

**ALBERTA'S INDUSTRIAL
HEARTLAND ASSOCIATION**
艾伯塔省核心区工业园协会
**2019 China Petroleum and
Chemical International
Conference**
2019中国石油化工国际会议
Hangzhou, China
中国杭州
September 19th, 2019
2019年9月19日

ALBERTA'S INDUSTRIAL HEARTLAND ASSOCIATION 艾伯特省核心区工业园协会



Alberta's Industrial Heartland (AIH) is guided by a non-profit association of municipalities dedicated to sustainable eco-industrial development.

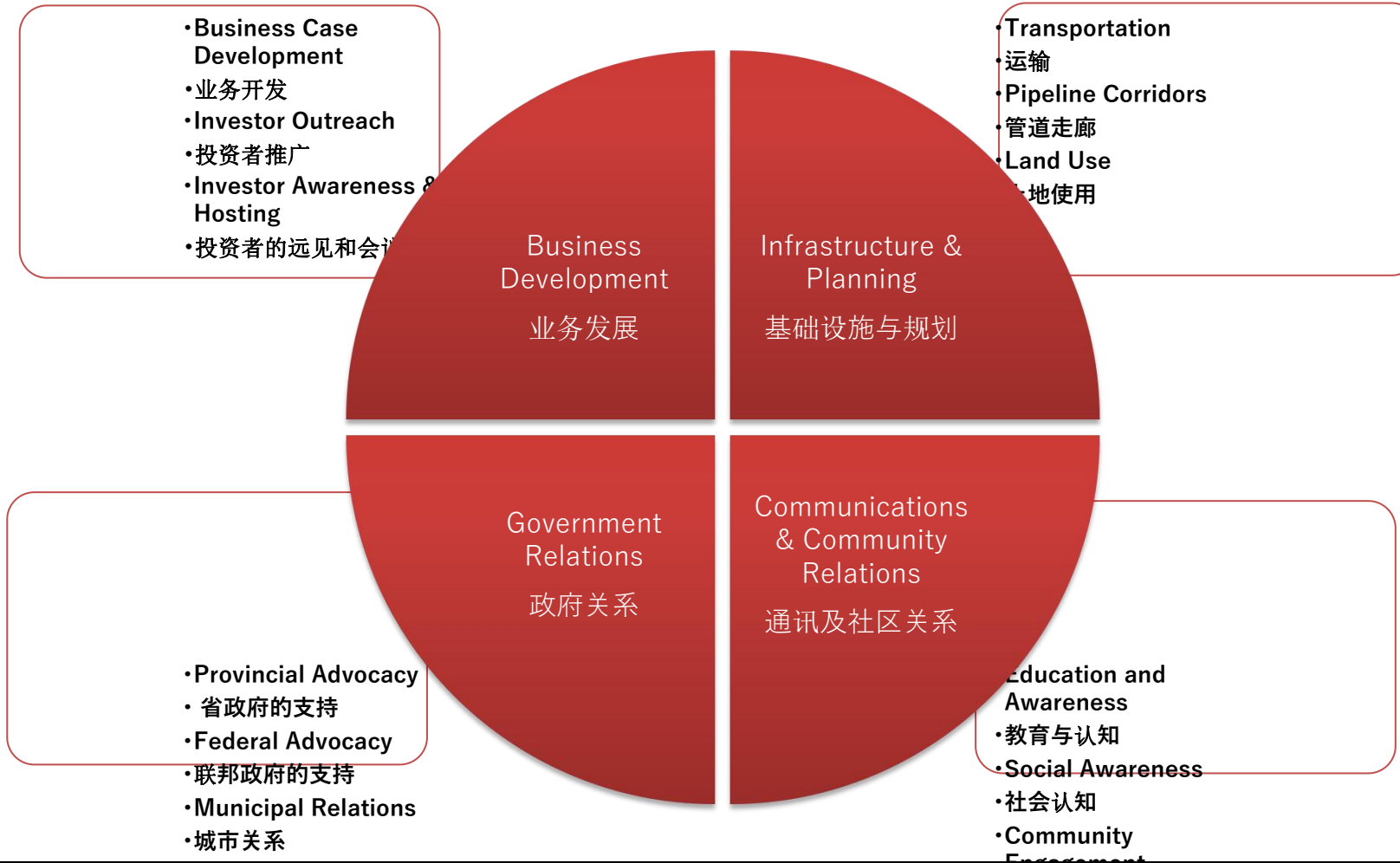
艾伯特省工业核心区（AIH）直接受非营利性市政协会领导，主要致力于可持续生态工业发展。

Alberta's Industrial Heartland Association is a collaborative 20-year partnership of five municipalities and three associate members.

