



## **CSA in Climate Change A BACKGROUND REPORT**





CSA and Climate Change  
*A Background Report*  
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CONTENTS

*I. Growing focus on climate change is driving an unprecedented demand for solutions ..... 2*

*II. Standards are an essential component of climate change action .. 4*

*III. CSA: A record of leadership on standards development for the environment..... 5*

*IV. CSA: Advancing an integrated approach to climate change..... 7*

*V. CSA solutions for adapting infrastructure to a changing climate.... 8*

RESILIENCE .....8

EFFICIENCY .....8

CONSERVATION .....9

*VI. CSA solutions for managing greenhouse gas emissions..... 10*

MEASURING THE CARBON FOOTPRINT .....10

REPORTING CARBON FOOTPRINT, REDUCTION PROJECTS AND RESULTS .....10

RECOGNIZING RESULTS.....12

*VII. CSA solutions for reducing greenhouse gas emissions..... 13*

SUPPORTING GREEN POWER TECHNOLOGIES .....13

MANAGING THE DEMAND SIDE: ENERGY CONSERVATION AND ENERGY EFFICIENCY .....14

*VIII. Conclusions: Considerations for decision-makers ..... 16*

About CSA .....17

## I. Growing focus on climate change is driving an unprecedented demand for solutions

Current market survey results suggest that climate change looms ever larger on the corporate agenda.

In early October, the Canadian Council of Chief Executives reported “unprecedented consensus” on the need to combat global warming and their obligation to do more to help. Executives called climate change “the most pressing and daunting issue” today. (*Globe and Mail, October 1, 2007*)

The annual Carbon Disclosure Project (CDP5) survey, released in September 2007 received a 77% response rate from the FT500 (up from 72% a year earlier) and “the gap between climate awareness and action continues to narrow” (*CDP Report 2007*). More than three-quarters of responding companies reported implementing a GHG emissions reduction initiative, up from 48% in 2006.

The made-in-Canada edition of CDP5, the Canada 200, reports that 64% of respondents have a formal GHG emissions management system – either targeting emissions directly, or indirectly through energy efficiency and conservation.

Canadian Standards Association (CSA) has encountered a similar sense among its more than 9,000 members, who represent business, industry, government, academia, consumer groups and others. Senior managers are expressing interest in demonstrating leadership and accountability on the climate change issue. They are looking for cost-effective ways to improve carbon management – *voluntarily*. And they want tools to measure and report on their progress.

Momentum for action on climate change is coming from multiple stakeholders:

- investors who want to understand their risk exposure
- consumers who seek greener choices
- employees who want leadership and action in their workplaces
- government which formulates public policy and decides on regulations
- businesses that wish to demonstrate corporate social responsibility and enhance their reputations

Large emitters – that is, those facilities emitting more than 100,000 tons of CO<sub>2</sub> per year – have faced the threat of mandatory emission reductions for some time. And many started producing greenhouse gas inventory reports years ago.

Today, there are thousands of organizations, small and large, involved in light industrial activities, manufacturing, services and retailing throughout North America, that do not fall under regulations. Yet the most progressive among them are seeking ways to *voluntarily* measure and improve their carbon footprint, to improve performance, satisfy stakeholders and enhance their reputations. This voluntary sector is fueling demand for credible emission reducing projects...and for proper recognition of efforts to improve the carbon footprint.

Climate change has the potential for deep and lasting impact on our natural, human and economic resources, yet there is significant opportunity in managing human activity

relating to greenhouse gas emissions ... opportunity to bring world-leading technologies and services, and sound environmental policies to the fore.

In the drive for incremental action and lasting impact on climate change, governments and industry will need methodology, standards, tools and resources to help them reduce greenhouse gas emissions, as well as advice and training to achieve positive results.

## II. Standards are an essential component of climate change action

The standards community in Canada, internationally renowned for its technical expertise, integrity and proven processes, has much to contribute in the climate change area. Canada has a track record for developing consensus-based standards that embrace the positions and perspectives of a wide range of stakeholders.

