

GUIDE:

# FIT FOR THE GREEN TRANSITION?

HOW TO MAKE A BUSINESS MODEL FOR YOUR TRANSIT TO CLEAN AND RENEWABLE ENERGY USING METHANOL-BASED FUEL CELLS



Meet the needs of the present  
without compromising the  
ability of future generations!

## **A BUSINESS MODEL FOR THE TRANSITION TO CLEAN AND RENEWABLE ENERGY**

Are you looking for a way to make sure your business model will bring your company ahead of competitors while being aligned to end-users' demand and compliant to future regulations for clean and green energy practice?

The demand for sustainable energy is in steady increase and constantly pushed by regulations for low or 100% emission-free energy. In view of these market developments and UN regulations, the transition to sustainable and clean energy is irrevocable for both societies and enterprises. It is no longer a question if, but how and when to transit to clean, renewable energy.

But the journey is not a simple one. And where to start, how to start and by what means are necessarily among the concerns of both operators and industries.

This guide is intended to help you consider and initiate the transition to clean and renewable energy as presented by Advent: A viable catalyst: methanol-based fuel cells for your future, alternative energy practice.

We will provide you with a brief introduction to the technology, methanol-based fuel cell systems; the opportunities for transitioning to our methanol-based fuel cells highlighting the necessary basic know-how and finally, we will illustrate by means of simple models how you can analyze your enterprise for the investments in tomorrow's sustainable practice. In the guide, we will cover these key topics.

### **METHANOL-BASED FUEL CELLS**

- What is methanol?
- What is a fuel cell and why is it a viable solution?
- What are your opportunities in the transition to methanol-based fuel cells?

### **FIT FOR THE GREEN TRANSIT? METHANOL-BASED FUEL CELLS IN YOUR BUSINESS MODEL**

- What is a business model and how can inclusion of a SWOT take it further?
- Why is a business model important when considering the transition to clean and renewable energy?
- What framework can be used when considering the innovation of your business model, transitioning to clean and renewable energy?

This guide will present two well-known models, namely the Canvas and the SWOT, which you can apply to map and highlight your situation, value propositions and the opportunities for transitioning to green energy. Our hope is that using these simple models and methods as a means to analyze your company in the transition to clean and renewable energy will provide inspiration for your continued journey towards the green transit.

Enjoy your reading.

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## WHAT IS METHANOL FUEL?

Growing recognition of the threat posed by man-made climate change has spurred government institutions, industry, and science to find clean fuels to power economic activity. Government legislation on emissions has created challenges for those who need to comply, opening new markets and opportunities for alternative fuels, including methanol.

In 2018, the European Parliament, Council and Commission agreed on the Renewable Energy Directive II (RED II), requiring 14% renewable energy to be used in transport by 2030. In total, 66 countries have put targets or mandates in place. Besides the EU-27, 14 countries in the Americas, 12 countries in Asia Pacific, 11 in Africa and 2 in non-EU countries in Europe have all implemented biofuel adoption policies, some as high as 15 to 27%.

In this context, methanol has risen as a clean alternative to fossil fuels, offering a clear pathway to drastically cutting emissions in power generation, overland transportation, shipping, and industry. Methanol is an outstanding energy delivery mechanism and may therefore be considered as a unique storage medium for

sustainable energy. As a result, methanol has become one of the largest commodities, and methanol demand is expected to continue to grow. There is a well-established worldwide production with methanol plants in Asia, North and South America, Europe, Africa, and Middle East. Worldwide, over 90 methanol plants have a combined yearly production capacity of about 110 million metric tons (almost 36.6 billion gallons or 138 billion liters). According to renewable methanol provider Nordic Green, the global methanol market exceeds 100 million tons in 2020. The first year that the 100 million tons (125 million m<sup>3</sup>) barrier was broken.

The fuel applied for Advent fuel technology is a pre-mix consisting of 60% methanol and 40% demineralized and de-ionized water (on a volume basis). This mixture provides many advantages as an energy-carrier, being less flammable.

Many sources for methanol production exist. Bio methanol is often referred to as green or renewable methanol. Compared to conventional fuels, renewable methanol cuts carbon dioxide emissions by up to 95%, reduces nitrogen oxide emissions by up to 80%, and eliminates sulphur oxide and particulate matter emissions. In the Power-to-X debate, electro fuels are often mentioned. Electro fuels are based on electrical energy from solar, wind or other renewable sources. This combined with e.g., carbon capture methods provides almost zero release of CO<sub>2</sub>, when converted to methanol.

This green methanol is available in European countries and worldwide for stakeholders involved in the production of renewable methanol.



Methanol has risen as a clean alternative to fossil fuels, offering a clear pathway to drastically cutting emissions in power generation, overland transportation, shipping, and industry.

## OFF- AND ON-GRID BENEFITS

Remote areas and island nations, which often rely heavily on diesel generators, could save money by switching to conventional methanol. The “Renewable Methanol Report” (Methanol Institute, Dec. 2018) documents the tendency; as wind and solar prices drop, they are often cheaper than diesel, which, due to safety and logistics, becomes increasingly expensive in difficult-to-access areas.

Wind and solar power offer remote areas and islands an opportunity to enjoy lower energy costs, reduce dependence on imported energy, and mitigate their impact on the environment.

However, wind and solar power are variable and might not be available when most needed, so islands need to retain some supplemental power. Adopting methanol with Advent fuel cells would significantly reduce harmful emissions compared to diesel generators. Methanol could also play a key role in providing grid stability by drawing excess renewable electricity from the system to power electrolysis, one of the key processes in the manufacture of methanol. The resulting methanol could then be used as a clean power plant fuel that can be dispatched to provide energy whenever it is required.

### PEM TECHNOLOGY IN ADVENT FUEL CELLS

A high temperature PEM fuel cell converts chemical energy directly into electrical energy, providing an unprecedented energy source that in practice combines principles from batteries and the combustion engine. Compared to batteries, a fuel cell need not be discarded or recharged, but can sustain operation by continuously supplying fuel. The concept is strong. No movable parts, excellent part load performance, no carnot efficiency limitation - simply smooth sailing with pure electrochemistry, and the only emission produced by the fuel cell is heat, water and CO<sub>2</sub>. The result is higher efficiency, no pollution, longer run-time, etc. This makes fuel cells useful for a broad number of applications and small unit manufacturing, right up to major power stations generating megawatts.



