

BICHLOR™ Electrolyser

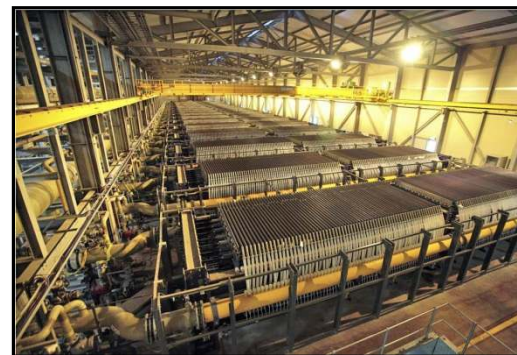
***Designed by Operators
for Operators***



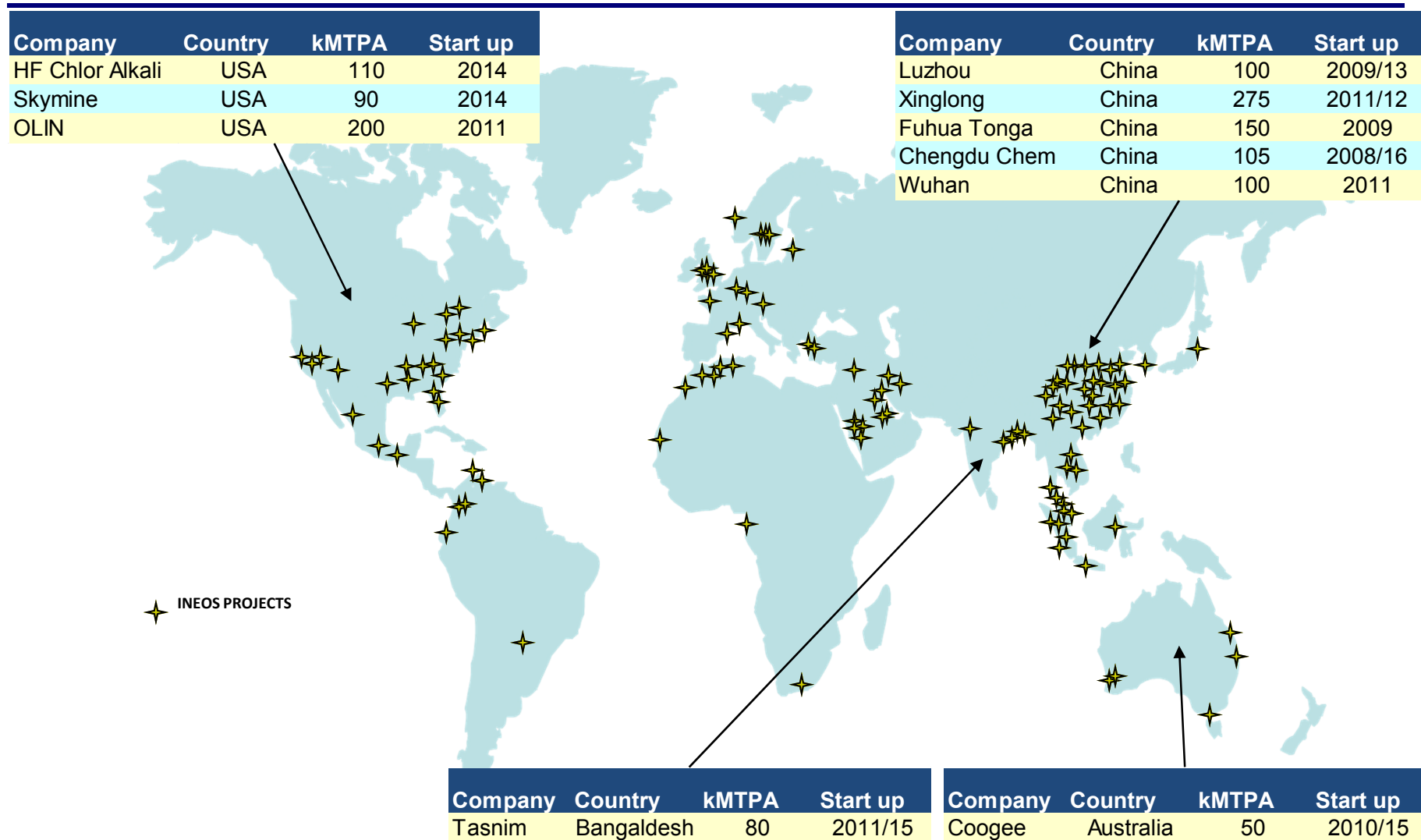
John D Hughes
Business Development Manager

