



# REIMAGINING VALVE TECHNOLOGY



Oxford Flow produces the  
**most precise and accurate**  
flow control valves in the world.



# STORY



## Inspiration

for the core innovation behind Oxford Flow's technology came to Professor Tom Povey during research into jet turbines at Oxford University.



## Initial design

Frustrated that market-leading pressure regulators couldn't meet his needs he decided to design his own.



## Oxford Flow established

In 2015 Oxford Flow was established to commercialise the invention and the resulting technology has set new benchmarks for performance and reliability.



# PRODUCT PORTFOLIO EVOLUTION

## 3 PRODUCT FAMILIES

THE ORIGINAL INVENTION



IHF GAS REGULATOR

### LIQUID REGULATORS



IP-K



IP VALVE



IP-X



IP-W



INTELLIGENT WATER VALVE

### GAS REGULATORS



IM-S



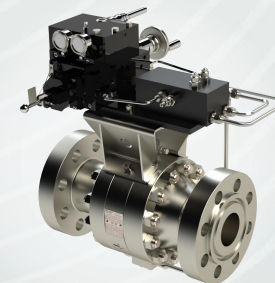
IM SERIES GAS REGULATORS



IM-C

### ISOLATION & CONTROL VALVE

Multiphase

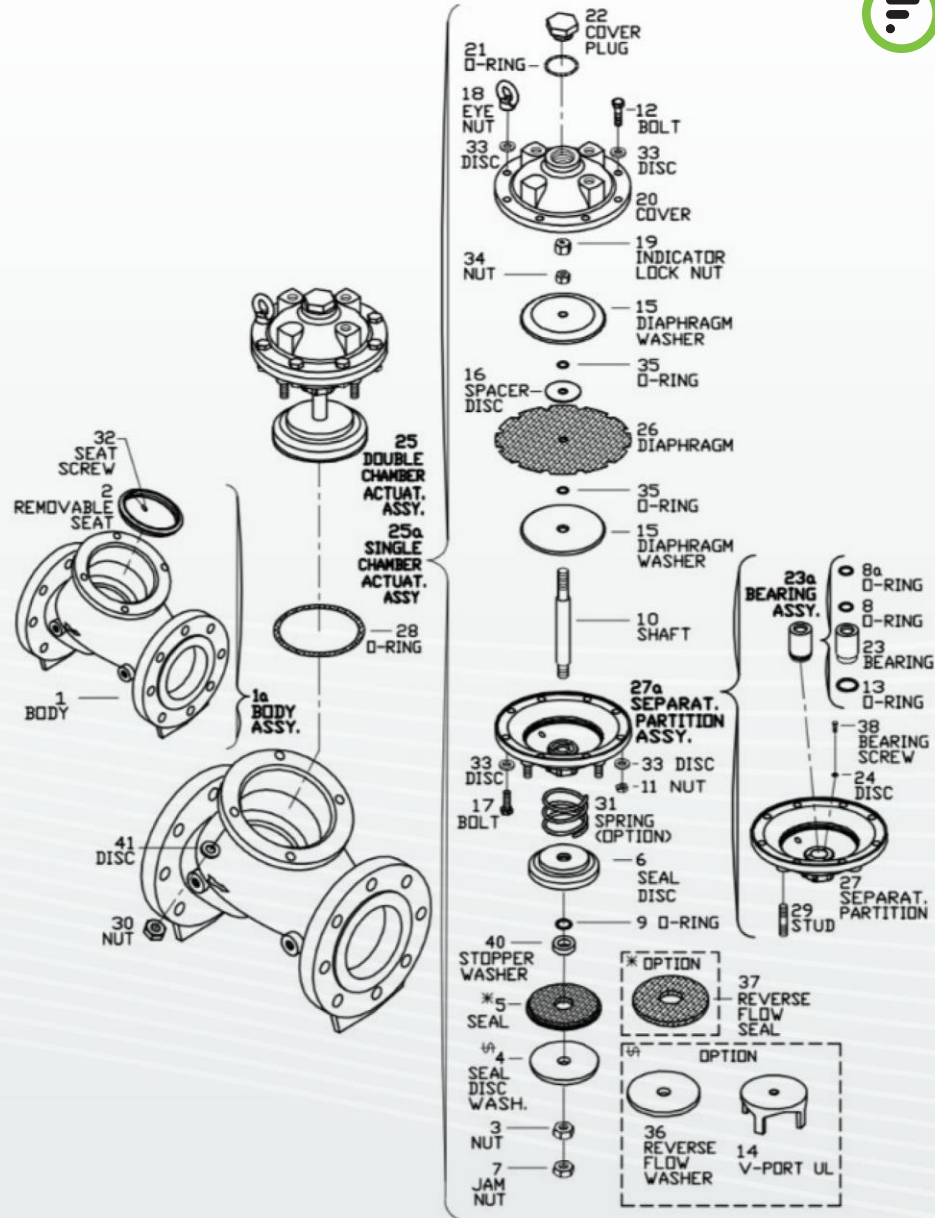


ES CONTROL VALVE



ES ISOLATION VALVE

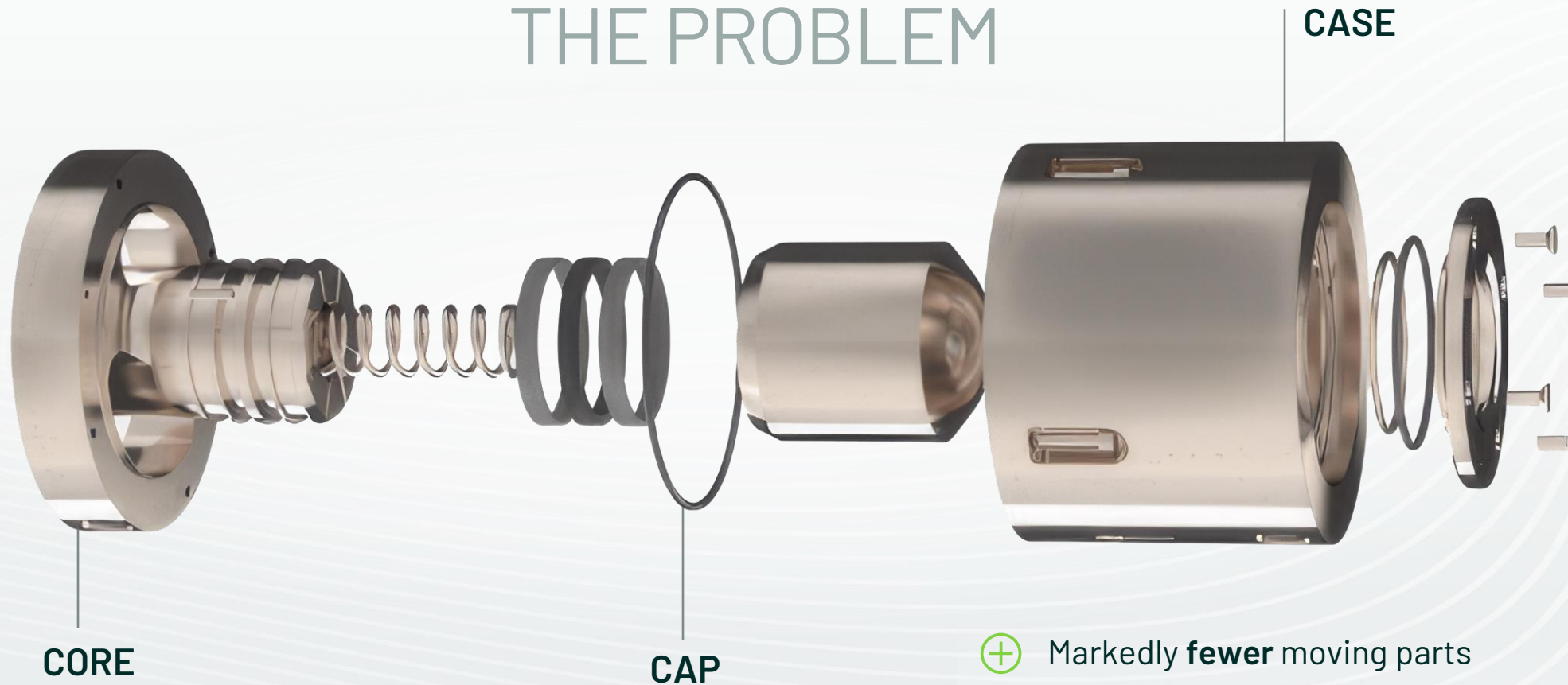
+ All products **protected** by a comprehensive suite of 78 patents



