

# JAPAN TRADE MISSION, CUSTOMER DINNER, AND SAFER BIOMASS HANDLING AND SILO OPERATIONS: PREVENTING FIRES AND EXPLOSIONS WORKSHOP



バイオマス安全性ワークショップ開催!

バイオマスの防火防爆:  
ハンドリングとサイロ運営をより安全に

Safer Biomass Handling and Silo Operations:  
*Preventing Fire and Explosions*

平成5年12月14日

 **WOOD PELLET**  
ASSOCIATION OF CANADA

 FutureMetrics LLC™

 **CANADIAN BIOMASS**  
media partner

December 10-15, 2023



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## BACKGROUND

From December 10 to 15, 2023, Gordon Murray, Executive Director at the Wood Pellet Association of Canada (WPAC), participated in the Forestry Innovation Investment (FII) BC Forest Industry Trade Mission to Japan, attending the mission launch reception, the Canadian embassy presentation, pre-arranged customer site visits, and the Canada-Japan Wood Forum.

During the week, WPAC held a customer dinner and reception and conducted a one-day seminar on Safer Biomass Handling and Silo Operations: Preventing Fire and Explosions.

WPAC member customers have experienced six serious fires and explosions in materials handling and biomass storage facilities, putting the reputation of Canadian wood pellets at risk with the Japanese government and the public. In response to customer inquiries, WPAC wanted to share expertise to reduce or prevent future incidents and restore trust. Silo fire prevention and suppression requires a unique approach. Risks include combustible dust, structural collapse, and smoulders that can result in fire and explosions.

## WPAC / CANADA OBJECTIVES

Gordon Murray, Executive Director at WPAC, attended the mission and executed the customer dinner and Japan Silo Workshop.

Key objectives included:

1. Protecting the reputation of Canadian wood pellets as a safe energy solution for Japanese electricity generators.
2. Training on-the-ground personnel on safer biomass handling and silo operations to prevent fire and explosions and keep people safe.
3. Building alliances with Japanese customers.

## ACTIVITIES, DELIVERABLES & OUTCOMES

### Activities

1. Participated in the FII BC Forest Industry Trade Mission to Japan—attending the mission launch reception, the Canadian embassy presentation, pre-arranged customer site visits, and the Canada-Japan Wood Forum.
2. Hosted a customer reception & dinner.
3. Held a one-day seminar on the topic of fires and explosions in material handling & silos.

### Safer Biomass Handling Workshop Topics

- Biomass handling and storage considerations
- Causes of silo fires and explosions
- Biomass ignition prevention
- Silo firefighting techniques and procedures
- Personnel safety
- Fire prevention methods
- Preventative and preparatory measures
- First responder training
- Case studies

The presentations can be found [here](#).

## Deliverables & Outcomes

*Note: a full breakdown of these deliverables and outcomes is further down in this report.*

- Protect the reputation of Canadian wood pellets as a safe energy solution for Japanese electricity generators.
- Identification of 70 potential foreign partners (agents, distributors, service contractors).
- Interact with 91 foreign participants.
- Fifteen Canadian participants, including WPAC members, government officials, and WPAC representatives, interacted with foreign participants.
- Reach 100 Canadian industry personnel through a trip report developed as a result of the association's participation in this activity.

## KEY OBSERVATIONS

- There was great demand for a Japan silo safety workshop. WPAC had to cap attendance at 70 people due to venue constraints. There was a large waiting list, indicating demand for a second workshop.
- Many participants learned for the first time that water should not be used for wood pellet silo storage fires and that it is essential to use nitrogen for fire suppression. The challenge was highlighted that regulations in many circumstances require water extinguishing systems; this indicates that further work is needed to further communicate and educate on the best practices for mitigating and responding to silo fires.
- Numerous attendees work with or operate facilities that store biomass in flat, warehouse configurations. Discussions were had on the similarities and differences of the hazards between both silos and flat storage, as well as the response plans and tactics that need to be used, such as the use of firefighting foam for flat storage.
- Clarity on how and why the moisture content of the biomass is an influence on self-heating was sought. Water is conducive to microbial activity, which generates and releases heat. Water is involved in other physical and chemical reactions and processes that also produce heat.
- Consistent communication regarding silo safety is important.

