

Natural Gas Vehicle Codes & Standards Update

Brent Hartman

Program Manager, Alternative Energy



Agenda

- Industry Challenges
- Introduction to CSA Group - How We Can Help
- NGV Codes and Standards Activities
- How to Get Involved
- Conclusion

Challenges Facing the Industry

- Safety
 - Tank Life
 - Incidents
 - Fueling
- Innovation to Market
 - Conformable Tanks
 - Adsorbed Natural Gas
- Maintenance Facilities
- Market Access
 - Harmonized Standards
 - Code Adoptions
- Trained Personnel

Brand New, 100-year-old Company

Strategic
Partner



Established
1919



Trusted
Advisor



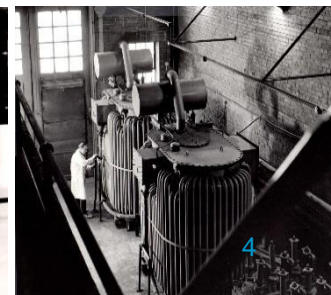
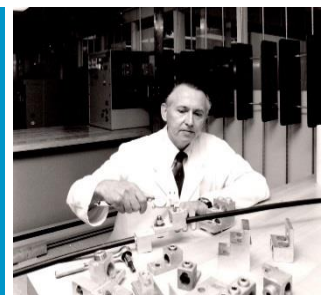
Help Bring
Innovative
Products to
Market



1st
Standard
for Railway
Bridge



Advancing
Safety



Global Footprint For Market Expertise & Access

+2,000 employees

39 offices in
14 countries,

assists in entering
+140 countries



Focused on Trust and Safety Across the Value Chain

Standards Development

Supported by active research capabilities

Government Relations

Supporting adoption into codes, regulations

Testing, Inspection & Certification

Global services in more than 50 technology areas

Global Market Programs

Cybersecurity, Functional Safety and Management Services

International Certification

Assistance in entering +140 countries

Mark Acceptance

Harmonization and engagement with Authorities having jurisdiction

Anti-Counterfeiting

Protecting the mark globally

Built on nearly a century of public trust and exceptional customer service

NGV Testing Expertise



Standards Research: Proactive Leadership

Standards Research & Planning

Funding and conducting research to enhance the development of standards

Macro research – proactively determine how society would benefit from new or improved standards in high visibility areas

Micro research – valuable information/insights that strengthen and expedite standards development process



Standards & Codes Drive Trust and Safety

Electrical
and Gas



Healthcare



Power
Generation
and Delivery

Construction
and
Infrastructure

Over **3,000** standards,
codes & related products
in **50+** technology areas

Public and
Workplace
Safety

Petroleum
and
Natural Gas



Environment



Business
Excellence



CSA
Group

Value of Standards

Standards play an important role in safety, security, the environment and the global economy, by fostering wider acceptance of emerging technologies and helping to manage risk.

