



**Signina Capital AG
Water Infrastructure**

**Quarterly Water Report
Q3 2018**

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I. Current Project Descriptions

Wastewater plant, NJ: A New Jersey-based Wastewater Treatment Plant where original funds were partly used to mount solar panels to increase energy efficiency of the plant, lower costs over time, and provide energy to the local municipality. The state of New Jersey requires electricity suppliers to secure a portion of their electricity from solar facilities located in NJ, creating a natural market for Solar Renewable Energy Credit (SREC) trading credits. The project not only reduces the plant's energy consumption but also improves its overall efficiency. We can surely extend our reach in this area and currently look at a broader investment opportunity in the same sector.

Sustainable Sewerage, Ontario: The Sustainable Sewerage market in Ontario currently undergoes a significant change when it comes to consolidation and strong demand for renewal of existing plants. Amongst others we are working with a public company which has developed a technology providing sewage collection and water treatment. It offers an all in one solution which is both cheaper to install and operate than traditional systems. The existing projects are all government linked and work closely with municipalities and we are currently working towards a PPP pipeline for its sewerage system. The provincial regulations regarding sewerage mean that many municipalities are required to change/install systems in the coming years. We have been implementing the first parts of the portfolio of existing projects and we will continue to implement more under the same framework. The constant diversification increased the security for the investors but also allows us to further reach into this market. The investment model has not changed, but the reach within Ontario has become broader.

Hydropower, Illinois: A lock and dam hydroelectric water power project located on the Illinois River. The site has obtained a FERC License (expires 2061) and is finalising development. Once the site is connected and producing energy it will provide power to the local municipalities and income will be generated by the power purchase agreement in place.



II. Regional Market Information

News in Brief

- Congress moves forward with Water Resources Development Act bill
<https://www.naco.org/blog/congress-moves-forward-water-resources-development-act-bill>
- Why New Mexico Shouldn't Rush Toward Repurposing Oilfield Wastewater
<https://breakingenergy.com/2018/10/05/why-new-mexico-shouldnt-rush-toward-repurposing-oilfield-wastewater/>
- SBI makes USD650million Certified splash in green bond pool: inaugural green issuance cements State Bank of India commitment to sustainability
<https://www.climatebonds.net/2018/10/sbi-makes-usd650million-certified-splash-green-bond-pool-inaugural-green-issuance-cements>

Would You Drink Beer Made From Recycled Sewage Water?

Water Treatment is used in many industrial processes especially in areas where water is in short supply such as California. A Swedish company has taken water treatment to the next level producing beer from purified wastewater. Forbes recently wrote about the company and concept. Below are some extracts from the article¹.

A pint of beer takes about 20 gallons to produce making it not the most environmentally friendly drink. The people at Nya Carnegie Brewery, IVL Swedish Environmental Research Institute and Carlsberg Sweden – launched the country's first beer made from 'recycled water' called PU:REST.

As the creator of this concept and Senior Project Developer at IVL Swedish Environmental Research Institute – the industry-government-owned organization that has been developing waste water treatment technologies for almost 50 years – Staffan Filipsson wanted to do something creative to raise awareness about the value of safe and clean water plus demonstrate that wastewater can be made drinkable.

After several months of brainstorming, Filipsson and his team at IVL came up with the idea of using their highly purified wastewater for food production. He reached out to Nya Carnegiebryggeriet – a neighbouring brewery founded by Carlsberg Sverige in collaboration with Brooklyn Brewery – that has used ecological ingredients in the past.

First, the water is filtered through a combination of conventional microbiological treatment and an ultrafiltration membrane, a Membrane Biological Reactor (MBR) for breaking down organic substances plus separating bacteria, micro plastics and parasites. Second, the water goes through a very tight reverse osmosis membrane, which removes almost 100% of all chemical substances. As a back-up, there's an activated carbon filter to remove priority organic substances, such as pharmaceutical residues and PFAS (Perfluoroalkyl Sulfonate) that could become toxic at high concentrations. Third, and as the final safety barrier, the water is exposed to a bacteria killing ultraviolet (UV) light on the off chance that any bacteria remains.

The result is a recycled water that sufficiently meets the Swedish drinking water standard, with many typical concerns, chemical and biological parameters plus organic substances such as pharmaceuticals and endocrine disturbing compounds, all below the detection limits.

Apparently, that's all the folks at Nya Carnegiebryggeriet needed to hear. As someone that's always up for a challenge, Stephen Dippel, the brewery's ambassador, said,

¹<https://www.forbes.com/sites/eustaciahuen/2018/07/19/sewagebeer/#16f69fed77c0>



As soon as we were 100% confident that the beer would be totally safe to drink and taste good, we talked amongst ourselves at the brewery and came to the conclusion that this is the ideal 'teaser' project for a great cause. To us, this is a really unique way to inform people about the importance of water conservation and challenge consumers' notions about what's possible to consume.



