Ionics* BPED

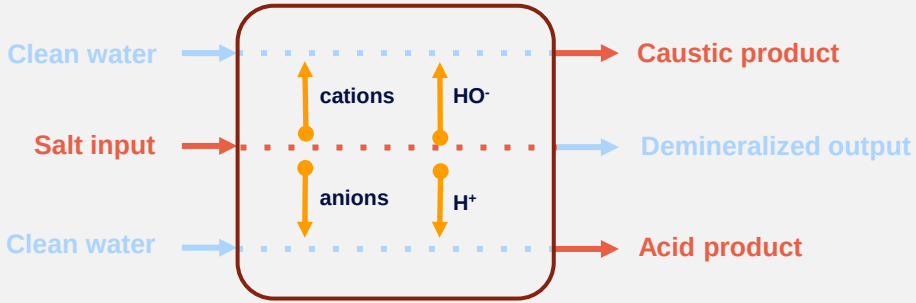
Electrodialysis converting salt-containing streams into value-added products.


VEOLIA
Product Overview
Ionics BPED Product Range

WHAT IS BIPOLAR ELECTRODIALYSIS ?
SHORT OVERVIEW

This is a plate-and-frame ion exchanger + a water splitting device

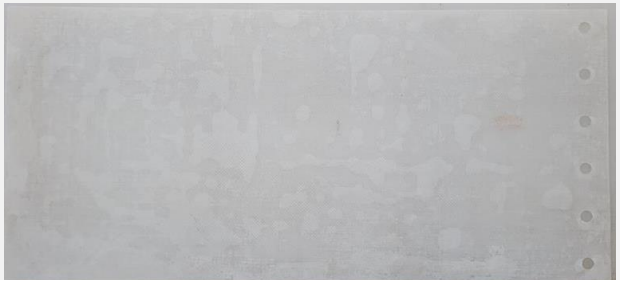
1. It moves ions through selective ion exchange membranes
2. Bipolar membranes catalyzed to split water
3. Cations and anions are separately combined with OH^- and H^+ and converted to caustic and acid



WHAT IS IT MADE OF?
PARTS

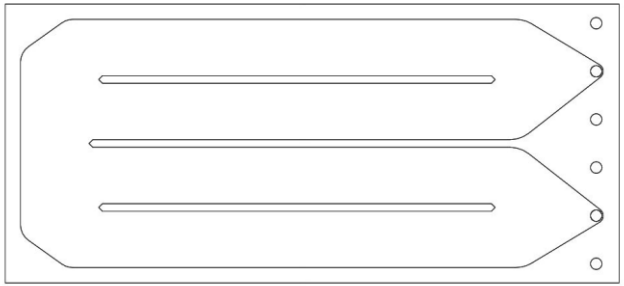
IONICS MEMBRANES & BIPOLAR MEMBRANES

Ion-exchange resin cast on a cloth support. Ion-selective for either anions or cations



SPACERS

Provide flow path for stream in between alternating membranes.