## RECOMMENDATIONS

- Continue communications with Japanese customers about silo safety.
- Conduct another workshop in May 2024.
- Include personnel from municipalities and fire brigades in the next workshop
- Continue to cooperate with BC and Canadian governments in participating in annual trade missions to Japan. Customers appreciate being able to engage with senior provincial and federal government representatives, especially with ministers.

## BC TRADE MISSION TO JAPAN

The BC government, in cooperation with the Government of Canada and the forest industry, organizes an annual trade mission to Japan. This annual event enables industry and government to jointly demonstrate to customers and government counterparts how important BC/Canada views our trade relationship. We use the opportunity to strengthen and renew relationships, address current issues, seek out new opportunities and customers, and show appreciation for business. It is customary for BC's forest minister, deputy minister and one or more deputy ministers to attend, along with representation from Government of Canada personnel from Ottawa and from the Canadian embassy in Japan. Most forest industry sectors are represented by their trade associations and by senior executives from companies.

## CUSTOMER RECEPTION & DINNER

On December 13, 2023, WPAC hosted a customer reception and dinner for 36 people. Twenty-one customers, six BC/Canadian government officials, five WPAC members, and three WPAC representatives attended the event.

The dinner opened with welcome remarks from Gordon Murray, followed by the BC Minister of Forests, Bruce Ralston. Gordon also showed WPAC's [The Carbon Story](#) video in Japanese.



*Gordon Murray, introducing [The Carbon Story](#) (left). BC Minister of Forests, Bruce Ralston, giving opening remarks (right).*

## JAPAN SAFETY WORKSHOP: SAFER BIOMASS HANDLING AND SILO OPERATIONS: PREVENTING FIRE AND EXPLOSIONS

On December 14, 2023, more than 70 participants from Japan and around the world met to learn about prevention and response to silo fires. Participants included power generation plants/stations, trade associations, researchers, and equipment manufacturers, wood pellet producers. The workshop, conducted in English and Japanese, was hosted by WPAC, FutureMetrics, and media partner Canadian Biomass.

There was an overwhelming amount of interest in the event. Over seventy people attended (20 more people than targeted), and there were many more people on the waitlist. A workshop is planned for the spring 2024 to accommodate people on the waitlist and others who may want to participate.

Silo fire prevention and suppression requires a unique approach. Risks include combustible dust, structural collapse, and smoulders that can result in fire and explosions.



*Over 70 people attended the Japan Safety Workshop.*



*From left to right: Presenters: Gordon Murray, WPAC; Kayleigh Rayner Brown, MASC, P.Eng., Director at Obex Risk; John Swaan, Operations and Project Development Expert, with FutureMetrics.*

## Pre-Workshop Communications

WPAC promoted the event via several eblasts, the WPAC LinkedIn channel, on pellet.org and an article in Canadian Biomass magazine. Co-host, FutureMetrics also promoted the event to their contact list and social channels.

### Morning Session: Setting the Stage

Gordon Murray, opened the session by providing an overview of how the workshop will make silos safer through shared experiences.

Kayleigh Rayner Brown, M.A.Sc., P.Eng., Director at Obex Risk, discussed biomass handling and storage considerations such as the generation of combustible dust and gas as well as off-gassing and emissions. The group explored self-heating and the factors that can initiate self-heating. The fundamentals of combustible dust and combustible were also described, as well as the conditions that can lead to fires and explosions. External ignition sources and key actions and systems to prevent biomass ignition were outlined.

The second topic was effective approaches to fire suppression, presented by John Swaan, Operations and Project Development Expert, with FutureMetrics. John shared his experience, as well as other facilities that have successfully implemented nitrogen inerting systems, and the successes of those systems in addressing silo fire hazards. He also discussed limiting access to oxygen and discharging silo material. The similarities and differences of the hazards between both silos and flat storage, as well as the response plans and tactics that need to be used, such as the use of firefighting foam for flat storage, were discussed.