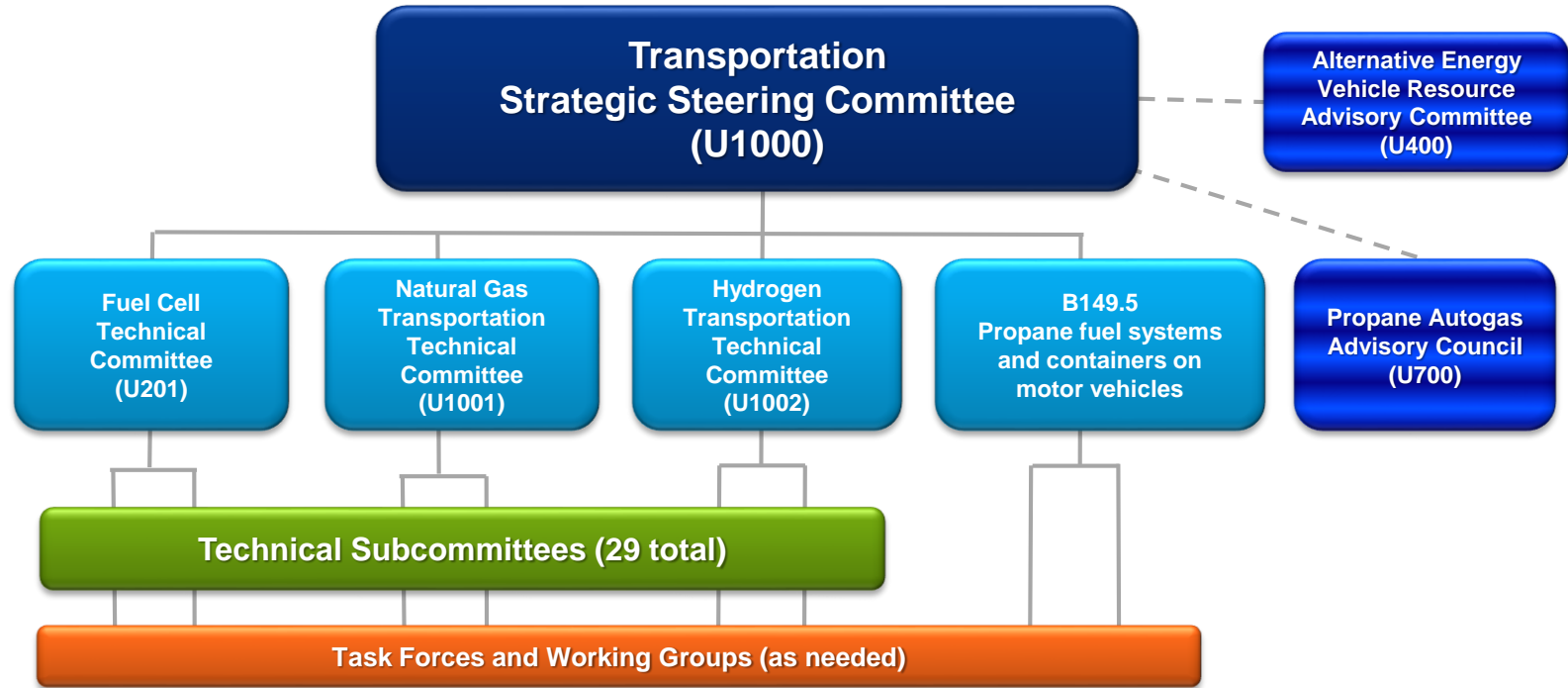


CSA's Transportation Program Overview

- Scope of Program
 - Alternative Energy Vehicles, Systems, and Fueling Stations
 - Alternatives to gasoline and diesel
 - Current focus on automotive and industrial trucks – marine and rail identified as future targets
- Energy Sources
 - Electricity
 - Liquefied Natural Gas (LNG)
 - Compressed Natural Gas (CNG)
 - Hydrogen / Fuel Cell
 - Propane
- 53 Published Codes and Standard
- 30+ Committees
- 250+ Members

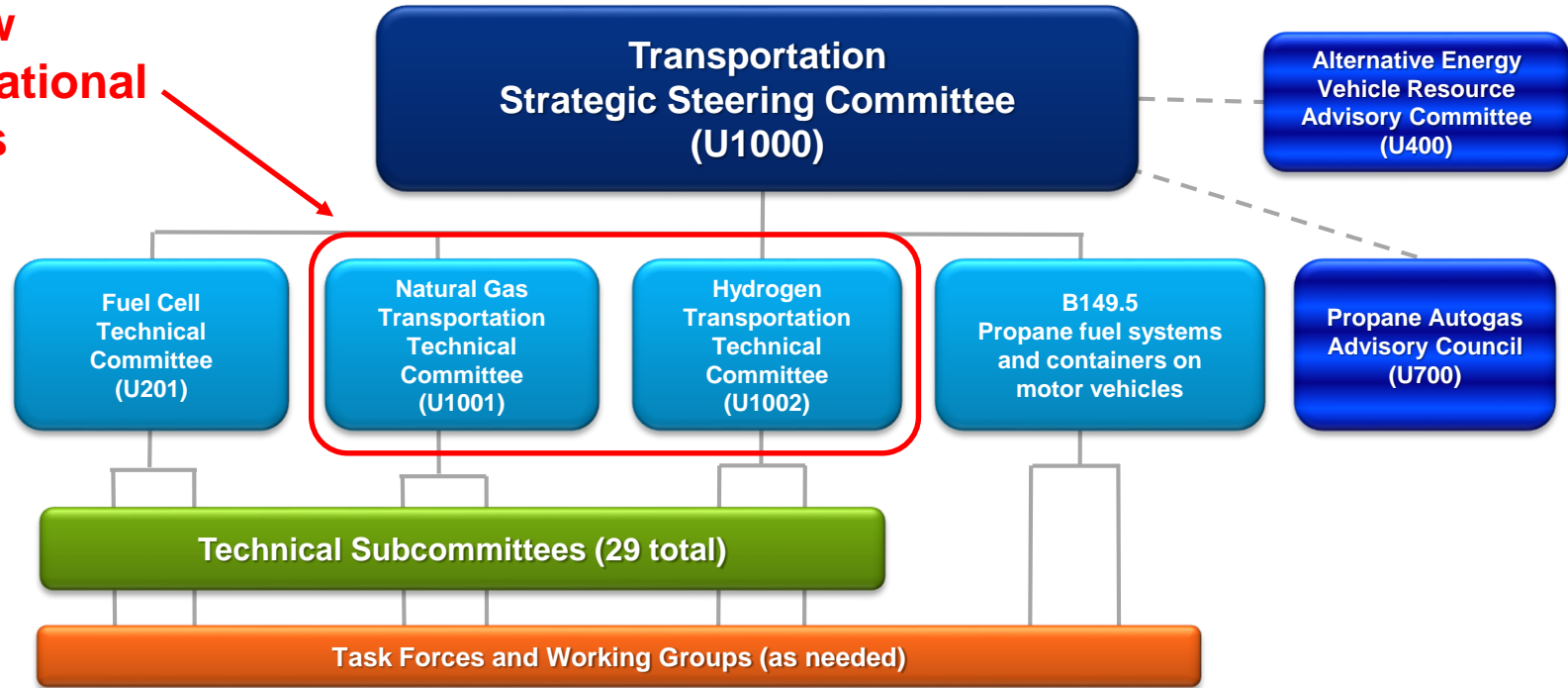
CNG & LNG includes Codes Standards that cover vehicles, stations, vehicle/station interface, and best practices and training for NGV workforce

