# Production Facilities in the Net Zero World

Shwan Dizayee, Francesca Tate

# Meet Presenters

**Shwan Dizayee**

Management Consultant Manager

**Francesca Tate**

Management Consultant Manager

# Agenda

1. Introduction *5 mins*
2. Production facilities in E&P *15 mins*
3. The role of the energy transition in E&P *10 mins*
4. Q&A *10 mins*

# Production facilities in Exploration & Production

1. Overview of Production Operations
2. Production Facilities
3. Production Optimisation Use Cases

# Overview of Production Operations

**Production** is the process of extracting hydrocarbons and separating production fluids into their constituents for transport to downstream refineries to refine for consumer usage. In order to maintain production operations, the production team maintain the wells, flowlines & the installation facility

## Wells

Once the well is commissioned, the well needs to be maintained regularly to ensure production.

## Flowlines

Flowlines are a network of pipes of lesser diameter (~4-6”) transporting the production fluids from well to the installation facility for processing.

## Production Facility

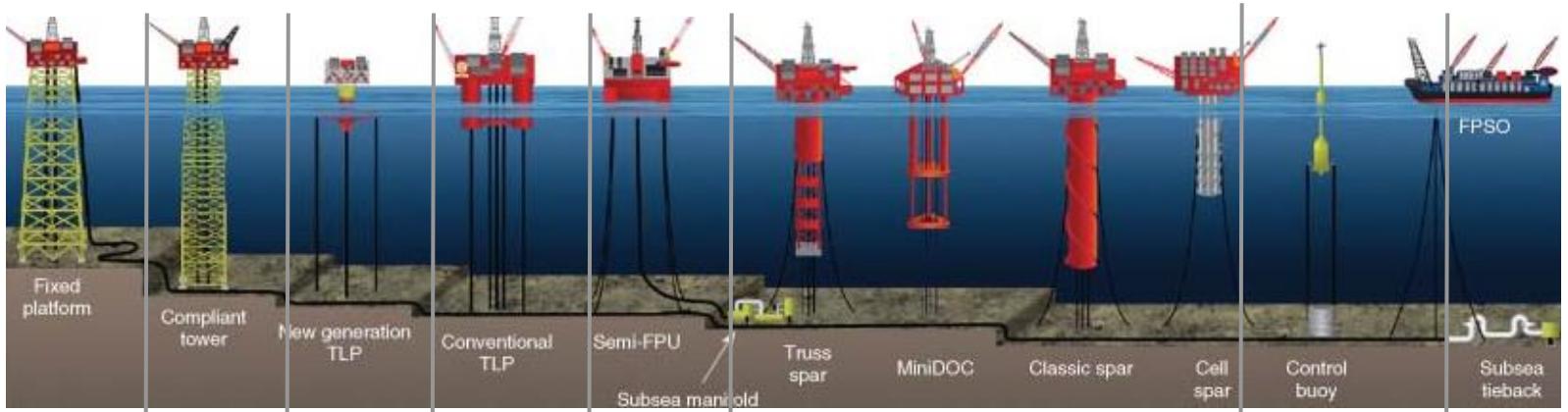
The production fluids are a mixture of …