艾伯特省核心区工业园协会由5个市级和3个协会成员组成，至今已运行20年。

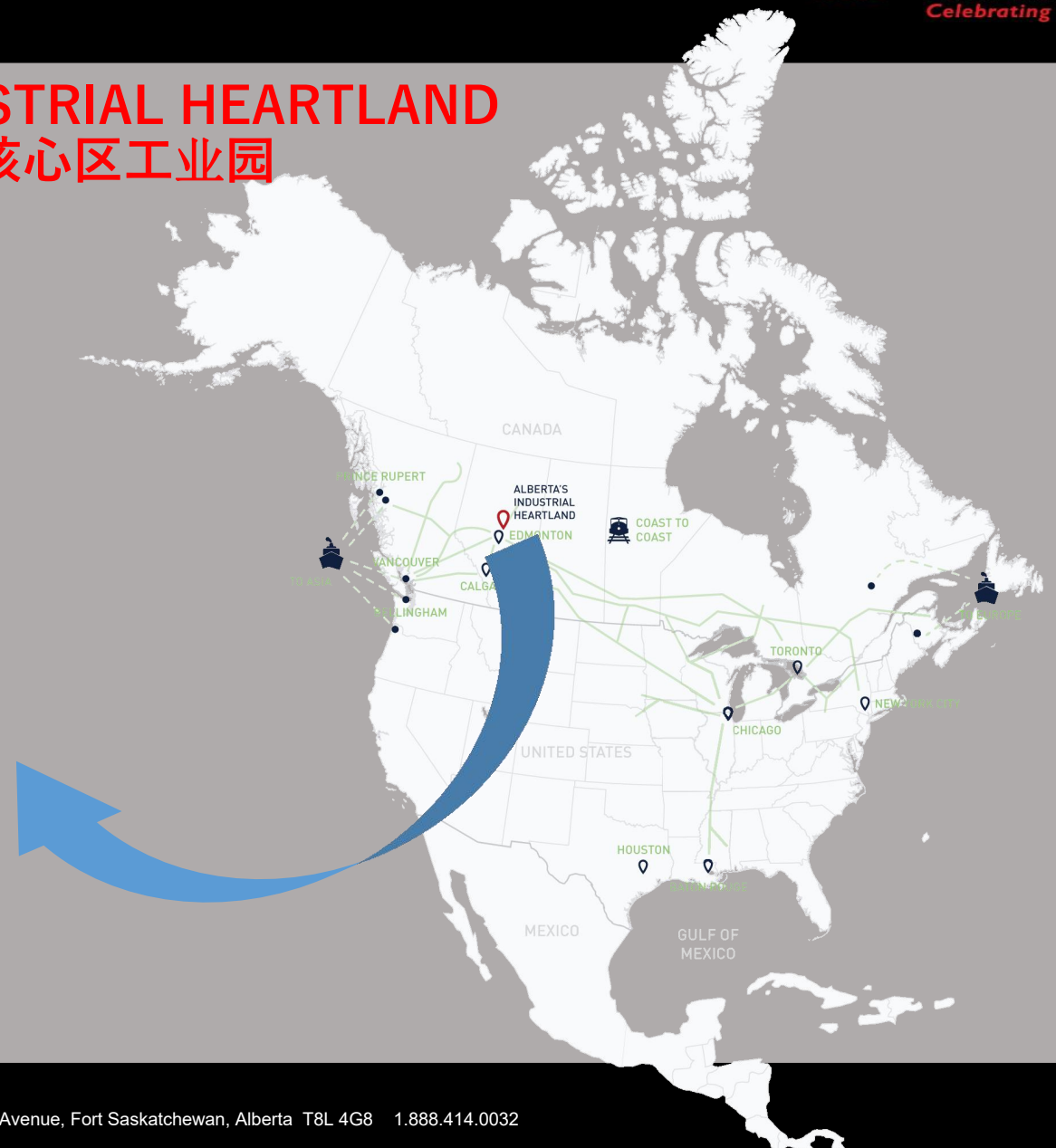
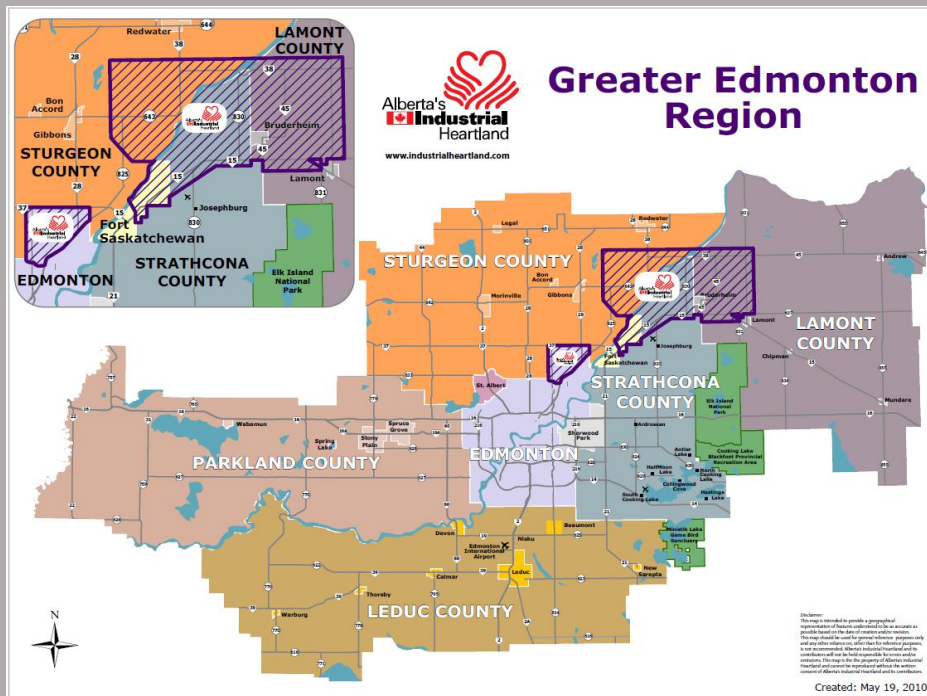


