



BEWI Universal Protector

1. The need for Change

Operations in the offshore industry depend on smart and sustainable solutions to ensure safety, as well as efficient logistics and use of resources to maintain a good and healthy business.

To safeguard pipes (e.g., for oil, gas and waterworks) from external exposure, such as damage to threads, sealing surfaces and corrosion during transportation and storage, the oil and gas industry uses a vast amount of thread protectors. Most of these protectors are discarded after a single use, which amounts to a total of several thousands of tons of plastic each year. The wide range of pipes require different dimensions of thread protectors, which in turn require large storage spaces and entail other logistical challenges. The mounting of the threaded protectors is also time consuming and is often done in high-risk zones on the rig that can pose dangers to workers.

About BEWI Energy

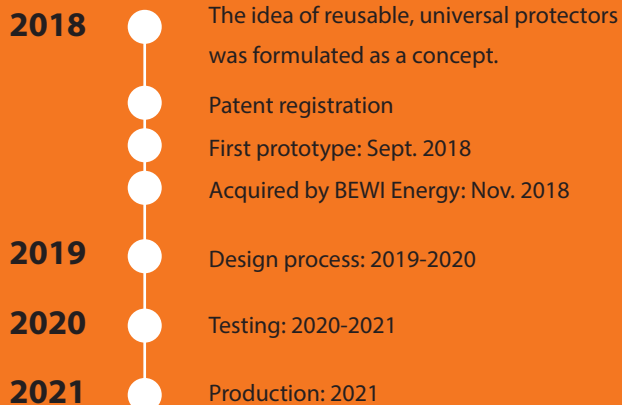
- BEWI Energy is part of the BEWI Group, a leading international provider of packaging, components, and insulation solutions.
- The Group had net sales of EUR 463 million in 2020, with an EBITDA of EUR 65 million.
- The Group has approximately 1,400 employees and production facilities all over Europe.
- BEWI Energy operates in the energy sector and the company's main objectives are to introduce new, innovative, and sustainable solutions. Today the most prominent offering is the BEWI Universal Protector.

2. A novel solution

The BEWI Universal Protector is the superior solution for the many challenges associated with conventional protectors. It introduces a way to reduce the risk for HSEQ hazards, improve cost and resource efficiency, and at the same time contribute to a more sustainable world.

BEWI Energy AS is a global provider of smart and sustainable solutions to the energy sector. The company seeks to enable its customers to work safer and more efficiently. Through many years of experience from the offshore industry, the minds behind BEWI Energy found that there was a need for a smarter, more cost efficient and sustainable solution connected to protectors used in the oil and gas industry. This prompted the development of the BEWI Universal Protector; a reusable and recyclable pipe protector made of 100% plastic. The protector adapts to a variety of pipe dimensions and thread standards, is easy to install and has an ergonomic and user-friendly design.

The BEWI Universal Protector Timeline



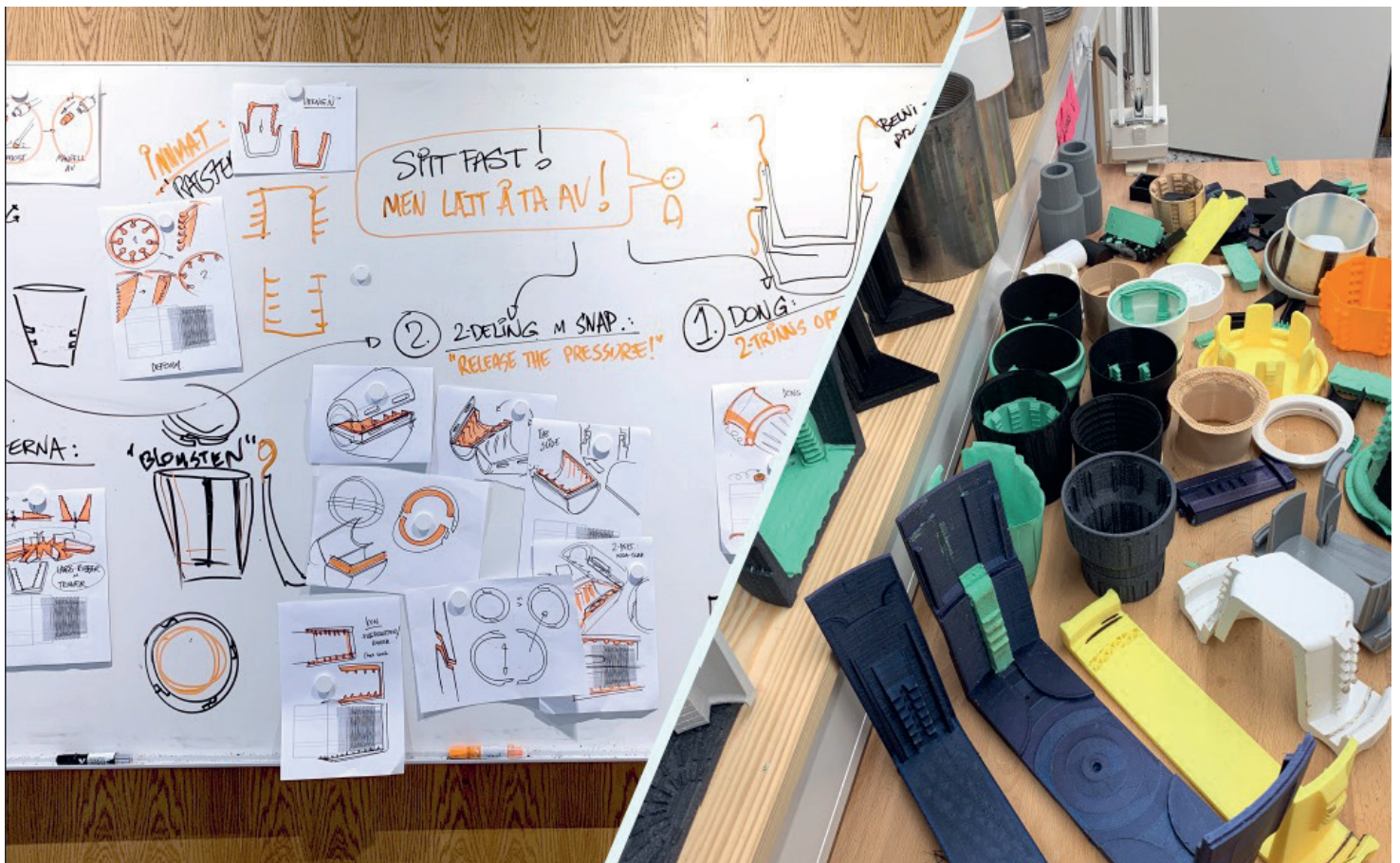
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3. Innovative design