# TRADITIONAL VALVES

Traditional valves have many moving parts, which leak & break

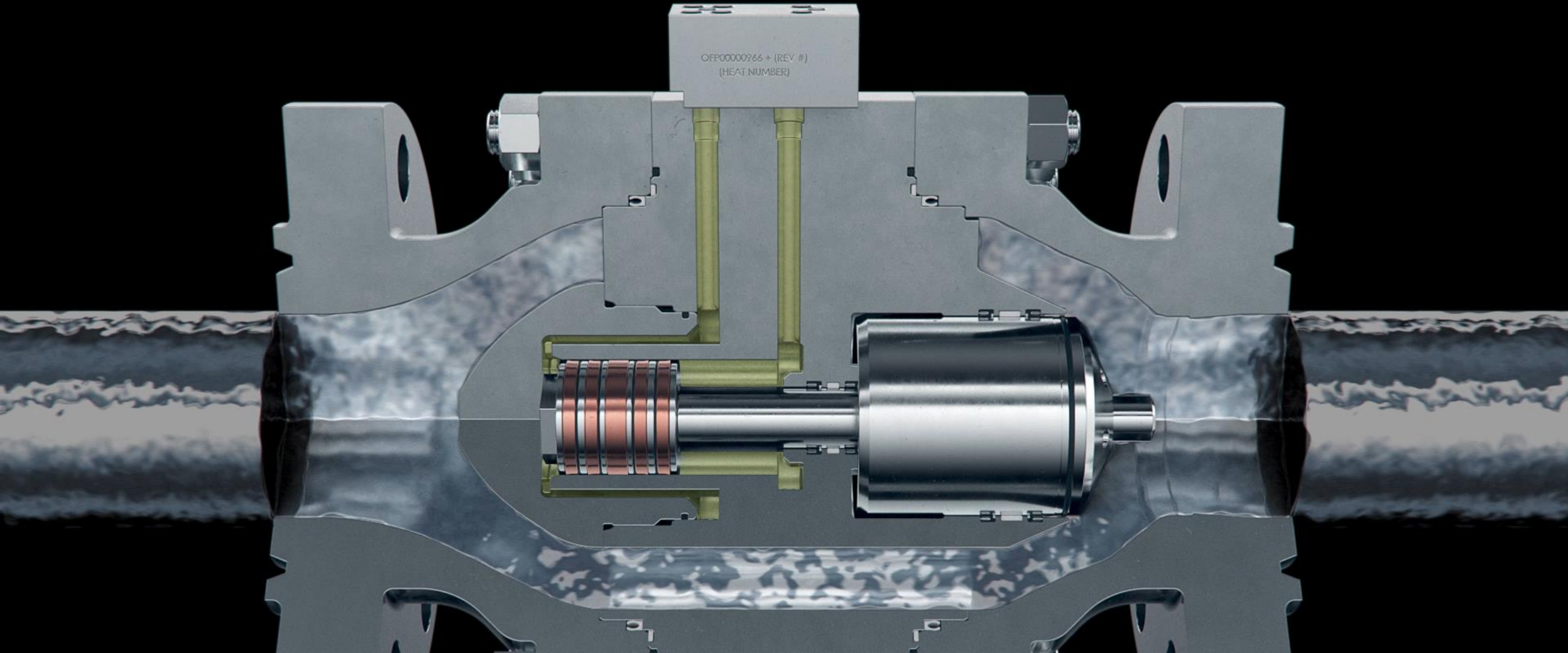
# SOLVING THE PROBLEM



⊕ Markedly **fewer** moving parts  
With only 1 moving part and less machined parts compared to traditional valves. Delivering enhanced reliability & lower operational costs

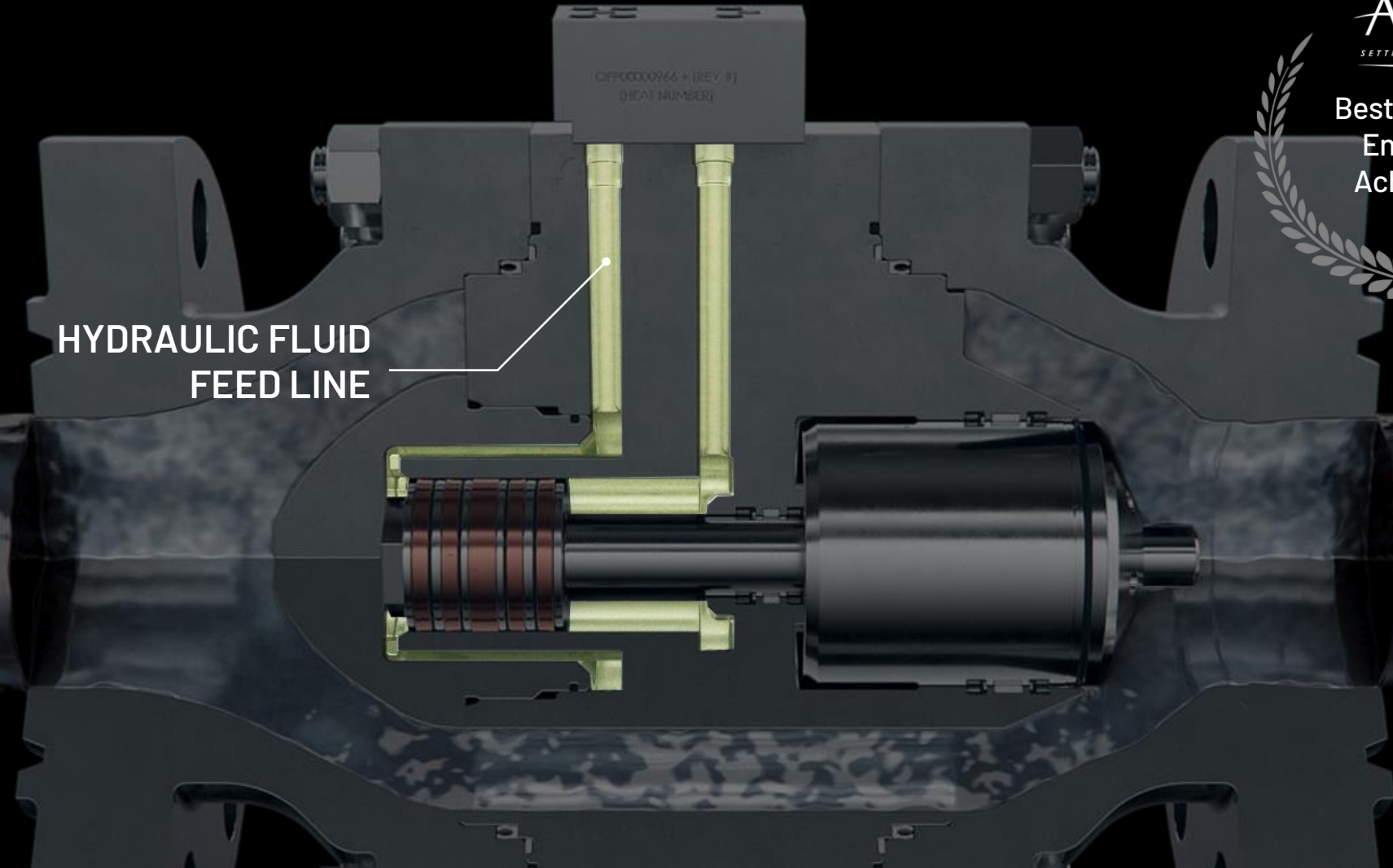


# ES VALVE TECHNOLOGY





# ES VALVE TECHNOLOGY



HYDRAULIC FLUID  
FEED LINE

WINNER



Best Mechanical  
Engineering  
Achievement  
Award



# LIFECYCLE COSTS

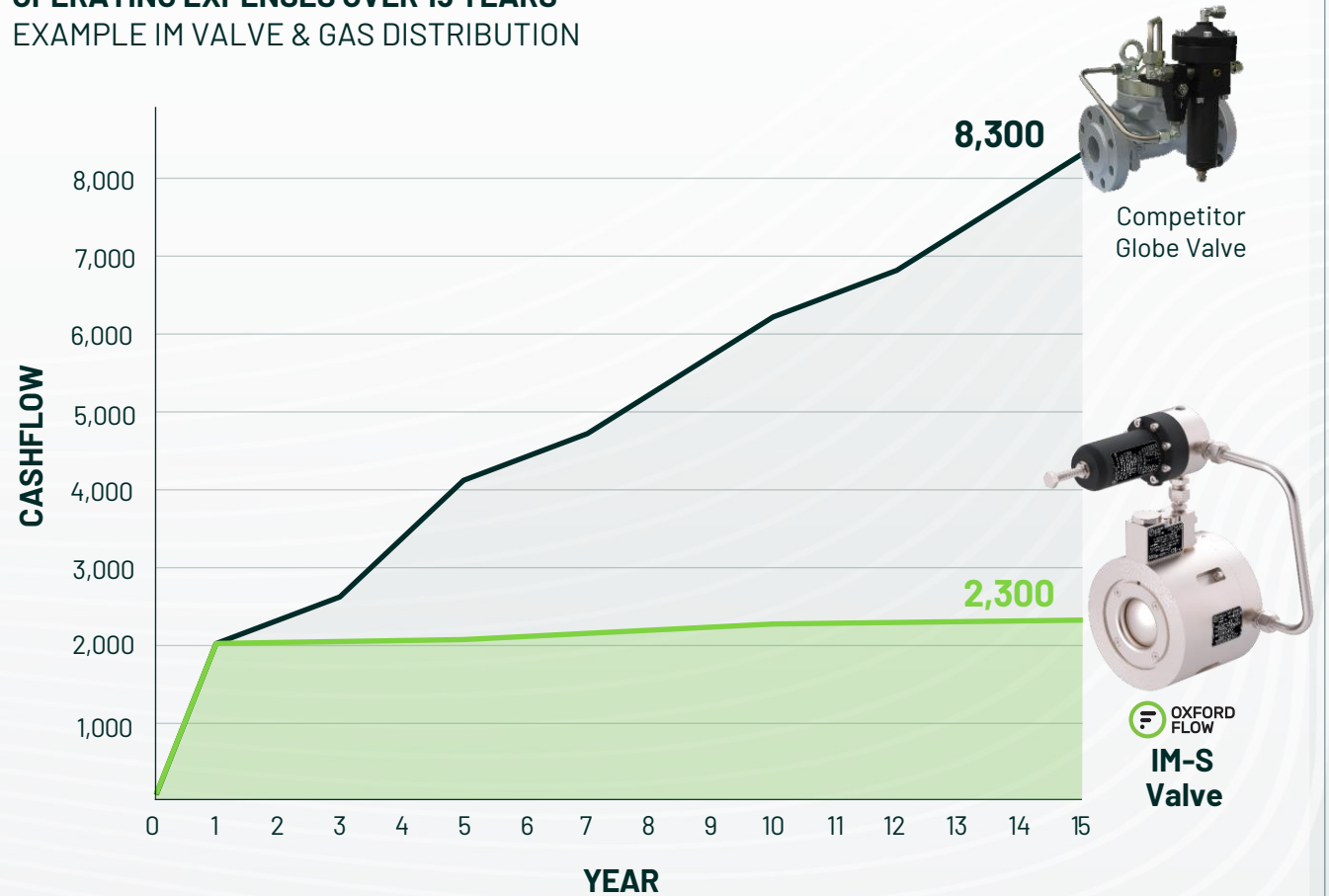
**Oxford Flow's valves offer significant lifetime operating cost savings versus competitor valves.**