Source: <https://www.forbes.com/sites/eustaciahuen/2018/07/19/sewagebeer/#16f69fed77c0>

Moving forward, this beer will be served at a number of environmental conferences this fall. According to Henric Byström, Head of Communication at Carlsberg Sverige, there have been discussions to produce more bottles in response to the "extreme high interest," but no plans are confirmed as of press date.



The Next Big Bet in Fracking: Water²

Investors sense opportunity in companies that handle drilling wastewater

Fledgling companies, many backed by private equity, are rushing to help shale drillers deal with one of their trickiest problems: what to do with the vast volumes of wastewater that are a by-product of fracking wells.

When producers blast a mix of water, sand and chemicals to release oil and gas from rock formations miles underground, they not only unlock oil and gas, but also massive quantities of briny water long buried beneath the surface. Drillers in the Permian Basin in New Mexico and Texas currently generate more than 1,000 Olympic-size swimming pools full of this murky, salty water every day. Handling it amounts to up to 25% of a well's lease operating expense, according to analysts.

Investors have expressed interest in this corner of the U.S. shale industry as oil production in the Permian soars to record levels. Analysts said the region could produce more than five million barrels of oil a day by 2023, more than the current daily production of Iran.

Sensing a chance for a big return, private-equity firms have invested more than \$500 million into wastewater-disposal companies such as Solaris Water Midstream LLC, WaterBridge Resources LLC, Goodnight Midstream LLC and Oilfield Water Logistics LLC. There are roughly a dozen of these water-focused companies.

These companies are building pipelines to transport the wastewater and dispose of it deep underground, hoping to displace the trucks that currently do the job. Some companies have a longer-term plan: recycling the wastewater to sell it back to drillers to reuse.

Large pools of capital are looking for a way into the game, with companies hoping to attract billions of dollars in investment. KKR & Co., one of the world's largest private-equity firms, has begun approaching companies in the space in recent months.

Finding a long-term solution to the wastewater problem is essential for Permian producers. A single shale well can produce more than a million of barrels of oil over its lifetime, and many times that amount of water. Energy consultancy Wood Mackenzie has found that in some parts of the Permian Basin, wells produce 10 times as much water as they do hydrocarbons. In the Delaware portion of the Permian, the area's most popular geologic deposit, water-to-oil ratios conservatively average 5 to 1, analysts said.

For years, drillers have relied on trucks to move the water, but surging U.S. shale production means trucks alone may not be able to handle the growth, a problem exacerbated by a continuing trucking shortage. Moving the water by truck, about 125 barrels at a time, is no longer feasible when a single well produces thousands of barrels a day. In addition rising water-management costs could add as much as \$6 to the cost of producing a barrel of oil, according to Wood Mackenzie, potentially curbing the growth of future Permian oil supply by 400,000 barrels a day by 2025.

Truckers and the new entrants typically dispose of wastewater in underground wells, but the latter group hopes it can provide drillers the service more cheaply using pipelines that are scalable. Outside of Pecos, Texas, WaterBridge is building a network of pipelines to take away wastewater from some of the area's biggest producers. The company said it would have 125 miles of pipelines built by the end of the year capable of handling 600,000 barrels a day.

Apache Corp. one of the largest producers in the Permian, wants to reuse more water to reduce the millions of barrels it must dispose of and limit the freshwater it purchases for fracking, according to a company presentation earlier this year. Apache recycled more than 22 million barrels of water from 2013 to 2016 in just one subsection of the Permian.

This potentially means a new business opportunity for water-disposal players. Historically, producers have mostly used freshwater for fracking, but water companies are setting up their networks with an eye on treating produced water so it can be reused for fracking and resold to the shale drillers who paid them to take it away in the first place.

²<https://www.wsj.com/articles/the-next-big-bet-in-fracking-water-1534930200>

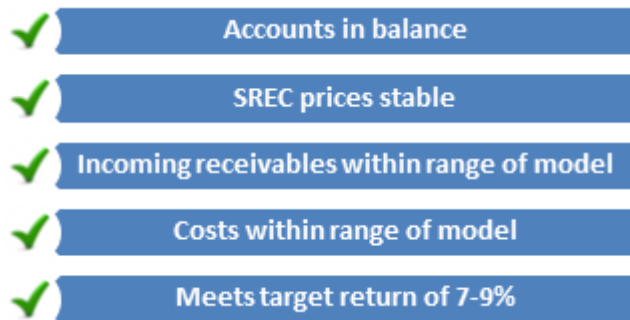


III. Ongoing Projects

Wastewater plant, NJ:

The energy creation for Q3 2018 was in line with expectations. Furthermore the payment for the PPA SREC contract occurred in July for the energy year ending 31 May 2018. The SREC energy prices remain at stable levels in New Jersey making it likely that 2018/19 will again be a solid year for the asset.