WHAT WE DO 我们的职责



ALBERTA'S INDUSTRIAL HEARTLAND

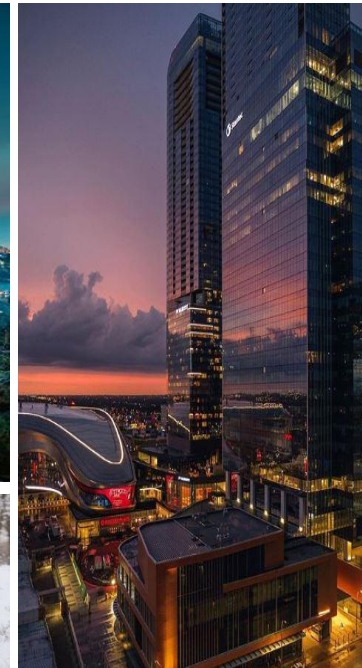
艾伯塔省核心区工业园



GREATER EDMONTON REGION 大埃德蒙顿地区

AIH is part of the Greater Edmonton Region, the 5th largest population center in Canada
AIH是大埃德蒙顿地区的一部分，加拿大第五大人口中心。

- Population of 1.3 million people 地区内拥有130万人口
- Capital city of Alberta 艾伯塔省首府
- Second fastest growing region in Canada 加拿大增长速度第二的地区
- World-class post-secondary: 世界级的高等教育资源
 - University of Alberta 艾伯塔大学
 - Northern Alberta Institute of Technology 北艾伯塔理工学院
- Skilled workforce with experience building world-scale industrial facilities 拥有建造世界级工业设施经验的熟练工人
- Established modular construction and transportation industry; over 25 fabrication yards in region 模块化建筑和交通运输业的构建;区域内超过25个制造工厂
- One of the youngest labour markets in Canada 加拿大最年轻的劳动力市场之一



