# ENTROPY INC.

Global Leader in Modular Carbon Capture and Storage Solutions August 2021





# WHAT IS ENTROPY?

# **Clean Tech Pure Play**

Dedicated, full-service industrial CCS company with innovative, proprietary post-combustion carbon capture technology



### Expertise

Valuable and unique technical partnerships that create a deep talent pool of experts focussed on economic scaling of CCS technology and project execution



# Technology

Exclusive ownership of world-class solvent, deployed in combination with low-risk, proven process technologies that have been optimized for solvent performance



# Capital

Long-term CCS partner that can deploy at-risk capital in exchange for carbon value

# WHO ARE WE?

### Rare and difficult to reproduce partnership of three leading organizations:

ENERGY LTD. *	<ul> <li>50,000 boepd producer, enterprise</li> <li>Track record of lowest operating of 10+ years experience capturing and 10-house earth sciences profession and qualifying reservoirs for CO<sub>2</sub> second seco</li></ul>
Allardyce Bower <sup>A</sup> B Consulting inc.	<ul> <li>ABC Engineering – significant We</li> <li>Exclusive engineering services pr</li> <li>Experts in process design, modul</li> <li>\$2.5B of projects executed in the AFE amount</li> </ul>
University of Regina Cetri	<ul> <li>Founders of CETRI &amp; Advisors to E Raphael Idem, (SaskPower Clean Paitoon Tontiwachwuthikul</li> <li>Global leaders in CCUS and liquid spawned from Weyburn EOR pro</li> <li>CETRI – one of only a facilities in t testing CCS solvent technology</li> <li>Ownership of next generation, high</li> </ul>

se value >\$1B costs in industry nd sequestering raw inlet CO2 onals with experience in identifying storage

- estern Canadian EPCM
- ovider
- arization and project management
- last decade delivered at 8% under

Entropy - Engineering professors Dr. Energy Research Chair), and Dr.

- l solvents. 30-year research history ject
- he world capable of developing and

gh-performance solvent

# MASSIVE MARKET OPPORTUNITY ACROSS MULTIPLE INDUSTRIES



Notes: (1) Data from Environment and Climate Change Canada's Greenhouse Gas Reporting Program (2019)

# NTRODUCING REVERSE ENTROPY CARBON CAPTURE<sup>TM</sup> (RECC<sup>TM</sup>)

- RECC<sup>™</sup> technology is an accumulation of expertise from decades of experience with amine processes
- Through extensive laboratory testing, Entropy Research and Development has developed novel processes and chemistry required for commercial deployment: Equipment cost reduction
   Minimizing operating costs
   Maximizing recovery efficiency







# **NEW GENERATION OF CARBON CAPTURE SOLVENTS** Secured exclusive rights to a novel class of solvent technology

- Proprietary solvent provides a large cyclic capacity, high stability, and low operational issues
- Demonstrated step-change reduction in energy requirements and circulation rates compared to solvents that are currently available
- Solvent enables process design innovations which drives substantial capital efficiency improvements
- Developed over 25 years of research at the University of Regina's state-of-the-art CETRI facility, one of only a few in the world with full capability of developing and testing CCS solvent technology





# DEEP AQUIFER STORAGE – THE LOCAL SOLUTION IS OFTEN BEST



Much of North America has suitable deep saline geological storage potential for permanent sequestration





Notes:

- (1) Emissions Data from Environment and Climate Change Canada's Greenhouse Gas Reporting Program (2019)
- (2) Saline Aquifer Data from https://edx.netl.doe.gov/geocube/#natcarbviewer

# **REVERSE ENTROPY STORAGE™ (RES™)**

- Decades of experience with acid-gas/carbon dioxide sequestration resulted in the development of RES<sup>™</sup> technology
- Generated >500,000 tonnes of CO<sub>2</sub>e offsets and ~90,000 tonnes of emission performance credits associated with operations at Advantage's Glacier Gas Plant
- Entropy has a "right of access" to an existing sequestration facility allowing Entropy to complete the full-scale commercial CCS project
- Permanent sequestration with sufficient capacity proven by years of injection and monitoring on location
- Additional storage reservoirs established to manage future growth
- This commercial demonstration project is expected to establish RECC<sup>™</sup> and RES<sup>™</sup> as a global leader, and set the stage for a global roll-out