Oxford Flow's valves are warranted for 3 years and **are expected to be free of non-routine maintenance for up to 50 years.**

We recommend a low-cost service every 5 years followed by a full service at 10 years.

| Service                          | Valve Body                                    | Pilot                                    | Control Block                |
|----------------------------------|---|--|------------------------------|
| Serviceable items after 1 year   | No service Required                           | No service Required                      | Inspect / Clean Filter       |
| Serviceable items after 5 years  | No service Required                           | Replace Pilot soft seat                  | Replace Control Block Filter |
| Serviceable items after 10 years | Replace all seals, bearing strips and O-rings | Replace all seals, seat and PTFE scraper | Replace all seals            |

**OPERATING EXPENSES OVER 15 YEARS**  
EXAMPLE IM VALVE & GAS DISTRIBUTION





# OUTDATED LEGACY VALVE DESIGN

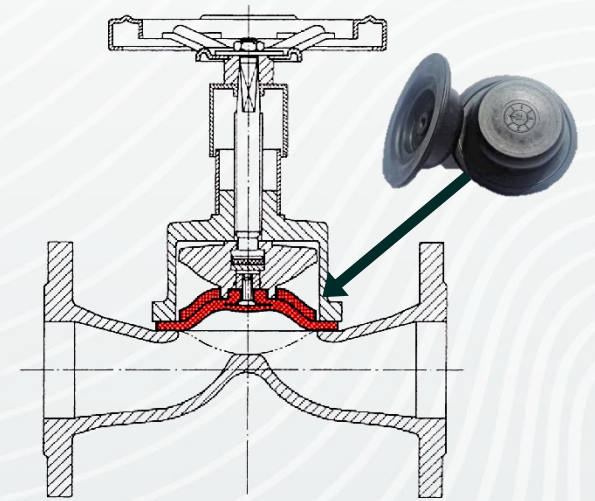
System flow control requires compromise in other areas

**Stem and external actuator**  
Primary causes of valve failure

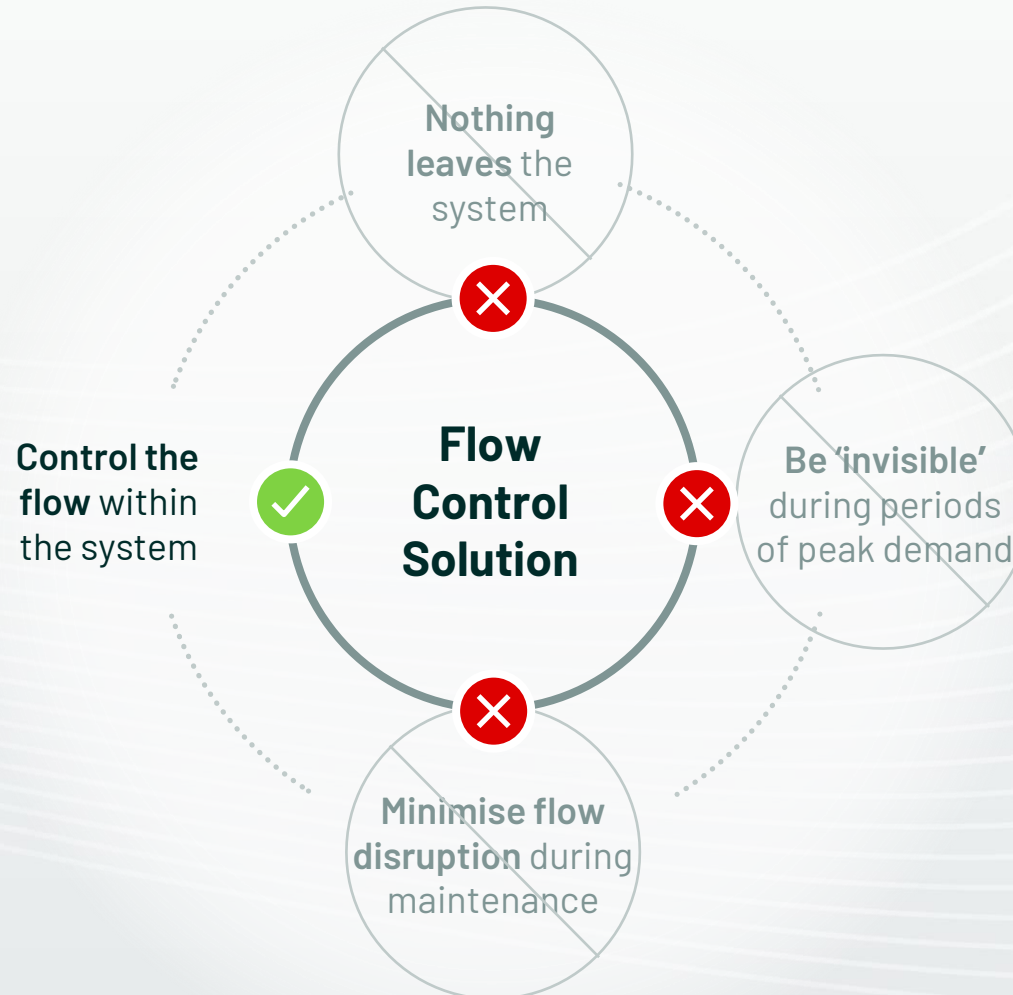


**80%** of leakages are from the **stem-seal** interface\*

**Soft rubber diaphragm**  
Requires frequent replacement



**Convoluted flow path**  
High pressure drop  
Increased wear

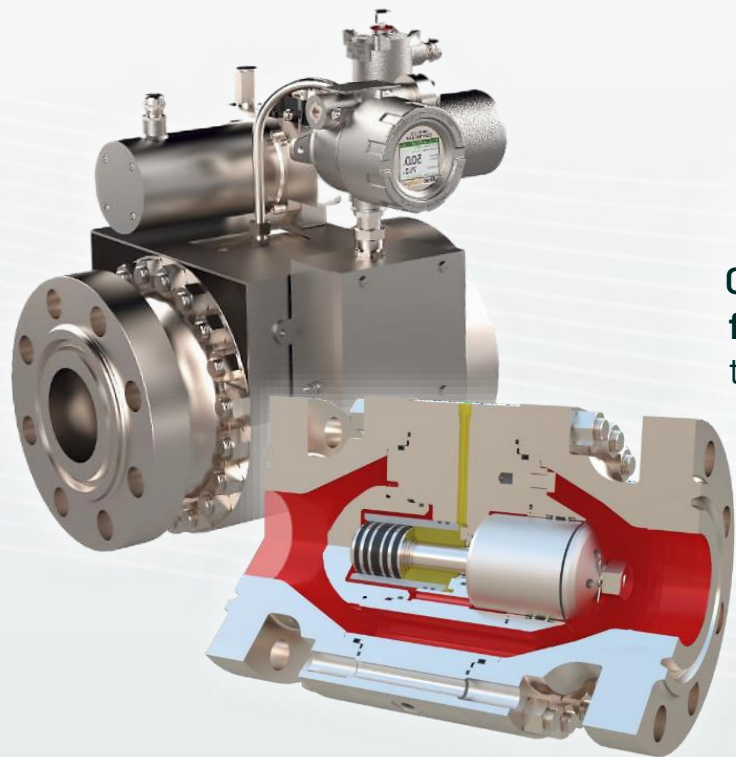


\* The U.S. Environmental Protection Agency (EPA) states that 60% of all fugitive emissions are derived from valves and up to 80% of this leakage originates at the stem-seal interface.