ALBERTA'S INDUSTRIAL HEARTLAND AIH的优势特点

- ✓ Canada's largest refining and petrochemical hub 加拿大最大的炼油和石化中心
- ✓ Close proximity to world-class, cost-advantaged, oil and gas feed stocks 接近世界级且成本优势明显的油气原料
- ✓ Lowest average operating costs in North America 北美最低的平均运营成本
- ✓ Hub for major oil, gas, and NGL delivery systems 主要石油、天然气和NGL输送系统的枢纽
- ✓ Western Canada's NGL processing hub 加拿大西部NGL加工中心
- ✓ Established industrial gas and utility networks 完善的工业用气和公用工程网络
- ✓ Two Class-1 transcontinental railroads – market access 两条一级横贯大陆的铁路——连接市场
- ✓ Established energy processing cluster – synergies 完善的能源加工集中地——协同效应
- ✓ Community support for development 本地社区对化工及工业项目的正面支持
- ✓ Pre-zoned heavy industrial land – reduced regulatory complexity 预先划定的重工业用地——降低了项目审批和监管的复杂性
- ✓ Skilled workforce located in the area – no need for work camps 本地居民即为高水平技术工人来源——不需要工作营地
- ✓ Heavy haul access supporting modular construction – lowers capex 支持模块化建设的重载通道降低了资本支出
- ✓ World-class companies active in AIH 跨国公司在AIH积极的进行投资





Nutrien

 **TC Energy**



MEGlobal



 **HEXION™**



 **Interpipeline**

CANADA KUWAIT
PETROCHEMICAL CORPORATION

AIR PRODUCTS 

AUX SABLE

Imperial Oil



cenovus
ENERGY



PRAXAIR
Making our planet more productive.



ATCO



sherritt

EXISTING INDUSTRY / PRODUCTS 现有产业/产品



Midstream & Utilities 中游&公用工程

- NGL fractionation – 485 Kbpd
天然气凝析液分馏装置——48.5万桶/天
- Salt cavern storage - over 40 caverns
地下盐储库-超过40个盐穴
- Oil, natural gas, and NGL pipelines
完善的石油、天然气和天然气凝析液管道系统
- Water and industrial gas systems
水和工业气体系统
- CO₂ capture and pipelines
二氧化碳收集和管道



Downstream Gas & NGL 下游气体&天然气凝析液

- Ethylene – 1,300 KTA 130万吨/年乙烯
- Polyethylene – 850 KTA 85万吨/年聚乙烯
- Polymer-grade propylene – 115 KTA 11.5万吨/年聚合级丙烯
- MEG/EO/EG– 800 KTA —80万吨/年乙二醇/环氧乙烷/乙二醇
- Iso-octane – 521 KTA 52.1万吨/年异辛烷
- Styrene monomer – 450 KTA 45万吨/年苯乙烯单体
- Urea – 1,400 KTA 140万吨/年尿素
- Ammonium sulphate – 355 KTA 35.5万吨/年硫酸铵
- Ammonia – 376 KTA 37.6万吨/年合成氨



Other 其他

- High-purity nickel & cobalt – 39 KTA
3.9万吨/年高纯度镍钴合金
- Nickel based composite powders
镍基复合粉末
- Cobalt powders 钴粉
- Hydrogen peroxide 双氧水
- Prilled sulfur 硫磺造粒设施

Downstream Oil 原油下游炼油行业

- Refining – 447 Kbpd
44.7万桶/天炼油能力
- Bitumen upgrading – 270 Kbpd
27万桶/日沥青升级
- Benzene – 370 KTA
37万吨/年苯
- Aromatics
芳烃

MAJOR PROJECTS IN AIH

AIH的主要项目



North West Redwater Partnership - Sturgeon Refinery 西北红水合作伙伴——斯特炼油厂

- First greenfield refinery built in North America since the 1970's
20世纪70年代北美建设的第一个平地起炼油厂
- 50,000 bpd of ultra low sulphur diesel, with potential to expand to 150,000 bpd
超低硫柴油日产量5万桶，有扩大至15万桶/日的潜力
- 50/50 JV between North West Refining and CNRL
西北炼油与CNRL的合资企业，两家股份各占50%



Inter Pipeline – Heartland Petrochemical Complex - PDH/PP 英特尔管道—工业园 PDH / PP装置

- Positive FID December 2017 2017年12月
- 525 KTA PDH/PP Facility 52.5 万吨/年 PDH/PP装置
- Locally sourced propane from upgrader 'off gas' and natural gas production
来自当地升级天然气和天然气生产的丙烷