# FIRST COMMERCIAL **PROJECT UNDERWAY: GLACIER GAS PLANT**

400 mmcf/d of Natural Gas Processing Capacity

**Enroute to Blue Natural Gas** 



PHASE 1 (\$27 MILLION INVESTMENT)<sup>(1)</sup> ONSTREAM Q1 2022 TONNES CO2E/YEAR: **46,000** ANNUAL NET OPERATING INCOME (AT \$50/TONNE): \$2.9M

### PHASE 2 (\$49 MILLION INVESTMENT)<sup>(1)</sup> ONSTREAM Q2 2023 TONNES CO2E/YEAR: **136,000** ANNUAL NET OPERATING INCOME (AT \$50/TONNE): \$4.3M BREAK-EVEN CARBON PRICE @ 10% (BCP10): \$60/T\*

Energy input and operating costs are expected to be \$15/tonne

\*Break Even Carbon Price (BCP) is the carbon price required for the life of the project to achieve 10% IRR

(1) Forward-looking information. Refer to Advisory for material assumptions and risk factors.

BREAK-EVEN CARBON PRICE @ 10% (BCP10): \$45/T\*

### **CARBON CAPTURE & STORAGE COSTS** CO<sub>2</sub> Capture

Comparing costs structures of CCS projects has been hampered by limited disclosure from historical projects – and no two projects are the same.



Notes:

- (1) Entropy management estimates for Glacier Phase 1 and Phase 2.
- (2) Source: Alberta Department of Energy 2019 Annual Summary Report (https://open.alberta.ca/publications/guest-carbon-capture-and-storage-project-annual-report-2019); and Shell "The Quest for less CO2: Learning from CCS Implementation in Canada" (https://www.globalccsinstitute.com/archive/hub/publications/196788/guest-less-co2-learning-ccs-implementation-canada.pdf
- (3) Source: Enhance Energy, Wolf Carbon Solutions and North West Redwater Partnership 2019 Knowledge Sharing Report (https://www.nrcan.gc.ca/energy/publications/16233)
- (4) Figures have been derived from the websites referenced above in footnotes (2) and (3), taking into account the formula applied above.
- (5) Forward-looking information. Refer to Advisory for material assumptions and risk factors.

### Geologic Storage Transport

### **Preferred Comparative Metrics**

Capital efficiency (CE) and annual operating cost (Opex) are most readily available to compare projects around the

\$CAPITAL	Onor -	\$Opex
$TCO_2e$ /year	oper -	$TCO_2e$

	<u>CAPITAL (\$M)</u>	OPERATING <u>COST/TCO<sub>2</sub>e (\$)</u>	CO <sub>2</sub> MITIGATED <u>(TCO<sub>2</sub>e/year)</u>
	\$27	\$15.00	46,820
	\$49	\$15.00	135,908
	\$790	\$25.83	1,200,000
ine <sup>(3)(4)</sup>	\$1,200	\$14.22	1,400,000

https://open.alberta.ca/publications/alberta-carbon-trunk-line-project-knowledge-sharing-report-2019 ) : and Government of Canada

# MODULAR CARBON CAPTURE AND STORAGE (MCCS) AT GLACIER

- Capturing flue gas from 11 gas-drive reciprocating compressors and 4 generators (182,000 Tpa)
- ~50,000 HP of lean-burn compression with 5%  $CO_2$  flue gas concentration
- Inlet stream H<sub>2</sub>S of 2500 ppm is precombustion sweetened
- 90% capture efficiency
- Waste-heat integration for improved process efficiency
- Sequestration in existing deep saline aquifer at expected rates of 10 Mmcf/d (99% CO<sub>2</sub>)
- CO<sub>2</sub> revenue via Emission Performance Credits under Alberta's TIER program (2022 price)



# NET OPERATING INCOME (NOI) SENSITIVITY TO CARBON PRICING



(1) Forward-looking information. Refer to Advisory for material assumptions and risk factors

Revenue from carbon tax offsets & credits commercially profitable at \$50/tonne with substantial upside in other jurisdictions

### PROFITABLE

At carbon offset pricing below \$50/tonne<sup>(1)</sup>

## SCALABLE

Suiting Projects as small as 8,000  $TCO_2$ /year with the ability to scaleup to >1M TCO<sub>2</sub>/year

# THE MCCS ADVANTAGE

ENTROPY HEAT CAPTURE REVERSE ENTROPY CARBON CAPTURE **REVERSE ENTROPY STORAGE** 



Notes: (1) Forward-looking information. Refer to Advisory for material assumptions and risk factors.