Oxford Flow valve design **does not** compromise the system

⊕  
**No stem**  
or external actuator



Nothing  
leaves the  
system



Control the  
flow within  
the system

Be 'invisible'  
during periods  
of peak demand

Minimise flow  
disruption during  
maintenance



⊕  
**Axial flow path**  
Best in class head-loss over  
the full operating range

\* The U.S. Environmental Protection Agency (EPA) states that 60% of all fugitive emissions are derived from valves and up to 80% of this leakage originates at the stem-seal interface.



# INNOVATION

## REGULATORS



'INTELLIGENT' ACTUATED PRESSURE REGULATING VALVE



AXIAL FLOW STEEL PRESSURE REGULATOR FOR USE IN GAS APPLICATIONS



AXIAL FLOW STEEL PRESSURE REDUCING VALVE FOR WATER APPLICATIONS



World's first 100% polymer valve



No actuator stem or diaphragm



Only 3 components & 1 moving part



Low head-loss across the valve



Certified for potable water and utility gas use



Extremely accurate set-point control

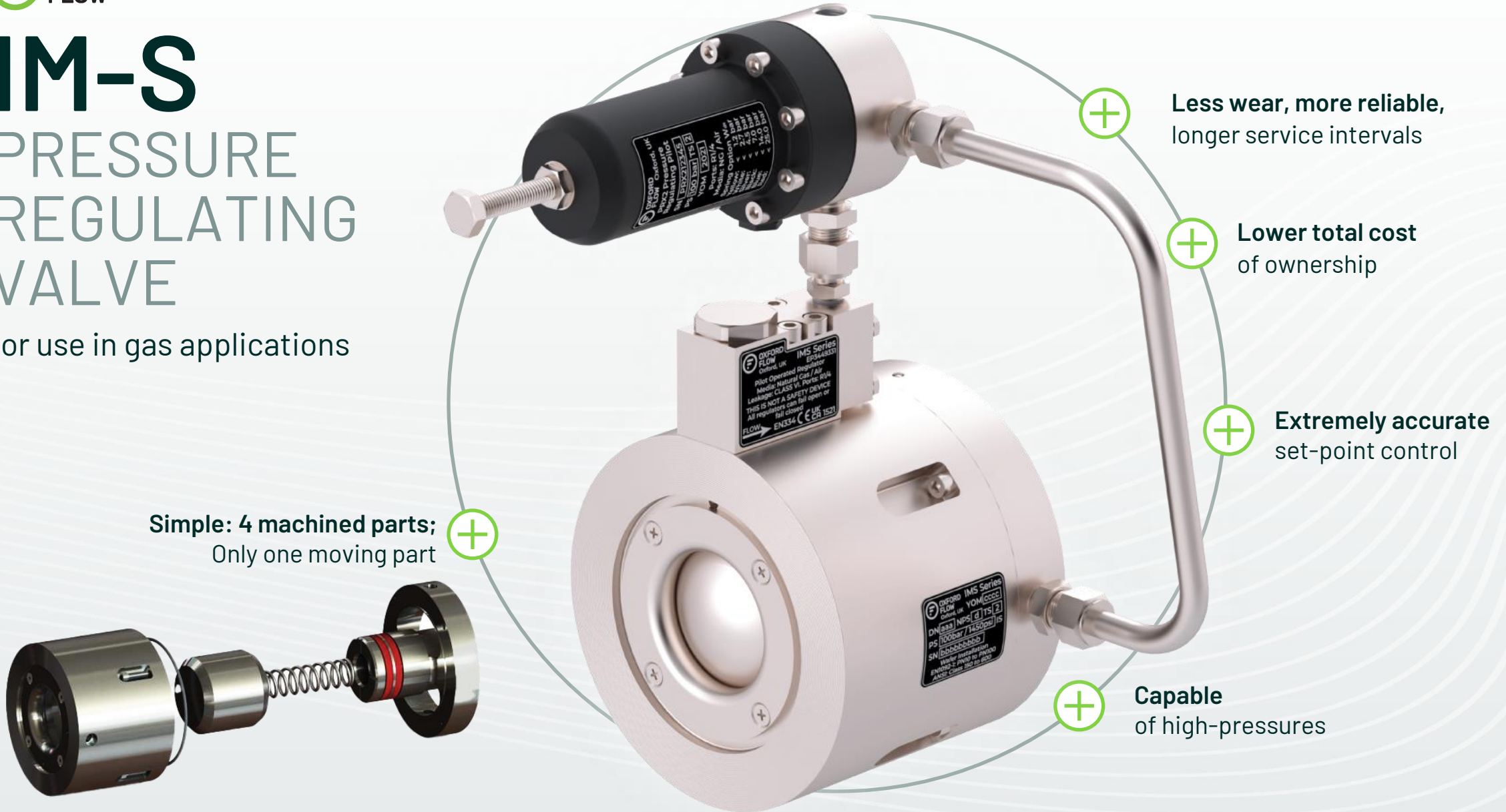
Stable down to zero flow rate



# IM-S

## PRESSURE REGULATING VALVE

for use in gas applications



**Simple: 4 machined parts;**  
Only one moving part

**+** Less wear, more reliable,  
longer service intervals

**+** Lower total cost  
of ownership

**+** Extremely accurate  
set-point control

**+** Capable  
of high-pressures

# UK GAS DISTRIBUTION INSTALLATION



# IM-S VALVES

COMGAS, BRAZIL (LARGEST GAS DISTRIBUTOR)

## Trial 1 - 9th November, 2022

Replacement of a Tartarini MFL 3" (~200kg) with a 3" IM-S (12kg)



## Trial 2 - 10th November, 2022

Replacement of 2 x Fisher EZR 2" (~30kg) with 2 x IM-S 2" (6kg)





# IM SERIES

## APPLICATIONS



Natural gas transmission & distribution



LNG / LPG regasification



Power & cogen



Hygienic industrial



Hydrogen



Tank blanketing



## INSTALLATIONS



Hong Kong



UK



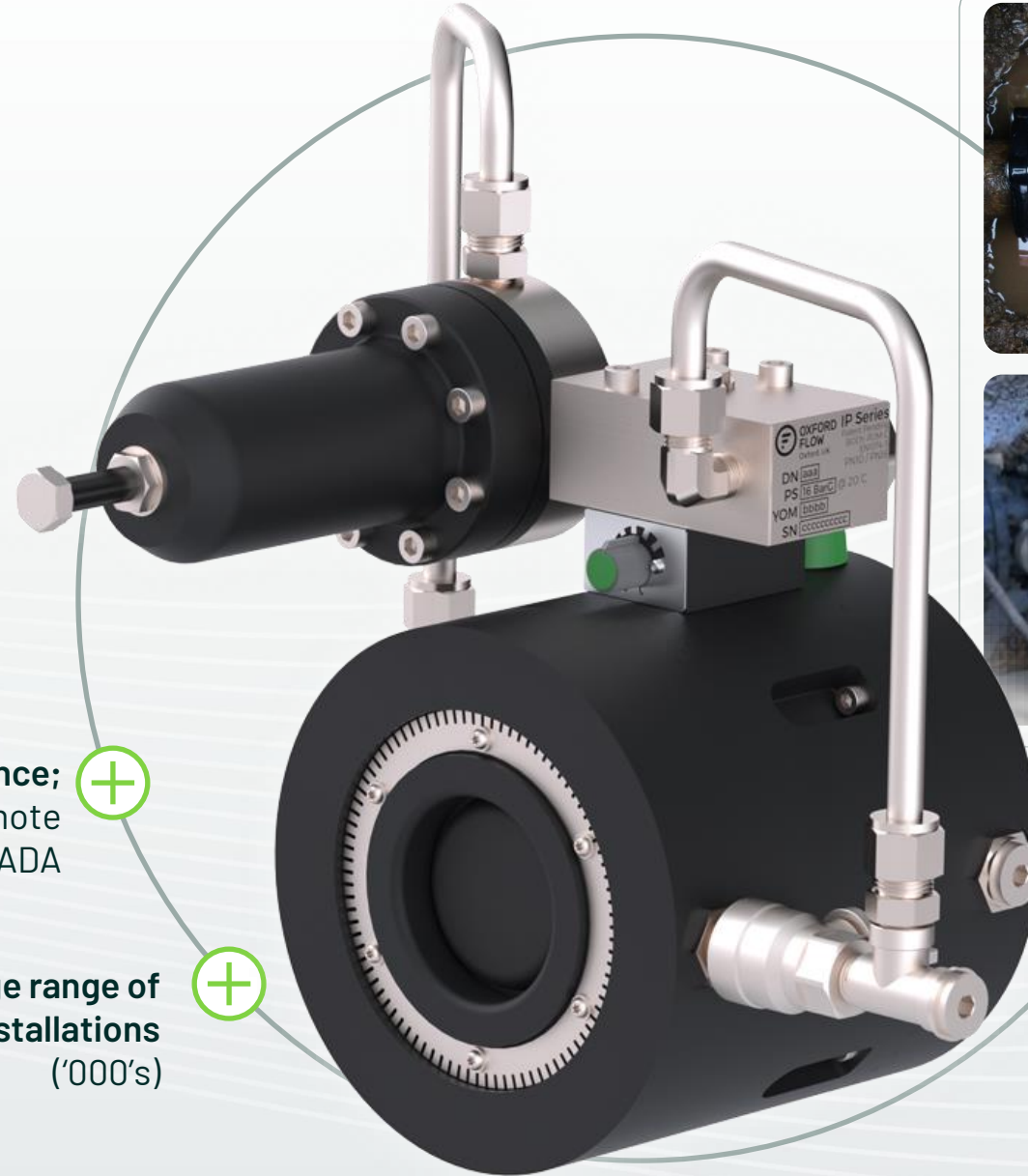
USA





# IP SERIES

## LIQUID PRESSURE REGULATORS



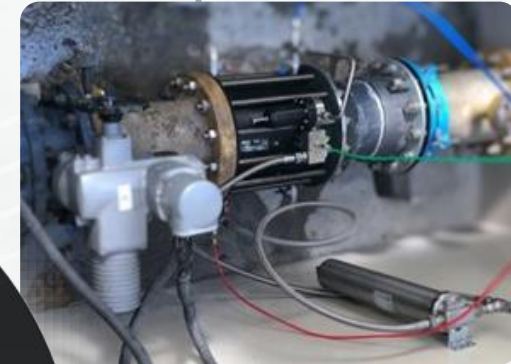
**Intelligence;** +  
Autonomous or remote  
control via SCADA