Canada Kuwait Petrochemical Corporation – PDH/PP 加拿大科威特石油化工公司——PDH/PP

- Positive FID February 2019 2019年2月
- 550 KTA PDH/PP Facility 55万吨/年 PDH/PP装置
- 50/50 JV between Pembina and Petrochemical Industries Company (P.I.C.)
与石化工业公司(P.I.C.)成立的合资企业，各占一半股份。



Enhance Energy & Wolf Carbon Solutions – Alberta Carbon Trunk Line

Enhance Energy&沃尔夫碳解决方案项目——Alberta Carbon Trunk Line

- Positive FID mid-2018 2018年中
- 240-kilometere pipeline collecting and transporting CO₂ from AIH to central-Alberta for enhanced oil recovery (EOR)
从AIH到阿尔伯塔中部有240公里管道收集和运输二氧化碳，以提高石油采收率(EOR)
- Partnership between Enhance Energy and Wolf Midstream
Enhance Energy与沃尔夫两家公司的伙伴关系

Rail Transportation 铁路运输

- AIHA energy and chemical producers are served by two Class 1 Transcontinental Railroads; Canadian National Railway (CN) and Canadian Pacific Railway (CP)

AIHA能源和化学生产商由两条横贯大陆的一级铁路提供服务;加拿大国家铁路(CN)和加拿大太平洋铁路(CP)

- CN and CP represent more than 95% of Canada's annual railway traffic

CN和CP占加拿大铁路年交通量的95%以上



Western Canadian natural gas plays are world-scale, world-class, and competitive with other North American gas plays