- Oil
- Gas
- Solids
- Water
- Other gases

# Overview of Production Operations

**Onshore**

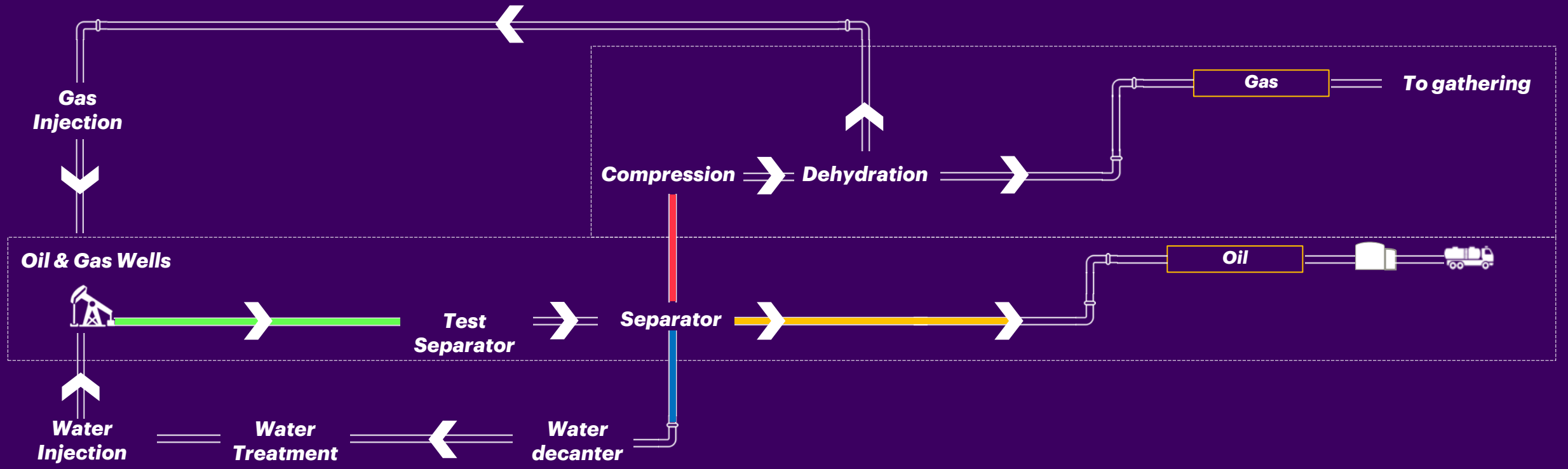
**Offshore:** There is no such thing as a standard asset, each is designed based on the particular set of conditions it will face. Broadly there are 5 categories of offshore facilities: **Rig, Platform, NUI, FPSO and Flotel**




| Up to 1500ft | 1500ft – 3000ft | 500ft – 3.500ft | 1000ft – 7000ft | 200ft – 10,000ft | 2000ft – 10,000ft | Current Record 18,000ft | Up to 8500ft |
|---|---|---|---|---|---|---|---|
| 1.5 Shards | 3 Shards | 3.5 Shards | 7 Shards | 10 Shards | 10 Shards | 18 Shards<br>1 Kilimanjaro | |

# Example of an Oil & Gas Production Facility

*Example of an Oil Production Facility*




Crude Oil Gas Water

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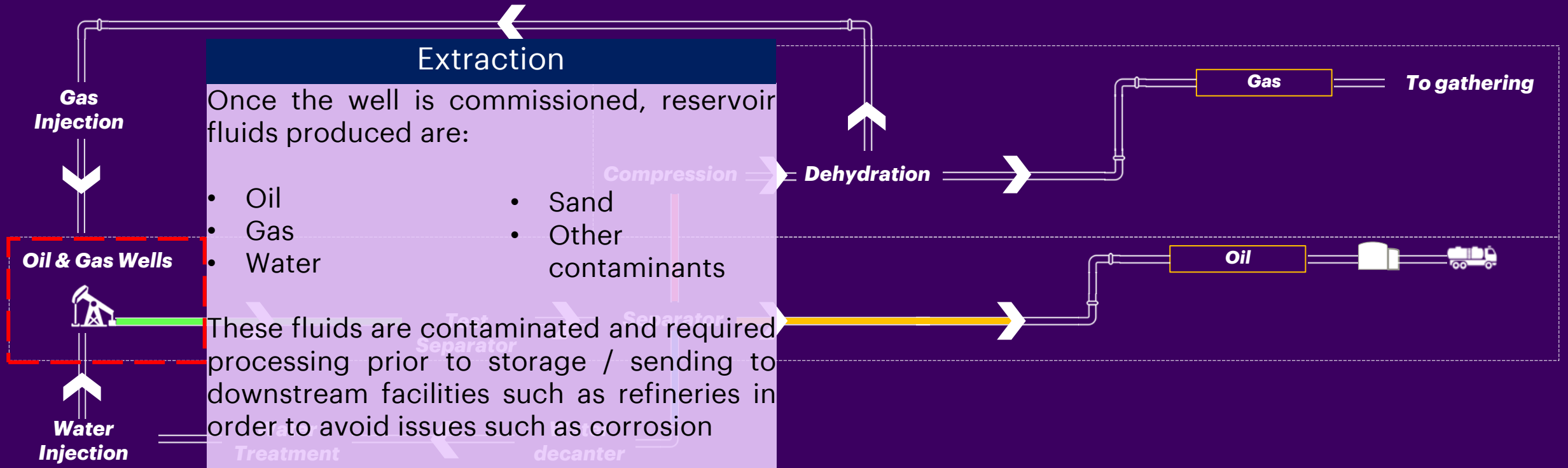