Adopting methanol with Advent fuel cells would significantly reduce harmful emissions compared to diesel generators.

## WHAT IS A FUEL CELL?

Diesel generators used to be widely deployed for powering battery systems; however, over time the idea of using diesel generators as a primary or back-up power supply has become less favorable due to the challenges linked to their reliability, availability, high operational and maintenance (O&M) costs, and significant environmental impact. In the context of powering off-grid battery systems, key features such as the economic, environmental, and social sustainability of battery systems are critically important. Hence, methods using renewables coupled with sustainable energy storage solutions are now receiving much more attention.

A fuel cell is a device that generates electricity through an electrochemical reaction, not combustion. In a fuel cell, hydrogen and oxygen are combined to generate electricity, heat, and water. Fuel cells are used today in a range of applications, from providing power to homes and businesses, keeping critical facilities like hospitals, grocery stores, and data centers up and running, moving a variety of vehicles, and last but not least for critical, backup, auxiliary, and primary power.

Fuel cell systems are a clean, efficient, reliable, and low-noise source of power. Fuel cells do not need to be periodically recharged like batteries, but instead continue to produce electricity as long as a fuel source is provided.

Unlike combustion-based power generation, stationary fuel cells provide virtually emission-free power. Fuel cells do not produce particulate pollutants or unburned hydrocarbons. They emit less carbon dioxide than other, less efficient technologies, and when using fuel generated from renewable sources such as biomass, fuel cells reduce carbon emissions up to 95%.

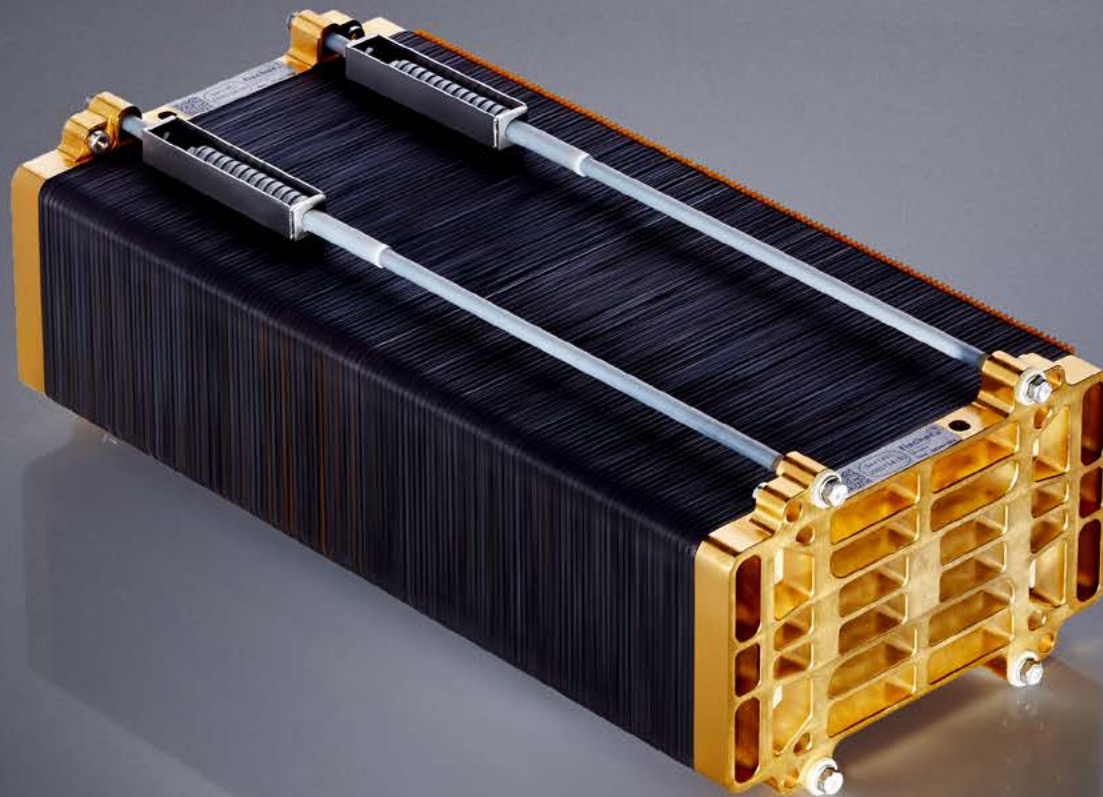
Because of these environmental benefits, fuel cells are being adopted by federal facility managers in order to reach mandatory air pollution goals. Utilities and enterprises also working to meet state renewable energy standards and emission requirements are also increasingly turning to fuel cell technologies.



Unlike combustion-based power generation, stationary fuel cells provide virtually emission-free power.



**GUIDE:** FIT FOR THE GREEN TRANSIT?





## MFC UNIT – CLEAN, SIMPLE, AND SUSTAINABLE POWER

Methanol fuel cell units by Advent belong to the small manufacturing category - but with the option to interconnect with multiple units, resulting in power systems and solutions for larger power demands.

In terms of category of power supply, the MFC unit by Advent is a reliable source of on-demand power generation for critical communication networks such as commercial telecom and security, etc. This is delivered in an environmentally friendly way, where CO<sub>2</sub> pollution and noise during operation are significantly reduced.

The MFC unit delivers DC power directly, without power loss from additional converters, providing a highly efficient energy supply. This reduces complexity and fuel consumption on site.

As a low-maintenance power technology, the MFC unit is ideal for critical backup power, temporary or continuous 24/7. It works both in off-grid applications and as back-up for in-grid applications. The system uses HT-PEM technology, which is unique and offers many advantages.

Methanol is reformed to hydrogen inside the units on site, enabling the units to run on liquid methanol. Besides the standard 48 Vdc, MFC units from Advent are also available in high-voltage variants.