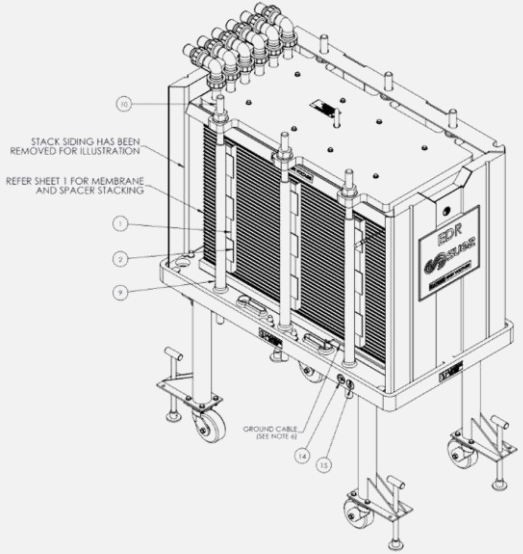
ELECTRODES

Deliver DC power to stacks. Metallic anode and cathode

WHAT IS IT MADE OF?
Stacks & System

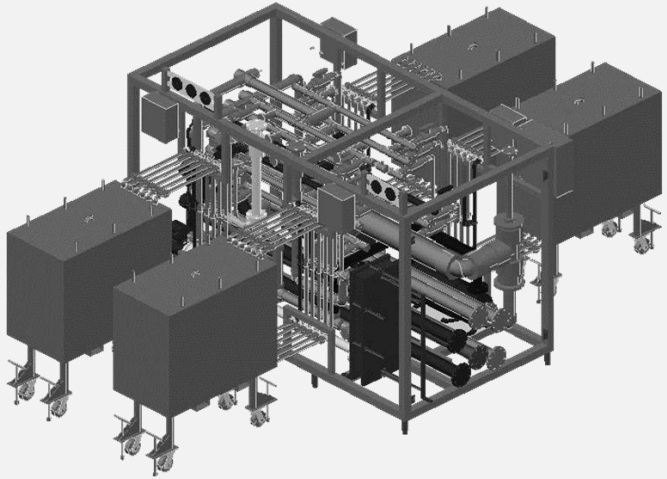
STACKS

Membranes, spacers, and electrodes, are installed within endplate assemblies to make stacks. Sold individually as SKU or into a system/project.