For example, to produce its more than 3,000 published standards, CSA relies on the involvement of its members – over 9,000 volunteers from all walks of life, offering diverse experience and skill sets. CSA's role is to facilitate that process. A balanced matrix approach ensures that all relevant stakeholder groups are represented at the table, and that their points of view are heard. Because of this inclusive, consensus approach, CSA's standards are recognized throughout Canada and around the world for their integrity, technical rigor and market acceptance. Many are cited in legislation at the federal, provincial, state and municipal levels across North America. Many are also internationally or regionally harmonized.

Because no single group has jurisdiction over the climate change agenda, meeting its challenges will take unprecedented levels of innovation, collaboration and commitment from all sectors: government, industry, NGOs and consumers. The standards community is ideally positioned to leverage its inclusive process and consensus approach to meet the needs of stakeholders.

New technologies will be essential contributors to the reduction in greenhouse gas emissions. Historically, standards have been enablers of new technologies because they help set requirements for design, performance and safety. They also help foster market acceptance and adoption through the creation of consistency, uniformity and interchangeability. For example, standards will enable the connection of energy generated from renewable sources to the grids that transmit and distribute electricity.

By creating a framework of consistent rules and applications, standards (and related certification programs) help encourage innovation while assuring certain levels of safety and performance. This can contribute to well-shaped public policy that accelerates the process of invention, adoption and diffusion of green power technologies. CSA's standards are a springboard for helping to bring green power into the mainstream. They help to give consumers confidence in the safety of new technologies.

### III. CSA: A record of leadership on standards development for the environment

Since 1919, CSA has developed standards that help to enhance public safety and health, advance quality of life, facilitate trade and preserve the environment.

On the environmental front, CSA has been active at both national and international levels for many years.

For example, CSA is involved in:

- **ISO 14000 Environmental Management standards**

On behalf of the Standards Council of Canada (SCC), CSA administers the international committee responsible for the world's most recognized environmental management standards, the ISO 14000 series. When released in 1996, these standards helped to provide a systematic way for organizations to manage their impacts on the environment. Since then, the committee has become a force for increasing corporate support over the environment, and a leader in including elements of sustainable development in its products.

- **ISO Working Group on Climate Change**

CSA administers ISO Working Group 5, which brings together 140 international experts from 24 countries and three liaison organizations. The goal is to provide a set of unambiguous and verifiable requirements so that emerging GHG registry and emissions reduction schemes can be viewed as credible and comparable.

CSA was named World Secretariat to develop new international standards for greenhouse gas inventory at the organizational level. The result, after four years of work involving hundreds of participants, is the ISO 14064 series of standards for project quantification and verification. They help measure, monitor, report and manage GHG emissions.

- **Water Quality**

In 2003, CSA was contracted by the Ontario Ministry of the Environment to develop a draft Drinking Water Quality Management guidance document and to engage stakeholders in the development of a provincial standard. CSA was responsible for the development of a stakeholder engagement plan, the analysis of existing quality management models for drinking water systems, the development of a working paper and the development of a draft guidance document. Elements of the draft guidance document formed the basis for Ontario's new Drinking Water Quality Management Standard.

The impacts of more extreme weather resulting from climate change, such as more frequent flooding, drought and reduced glacial runoff, may have a major impact on resource management areas such as water and food security.

- **Managing the Impacts of Agriculture, Livestock and Farm Sector Operations on the Environment and Sustainable Development**

CSA was engaged by the Canadian Pork Council (CPC) to develop and deliver a comprehensive program to support Agriculture and Agri-Food Canada's (AAFC) Livestock Environmental Initiatives. CSA developed Canada's first environmental management systems (EMS) standard that promotes the responsible environmental management of hog operations in Canada. The management system standard was designed to be consistent with the principles of ISO 14001.

- **Sustainable Forest Management and Climate Change**

CSA worked with a diverse range of stakeholders to develop Canada's National Standard for Sustainable Forest Management (SFM) CAN/ CSA Z809. As of December 2006, about 59% or 79.3 million hectares\* of 134.1\* hectares of certified Canadian forests had been certified under the CAN/CSA-Z809 SFM Standard.

\*Source: Certification Status Report Canada-wide, June 21, 2007 Canadian Sustainable Forestry Certification Coalition

- **Fuel cells and hydrogen**

As a catalyst for environmental change, standards are often the first step in directing change and building new industries. CSA's accredited standards writing body in the U.S., CSA America, is working with the U.S. Department of Energy to develop standards that will enable fuel cells and hydrogen to become a primary energy source. Active in Fuel Cells and Hydrogen Research since 1998 when CSA's standard for fuel cell power plants was introduced to North America, CSA is now involved in 22 different project areas relating to fuel cells and hydrogen through our CSA America operation.