## Extraction

Once the well is commissioned, reservoir fluids produced are:

- Oil
- Gas
- Water
- Sand
- Other contaminants

These fluids are contaminated and required processing prior to storage / sending to downstream facilities such as refineries in order to avoid issues such as corrosion

Crude Oil Gas Water

# Example of an Oil & Gas Production Facility

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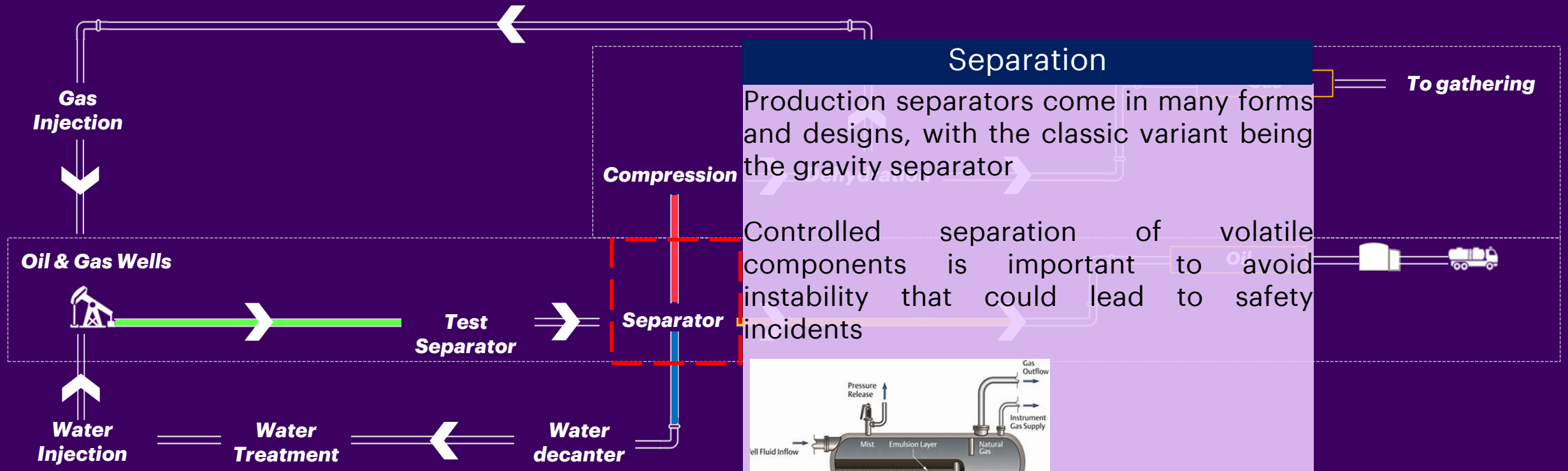



## Separation

Production separators come in many forms and designs, with the classic variant being the gravity separator

Controlled separation of volatile components is important to avoid instability that could lead to safety incidents

