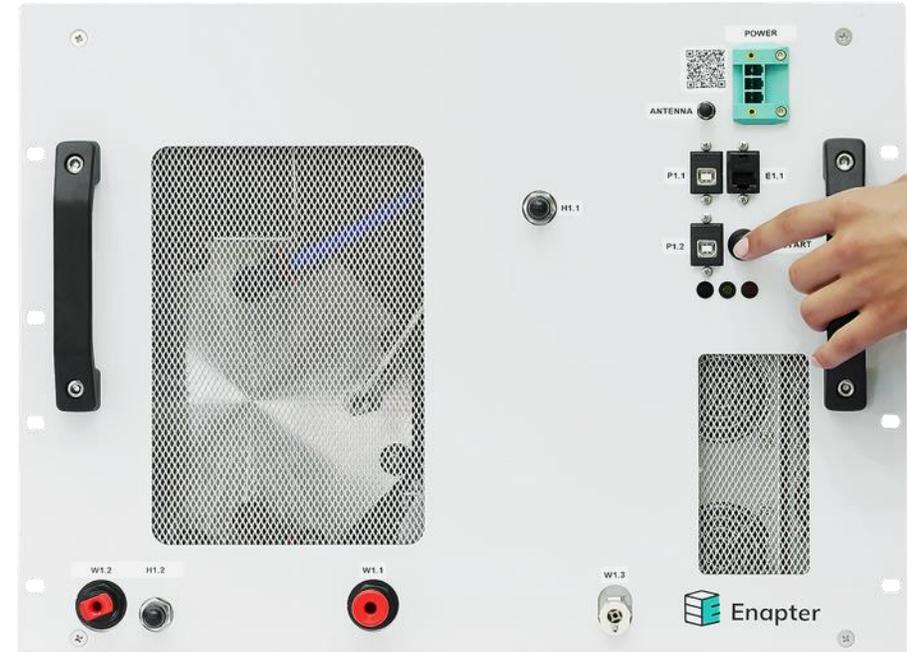# Enapter

Enapter Technology Roadmap

Q2 2021

Enapter Technology Roadmap

2nd Quarter, 2021

- We decided to send you quarterly updates on Enapter's products and technology to provide visibility on upcoming product releases / updates as well as new software features that our teams are working on. As valued Customers and Partners, we hope that these updates will allow you to account for our upcoming developments with regard to your projects.

- In the second quarter of 2021 we will continue development of the EL 4.0 - the next generation of the flagship Enapter electrolyser, development of the megawatt scale AEM Multicore and begin the design and construction of an AEM Cluster electrolyser. On the software side we will be working on developing a Web UI for the EL 2.1 and making the Gateway a stand-alone application in Linux-based OS.

- The next slides will dive deeper into these developments, take a look to see how they can benefit your integration activities. Detailed documentation of developments will become available on the Enapter Handbook as we progress. For more information on any of these developments feel free to reach out to us!

- You can find our previous technology roadmaps in the Handbook here.

Hardware Developments (1/2)

What	Why	When
Electrolyser EL 4.0 The next generation of our flagship electrolyser, providing the familiar modularity of 0.5 Nm³/h production, now designed according to ISO 22734 and reduced requirements on installation space.	▪ We expect that customer requests for compliance with ISO 22734 will become more common since AEM technology has been covered in this standard. Thus, the next generation of our electrolyser will be designed according to ISO 22734. ▪ The EL 4.0 will also reduce the weight and installation height required for a 0.5 Nm³/h electrolyser by approximately 25% and 15% respectively. ▪ We will keep the design as close as possible to the connections, interfaces and functionality of the EL 2.1, allowing you to quickly understand and begin integration into your projects as well as easily upgrade existing EL 2.1 installations to the EL 4.0.	September
Development AEM Multicore The AEM Multicore is a megawatt electrolyser featuring several hundred AEM stack modules and a common, yet redundant, balance of plant.	▪ The AEM Multicore will create new opportunities for partners looking to expand into hydrogen applications which demand production rates of 210 Nm³/h or higher, using the tried and tested Enapter AEM stack. ▪ It will incorporate many electrolyser cores that make a more reliable and resilient system running at optimal efficiency no matter what load is applied. Stack modules will be arranged in strings, allowing for great flexibility and extremely low down-times for maintenance. ▪ Its unique approach with this system configuration allows for unprecedented availability and built-in redundancy, making the Multicore comparable to alkaline-systems in price and PEM-systems in footprint, hydrogen quality and reaction time. The first 5 units will be available in the second half of 2022 and we are accepting pre-orders now. Draft specification for the AEM Multicore are available [here]().	Demonstration in December

Hardware Developments (2/2)