## Serene Units By Advent

- 5kW units up to 300kW systems
- DC output from 48 Vdc (200-1000 Vdc as option)
- Remote monitoring platform
- Ambient temperatures from -20°C to 50°C
- Perfect as range extender for your batteries



## Serene Systems By Advent

- Fuel tank for 200 kWh electric power
- Option of large external tank
- Easy refilling
- Option kit for indoor installation
- Up to 15kW power



## METHANOL FUEL CELLS IN SYSTEMS

As part of a system or solution, MFC by Advent also offers on-demand power generation for applications beyond the capacity of 1kW-5kW. Examples are back-up, supplementary, and continuous power demands from the 5G network in telecom and portable or temporary power demands for construction sites, agriculture, flexible housing and events, or for industry and communities in off- or bad-grid locations.

### SCALABLE SYSTEMS

The MFC System by Advent is easy to install and ready for scalable power and run-time demands. A robust design, remote monitoring, and self-maintenance safeguard the stability and fuel quality of the system. In short, it is a versatile system providing a long-term solution for flexible power and application needs.

With the 200-liter internal tank, the 5kW system can generate continuous power for more than 40 hours. When applying the external fuel tank option, independent run-time can be significantly extended. It meets high safety standards and is suitable for harsh and humid weather conditions, and the system favors remote and off-grid application as well as back-up for grid applications.

### BACK-UP, SUPPLEMENTARY, AND PRIMARY POWER

#### BACK-UP POWER

Applies to installations in occasional usage, e.g. power outage, failure in primary power deliveries, service or maintenance situations.

#### SUPPLEMENTARY POWER

Applies to installations providing short-term power to an application with the intent to cover a share of the energy use. This is relevant whenever renewable power sources like solar or wind energy are used that might not always be able to fulfill the full power demand, for example during peak load or night time of seasons where wind or solar energy are less available.

#### PRIMARY AND CONTINUOUS POWER

Applies to installations where one or more fuel cell systems or units serve as the primary source of energy at constant or varying load.

This is what characterizes a truly self-sufficient power system that is well suited for back-up, temporary and continuous power supply.

The system supports sustainable features of the fuel cell, keeping noise and emission at a minimum – thereby making for an excellent power source for urban and roof-top installations with an indoor installation option.

“When applying the external fuel tank option, independent run-time can be significantly extended.”





Hybrid solutions merging wind or solar power with fuel cells represent the ultimate choice for sustainability.

## FUEL CELLS IN SCALABLE APPLICATIONS

A system often consists of more than one unit, since it needs to satisfy a larger power demand than one unit can supply. For example, Advent's own telecom systems provide up to 15kW in an intelligent communicating cabinet, meeting safety standard for harsh environments. Initially, a site often only needs a 5kW system, but in the coming years as the 5G network matures, more power is needed. The MFC System has an easy option for power upgrade to 10kW and 15kW.

The same principle is valid for power systems for applications with a power demand beyond 15kW. Here, the MFC unit is integrated within the new boundaries and specifications, whether this is engineered into power equipment or integrated into houses. Depending on the power supply, more MFC units will be interconnected and assembled. The integration requires engineering know-how on fuel cells and knowledge about user interface specifications and regulations.

Customized solutions appear in many shapes, depending on the power demand and application. They may be installed and co-operating with other energy units, or subject to a degree of engineering integration into outer units or projects.

The development of power systems is done both by Advent and Advent engineering partners.

Besides the standard 48 Vdc, the methanol fuel cell unit also comes in the following high-voltage variants:

### HIGH-VOLTAGE VARIANTS

190 [Vdc]	144-237
250 [Vdc]	200-312
380 [Vdc]	288-474
500 [Vdc]	400-624
760 [Vdc]	576-948
1000 [Vdc]	800-1248

### FUEL CELL APPLICATIONS

Configuration	Co-Installed Systems	Engineered Design Solutions	
<b>Concept</b>	<b>Microgrid &amp; Hybrid Solutions</b> Sustainable use and optimization of available power sources. Green power for off-grid communities and applications	<b>Power Systems and Utility Equipment</b> Clean power replacing fossil-driven scalable power units and utility equipment	<b>Turn-key Project Solutions</b> Environmentally friendly power e.g., for houses and boats
<b>Partner</b>	<b>Installer, Service &amp; Maintenance</b> Installation and Service	<b>Equipment and Power System Retailer</b> Development & Retailing	<b>Technical Consultant, Developer</b> Planning, Development & Delivery

## CO-INSTALLED MICROGRID & HYBRID SOLUTIONS

### SCALABLE SOLUTIONS

Whether on- or off-grid, microgrid solutions are scalable. Use cases range from remote residentials to base stations and urban utilities. Renewable energy provides zero carbon emissions, low operating costs, and low fuel expenses – but there are some drawbacks as they are dependent on weather and time-of-day, may suffer output punctuations, and often require major capital investment. A smart microgrid uses storage and/or complementary generation technologies to optimize the use of renewables.



### ON-GRID / OFF-GRID

A microgrid can run while connected to a public power grid (on-grid) and can be used to safeguard stability of supply and optimize both cost and the operator's environmental footprint. Fully independent (off-grid) microgrids can be used to power remote communities and industries or to provide energy independence from the grid.



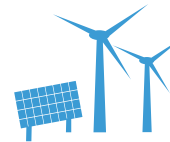
### BATTERY ENERGY STORAGE

Battery storage systems are a complement to systems using renewable energy that cannot be ramped up and down at will. They provide grid stability, voltage and frequency control, instantaneous power, plus the ability to de-couple peaks in generation from peaks in demand.



### RENEWABLE ENERGY SOURCES

Solar power, wind power, and other renewables that are not always dispatchable offer key benefits.

