

# WATER INFRASTRUCTURE **QUARTERLY REPORT - Q4 2023**

# SIGNINA CAPITAL AG







### Waste Water, Mt. Holly, 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 allin-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.

### Greenhouses, Virginia

A lot of the groceries produced in the USA are transported across the country and come from regions with little water (such as leafy greens which are still 99% field grown in the US). This creates high costs and carbon footprint along with a lack of consistency for fresh produce. The greenhouses today can control the environment to produce fresher quality produce, utilizing less water, is local and sustainable. The project will be developed in Virginia for the local market.

## Industrial Re-use, Blue Planet, California

The project is a carbon capture and mineralization project based in Pittsburg, CA. The company captures both wastewater and CO<sub>2</sub> emitted from a gas-fired power plant and combines these with locally sourced demolished/returned concrete as a process input material to produce several different "CO<sub>2</sub> sequestered" and "up-cycled" aggregate products for use by Bay Area businesses, governments and consumers in a wide range of low-carbon, highvalue concrete mix designs. The wastewater and steam is obtained from the local power plant and the ammonia needed from their treatment plant is located adjacent to the plant. As a result, either method will use recycled water, which is legislatively supported in California. The whole process revolves around reusable and recyclable products. The carbon dioxide mitigation, waste water usage and demolished concrete process input provide a process producing recycled aggregates while reducing carbon dioxide.

## Hydropower, Marseilles, 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.

### Hydropower, Braddock, Pennsylvania

A lock and dam hydroelectric water power project located on the Monongahela River, Pittsburgh. The site has obtained a FERC License (No. P-13739) with a 5.25MW capacity and is finalising development. The site, once producing energy will provide power to the local area with income being generated via the sale of the energy.

# **PROJECT RELATED** DEVELOPMENTS

## **Carbon linked projects**

Blue Planet raised further financing in Q4. Marathon, Sulzer and other industrial counterparts continue to progress with plans for the future. The immediate update is that the commercial and automatization phase at the San Franciso Bay Aggregates (SFBA) site will likely be commissioned by the end of Q2 2024. This is a significant milestone having a large operating site.

Web Link with the time warp function, newly also showing the inside of the greenhouse.

## Waste water in Canada

We continue to see supply for sites that need upgrading. This continues to be a task of reviewing feasible sites and the economics of them. However the potential projects and expansions are slow moving and with the current regulatory framework it is prudent to not rush into anything. The opportunity and pipeline are strong and will likely have economies of scale in certain municipalities.

Hydropower PPAs continued to be reviewed with pricing monitored. The projects are being appraised and the hope will be there will be a significant update and movement in the first half of this year.

## **Agricultural Greenhouses**

The site is finishing construction. The first harvest will probably be in Q2/Q3 2024.

http://tinyurl.com/nm3wwwbn



# **REGIONAL MARKET INFORMATION**

## **NEWS IN BRIEF**

## **US-China climate talks highlight opportunity for investors**

https://www.ubs.com/global/en/wealth-management/insights/chief-investment-office/house-view/daily/2023/latest-13112023. html?caasID=CAAS-ActivityStream

## Farms Of The Future Will Grow Food While Restoring The Environment: Here's How

https://www.forbes.com/sites/juergeneckhardt/2023/07/06/farms-of-the-future-will-grow-food-while-restoring-theenvironment-heres-how/?sh=6ff8f3acbbd2

## Global Energy Perspective 2023: Hydrogen outlook

https://www.mckinsey.com/industries/oil-and-gas/our-insights/global-energy-perspective-2023-hydrogen-outlook

## THE DIFFERENCE BETWEEN GREEN HYDROGEN AND BLUE HYDROGEN<sup>1</sup>

The below is a summary from Petrofac and their explanation of the different types of hydrogen as described by their Head of Business Development.

## Different colours of hydrogen

The basic understanding of hydrogen as an energy carrier and the semantics behind its various names, requires answers to two essential questions: what is it and how is it produced?