**Large range of  
global installations** +  
(‘000’s)

**Applications:** +  
Pressure reducing  
Pressure sustaining / relief  
Tank level / control



+  
Bristol Water  
UK



+  
Dubai  
UAE





# EXISTING CONTROL VALVE DESIGN ISSUES



BULKY & EXPENSIVE  
ACTUATION PACKAGES

**>90%**

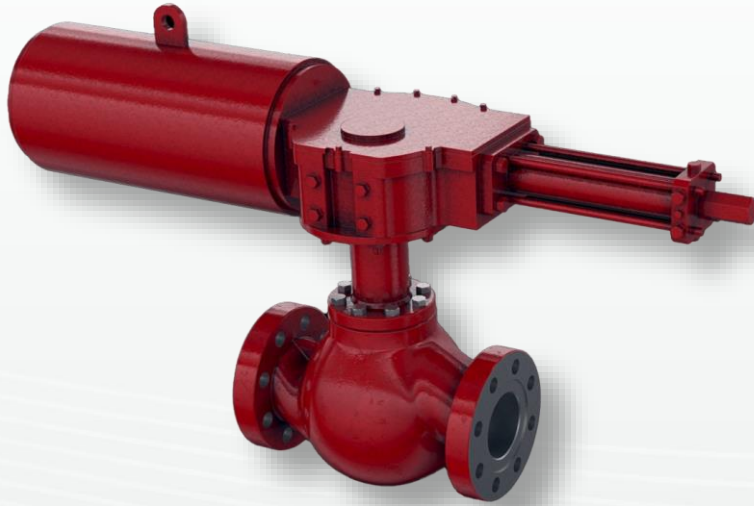
Valve emissions  
are from **stem  
packing leaks**\*



# ES VALVE TECHNOLOGY



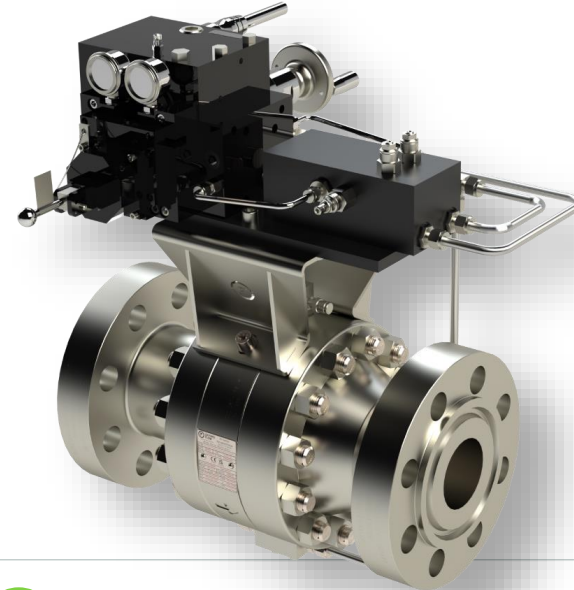
## COMPETITOR QUARTER-TURN VALVE



- Mechanical drive train is subject to mechanical stresses and wear
- High torque requires large actuators
- Stem requires complex packing to reduce fugitive emissions
- Size and weight of valve package requires significant structural support



## ES AXIAL FLOW VALVE

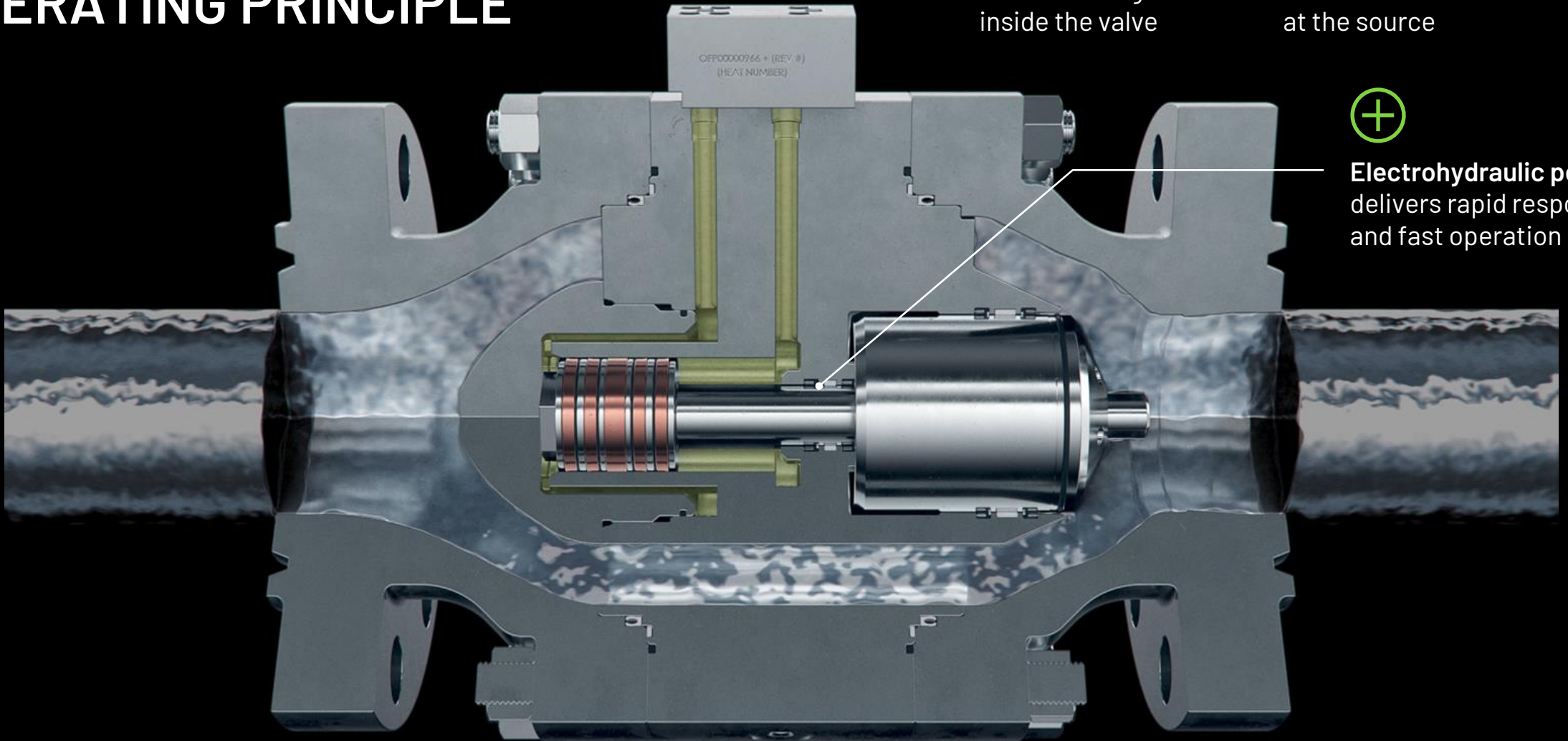


- +** **Eliminates Mechanical Drive Train**
- +** **Compact**  
Self-Contained HPU
- +** **Eliminates Stem Packing**  
Prevent Fugitive Emissions
- +** **Size and weight reduction**