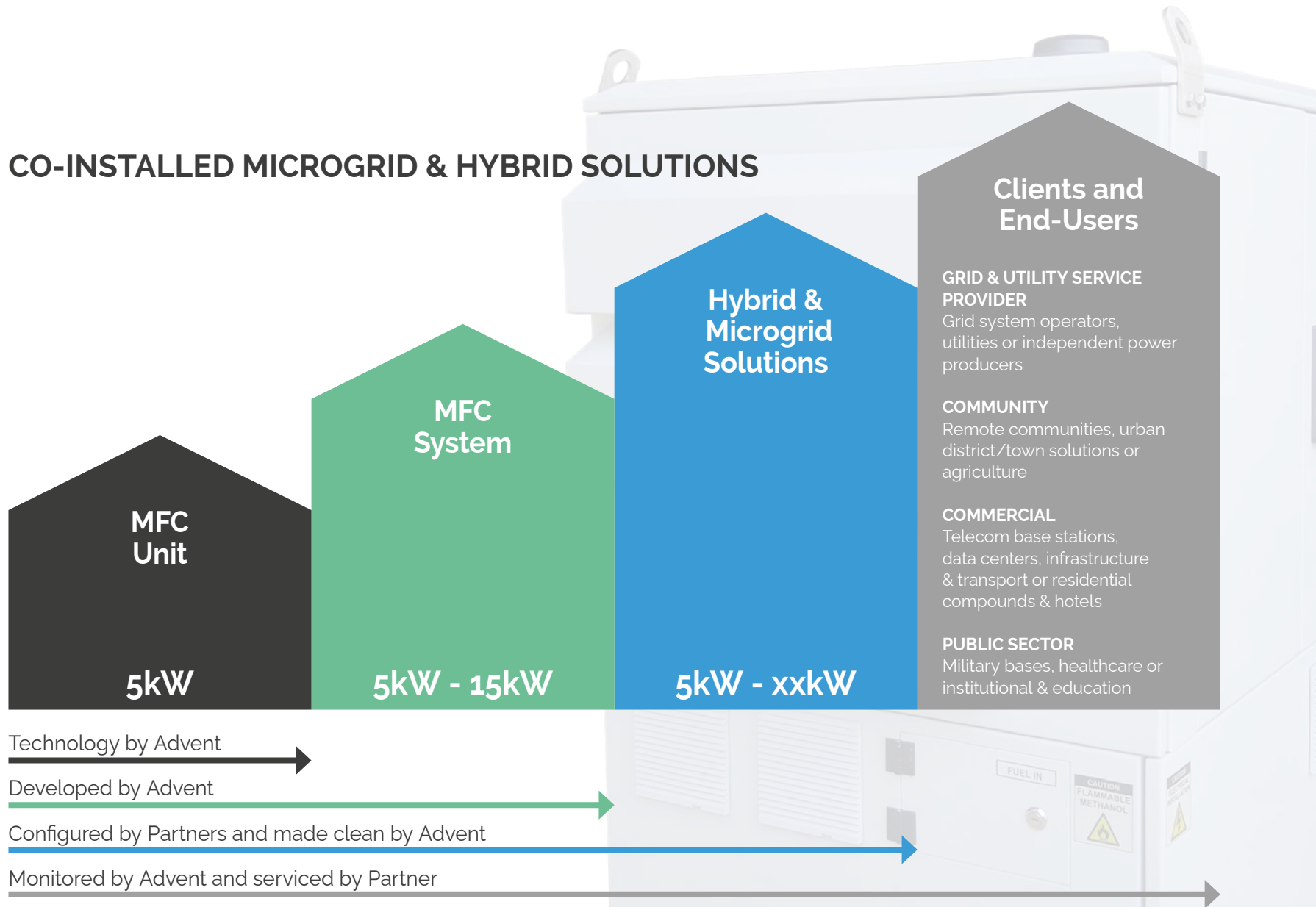


### MFCs

MFCs by Advent provide clean, flexible and scalable power on demand. Their load flexibility adapts output, and load ranges provides easy power increase from 5kW to 15kW.



## CO-INSTALLED MICROGRID & HYBRID SOLUTIONS





## INTEGRATED ENGINEERED APPLICATIONS

### ENGINEERED FUEL CELL SOLUTIONS

The engineered design solution with fuel cells takes significantly more effort than installation of the fuel cell into a co-operating hybrid installation. Nevertheless, integrated engineering solutions are emerging in an increasing number of applications and designs. Integrated engineering solutions are typically executed by integration partners responsible for planning, service, development, and supply. The partner has a thorough understanding of specific user needs and possesses the relevant technical knowledge to apply fuel cells in this user interface.

A common tendency addresses the use of fuel cells in equipment or solutions that are today operated in larger scale by fossil-driven combustion engines or generators. Methanol-based fuel cells make a viable alternative due to their ability to provide clean energy with high efficiency and low-impact emission. As an alternative choice, they do meet future regulations for less harmful emissions and do not compromise quality of service.

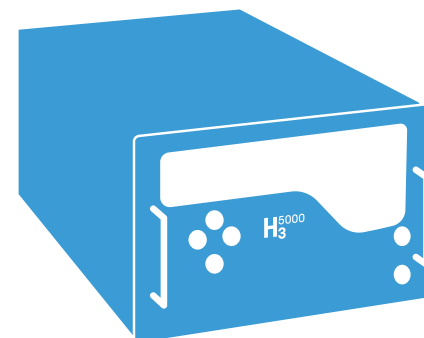
### SCALABLE EQUIPMENT AND SYSTEMS

Environmentally friendly fuel cell power increasingly replaces fossil-driven scalable power units for low and high loads. Low load ( $\leq 5\text{kW}$ ) examples are light towers and surveillance equipment. High load ( $\geq 5\text{kW}$ ) examples are portable power systems and generators. The supplier of and partner for equipment can ensure integration of stand-alone fuel cells as well as connected fuel cell units. Users include managers from within construction, facilities, power and equipment rentals as well as event organizers.