Transportation Program – Committee Structure

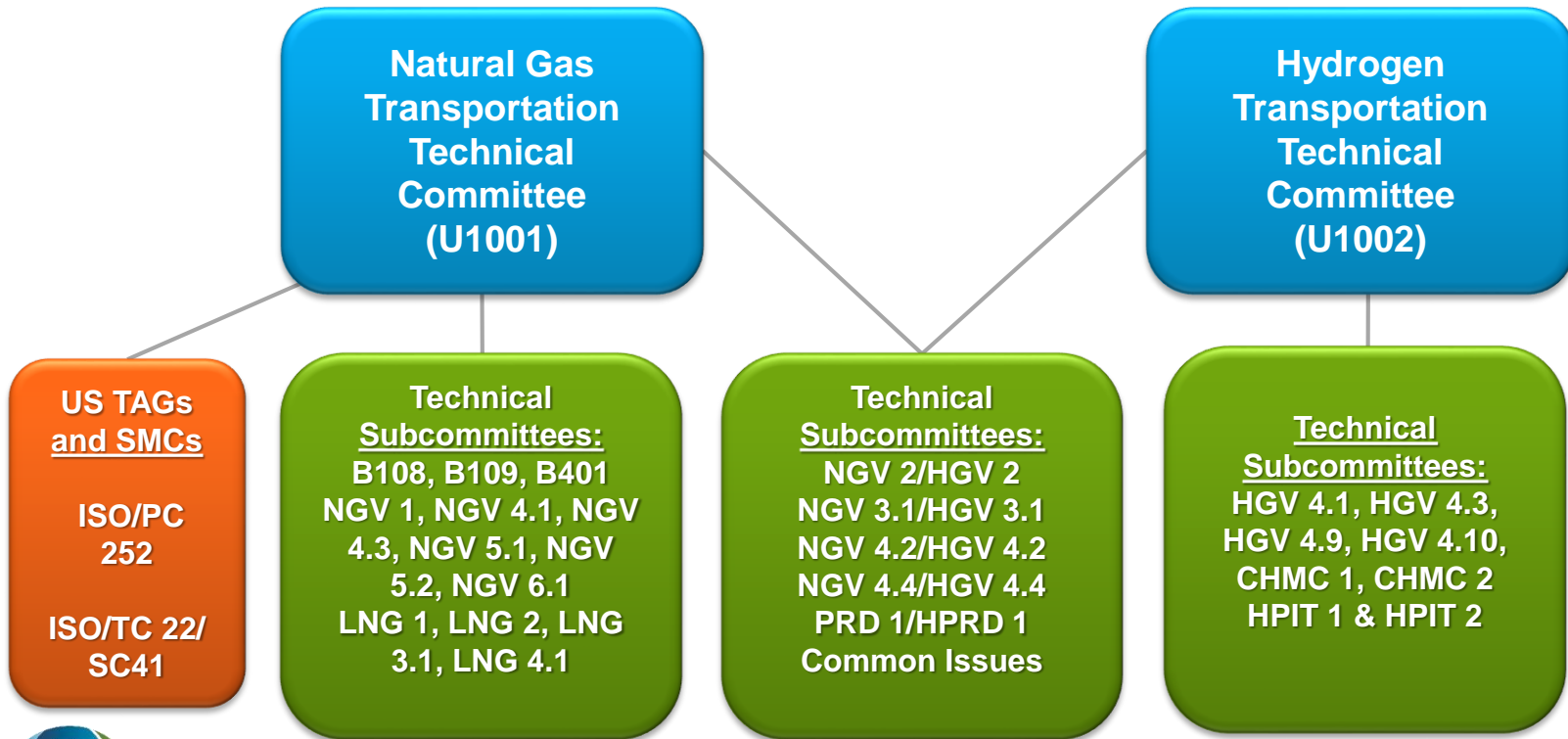


Transportation Program – Committee Structure

**New
Binational
TCs**



Transportation Program – Committee Structure

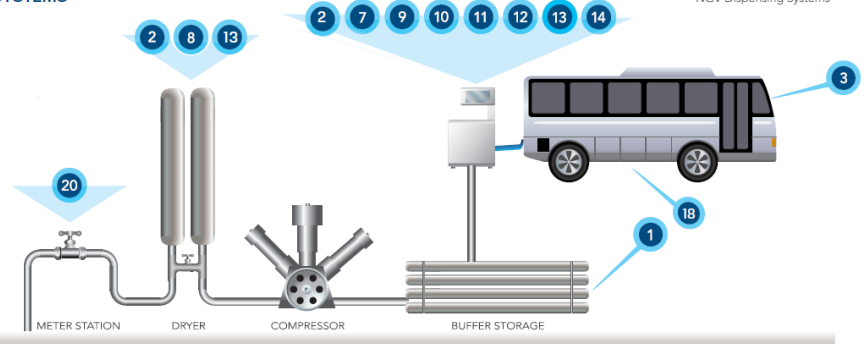


Compressed Natural Gas Standards

CSA Group is the leader in North American Codes and Standards for NGVs

- 1 CSA B51 PART 3
Compressed Natural Gas and Hydrogen Refueling Station Pressure Piping Systems and Ground Storage Vessels
- 2 CSA B108
Compressed Natural Gas Fueling Stations Installation Code
- 3 CSA B109
Natural Gas for Vehicles Installation Code, Part 1
- 4 CSA 12.6 / NGV 5.2 **NEW**
Vehicle Fuelling Appliances (VFA)
- 5 B149.1
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- 6 NGV 5.1 **NEW**
Residential Fuelling Appliances (RFA)
- 7 NGV 1 / CSA IR-1-15
Compressed Natural Gas Vehicle (NGV) Fueling Connection Devices
- 8 NGV 4.11 **PENDING**