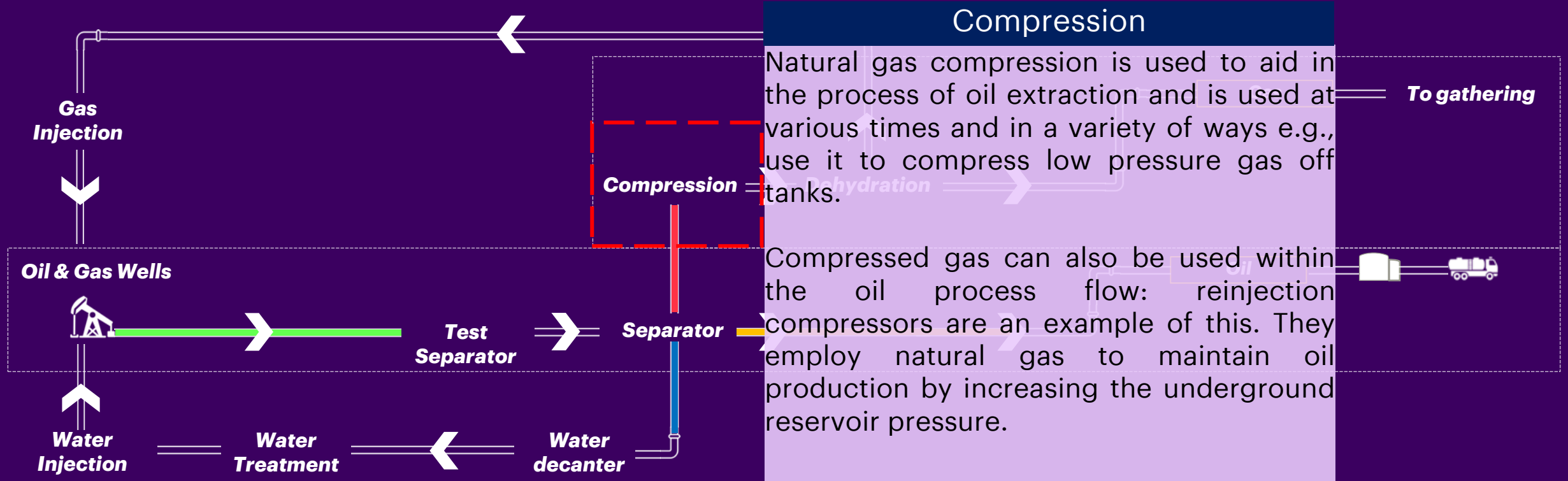



Crude Oil Gas Water

# Example of an Oil & Gas Production Facility

*Example of an Oil Production Facility*




## Compression

Natural gas compression is used to aid in the process of oil extraction and is used at various times and in a variety of ways e.g., use it to compress low pressure gas off tanks.

Compressed gas can also be used within the oil process flow: reinjection compressors are an example of this. They employ natural gas to maintain oil production by increasing the underground reservoir pressure.

# Example of an Oil & Gas Production Facility

## Dehydration

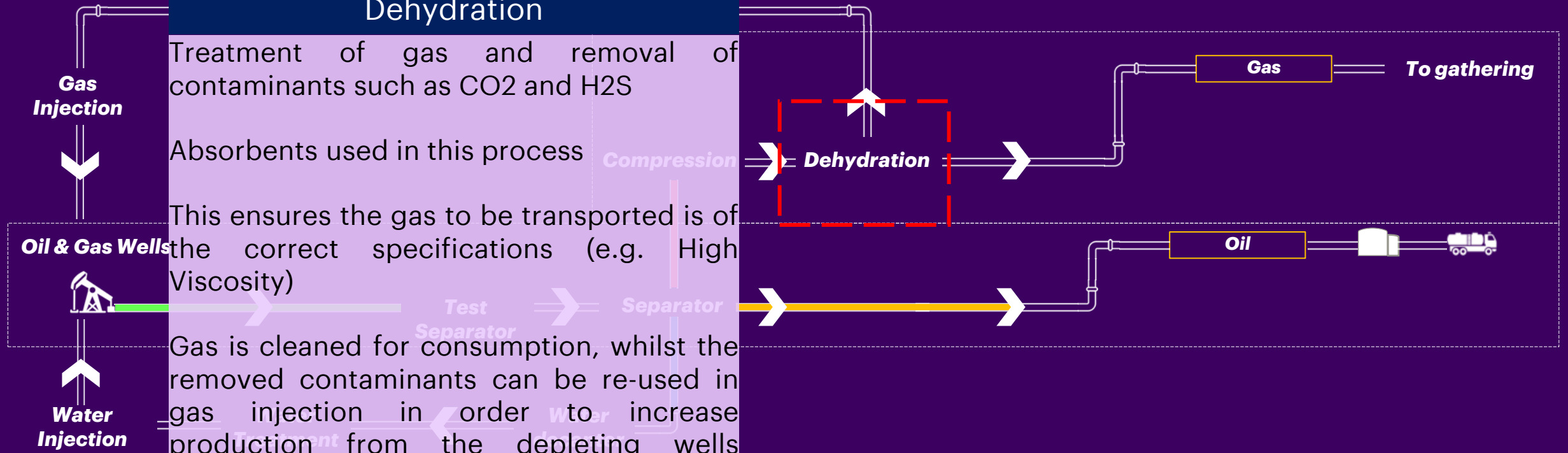
Treatment of gas and removal of contaminants such as CO2 and H2S