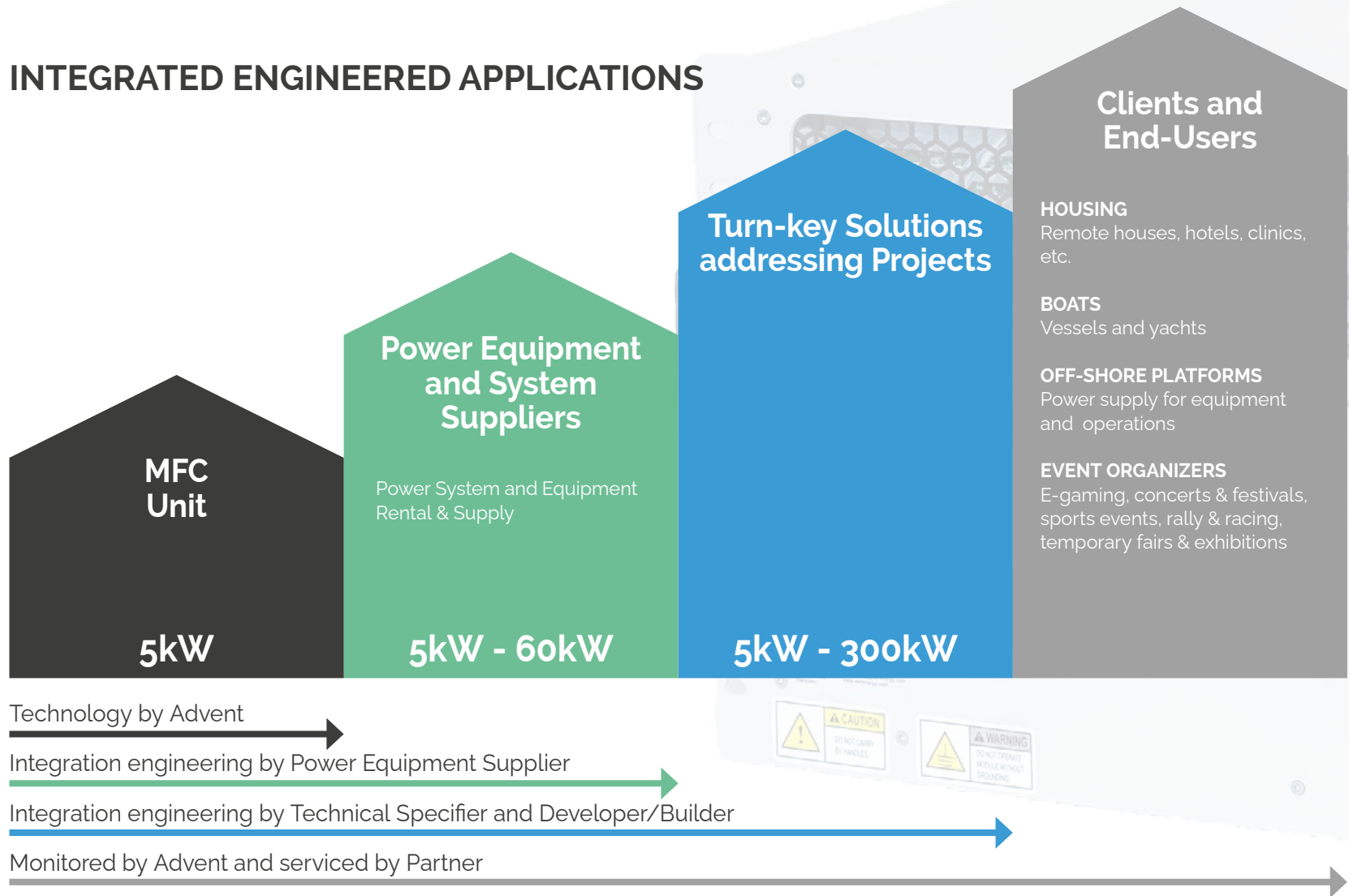
The difference for the power equipment supplier is whether to integrate one single fuel cell unit and/or serial-connected fuel cells addressing high load power systems. End-users include facility managers in construction, equipment rentals and event organizers.

### TURN-KEY SOLUTIONS

Turn-key solutions are delivered by partners with MFC units integrated. In development projects in construction and the maritime sector, the partner has knowledge and responsibility for system integration within a broader technical infrastructure. Load ranges vary according to the application, but the final fuel cell solution may be assembled from several customized cabinets that accommodate the individual fuel cell units, thereby enabling power ranges up to 300kW.

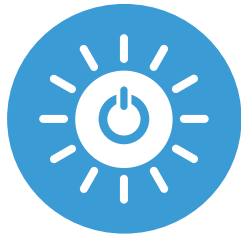


## INTEGRATED ENGINEERED APPLICATIONS

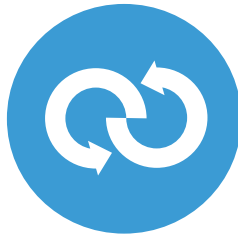


## OPPORTUNITIES IN THE TRANSITION TO CLEAN ENERGY, METHANOL-BASED FUEL CELLS

METHANOL-BASED FUEL CELLS CARRY A NUMBER OF UNIQUE BENEFITS COMPARED TO OTHER ENERGY SOURCES SUCH AS BATTERIES OR INTERNAL COMBUSTION ENGINES. FROM HIGH EFFICIENCY TO SCALABILITY, THE MAIN BENEFITS OF A METHANOL-BASED FUEL SYSTEM ARE:



CLEAN ENERGY



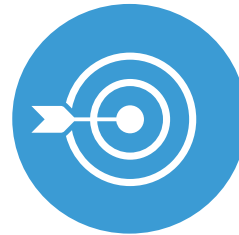
SUSTAINABILITY



RELIABILITY




PROFITABILITY



SIMPLICITY



KNOW-HOW



**ENVIRONMENTAL:** Unlike diesel generators, fuel cells do not produce combustion and therefore there are no NO<sub>x</sub>, SO<sub>x</sub>, or particulate emissions from the unit. As such, the fuel cells provide clean energy. Methanol can be extracted or produced in a number of ways. If it is produced from biomass resources or the biodegradable parts of waste (green methanol), it is almost carbon neutral. Our fuel cell technology is designed for compatibility with other energy generation technologies, especially renewable technologies.

**LOW-COST:** Compared to existing technologies and over the lifetime of the unit, cost savings can be obtained. This includes: maintenance, transport, and disposal. In cost-per-unit-of-energy terms, methanol compares favorably with both gasoline and diesel.

**RELIABILITY:** In many cases, fuel cells can offer higher reliability and MTBF (Mean Time Between Failures). Also, fuel cell modules have very few moving parts, which reduces the need for regular maintenance.

**FUELS:** The majority of systems operate on hydrogen, which can be generated from renewable sources (electrolysis) or from reformed hydrocarbons. Being a liquid fuel, methanol is easier to handle and store than hydrogen.

Moreover, the distribution of methanol can take advantage of existing distribution systems.

**ACCESSIBILITY:** Methanol is produced on a global scale and used in thousands of everyday products. Thus, methanol is readily available and easy to obtain no matter where in the world you are located.

**HIGH TEMPERATURE TOLERANCE:** Unlike batteries, fuel cell units do not degrade at extreme temperatures and ambient temperatures may range between -20°C and +50°C.