Our Experience as Operators and Engineers

- **INEOS** has over 118 years experience in chlor-alkali operation
- **INEOS ChlorVinyls** is a major European chlor alkali producer operating 7 cell-rooms across Europe, total capacity 1.6 million MTPA of chlorine
- **INEOS Technologies** is an expert in cell room technology and is a manufacturer of electrolyzers and licences the process knowledge
- **INEOS Technologies** has recently enhanced their electrolyser offering
- **INEOS Technologies** has more than 120 licensees world wide

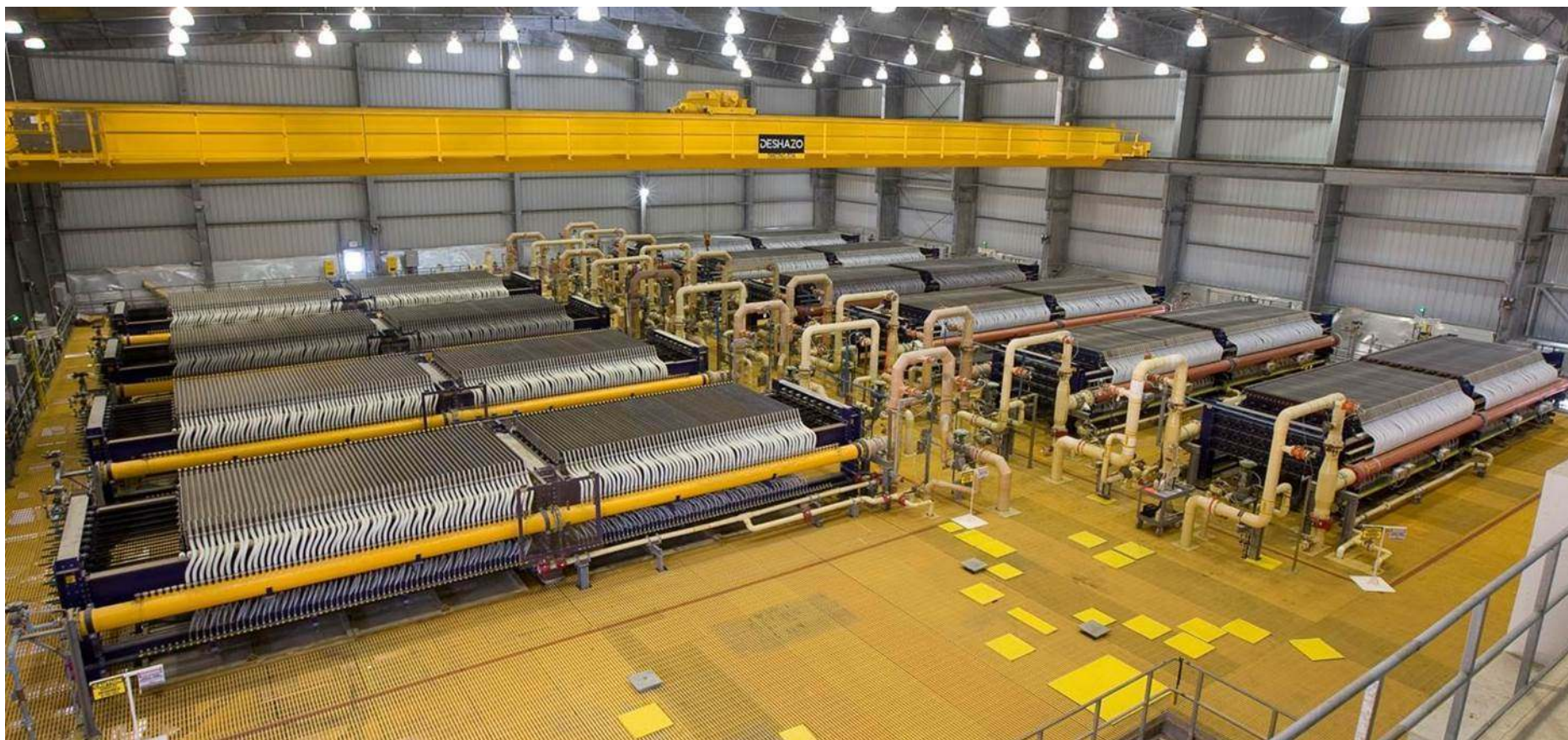


BiChlor - Global Presence

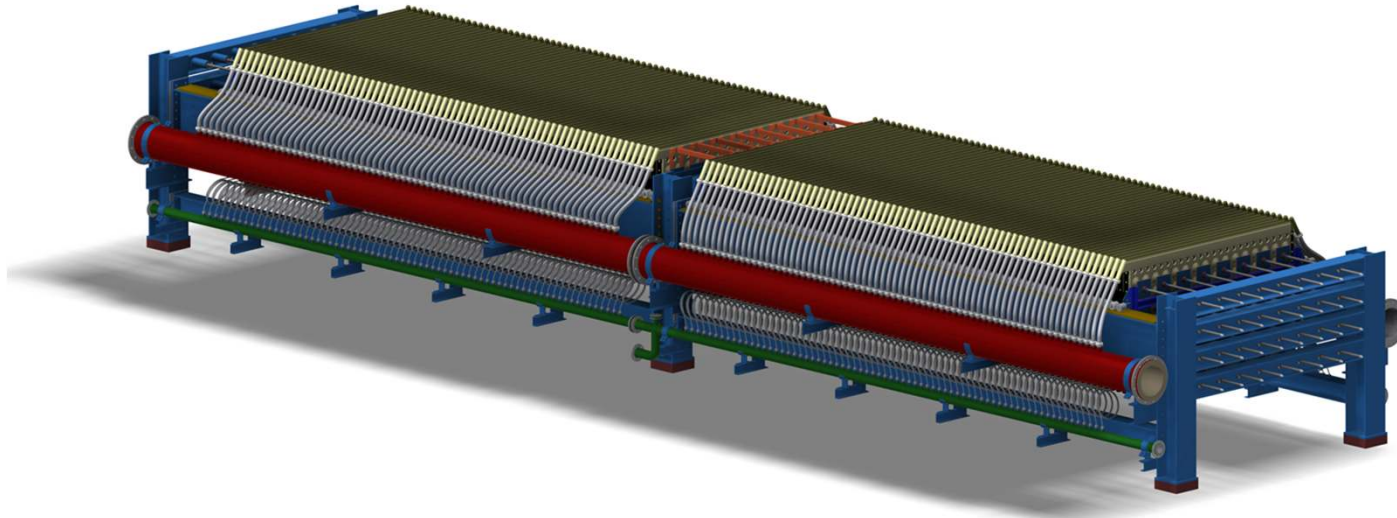