We could discuss at length about what hydrogen is, from its atomic weight to its end use, but to understand the basics we need to make the distinction of hydrogen as a carrier and not an energy source. What this means is that it needs a primary source of energy to be produced – solar, electricity, hydro, nuclear power, or gas, to name a few. It is the specifics of the production process, including the energy source it utilises, that determine whether hydrogen will be dubbed green or blue. There are also grey, pink, or yellow in fact.

## Blue Hydrogen

Blue hydrogen is when natural gas is split into hydrogen and CO2 either by Steam Methane Reforming (SMR) or Auto Thermal Reforming (ATR), but the CO2 is captured and then stored. As the greenhouse gasses are captured, this mitigates the environmental impacts on the planet. The 'capturing' is done through a process called Carbon Capture Usage and Storage (CCUS). This is a method that our Blue Planet project utilises by sequestering the carbon with the aggregates.



## **Green Hydrogen**

Green hydrogen is hydrogen produced by splitting water by electrolysis. This produces only hydrogen and oxygen. We can use the hydrogen and vent the oxygen to the atmosphere with no negative impact. To achieve the electrolysis we need electricity, we need power. This process to make green hydrogen is powered by renewable energy sources, such as wind or solar. That makes green hydrogen the cleanest option – hydrogen from renewable energy sources without CO2 as a by-product.

# **Grey Hydrogen**

Grey hydrogen has been produced for many years. It is a similar process to blue hydrogen – SMR or ATR are used to split natural gas into Hydrogen and CO2. But the CO2 is not being captured and is released into the atmosphere.

# Pink Hydrogen

Similar to green hydrogen, pink hydrogen is made via electrolysis, but using nuclear energy as its source of power.

# Pink Hydrogen

Another type of hydrogen made by electrolysis is yellow, where electrolysis is achieved solely through solar power (unlike green which could use a combination of renewable energy sources such as wind or solar).

There are some other colour hydrogen and there likely will be more over time but they all emphasis the need to transition away from some of the hydrogen types.<sup>2</sup> The future is a transition from grey, through blue, to green hydrogen. One thing that is clear is the important role hydrogen will play in energy transition. We are likely to see a transition period of 20-30 years where blue hydrogen plays a key role.





## **CARLSBERG WINS GLOBAL INDUSTRIAL WATER REUSE AWARD USING DUPONT TECHNOLOGY<sup>3</sup>**

Carlsberg reduced water consumption by 58 percent using DuPont closed circuit reverse osmosis (CCRO).

processes.

Using DesaliTec<sup>™</sup> closed circuit reverse osmosis (CCRO) technology as part of its total watermanagement(TWM)treatmentplant, CarlsbergGroupreducedwaterconsumption by 58.8 percent—or 500,000m3 per year—virtually eliminating wastewater from the water-intensive brewing process at its flagship brewery in Fredericia, Denmark.<sup>4</sup>

Carlsberg's total water management system project, which recycles the non-ingredient water used for cleaning and other industrial processes, was led by the Belgian circular water specialists, Pantarein Water and included expertise and technologies from Dutch water treatment system designer Lenntech, DuPont Water Solutions, and Danish industrial pumps specialist Grundfos.

By reusing 90 percent of all process water from production, the plant has reduced the average water consumption at the brewery from 2.9 hl of water per hl of beer to 1.4 hl of water per hl of beer. After two years with its pioneering water recycling system, Carlsberg estimates that the brewery in Fredericia has saved approximately 1 billion liters of water.<sup>5</sup>

The water recycling plant is developed through collaboration with the multi-stakeholder Danish partnership for Resource and water efficient Industrial food Production (DRIP).

## The Carlsberg group leveraging water technologies from DuPont, was awarded the Global Industrial Water Reuse Champion Award for its water recycling plant and commitment to water reuse and recycling in its brewing

In DRIP, companies, technology providers, research institutes and health and food authorities have been working to rethink how we use and reuse water and expand the boundaries of water purification and circularity. The Carlsberg Group and Grundfos were among others part of DRIP.

The success at Fredericia has enabled significant progress towards Carlsberg's ambition for ZERO Water Waste, having become an important demonstration of the technology's potential and a key sourcing of learning and best practice for other breweries - within and beyond the Carlsberg Group.

