Capital Power
RESPONSIBLE ENERGY FOR TOMORROW

Winter 2021

Genesee Connection

Hello Neighbours and Friends

Today, our Genesee Generating Station in Leduc County provides approximately 1,300 megawatts (MW) of reliable and responsible baseload electricity to Albertans. As our existing coal-fired operations transition to support a low-carbon future, our vision is that Genesee continues to play a vital role supplying Alberta's electricity needs and supporting the local community.

> *Changes at the Genesee Generating Station will deliver substantial environmental benefits including a 50% reduction in CO_2 emissions by 2030 from 2005 levels.*

In this newsletter, we want to share several exciting initiatives that are underway or planned at Genesee that will transform and extend the life of the facility well beyond the mandated phase out of coal emissions in 2030.

We encourage and welcome your feedback.

Your feedback is important. If you have any questions, comments or concerns, we want to hear from you. Please contact us anytime by one of the methods listed on the last page of this newsletter.

Genesee Fly Ash Reclamation Project

Capital Power is seeking regulatory approval to construct an ash processing facility within the Genesee Mine that can process landfill fly ash for use in cement. In Q2 2021, we are applying to amend our Alberta Energy Regulator (AER) *Environmental Protection and Enhancement Act* (EPEA) approval (10404-03-00) and *Coal Conservation Act* (CCA) Permit C99-8D and licence C2005-12H for the Genesee Mine to recover the fly ash and construct and operate a processing facility. To learn more about the AER application and review process, please visit **www.aer.ca**

Reducing waste and proposing to process coal ash for reuse in cement production.

What is Fly Ash?

Since operations began at the Genesee Generating Station more than 30 years ago, the facility has produced fly ash, a by-product of coal combustion in the production of electricity. It has a similar consistency to volcanic ash and when mixed with other substances, like cement to form concrete, it hardens and has value-add benefits (e.g., adds strength, product longevity, reduces manufacturing emissions and costs). More than 99% of the fly ash produced at the Genesee Generating Station is captured by our emission-control systems and then put into licensed storage landfills within the adjacent Genesee Mine or sold for use in cement and concrete applications.

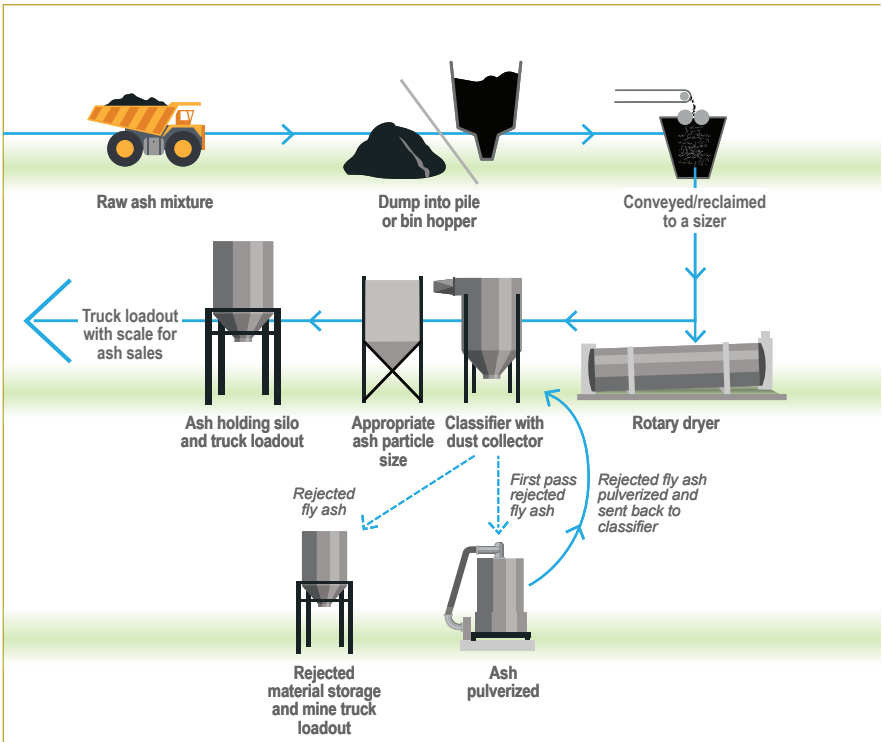
Fly ash reduces the amount of cement needed in concrete thereby reducing emissions in its manufacturing.