Design and Performance of Compressed Natural Gas (CNG) Dryers
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Oil & Gas Pipeline Systems

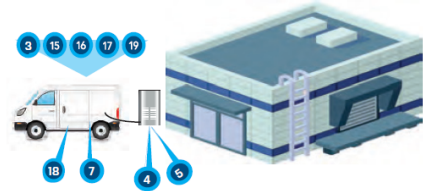
SYSTEMS



RESIDENTIAL



COMMERCIAL



Liquefied Natural Gas Standards

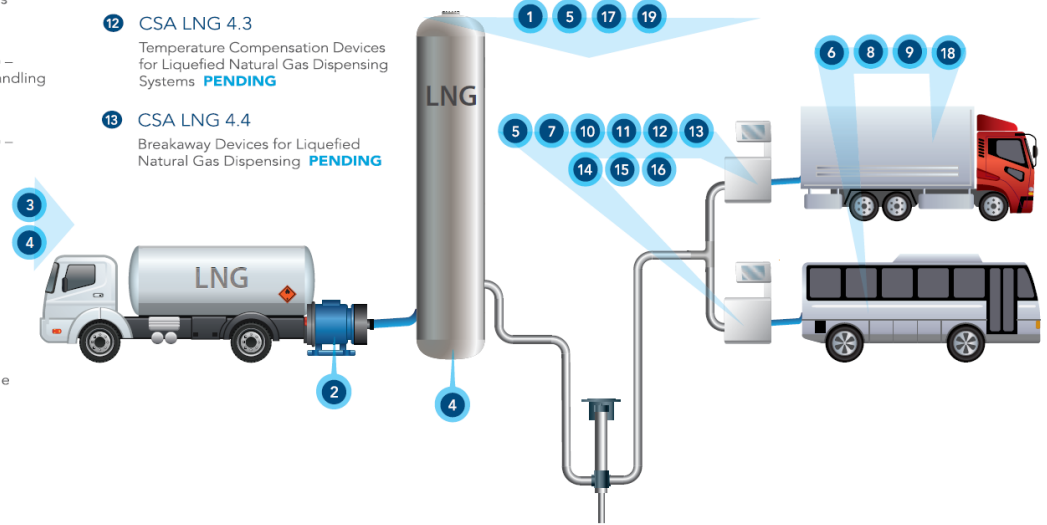
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- 10 CSA LNG 4.1
Liquefied Natural Gas (LNG) Dispensing Systems **PENDING**
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Automatic Operated Valves for Liquefied Natural Gas Dispensing Systems **PENDING**
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Liquefied Natural Gas Fueling Station **PENDING**

- 17 CSA LNG 4.11
Odorizer for Liquefied Natural Gas Dispensing Systems **PENDING**
- 18 CSA LPRD 1
Pressure Relief Devices for Liquefied Natural Gas Fuel (LNG) Containers **PENDING**
- 19 CSA LPRD 2
Pressure Relief Valves for Natural Gas Dispensing Systems **PENDING**



