

# CLIMATE CHANGE AND CALGARY



## Session Agenda

#### Laying the Foundation (AM)

- Global and Local Context of Climate Change
- Speaker Panel 1: Building Climate Resilience
- Speaker Panel 2: The Opportunity Before Us

#### The Climate Roadmap (PM)

- Interactive Session: Solutions for Energy Management and GHG Reduction
- A Roadmap to the Climate Strategy

#### **Session Closing**



## Goals for the Strategic Session

- Build awareness of climate change
- Enable Council to make decisions that further Calgary's climate goals
- Prepare Council for the 2022 Climate Strategy and Action Plans

#### **Global and Local Context of Climate Change**

Calgary







## Calgary's Fair Share

**Equality** based on an understanding that human beings should have equal rights and quality of life

**Responsibility** for contributing to climate change based on historic and current emissions

**Capacity** to contribute to solving the problem



#### Building a climateready city



## From Calgarians...



Remember of GROW Test Sa VF and GROW Test Sa VF a

- Nearly 80% of Calgarians are concerned about climate change
- 72% feel we need to do more
- 77% say they support The City moving to net-zero by 2050



#### MITIGATION

actions to reduce emissions that cause climate change

"avoid the unadaptable"



Renewable energy







Waste



Zero emissions climate resilient buildings and infrastructure



Complete communities



Natural infrastructure



actions to reduce the impacts of climate change

"adapt to the unavoidable"

Community and food resilience





Disaster risk reduction





### **Building Climate Resilience**

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Calgary 🖄





## **Calgary's Climate Hazards**



Extreme Heat



Heavy rainfall



Drought



Heavy snowfall



Wildfire



Severe storms



Shifting Seasons



River flooding

#### Calgary

## Why is climate adaptation so important?

- Calgary's climate risk will increase over time
- Climate adaptation will prepare Calgary for the future

 Failure to prepare will result in significant environmental, economic and social consequences



## How do we build climate resilience?

Adaptation leads to **enhanced climate resilience** and **climate risk reduction** 



#### **Climate Panel 1**

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Calgary





## Speakers



University of Waterloo

#### **Richard Boyd** Director, Economics & Research

All One Sky Foundation

#### IMPACT OF FLOODING ON CANADA'S RESIDENTIAL HOUSING MARKET











Dr. Blair Feltmate Head, Intact Centre on Climate Adaptation bfeltmate@uwaterloo.ca

April 26, 2022







#### CLIMATE CHANGE IS IRREVERSIBLE: SEVERITY OF WEATHER WILL INCREASE



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INTERGOVERNMENTAL PAREL ON CIIMATE CHARGE Climate Change 2022 Impacts, Adaptation and Vulnerability Summary for Policymakers

**IDCC** 





It is <u>indisputable that human activities are causing</u> <u>climate change</u>, making extreme climate events, including heat waves, heavy rainfall, and droughts, more frequent and severe

IPCC 2022

Canada's climate has warmed and <u>will warm further</u> in the future, driven by human influence... <u>this warming is</u> <u>effectively irreversible</u>.

ECCC/CCCR 2019

#### Key climate change drivers

- *increasing global population (9,000 people/hr. net)*
- climate change driving climate change

#### COSTS OF EXTREME WEATHER: CATASTROPHIC INSURABLE LOSSES (\$CAD)

#### **INTACT CENTRE** ON CLIMATE ADAPTATION



Loss + Loss Adjustment Expenses \$2021 - total natural-catastrophe losses normalized by inflation and per-capita wealth accumulation Source: CatIQ, PCS, IBC Facts Book, Statistics Canada, IMF WEO Database

#### **IMPACT OF FLOODING ON RESIDENTIAL HOUSING**





#### **Average Sold Price**

• 8.2% reduction in sold price

#### **Average Number of Listings**

• 44.3% decrease in listings

#### **Average Days on Market**

• 19.8% longer on the market

#### Mortgage Arrears / Deferrals

• No material impact

## SOLD PRICE: 8.2% reduction in sold price

#### **INTACT CENTRE** ON CLIMATE ADAPTATION



#### HOME FLOOD PROTECTION

#### **INTACT CENTRE** ON CLIMATE ADAPTATION

Distribute infographic to homeowners through <u>Property Tax Notices</u>, councilor newsletters (Spring & Fall), newspapers

Most homeowners can limit risk of basement flooding :

- without special expertise
- generally for less < few \$100
- over a long weekend



## Economic risks of climate change impacts for Calgary

April 26, 2022

**Dr. Richard Boyd** Director, Research and Economics All One Sky Foundation



Projected economic risks of climate change for Calgary



How are economic risks distributed across Calgary's human, built and natural capitals?