Did you know? Capital Power currently sells fly ash from Genesee where it is reused in the production of cement and concrete.

The Fly Ash Processing Facility

Samples of the landfill fly ash show that it can be processed to meet necessary standards for use in concrete. The fly ash will be recovered from landfills within the Genesee Mine using existing mining equipment and transported to the proposed ash processing facility. The facility will screen, dry and grind the recovered fly ash to a consistency of a fine powder. The processed fly ash will then be stored in silos before it's loaded onto trucks and delivered to customers for various uses, primarily in the concrete industry.

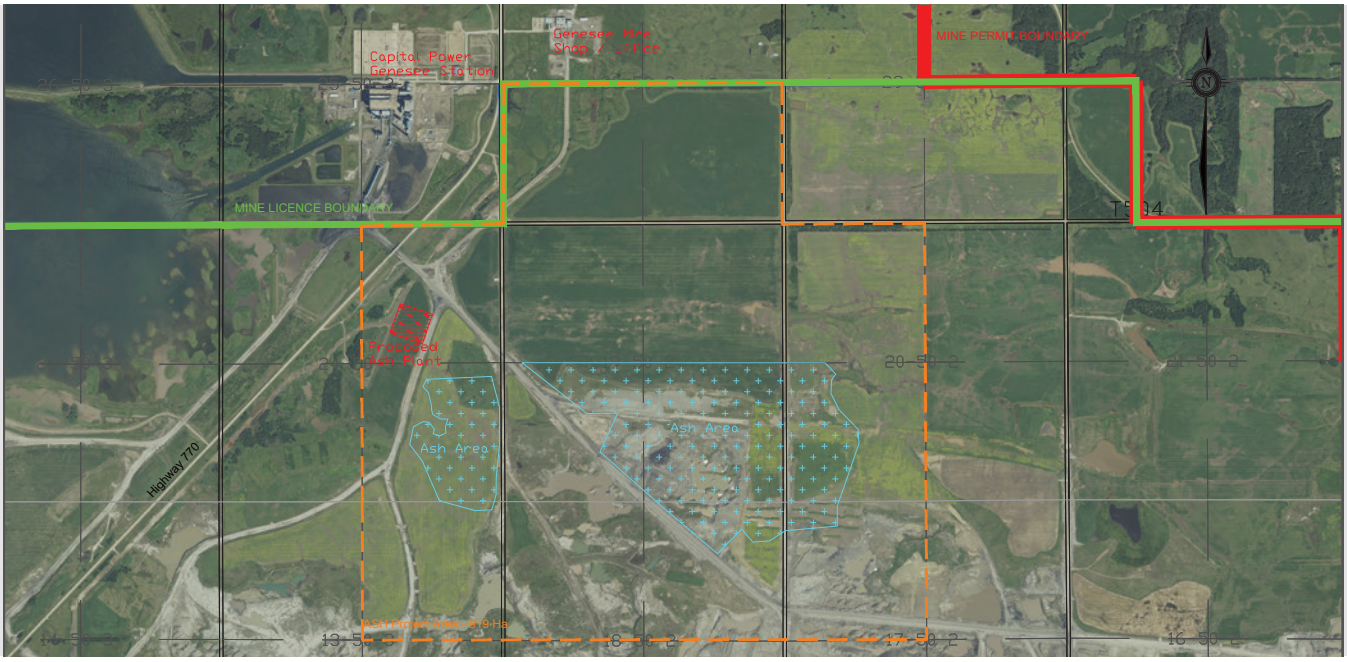
How Reclaimed Fly Ash is Processed



The conceptual diagram above illustrates how the reclaimed fly ash is proposed to be processed so it can be used for sale.