More than 120 licensees world wide

BiChlor Electrolyser – Actual view



BiChlor Electrolyser – Enhanced Attributes



- Zero Gap Technology
- Electrolyser output up to 50,000 MTPA per electrolyser
- Effective Area of modules 3.4 m²
- Normal operating current density 6.0 kA/m²
- Normal Operating Pressure range up to 300

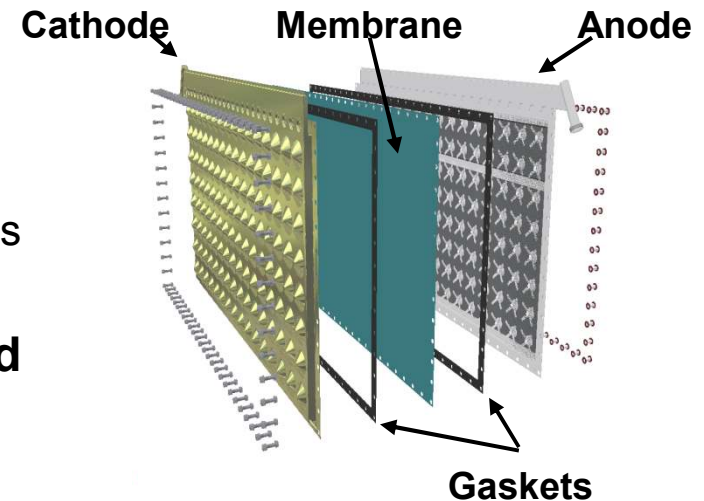
BiChlor electrolyser have the largest module area. This reduces the number of modules required per tonne NaOH

Looking inside the BiChlor electrolyser – Key Features

- Modular
- Dimple Pan Design
- Short current path and uniform current distribution
- Electrode coatings (Dr Armstrong)
- Advanced Sealing