**SCALABILITY & INTEGRATION:** Fuel cell systems are provided as either a standalone unit similar in size to a small refrigerator (for applications like base stations) or can be inserted in systems with variable capacity. Fuel cells are fit for outdoor as well as indoor applications.

**AUTONOMY:** Fuel cells can operate as long as long as fuel is available, so storage onsite can be established according to run-time required.

**REMOTE MONITORING:** Fuel cell units can be fully monitored from one central location, alerting the operator as to when the system is in use and when refueling will be required to ensure no downtime.

**SPACE REQUIREMENTS ARE LOW:** Fuel cells running at high temperatures are easier to cool, which eliminates the need for spacious cooling systems.

**SMALL FOOTPRINT AND LOW NOISE:** Fuel cell systems operate with low noise and vibration, meeting regulations for low environmental impact.

**SAFETY:** Methanol is less prone to ignite than gasoline. Also, it burns slower, creates no black smoke, and emits lower radiant energy, which makes it less likely that surrounding materials catch fire.

**PREVENTIVE OF THEFT AND VANDALISM:** The fuel cell units by Advent use a methanol-water mix to run the systems. This fuel is clean and produces highly efficient power. As a result, this is highly valuable for professional applications, but for thieves it has no value, as the methanol-water mix fuel cannot be used for common appliances and vehicles. Zero common value = Zero theft.

## FAQ ABOUT FUEL CELLS AND THE TECHNOLOGY IN USE

**Q: When was the fuel cell invented?**

**A:** Christian Friedrich Schoenbein, a German-Swiss chemist, invented the fuel cell in 1838. Almost simultaneously, in 1839, a Welsh scientist, William Robert Grove, developed the "gas voltaic battery". The functional fuel cell was born. Since then, the world has changed, and fuel cells are an important technology in land, sea, air and space applications.

**Q: What types of fuel cells does Advent provide?**

**A:** We make High Temperature Polymer Electrolyte Membrane (HT-PEM) fuel cells. HT-PEM fuel cells are similar to LT-PEM fuel cells, but operate at higher temperatures (150-180 degrees Celsius). Our fuel cell units are integrated with fuel reformers.

**Q: Why is methanol a good choice in fuel cells?**

**A:** Methanol is an excellent liquid energy carrier, and it is stored and transported using conventional methods. Therefore, methanol can be an excellent solution for storing

energy from renewable sources like solar and wind power. Compared to other liquid fuels, the methanol steam reforming process operates at low temperatures, which avoids unnecessary loss of energy. Also, methanol can be produced in clean, efficient CO<sub>2</sub>-reduced ways from either biomass or various Power-to-Liquid or Power-to-X technologies.

**Q: What kind of emissions do Advent solutions emit?**

**A:** The exhaust from a methanol fuel cell system is hot air and CO<sub>2</sub>. When using green methanol, hydrogen is produced from renewable sources like wind or solar power and the CO<sub>2</sub> for the methanol is captured from the air or from industrial production.

**Q: What is a fuel cell stack?**

**A:** A single fuel cell consists of a membrane electrode assembly (MEA) and two flow plates distributing the feed gasses correctly onto the fuel cell electrode. A single fuel cell typically has an operational voltage below

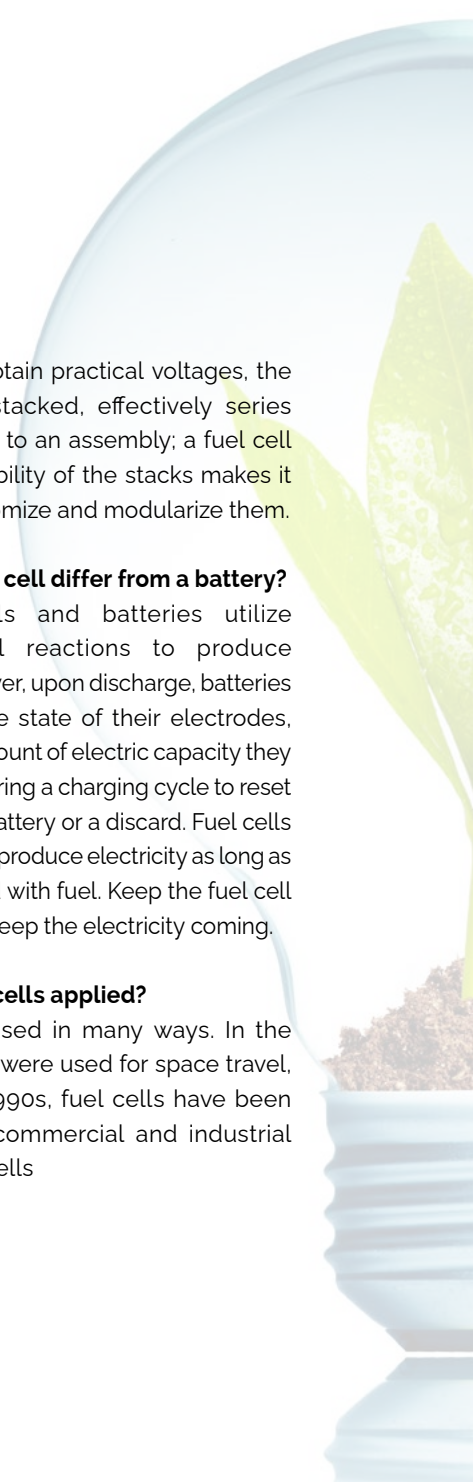
1V. In order to obtain practical voltages, the fuel cells are stacked, effectively series connecting cells to an assembly; a fuel cell stack. The scalability of the stacks makes it possible to customize and modularize them.