Home > Events > Japan Biomass Safety Workshop | バイオマス安全性ワークショップ

DECEMBER 14, 2023

### Japan Biomass Safety Workshop | バイオマス安全性ワークショップ



#### バイオマスの防火防爆: ハンドリングとサイロ運営をより安全に

バイオマス業界が今、まさに必要とする、バイオマス火災のリスク管理ワークショップを開催します。サイロ火災の予防と対応の両方を中心に、サイロ、ビン、バンカーをはじめとする大規模貯蔵施設で、木質ペレット、ウッドチップ、PKSなどバイオマス燃料のバルク貯蔵にかかわっている方ならどなたにも有益なワークショップです。サイロ火災で出火となる可能性の高い消防関係者の方々にとっても、現場での実務役立つ情報満載です。

平成5年12月14日に東京で開催。カナダ木質ペレット協会、FutureMetrics社、そしてメディアパートナーであるCanadian Biomass社の主催によるワークショップです。より詳しい情報と参加登録はこちらをクリック。

#### 参加をお薦めするのは

サイロの防火と消火活動にはサイロ特有のアプローチが必要です。可燃性粉塵、サイロ自体の崩落、火災や爆発につながる塵りなど、リスク全般を取り上げます。

#### 内容:

- バイオマスのハンドリングと貯蔵上の注意
- サイロ火災と爆発の原因
- バイオマスの発火防止
- サイロ火災の消火方法と手順
- 人員の安全性
- 火災予防方法
- 予防措置と緊急対応
- 初期対応訓練
- 事例紹介

[当日のプログラムは以下からご覧ください](#)

#### Safer Biomass Handling and Silo Operations: Preventing Fire and Explosions

You are invited to attend a workshop addressing the risks of silo fires. Focusing on both prevention and response to silo fires. This is an important workshop for anyone in the biomass industry using silos, bins, bunkers, or other bulk storage vessels to store biomass fuels such as wood pellets, wood chips and PKS. It will also be highly relevant to first responders that may be called out to respond to silo fires.

The workshop will be held on **December 14, 2023, in Tokyo, Japan**. It is being hosted by the Wood Pellet Association of Canada, FutureMetrics and media partner Canadian Biomass. To learn more and register for this event [click here](#).

#### Why should you attend?

Silo fire prevention and suppression requires a unique approach. Risks include combustible dust, structural collapse, and smoulders that can result in fire and explosions.

#### Topics include:

- Biomass handling and storage considerations
- Causes of silo fires and explosions
- Biomass ignition prevention
- Silo firefighting techniques and procedures
- Personnel safety
- Fire prevention methods
- Preventative and preparatory measures
- First responder training
- Case studies

[View the agenda](#)

#### WHAT YOU SHOULD KNOW

Workshop date: December 14, 2023

Where: Prince Sakura Tower Tokyo 3-13-1 Takanawa, Minato-ku Tokyo, Japan.

Register: Sold Out.

*The event was promoted in both Japanese and English on pellet.org (above) and via email.*

## Morning takeaways

- **(No) water use for silo fires:** Water should not be used for wood pellet silo storage fires. The pellets have the capacity to absorb large quantities of water and expand dramatically. This expansion can damage storage infrastructure and form a hard material that is difficult to remove. In some cases, firefighting foam is appropriate to use. The challenge was highlighted that regulations in many circumstances require water extinguishing systems. Further work is needed to communicate and educate on the best practices for mitigating and responding to silo fires. Nitrogen is the only medium that should be used for fire suppression. This raises challenges with ensuring rapid supply of nitrogen, proper equipment and plumbing of storage silos and personnel training.
- **Biomass moisture content influence on self-heating:** Participants requested clarity around how and why the moisture content of the biomass influences self-heating. Water is conducive to microbial activity, which generates and releases heat. Additionally, water is involved in other physical and chemical reactions and processes that also produce heat. To learn more, read the WPAC fact sheet—[Fibre Pile Management for Pellet Plants](#).
- **Key resource:** [Silo Fires: Fire extinguishing and preventive and preparatory measures](#) (Persson, H., 2013) is a key resource for silo fire response, and it is highly recommended that readers review this document and integrate the described practices within their operations.

## Afternoon Session: Bringing it All Together

The afternoon session opened with a hands-on group activity, where participants went through a **response plan to a fire situation**. Kayleigh and John walked the participants through the plan, and everyone provided input from both a Japanese and Canadian perspective.

John and Kayleigh highlighted **real-life silo fire examples**, including responses, action plans and preventative measures. They discussed training for workers both in the plant and with local fire departments.

John shared his past experience with silo fires with two different root causes and offered his key takeaways based on these cases:

When performing hot work, such as welding, follow hot work best practices and formalized procedures.

Self-heating is possible if biomass is stored for long periods of time; proper measures, such as product rotation, must be taken to prevent self-heating.