- **Energy efficiency**

CSA has been in the business of developing energy efficiency standards for the past 30 years. Performance Energy Efficiency and Renewables Program (PEER) standards have supported the Energuide™ and ENERGY STAR™ programs, which have influenced the behaviours of manufacturers and consumers with dramatic results. In Canada alone, from 1992 to 2003, the collaborative efforts of CSA, manufacturers and governments to promote the use of energy efficient appliances resulted in energy savings equivalent to what 576,000 Canadian households consume in a year.

## IV. CSA: Advancing an integrated approach to climate change

A complex and multi-dimensional challenge of unprecedented proportions, climate change calls for sustained action on many fronts. There is no single cause and no one answer.

Today, CSA is one of the primary players in the development and deployment of technologies, services and processes that seek to reduce the impacts of climate change.

Leveraging core strengths in engaging stakeholders, facilitating technology innovation and adoption, and diffusing knowledge and resources, CSA is fostering the development of common standards for climate change technology, products, procedures and management systems. These are aimed at helping organizations meet three main objectives:

1. Adapt to a changing climate
2. Manage greenhouse gas (GHG) emissions
3. Reduce greenhouse gas emissions

## V. CSA solutions for adapting infrastructure to a changing climate

### **RESILIENCE**

Due to the potential for extreme weather events, climate change presents urgent challenges to Canada's infrastructure. For example, a 15% increase in the intensity of precipitation has been observed in the past decade. What does that mean to infrastructure? The City of Ottawa has recently estimated that such an increase translates into a 25% pipe surcharge. So it means more flooding and an additional stress on infrastructure. The *Globe and Mail* has reported that the heavy thunderstorms that hit southern Ontario on August 19, 2005 caused \$500M worth of damage. That is the worst insured loss in the province's history. And there are other observed changes underway – such as increased wind velocity, more frequent freeze-thaw cycles, heat waves and melting permafrost.

Regulations, standards, codes and bylaws relating to infrastructure require upgrading to ensure infrastructure is resilient and capable of withstanding new thresholds for extreme weather events and other climate change repercussions.

- **Standards review and development**

CSA manages close to 400 standards that cover a wide range of civil infrastructure categories. These include: buildings, water, transportation structures, as well as electrical, petroleum and gas distribution networks and components. More than 250 of these CSA standards are referenced in building codes.

CSA is currently reviewing how these standards may need to be revised given our changing climate, and whether new standards are required to manage the emerging risks.

- **Engineering knowledge transfer**

With the financial support from Infrastructure Canada, CSA launched a pilot project in 2006 that will help to identify ways to help to ensure that climate change issues and solutions become part of mainstream curriculum and continuing education for engineers working in the built infrastructure area. This in turn will help to improve the content of standards over the longer term as standards content development relies heavily on Canada's engineering community. More information is available from [www.infraengineers.ca](http://www.infraengineers.ca)

### **EFFICIENCY**

Another important dimension of adaptation is to build more efficient infrastructure and buildings. These will need to employ more sustainable building practices and consume fewer resources in their operation.

CSA standards and related products help to facilitate the adoption of new solutions and approaches. We are focused on planning for future development, helping to develop new standards, guidelines and training to help ensure that Canada's buildings, bridges

and transport infrastructure as well as water and energy distribution systems are more energy efficient.

## **CONSERVATION**

It is estimated that up to 6 million tonnes\* of solid waste is created annually by construction, renovation and demolition activities. A significant percentage can be recovered and diverted from landfill by applying design for disassembly and adaptability principles. Buildings are potentially enormous sources of materials that can be reused and recycled in future construction projects, with significant corresponding benefits in greenhouse gas (GHG) reductions.

\* Source: Public Works and Government Services Canada

- **Design for disassembly and adaptability in buildings**

CSA has developed a guideline, *Z782-06 Guideline for design for disassembly and adaptability in buildings*, which gives designers the means to implement environmentally responsible design practices. These practices can help to reduce material diverted to landfill, reduce greenhouse gas emissions and ease the strain that construction places on natural resources.