Recently Published by CSA Group

B109

NGV 4.1

NGV 4.3

NGV 5.2

SPE 2.1

- Canadian Code for CNG and LNG Vehicle Installations
- New Edition – Published November 2017
- Adopted by Transport Canada and various provinces

Recently Published by CSA Group

B109

NGV 4.1

NGV 4.3

NGV 5.2

SPE 2.1

- Binational Standard for CNG Dispensers
- Device or system dedicated to dispensing fuel into vehicles and can be accessed by the general public
- New Edition – Published January 2018

Recently Published by CSA Group

B109

NGV 4.1

NGV 4.3

NGV 5.2

SPE 2.1

- Binational Standard for Temperature Compensation of Existing CNG Dispensers
- New Standard – Published January 2018
- Future work activity will develop temperature compensation test methods for new dispensers and appliances

Recently Published by CSA Group

B109

NGV 4.1

NGV 4.3

NGV 5.2

SPE 2.1

- Binational Standard for Vehicle Fueling Appliances
- VFAs are intended for private use in private commercial settings, such as fleet operations.
- New Standard – Published July 2017

Recently Published by CSA Group

B109

NGV 4.1

NGV 4.3

NGV 5.2

SPE 2.1

- Binational Guideline for defueling, decommissioning, and disposal of NGV tanks and containers (CNG and LNG)
- Added coverage for LNG tanks
- Launched [free online training module](#) for CNG containers
- New Edition – Published in January 2018

In Development at CSA Group

B108

B401

LNG 4.1

LNG 3.x Series

NGV 2

NGV 6.1

- Canadian Code for NGV Fueling Stations
- Adopted in various provinces
- Adding LNG coverage
- Working group to align with NFPA 52
- Next Edition Expected in June 2018

In Development at CSA Group

B108

B401

LNG 4.1

LNG 3.x Series

NGV 2

NGV 6.1

- New Canadian Code for NGV Maintenance Facilities
- Compared NFPA 30A and IFC prior to commencing work
 - Report forthcoming on CSA's Communities of Interest
- Expected Publication in December 2018
- Working with IGAC to promote adoption by provinces

In Development at CSA Group

B108

B401

LNG 4.1

LNG 3.x Series

NGV 2

NGV 6.1

- New Binational Standard for LNG Dispensers
- Expected Publication in December 2018

In Development at CSA Group

B108

B401

LNG 4.1

**LNG 3.x
Series**

NGV 2

NGV 6.1

- New Binational Standards for LNG Fuel System Components
- Adoptions of ISO 12614-x series of standards – 17 total
- Expected Publication in June 2018

In Development at CSA Group

B108

B401

LNG 4.1

LNG 3.x Series

NGV 2

NGV 6.1

- U.S. Standard for CNG fuel containers – New Edition
- Referenced by Transport Canada and Canadian Code
- Incorporating coverage for Conformable CNG tanks
- Evaluating coverage for ANG tanks
- Expected Publication in August 2018

In Development at CSA Group

B108

B401

LNG 4.1

LNG 3.x Series

NGV 2

NGV 6.1

- New Binational Standard for CNG Fuel Systems for Vehicles
- Published in 2016 as a recommended practice
- Expected publication in March 2018
- Proposals submitted to NFPA 52

Other Codes for NGVs

NFPA 52

ICC

- NFPA proposals to reference CSA documents (NGV components and fueling)
- Proposal to remove coverage for CNG fuel systems and reference NGV 6.1
- Next Meeting: April 10-11 in Greenville, NC
- Expected publication in Fall 2019

Other Codes for NGVs

NFPA 52

ICC

- ICC proposals submitted by AGA to reference CSA documents (NGV components and fueling stations)
- CSA plans to attend the code hearings to testify in support of the AGA proposal
- Code hearings April 15-23 in Columbus, OH
- Expected publication in 2020

Future Work at CSA Group

Task Force

ISO

Code Adoptions

High Horse Power

NRCan

- Defueling Task Force reviewing:
 - Common defueling device profile
 - Defueling protocol, methodology, and best practices
 - Environmental impacts of defueling

Future Work at CSA Group

Task Force

ISO

Code Adoptions

High Horse Power

NRCan

- ISO/PC 252 considering disbandment
 - Two published standards: CNG Stations, LNG Stations
- ISO/TC 22/SC 41
 - CSA manages the U.S. and Canadian National Committees
 - 43 Published CNG/LNG standards
 - ISO 19723-1 and -2: LNG Fuel Systems