How much will adapting to climate change cost?

- 0.26% of GDP per year nationally [*estimated* expenditures in Canadian municipal adaptation plans] source: FCM & IBC, 2019
- 0.12% 0.25% of GDP per year over next 5 years
  [*estimated* expenditures on drinking water, sanitation, drainage, green infrastructure and roads in Quebec] source: Ouranos, 2019
- 0.22% 0.23% of GDP in 2015 [actual public and private sector spend on adaptation in NYC, London and Paris] source: Georgeson et al., 2016

The good news

... investing **\$1** in anticipatory, planned adaptation results in avoided losses of...

### \$10.5

From 'soft' engineered measures for coastal flooding, low water levels in Great Lakes, heat-related deaths, forestry

Source: Boyd and Markandya (2021)

\$5.1

From flood mitigation measures From strengthening early warning systems

**\$9** 

**Source**: Global Commission on Adaptation

#### building codes for storms and flooding

\$4.1

From

strengthening

Source: US National Institute of Building Science

### **\$3**

From 'hard' engineered measures for coastal flooding and low water levels in Great Lakes

Source: Boyd and Markandya (2021)

\$4.9

From making infrastructure more resilient

> **Source**: Global Commission on Adaptation

#### Source: Rose et al (2007) (evaluation of +5000 US FEMA projects)

# Some final thoughts

- Projected economic risks of climate change for Calgary are almost certainly *larger* than the estimates presented
- Economic analysis can support adaptation decisionmaking, but there's no one-size-fits all approach
- ✓ There are limits and barriers to equitably meeting all adaptation needs, creating *roles for government*



## Discussion





#### **The Opportunity Before Us**



## What is climate mitigation?

- Energy management
- Carbon reductions
- Supporting a low carbon economy



## Building Blocks of our Future Low Carbon Economy





Renewable Energy

#### Net Zero Building and Retrofits

#### Sustainable Transportation

Natural Infrastructure





#### **Climate Panel 2**





## Speakers



**Sara Hastings-Simon** Assistant Professor University of Calgary **Peter Tertzakian** Deputy Director ARC Energy Research Institute

#### Chris Brown

Business Development Manager

Calgary Economic Development **Yuill Herbert** Director / Principal Sustainability Solutions Group

# Global trends in climate policy and technology and implications for Calgary

Strategic Session of Council on Climate

Dr. Sara Hastings-Simon Department of Physics and Astronomy and School of Public Policy April 2022



#### Key milestones on a net zero pathway impact all sectors



The IEA net zero roadmap lays out a pathway that is ambitious but achievable for the world to reach 0 emissions in 2050.

- Buildings Transport Industry
- Electricity and heat Other



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## The technologies and policies required to cut emissions through 2030 already exist, and some costs are falling rapidly



Aviation – energy efficiency

Biofuels



#### **Costs and adoption rates for example technologies**



Adoption (note different scales)

Fossil fuel cost (2020)



IPCC 6<sup>th</sup> assessment report, Working group 3

## Governments at all levels are taking action

Countries that have NDCs, long-term targets and netzero emission targets and their share of global CO<sub>2</sub> emissions.



#### **City level action from leading cities across the US**



The 25 Cities in the "American Cities Climate Challenge" are on track to collectively reduce emissions by 32% in 2025 (compared with 2005 levels)

Meinshausen, M., Lewis, J., McGlade, C. *et al.* Realization of Paris Agreement pledges may limit warming <sup>38</sup> just below 2 °C. *Nature* **604**, 304–309 (2022); American Cities Climate Challenge



## More efforts are needed to reach targets but some sectors are on track to net zero, with implications for future energy markets



Figure 3.2 Coal, oil and natural gas production in the NZE

- Changes to energy systems in the 2020s and beyond will impact the City of Calgary through both the structure of the local economy and the infrastructure and services needed to serve the local population.
- <sup>39</sup> Bloomberg New Energy Finance; International Energy Agency Net Zero Scenario

Electric car sales share,





## Peter Tertzakian

## **Carbon Mitigation: Who Has Influence?**



#### Annual Oil and Gas Royalties | Historic and Forecast | Alberta Only



Source: ARC Financial, Alberta Government

## ALBERTA ENERGY TRANSITION STUDY



FORESIGHT

Edmonton Global

**Calgary** economic development be part of the energy"

With the support of: Prairies Economic Development Canada Canadä

### SEIZING THE OPPORTUNITY



What is the current ecosystem? How do we compare? How large is the opportunity? Where can we be a leader?

