Innovation Award 2025 Submission

PAC presents Oxford Flow's ES Stemless Valve: Groundbreaking Technology for Net Zero

Introduction

As the exclusive distributor of Oxford Flow in Australia and New Zealand, PAC is proud to present the **ES Stemless Valve** - a transformative innovation in valve technology that directly supports the global push toward net zero emissions. Valves are essential components in the oil, gas, and energy sectors, yet they are also responsible for up to 60% of industrial fugitive emissions, primarily due to leakage at the stem seal interface. Oxford Flow has addressed this challenge head-on by eliminating the stem entirely, creating the **world's first truly zero-emission valve**.

In addition to its emissions-free design, the ES Stemless Valve is **fully hydrogen-ready**, making it a future-proof solution for industries transitioning to hydrogen based systems as part of broader decarbonisation strategies.

The Impact of Fugitive Emissions on the Oil & Gas Industry

Fugitive emissions are unintended releases of gases such as volatile organic compounds, methane and other greenhouse gases, often occurring through leaks in valves, pumps and flanges. Valves are a particular culprit, **accounting for approximately 60% of these emissions**, primarily due to the challenges associated with sealing around a moving stem. In Queensland alone, fugitive emissions contributed 18.2 million tonnes of carbon dioxide equivalent ($MtCO_2e$), 14.6% of Queensland's total emissions (*2022 State of The Environment Report*).

While the oil and gas sector contributes a relatively small portion of Australia's overall emissions, it is a major source of methane, a greenhouse gas with **25 times the global warming potential of CO_2** over a 100-year period. These leaks not only hinder climate goals but also result in product loss, inefficiencies and safety risks.

The Problem: The Valve Stem

In conventional valves, the stem is necessary for actuation but introduces a critical vulnerability. Stem seals degrade over time due to wear, pressure fluctuations and thermal expansion, becoming a persistent source of fugitive emissions, even with regular maintenance.

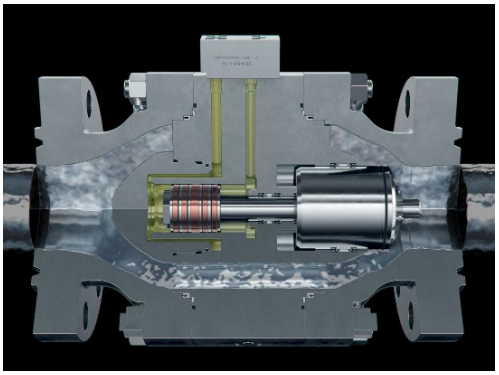
This design flaw has far-reaching environmental consequences, contributing significantly to climate change and operational inefficiencies across industrial sectors.

The Solution: The First Ever Stemless Valve

Oxford Flow's ES Stemless Valve represents a **paradigm shift** in valve engineering. By **eliminating the stem**, the valve removes the primary source of fugitive emissions, achieving **true zero-emission performance**. This innovation sets a new benchmark for sustainability and reliability in industrial valve design.

How It Works

The ES Stemless Valve uses a **direct electrohydraulic actuation system**, applying force directly to internal components without the need for a stem. This fully enclosed system eliminates all external leakage points, resulting in a **sealed, leak-proof design**.



Key Features and Benefits

- **Zero Emissions**: Eliminates the stem - the main source of valve leaks - achieving genuine zero emissions.
- **Maintenance-Free Operation**: Reduces downtime and operational costs by eliminating the need for frequent seal replacements.
- **Durability and Longevity**: Fewer moving parts and no external seals mean longer life and greater reliability.
- **Cost-Effective**: Lower total cost of ownership through reduced maintenance, emissions penalties, and operational disruptions.
- **Hydrogen-Ready**: Fully compatible with hydrogen applications, supporting the transition to low-carbon energy systems.

Scalability of Design

The ES Stemless Valve's compact, pressure-balanced design and material versatility make it highly scalable across industries:

- **Reduced Size and Weight**: Ideal for space constrained environments such as offshore platforms.
- **Remote Mounting**: Flexible installation and easier maintenance in complex systems.
- **Material Versatility**: Configurable for oil & gas, petrochemicals, hydrogen and more.
- **Emerging Energy Applications**: Suitable for hydrogen infrastructure, carbon capture and ammonia distribution.

See the Product Information Sheet attached to this submission for details on Applications, Scope and Performance & Sizing

Alignment with APGA's Strategic Goals

Oxford Flow is committed to developing sustainable, forward-thinking technologies that contribute to a cleaner, greener future. The ES Stemless Valve aligns with **APGA's three Strategic Pillars** by:

- Reducing emissions and environmental impact.
- Supporting innovation and technological advancement.
- Enabling the transition to low-carbon energy systems

More specifically....

MEMBERS

Create opportunities for members

- Oxford Flow have appointed PAC, Australian owned and operated, as their sole Australian/NZ distributor
- PAC's large existing network of O&G customers will have access to this innovative product

ADVOCACY

Increase appreciation of the role of gas infrastructure

- The ES Valve has been designed to meet key strategic imperatives recognised globally, demonstrating that the Oil & Gas industry can play a key role in:
- Contributing to NetZero emission targets
- Reducing operating costs due to it's maintenance-free operation, and durability/longevity

CAPABILITY

Best prepare the industry for the future

- The ES design has been specifically engineered to accommodate the unique challenges of hydrogen, such as its small molecular size and potential for permeation
- This future-proof capability ensures the valve can play a critical role in hydrogen-based systems, supporting the Oil & Gas industry in efforts to decarbonise

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Conclusion

The Oxford Flow ES Stemless Valve is more than an engineering innovation, it is a **strategic enabler of net zero goals**. By eliminating the stem, Oxford Flow has solved a decades-old problem, delivering a valve that is **zero emission, maintenance free and future-ready**.

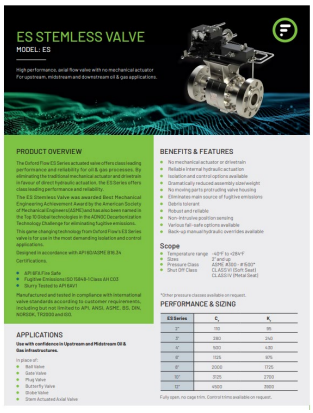
PAC is proud to bring this technology to Australia and New Zealand, helping the Oil & Gas industry reduce emissions, improve efficiency and prepare for a sustainable energy future.

The Oxford Flow ES Valve – Reimagining Valve Technology!

Attachments (to submission) :

- Website references:
  https://www.pipact.com.au/
  https://oxford-flow.com/

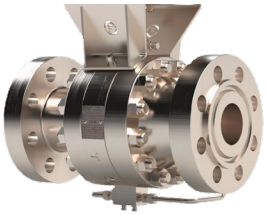
- Product Information Sheet:
  ES Stemless Valve



- **Case Study:**
  SE Stemless Valves
  High Pressure Live Gas Project

- **Product Images**

ES Valve on XXXXXXXXXXX



ES Valve with bracket

ES Valve on Red Cedar 3