# VERSATILE

Applicable to most point-source industrial emmision generators

- Power Generation
- Blue Hydrogen
- LNG
- Oil and Gas Processing
- Cement and Steel Production



# LEADERSHIP

# MIKE BELENKIE

### **PRESIDENT & CHIEF EXECUTIVE OFFICER**

Mike is the President and Chief **Operating Officer of Advantage Oil &** Gas Ltd. and has over 20 years of diverse experience in the oil and gas industry. Mike founded and helped lead Modern Resources to become a highly efficient Deep Basin producer which included oversight on all aspects of the corporation. He held roles of increasing responsibility at Painted Pony Energy Ltd. including Vice President of **Reservoir Engineering and Corporate** Development. Mike also held various roles at Talisman Energy within their North American assets, including Team Lead of Montney and Northeast British Columbia. He received his BSc. in Mechanical Engineering from the University of Calgary and is a registered professional engineer with APEGA.

# **CRAIG BLACKWOOD**

### CHIEF FINANCIAL OFFICER

Craig is the Chief Financial Officer of Advantage Oil & Gas Ltd. and has over 25 years of experience in the energy industry. He joined Advantage in November 2004 progressing through positions of increasing responsibility from Director of Finance, Vice President. Finance to Chief Financial Officer. Craig has previously worked with Calpine Canada Natural Gas Company and Calpine Power Income Fund as Controller and Manager, Financial Reporting. He has worked in various financial roles with diverse experience throughout the resource sector. Craig is a graduate of Memorial University of Newfoundland with a Bachelor of Commerce degree and is a member of the Chartered Professional Accountants of Canada (CPA Canada), and the Chartered Professional Accountants of Alberta (CPA Alberta).

# **RICK BOWER**

### CHIEF TECHNOLOGY OFFICER

Rick was the co-founder of Bower Damberger Rolseth Engineering (BDR) and was responsible for the design and installation of over 4000 facilities over the 22 years he was involved in the corporation. BDR Engineering was a leader in innovative engineering design, modular construction, plant troubleshooting and operational improvement. In addition, Rick developed a reputation for innovative design and utilized his knowledge, along with the extensive operation knowledge of the people he worked with, to optimize facility operations. The design and operation of many Renaissance Energy facilities are examples of his work. Rick's expertise lies in maximizing the efficiency and recoveries from existing facilities, particularly from older plants where recent attention has not been paid to these issues. Rick and Brent Allardyce ioined forces and started ABC engineering to utilize his skillset along with Brent's to provide engineering knowhow and project management to the energy sector.

### **BRENT ALLARDYCE**

### **BOARD MEMBER**

Brent began in the refrigeration industry in the mid 70's and then spent several years at Petro-Canada in process and refrigeration before utilizing his experience to develop Startec Refrigeration into one of the premier refrigeration companies in Western Canada. He then started Thermocarb Engineering Ltd. which provides refrigeration and process engineering to all facets of refrigeration from gas processing to municipal arenas. Chief Engineer and General Manager of Startec Refrigeration for sixteen years, Brent designed and installed hundreds of refrigeration systems from small single stage reciprocating units to several thousand horsepower systems for large gas plants and meat packing installations. Together with Rick Bower he founded Allardyce Bower Consulting Inc (ABC) to utilize his knowledge and abilities to provide innovative solutions to energy projects. Brent now primarily concentrates his efforts on providing project management expertise to various clients. His commitment to leading quality projects had made him a pioneer in leading and organizing large scale projects from conception through to completion.

# **ADVISORY**

All dollars and currency references in this presentation are in Canadian dollars, unless otherwise indicated.