# ARGEIS HO

# ALBERTA'S NET-ZERO OPPORTUNITY



# WHERE CAN WE BEACHER ENDER?

#### SIX SUBSECTORS SET TO SOAR



#### **AG-TECH & AGRICULTURE**

Alberta exports agricultural and food products to more than 150 countries with particular industry expertise in ag-tech innovation to increase yield and improve energy efficiency. Agribusiness sector is forecast to invest \$246 million in digital transformation by 2024.

#### 2,399 **PEOPLE** 2030 EMPLOYMENT

**3%** NET ZERO PATHWAY CAGR

59 COMPANIES

#### **CARBON CAPTURE, UTILIZATION & STORAGE (CCUS)**



Alberta is home to four leading commercial CCUS projects including Alberta Carbon Trunk Line, the world's largest CO, pipeline. It has extensive CCUS infrastructure and a track record of innovation in all aspects of the industry.



#### DIGITALIZATION









13

COMPANIES

Alberta has an opportunity to be a leader in the development

ELECTRIFICATION





4% NET ZERO PATHWAY CAGR

13 COMPANIES

#### **ENERGY EFFICIENCY**



market make Alberta a magnet for investment in industrial process energy efficiency and large-scale, low-carbon heat recovery technologies.

Canada's largest cogen facilities and most competitive HVAC

9.533 PEOPLE 2030 EMPLOYMENT

7% NET ZERO PATHWAY CAGR

#### COMPANIES

#### HYDROGEN PRODUCTION AND UTILIZATION



Home to Canada's first industrial hydrogen hub, Alberta is at the leading edge of hydrogen economy development in the country with an opportunity to be a global leader in the coming decades.



9% NET ZERO PATHWAY CAGR

13 COMPANIES



# VALUE PROPOSITION:

Calgary's key laboratories and test centers are accelerating the pace of commercialization of new ventures, complementing Edmonton's manufacturing and industrial heartland narrative.

Economist's 2019 Global Livability Index ranked Calgary **5th most livable city in the world**. It offers **premium office and industrial space**, a strong complement of support services (IT, engineering, legal) and a **highly integrated transportation and logistics system**.

Calgary is an **entrepreneurial hot spot** in Canada, consistently ranking on Start-up Genome's Emerging Eco-system List. It was ranked **15th overall as a global cleantech market** in the 2021 report with a **strong support network of co-working spaces, accelerator programs and an emerging financing nucleus**.



## **KEY RECOMMENDATIONS**

#### **KEY RECOMMENDATIONS**



#### **KEY RECOMMENDATIONS**



VC'S & INVESTMENT



**FUTURE TALENT** 



**1st CUSTOMERS** 



**STRONG CLIMATE POLICY** 

## THANK YOU.



CHRIS BROWN BDM, ENERGY AND ENVIRONMENT CBROWN@CALGARYECONOMICDEVELOPMENT.COM

**ALBERTA ENERGY TRANSITION STUDY** 



# Momentum and Seriousness

The state of climate action in cities

April, 2021



## >60 cities



The active engagement of local government is essential to any effective response to climate change.





Renewable energy
Non-renewable energy

Carbon Budget



Advance social equity



Protect low-income residents



Improve affordability particularly for vulnerable population



Enhance and strengthen the local economy



Maintain and create good quality local jobs



Improve public health



Contribute to poverty reduction



Create resilient communities and infrastructure

The **spatial configuration** of a community determines its current and future GHG emissions.

The durability of the patterns of built environment and the associated infrastructure results in a phenomenon called **lock-in or path dependence** 



Source: Transit Density: Atlanta, the United States and Western Europe. Bertaud and Richardson, 2004.







**CLIMATE SOLUTIONS** 

# This U.S. city just voted to decarbonize every single building

Following a common council vote, Ithaca, N.Y., is set to be the first city in the country to electrify its buildings with the help of BlocPower



November 3, 2021 at 9:18 p.m. EDT

∩ Listen to article 4 min





ACTING ON CLIMATE TOGETHER



# A Shift



# THANK YOU





## Discussion





Calgary





## **Climate Strategy and Action Plans**



Climate Resilience Strategy

Calgary 2018







Calgary M

#### UPDATE COMING IN 2022

Climate Action Plans must be updated every 5 years, one year ahead of business cycle







Built Infrastructure

Natural Infrastructure



Enabling Actions







Calgary 🚳

#### Calgary's Pathway to Net Zero by 2050


What are our roles in taking climate action?





## THANK YOU