Project Location

The proposed fly ash processing facility will be located on Capital Power-owned land within the boundaries of the existing Genesee Mine, which is approximately 80 kilometres SW of Edmonton (Section 24, Township 50, Range 3, west of the 5th Meridian) within Leduc County, AB. It's located on the eastside of Highway 770 and south of Westmoreland's existing facility. The landfill fly ash is located within 3 kilometres of the proposed processing facility.



Proposed Project Schedule

Capital Power anticipates submitting its regulatory application to AER in late April 2021. Prior to construction, we will apply to Leduc County for building and other development permits. Pending a successful outcome of the regulatory review, we expect construction to begin in Q2 or Q3 2022, with an anticipated in-service date in early 2023.

Activity	Timing
Stakeholder engagement and consultation	Throughout development
Engineering / project design	Q1 2021 to Q1 2022
Construction start	Q2 or Q3 2022
Testing and commissioning	Q1 2023
Facility in operation	Q2 2023

Proposed Impacts

The project will have positive environmental benefits. Using our supply of fly ash waste will decrease greenhouse gas emissions in the production of cement.

The landfilled fly ash only requires physical processing; no chemical treatment is required. The processing facility will not require any transmission lines. It will reuse the existing Genesee Mine 25kV distribution line. The rotary dryer proposed to be used to reduce the moisture content of the fly ash will require natural gas from an existing line in the area.

During the excavation and mining of the landfilled fly ash, any topsoil and subsoil will be preserved for reclamation.

We anticipate there will be minimal dust from ash recovery and processing. There are already special provisions in place for the careful management of fly ash at our existing facility, which will be adopted for use at the proposed processing facility. Currently, as the fly ash is moved from the plant into trucks, it is wetted down. This prevents the fly ash from blowing around during the transfer process, or out of the truck while it's being transported.

Repowering Genesee 1 and 2 — Off Coal in 2023

Capital Power applied to the Alberta Utilities Commission (AUC) and Alberta Environment and Parks (AEP) for regulatory approval in Q4 2020 to repower Genesee 1 and 2 to natural gas combined cycle (NGCC) units.

This transition will allow us to be off-coal in 2023 and directly deliver 3.4 megatonnes of annual carbon emission reductions at Genesee.

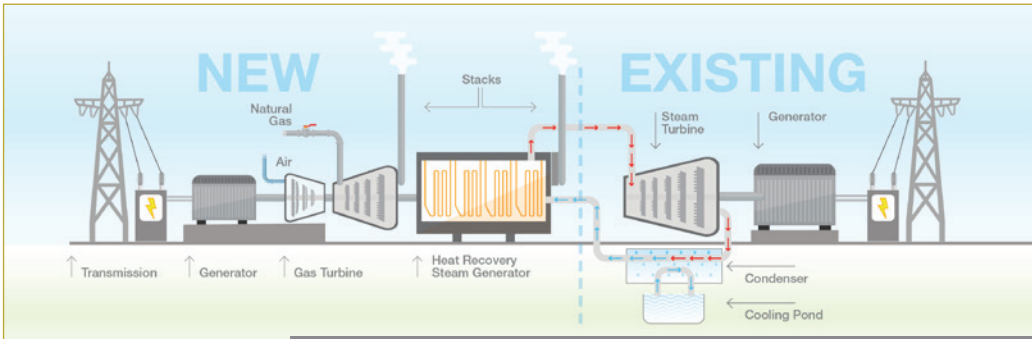
There are currently no plans to repower Genesee 3, and this unit will continue its transition to a dual fuel capability, with the ability to generate power with natural gas or coal until it's entirely off-coal in 2023.