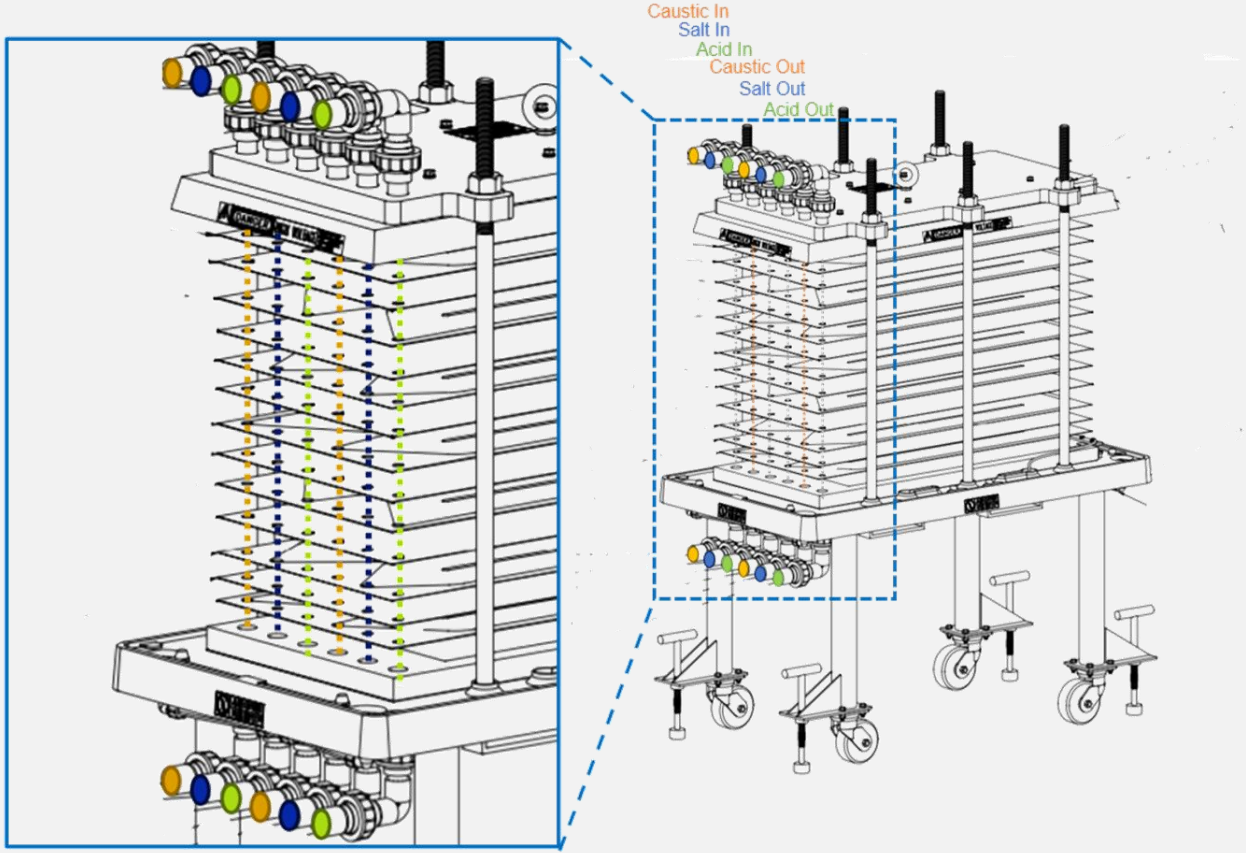


SYSTEMS

Standard modular design available



WHAT IS IT MADE OF?
Stacks & System



WHY SHOULD YOU CARE?
VALUE PROPOSITION

Ionics BPED is the sole mature viable technology available on the market to transform a waste salt stream into acid and caustic for reuse in manufacturing facilities.

Waste disposal minimization: Waste salt discharge and salt off-taking are getting more challenging as environmental regulations get more stringent over time.

Supply chain risk mitigation: As the demand for Electric Vehicles increases, the demand for commodity chemicals like sulfuric acid and sodium hydroxide is outpacing the supply, creating pricing and supply uncertainties around key chemicals

True circular economy: The acid and caustic produced can directly be reused in the production process and prevent buying and trucking tons of chemicals to sites, drastically diminishing the carbon footprint of the equipped production plant.

Clean and Green: BPED is an electricity-driven technology and therefore can be considered “Green” depending on the electricity source


VEOLIA
Applications &
Case studies
Who buys Ionics BPED?

WHERE DOES IONICS BPED MAKE A DIFFERENCE?

TYPICAL APPLICATIONS

SODIUM SULFATE

A significant amount of sodium sulfate is getting produced in Mining and EV supply chain. Producers are currently looking at ways to valorize this stream as it's getting very hard to just get rid of it