INEOS Modular Design Enables:

- **Fully Wetted Membrane**
 - Gas/Liquor interface above the membrane
 - Avoids damage and pin-holing of membrane
 - Prevents mixing of Cl_2 / H_2 to avoid explosions
- **Pressure testing before use (to detect and eliminate leaks)**
- **Maintenance work carried out away from the cell room**
 - No risk of electrical shock
 - Clean and safe work area
 - No work carried out on top of the electrolyser
 - Replacement modules can be prepared for rapid electrolyser turn around

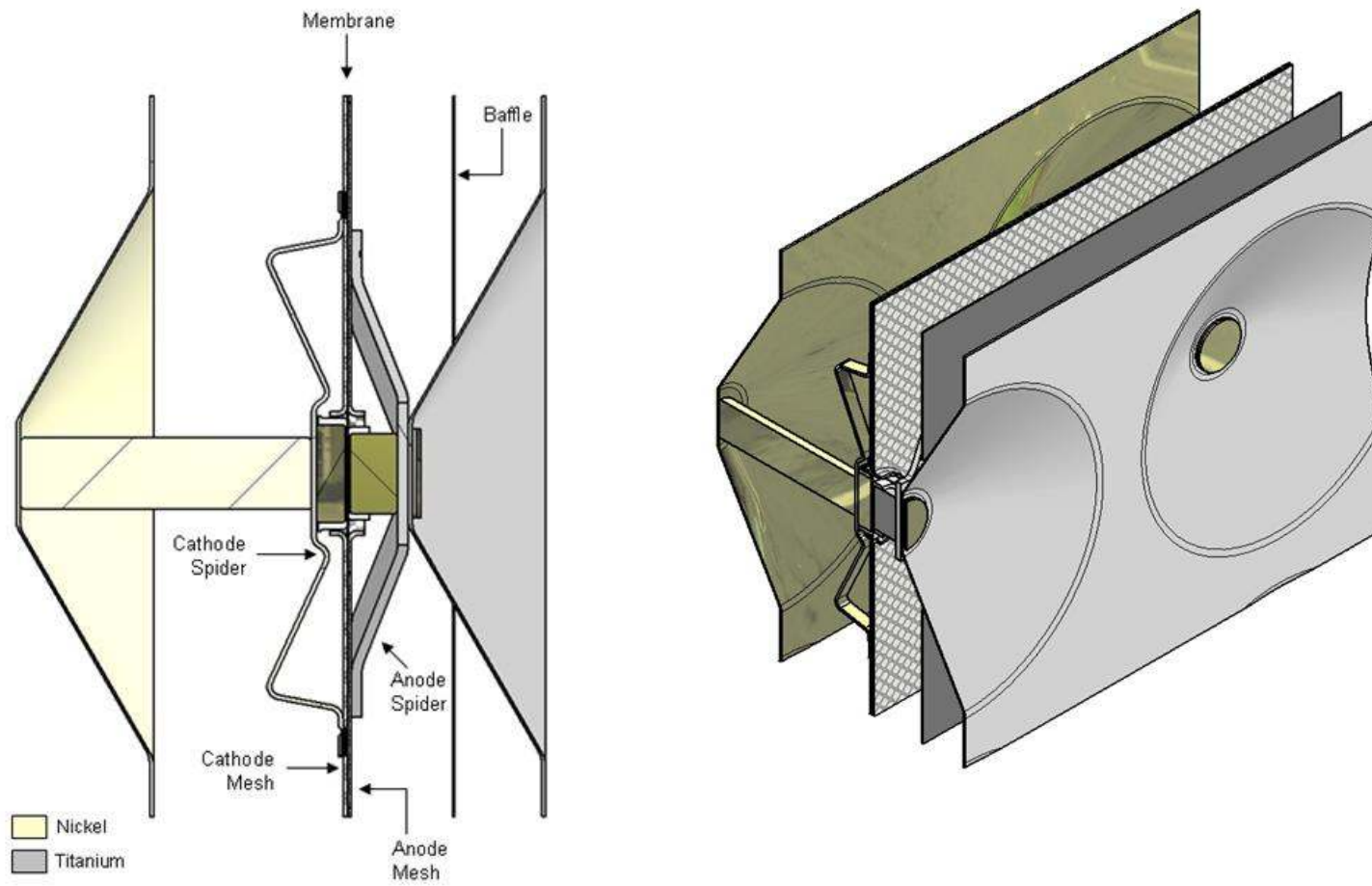


Dimple pan design

- **Reduced electrical resistance by**
 - Maximising use of nickel post in cathode pan
 - Minimising use of titanium post in anode pan
- **Strength**
 - Resistant to distortion during in-pan re-coating
 - Resistant to pressure
- **Self alignment of modules at commissioning**