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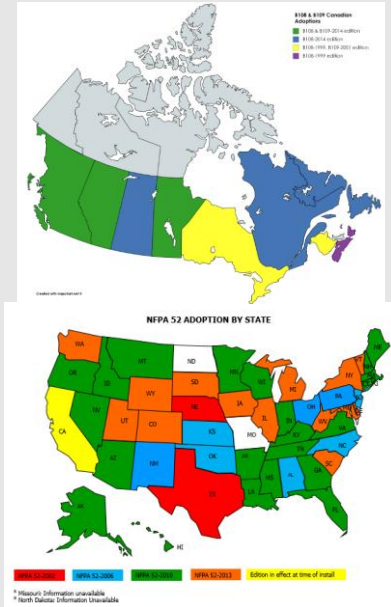
ISO

Code
Adoptions

High Horse Power

NRCan

- CSA Group plans to release maps and data pertaining to code adoptions in US (NFPA 52) and Canada (B108 and B109)
- Support industry efforts to ensure uniform code adoption



Future Work at CSA Group

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Code Adoptions

**High Horse
Power**

NRCan

- Facilitating LNG and Marine activity at NFPA 52
- Monitoring CNG and LNG activity at Association of American Railroads
- Monitoring Canadian initiatives related to mining equipment

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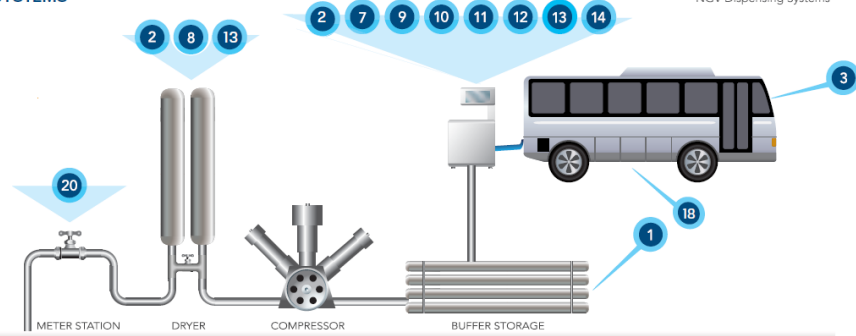
NRCan

- Natural Resource Canada recently announced a \$120 million initiative to deploy alternative energy vehicle infrastructure in Canada
 - Includes CNG and LNG refueling
- Initiatives related to Codes and Standards will be included

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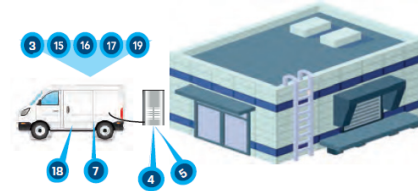
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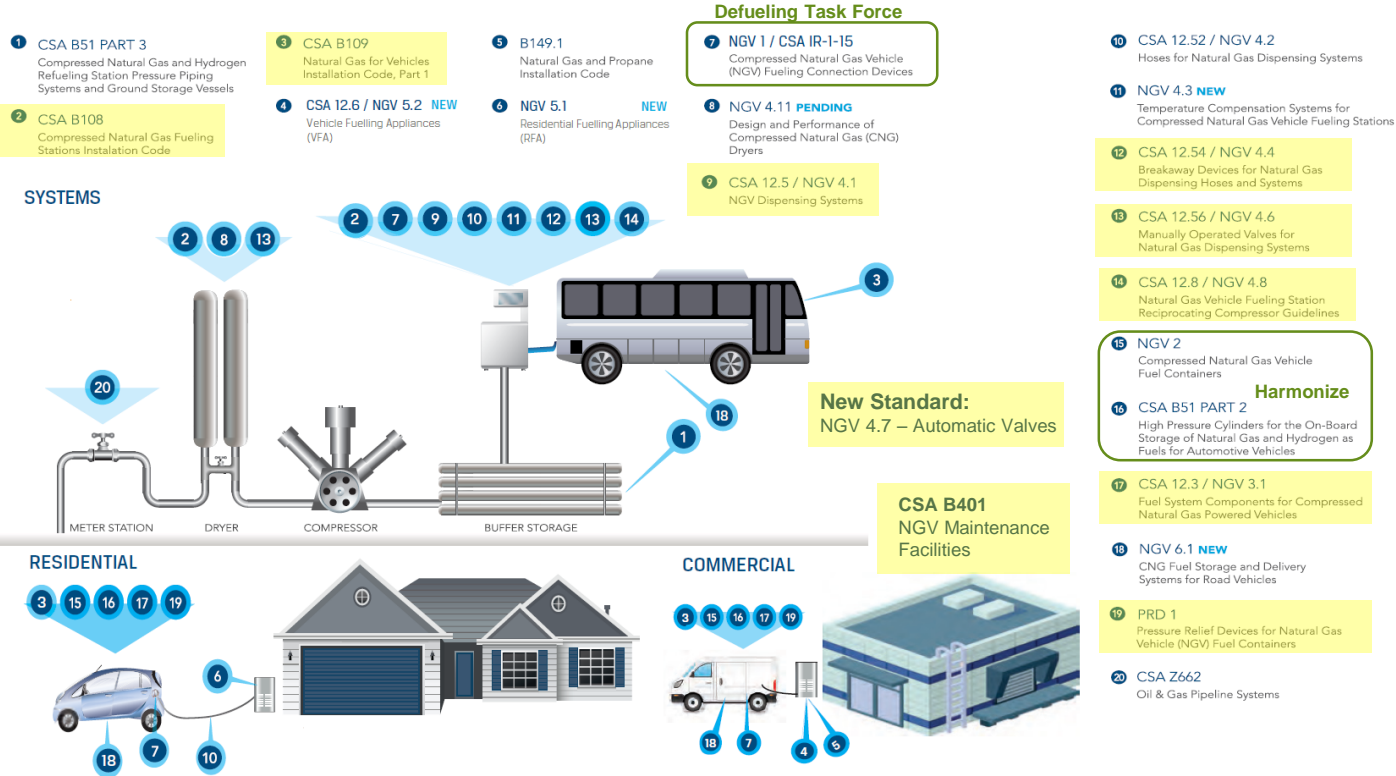