ES VALVE

# DOUBLE ACTING OPERATING PRINCIPLE



Direct hydraulic drive actuator integrated inside the valve



Fugitive emissions eliminated at the source



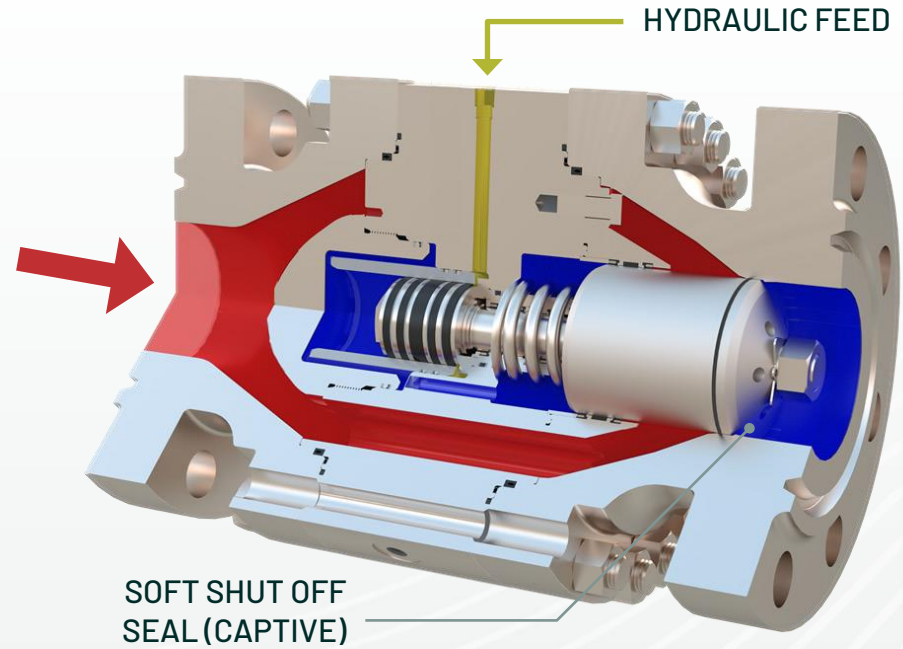
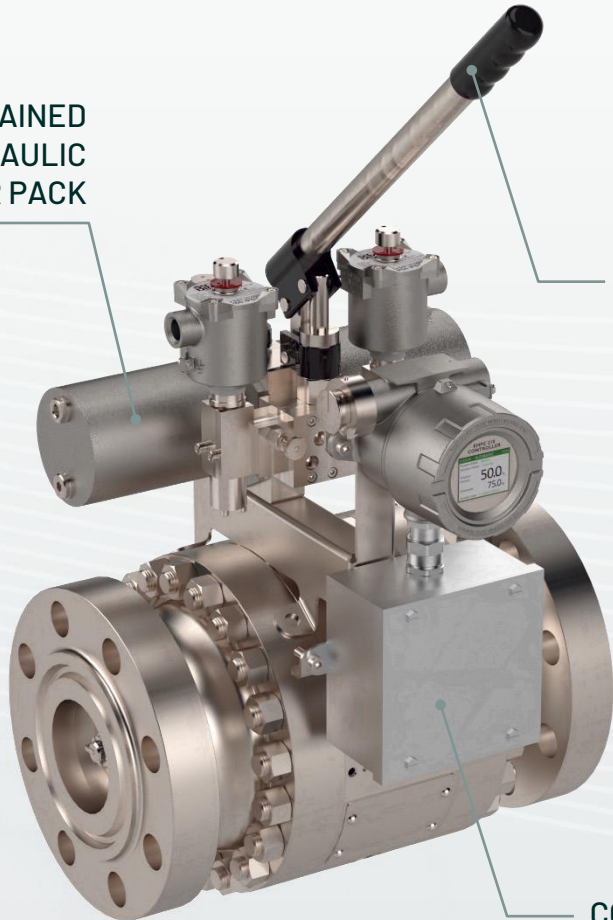
Electrohydraulic power delivers rapid response and fast operation



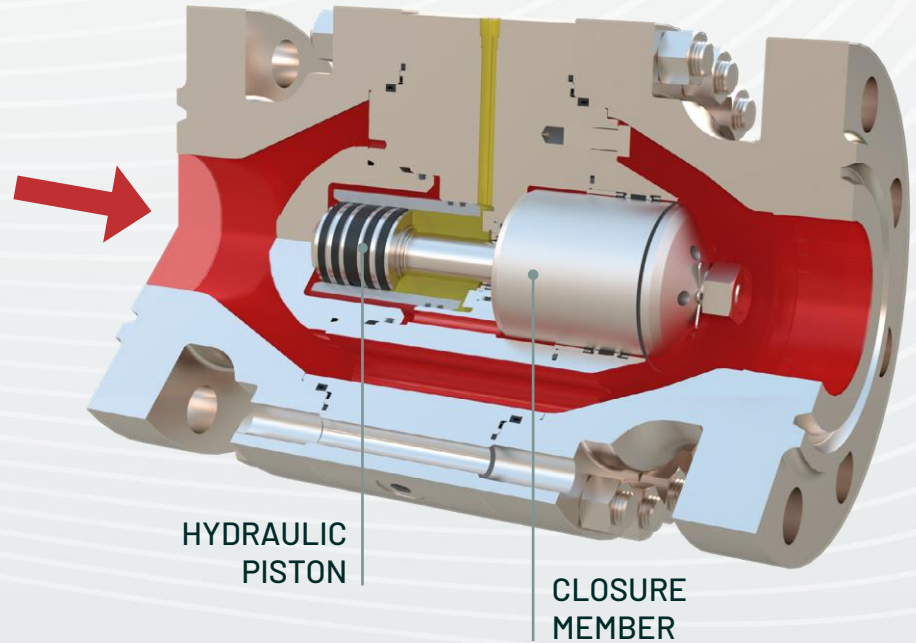
ES VALVE

# SINGLE ACTING OPERATING PRINCIPLE

SELF-CONTAINED  
24V DC HYDRAULIC  
POWER PACK



- Upstream
- Downstream
- Hydraulic





ES VALVE

# RANGE DETAILS



+ Size 2" - 24"

+ Class (150) 300 - 2500

+ Soft / metal seat options

+ Various Trims  
Anti-Cav, Linear, Equal %

+ Up to Class VI seat leakage

+ Designed in accordance with  
API 6D (2020)/ASME B16.34

# TESTED AND CERTIFIED



## Accelerated Life Testing (SIL 2)

25,000 cycles in OF flow loop to test endurance



## API 6D (2014) Design Validation Tests

Shell & seat tests with air and water, valve bubble tight



## High dP Restricted Flow Hydrocarbon Testing

Equinor trial with live hydrocarbon and severe pressure drop



## ISO 15848 Fugitive Emissions Testing (Helium)

Top rating achieved by significant margin, Class AH C03



## API 6AV1 Slurry Testing

500 cycles in 2% sand slurry, valve still bubble tight



## API 6FA Fire Testing

30min burn in 750C flames, valve still bubble tight





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# EQUINOR, KÅRSTØ

NORWAY







ES VALVE

# DEPLOYMENTS



## Red Cedar (AKA Energy), Colorado

3" ES valve to manage CO<sub>2</sub> blowdown at its Gas Gathering & treatment facility



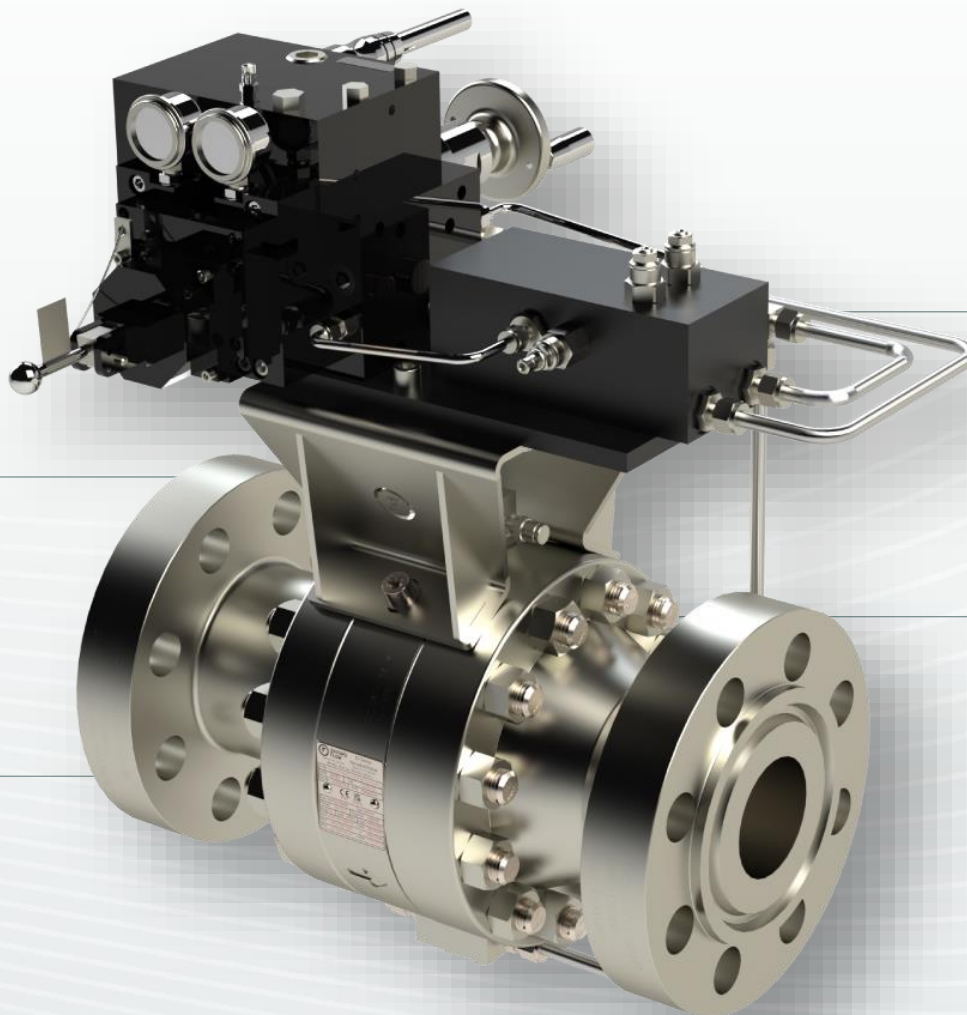
## Oxy, West Texas

2 x 2" ES valves for EOR operations (Isolation)