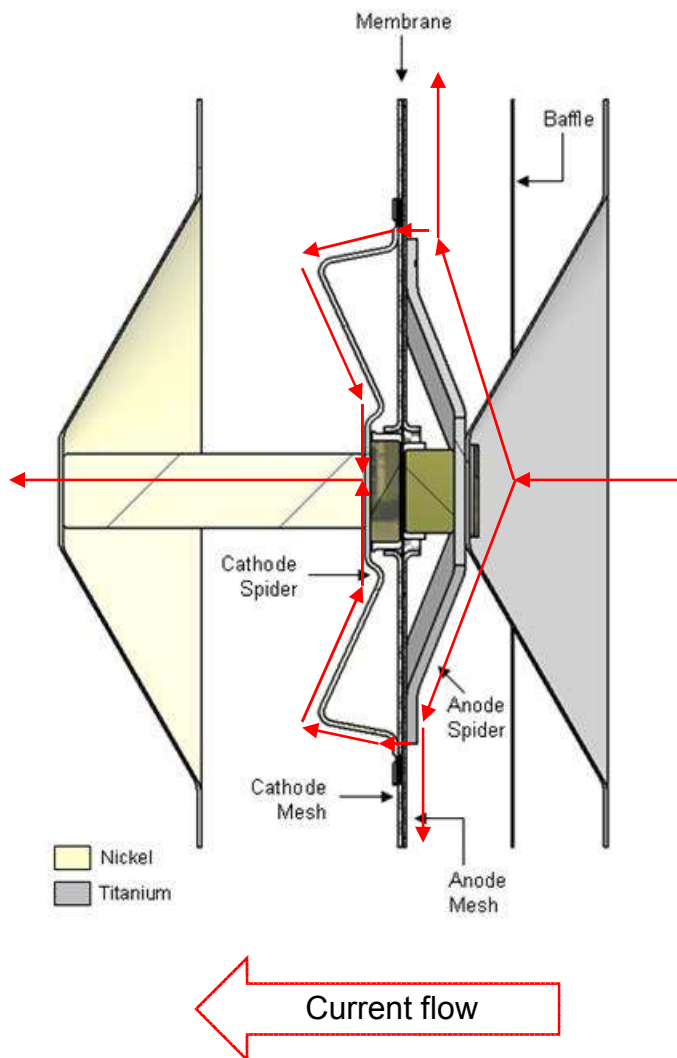


Module construction showing dimples and “spider” structures



Cross Section through module

Module construction showing dimples and “spider” structures



- Each anode and cathode has hundreds of dimples
- Each dimple on the anode and cathode has a offset distribution 'spider' attached to it
- Insulated pins redirect the current through the spiders 'legs'