The BEWI Universal Protector is designed to meet API 5CT where applicable and is a major improvement in terms of economy, safety and footprint.

As the name implies, the protectors' main feature is "universal". For each dimension, there is one protector (Pin and Box), regardless of threading. With the "one-size-fit-all"-approach there is no need for stockpiling a multitude of different protectors.

The protector is designed with a hard-plastic casing that protects the pipe from external forces and is equipped with ergonomic handles. The inside of the protector has soft plastic that provides a good grip around the pipe-threads and absorbs possible chocks. It offers waterproofing and protection from unwanted substances possibly leaking in.



“BEWI Smart Protector is awarded the DOGA Award for design and architecture for dealing with a fairly invisible, but nevertheless significant, environmental issue. This is a top-notch innovative industrial design based on a solid business model”

DOGA Award’s jury, 2021

The protectors are easy and quick to install, and unlike conventional models require no tools at all for mounting and removal. The time for mounting has been reduced from typically 20 seconds to approximately 4 seconds, and the operation is now more ergonomic and user-friendly for the operators. The sturdier and plastic-only design enables the protectors to be introduced into a circular material stream. The properties of the protector itself, and the subscription system built around it, enables reuse and recycling of the protectors, which are otherwise often discarded after a single use. This contributes to potentially saving many thousands of tons plastic from being discarded every year.

The BEWI Universal Protector received the DOGA Award for design and architecture in March 2021.



4. Facts and features

- The protectors are made of HDPE and TPV plastic
- Optimizes operations by reducing the time consumption of manual workloads by 75 - 80% (onshore and offshore)
- Thread pattern independent. One protector will swallow any thread pattern in the various size columns of tubulars, reducing logistics challenges significantly
- Not more than 4 seconds to mount or remove
- Reusable (Under normal use; 5-10 times)
- Recyclable
- Current Range limit: 5 1/2" to 13 3/8"
- Montage does not require tools
- Reducing Stock keeping units by 80%
- By subscription the protectors can be returned to BEWi free of charge (less freight) after use

5. Independent testing and evaluation

The BEWI Universal Protector has been independently tested and evaluated by Vallourec, Equinor and Kiwa.

Vallourec has performed the most comprehensive range of evaluation, whereas Equinor and Kiwa have benchmarked more specific features. The three parties have in sum covered all major aspects of the protectors.

	Handling	The connection integrity is preserved during transport, loading/unloading and handling.
	Assembly	Time spent on mounting and removal is reduced by 80%.
	Storage	Vallourec reduced Storage Volume Effect from 200 to 32 Stock Keeping Units (SKU). Overall effect in storage footprint requirements reduced with 80%.
	Impact	The soft plastic material was able to absorb impacts according to API 5 CT requirements well and remained intact.
	Fitability	The fitting on the connection was considered good and covers various foot pound classes.
	Wettability	The elastic material in the protector returns to its original shape and ensures overall integrity from water and debris ingress.
	Cleaning	High-pressure cold water is the preferred method for cleaning the BEWI Universal Protectors.
	Corrosion <i>Long term test</i>	Long-term outdoor storage over periods up to 25 weeks in Norway, Brazil and Abu Dhabi covering winter-, hot summer- and tropical environment. No sign of any humidity-, sand grain-, debris ingress or pitting corrosion.