Absorbents used in this process

This ensures the gas to be transported is of the correct specifications (e.g. High Viscosity)

Gas is cleaned for consumption, whilst the removed contaminants can be re-used in gas injection in order to increase production from the depleting wells (reduction in pressure)

*Example of an Oil Production Facility*



# Example of an Oil & Gas Production Facility

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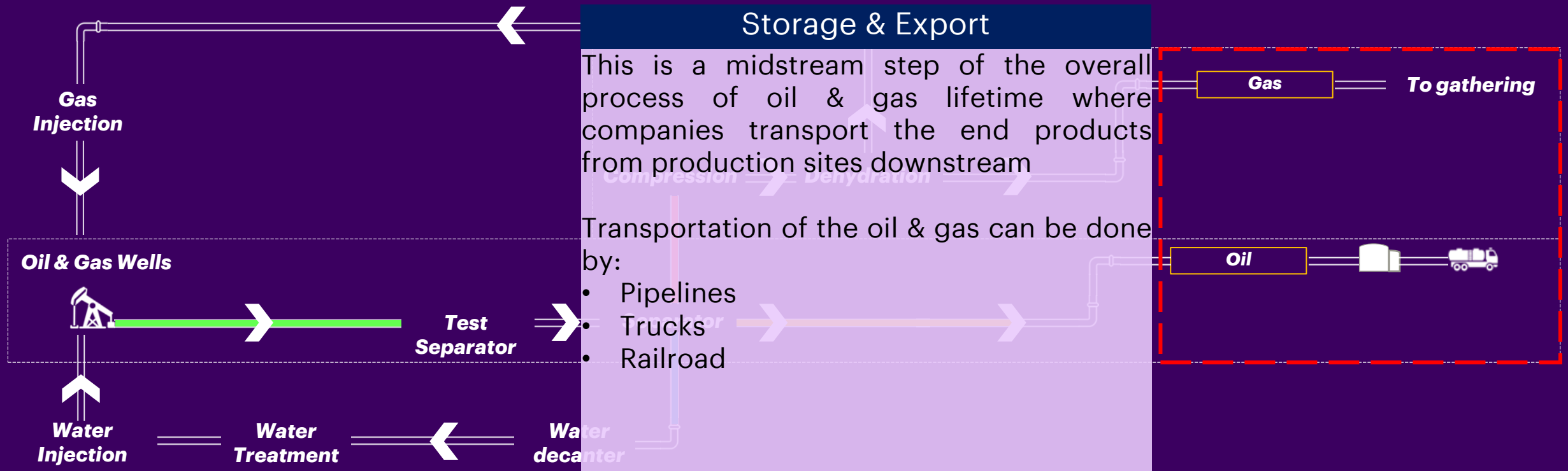



## Storage & Export

This is a midstream step of the overall process of oil & gas lifetime where companies transport the end products from production sites downstream

Transportation of the oil & gas can be done by:

- Pipelines
- Trucks
- Railroad

Crude Oil Gas Water

# Production Optimisation Use Cases

**Production increase** – increasing the production capacity of the production facility

**Adjusting system performance** – finding the optimal requirements for production through simulating different production conditions

**Process optimisation –** Integrate processes, systems and data enabling visibility across silos and optimal decision making.