The water reuse process is also generating additional sustainability benefits—in addition to operational cost savings. Biogas, a byproduct of the total water management facility, is used to heat on-site facilities and accounts for about 10 percent of the total amount of heat used at the Carlsberg Fredericia brewery, further helping to improve the site's sustainability profile and helping to reduce energy consumption.

The award was presented at the 2023 Sustainability and Circular Economy Summit in Washington, D.C., by the U.S. Chamber of Commerce, Veolia, University of Pennsylvania Water Center, International Desalination Association, and the Water Reuse Association.





Accounts in balance **SREC** prices stable Incoming receivables within range of model Costs within range of model Meets target return of 7-9%

# WASTE WATER MT. HOLLY, NEW JERSEY

A New Jersey-based Wastewater Treatment Facility (WWTF) where funds were partially 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. It also helped in 2010 to improve the infrastructure in an area that was hard hit during the financial crises.

# stable.

- Monitor PPA component



# **ESG RISK MITIGATION**

The site continues to operate and provide energy with the usual stronger summer months. Pricing appears to be

• Monitor SREC eligibility and prices on the market (1 SREC for every 1000kW-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

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# **ICMA CRITERIA**

### **Renewable energy**

- Climate change mitigation
- Natural resource conservation
- Pollution prevention and control

### **Climate change adaptation**

# **ESG POLICY SOLUTION**

**Clean energy creation** – solar panels provide clean renewable energy

**Pollution reduction** – the Waste Water Treatment Facility (WWTF) utilizes the solar panels energy via a power purchase agreement. This reduces the heavy amount of energy required by the WWTF which would otherwise be coming from non-renewable sources of energy

Renewable Energy consumption
Water Consumption



**Energy efficiency** – the proximity of the site to the waste water facility offers a high energy efficiency



**Accounts in balance Project updates** Incoming receivables within range of model Meets target return of 7-9% **Interest payments made on time** 

# SUSTAINABLE SEWERAGE ONTARIO

The Canadian wastewater market is highly fragmented. The market requires small impact installations, rather than traditional centralised large waste water treatment plants. Our existing 300 projects are government linked and only fully licensed projects with no planning risks are being considered. Signina focuses on business consolidation of midsized businesses, operating in project sizes of \$5-50m. The small to mid-range business growth is supported by shifting demographic developments into smaller, satellite communities, as well as a stable favourable regulatory environment.

With wastewater rates rising steadily, the risk-reward associated with Signina's consolidation strategy is readily apparent and has picked up pace since its start in 2008. With larger institutional mandates we have triggered more deals diversifying from the existing projects. Sustainable sewerage has become a major concern over the past couple of decades. The majority of the contracts are in municipalities that are rated A or higher by rating agencies. In addition there are various municipalities that do not carry any debt.

### The operations are as expected. Some of the new potential contracts have come to fruition or making significant progress in the past quarter. There also remains a pipeline of new business and contracts which are being assessed.



# wastewater management:

- Natural resource conservation Climate change adaption
- **Eco-efficient and/or circular** economy adapted products, production technologies
- Climate change mitigation Natural resource conservation

# **ESG POLICY SOLUTION**

# treatment and clean water

**Pollution prevention** - by creating sustainable sewerage infrastructure the need for septic tanks and landfill sites are heavily reduced. The waste water treatment assists an ongoing global problem with handling waste and impurities

## **ESG RISK MITIGATION**

Water Re-use
Water Pollution



Sustainability - providing finance and assistance in creating and maintaining infrastructure for wastewater



**Accounts in balance V** Permitting process on schedule **Timeline on Track** In line to meet target return of 7-9%

# INDUSTRIAL RE-USE BLUE PLANET, CALIFORNIA

The project is a carbon capture and mineralization project based in Pittsburg, CA. It captures both wastewater and CO<sub>2</sub> emitted from a gas-fired power plant and combine these with locally sourced demolished/returned concrete as a process input material to produce several different "CO<sub>2</sub> sequestered" and "up-cycled" aggregate products for use by Bay Area businesses, governments and consumers in a wide range of low-carbon, high-value concrete mix designs.