LITHIUM CONVERSION

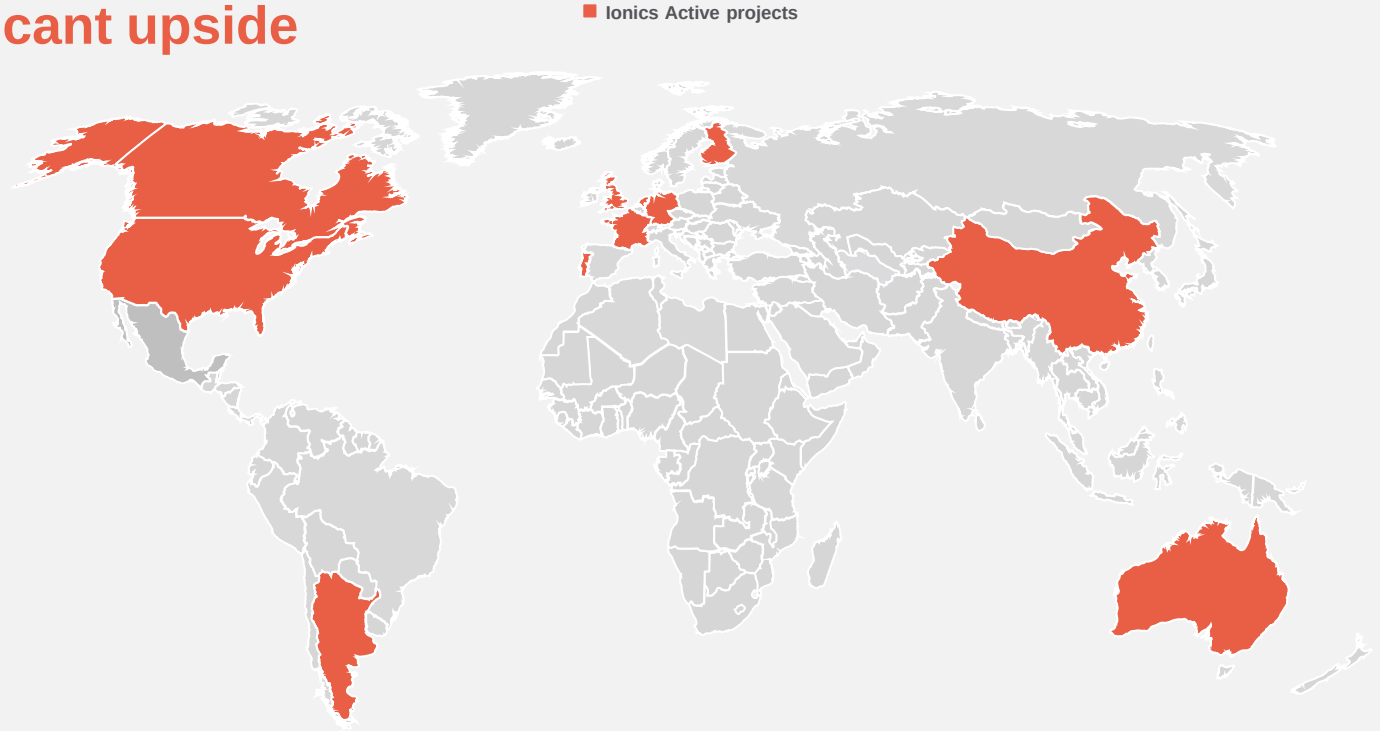
As EV demand increases, the demand for high-grade lithium hydroxide increases as well. BPED can be used to convert lithium sulfate in the higher value compound Lithium hydroxide

CHEMICAL REGENERATION

As customers work on reducing their chemical consumption, BPED can be used on the IX regeneration effluent to recover the caustic and acid necessary for the regeneration of the resin

IONICS BPED

A nascent Technology with significant upside



ITALY
Na_2SO_4 conversion

1. Existing Ionics ED customer producing lactulose (Pharma Industry), experiencing restriction on the discharge of its salty brine

2. The customer asked if we could help him convert its waste streams (containing aluminum from an upstream catalyst) into reusable product

3. Aluminum is removed upstream of the Ionics BPED, which couples with a small RO system to provide a full ZLD process.

Credit project, Finland
Chemical recycling

1. The CREDIT project (co-funded by EU) has been initiated to develop a new concept of water treatment to reduce the sodium sulfate waste generated by the battery chemical plants.

   An Ionics BPED pilot was commissioned and run successfully for 9 months on site

Technology competition

Where do we stands a chance ?