## Petros, Malaysia

4" ES valve for ESD operation at Gas Utility facility



## ADNOC, Offshore

5 x ES valves to replace leaking 'bad actors'



## Harbour Energy, North Sea

Pilot project to replace leaking ESD valve



## BP, N America Refinery

17 ES valves for isolation / ESD to replace leaking legacy valves

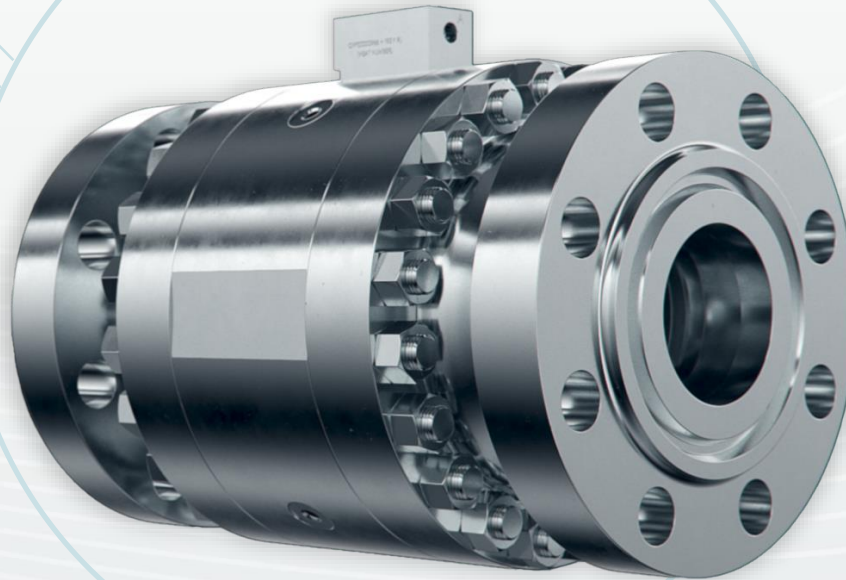
**+ Elimination**  
of main H2 leakage paths  
(stem/diaphragm)

**+ SS316**  
construction  
as standard

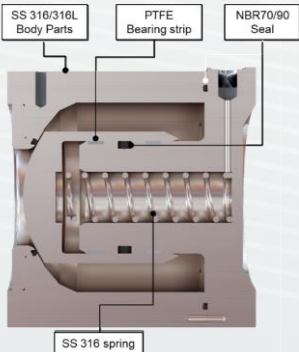
**+ ISO15848-1 FE**  
testing complete  
Class A Certified



**+ HYDROGEN READY TECHNOLOGY**



**Seal Integrity**



**Materials**



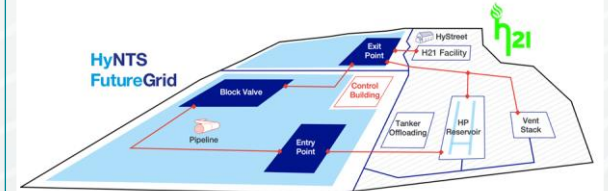
nationalgrid

**HyNTS FutureGrid**  
Building a Testing & Training Facility for the UK

The FutureGrid test facility will be built at DNV GL's Spadeadam Site:



The FutureGrid test facility will connect to the H21 distribution facility creating a representative UK Hydrogen Testing and Training Facility:



'Beach to Burner' UK Test Network



Digital first approach to engagement



Maximise collaboration and reach



Train Future Hydrogen Engineers

Testing & Training Facility





# H<sub>2</sub> PROJECTS

## LTS FUTURES



**+ LTS Futures (SGN) and National Grid pipeline**  
- methane blends up to 50% Hydrogen (stem/diaphragm)

**+ Project awarded 2023**  
installations in 2024



## SGN partners with Oxford Flow to verify hydrogen-ready gas networks

06 Jun 2023



Gas distribution company SGN has selected flow control solutions specialist Oxford Flow, to help prove the hydrogen-readiness of existing gas network infrastructure. The companies will work together as part of SGN's LTS Futures project, which is verifying the compatibility of Great Britain's local transmission system (LTS) with hydrogen gas.





# H<sub>2</sub> PROJECTS

H100 FIFE



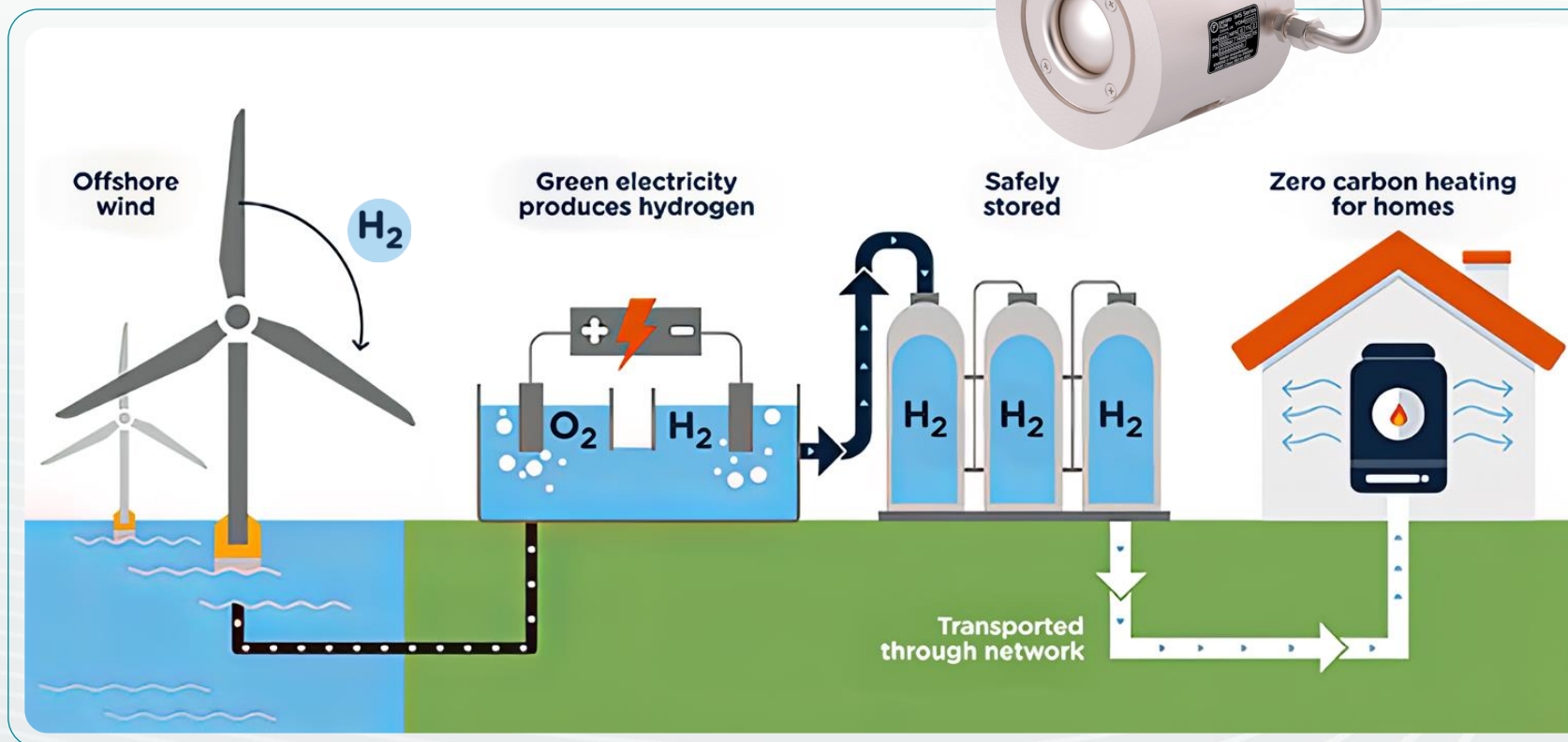
H<sub>2</sub>

H<sub>2</sub>

+ **World first**  
renewable H<sub>2</sub> to homes

+ **Heating 300 homes**  
using clean gas via  
electrolysis plant,  
powered by offshore wind