加拿大西部的天然气具有世界规模、世界一流水平，与北美其他地区的天然气相比具有竞争力

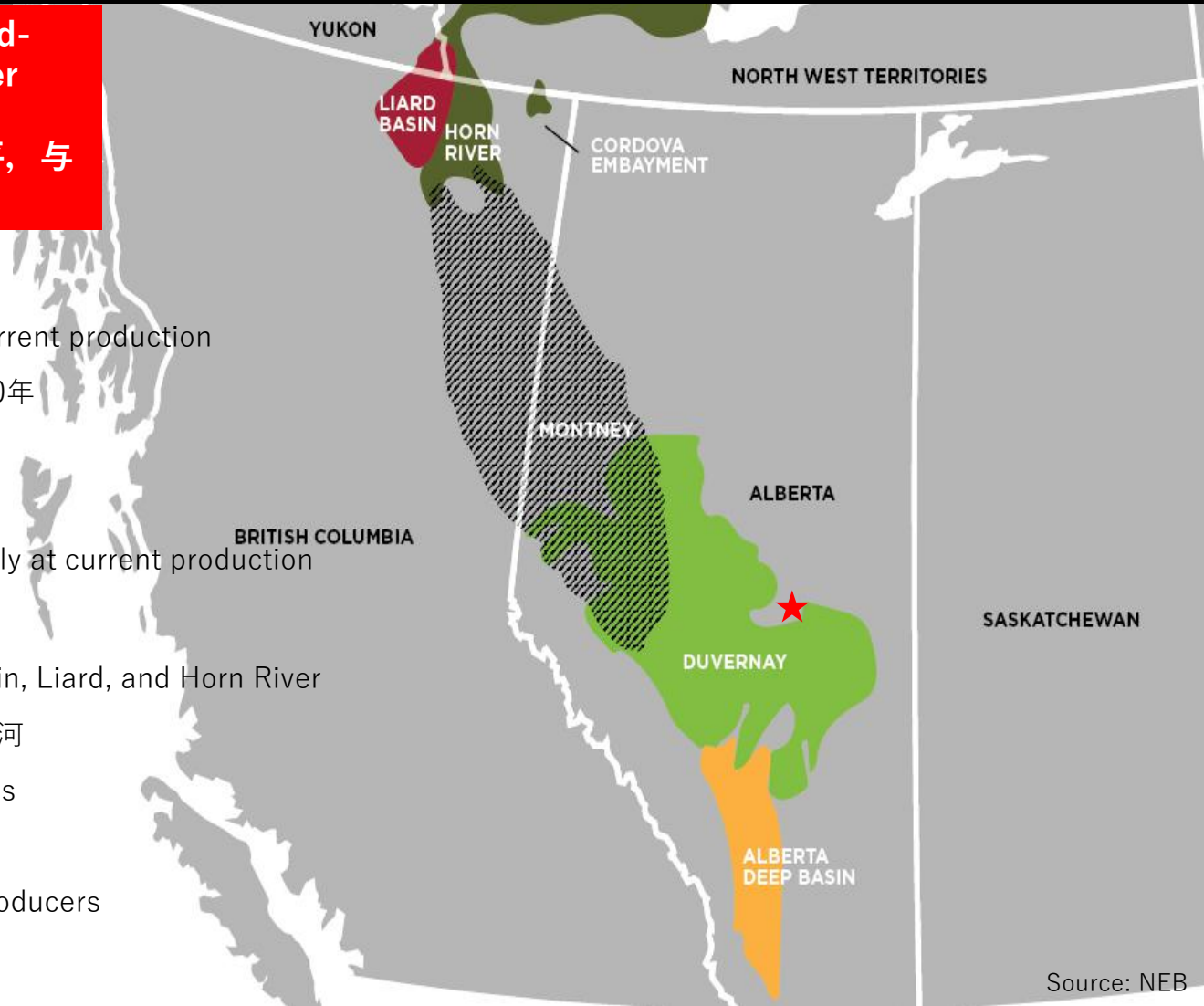
Immense natural gas reserves: 巨大的天然气储量：

- 1,128 Tcf of natural gas; over 200 years supply at current production
1,128万亿立方英尺的天然气;按目前产量能供应超过200年
- 24.8 billion barrels of NGL
248亿桶NGL
- 8.7 billion barrels of propane; over 100 years of supply at current production
87亿桶丙烷；按目前产量供应超过100年