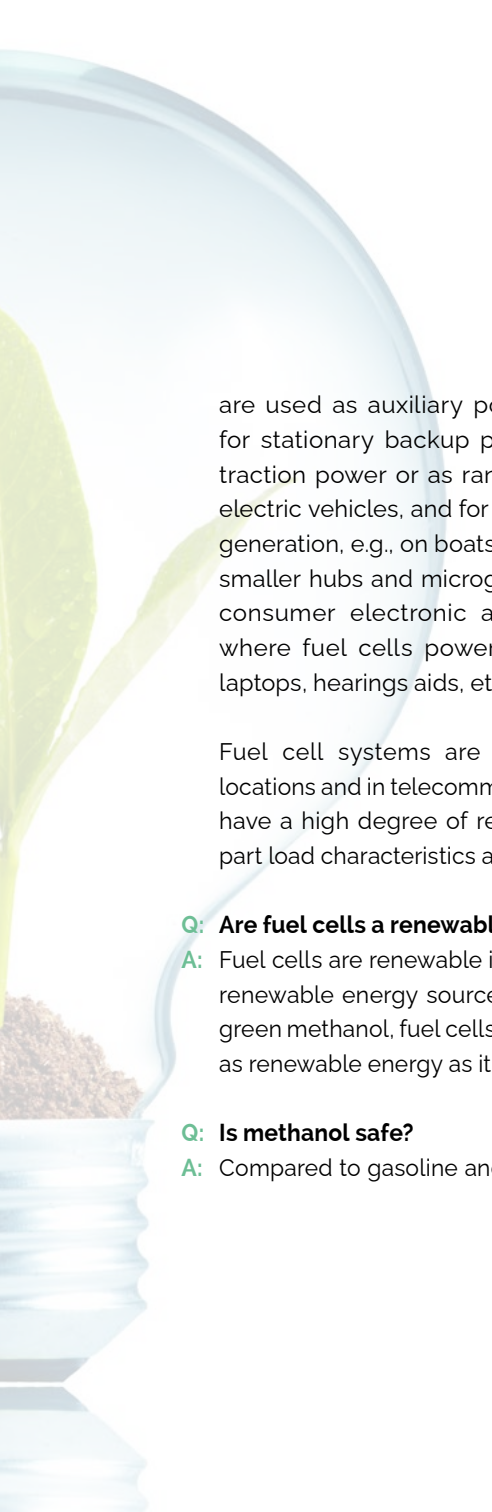
**Q: How does a fuel cell differ from a battery?**

**A:** Both fuel cells and batteries utilize electrochemical reactions to produce electricity. However, upon discharge, batteries are changing the state of their electrodes, depleting the amount of electric capacity they can deliver; requiring a charging cycle to reset the state of the battery or a discard. Fuel cells can continuously produce electricity as long as they are supplied with fuel. Keep the fuel cell fueled, and you keep the electricity coming.

**Q: Where are fuel cells applied?**

**A:** Fuel cells are used in many ways. In the 1960s, fuel cells were used for space travel, and since the 1990s, fuel cells have been developed for commercial and industrial purposes. Fuel cells





are used as auxiliary power units (APU), for stationary backup power, as primary traction power or as range extenders for electric vehicles, and for distributed power generation, e.g., on boats, ships, trains or in smaller hubs and microgrids. Finally small consumer electronic applications exist where fuel cells power mobile phones, laptops, hearing aids, etc.

Fuel cell systems are ideal for remote locations and in telecommunications as they have a high degree of reliability, excellent part load characteristics and high efficiency.

**Q: Are fuel cells a renewable energy?**

**A:** Fuel cells are renewable if the fuel used is a renewable energy source. When fueled by green methanol, fuel cells must be regarded as renewable energy as it is CO<sub>2</sub> reduced.

**Q: Is methanol safe?**

**A:** Compared to gasoline and diesel, methanol

is harder to ignite, it burns slower, it creates no black smoke, and it emits lower radiant energy, which makes surrounding materials less likely to catch fire.

Furthermore, our fuel cell solutions are fueled by a methanol mix of 60% methanol and 40% water, thus making the fuel less flammable than pure methanol.

Methanol, however, is flammable and has the potential to react violently with oxygen – just like gasoline, diesel and natural gas. Therefore, it is paramount to implement correct safety features and infrastructure.

For these reasons, we put a lot of effort into manufacturing safe fuel cell solutions.

We comply with all international safety standards and do everything to make sure that our customers are aware of the right way to handle methanol.

**Q: What is the cost of methanol?**

**A:** You can find the current selling price of methanol on the official Methanex index - <https://www.icis.com/explore/commodities/chemicals/methanol/>

**Q: How long does it take to install a Advent fuel cell system?**

**A:** Our fuel cell systems can be installed from scratch in less than a day. In case of system failure or repairs, a unit can be replaced in less than 15 minutes.

**Q: Is it easy to repair a Advent fuel cell system?**










**A:** It takes less than 15 minutes to replace a fuel cell unit. Replacement of normal consumable spare parts takes around an hour.

# BUSINESS MODELLING CLEAN AND RENEWABLE ENERGY







THE BUSINESS MODEL CANVAS		Designed for:	Designed by:	Date:	Version:
<b>KEY PARTNERS</b>  <p>Identify your key partners who play a role for power supply, logistics, and operations</p>	<b>KEY ACTIVITIES</b>  <p>What are your key activities around your power supply, logistics, and operations?</p>	<b>VALUE PROPOSITIONS</b>  <p>What are current value propositions?</p> <p>Is there a gap to existing practice, desired situation?</p>	<b>CUSTOMER RELATIONSHIPS</b>  <p>How does your existing power supply, logistics, and operation influence clients and end-users?</p>	<b>CUSTOMER SEGMENTS</b>  <p>Identify segments, split up if more.</p> <p>How does current practice for power supply, logistics, and operation affect your customer segments?</p>	
	<b>KEY RESOURCES</b>  <p>What are the main resources provided for power supply, logistics, and operations?</p>		<b>CHANNELS</b>  <p>Identify your existing supply chain for power supply, logistics, and operations</p>		
<b>COST STRUCTURE</b>  <p>What is the current cost structure for existing practice for power supply, logistics, and operation? Consider future regulations and taxes and their impact.</p> <p>What is the cost structure for investment in alternative set-ups based on for example MFC? Consider the various scenarios for MFC.</p>			<b>REVENUE STREAMS</b>  <p>Return on Investment?</p> <p>Where is break-even for an investment in MFC?</p>		

## THE BUSINESS MODEL CANVAS: WHAT IS IT?

A business model describes the rationale of how an enterprise creates, delivers, and captures value in economic, social, cultural or other contexts. The process of a business model construction and modification is also called business model innovation and forms a part of business strategy.

