

**Who said
oil can't be
green**

Sayyala™
Technology

www.sem.world
www.hema.om

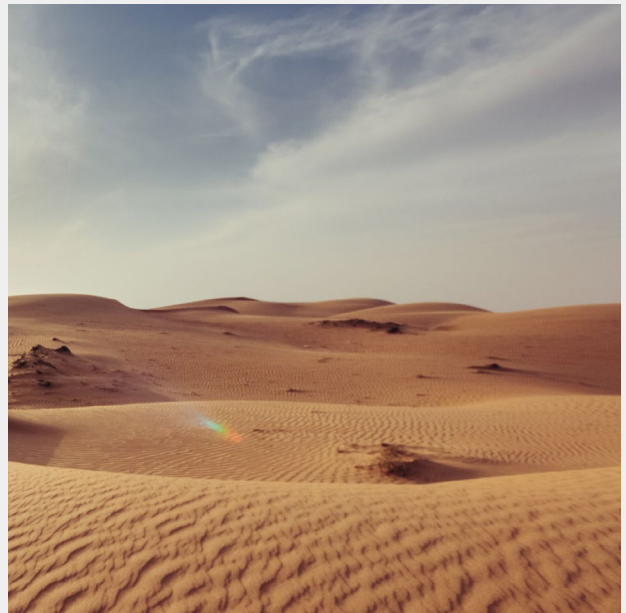
Sayyala™ Technology

We get it

It is no news that the Middle East region has some of the largest oil reserves in the world, but this wealth also comes at a cost – operational and environmental. Traditional approaches to oil production are often rigid and CAPEX heavy, not allowing for flexible operations. Sayyala can solve this challenge and bring a much-needed flexibility to crude production. This does not only achieve better margins and commercial benefits, but most importantly, yields economic impact for our stakeholders and their projects. Sayyala is designed to remain attractive even at low prices!

Water availability, especially in the remote crude production areas, is often limited. This does not only affect your operations but also greatly increases your handling costs. We have a better solution. What if we told you that using Sayyala on your site can reduce handling costs, clean high volume of water in the desert area to support your oil operations, reduce your carbon footprint and make the desert green?

Our proposition doesn't end there. Around 140 billion cubic meters of associated gas are currently flared globally. Not only does this mean that valuable energy is wasted but increasing environmental pressure to stop routine flaring also makes such operations a lot more difficult. You need solutions that will do the hard work for you and allow for smooth energy transition. Sayyala encompasses both, converting associated gas to power in a seamless environmental manner while driving costs down and increasing throughput.



Why Sayyala™?

Sayyala (Arabic) – an easy flowing stream of water. To us it is not just a name, it also reflects the way in which we conduct our business.

Hema Energy has partnered with a UK company SEM Energy to form a joint venture – SEM-MENA and to bring Sayyala to the forefront of the Oman market to provide value to the oil & gas sector. Regardless of the remoteness of the facility, low productivity, high contaminant levels or high water cuts, we work with our clients to tailor scalable and flexible optimization solutions that bring life to the wells and improve their economics.

#makethedesertgreen



S A Y Y A L A TM

How can SayyalaTM help?

Early production facility

When discovering oil reservoirs, choices for clean extended productivity testing are limited. SEM-MENA's Sayyala technology can speed up the infrastructure process, allowing you to benefit from the production value right away. Not only does Sayyala offer a mobile, cost effective and adaptive system but it also provides sustainable option for an early hydrocarbon monetization regardless of the size and remoteness of the discovery prospects. This means that our equipment is fully customisable and scalable to given requirements, offering a solution for a wide range of early development opportunities.

Facility management services

Always looking at the bigger picture, our solutions don't work in isolation. We realise that remote facilities, large or small, often require a focused operation care. The Sayyala team provide an 'Operational Excellence' model to bring optimal value to your operations. Upon facility inspection, baseline performance is established with a set of KPIs aiming to improve availability and delivery optimisation.

Marginal fields management

We understand that allocation of valuable resources to marginal oil and gas fields is often hard to justify, especially for big operators. Struggling wells, increasing water-cuts, pumps not performing, compressors needing adjustment or separators requiring revamping, those are just a few of the prioritization challenges that operators face regularly. In fact, the challenge starts with problem definition. Sayyala offers a field management integrated solution based on agreed KPIs spanning from reservoir / well performance and operational efficiencies to facilities uptime.