- Monitor PPA component
- Monitor SREC eligibility and prices on the market (1 SREC for every 1000 kW-hours of electricity produced)
- Monitor regulatory shifts in clean energy incentive programs (RPS) and timelines
- Document any changes to the investment expectations
- Online monitoring of the solar power as well



Sustainable Sewerage, Ontario

The last quarter has seen some movement compared to Q2. While there is a growing pipeline opportunities to purchase operating sites there is also traction on the design and build elements which lead to operating contracts following commissioning.

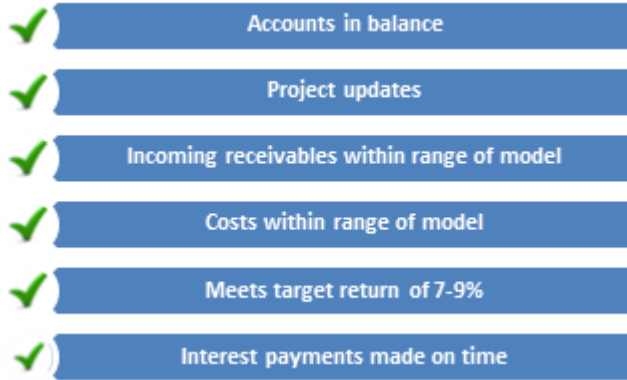
From an O&M contract basis there continues to be ample opportunity with sites that need upgrading and potential expansion. These are individual sites of a portfolio of sites being offered as a package. The upgrading element of the sites needs extensive due diligence to work out the valuation of such contracts. There does not seem to be a lack of supply of potential systems that need upgrading for future and current regulatory environment compliance.

Clearford was awarded a contract to supply a wastewater treatment plant for a Warehouse in Ottawa's East End³. Clearford Koester Canada to provide a full turnkey solution including engineering, design, and installation of a Clearford packaged advanced membrane bioreactor plant. It is the same style membrane technology that was seen in the on-site visit at Fibrecast in June.

In addition Clearford and Koester are continuing to realise the synergies between the two companies. UV Pure Generation 3 product is likely to be released in Q4. There looks to be a strong pipeline for the product which will also be used as an upgrade for many operating sites. The product will be more efficient and cheaper to maintain once installed.

- Maintain monthly communication with Kevin Loiselle and Mark McGuire regarding projects
- Document any changes to the investment expectations

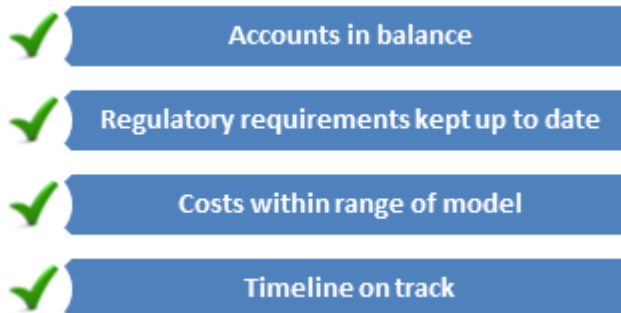
³ <https://www.clearford.com/news/clearford-announces-contract-to-supply-wastewater-treatment-plant-for-yow1-warehouse-in-ottawas-east-end/>



Hydropower, Illinois

Similar to last quarter there has been little to update. The site is delayed with smaller construction work conducted than expected in Q3 2018. There continues to be volatility in the electricity prices which assists with PPA pricing. We continue to explore further financing rounds on debt level, as the financing environment is changing with the volatility. We keep in close contact with our electricity traders in order to establish when it is the right time to lock in the current pricing according to the market.

- Maintain monthly communication with onsite project manager
- Document any changes to the investment expectations
- Monitor the financial reporting, cash flows and accounts





IV. Latest Developments

Latest Actions

There are three main areas where exciting future developments are occurring:

1. This quarter similar to last looks at operating contracts in Canada. There are individual sites and small portfolios of assets from small operators that may be available depending on the price and upgrades if needed. Some potential contracts rely on the upgrades and expansion which if they pass all due diligence checks are strong assets. The pipeline is large with a strong emphasis now on understanding and trying to convert some of the potential projects that are financially viable.
2. The US projects remain open of interest: the potential projects and contracts are described above there seems to be additional potential capacity across the border. Koester have targeted some regions in the US which could be appealing from a design and build perspective as well as operating contracts.
3. The new potential in Texas in a different sector continues to be of interest: The oil and gas industry is booming in Texas but the tipping and dumping of the waste in the oil industry remains a big concern which is not overly addressed. There are many landfarms which act as landfill sites for the cutting and mud waste from the oil extraction procedures. Many sites do not do anything with the waste. However there is a growing trend to start recycling the waste (centrifuge can be used to separate the mud into water and hydrocarbons). This concept has great potential in recycling water and minimising waste; thus there are some site currently being investigated from both a conceptual basis and a financial viability basis.
4. There are some new potential projects regarding water treatment in California. The concepts vary from agriculture needs to water storage to a plant using reusable and recyclable products to convert into construction aggregates. As the new projects have only recently come to light there will be more information in Q4 if anything becomes of more interest.

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