Benefits

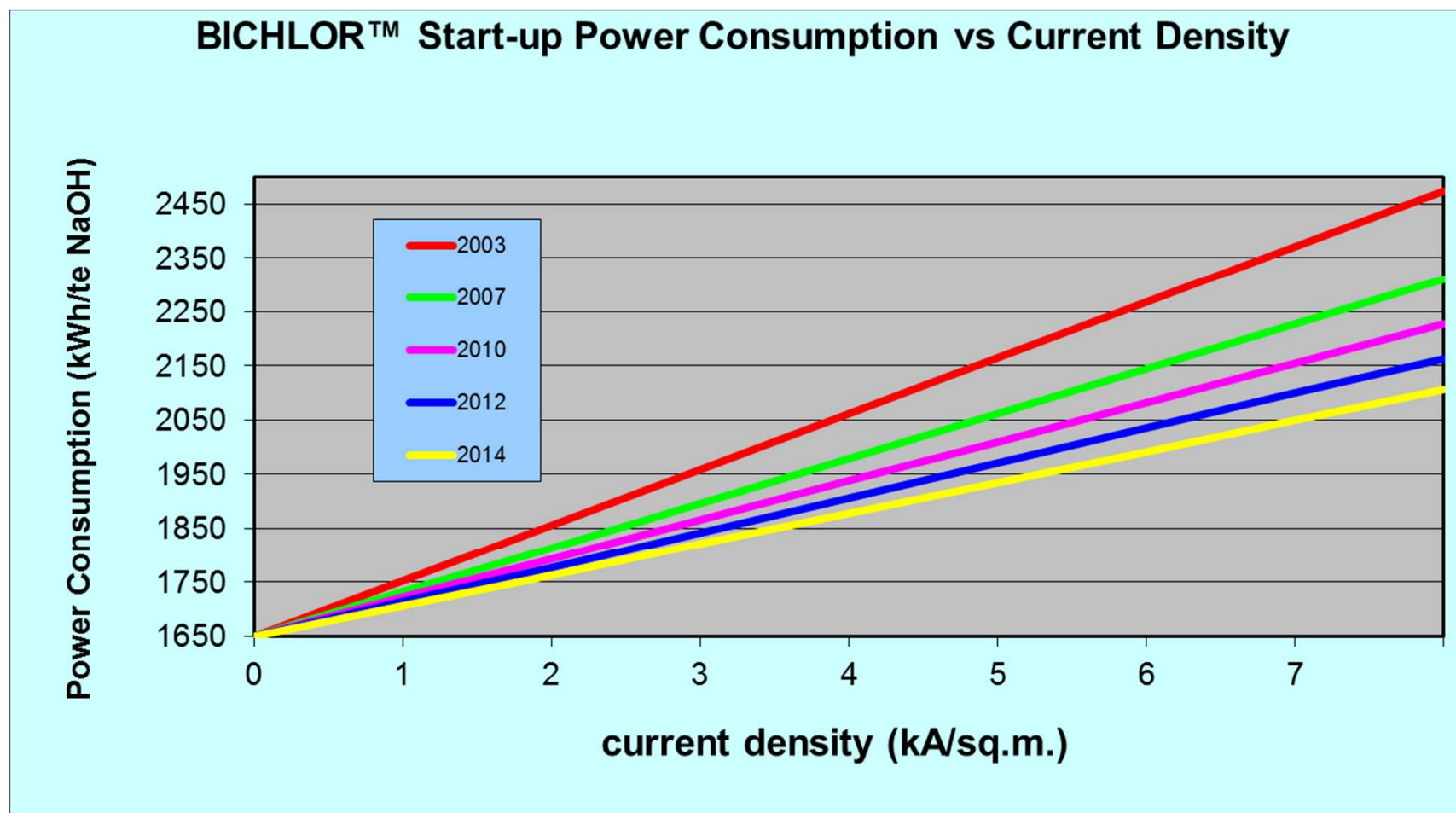
- Membrane fully supported no “flapping”
- Openness of contact points ensures even current distribution with no “hot spots” and no localised high concentration of product formation
- Prevents pinching of membrane

Bichlor open mesh cathode structure

- BiChlor electrolyzers have always used an open mesh cathode
- This provides the following advantages
 - Enhanced catholyte circulation
 - Eliminates stagnation of catholyte
- This means no “hot spots” are generated and that all new high performance membranes can be used to optimise energy efficiency and reduce power consumption