**Enhanced maintenance scheduling** – finding the optimal point to scheduling maintenance activities

**Digital transformation of process** – through transforming process workflows and automating

**Predictive maintenance of assets** – becoming predictive in the maintenance of assets which in turn will reduce downtime and optimise production

# The role of the energy transition in Exploration & Production

1. Energy transition overview
2. Use cases in production facilities
3. Carbon capture 101
4. Hydrogen 101
5. Case Study

# Overview of renewable integration, low-carbon technologies, and circular economy initiatives

Non-Exhaustive

01

**Renewable Energy Integration**

- Solar
- Wind
- Geothermal

02

**Low Carbon Energy**

- Hydrogen
- Biofuels

03

**Energy Storage & Efficiency Reduction**

- Energy storage systems
- Waste heat recovery

04

**Emissions Reduction**

- Methane
- Carbon capture

05

**Circular Economy**

- Material/water recycling
- Closed-loop systems for chemicals
- Product life extensions

# Renewable energy use cases in production facilities

Non-Exhaustive

**Off-grid power for remote or harsh sites** – reducing reliance on diesel and minimizing logistical challenges

**Powering well infrastructure** – integrating renewables into existing infrastructure to support energy requirements

**Powering accommodation units** – providing sustainable power sources for lighting and comms

**Instrumentation monitoring** – ensuring a sustainable power source for sensors, cameras, and comms devices used in production monitoring

**Emergency systems** – ensures critical functions during outages or emergency systems

**Renewable energy microgrids** – enhancing energy resilience and reducing dependencies

# Carbon capture 101

Carbon capture involves isolating CO2 emissions from the industrial processes before they are released into the air.

## MAIN APPROACHES

**Post-combustion** – involves capturing CO2 after combustion, using technologies like scrubbers or filters. It's like to cleaning the exhaust gases after they've been used to generate energy.

**Pre-combustion** – captures CO2 before combustion, separating it from other gases in the fuel. It's like refining the fuel mix before it goes into the energy production process.

**Oxyfuel combustion** – changes the combustion process by using oxygen instead of regular air. It makes it easier to capture CO2. Think of it as optimizing the "ingredients" for combustion.

**Capture** → Transport → Utilisation/ Storage

## CHALLENGES

**Cost** - implementation costs can be a challenge, impacting widespread adoption

**Energy consumption** - balancing the energy demands of capture technologies with the energy efficiency goals is a challenge

**Infrastructure** - requires a developed infrastructure for transport and storage

**Storage site availability** - availability of appropriate storage sites can impact the feasibility of carbon capture projects

**Public acceptance** – there are public concerns regarding the safety and long-term environmental impact of storing captured CO2 underground

# Hydrogen 101

Hydrogen is the simplest and most abundant element in the universe. In energy discussions, it's often referred to as a clean and versatile fuel.

## MAIN TYPES

**Grey hydrogen** – produced from fossil fuels via steam methane reforming (extracting hydrogen from natural gas). Accounts for majority of hydrogen produced today

**Blue hydrogen** – produced from fossil fuels combined with carbon capture. Good way to kickstart low carbon hydrogen production

**Green hydrogen** – produced through electrolysis (decomposition of water into oxygen and hydrogen) using renewable energy