In early 2020, ATCO completed a new incoming natural gas pipeline at Genesee increasing overall fuel capability of the three units in preparation for 100% natural gas capability.

The two repowered units will provide an additional 560 megawatts of net capacity totalling 1,360 megawatts. The repowered assets will utilize best in class, hydrogen-ready NGCC technology from Mitsubishi and are expected to set a new standard for gas generation efficiency in Canada.

Subject to regulatory approval, we expect construction to begin in Q3 2021, with an anticipated in-service date in late 2023 for Genesee 1 and 2024 for Genesee 2. Both units will operate in simple cycle mode before the expected completion of the repowering of each unit.

Located entirely within the footprint of the existing Genesee Generating Station, the project will result in one of Alberta's most advanced power generation facilities.



The units are repowered by installing a new gas-fired combustion turbine and a heat recovery steam generator, while reusing the existing steam turbine generator. The existing boiler and coal equipment will no longer be operated.

Repowering Project Environmental Performance

As Genesee is already connected to the 500kv transmission system, no material transmission upgrades are anticipated for the repowered units. There are also significant environmental benefits expected from the project, including reduction in emissions associated with coal-fired power generation such as carbon dioxide (CO_2), sulfur dioxide (SO_2), nitrogen oxide (NOx), particulate and mercury emissions.

Advancing Innovative Carbon Conversion Technology

Capital Power is seeking regulatory approval to build GC^3 (depicted in white), which will be located immediately east of Genesee 3 where an existing mechanical shop will be expanded to house the facility.

Genesee Carbon Conversion Centre (GC^3)

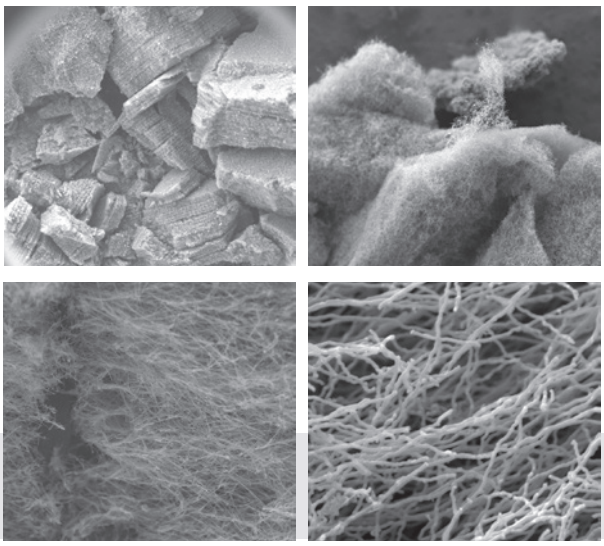
In December 2019, Capital Power announced plans to build the Genesee Carbon Conversion Centre (GC^3), a commercial scale production facility of a high-value product called carbon nanotubes (CNTs) captured to optimize processes in future Phases.

GC^3 will use innovative technology developed by C2CNT LLC to capture carbon dioxide (CO_2) from the flue gas at Genesee 3 and through an electrolysis process, create high-quality CNTs.

Pending a successful outcome of the regulatory review, we expect construction to begin in mid-2021, with an anticipated in-service date in the first half of 2022.

What are CNTs?

Carbon nanotubes or CNTs are stronger than steel and lighter than aluminum. They provide improved properties of tensile strength and electrical conductivity when used as an additive. CNTs can be used in multiple applications such as structural materials (cement, steel), batteries (Li-Ion), polymers and more. Capital Power's inaugural application of CNTs is focused on concrete. In addition to improving the strength properties, using CNTs reduces the volume of cement required. The production of cement is an intensive carbon emitting process.



Carbon nanotubes as viewed at varying magnification levels.