### Forward Looking Information and Statements

The information in this presentation contains certain forward-looking information and forward-looking statements (collectively, "forward-looking statements") within the meaning of applicable securities laws relating to Entropy's (the "Corporation") plans and other aspects of its anticipated future operations, management focus, strategies, financial, operating and production results and business opportunities. These statements relate to future events or our future intentions or performance. All statements other than statements of historical fact may be forward-looking statements. The statements have been prepared by management to provide an outlook of the Corporation's activities and results and may not be appropriate for other purposes. Forward-looking statements are often, but not always, identified by the use of words such as "seek", "anticipate", "plan", "continue", "estimate", "guidance", "demonstrate", "expect", "may", "can", "will", "project", "predict", "potential", "target", "objectives", "intend", "could", "might", "should", "believe", "would" and similar expressions and include statements relating to, among other things, Entropy's position, strategy and development and deployment plans and the benefits to be derived therefrom; the Cos technology, that projects developed by Entropy will be profitable; the anticipated benefits from the Glacier Gas Plant Phase 1 and Phase 2 project, including the expected sources of funding; anticipated timing of completion and onstream dates for the Glacier Gas Plant Phase 1 and Phase 2 project; and that a new proprietary novel carbon capture and results on operating costs, reduction in fuel costs and process costs, and internal rates of return from the Glacier Gas Plant Phase 1 and Phase 2 project; and that a new proprietary novel carbon capture solvent will provide a large cyclic capacity, high stability and lower operational issues. Entropy's actual decisions, activities, results, performance or achievement could differ materially from those expressed in, or implied

With respect to the forward-looking statements contained in this presentation, Entropy has made a number of material assumptions regarding, but not limited to: conditions in general economic and financial markets; effects of regulation by governmental agencies; receipt of partner, regulatory and community approvals; current and future carbon prices and royalty regimes; future exchange rates; future operating costs; availability of skilled labor; availability of equipment; timing and amount of net capital expenditures; the impact of increasing competition; the price of and market for carbon credits and offsets; that Entropy will have sufficient cash flow, debt or equity sources or other financial resources required to fund its capital and operating expenditures and requirements as needed; that Entropy's conduct and results of operations will be consistent with its expectations; that Entropy will have the ability to develop projects in the manner currently contemplated; current or, where applicable, assumed industry conditions, laws and regulations will continue in effect or as anticipated; the impact of improving technologies; the performance of the new proprietary novel carbon capture solvent; that Entropy will continue to have a right of access to an existing sequestration facility for the Glacier Gas Plant project; and that the estimates of Entropy's cost structure and the assumptions related thereto are accurate in all material respects.

Management has included the summary of assumptions and risks related to forward-looking information in order to provide shareholders with a more complete perspective on Entropy's future operations and such information may not be appropriate for other purposes. Entropy's actual results, performance or achievement could differ materially from those expressed in, or implied by, these forward-looking statements and, accordingly, no assurance can be given that any of the events anticipated by the forward-looking statements will transpire or occur, or if any of them do so, what benefits that Entropy will derive therefrom. Readers are cautioned that the foregoing lists of factors are not exhaustive. The Corporation and management believe that the statements have been prepared on a reasonable basis, reflecting management's best estimates and judgments. However, because this information is highly subjective and subject to numerous risks including the risks discussed above, it should not be relied on as necessarily indicative of future results. These forward-looking statements are made as of the date of this presentation and Entropy disclaims any intent or obligation to update publicly any forward-looking statements, whether as a result of new information, future events or results or otherwise, other than as required by applicable securities laws.

These statements involve substantial known and unknown risks and uncertainties, certain of which are beyond Entropy's control, including, but not limited to: conditions in general economic and financial markets; effects of regulation by governmental agencies; current and future carbon prices and royalty regimes; future exchange rates; future operating costs and internal rates of return; availability of skilled labor; availability of equipment; timing and amount of net capital expenditures; the impact of increasing competition; the price of and market for carbon credits and offsets; that Entropy will have sufficient cash flow, debt or equity sources or other financial resources required to fund its capital and operating expenditures and requirements as needed; that Entropy's conduct and results of operations, laws and regulations will continue in effect or as anticipated; the estimates of Entropy's cost structure and the assumptions related thereto are accurate in all material respects; Entropy's ability to obtain patents for its technology; the performance of the new proprietary novel carbon capture solvent; and the anticipated amount of carbon dioxide captured, stored and offset is consistent with expectations.