## CHALLENGES

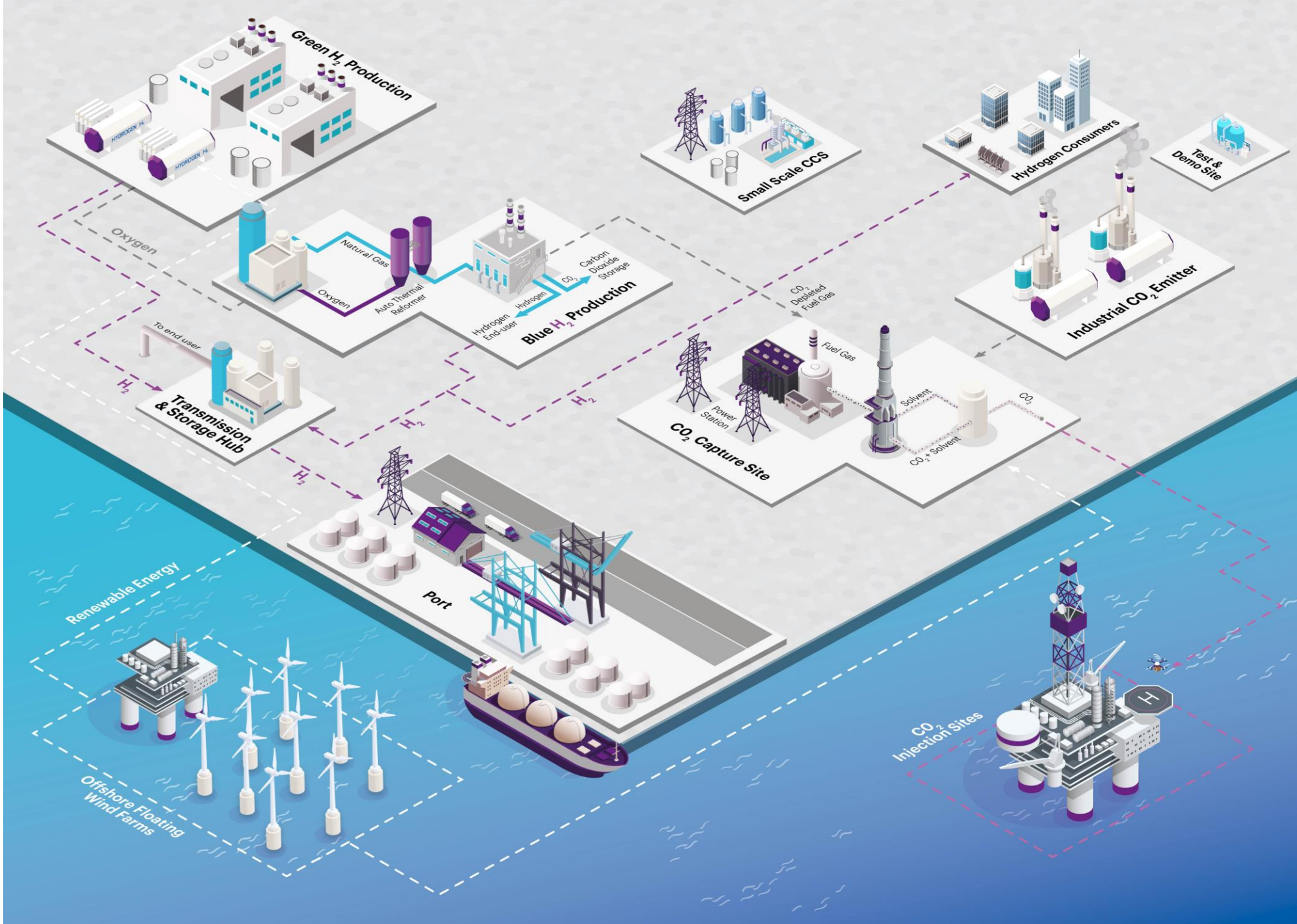
**Economic viability** - current hydrogen production methods, especially green hydrogen, can be more expensive compared to conventional fuels

**Infrastructure investment** - establishing a comprehensive hydrogen infrastructure, including production facilities, storage, and distribution networks, requires significant investment

**Technology maturity** - some hydrogen technologies, such as fuel cells, are still evolving and may require further development and standardization

**Competing technology** - hydrogen competes with other clean energy technologies

# A Future Integrated North Sea




Source: Accenture and NZTC Technology Driving Green Energy Growth

# Questions?