The wastewater and steam will be obtained from either the local power plant or from the sanitation district that can provide wastewater and the ammonia needed from their treatment plant which is located adjacent to the plant. As a result either method will use recycled water, which is legislatively supported in California. The whole process revolves around reusable and recyclable products. The carbon dioxide mitigation, waste water usage and demolished concrete process input provide a process producing recycled aggregates while reducing carbon dioxide.

industrial firms.





### The project and technology company continues operate as expected and has gained momentum from some large

### Maintain monthly communication with project team Document changes and delays to the permitting process



# **ICMA CRITERIA**

### **Climate change adaptation Green Buildings**

- Climate change mitigation Natural resource conservation Pollution prevention and control
- **Eco-efficient and/or circular** economy adapted products, production technologies and processes
- Climate change mitigation Natural resource conservation

# **ESG POLICY SOLUTION**

**Reuse of wastewater** – the water will be obtained from either the local power plant or from the sanitation district. This results in recycling the wastewater

**Recycling products** – the process also uses locally sourced demolished concrete as a process input to create aggregate products for use in the Bay Area

Sustainable buildings – the aggregates created in the process are from renewable and green sources. This in turn does not impact the environment negatively and meets the goal of sustainable cities and communities

**ESG RISK MITIGATION** 

Water Re-use · CO, Emissions Neutrality · Pollution







**Timeline on Track** 

# HYDROPOWER MARSEILLES, ILLINOIS

Hydropower, Illinois: A lock and dam hydroelectric water power project located on the Illinois River. The site has obtained a FERC License (expires 2061) with a 10.26MW capacity. 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. The project is considered a small- or mid-sized project and has reduced the environmental impact dramatically. It entails a variety of environmental rules from the EPA that have been fulfilled with the FERC licence. The mandate looks at small hydropower facilities (below 25 MW) as such sites have minimal impacts on the surrounding area unlike large hydropower facilities which often have negative impacts on the surrounding environment.





The project continues to move slowly both on from a construction aspect as well as any PPA finalisation. Hydropower continues to be a hot topic in the clean energy movement and will likely pick up momentum now the world is reopening. There continues to be some volatility in the pricing too which is being monitored closely.

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

# ICMA CRITERIA

### **Renewable energy**

 Climate change mitigation Natural resource conservation Pollution prevention and control

### **Energy efficiency**

 Climate change mitigation Pollution prevention and control

### **Environmentally sustainable** management of living natural resources and land use

- Natural resource conservation Biodiversity
- Climate change adaptation

# **ESG POLICY SOLUTION**

**Renewable energy creation** - hydropower is a clean renewable source of energy which can be sold via a PPA agreement or via merchant wholesale pricing on hydropower exchanges

**Environmental management** – the small hydropower market goes through a rigorous environmental approval process to make sure there is minimal impact to the surrounding region

**Biodiversity** conservation the environmental such projects include aquatic approvals for preservation to ensure the natural environment is not negatively impacted

**ESG RISK MITIGATION** 

Project Size under 25mw
Renewable Energy Production



Costs within range of model **Timeline on Track** 

# HYDROPOWER BRADDOCK, PENNSYLVANIA

Hydropower, Pennsylvania: A Lock and Dam Hydroelectric Water Power Project located on the Monongahela River, Pittsburgh. The site has obtained a FERC license (expires 1965) with a 5.25MW capacity. It is a similar project to Illinois and is in an advanced stage in the PPA negotiations to lock in a price for the first few years post commissioning. Furthermore the project has received state grants.

The project is getting through its final approvals in order to construct the Hydropower plant. Alongside this step there continue to be discussions with some local groups to regarding PPA offtakes for when the site should be operational.

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





# ICMA CRITERIA

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 Climate change mitigation Natural resource conservation Pollution prevention and control

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**Biodiversity conservation** – the environmental approvals for such projects include aquatic preservation to ensure the natural environment is not negatively impacted





**Off-take agreement signed All licenses acquired All EPC contracts and bonding signed** Costs within range of model **Timeline on Track** 



A lot of the groceries produced in the USA are transported across the country and come from regions with little water (such as leafy greens which are still 99% field grown in the US). This created high costs and carbon footprint along with a lack of consistency for fresh produce. The greenhouses today can control the environment to produce fresher quality produce, utilizing less water, is local and sustainable.