Kayleigh guided the participants through a **literature case study on an ignition source caused by mechanical failure**. The key takeaways were:

Protection systems and equipment should be installed to stop fires or deflagrations. Explosion protection systems, such as deflagration venting, need to be properly designed and installed.

Preventative maintenance programs are essential to help prevent mechanical failure and ensure process and equipment integrity.

Kayleigh and John summarized the factors for reducing fire risk associated with biomass storage and the key actions of a silo fire response plan. Participants reviewed the key measures they can take in the event of a silo fire at their own operations and **shared how they will use the workshop information to ensure safer silos.**

Kayleigh closed the session with the workshop team's observations for the day and summarized how **safety is everyone's responsibility** and the strength of the industry's ongoing collaboration to ensure safer biomass storage and workplaces.



*Kayleigh answers questions from the audience.*

### **Afternoon takeaways**

- **Nitrogen #1 tool:** Nitrogen is the most effective tool for responding to a silo fire incident. Facility operators should be prepared accordingly in order to have access to nitrogen and consider aspects such as nitrogen deliveries, vaporizer units, and onsite nitrogen systems.
- **Pellet quality impact on safety:** Extensive discussions were had on pellet quality and the impact that quality can have on storage and handling safety. During the pellet manufacturing process, the pellet cooler plays a critical role in pellet quality with respect to moisture content and fines, which can both contribute to self-heating.
- **Key resource:** Participants were provided a silo fire response plan template that they were able to review and consider how to integrate within their operations; this would be a catalyst to start implementing new processes and resources to be effectively prepared to respond to a fire.

### **Sponsor participation**

Two WPAC members—[Renova](#) and [Firefly](#)—sponsored the Japan Silo Safety Workshop and provided insights to participants.

Yoshinobu Kusano, Executive Advisor, Renova and Asian Policy Advisor, FutureMetrics helped open the session by discussing why this workshop matters in Japan. He was pleased with the commitment from the industry to safety.

Anders Bergström, General Manager, with Firefly, offered extensive insight into Firefly's practical experience with silo fire research and solid biofuels safety. Anders highlighted that implementing protection measures is highly dependent on site-specific conditions and process configuration.

## LEAD GENERATION

Gordon Murray met numerous existing and potential important contacts:

First Name	Last name	Company
Yoshiki	Yamamoto	
Noguchi	Yohei	Agatsuma Bio Power
Shin	Yamaguchi	Airex Energy
Ian	McMahon	BC Ministry of Forests
Eamon	O'Donoghue	BC Ministry of Forests
Bruce	Ralston	BC Ministry of Forests
Chuoudhry	Umair	British Embassy Tokyo
Junichiro	Hirono	Chubu Electric Power Co., Inc.
Takahide	Imai	Chubu Electric Power Co., Inc.
Kimitsugu	Kozasa	Chubu Electric Power Co., Inc.
Masanari	Uehara	Chubu Electric Power Co., Inc.
村田	寛之	Chugoku Electric Power Co., Ltd.
椛島	弘順	Chugoku Electric Power Co., Ltd.
栗栖	文章	Chugoku Electric Power Co., Ltd.
Megumu	Sonobe	Daiwa House Industry Co., Ltd.
Paul	Amyotte	Dalhousie University
Mayuko	Katayama	Drax Group
Tony	McRae	Drax Group
Yasuhisa	Okamoto	Drax Group
Tomohiro	Yamamoto	Drax Group
Kajita	Akira	Embassy of Canada to Japan
Anders	Bergström	Firefly
Jonas	Persson	Firefly
Victoria	Hayes	Forestry Innovation Investment
Michael	Loseth	Forestry Innovation Investment
John	Swaan	Future Metrics
Keisuke	Tanabe	Hanwa Co., Ltd.
Fukushige	Mitsuru	Hibikinada Energy Park
Yoshiteru	Ya	Hiroshima Gas Co. Ltd.
Rika	Nakazawa	Hokuriku Electric Power Co.
Shinsuke	Ogake	Hokuriku Electric Power Company
Satoka	Shaura	Hokuriku Electric Power Company
Takuya	Furuzono	Idemitsu
Shigeru	Kaida	Idemitsu