CSA Group is the leader in North American Codes and Standards for NGVs



Compressed Natural Gas Standards

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Liquefied Natural Gas Standards

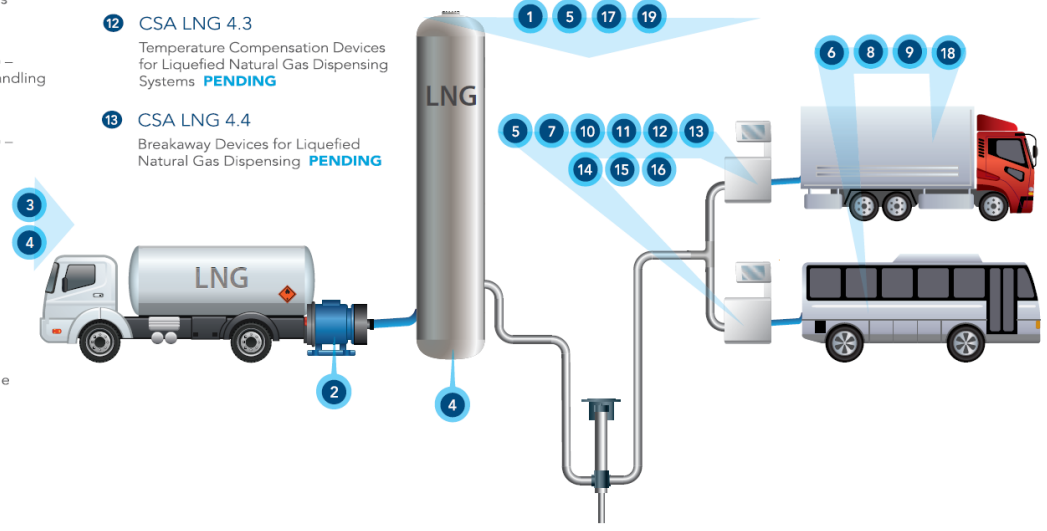
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CSA B108, Part 2
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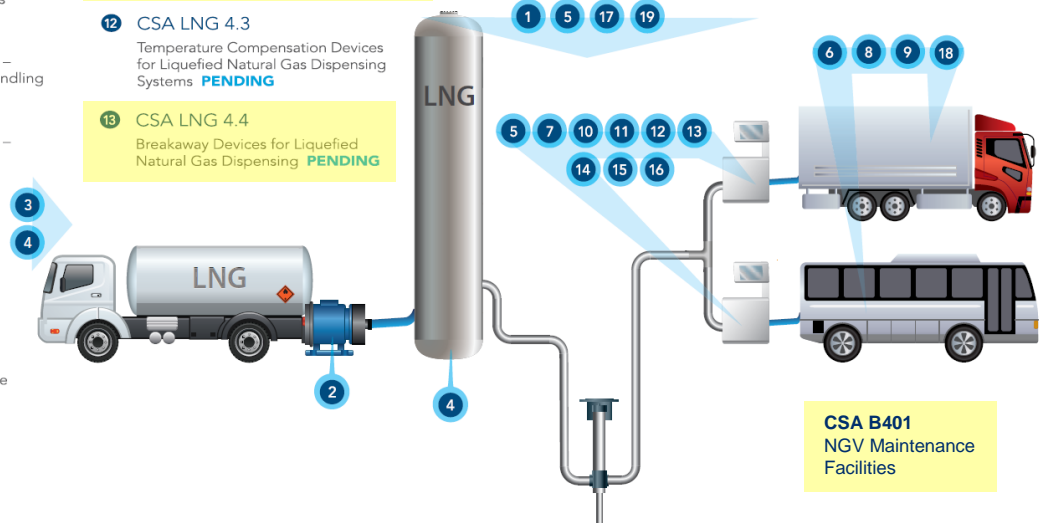
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Get Involved!