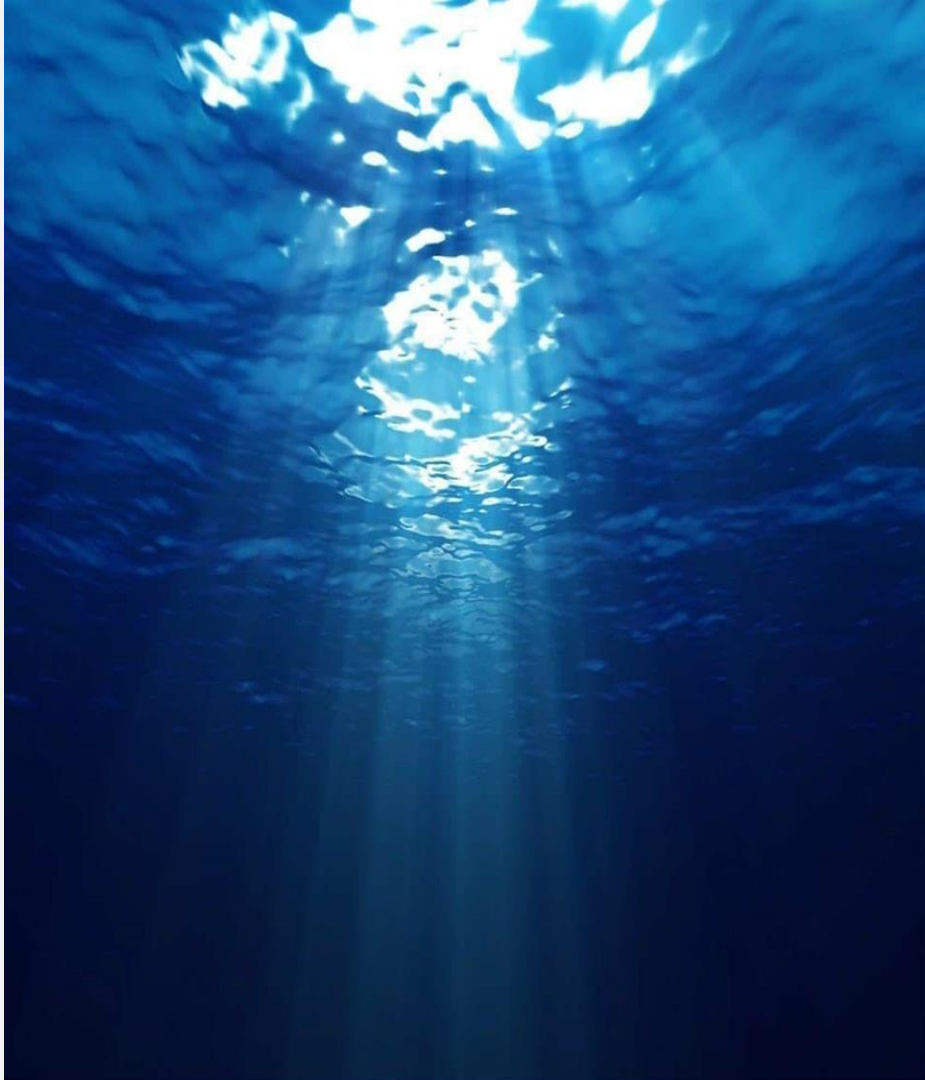
HOW DOES IONICS BPED WIN? AGAINST ?

Ionics BPED has currently a unique positioning

Supply chain risk mitigation: No other mature solution allows for commodity chemicals production on site

True circular economy: No other mature solution can remove the carbon footprint impact associated with hauling and trucking chemicals across countries

Clean and Green: No other mature solution can use a cleaner energy source



HOW DOES IONICS BPED WIN?
AGAINST ALTERNATIVES

DISCHARGE | ZLD

Discharge in the environment if you can get a permit for it
Crystallize and Store (and find a off-taker if available)

+ Cheapest and fastest option if available

+ Proven Technology, simple to implement

- Getting discharge permit is getting harder | Finding an off-taker for Na2SO4 is very hard (very stringent specs + low availability)

- It does not address the NaOH scarcity/price hike issue
It does not address the Carbon footprint issue

RECYCLING | VALORIZATION

BPED is the front running Technology

Anaerobic digestion (still at lab stage) | Chemical conversion (need to find a by-product with enough value) are promising technology

+ transform a waste into an added-value product

+ Eliminate the need to buy NaOH

+ Significantly reduce Carbon footprint

- Higher CAPEX than ZLD

- Lack of large-scale references (outside of China)

SUBSTITUTION

K-based Chemistry or NO_3 based chemistry could be used instead of the current NaOH/ SO_4 based chemistry

However, K- based chemistry is also constrained in terms of availability and NO_3 based chemistry is still not delivering the expected product quality needed in the industry

- Substitution is likely to happen but it is also likely **a Decade** away

Fact Sheets & Design Tools

Kobe.Thys@Veolia.com

SalesEdge - Ionics