Major plays include the Montney, Duvernay, Deep Basin, Liard, and Horn River

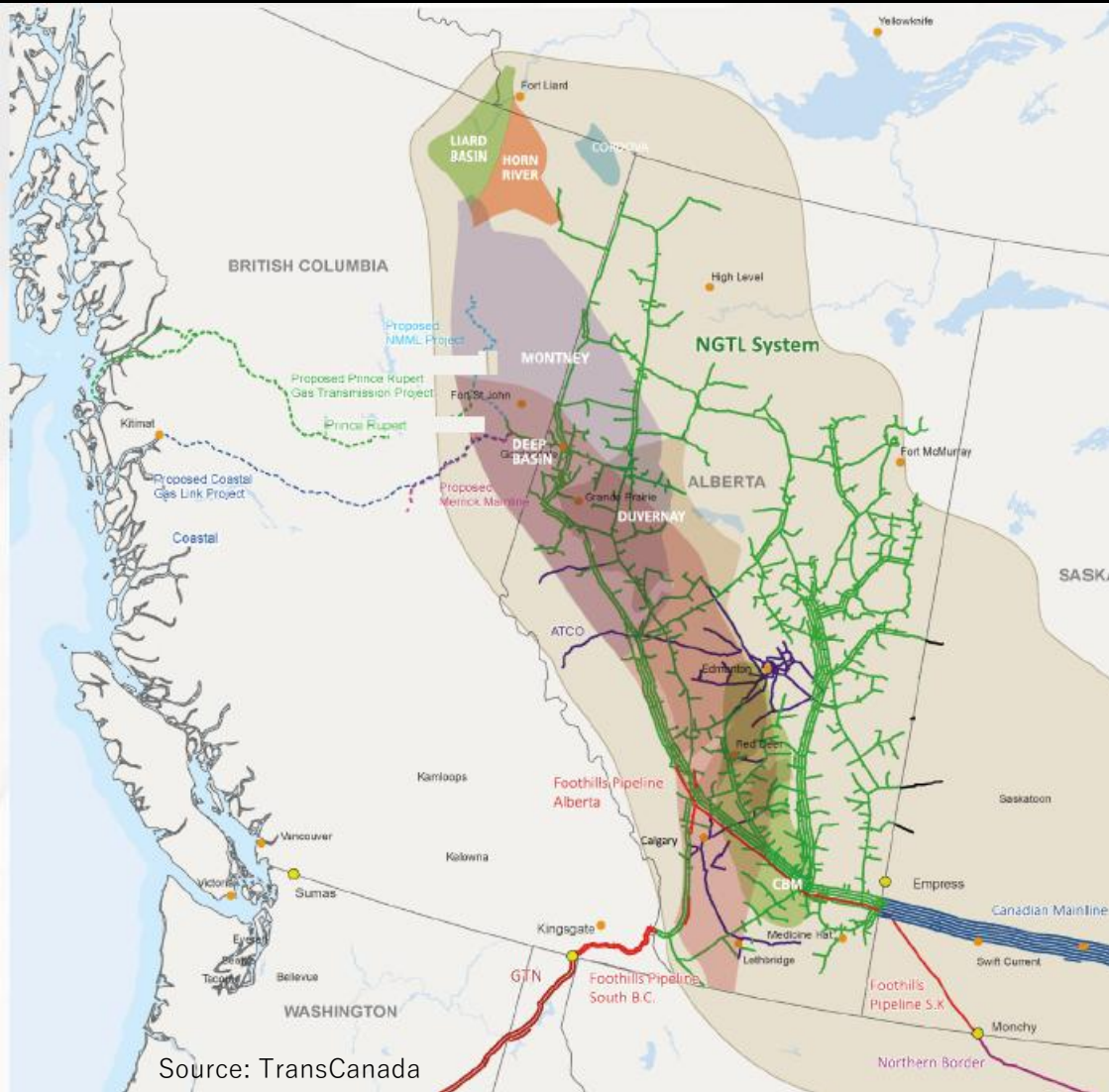
主要油藏包括蒙特尼、杜威内、深水盆地、利亚德和霍恩河

- Producers target condensate and light oil formations
生产商的目标是凝析油和轻油层
- Higher NGL content delivers higher netbacks for producers
更高的NGL含量为生产者提供了更高的净回报



Source: NEB

Established Natural Gas Infrastructure 完善的天然气基础设施



Western Canada has an established network of pipeline infrastructure delivering natural gas across North America. TransCanada's NGTL system is the primary gas delivery system in Alberta:加拿大西部已建立起横跨北美的天然气输送管道基础设施网络。横加公司NGTL系统是阿尔伯塔省的主要天然气输送系统

- NGTL Commenced operations in 1957
NGTL于1957年开始运转
- Over 33,000 km of pipeline and auxiliary infrastructure
超过3.3万公里的管道和辅助基础设施
- Over 1,000 receipt points and 400 delivery points
超过1000个收货点和400个送货点
- Regulated by the National Energy Board
由国家能源局监管
- Transports approximately 75% of WCSB production
约75%的WCSB产品由其运输
- Currently undergoing a \$9.1 billion expansion program
目前正在进行一项91亿美元的扩产计划
- NIT trading hub – trades 6-7x physical volume
NIT交易中心交易为实际交易量为6-7倍

Chemical Opportunities 化工项目的机会



In 2018, AIHA engaged IHS Markit to update a study evaluating relative attractiveness of various chemical projects in AIH