+ **Project awarded 2023**

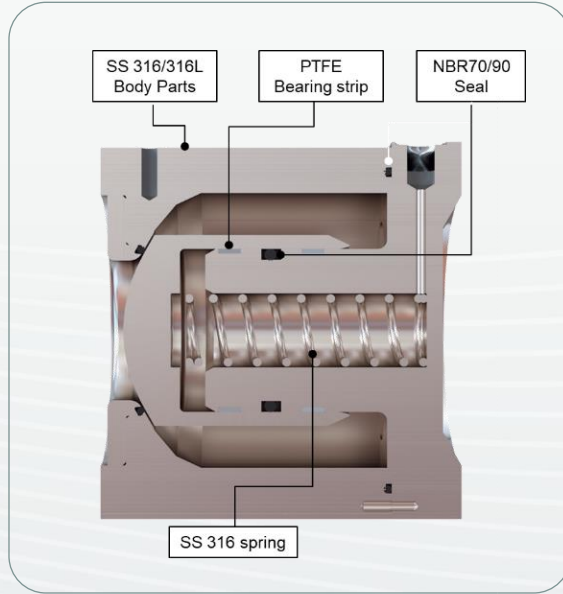


# HYDROGEN READY PRODUCTS

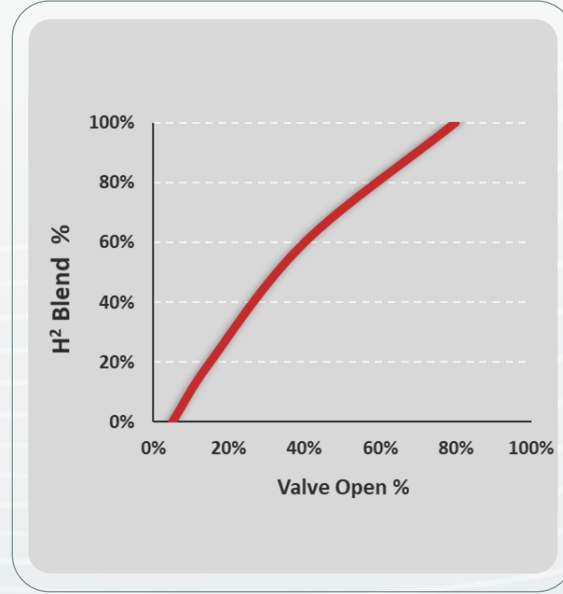
Ideally suited to support the introduction of Hydrogen into the gas distribution and transmission network.



+  
Materials



+  
Seal Integrity



+  
'Rangeability'



Discussions are ongoing with all of the major UK gas distribution network companies about the use of Oxford Flow's IM technology into their Hydrogen pilot schemes.





OXFORD  
FLOW

# REIMAGINING VALVE TECHNOLOGY



[oxford-flow.com](http://oxford-flow.com)



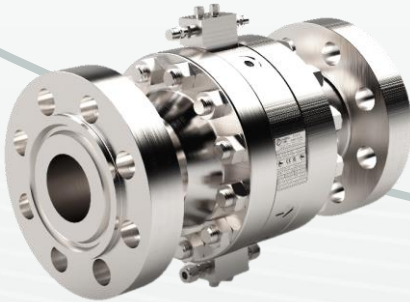
# OUR FUGITIVE EMISSION FREE, LEAK-PROOF PRODUCTS ARE:

⊕ HYDROGEN  
READY

⊕ SMALLER

⊕ LIGHTER

⊕ UNRIVALED  
in performance  
& cost savings



**ES**

**STEMLESS, ZERO EMISSIONS  
CONTROL & ISOLATION VALVE**

Pressure-balanced, internal hydraulic actuation  
operated by a compact hydraulic power unit



**IP-X**

**AXIAL FLANGED LIQUID REGULATOR**

Axial Flow design using piston sensed  
mechanism eliminating need for diaphragm



**IM-C**

**'TOP-ENTRY' FLANGED GAS REGULATOR**

Cartridge insert design offering easily  
accessible inline servicing



**IM-S**

**AXIAL FLOW WAFERGAS REGULATOR**

Enabling technology for the 'Energy Transition'  
(H2 ready & tested).





# TRACTION

US UTILITY GAS DISTRIBUTION & TRANSMISSION



May 2022  
Williams Hockessin



Dec 2023

Florida Gas Transmission  
TC Energy



Feb 2024  
Red Cedar Gathering



May 2024

PG&E Trenton Station  
Ethos Energy







# VALUE PROPOSITION

FUGITIVE EMISSIONS AND EXTERNAL LEAK PATH FREE

**ELIMINATING** FUGITIVE EMISSIONS



**No stem or external actuator**

Eliminates main causes of failure & eliminates risk of fugitive emissions



Fugitive emissions **free**



ISO15848 tested with Helium



Performed 1,000x better than any typical valve currently on the market

**ENABLING** THE GREEN ENERGY TRANSITION



**No rubber diaphragm**

Enabling technology for the 'Energy Transition' (H2 ready & tested)

Ideally suited to support the transition to the use of hydrogen in gas networks

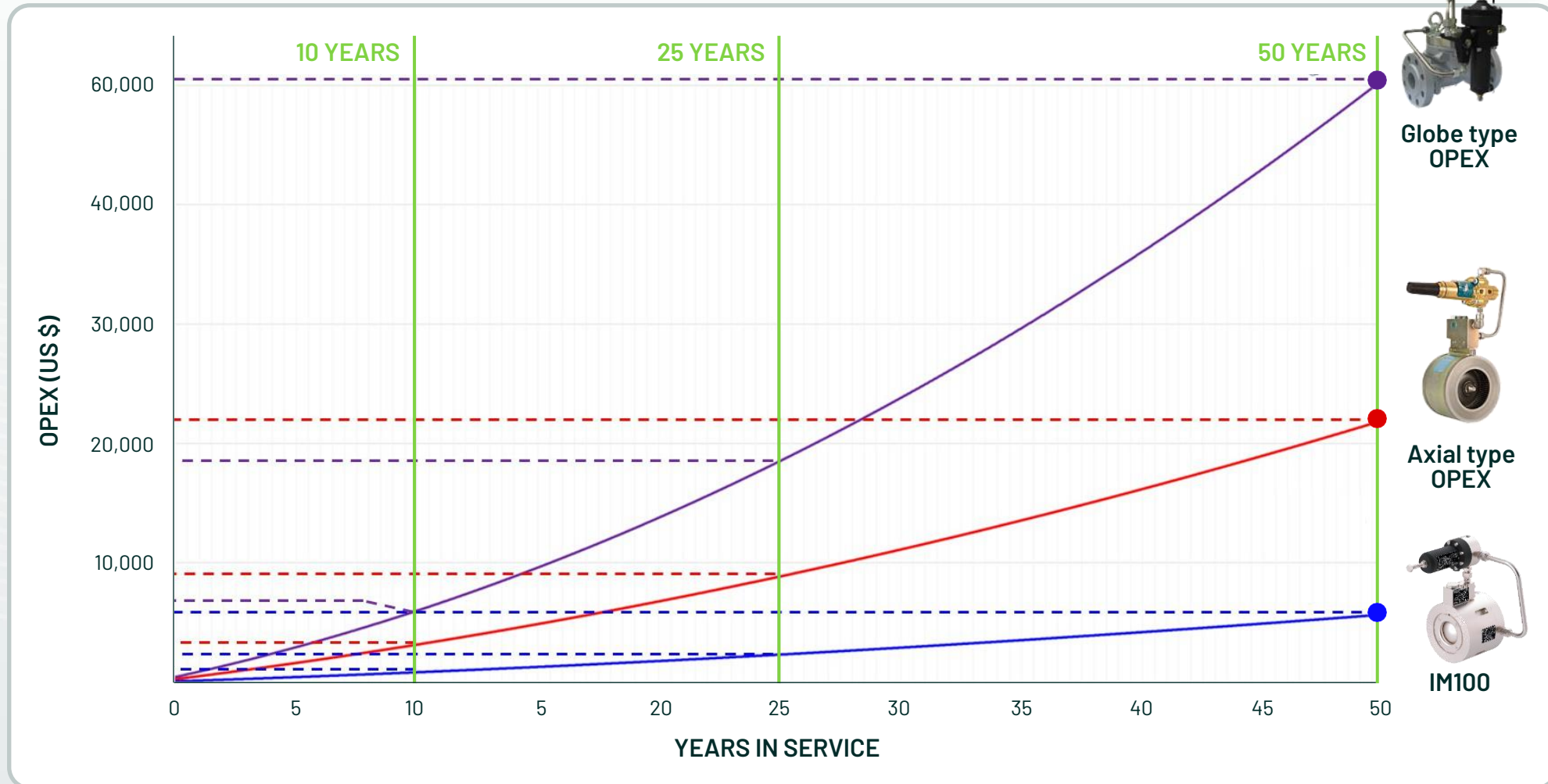
Customer engagements increasingly driven by growing environmental necessity





# OPEX IMPACT

EXAMPLE OVER 50 YEAR LIFETIME (4 INCH REGULATOR)



# DECARBONIZATION IMPACT



QUAD 0 REGULATIONS

**58 Million tons**  
of methane emissions  
Between 2024 and 2038

EQUIVALENT TO...

**1.5 Billion tons**  
of CO<sub>2</sub> emissions

ESTIMATED AVERAGE ANNUAL COST...

**\$1.5 Billion**  
per annum

Regulatory compliance costs  
for the implementation & maintenance  
of emissions control technologies



**+** 125,000 valves per location

**+** 1,102 Tons CO<sub>2</sub>e reduction  
per location per year (4" valves)

**+** CO<sub>2</sub> equivalent of  
1,000 flights between  
UK and USA



# REIMAGINING VALVE TECHNOLOGY