Using carbon nanotubes displaces CO_2 emissions in two ways:

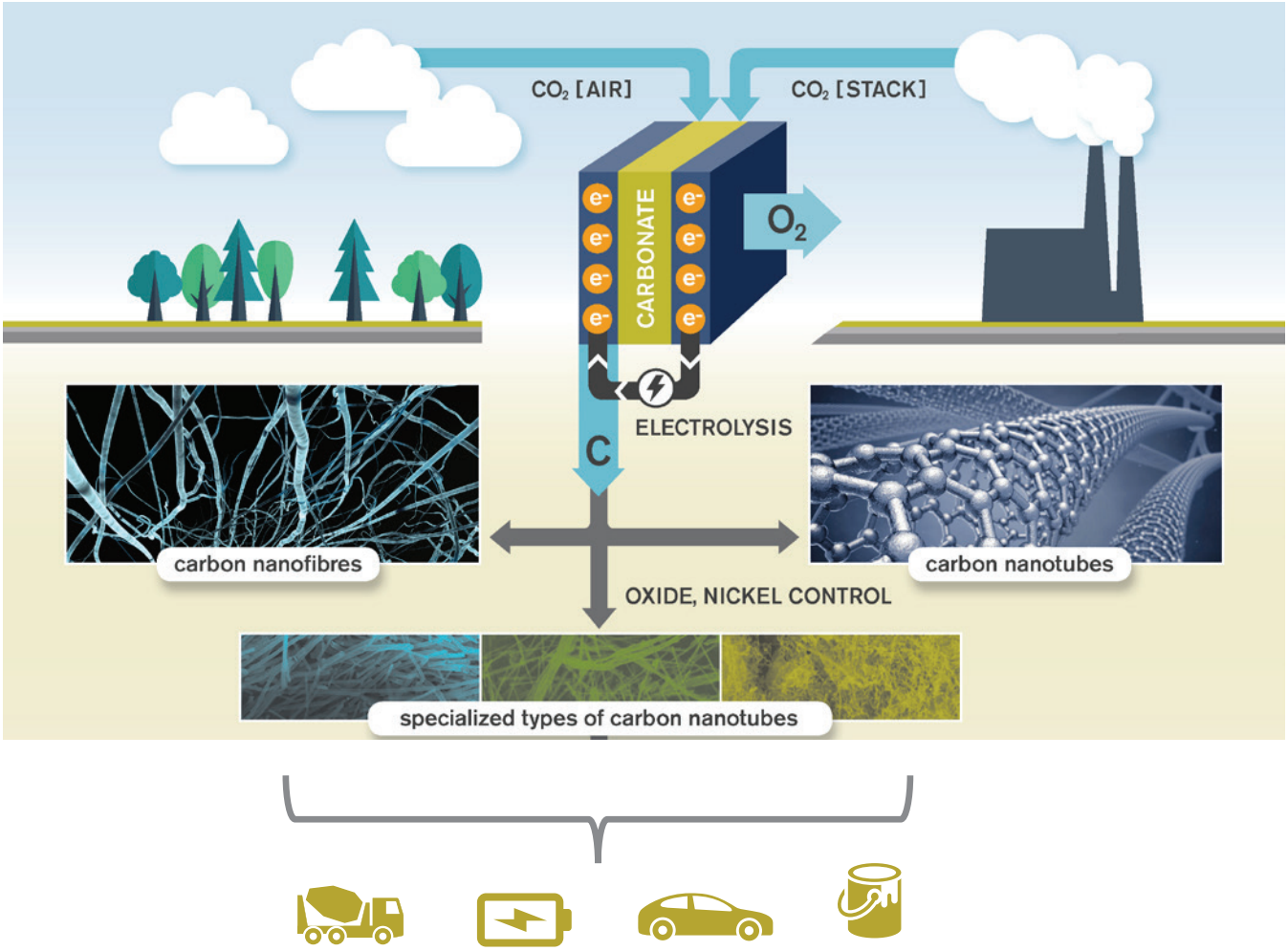
1. The carbon capture process reduces power generation emissions at the source and then transforms the carbon emissions into carbon nanotubes.
2. By using carbon nanotubes as an additive in applications such as industrial processes (e.g. manufacturing concrete or steel) it reduces the amount of carbon-intensive materials needed to deliver the product. For example, it has been estimated that for every tonne of CNTs used in cement, 840 tonnes of CO_2 is avoided.