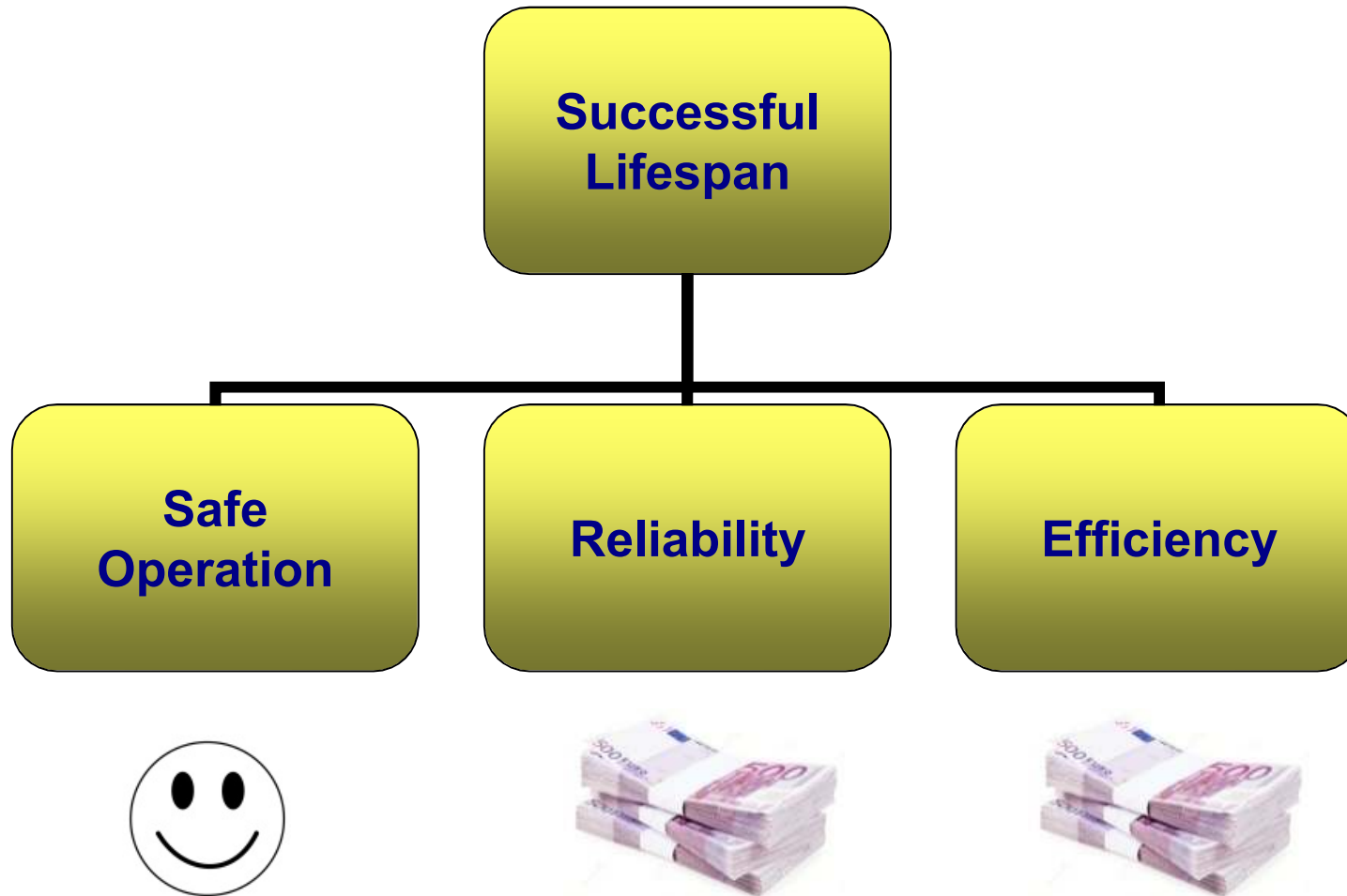
Continued focus on performance



- **Gasket structure evolved over > 25 years**
 - Constructed of EPDM rubber with PTFE protection at the interfaces with the electrolytes
 - Designed to minimise anode flange crevice corrosion
 - Profiled at point of contact with membrane
 - Diminished risk of leakage of products



As Operators what are we looking for?



With BiChlor you benefit from

- **Safe Operation**

- Designed for safety
- Easy access to electrolyser components, e.g. headers
- Module maintenance away from the electrolyser area
- Module design prohibits chlorine and hydrogen explosions



- **Reliability**

- Proven electrolyser design
- Membranes guaranteed for 4 years minimum
- Anode and cathode life up to 16 years
- Performance backed up by product volume guarantees
- Engineering and Technical back up help from INEOS team
- Access to INEOS Technical service team at start up and whilst in production



- **Efficiency**

- Leading position on power consumption
- Performance backed up by product quality guarantees



Plus: Our Commissioning and Technical Service offering

- **Extensive commissioning support**
 - Lead commissioning manager plus support as required
 - Operator training
 - Overview of frame and module build
 - Electrolyser start-up
- **Technical service support is part of the deal**
 - No extra cost for standard level of support
 - Designated Technical Service Manager
 - Your link to our full technical team
- **Regular contact**
 - Visits at least once per year
 - Phone & e-mail
 - Performance evaluation and operating advice
 - Technical support
 - Electrolyser maintenance planning
- **Customer forum every 2 years – highly valued by our clients**

A photograph of a large industrial facility, likely a refinery or chemical plant. The image shows rows of complex machinery, including pipes, valves, and structural supports, extending into the distance. The lighting is bright, and the overall scene is one of a large-scale industrial operation.

Thank you &
Enjoy the remaining
Conference