## VI. CSA solutions for managing greenhouse gas emissions

### **MEASURING THE CARBON FOOTPRINT**

The first step for any organization wishing to manage greenhouse gas emissions is to assess its current carbon footprint.

CSA offers internationally accepted standards for GHG accounting and reporting as well as GHG Registries to help organizations establish their GHG footprint. CSA also offers educational programs and services to help businesses understand and apply ISO 14064.

- **CAN/CSA ISO 14064**

This series of voluntary standards is designed to help organizations, governments and other stakeholders monitor, report and verify GHG emissions through internationally agreed upon best practices.

- ISO 14064-1 helps to calculate and compile a GHG inventory
- ISO 14064-2 helps to calculate the emission reductions or removals offered by a GHG-reduction project
- ISO 14064-3 explains how to validate a GHG project plan or have a GHG inventory or emission reduction or removal project verified

The ISO 14064 series provides a common GHG accounting architecture for international carbon markets and supports GHG reduction programs through a consistent and comparable method for monitoring, reporting and verification.

Countries that have approved these standards include the U.S. and Australia, which declined to ratify the Kyoto Protocol. They include large emitters, such as China, India, Brazil, South Korea and Indonesia. They also include oil and gas producing countries, such as Russia, Venezuela, Libya and Norway, as well as key E.U. countries such as Germany, France, Italy and the U.K. Canada has adopted ISO 14064 as national standards of Canada. Together, these countries account for more than 80% of world GHG emissions.

In the future, these standards could act as a bridge between various emission reduction commitments regimes.

### **REPORTING CARBON FOOTPRINT, REDUCTION PROJECTS AND RESULTS**

The next step, after measuring the carbon footprint, is to develop a plan to improve the footprint. Quantifying and publicly reporting emissions reductions is an essential component of any carbon reduction plan.

- **CSA's GHG CleanProjects™ Registry**

This registry will provide a framework and a site to publicly report GHG emission reductions or removals stemming from a project. This registry provides the

advantage of internationally agreed upon standards, as GHG measurements will be based on ISO 14064-2 and 14064-3 requirements.

Web-based portals such as CleanProjects™ help to showcase emission reducing and removal projects. These tools can help organizations or individuals assess their footprint through a GHG inventory and review options to improve it. They can also help project developers to develop and showcase their GHG-reducing projects. When a third-party verification is provided, the registry assigns a unique serial number to each tonne of emission reductions from the project.

- **CSA's GHG CleanProjects™ Aggregation Registries**

These custom registries, developed on an individual contract basis, aggregate emission reductions/removals from small projects, once the reductions and removals have been verified by an independent third party. The measurements are based on ISO 14064-2 and 14064-3.

- **Canadian GHG Challenge Registry™**

Formerly known as Canada's Climate Change Voluntary Challenge & Registry Inc. (VCR Inc.), and managed by CSA, this registry challenges both current and potential registrants from all economic sectors and geographic regions to demonstrate meaningful actions which contribute towards the reduction of Canada's GHG emissions. It is a voluntary, publicly accessible, national web-based registry of greenhouse gas baselines, targets and reductions.

Developing a champion-level GHG Action Plan requires tracking and monitoring energy consumption and may provide opportunities for registrants to focus efforts on savings by reducing consumption. The site allows for the posting and comparison of practices and offers an opportunity to registrants for positive market exposure and recognition.

- **CSA's GHG CleanStart™ Registry: Establishing and Maintaining Your Emissions Inventory**

Now in development and scheduled for release in early 2008, this registry will provide a framework and a site to publicly report an organization's GHG inventory. A more robust version of the Canadian GHG Challenge Registry™ described above, this registry provides the advantage of internationally agreed upon standards, as GHG inventories will be based on ISO 14064-1 requirements.

- **Canadian GHG Reductions Registry™**

This registry provides a listing service for organizations that wish to have GHG reduction projects registered. When a third-party verification is provided, the registry assigns a unique serial number to each tonne of emission reductions from the project.

- **Manitoba Climate Action Project (MCAP)**

In an example of helping governments meet and manage the impacts of a changing climate, CSA is working with the Government of Manitoba and the Canadian Climate Exchange (CCE) on a climate action project. The resulting business plan will propose steps for the potential development and implementation of a web-based portal to assist project developers (proponents) in developing and showcasing GHG emission-reducing projects. The portal is intended to be a one-stop shop to provide tools to help organizations, associations and individuals establish and improve their

GHG footprint, provide a place for them to showcase their projects to the public and/or locate emission reduction or removal projects.