There is continued growth of advanced greenhouse market (482 acres built or in construction in U.S. since 2018). There has been significant disruption in leafy greens caused by food safety (recalls), changing climate, and labour availability. There is an expected acceleration in food service driven by demand for food safety, resiliency, and quality representing a strong growth sector. The target crop segments benefit from demand for sustainably grown, local food, enhanced convenience and taste, and improved food safety.

The major food chains need reliable produce which is hard with purely field grown facilities. Therefore similar to other areas in infrastructure the various food service, retail and integrated growers are happy to sign off-take agreements to guarantee a reliable product. Such greenhouses are plentiful in Europe reducing the technology risk to being tried and test.





![](_page_10_Picture_10.jpeg)

# **ICMA CRITERIA**

### **Energy efficiency**

 Climate change mitigation Pollution prevention and control

**Environmntally sustainable** management of living natural resources and land use Natural resource conservation

**Eco-efficient and/or circular** economy adapted products, production technologies and processes

# **ESG POLICY SOLUTION**

Food Security – The sites create standardized produce. The classic agriculture method leaves a lot of the quality down to the elements. This could lead to bad harvests. The Greenhouses secure the output quality and quantity.

Enivronmental Management – The greenhouses reduce the amount of water required in order to grow the fresh produce. As it is under strict conditions the process can be optimized. Furthermore the sites are local rather than cross country.

## **ESG RISK MITIGATION**

Water Consumption 
Pollution 
Water Re-Use

![](_page_11_Picture_0.jpeg)

# REFERENCES

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- 2. The hydrogen colour spectrum https://www.nationalgrid.com/stories/energy-explained/hydrogen-colour-spectrum
- 3. https://www.dupont.com/news/carlsberg-wins-global-industrial-water-reuse-award-dupont-technology.html
- 4. DesaliTec<sup>™</sup> CCRO helps Carlsberg create what is probably the world's most water-efficient brewery

https://www.youtube.com/watch?v=cnRtk5BjFGw

5.

### Carlsberg Wins Global Industrial Water Reuse Award Using DuPont Technology

### Danish Carlsberg brewery saves 1 billion litres of water with new technology

https://www.carlsberggroup.com/newsroom/danish-carlsberg-brewery-saves-1-billion-litres-of-water-with-new-technology/

![](_page_11_Picture_17.jpeg)

![](_page_11_Picture_18.jpeg)

![](_page_11_Picture_19.jpeg)

![](_page_11_Picture_20.jpeg)

**Re-cycle symbol:** refers to industrially used water that is recycled or re-used and cleaned for our projects.

flowing water.

![](_page_11_Picture_23.jpeg)

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Cloud / Contract: the planning stages and contracts are drawn up and we have fully due diligenced all security matching our criteria.

![](_page_11_Picture_25.jpeg)

![](_page_11_Picture_26.jpeg)

and running.

Brown-yellow: contains current or past brownfield status combined with extensions or upgrades.

Brown: brownfield projects mid-stage projects that we entered relatively early with a limited or de-risked construction period.

**Green:** greenfield projects mean that we are an active part since the very beginning of the projects. This is unusual for us and only applies to a fully de-risked contractual situation.

Waste Water symbol: refers to projects in the US and in Canada and includes water treatment, water discharge and waste water treatment.

Hydro symbol: refers to any project that generates energy out of

**Rocket / Money:** execution of all major contracts, licences and financing has been agreed upon.

**Bar Chart:** project is producing cash flows or fully financed and up

# SIGNINA CAPITAL AG

Zurich-based Signina Capital AG was established in 2006. Signina is a full spectrum advisory firm in the water infrastructure sector. The team has more than 100 years of combined industry experience. They have placed in excess of USD 1 billion of capital with the private and public sector into environmentally and commercially strategic water infrastructure assets. It is currently overseeing more than USD 750 million of active water infrastructure assets.

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![](_page_12_Picture_6.jpeg)

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