6. Constantly looking ahead - R&D

BEWI Energy is constantly looking to develop products for the offshore industry to create easier, more efficient, and sustainable solutions.

Through collaborations with research institutes and partners, BEWI Energy has developed some patent pending solutions to further improve the use of the Universal Protector.

Ongoing projects:

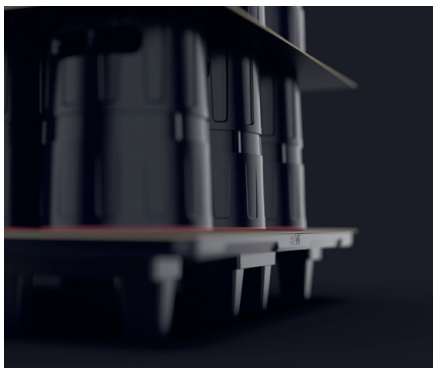
Smart Chip: BEWI Energy has reached prototype level on a full system from Chip, multi signal locator and cloud based servers with global access. The chip will come in variants from EX Zone 2 / 1 smart chip that will monitor external influence on the tubular, temperatures the tubular has been exposed to and what kind of humidity you actually have – on the thread, from factory to down hole – to simpler versions not in need for all functions nor ATEX certification. The chip can help you find where the protector is physically located and whether or not an inspection is required.

Robotic arm: For safe and efficient handling of the protectors, for use in combination with Fanuc's industrial robots. An EX Zone 2 / Zone 1 robotic arm with a gripper will reduce human activity in the red zone on a drill deck. BEWI Energy can provide both tools and robots as a package for indoor-, outdoor-, ATEX Zone 1 / Zone 2-, Harsh environment and Non- EX areas.

Universal Line Pipe End Cap: A major challenge in Line Pipe End Caps is similar to the OCTG Tubulars protectors. Different wall thickness and variation in ID / OD causes many variants, loss of End Caps and damaged End Caps by removal. A universal solution will allow for reuse and be a part of a circular chain for reuse and recycle, as the OCTG Protectors.

New Euro Pallet and frame system capturing inputs from offshore piloting. All components are 100% recyclable and certified according to relevant standards. Robust, washable and reusable until collected, processed, and turned into raw material for new products.

Universal Tubular Stackers: patent pending, will provide universal stacker bars, adaptable to all tubular dimensions. The stackers are 100% recyclable after several times of use.



7. Subscribing to a circular economy

Ensuring that the protectors are part of a circular solution, BEWI Energy can offer the protectors and handling as a subscription service in the North Sea Basin today.

This means handling logistics and infrastructure, ensuring that buyers do not need to make investments in equipment, training, or staff. Production facilities will be set up in a circular system where production, storage, logistics, transportation, and collection of the protectors is handled by BEWI Energy with a large network of selected partners. The subscription can be invoiced annually and has a transparent pricing available.

For global customers BEWI Energy are currently building a network of selected partners enabling an infrastructure that can provide a reliable and sustainable supply of protectors as a subscription. With a large network of selected partners worldwide, the goal is to handle both production, storage, logistics, transport and collection. This will simplify logistics and operations, while at the same time meet all Taxonomy requirements.



8. Transforming waste into resources

By managing the entire plastics value chain – from raw materials to final products – BEWI Energy is committed to finding more circular and sustainable solutions.

All BEWI Energy's solutions are re-usable and recyclable, resulting in lower CO₂ emissions.

What was previously considered waste is now considered new raw materials and input factors in BEWI Energy's products. The BEWI Universal Protector is made of HDPE and TPV plastic, and will be used, and reused until reaching a status where the product is recycled. On top of this, all engineering plastic and EPS plastic returning to base from the rigs in Norwegian waters, is also received by BEWI Energy. These plastics are cleaned, grinded and processed in order to become new protectors and pallets in a circular model. The aim is to collect and recycle thousands of tons of plastic per year.

Plastic is often lighter and more cost-effective than alternative products made of wood, metal, or glass, and can be given properties these materials can not be provided. All plastics are inherently resistant to all salts, and especially polyethylene (HDPE) and polypropylene (PP) has good resistance to chemicals and seawater. Oil spill or chemicals can also pose a challenge. A pallet made of wood with oil residue is not washable and must be handled as hazardous waste. Like BEWI Energy's protectors, our pallets, made of recycled plastic, can easily be cleaned and reused numerous times.

9. EU Taxonomy requirements

The BEWI Universal Protector meets the EUs requirements for taxonomy, a list of environmentally sustainable economic activities.

The taxonomy requirements will not only apply to manufacturers of plastic products, but also the user. With the Taxonomy Climate Delegated Act we can now relate to consistent, objective criteria, enabling a common understanding of economic activities that make a substantial contribution to the EU's environmental goals.

For a developer of innovative, sustainable products, this is an opportunity to get adequate recognition for the qualities BEWI Energy can offer. The EU taxonomy is an important enabler to scale up sustainable investment and to implement the European Green Deal. It is expected to create security for investors, protect private investors from greenwashing, help companies plan the transition, mitigate market fragmentation and eventually help shift investments where they are most needed.