What	Why	When
Development AEM Cluster Integrating multiple Enapter electrolyser modules into standard 20 or 40 foot shipping containers with centralized water preparation units, HVAC, hydrogen safety power distribution, etc.	▪ We will share our learnings from designing and integrating a turn-key electrolyser with 40 x 0.5 Nm³/h EL modules incl. auxiliaries in a 20-foot shipping container. ▪ The modularity of the 0.5 Nm³/h electrolysers should allow you to modify and adapt these designs for specific projects, for e.g., increasing or reducing the overall production capacity, accommodating for different climate conditions, regulations etc. Container solutions based on the standard electrolyser modules will not be a product offering from Enapter. We do this to support and encourage your integrations activities. Draft specifications for an AEM Cluster 60 (with dryers) and Cluster 70 (without dryers) are available here and here.	September

Hardware updates from the previous quarter

What	Why	When
Electrolyser EL 2.1 LC (liquid cooled)	The EL 2.1 LC simplifies heat removal for larger scale installations with multiple electrolysers; allows new larger scale projects/ applications (refuelling, district heating, etc.) to be addressed better.	Available now
Electrolyser EL 2.1 DC (prototype)	The EL 2.1 DC can eliminate the need for DC-AC transformers in projects with DC (48-60 V input) renewable energy sources, which also often involve other DC energy components like batteries and fuel cells. *A limited quantity of these prototypes is available now. A CE certified DC powered variant will be available with the EL 4.0.*	
Water Tank 2.1	The WT 2.1 includes conductivity monitoring of water supplied to electrolysers, rejecting poor quality water and eliminating the risk of poor-quality water flowing into the electrolyser and affecting lifetime.	

What	Why	When
Web User Interface for the EL 2.1 Firmware version 1.6.0. for EL 2.1 will introduce a local web interface for EL commissioning and monitoring of individual ELs directly via an ethernet connection.	This will simplify commissioning and monitoring for many use cases, especially for operation in Offline Mode i.e. without the need for Gateway, Mobile App or Cloud/internet connection. The EL 2.1 Web UI will allow: ■ Real-time monitoring of parameters/ states like production, temperatures pressure, safety heartbeat. ■ Setting up the IP address of each EL used for Modbus TCP integration, for example, with your own energy management system. ■ Review of any errors and warnings with explanations. ■ Switching to Maintenance Mode for initial refilling / electrolyte replacement and commissioning of the system. The EL 2.1 Web UI is different from the Gateway Web UI; the Gateway Web UI, announced in our last quarterly update, will offer all the above functionality as well as additional features such as telemetry cache and use of the Rule Engine for automation in Offline Mode.	June
Software Gateway as an application for Linux-based operating systems The Gateway will become available as a stand-alone application for Ubuntu / Cent OS / Red Hat.	This application will allow your software teams to easily tailor your electrolyser installations for existing infrastructure, servers and networks using the commonly used Linux operating systems. You will be able to use this Gateway Web Interface to oversee parameters of connected devices and execute commands.	June

Software Developments (2/2)

What	Why	When
We continue our work on bringing you Enapter Blueprints as well as more features to setup and operate systems in Offline Mode.	- Enapter Blueprints will support integration of 3rd party energy devices into our EMS. Each Blueprint consists of a few core concepts (such as device properties, telemetry, supported commands and alerts) - which you can adapt to your needs. This should allow Partners to integrate different energy devices without requiring an expert level understanding of software programming. - Offline Mode and the Gateway Web UI will allow you to commission, set up and perform basic functionality on Enapter modules in locations with poor or no internet access. You can take a look at more detailed descriptions in our first quarterly update for 2021 [here]().	June

Software updates from the previous quarter

What	Why	When
Updates to the Enapter Mobile App We updated our Mobile Application for both iOS and Android to version 2.11.	▪ This introduces a new refiling and draining wizard for the EL 2.1 which includes a detailed guide, as well as vibration and sound notifications. This should provide a much smoother and accurate experience for filling and refilling the electrolyte. ▪ This update also includes other improvements to the commissioning process when using the App, with better notifications. ▪ The overall interface is now more responsive with additional animations and improved communication with Enapter Cloud.	**Available now in the Mobile App**
Dryer Control Network A peer-to-peer wireless mesh network between a single dryer and up to 5 electrolysers for device interoperability and peer monitoring.	It is now possible to set up and commission the dryer and electrolysers for device interoperability, without the need of an external controller such as the Enapter Gateway or PLC. Configuring the Dryer Control Network is fully automated with the Enapter Mobile App and can be accomplished within minutes. More information about the Dryer Control Network can be found in our Handbook [here](#).	**Available now in the Mobile App**