Modular solution

Depending on the specific operation, SayyalaTM can be tailor-made in a modular setup to suit your requirements.

What can we provide?



Multi-phase separation

SEM-MENA provides the full package, starting at the wellhead or flow-head discharge with multi-phase separation and solids control options.

SEM I-PUR

The SEM I-Pur Produced Water Treatment Technology is a method designed to remediate, decontaminate and sterilise produced water, such that it is suitable for re-use or environmental discharge at the lowest price point and energy usage in the market.

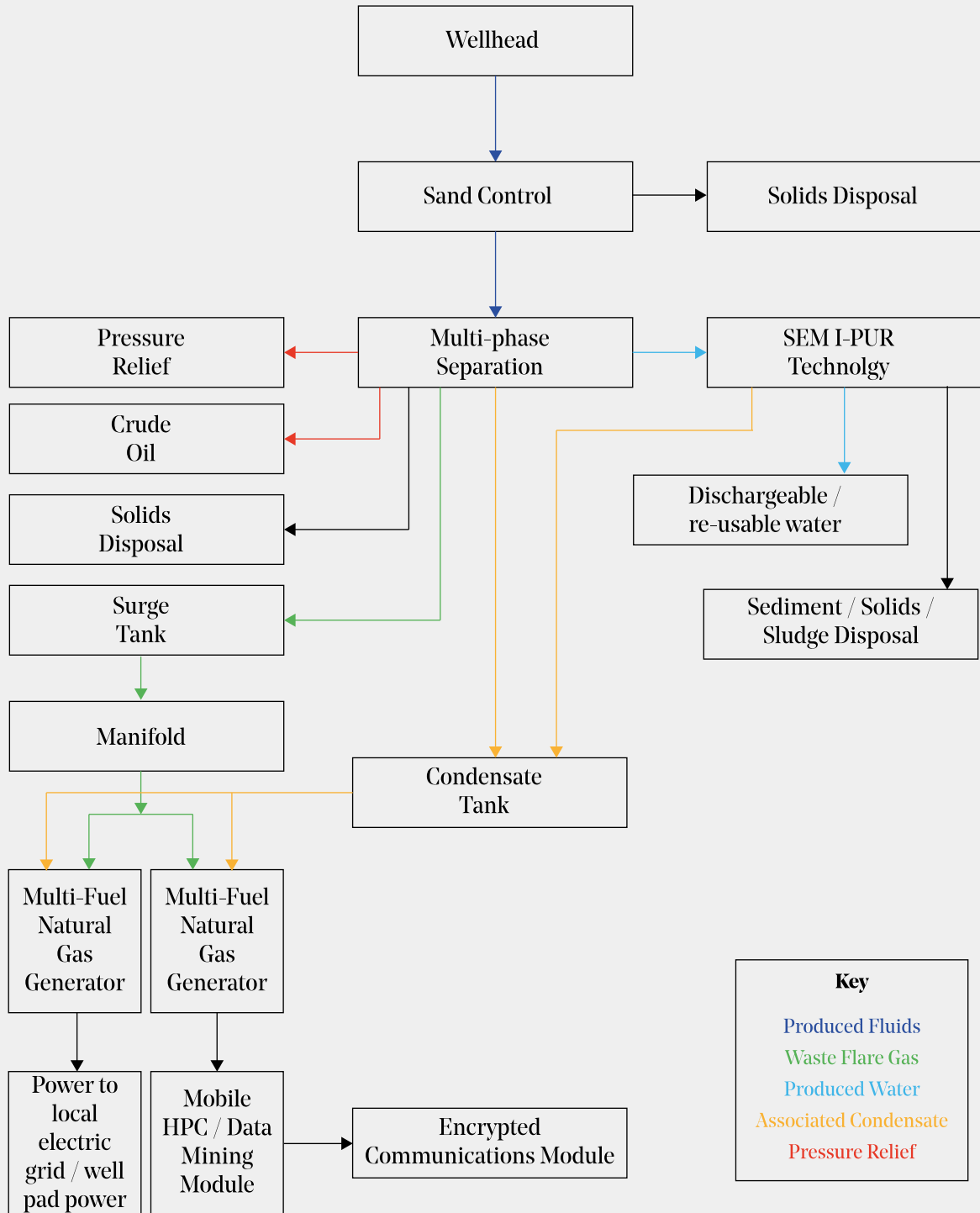
On-site electrical power generation

SEM utilises trailer mounted or containerised reciprocating two stroke, multi-fuel electrical energy generators that are designed to run off flare gas (without pre-conditioning) and are specially modified to cater for additional condensate injection. The generators are specially ruggedized for high temperatures and harsh environmental conditions, often found at the well site. Energy generation capacities / efficiencies are calculated considering these environmental conditions.