In theory and practice, the term business model is used for a broad range of informal and formal descriptions to represent core aspects of a business, including purpose, business process, target customers, offerings, strategies, infrastructure, organizational structures, sourcing, trading practices, and operational processes.

### BUSINESS MODEL CANVAS

A Business Model Canvas is a strategic management and lean startup template for developing new or documenting existing business models. It is a visual chart with elements describing the value proposition, infrastructure, customers, and finances of an enterprise or a product. It assists enterprises in aligning their activities by illustrating potential trade-offs.

The nine "building blocks" in the Business Model Canvas were initially proposed in 2005 and ever since, new canvases have appeared.

### USING THE BUSINESS MODEL CANVAS TO ASSESS YOUR READINESS FOR MFC

The Business Model Canvas can serve as a template, making sure you raise the necessary questions to existing practice of power supply, logistics, and operations. It can help you identify current practice and stakeholders either as co-partners or end-users/clients.

In this light, the Business Model Canvas can serve as a means to address the financial aspect of considering alternative options such as MFC vs. current practice.

Having mapped the "as/is" situation, you can turn to other models, such as the well-known SWOT. The SWOT can take your mapping further for strategic considerations. It can serve as a catalyst, securing your mindset for considerations of pros and cons plus opportunities and threats in continuing status quo vs. transitioning to green power.



The Business Model Canvas can serve as a template, making sure you raise the necessary questions to existing practice of power supply, logistics, and operations.

# TAKING IT FURTHER

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T



## GREEN TRANSITION ILLUSTRATED IN SWOT: WHAT IS SWOT?

SWOT analysis (or SWOT matrix) is a strategic planning technique used to help a person or organization identify strengths, weaknesses, opportunities, and threats related to business competition or project planning.

This technique, which operates by 'peeling back layers of the company' is designed for use in the preliminary stages of decision-making processes and can be used as a tool for evaluation of the strategic position of all kinds of enterprises. It is intended to specify the objectives of the business venture or project and identify the internal and external factors that are favorable and unfavorable to achieving those objectives. Users of a SWOT analysis often ask and answer questions to generate meaningful information for each category to make the tool useful and identify their competitive advantage. SWOT has been described as the tried-and-true tool of strategic analysis.

### USE THE SWOT MODEL TO CONSIDER YOUR TRANSITION TO GREEN POWER

Applying the SWOT analysis as a template to consider the transition to clean and renewable

energy can help your enterprise work on your business model identifying the pros and cons in transitioning. It may also serve as an indicator for the relevant timing, provided that it is used on a dynamic basis, ensuring that you are up-to-date with the situation and market conditions as they change.

Clearly, the transitioning to clean and renewable energy will speed up as regulations are implemented. And at some point in the future, it will no longer be a realistic choice not to consider alternative solutions to harmful practice. Meanwhile, many enterprises will see the opportunities and become forerunners prioritizing the area strategically, setting an edge and the new scene for a competitive advantage.

Whether and when timing is right for your enterprise is a strategic option. But asking the questions and identifying opportunities is a critical first step.



Applying the SWOT analysis as a template to consider the transition to clean and renewable energy can help an enterprise work on its business model identifying the pros and cons.

# S

## STRENGTHS



Expand portfolio by clean power solution, partnership relation and know-how access.

Lift your tradeoffs by a reinforced system strong in reliability for critical up-time, easy to maintain and operate with low impact on surrounding environments.

An investment in MFC can bring you a versatile future-oriented set-up, and a solution easy to scale up and not least enabling you to meet regulations for less harmful emissions.

How does your current set-up fit with a possible transition?

# W

## WEAKNESSES



Technology is new, need PoC and there is a need to communicate technology, efforts more demanding than selling traditional solutions.

Consider the areas that are obstacles for your transitioning to green power and their short- and long-term impact.

# O

## OPPORTUNITIES



Growing demand from customers for clean energy - ability to reach these new customers, update existing customers, hybrid collaboration, synergies, become forerunner in business, fuels cells are fit for both off- and on-grid applications.

Identify possible scenarios based on the strengths of your enterprise. How could the process be initiated either as pilot projects or full-blown depending on current set-ups? What are your opportunities in initiating the transition? What is the best timing?

Rank the different scenarios and their positive short- and long-term impact.

Consider ROI and the break-even in view of future situations regarding taxes, etc.

# T

## THREATS



Risk taking, the technology is matured but not mainstream in business, need for communications to assist sales, competitors may work faster, better, technology needs more investment and time, set-ups must be established for training and new practice.

Consider the threats for choosing a transition to green power. Can they be balanced?



## **BRINGING IT ALL TOGETHER: FIT FOR GREEN TRANSITION?**

The Business Model Canvas and the SWOT analysis are both well-known forms to apply when working on the strategy and innovation of an enterprise. In this guide, we have introduced them as possible methods for assessing the preparedness and strategic considerations for the transition to clean and renewable energy.

Applying the Business Model Canvas will help bring an overview - a mapping of the "as-is" situation - whereas the SWOT analysis can take the business model a step further, identifying the pros, cons, opportunities, and threats in transitioning to clean energy.

This guide started out stating that the transitioning to clean and renewable energy practice at some point will no longer be a choice but a demand, not least due to stringent regulations for the area and rise in demands from end-users for less harmful emissions. The question is more when the transition will take place. Weighing strengths versus weaknesses and considering opportunities versus threats will always bring about strategic choices of your own.

We hope that this guide has given you some insight into MFC as a viable solution - a possible alternative to your existing practice for power supply, logistics, and operations. We also hope that the introduction of well-known and used models can help you consider whether your enterprise is fit for the green transition to clean power.

You can download the models [here](#).

## ADVENT CAN HELP YOU TRANSITION TO CLEAN POWER

In this guide, we have introduced you to various models, based on which you can assess the relevance and strategic steps for the transition to clean and renewable energy. The models, however, are not as important as the message in itself, namely to bring your attention to the considerations around driving innovative business for you to keep ahead of market developments.

We have also introduced you to fuel cells, our technology and answer to the growing demand for clean and renewable power. We realize that this paper will not suffice for you to know enough about fuel cells as a technology nor as a solution in your context, but we hope you have found some inspiration. If you are interested in starting a dialogue, please reach out to our sales team.



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