## **RECOGNIZING RESULTS**

As they make incremental improvements to reduce their greenhouse gas emissions, organizations are looking for a way to be publicly recognized for their efforts – a key tool offered by Canadian GHG Challenge Registry™ and the soon to be released GHG CleanStart™ Registry.

## VII. CSA solutions for reducing greenhouse gas emissions

CSA is working on a wide range of standards to support new technologies, such as hydrogen fuel cells, renewable energy (including wind power interconnection), biomass energy and heat metering to support district heating and co-generation.

CSA is also working with governments to ensure that appropriate standards support the future development of a CO<sub>2</sub> capture and storage infrastructure. This initiative covers technical requirements as well as emergency preparedness requirements.

As Canada embraces GHG-friendly technologies, new standards are needed to ensure their proper integration into homes, offices, industrial facilities and energy generation/distribution systems.

### **SUPPORTING GREEN POWER TECHNOLOGIES**

CSA has developed and continues to update more than a dozen standards covering design and installation requirements for renewable energy sources. These standards can be used as a basis for training, education and deployment of technologies through utility and government-led initiatives. The standards are often referenced in Building, Plumbing and/or Energy Codes.

- **Wind Turbines**

Standards for wind energy were introduced in Canada 20 years ago – at a time when turbines were typically less than 50 metres tall, rated at less than 50 kilowatts, and generally limited to off-grid farm use and research facilities. In 2005, CSA initiated standards development activity to address new technology and increasing regulatory interest, updating wind energy standards to harmonize with recognized International Electrotechnical Commission (IEC) international standards. CSA adds value with Canadian expertise in cold weather design and operations.

- **Solar Photovoltaic**

CSA first introduced standards in this area in the 1980s. Photovoltaic technology has since become established as a mainstream energy source in many parts of the world. CSA's focus today is on member participation on international committees and facilitating the adopting of their collective output as National Standards of Canada.

- **Solar Hot Water**

A practical alternative energy source for homeowners, the technology has advanced – and become more cost effective, since CSA introduced standards for solar hot water systems 20 years ago. CSA committees are currently updating these standards to address improvements in technology.

- **Earth Energy Systems**

Also known as ground source or water source heat pumps, these systems are practical alternative energy sources for residential, commercial and institutional heating and cooling applications. CSA introduced performance and installation

standards in the late 1980s and CSA committees are reviewing proposals for updating the standards.

- **Heat Metering to support District Heating**

Until the 1980s, most district heating in Canada consisted of steam distribution systems, usually on government or university campuses. Common ownership of the buildings eliminated the need for accurate metering for billing purposes. With the advent of district heating/cooling applications, which are new in Canada but rapidly expanding, effective district metering has taken on much greater importance.

One of the drawbacks hindering the adoption of district heating/cooling had been the lack of reliable metering, especially for district heating and cooling in multi-tenanted facilities. Without effective metering, there has been little incentive to conserve. And yet, other countries' have experienced reductions of between 20 – 30% in energy consumption once energy use charges were billed.

CSA was funded by Natural Resources Canada to initiate a project to develop a Canadian standard for heat meters to measure both heating and cooling hydronic flows. The *CSA C900 Standard for Heat Meters* was published in November 2006. The standard is an adoption with modifications (Canadian Deviations) of the same titled EN 1434 standard published in 1997 and corresponding amendments.

At least nine systems of the megawatt size exist and a number of others are in the planning stages in Canada. Six of these have cogeneration plants. Others utilize a renewable biomass fuel.

- **Digester and Landfill Gas**

Digester gas is defined as gas from organic sludge and is composed of roughly 2/3 methane and 1/3 carbon dioxide. Landfill gas is very similar to digester gas and both behave closely to natural gas. CSA's standard *CAN/CGA-B105-M93* applies to the installation, operation and maintenance of systems for the production, handling, storage, and utilization of digester and landfill gas.