And even the production of crude oil

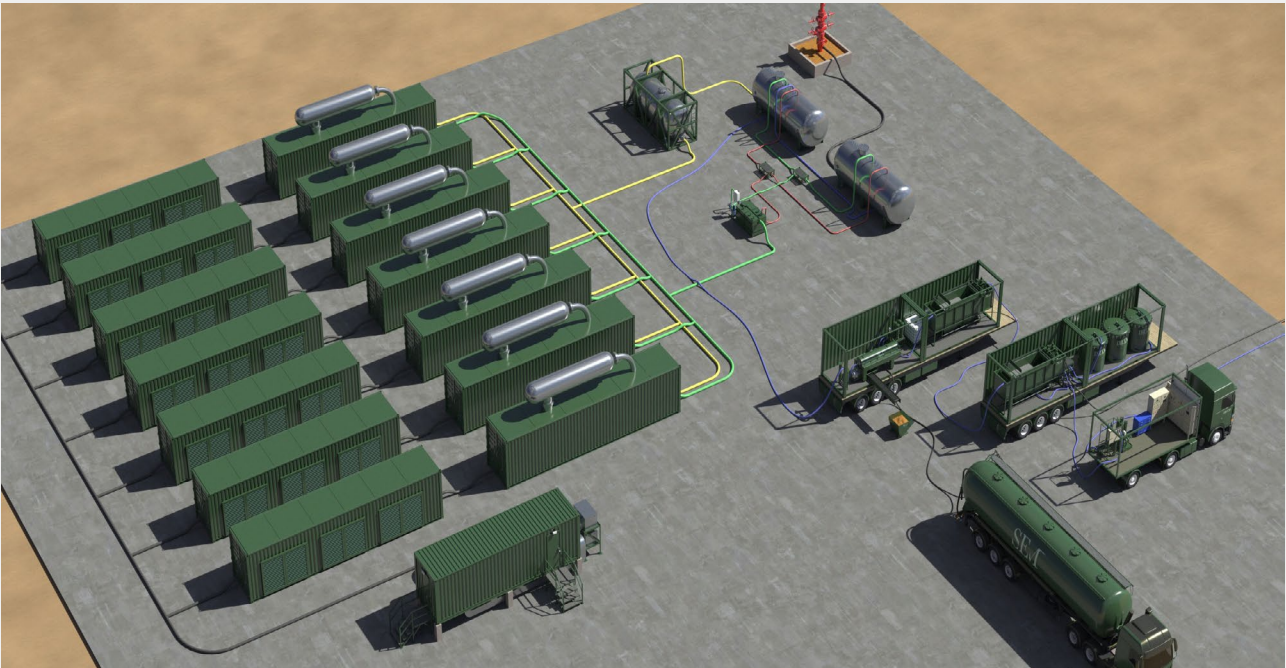
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Schematic Modular System Diagram