- Participate on CSA Group's NGV Committees
 - No annual dues; most meetings are held virtually
- [Follow CSA's Alternative Energy Vehicle Community of Interest](#)
- [Training and Certification of Personnel](#)
- [Testing, Inspection, and Certification of Products](#)

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Natural Resources
Canada

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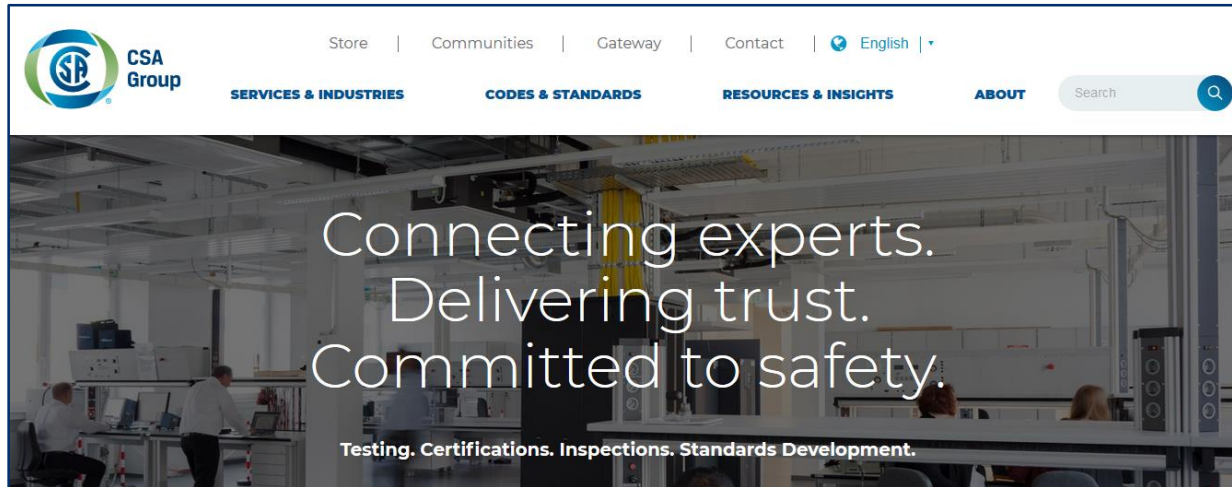
Canada



Summary

- Codes and Standards play a key role in addressing industry challenges
- Industry participation in Codes & Standards is critical – get involved!

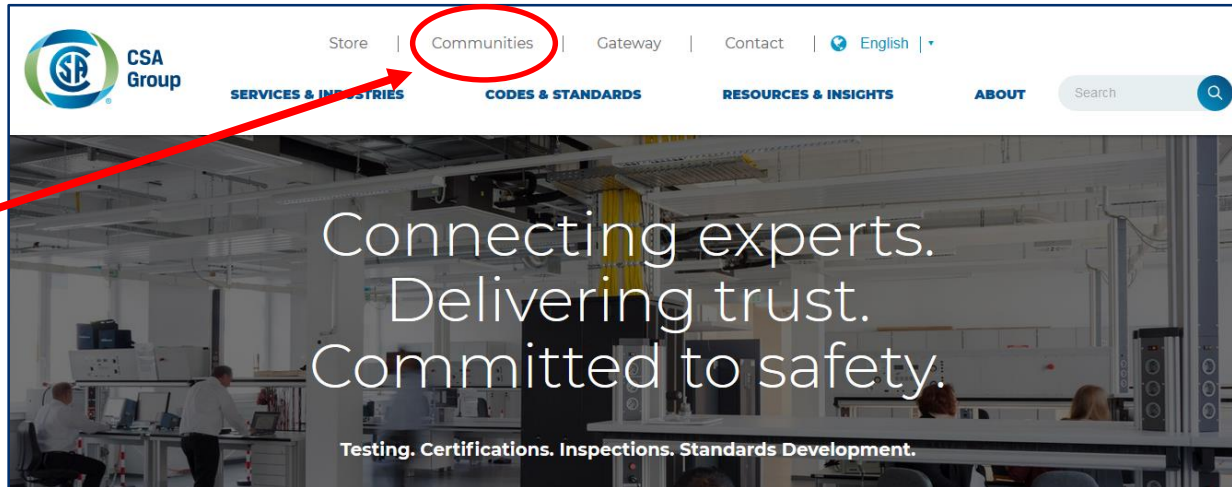
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Summary

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CSA's
Communities
of Interest





Questions?



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