- **Fuel Cells**

CSA has been involved in fuel cells activity since 1998, when the world's first standard for fuel cell power plants was introduced to North America. CSA is also helping with the development and adoption of international (IEC) fuel cell standards for use in Canada. CSA's role in this rapidly growing sector and ability to address the needs of stakeholders has put it in a leadership position in the development of fuel cell standards.

- **Distributed Generation systems**

CSA is developing new standards for the interconnection of renewable energy – wind, solar, biomass, and fuel cells – into the power distribution grid. The first of these standards was published in March 2006 covering the grid interconnection of distributed resources rated 600V or less.

## **MANAGING THE DEMAND SIDE: ENERGY CONSERVATION AND ENERGY EFFICIENCY**

A more proactive approach to energy conservation will be needed to reduce energy use in Canada – and help reduce GHG emissions.

CSA's energy efficiency standards contribute to an economic and sustainable use of natural resources and work toward a reduction in greenhouse gas emissions. Together with related certification programs, these standards have supported public policy over the past 30 years, including the Energuide™ and ENERGY STAR™ programs.

Mandatory reference to these standards in legislation (e.g. Energy Efficiency Acts) or procurement specifications helps to eliminate the possibility of the market regressing to lower energy efficiency levels and helps transform the market to higher efficiency.

- **Energy Performance and Renewable Technologies standards**

Today, CSA has over 60 published standards that cover the performance and energy efficiency of electrical, gas- and oil-fired equipment, building products and appliances. An inclusive listing of all of CSA's Energy Performance and Renewable Technologies Standards is available. The listing also includes associated Environmental Standards.

- **Consumer Representation and Services**

CSA standards are developed by a diverse group of stakeholders including consumers and representatives of consumer organizations. By actively involving consumers, CSA advances the acceptance and uptake of its energy-related standards thereby increasing mitigation efforts.

## VIII. Conclusions: Considerations for decision-makers

Climate change is now driving public policy and corporate decisions. It is also altering consumer behaviour and rewarding those who build environmental sustainability into their practices... the ones who introduce leading edge technologies to reduce energy consumption.

Due to Canada's diverse geography, more than 50 per cent of this country's gross domestic product is estimated to be affected by climate change and extreme weather events. For good reason, climate change has become intertwined with politics, culture, economics and society as a whole.

Today's senior decision-makers want to know the size of their organization's carbon footprint. They are looking for cost-effective ways to improve carbon management – *voluntarily*. And they want tools to measure and report on their progress.

All organizations, regardless of size, can consider four essential tools:

First, they need simple, user-friendly tools to enable them to **establish their carbon footprint**. The ISO 14064-1 standard is a good place to start for organizations that wish to establish their GHG inventory. CSA offers training on how to use the standard and how to verify inventory reports.

Second, they need a way to **document and track improvements to their carbon footprint**. CSA's GHG CleanStart™ Registry will reflect what leading edge organizations are doing to improve their carbon footprint: from investments in technologies... to improvements in internal operations... to investments in green power or identification of emission reduction projects.

Third, they want a way to be publicly recognized for their efforts. GHG CleanStart™ Registry can also be used for this purpose.

Finally, they need **credible carbon reduction projects** to become carbon neutral. The ISO 14064-2 standard offers a solution for achieving this, through its independent, third-party verification of emission reductions.

CSA has a great deal to contribute towards solutions that can help organizations meet many of challenges posed by climate change. We helped to foster the development of common standards for climate change technology, products, procedures and management systems, to help Canada adapt to a changing climate, manage greenhouse gas (GHG) emissions and reduce its GHG footprint. We will continue to play an active role as Canada seeks to address climate change, a complex challenge of unprecedented proportion.

## About CSA

Canadian Standards Association (CSA) is a membership association serving industry, government, consumers and other interested parties in Canada and the global marketplace.

A leading solutions-based standards organization, providing standards and codes development, application products, training and advisory services, CSA aims to enhance public safety, improve quality of life, preserve the environment and facilitate trade.

The Canadian Standards Association is a division of CSA Group, which also consists of CSA International, which provides testing and certification services for electrical, mechanical, plumbing, gas and a variety of other products; QMI, a leading North American registrar, which advances business excellence through client-focused management systems registration; and OnSpeX, a provider of consumer product evaluation, inspection and advisory services for retailers and manufacturers. For more information visit [www.csa.ca](http://www.csa.ca)

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