<b>First Name</b>	<b>Last name</b>	<b>Company</b>
Yutaka	Kiyono	Idemitsu
Kouta	Oba	Idemitsu
Isao	Kanki	IHI Corporation
Takeshi	Koyama	IHI Corporation
Shohei	Matsunari	IHI Corporation
Ogino	Tomoya	IHI Corporation
Masayoshi	Takezaki	Itochu Corporation
hiroказu	funatsu	Japan Woody Bioenergy Association
Ryohei	Arai	Jera Co., Inc.
kenji	kamikura	Jera Co., Inc.
Eiji	Watanabe	Jera Co., Inc.
Mika	Yamauchi	Jera Co., Inc.
Mika	Yamauchi	Jera Co., Inc.
Hiroyuki	Onoue	JPower
Toshihiro	Tanaka	Kanematsu Corporation
Shuichi	Muramatsu	Kawasaki Kinkai Kisen Kaisha, Ltd.
Masato	Nizuma	Konica Minolta Japan. Inc.
Asahi	Sone	Konica Minolta Japan. Inc.
Koki	Nakazawa	Marubeni Clean Power Corporation
Hisao	Sato	Marubeni Clean Power Corporation
Yoshihide	Togawa	Marubeni Clean Power Corporation
篤史	安田	Marubeni Clean Power Corporation
Takuya	Kawaguchi	Marubeni Corporation
Hiroaki	Sasaki	Marubeni Corporation
Kawagishi	Syunsuke	Mitsubishi Reserch Institute
Satoshi	Noguchi	Mitsubishi UBE Cement Corporation
紀央 (Norio)	山田 (Yamada)	Mitsubishi UBE Cement Corporation
賢治 (kenji)	嶋田 (shimata)	Mitsubishi UBE Cement Corporation
友祐 (Yusuke)	平岩 (Hiraiwa)	Mitsubishi UBE Cement Corporation
Naomi	Abe	Mitsui
Ai	Tominaga	Mitsui
Mori	Yukihiko	Mitsui
Satoshi	Kiya	Mitsui & Co., Ltd.
Masashi	Ishikawa	Nippon paper industries CO.
Keiichiro	Godo	Nissin Shoji Co., Ltd
Ayumu	Kawata	Nissin Shoji Co., Ltd
Kayleigh	Rayner Brown	Obex Risk Ltd.
Yosuke	Ohtsubo	Orix Corporation

First Name	Last name	Company
Kouichirou	Age	Osaka Gas Co., Ltd.
Ueji	Tokunori	Osaka Gas Co., Ltd.
Mitsuru	Doi	Renova
Yoshiyuki	Hatano	Renova
Yoshinobu	Kusano	Renova
Hodaka	Norimatsu	Renova
Greg	Stewart	Sinclar Group Forest Products Ltd.
Shimizu	Yuta	Soma Energy Park
Yasuo	Takahashi	Soma Kyodo Power Company, Ltd.
Fumie	Akiyama	Sumitomo
Mitsunari	Fujii	Sumitomo
Kazunari	Ishii	Sumitomo Corporation
Natsuki	Omori	Sumitomo Corporation
小山	聡	Sumitomo Forest Company
Eitaro	Koso	The Chugoku Electric Power Co., Inc
Yuki	Nakayama	The Chugoku Electric Power Co., Inc
Chikashi	Saito	Tohoku Electric Power Co., Inc.
	Tateyama	Tohoku Electric Power Co., Inc.
Higashi	Takumi	Tokuyama
Minoru	Isobe	Tokuyama Corporation
Takashi	Oshima	Tokyo Gas
Hideto	Hiramatsu	Tokyo Gas Engineering Solutions
Einosuke	Uryu	Toyota Tsusho
	Yoshikawa	Toyota Tsusho
Nobu	Araki	Trade & Invest British Columbia
Pek Ying	Seow	Treehouz Asia Sdn Bhd
Sohei	Soekawa	United Purpose Management Inc.
Hirotooshi	Iwabuchi	Weyerhaeuser Japan Ltd.

## SHARING INFORMATION WITH CANADIAN PELLET SECTOR

WPAC has shared this report and its observations and recommendations with more than 100 companies, including WPAC members. It is anticipated the report will be shared, reaching more than 500 key Canadian industry leaders.

## ADDITIONAL RESOURCES

- [Workshop resources](#)—including presentations, agenda, handouts, etc.
- [The Carbon Story](#) video in Japanese.