2018年，AIHA聘请IHS Markit更新了一项评估AIH各种化学项目相对吸引力的研究

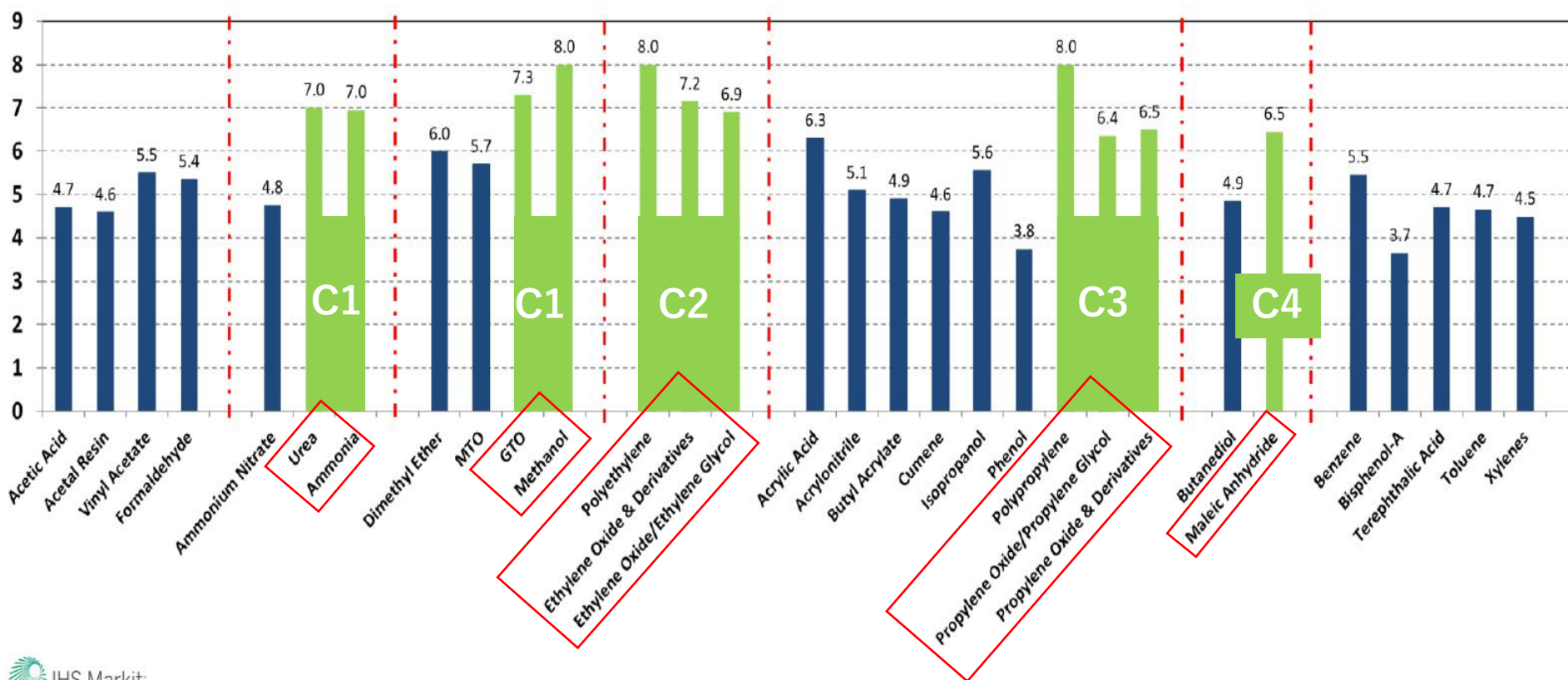
The opportunity for various chemical product production in AIH were ranked based on the following criteria:

根据以下标准，对AIH生产各种化工产品的机会进行了排名：

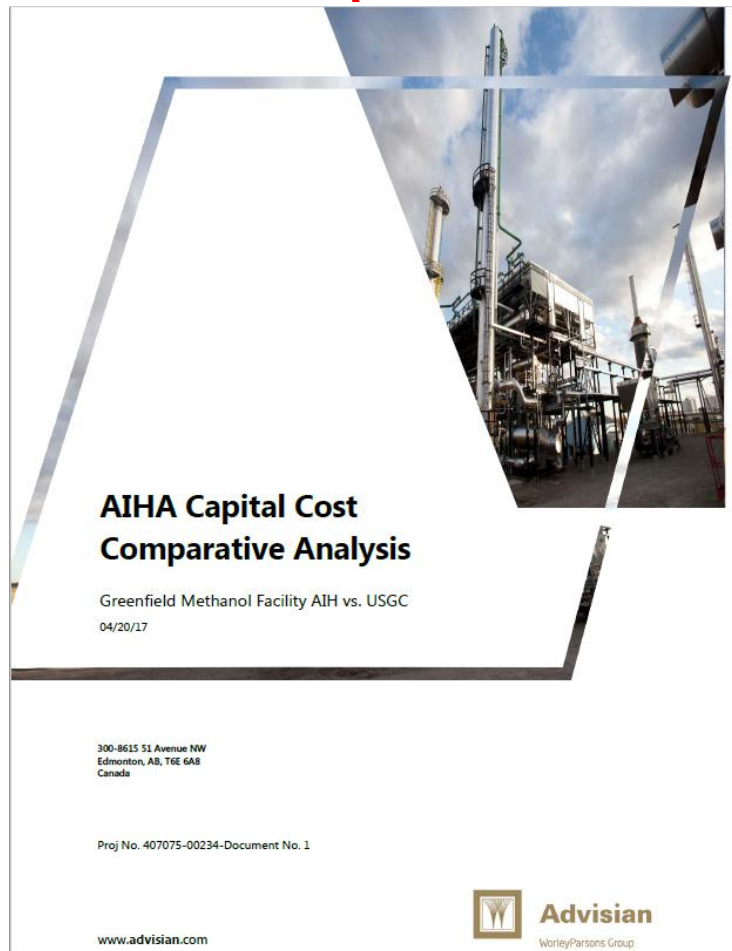
- