments to reduce GHG emissions, all companies participating in their supply chain will be under increased pressure to produce accurate and granular emissions data. PIDX has recognized the need for an industry specific standard for capturing and communicating this data across the supply chain.
- While current standards exist, most are regionalized, company specific, and adopted on a voluntary basis. None have been adopted across the industry. With or without adoption, investors, policymakers, regulators, and consumers will continue to apply pressure, and the data will still need to be reported. PIDX standards will help supply chain participants avoid having to track multiple standards for regulatory bodies, and multiple standards for each accountable reporting company.
- Used globally by over 100 oil & gas companies – including most of the majors – PIDX standards address specific oil & gas data needs that are not covered by generic B2B standards. Our standards are technologically agnostic, free to use, and have been proven to increase return on investment when implementing technology adhering to our standards.

https://pidx.org/join-etdx/ on 10 Feb, 2021

PIDX ETDX Use Cases Scope 1

Proposed

Use Case 1	Contribute Emission Data
Description	As a carbon emitting company in the oil and gas industry, I want to submit my carbon emissions for one of my production assets for one year to a central repository collectively managed by my industry that will support further analysis, reporting and sharing of anonymized, aggregated emission data
Actors	Resident carbon emission Analyst of submitting company from oil and gas industry
Basic Flow	• Carbon Emission Analyst gathers emissions data by GHG, by period, by asset • Carbon Emission Analyst puts data together in schema acceptable by central repository • Carbon Emission Analyst submits data to central repository • Central repository ingests data • Central repository generates success/failure message to submitter
MVP parameters	1 submitter 1 production asset 2 greenhouse gases 1 year of emission data by month

Use Case 2	Generate Standard Emission Report
Description	As a carbon emitter in the oil and gas industry who has submitted my carbon emissions for my production assets for one year to a central repository collectively managed by my industry, I want to generate an agency-compliant annual emissions report.
Actors	Resident carbon emission Analyst of submitting company from oil and gas industry
Basic flow	• Carbon Emission Analyst requests report from menu of available reports • Carbon Emission Analyst inputs parameters of report (year, asset) • Central repository generates report • Carbon Emission Analyst views report
MVP parameters	1 annual report (suggested: EPA-compliant) 1 submitter 2 greenhouse gases 1 production asset.

Use Case 3	
Description	
Actors	
Basic flow	
MVP parameters	

PIDX ETDX Use Cases Scope 2

Proposed

Use Case 1	Collect emissions data from IoT systems
Description	As a carbon emitter in the oil and gas industry, I want to capture the carbon emissions from the material/services I procure from my suppliers to a central repository collectively managed by my industry that will support further analysis, reporting and sharing of anonymized, aggregated emission data
Actors	Carbon Emission Analyst from oil and gas operator and supplier
Basic Flow	• Supplier provides information via their products into central system • Carbon Emission Analyst ties data to reporting needs • Carbon Emission Analyst submits data to central repository • Central repository ingests data • Central repository generates success/failure message to submitter
MVP parameters	1 submitter 1 supplier with IoT devices capturing this information in the field 1 greenhouse gas

Use Case 2	Correlate Emissions & Cost
Description	As a carbon emitter I want to correlate my cost of operations with my emissions and optimize.
Actors	Carbon Emission Analyst from oil and gas operator and supplier
Basic flow	• Carbon Emission Analyst from Supplier provides emissions data to a central system • Carbon Emission Analyst from Operators provides data to a central system on operational costs • Central repository ingests data • Central repository generates analysis on to predict sustainability and financial risk
MVP parameters	1 data protection 1 operator/1 supplier 1 green house gas 1 clear definitions on sustainability and what constitutes financial risk

Use Case 3	
Description	
Actors	
Basic flow	
MVP parameters	

PIDX ETDX Use Cases Scope 3- Proposed

Use Case 1	Exchange scope 3 emissions footprint across the SC
Description	I would like to exchange scope 3 emissions footprint with my upstream providers and downstream consumers across the supply chain. I would like the emissions footprint to be included in the business transactions thru PIDX messages for PO, invoice, quote, etc… at the aggregated or line item level.
Actors	Emissions inventory managers, emissions disclosure teams
Basic Flow	• Company A releases a Quote Request providing a range of emissions • Supplier provides quote with the emissions footprint • Company A releases Purchase Order with the committed emissions footprints • Supplier releases invoice with the emissions footprints • Company A logs the emissions resulting from this transaction as scope 3 and discloses to regulatory authorities with a linkage to PIDX transaction codes
MVP parameters	Company A as the buyer Company B as the supplier Sample PIDX business messages for the transactions with test data and sample products

Use Case 2	Provide emissions footprint data in catalog (PPID)
Description	I would like to calculate the emissions footprint of the products in the PPID catalog. For each product I would like to have reference either to the actual emissions or to models & parameters to calculate the emissions if these are determined dynamically for instance by country, location, facility and other parameters.
Actors	Emissions inventory managers, emissions disclosure teams, external standards bodies such as Open Footprint to calculate actual emissions
Basic flow	• Company A want to order a product and searched PPID catalog • Emission footprint generated during production is provided if it is a static value (for instance a certain type of pump, etc…) or a pointer to a model is provided if it is dynamic • Emission footprint calculation model and parameters are provided for carbon generated from the usage of the product • PIDX hosted or external service called to calculate the emissions. • Emissions level as an indicator (high, low, medium) if the actual calculation could be done at business transaction
MVP parameters	Company A as the buyer Test cases to calculate emissions for 1-2 products from Open Footprint

Use Case 3	TBD
Description	I would like to use measured data that closely conforms to PIDX schema v1.7 to simulate supplier reporting data that will act as an input to a PIDX
Actors	Suppliers reporting emissions disclosures related to received purchase orders. Buyers reporting scope 3 emissions.
Basic flow	• Measured field data generated for input into calculation engine (automates collection of ESG data from the seller's operation) • Calculation engine output stored on blockchain with units converted to CO_2e to match PIDX v1.7 schema • Blockchain API is called when quote request received • Quote response populated with supplier generated data
MVP parameters	Incoming field data can trigger a ledger entry Ledger entry can act as input to calculation engine in the smart contract Data is output in CO_2e and is callable via API to populate the seller's quote response to buyer

THE OPEN GROUP

OPEN FOOTPRINT™ FORUM

Reference Implementation – Data Model Design MVP1

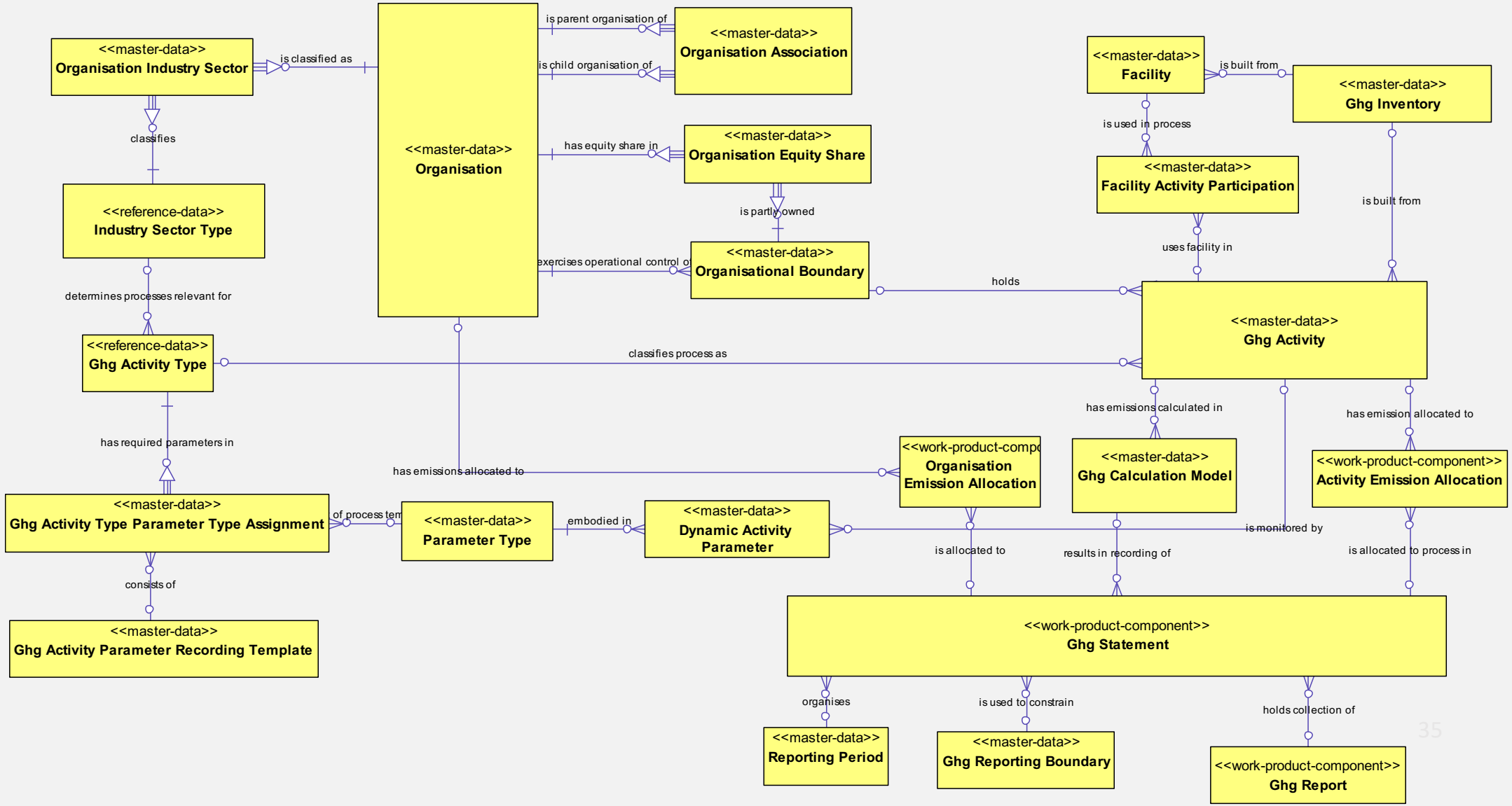
Gommaar van Strien

January 2021

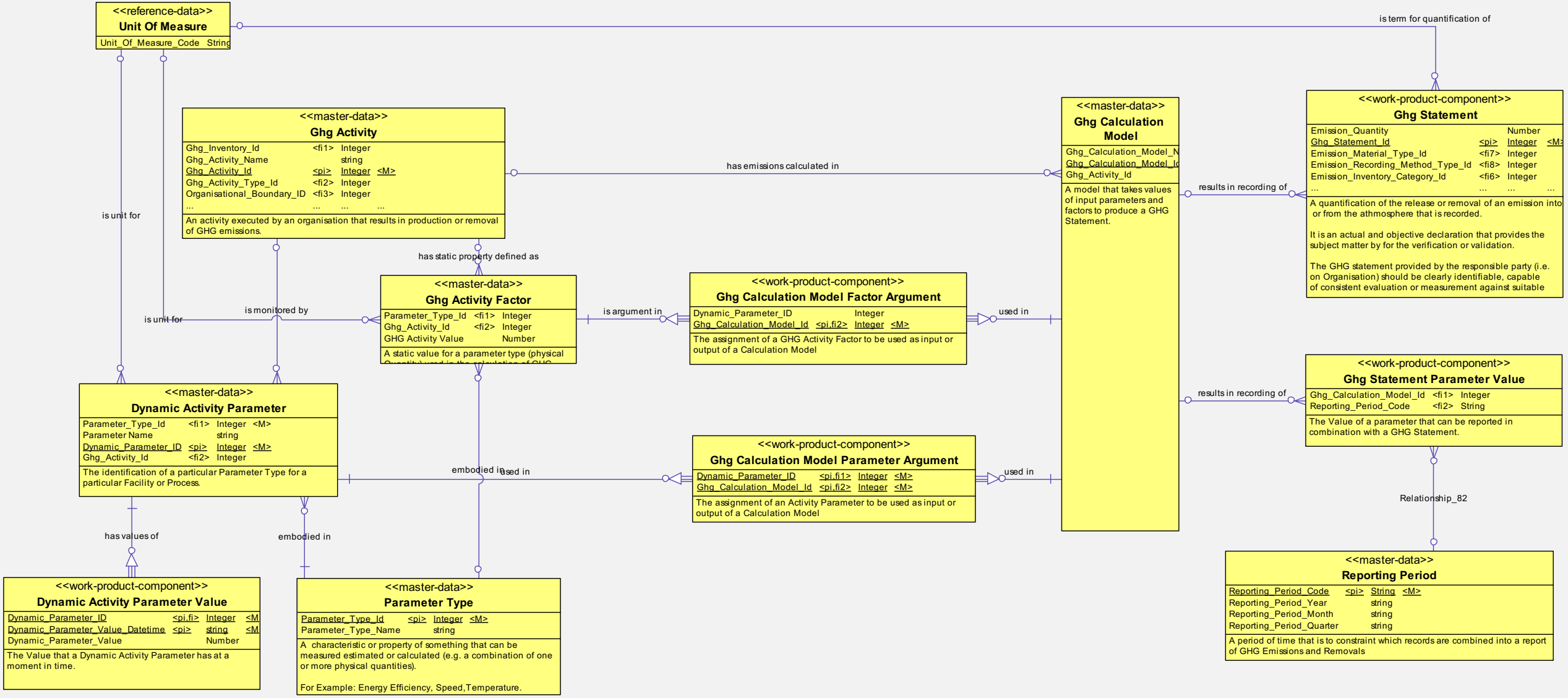
Data Design Principles

- The data model should cover all types of emissions, consumptions (e.g., water, land, energy) and base calculations to normalize and aggregate data
  - MVP1 will be focused on recording emissions and input; calculation models to be added
- Reference data is based/linked to existing standards where possible

Data Model Overview



GHG Recording and Calculation

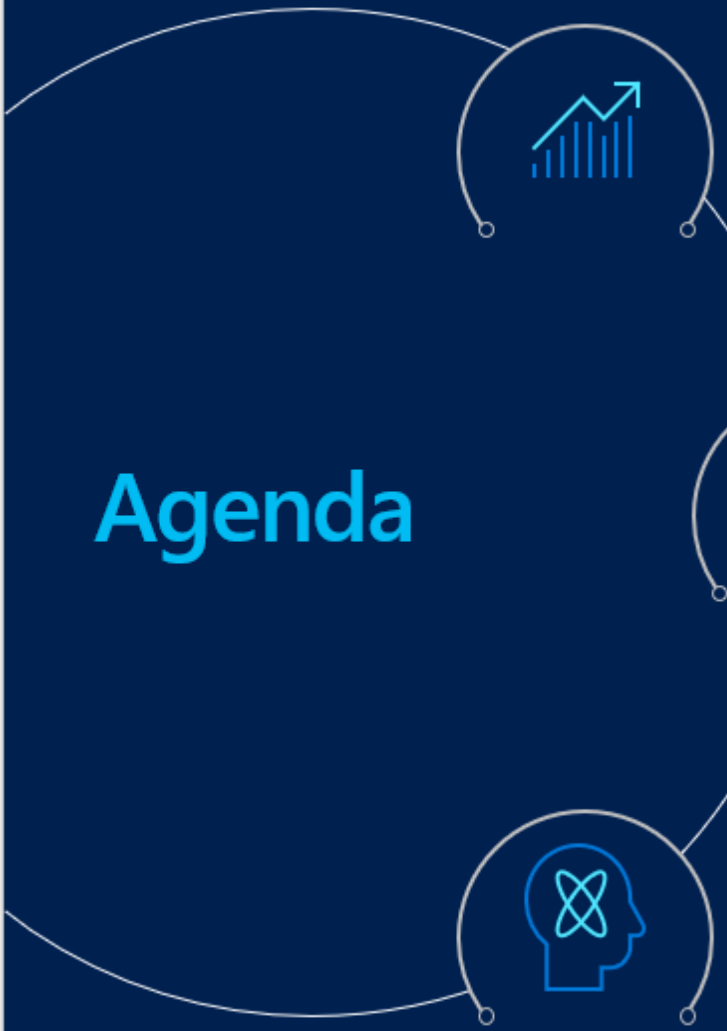


IDS Solutions

- IDS SaaS lead to measurable operational efficiencies/better performance.
- Develop of dashboard to show operational improvement. Eg tripping /connection times over time.
- Calculate associated carbon emissions improvements / carbon not emitted.

Muge Wood
Director, Microsoft Houston Technology Center

Agenda



Microsoft Sustainability Story

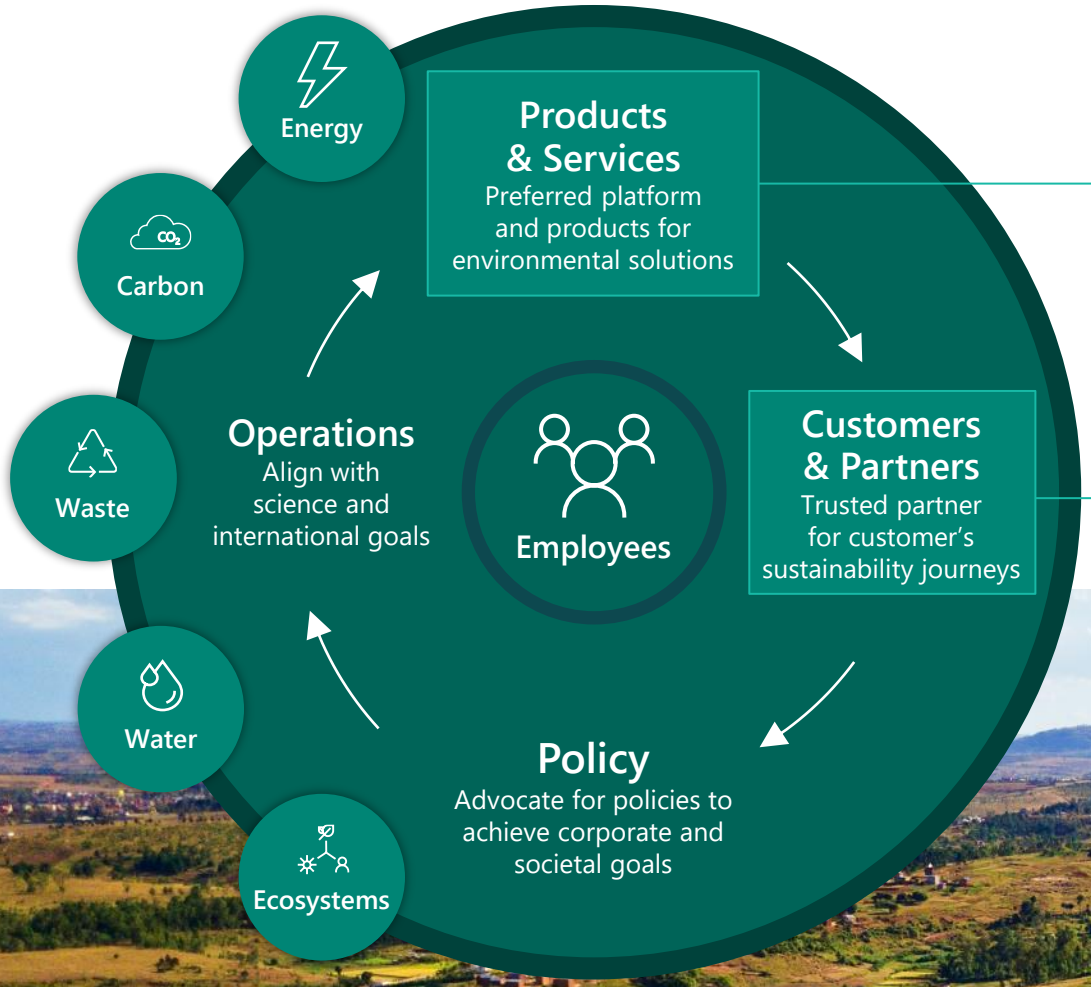
Sustainable digital transformation

Customer Success Examples


A planet-sized challenge

Microsoft is committed
to harnessing the power of technology
to help everyone, everywhere
build a more sustainable future.

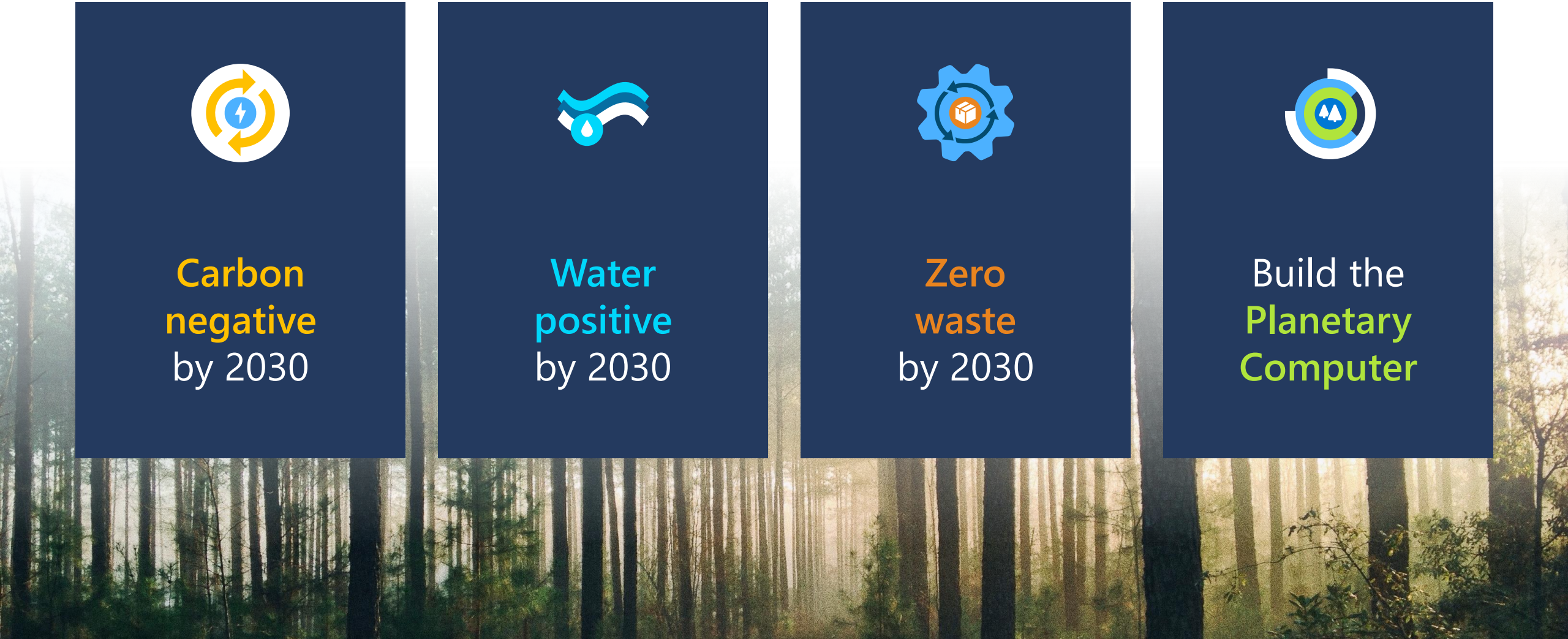
Investing to build the leading platform for technology solutions to environmental challenges



Providing the technologies and best practices to assist our customers with sustainable business solutions

- **Tracking and Reporting**
- **Enabling Efficiency**
- **Data and Insights**
- **Sustainable Transformation**

Our core environmental sustainability commitments



Carbon negative by 2030

Water positive by 2030

Zero waste by 2030

Build the **Planetary Computer**

Our progress

1.3 million
metric tons of carbon earmarked for removal by our projects[1]

580K+
metric tons of CO2 emissions reduced across scopes in FY20[2]

21 million
CO2e reduction achieved by suppliers[2]

Co-founded
Transform to Net Zero

[1] "Microsoft carbon removal: Lessons from an early corporate purchase," Microsoft
[2] Microsoft 2020 Environmental Sustainability Report

Takeaways from Microsoft's sustainability journey

Migrating to the cloud
reduces carbon emissions

Optimized datacenters
reduce energy use, emissions, water use, and waste

Smart buildings solutions
help reduce embodied carbon, energy and water use

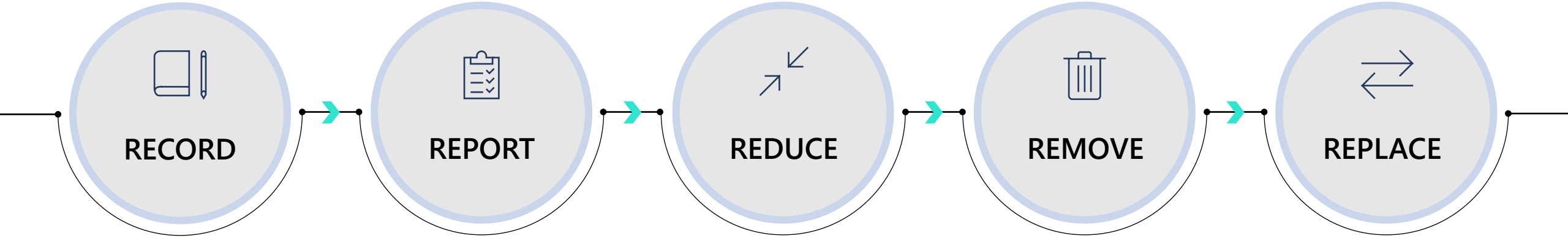
Carbon tax
funds innovation and drives the right behavior

Hybrid work and virtual events
accelerate carbon reductions

Focus on packaging helps
eliminate single-use plastic

Reducing the impact of our supply chain
requires collaboration and transparency

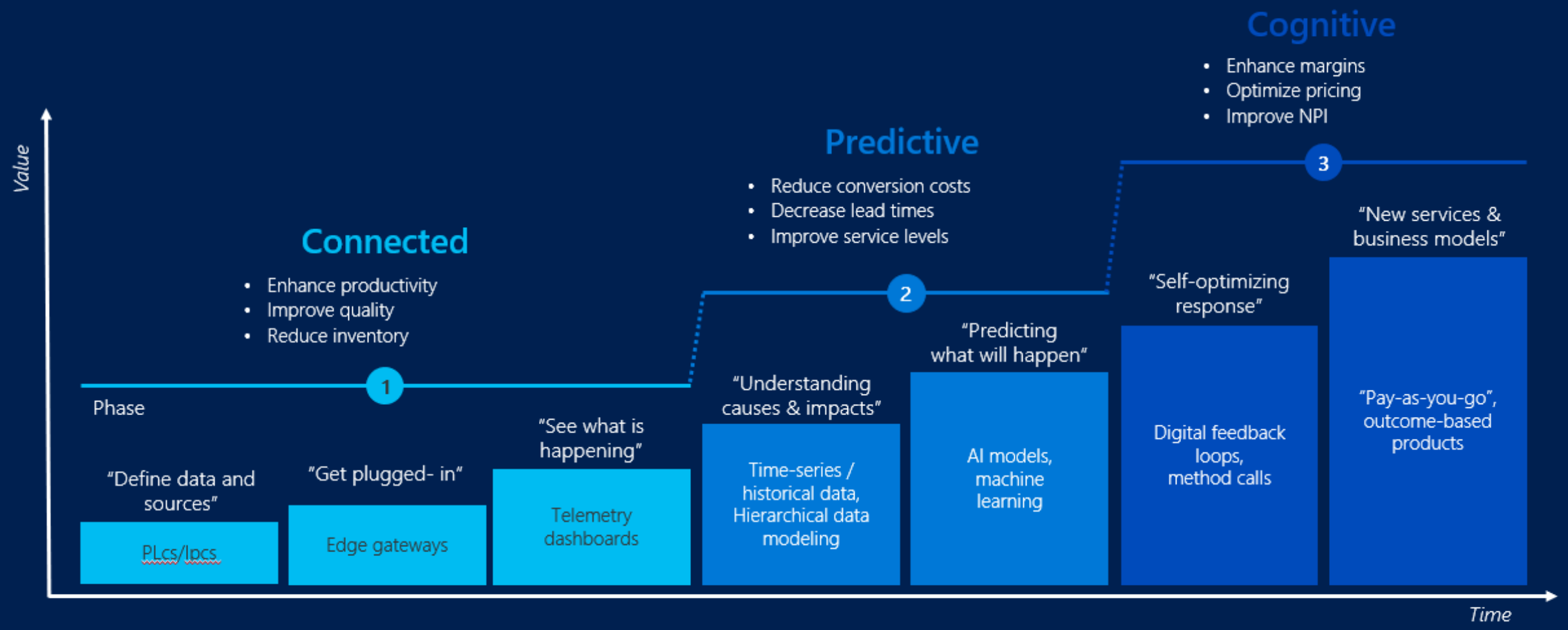
Sustainability Journey



Record data from telemetry, sensors, geospatial imagery and **measure** usage by standards	**Account** for resource usage at the company, product level and **report** against public commitments & to regulators	**Reduce** resource use with efficiency improvements and *data feedback loops*	**Remove** usage with external programs/ verifiable sequestration	**Replace** with sustainable technologies & practices

Step by Step Digital Transformation

"Plant the seed" to build capabilities and deliver benefits on this multi-year journey



Sustainable Transformation

Sustainability transformation

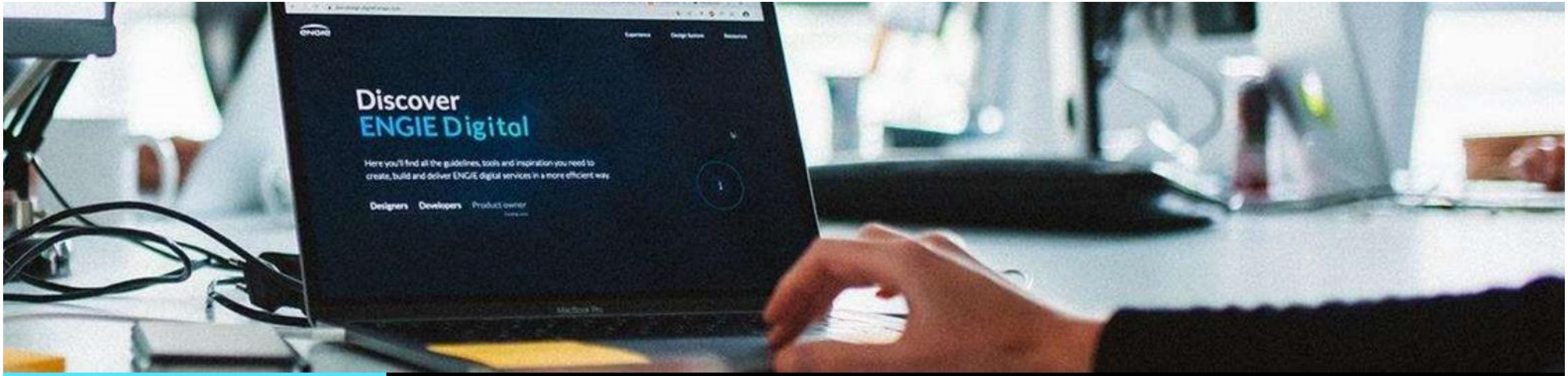
Customers looking at focused on driving internal transformation to achieve ESG goals, and looking for Microsoft to help set standards, design, build and deploy in their environments (ex. Coca-cola looking to decarbonize bottling process; Chevron – driving energy transition across all lines of business)

Sustainability as a competitive advantage

Infusing sustainability into their products and services (i.e., Corteva offering carbon and nitrogen credits with the sale of their seeds)

Business model transformation

Customers looking to co-create new lines of business and services to go to market together with Microsoft (i.e., Wood and environmental & emissions monitoring)



"Azure Time Series Insights is a foolproof solution. It's scalability Its scalability, resilience, performance, and cost-effectiveness mean we always have the latest data at hand."

Sebastien Gauthier
Head of Darwin Delivery
ENGIE Digital

ENGIE brings AI to renewable energy platform, helps decarbonize energy production with Azure

Renewable energy assets connected by the Internet of Things (IoT)—such as wind turbines and solar arrays—create huge amounts of useful data on everything from performance and output to maintenance issues. But processing and making sense of all this data requires serious performance and scalability. When power provider ENGIE modernized its Darwin operational performance software with Microsoft Azure Time Series Insights and Azure IoT Edge, it delivered AI-driven analytics and scalable data management capabilities to optimize power generation and asset management, helping to decarbonize its global energy production.

ENGIE digital

Products and services
Azure IoT Edge
Azure IoT Hub
Azure Time Series Insights
Power BI

Organization size
Medium

Industry
Energy

Country
France

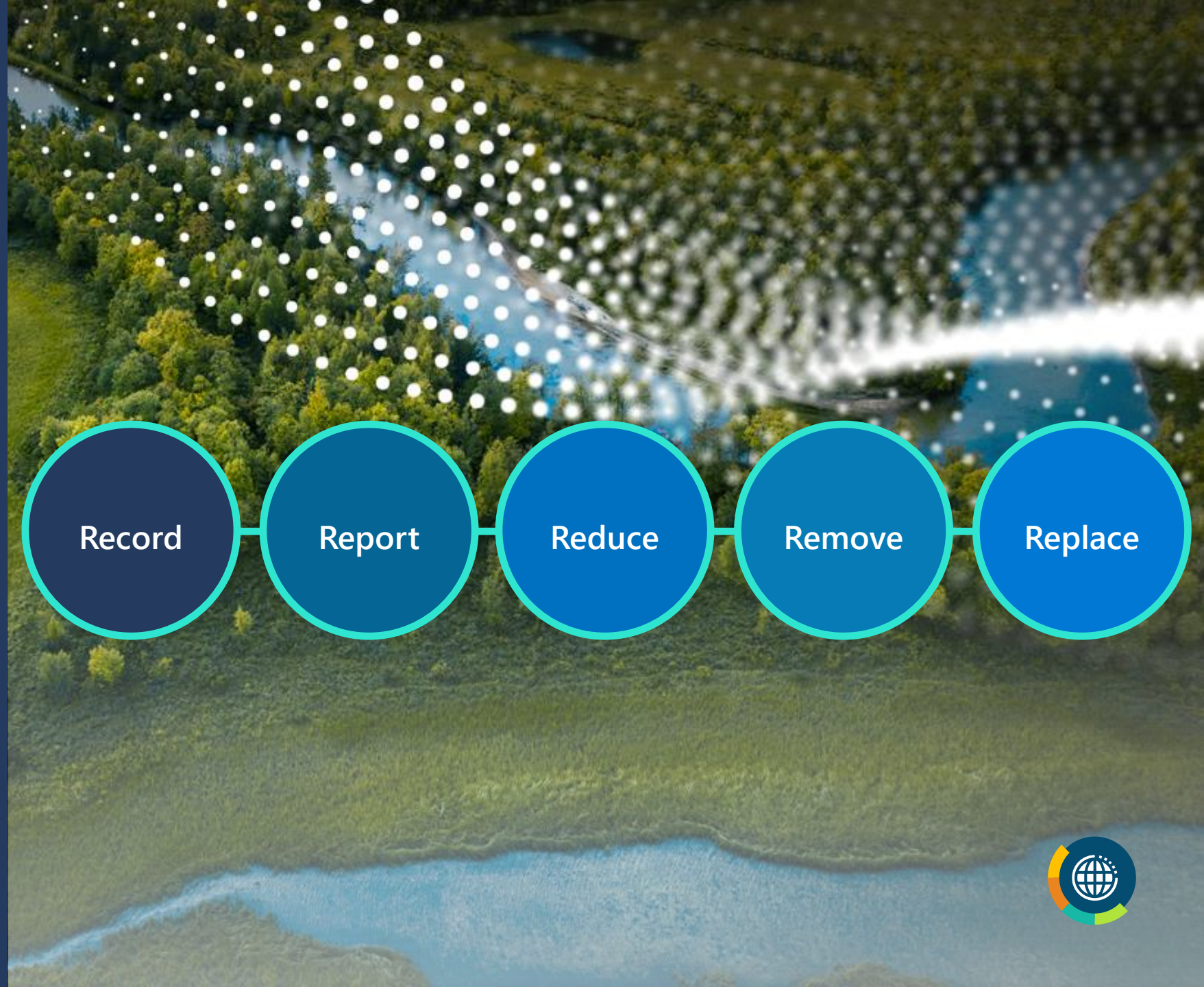
Business need
Digital transformation

Read more

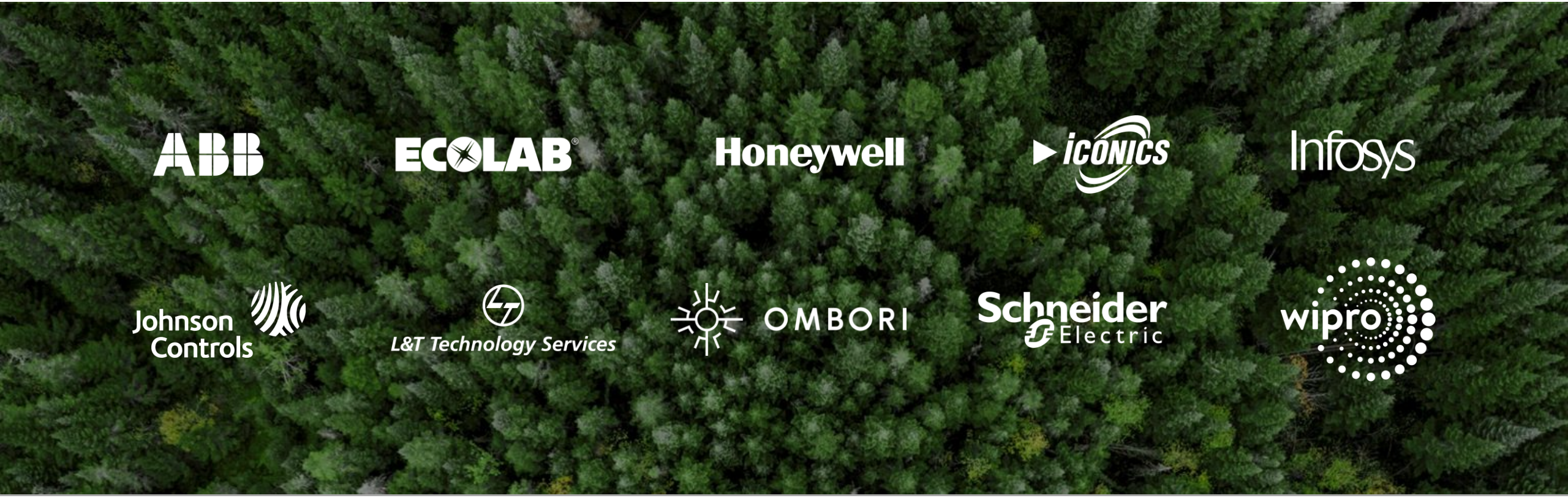
Microsoft Cloud for Sustainability

Delivering insights to help you accelerate every stage of your organization's sustainability journey

- **Comprehensive**
- **Integrated**
- **Automated**



Supported by a broad ecosystem of partners



Find more partner solutions >

Get started now

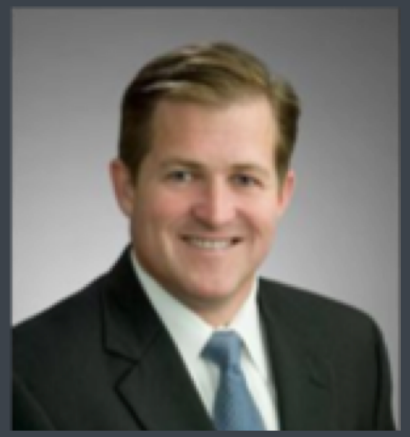
Reimagine your business processes

Reduce your environmental footprint with smart technology

Work with experienced partners to accelerate progress

Learn more >

OFS PORTAL™



Reid Morrison

Global Energy Advisor

Leader, PwC

Net Zero, Energy Transition, and ESG: Pathways for Success and Value

Net Zero, Energy Transition, and ESG: Pathways for Success and Value

- "Energy system" concept, demand, and sources of energy
- Four characteristics of energy and the role of the hydrocarbon
- ESG and sustainability
- Net Zero emissions, ISO Standard, GHG Protocol, and Scopes 1, 2, and 3
- CO2e, unit of measure, data challenge, and "best available emissions measurement”
- Scope 3, Categories 1 (purchased products, goods and services) and 11 (customer use of sold products, goods and services)
- Customer needs, "verified" carbon footprint, and potential requirements to tender

Related Industry Comparison: Maritime Emissions Reporting

Karl Jeffery, editor, Digital Energy Journal and Tanker Operator magazine

INTRODUCTION

Purpose is to talk about what the maritime industry is doing,

And also raise the question: Could / should maritime services be part of Emissions Transparency Data Exchange?

On plus side: its a big thing which oil and gas companies buy, and it makes a lot of emission, so it sounds like it ought to be part of an

On negative side: very different culture / world to where PIDX has historically operated, which I see as a world of many fairly small transactions. We're in a world of fewer very large transactions. Sometimes ships are hired for one voyage, often they are hired for a longer period of time.

I've got a bit of a unique position here - I edit two magazines, Digital Energy Journal, about upstream oil and gas digital technology, and Tanker Operator, so I've got one foot in both camps, so maybe that gives me some useful knowledge to start explaining what the issues are.

I don't want to get technical in these talks - plenty of good technical resources a few clicks away - but show you the issues and how they all fit together.

WHICH EMISSIONS ARE WE TALKING ABOUT

Lets start with the definition of "Scope 3".

Scope 3 includes "all other indirect emissions that occur in a company’s value chain."

including:

Use of Sold Products
Purchased goods and services

"Use of sold products" is very baggy definition for oil and gas. For example, if the oil powers a vehicle, we're obviously talking about emission from the exhaust, but are we also talking about emission to manufacture the car? That's got nothing to do with shipping, and we can leave that for someone else's presentation.

"Purchase goods and services" : That definitely includes tanker shipping, where oil company charters the tanker, as they often do.

So we are focussing today on emissions made in doing the tanker shipping, not the oil and gas the tanker carries.

WHAT ARE MARITIME EMISSIONS

In shipping:

Definitely fuel consumption

Methane slip (need to explain this).

But there’s more:

Auxiliary engine, tank cleaning, ballast water treatment.
Making steel for the vessel

Let's focus on fuel consumption and methane slip.
[I haven't heard about anyone considering the others].

PREDICTED VS REPORTED EMISSIONS
Challenge when building systems for decision making.

Reported = fairly easy to calculate fuel emissions.
Methane slip is based on engineering models
Tank cleaning, ballast water treatment, vessel construction, not yet reported as far as I know.

Predicted = very important, because the only way to actually reduce emisions is if we can make better decisions about which suppliers to go with.

But then we need a means to decide what the emissions 'cost' to us - ie an internal carbon price
And a means to compare the prediction with the actual ones, decide if the shipping company is being honest, penalise dishonesty, or some other method.

INTRODUCTION TO INITIATIVES TO REDUCE MARITIME EMISSIONS FROM FUEL CONSUMPTION

Understand how hard this is. Environmentalists make demands for reduction as though it is really easy to do. We have a world economy built around long distance freight transport, and no means of fuelling vessels apart from fossil fuels. Or - nuclear power, wind power, not-yet-available zero carbon fuels.

Understand how hard this is to regulate. On this planet, regulations are made by countries not by the world. Surprising how many people don't get this. There is no global authority. Countries can regulate what happens in their own borders, their own people or companies. Beyond that, they can only make agreements. Or invasions. Or try to extend what their own "borders, people, companies" means.

The most that can happen is if charterers pick better vessels for their own cargoes. This will send the older ships elsewhere, such as on Iranian / Venezuelan oil which is under sanctions, so they are still emitting. But it slowly pushes up the bar.

IMO's EFFORTS

International Maritime Organisation, part of the UN, members are countries.

Target: achieve a 40% reduction of the average carbon intensity by 2030 and a 70% reduction by 2050, compared to 2008 levels.

The industry’s total GHG emissions are to be reduced by 50% by the year 2050.

CARBON INTENSITY = emissions per ton mile - this is to take into account countries which expect to be shipping a lot more cargo by 2050, ie developing countries.

Methods via:

Energy Efficiency Design Index EEDI
Efficiency Existing Ship Index EEXI
Ship Energy Efficiency Management Plan SEEMP

SEA CARGO CHARTER

"The Sea Cargo Charter provides a global framework for aligning chartering activities with responsible environmental behavior to promote international shipping's decarbonization"

The Sea Cargo Charter establishes a framework for assessing and disclosing the climate alignment of ship chartering activities around the globe. It sets a benchmark for what it means to be a responsible charterer in the maritime sector and provides actionable guidance on how to achieve this.

The Sea Cargo Charter is consistent with the policies and ambitions of the International Maritime Organization (IMO), including its ambition for greenhouse gas emissions to peak as soon as possible and to reduce shipping's total annual GHG emissions by at least 50% by 2050."

Signatories include Dow Chemical, Equinor, Shell, TotalEnergies, Trafigura.

Screenshot here is from a webinar –
Top row: *Raghav Gulati, Anglo American; Johannah Christensen, Global Maritime Forum; Jim Lawrence, Marine Money.*
Bottom row: *Jan Dieleman, Cargill; Lance Nunez, Dow Chemical; Eva Birgitte Bisgaard, Maersk Tankers*

OIL COMPANIES INTERNATIONAL MARITIME FORUM (OCIMF)

Quote from Rob Drysdale, Director OCIMF

"The technical challenges are huge - in fact, technical solutions have a long way to go to have any chance of catching up with the ideas for new fuels and hitting the deadlines set by IMO for 2050 let alone the aspirational targets already being discussed by others. Having said that it is our job as member industry organisations to ensure the IMO are successful with respect to meeting these targets."

"A key agenda item for our 87th Executive Committee (ExCom) meeting on 9 and 10 June, is to seek further guidance and direction on OCIMF's role in the greenhouse gas emission reduction issue. We cannot be involved in everything, so we need to focus our collaboration efforts where we can best bring value for our members and for the maritime industry as a whole."

The sort of person PIDX people would know..! *In 2010, Rob commenced a commercial leadership role in ExxonMobil's chartering affiliate as Manager, Marine Transportation Optimization, Europe Africa and Middle East. In 2014 he became Manager, Global Field Engineering & Logistics, where he led the marine team responsible for supporting ExxonMobil's Aviation & Marine Fuels & Lubricants global function.*

HOW OIL COMPANIES NEGOTIATE CHARTERS:

To date = price + vetting + TMSA score.

OCIMF is technical organisation, manages vetting (onboard inspection) and TMSA score (management self-assessment, according to a framework).

Precise details of how choices are made are kept confidential, including the required scores or vetting level. Oil companies do not disclose their 'bar'.

My guess:

Oil companies take the vessel which has the lowest price which passes a standard they define internally.

If two vessels are available, one is better than the other and costs more, both meet their standard - then a judgement call is made?

OPEN FOOTPRINT FORUM

Open Footprint™ Forum Global Event June 24
Included discussion about gathering data from other industries (related to oil and gas) with one slide on shipping.

My understanding is:
They will focus on frameworks for data
They will not focus on how emission data is handled as part of a transaction.

BIG CHALLENGE FOR FUTURE

Zero carbon fuels may cost 3 x as much as standard maritime fuels.

But an oil and gas company may be willing to pay this, to avoid the CO2 on its balance sheet.

But how would it be negotiated, where two tankers are available, one using normal fuels, one using zero carbon fuels, how is the premium calculated?

How would tanker operators be incentivised to build tankers on zero carbon fuels, and how would ports be incentivised to provide zero carbon fuels?

How can oil and gas companies be incentivised to send hydrogen from their hydrogen + CCS projects to shipping?

How can other emissions be included, particularly methane slip and tank cleaning?

This is all potentially areas for PIDX.

Strengthen Your ESG: Gain an Edge with Transformative Tech

ENGAGE®

Rob Ratchinsky, CEO at ENGAGE

Rob Ratchinsky has an extremely unique background, growing up in parts of Canada, Europe, Africa and the US, before graduating from the University of Victoria in Canada. He began his career at Anadarko Petroleum, where he worked alongside portfolio, marketing, production and reserves teams. He left Anadarko to become the Vice President of Operations at Engage Management, a boutique consulting company for oil and gas operators.

In 2016, he co-founded ENGAGE, a digital field management platform that allows operators to schedule, track, manage and approve their field transactions. He currently acts as the CEO of ENGAGE and has built the company into the market leader for digitizing the oilfield.

AGENDA

- Industry Outlook: Technologies Impact on ESG & Energy Transition
- Gain Tangible Reporting through Data Capture and Transparency
- Emissions Reporting (Scope 1 / Scope 3) and Waste Tracking
- Business Automation & It's Role in Workforce Efficiencies
- Better Supply Chain Management – Enhance Your Relationships
- How To Get Started
- Questions

Industry Outlook: Technologies Impact on ESG & Energy Transition

- Investment Community Impact
- Corporate Governance Changes
- Increased Technology Adoption
- Reporting & Accountability
- Expected ROI

How Can Technology be Leveraged?

- Increased Transparency & Tracking for Improved EHS
- New Edge Data Points for Reporting & Auditability
- Business Automation Leads to People Optimization
- Efficiency Gains Result in Cost Reductions and Increased ROI
- Better Supply Chain Relationships

Industry Impacts

ESG

Air Emissions	Supply Chain Management	People Optimization	Health & Safety	Compliance & Transparency	Single Source of Truth
Optimizing loads with predictive algorithms and **machine learning**		Reduce duplicated human touchpoints, increased safety, insurance considerations		Validated data reduces audit and compliance **risk**	
Digitalization of air compliance and audit. **Scope 1, 2 & 3**		Service provider selection criteria based on aligned **ESG** initiatives		Real-time transparency for accurate reporting and regulatory **compliance**	
Predictive maintenance capabilities for reduced emissions		Time tracking and behavioral change		Single source of truth strengthens relationships with vendor, stakeholders, and **shareholders**	

- Reduction in Operating Costs

10.5% Reduction in Cost

- Human Capital Optimization

8% Increase in Job Productivity

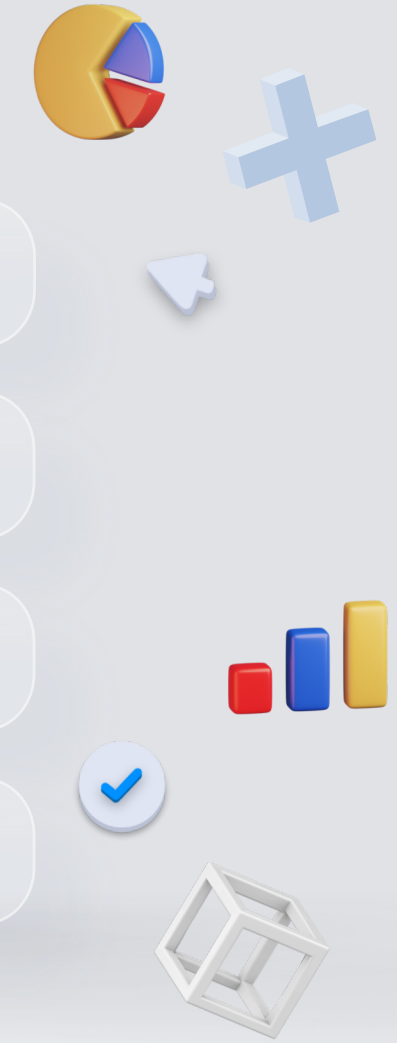
- Validated Reporting

28% Decrease in Error Rates

Better Supply Chain Management

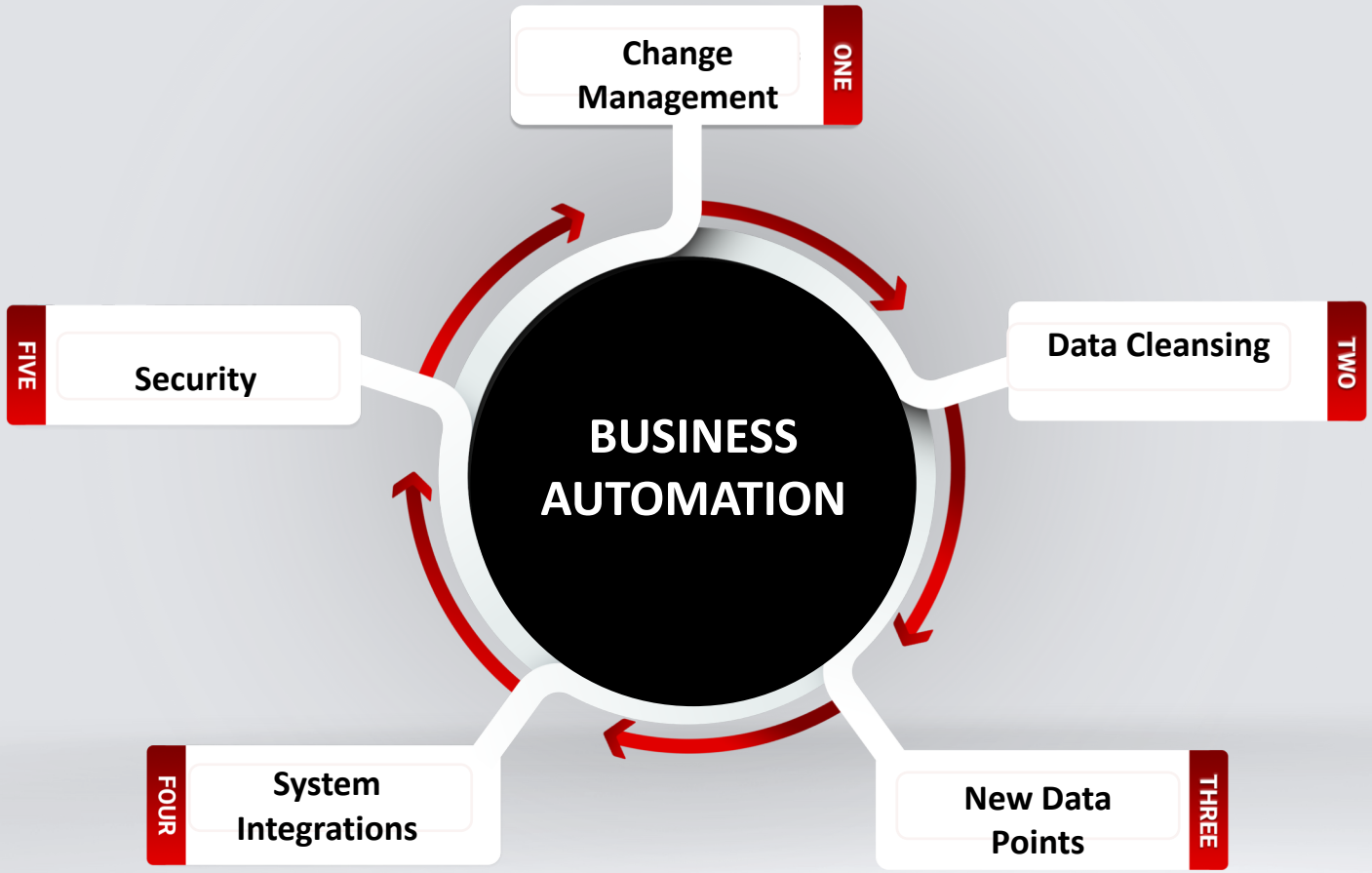
Increased transparency between operators and service providers forces better relationships, increased safety and liability protection for all sides

- Better Relationships
- Better Contract Structures
- Increase People Productivity
- Improve Health & Safety



How Companies Get Started

Position Your Company for Change



ENGAGE®

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OFS PORTAL™

INTEROPERABILITY • COMMUNITY • EFFICIENCY

19th Annual Conference

Chris Welsh – CEO

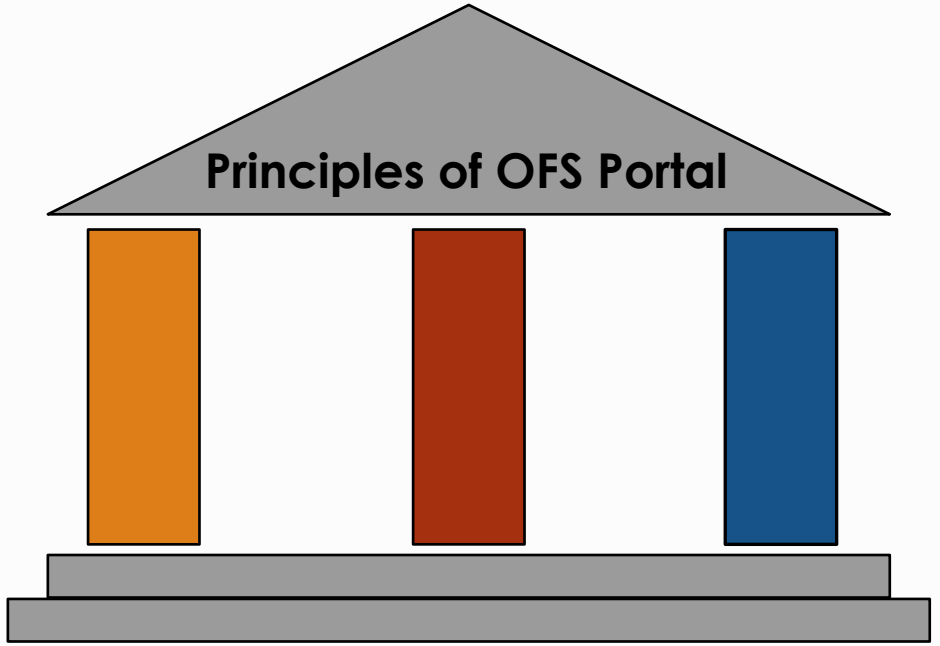
September 2021

What is OFS Portal?

- Established in 2000 by a group of ~20 globally diverse oilfield services Suppliers
- Best in Class Standard Interoperability Legal Framework for Digital Integration
- 495+ Oil Companies & NOCs
- 45+ eCommerce Networks
- Standard catalog process for all Suppliers & Operators
- Standard Transaction Management using open industry standards
- **Scalable supply chain digitalization for the global Oil & Gas industry**

INTEROPERABILITY

Strategic Initiative



Standards
(Business Process & Documents)

Legal Framework
(Governance)

Catalog Content
(Data Ownership, Use and Protection)

Members

Baker Hughes™

HALLIBURTON

Schlumberger

Weatherford®

BASIC SM ENERGY SERVICES

SELECT ENERGY SERVICES

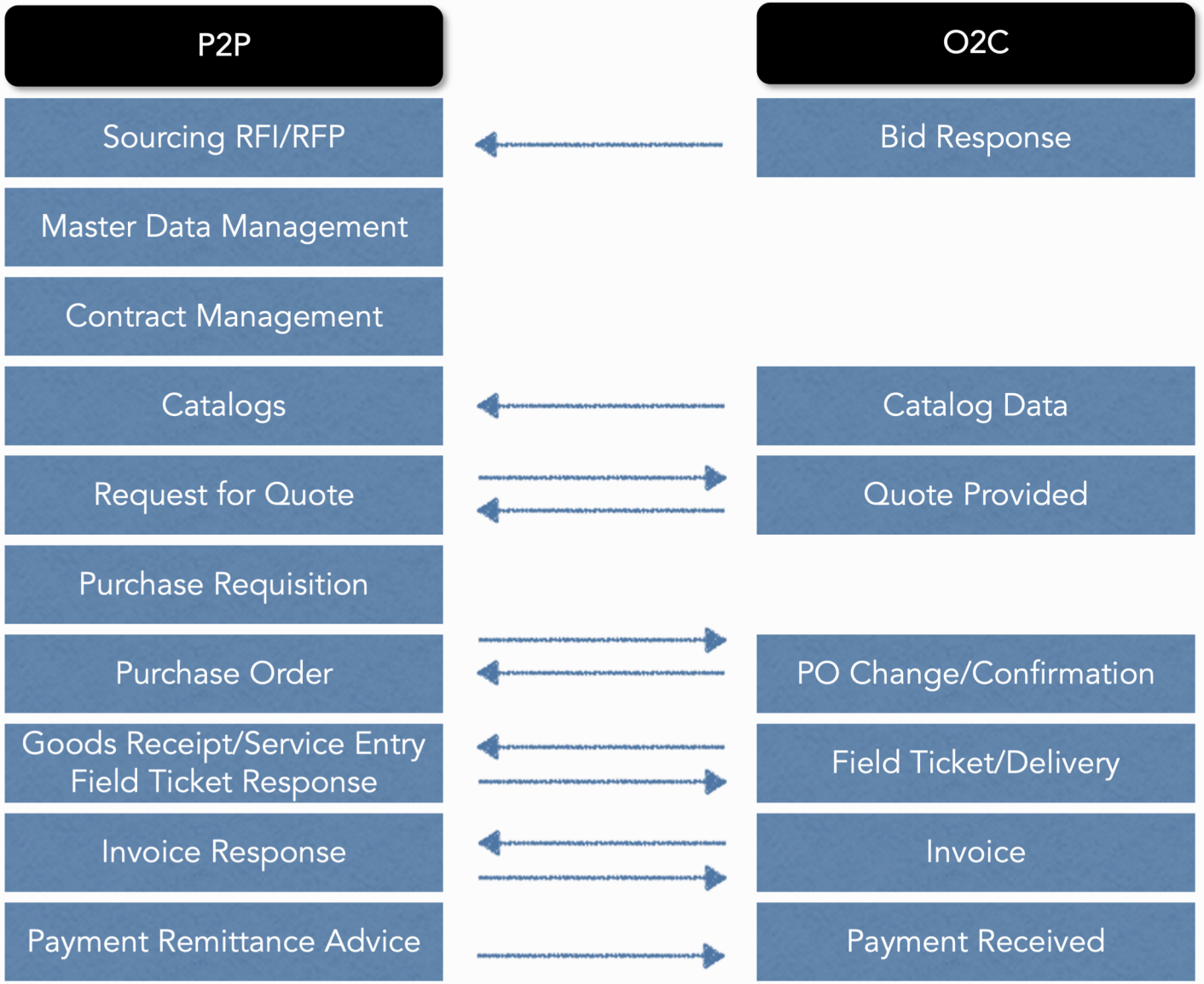
TOTAL SAFETY®

Wellbore Integrity SOLUTIONS

Digital Integration Between Operator's P2P & Supplier's O2C

FOCUS

Digital Integration Between Operator's P2P & Supplier's O2C

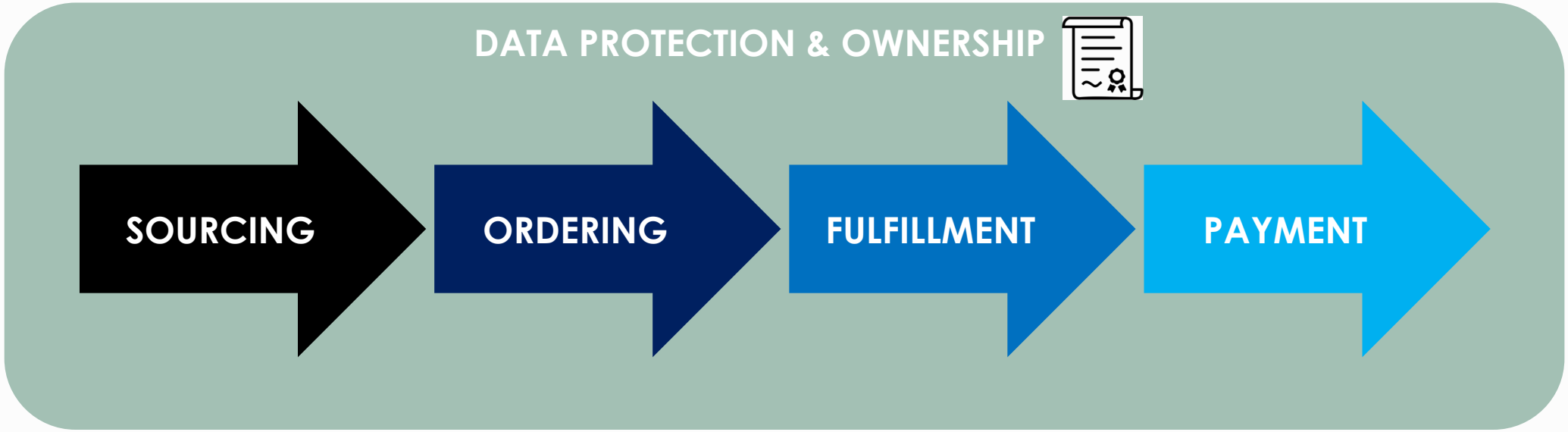


FOCUS

THE OFS PORTAL AGREEMENTS INTER-LOCK TO PROVIDE AN END-TO-END DIGITAL FRAMEWORK FOR TRANSACTING SECURELY, IMPLEMENTING STANDARDS AND REDUCING COSTS TO ALL TRADING PARTNERS

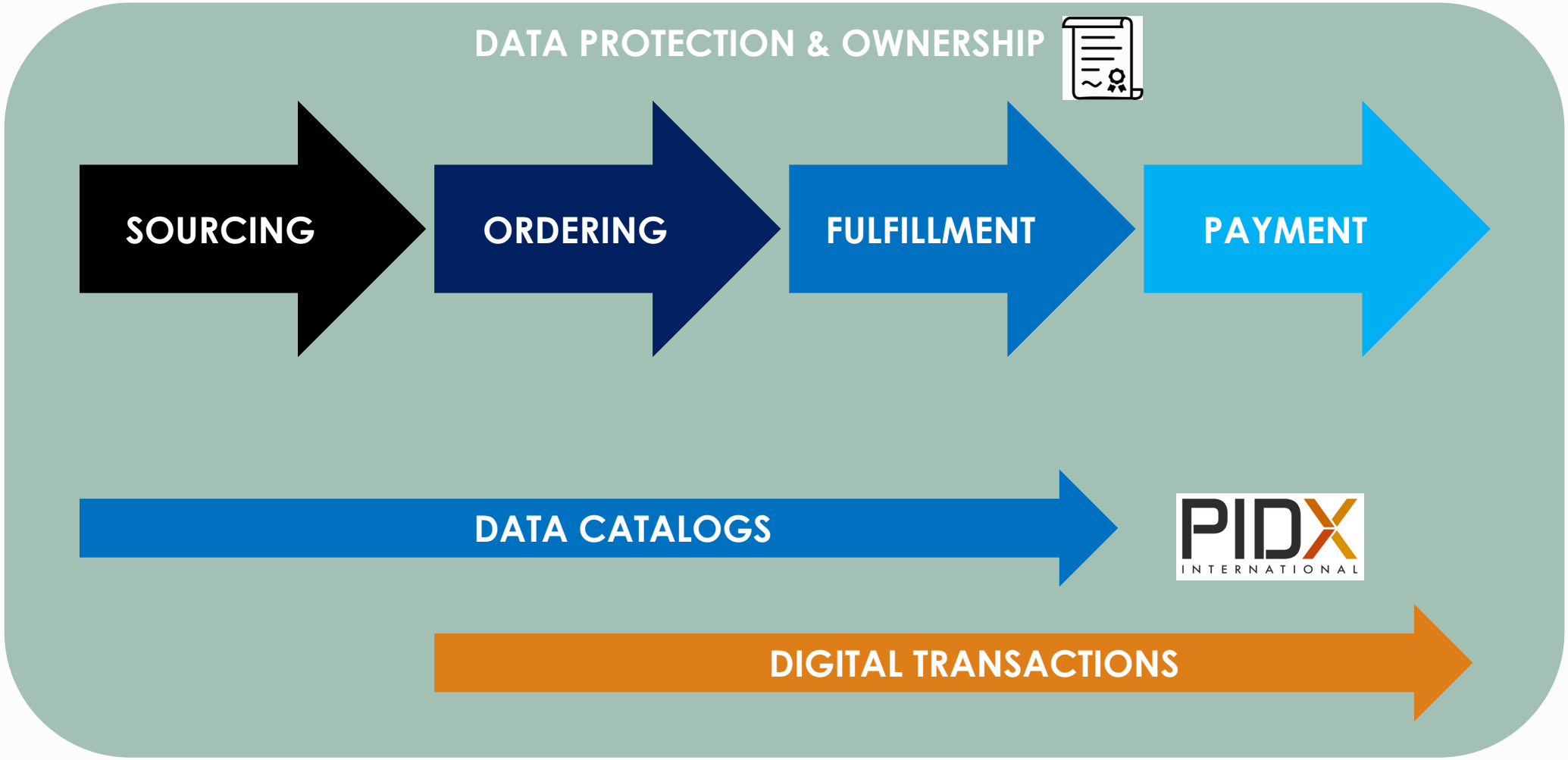
SA Supplier Agreement
EDA Electronic Data Agreement
IOA Inter-Operability Agreement

Digital Integration Between Operator's P2P & Supplier's O2C



FOCUS

Digital Integration Between Operator's P2P & Supplier's O2C



FOCUS

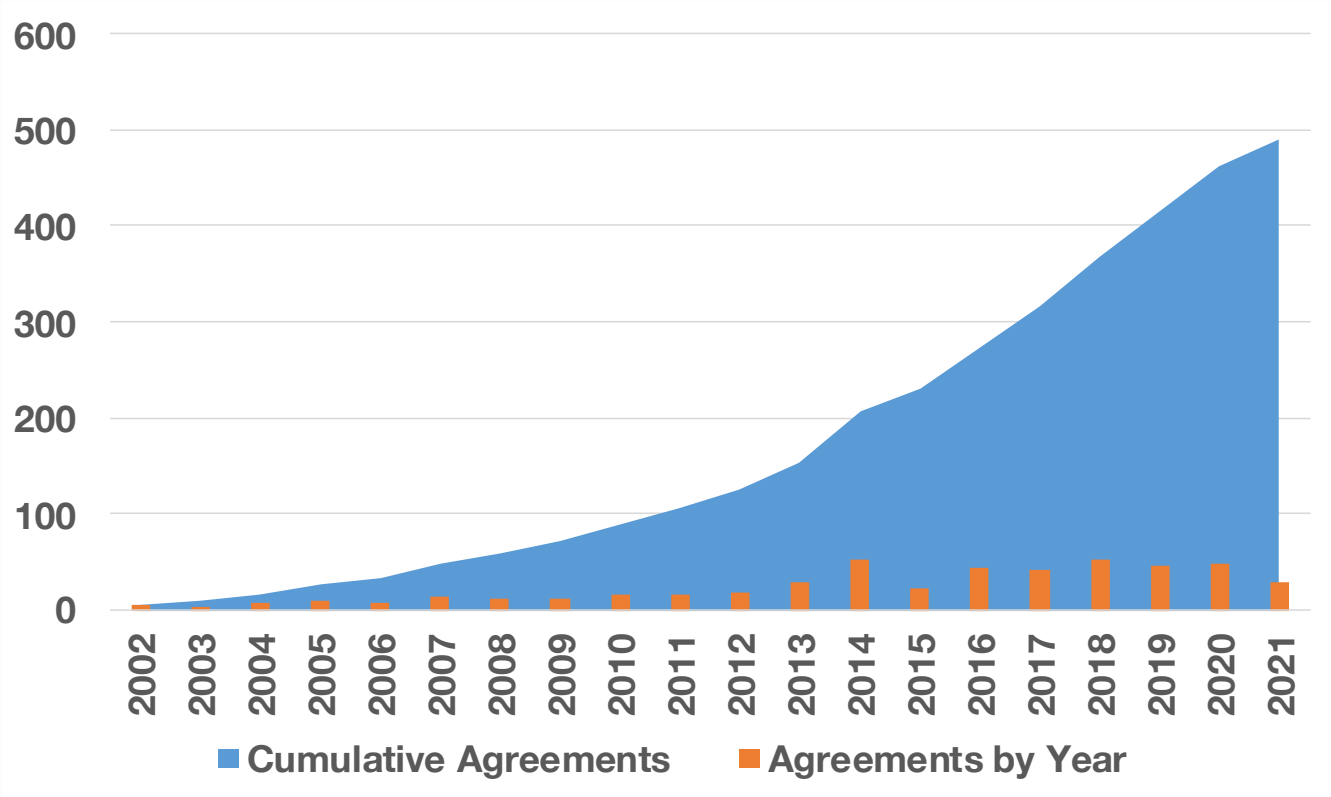
Community Growth

Operators Accelerating Digitalization

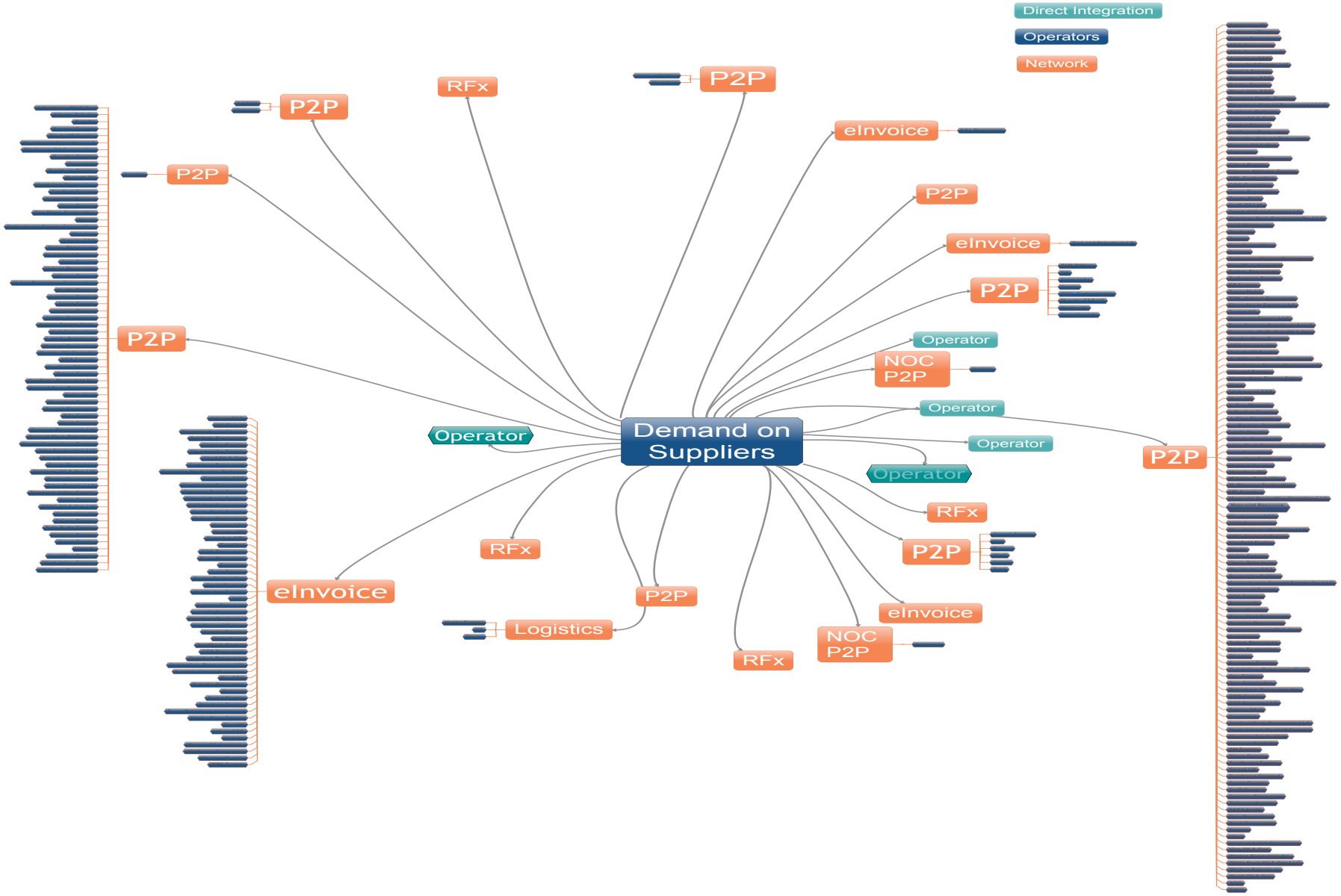
Cloud Enabling Many More Innovative Service Providers

Customer Electronic Data Agreements

495+ Buyer Agreements & 45+ Network Agreements
~50 Operator Agreements/Year



Created a Complex Web for Suppliers



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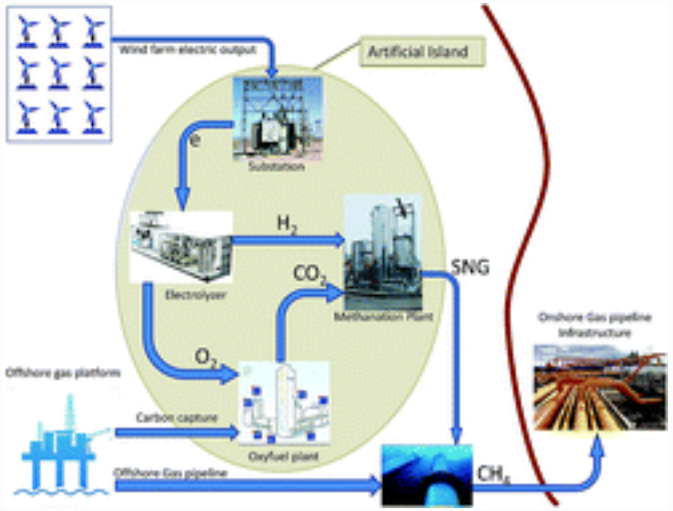
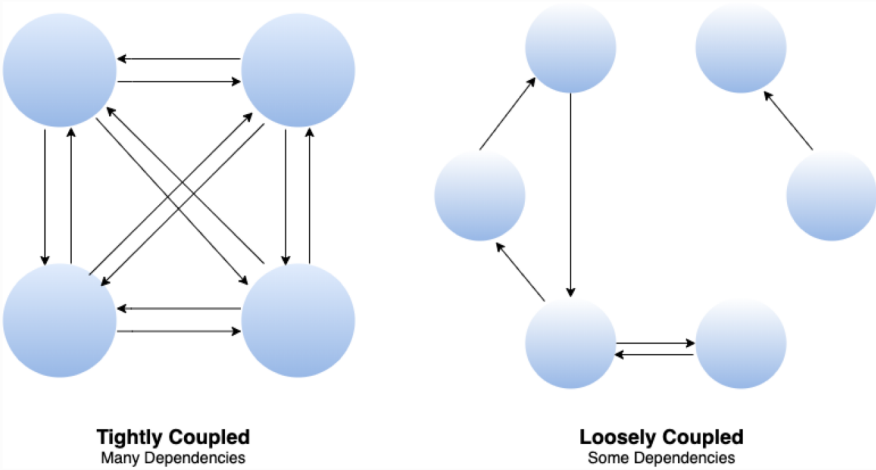
What is the Problem ?

INTEROPERABILITY

Diversity in the Energy Industry Support for Loosely Coupled SC

Renewables
Solar energy
Wind energy
Hydro energy
Tidal energy
Geothermal energy
Biomass energy





Changes to Traditional Customer Base

Changes to Traditional Operating Models

Community Diversification

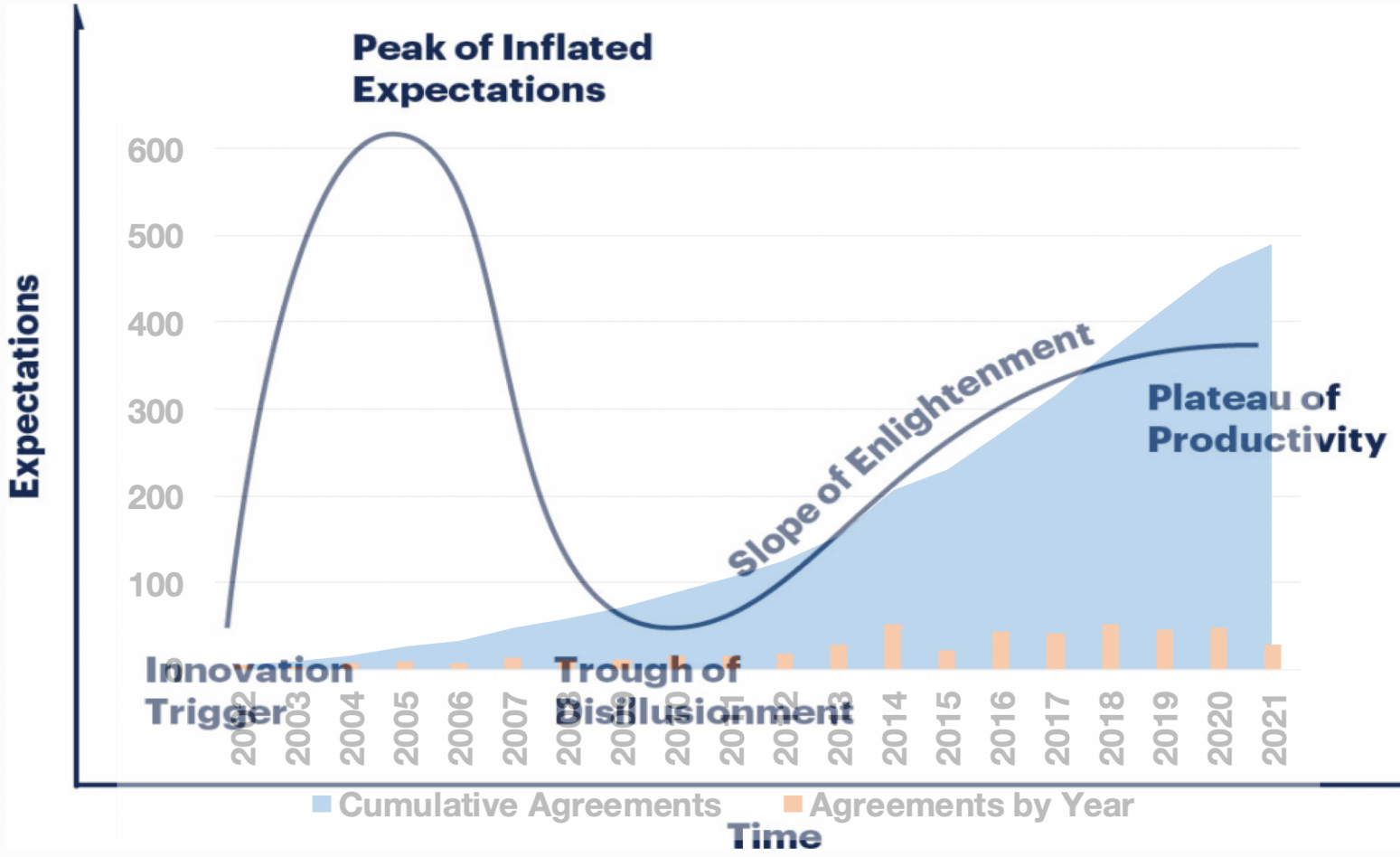
Suppliers are working in many markets outside of traditional Upstream

New Energy companies do not carry a legacy to support

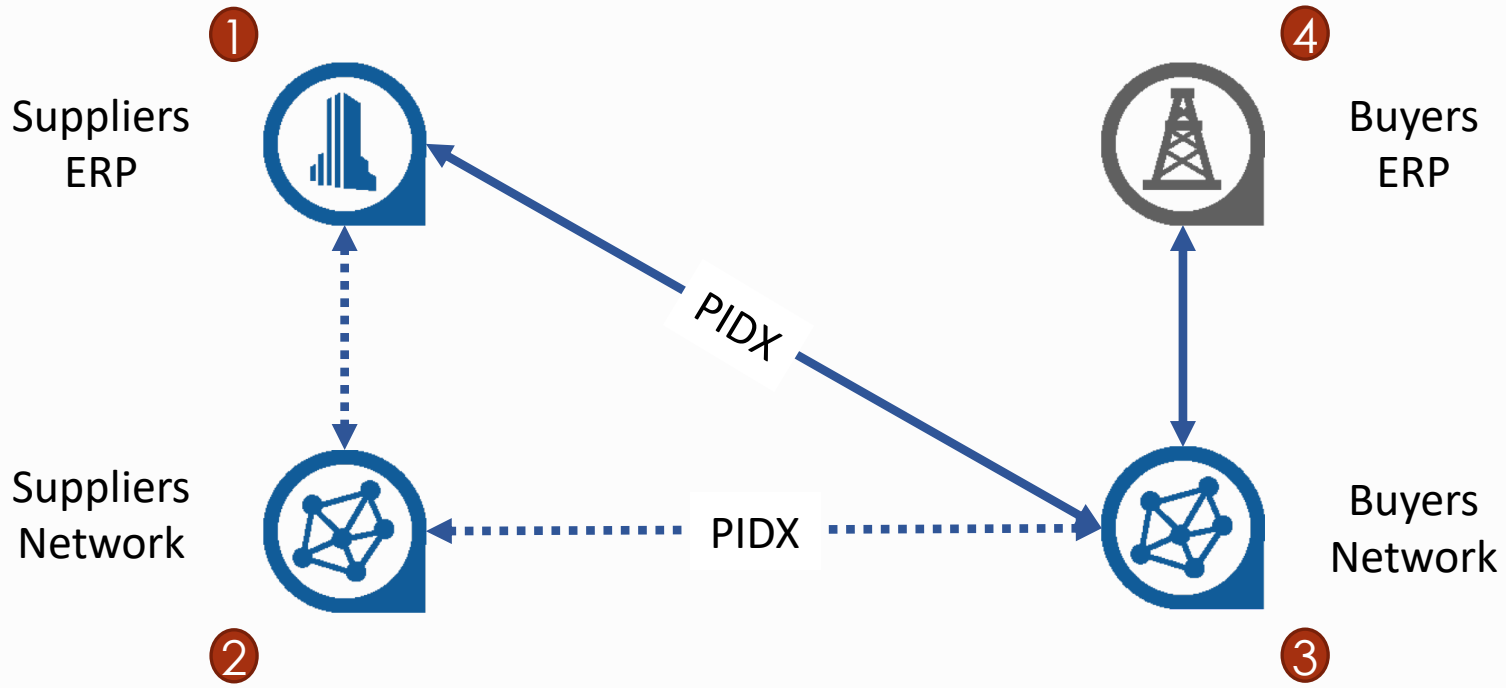
Better operating models are available for digital supply chain integration for any size of supplier

Time to look to an evolution (not revolution) of the model

Have We Reached the Plateau?

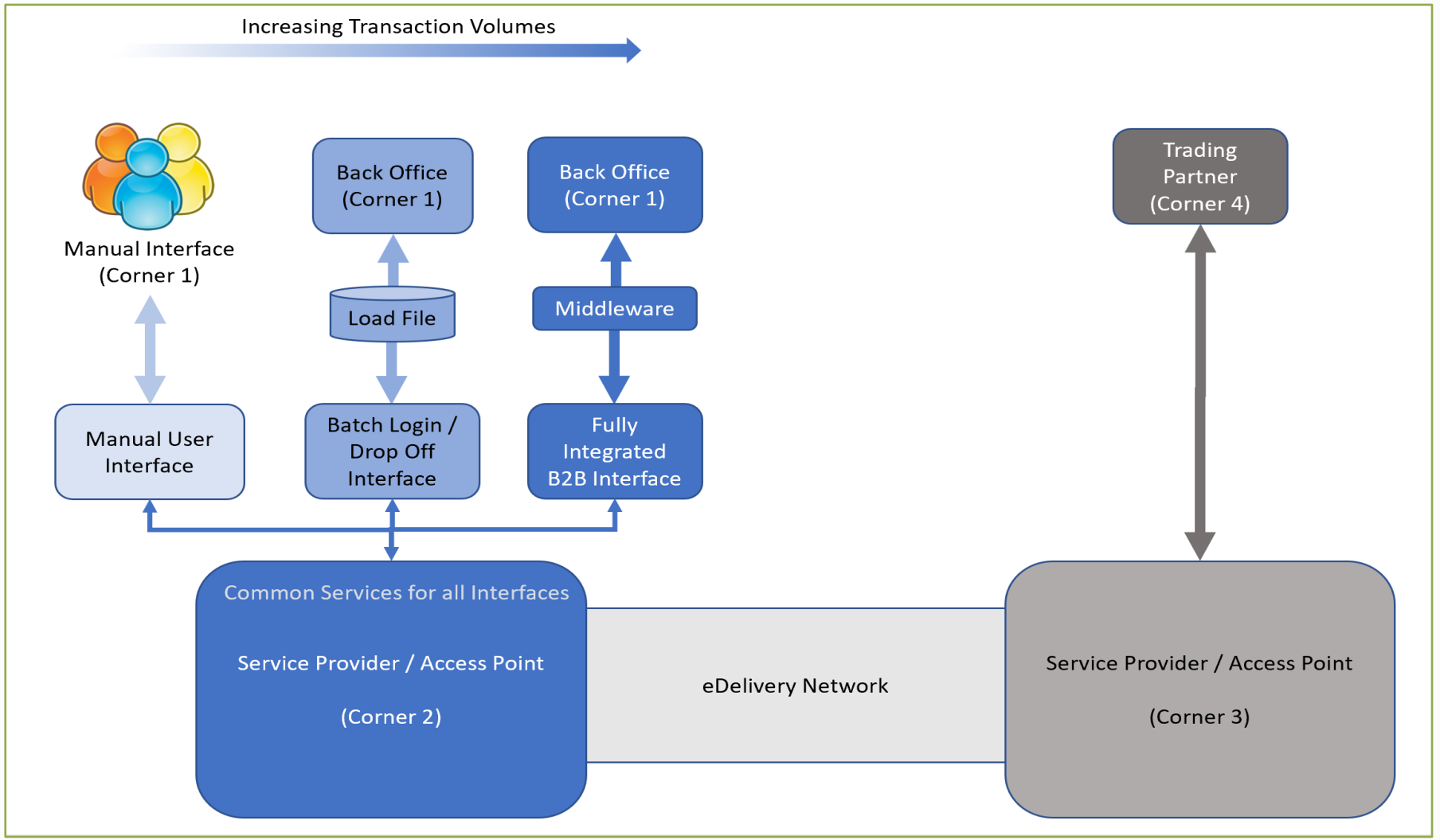


Suppliers may implement a 4 Corner Integration Model to Augment their ERPs



Supporting all Sizes of Trading Partners Equally

Sample Interface Options Provided by the Access Point



4 Corner Model

Governance through Legal Framework of Interoperability and User Agreements

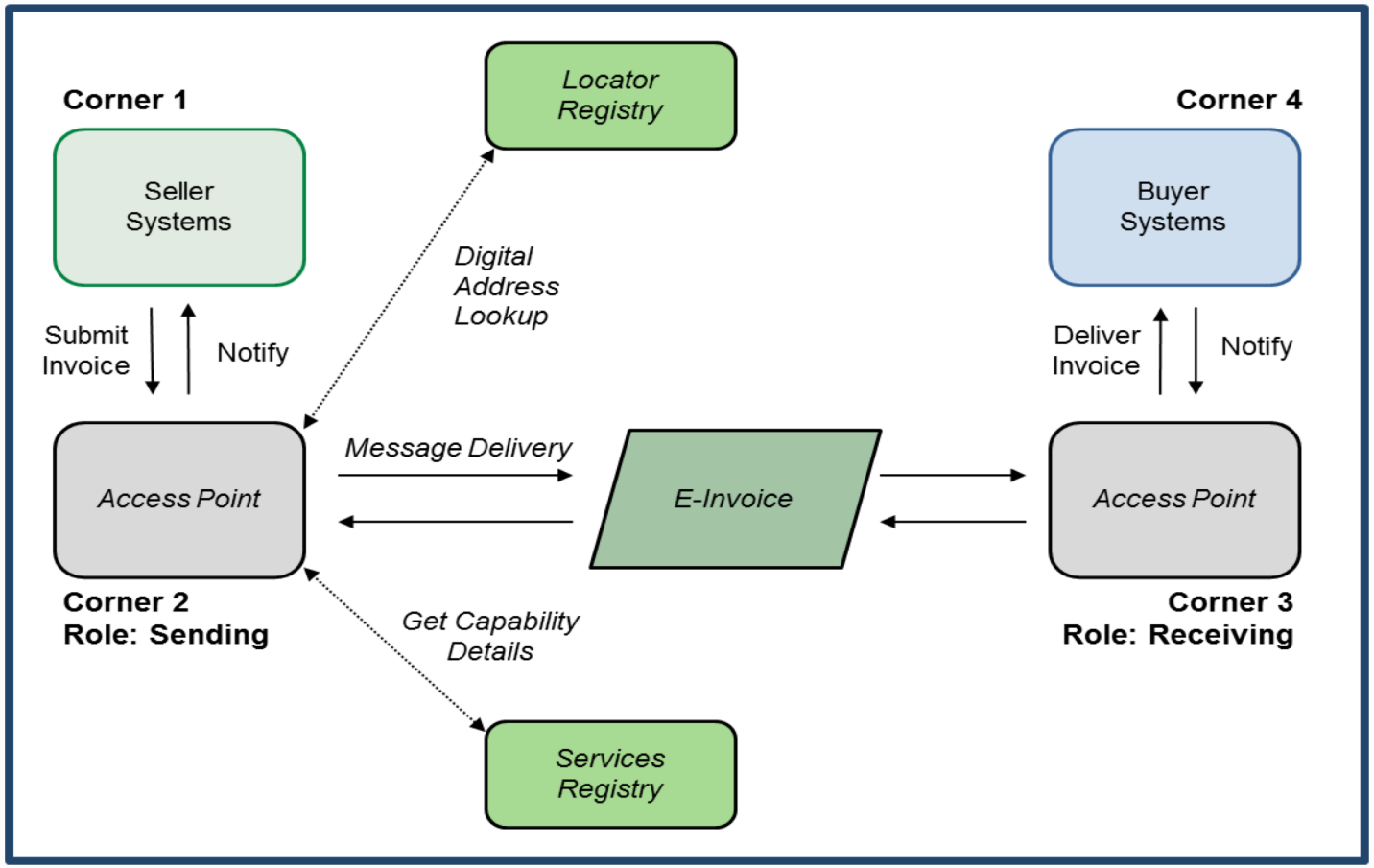
Uses an Industry Agnostic Open Standards Based Approach

Data Stewardship across the Network Embedded in Agreements

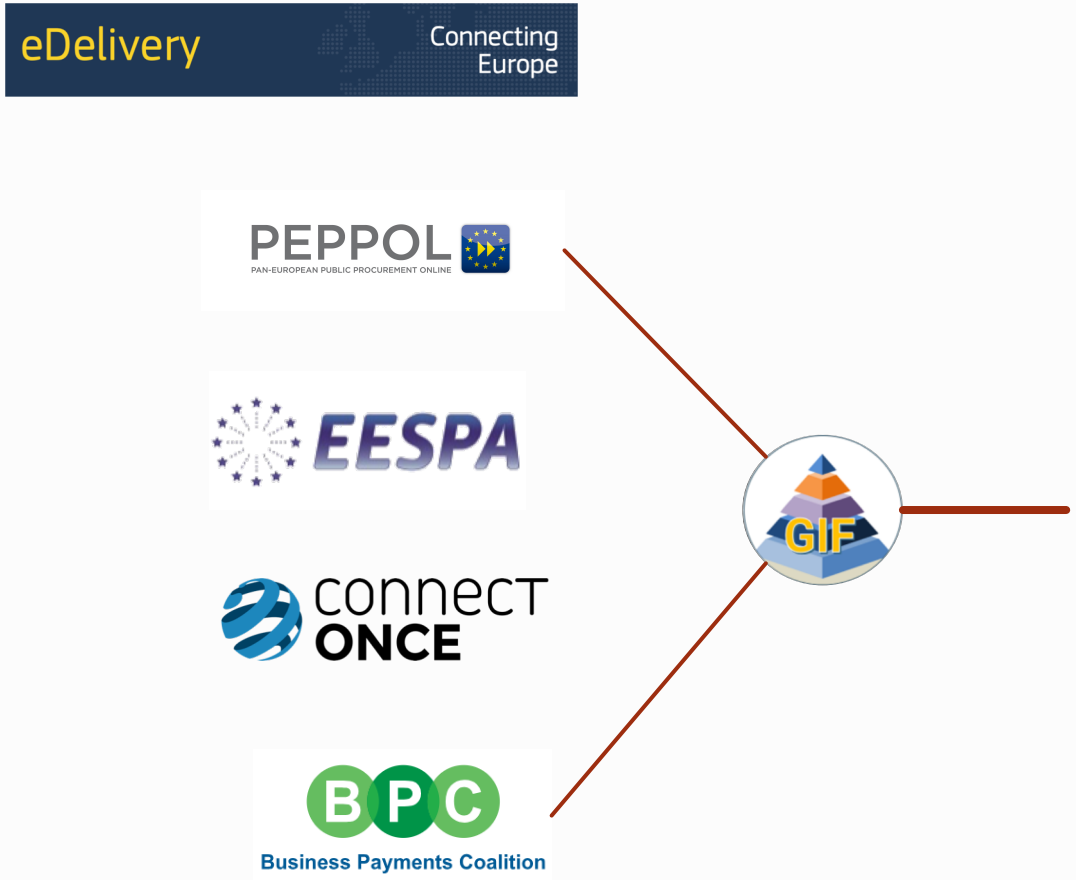
Connect Once Connect to All Simplifying and Accelerating Digital Connectivity

Supports all Tiers of Suppliers and Buyers by Utilizing the Access Points

Dynamic Integration Support for Loosely Coupled Supply Chain Processes



Widespread Support on an International Basis Already in Place



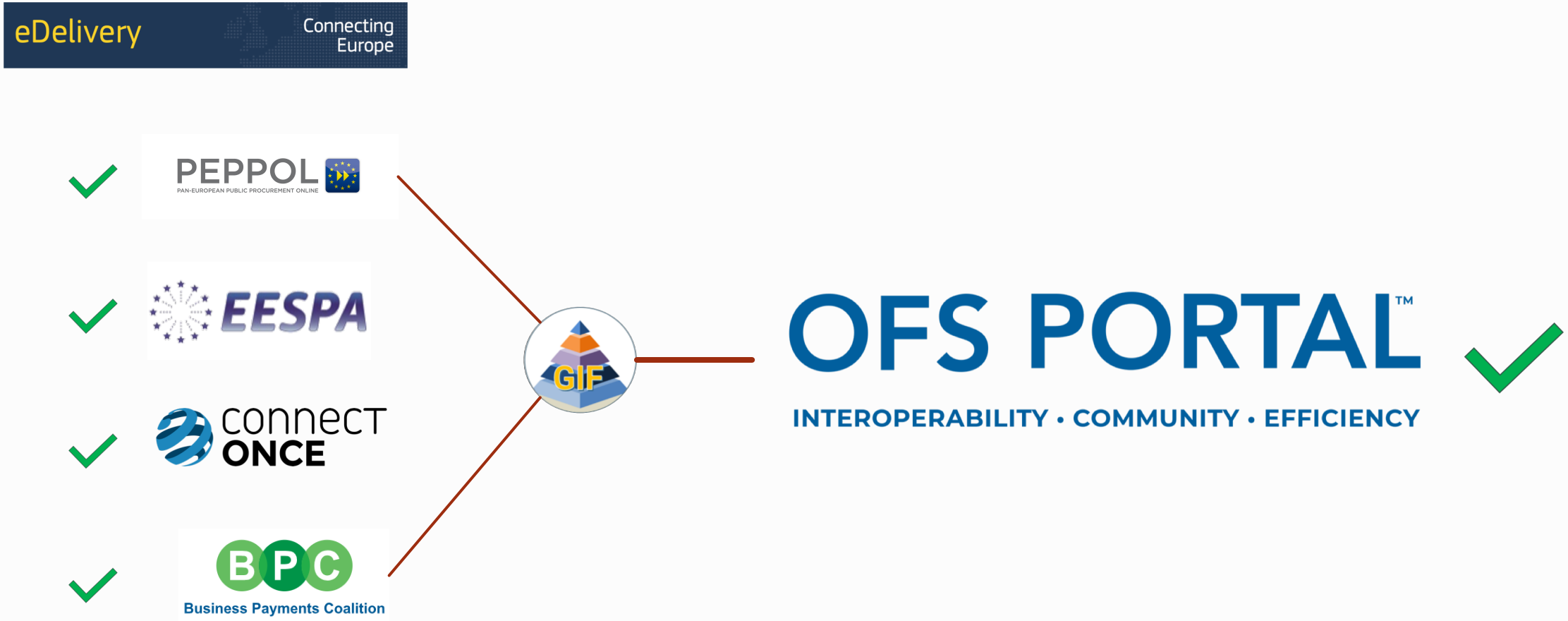
Global Interoperability Framework

a. A "**neutral vehicle**" to facilitate open collaboration on common issues and, where possible, to agree common artefacts that are supported on a global, or regional, basis.

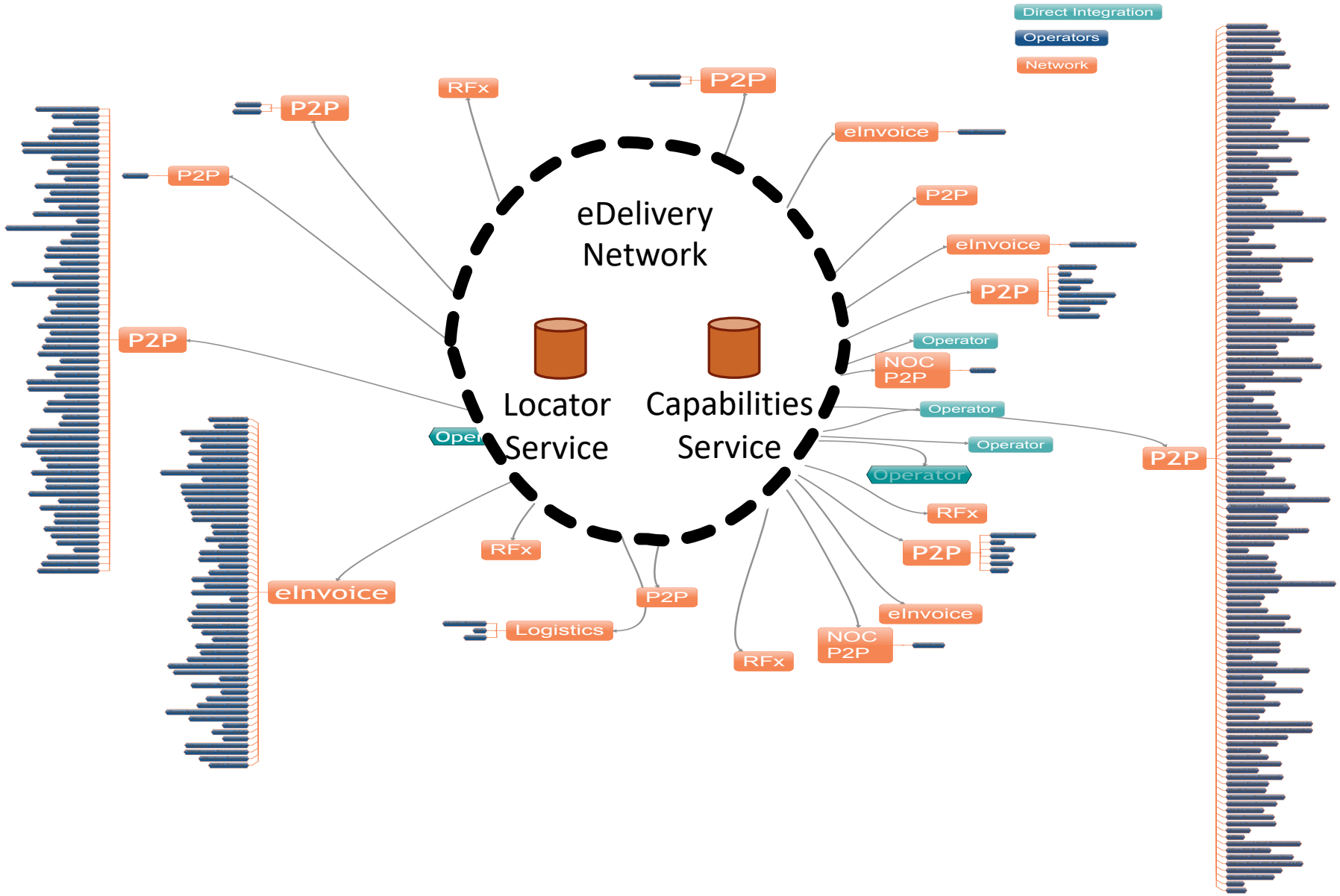
Leading to ..

b. Agreement on common interoperability '**building blocks**', the adoption of which will:
   - *Accelerate digital business adoption*
   - *Reduce adoption costs*
   - *Save time*

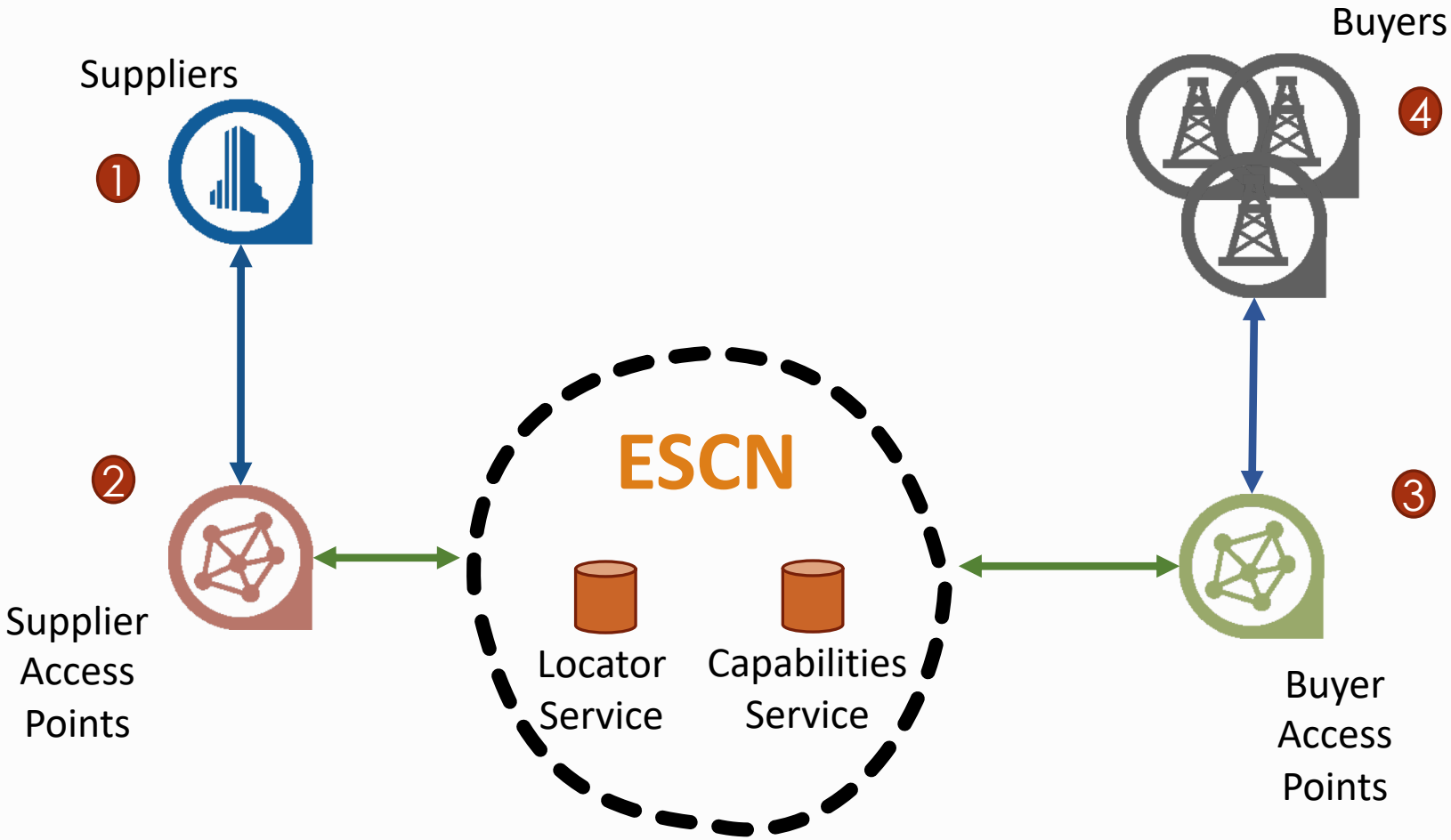
Widespread Support on an International Basis Already in Place



Removing Complexity for All Partners



2021 Strategy and Beyond



Formation of the **E**nergy **S**upply **C**hain **N**etwork