Module	Description	Benefits																				
1	Multi-phase Separation	<p>Produced fluids undergo primary low-pressure and high-pressure separation. Separated gas is discharged to Module 3. Condensates are discharged to holding tank and then to Module 3.</p> <p>Note: where oil production is heavy oil, condensates can be diverted and comigled with oil to reduce viscosity and improve flow characteristics.</p> <p>Separated oil is discharged to pipeline or tank / oil tanker (in the case of early production) and produced water phase is discharged to Module 2.</p>																				
2	SEM I-PUR Produced Water Remediation	<p>The SEM I-Pur treatment technology can remediate water with total dissolved solids (TDS) up to saturation levels (300,000 to 350,000 ppm).</p> <p>The I-Pur treatment module receives separated water from Module 1. Initially any remaining free oil or condensates are separated and discharged to holding tank. Residual sand / formation solids are discharged for disposal. Bulk water phase then undergoes multiple treatment phases to remove contaminants and sterilise:</p> <ul style="list-style-type: none"> • Primary Oxidisation removes bromide and begins to breakdown dissolved contaminants; Any H₂S present can also be removed at this stage. H₂S is broken down into chlorides, sulphates and small amounts of elemental sulphur • Bulk TDS removal stage precipitates out > 90% of TDS as an inert, non-toxic, recyclable solid residue; Remaining TDS are polished out through secondary ionic filtration; • Residual low-level suspended solids and free hydrocarbons are removed via SEM I-DAF treatment; • Final polish and sterilisation are provided through SEM DRAM filtration and secondary oxidation treatment. 																				
3	On-site Electrical Power Generation and Utilisation	<p>SEM multi-fuel generators will run for up to 50,000 hours continuous service at full load with no minor overhauls or major service events.</p> <p>Through automatic switch gear, automatic stop/start and the provision of continuous duty resistive load banks, the generator array is capable of safely handling variations in gas delivery rates and power draw. The resistive load banks are designed such that the full electrical load can be dissipated should consumption requirements reduce.</p> <p>Every generator is fitted with state-of-the-art emissions scrubbing and exhaust systems. Utilisation of flare gas through SEM generator systems typically reduces CO₂ emissions by up to 50% compared with gas flaring. Other salient emissions are also vastly reduced compared with flaring using integral US EPA qualified Tier 4 exhausts. Maximum emission levels are as follows:</p> <table border="1"> <thead> <tr> <th colspan="5">US EPA Tier IV Exhaust Emission Limits</th> </tr> <tr> <th colspan="5">Pollutant - all units (g/kWh)</th> </tr> <tr> <th>Category</th> <th>CO</th> <th>NMHC</th> <th>NO_x</th> <th>PM</th> </tr> </thead> <tbody> <tr> <td>Generators >560 kW</td> <td>3.5</td> <td>0.19</td> <td>0.67</td> <td>0.03</td> </tr> </tbody> </table> <p>Combustion of natural gas by flaring is relatively inefficient, as a result significant amounts of un-combusted CH₄ are released into the atmosphere every year. SEM generators burn natural gas and condensate far more efficiently than flaring, CH₄ emissions are negligible.</p>	US EPA Tier IV Exhaust Emission Limits					Pollutant - all units (g/kWh)					Category	CO	NMHC	NO _x	PM	Generators >560 kW	3.5	0.19	0.67	0.03
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4	Remote control, data transfer and IoT	<p>Due to its flexibility in design, variations in flow rate are easily catered for. Sayyala™ uses real-time monitoring at its core. Coupled with IoT overlay allows for full remote control and monitoring on performance and outflow containment levels. This can also be configured with alarm automation but most importantly, it provides real-time data to the operator. This can help operators to manage unseen challenges and reduce compliance risk and insurance premiums.</p>																				

Note: Separate detailed data sheets are available summarising each individual technology on request.



Key benefits

Sayyala™ delivers the following benefits:

- Early production even in remote areas, meaning that reserves can be monetized from date of well completion.
- Produced water is treated to discharge or re-use standard, providing a valuable resource and cutting disposal costs.
- Our waste to energy approach reduces operational costs and provides several possible routes to additional revenue streams.
- Cost effective operational continuity in zero-flare plays.
- Combination of technology with facility and production management expertise ensure that marginal wells remains viable with increasing productivity and profitability.

Water

Not only do our systems allow for treatment of water, but also ensure that the treated water can be further utilised in your processes. This includes the following examples:

- Irrigation of crops
- Utilise for steam generation

- Utilise as coolant water for other industrial processes
- Utilise as frack water
- Recharge aquifer / enhanced oil recovery by water injection without risk of contamination, increasing salinity or introduction of H2S production bacteria.

Energy

Electrical energy generated from the process represents an energy resource that has historically been wasted. Such energy can have various applications including:

- Powering the well pad and local amenities, cutting on-site diesel costs significantly and maximising earning potential.
- Back-up power battery charging which can be done on-site or transported to other locations.
- Discharging electrical energy onto a nearby electric grid, supporting local settlements and generating new revenue streams.
- Data mining utilisation – We can provide containerised, HVAC and fully ruggedized data mining modules.