Carbon Capture Integration to Genesee 3

Carbon capture technology will be integrated into the existing operations of Genesee 3. A new duct from Genesee 3's existing flue gas ductwork will connect to a CO_2 Concentrator. The Concentrator will separate the CO_2 from the waste stream flue gas that currently exits the unit's stack into the atmosphere.

The concentrated CO_2 will then be sent into an electrolyzer located inside the GC³ facility where it undergoes an electrolysis process to create the valuable product of CNTs. The CNTs are then extracted and stored, and oxygen (O_2) generated from the process is released. Although O_2 is released in the initial phase of this Project, it may be captured to optimize processes in future Phases.

Transforming Carbon Emissions into Leading-Edge Carbon Nanotube Products with C2CNT



Genesee Land Services Manager Change

Best Wishes to George Greenhough on his Retirement

After nearly 14 years working at Genesee, local resident George Greenhough retired as Land Services Manager at the end of February. George leaves behind a legacy of improvements in the way our land base is managed. During his tenure, he supported innovative reclamation projects, the peregrine falcon program and the establishment of many positive relationships with our community.

> *"I've enjoyed working with the residents and landowners and I will miss my colleagues at the Genesee Station and Genesee Mine. There were many changes that took place during my time, and I like working through issues with people to find a satisfactory solution."*
> — George Greenhough

In retirement, George plans to spend more time at his family's farm in the area and volunteering at the Stony Plain & Parkland Pioneer Museum.

Congratulations to Jennifer Linder on her New Role

Jennifer (Jen) Linder succeeds George as Land Services Manager in addition to maintaining her duties as Site Services Manager.

Jen first began working at Genesee in 2004 as a contractor labourer when she was still in high school, returning periodically before coming back full-time in 2010 after college. She began working with George shortly afterward where she's learned the ins and outs of land management.

In her new role, Jen is looking forward to spending more time in the field and continuing to develop relationships with our neighbouring residents and landowners.

> *"George and I have a lot of the same theories and goals regarding what the landscape should look like at Genesee, and I intend to keep moving forward with similar strategies. I look forward to working with community members, meeting new stakeholders, and re-connecting with existing residents that I haven't had a chance to catch up with in recent times."*
> — Jennifer Linder

Jen can be reached at 780-969-8706 or jlinder@capitalpower.com

12th Floor EPCOR Tower
1200 – 10423 101 Street NW
Edmonton, Alberta T5H 0E9

What is Important to You?

If you have an idea or suggestion for the Genesee Connection Newsletter, contact Community Engagement and help us continue to provide relevant information of interest to you.

Genesee Contact Information

If you have questions or comments about our operations, community engagement or our land management practices, please feel free to contact us.

Generating Station Reception
780-848-8300

Community Engagement
780-848-8474
PublicConsultation@capitalpower.com

Manager, Land Services
Jennifer Linder 780-969-8706

Genesee Guardhouse *(24-hour Security)*
780-969-8505

www.capitalpower.com

Careers

For more information or starting a career with Capital Power and to view current job opportunities, visit our website at capitalpower.com/careers. Capital Power is an equal opportunity employer.

Newsletter

Get this newsletter by email: If you prefer to receive your copy of the Genesee Connection by email instead of hard copy, or if you no longer wish to receive this newsletter, please contact us at **Community Consultation** and we will remove you from our mailing list.

Capital Power respects your right to privacy. Any personal information Capital Power collects about you, including your name, address, phone number and email address, will only be used to contact you for the purposes of the consultation process. For further information, please see Capital Power's Privacy Policy at capitalpower.com.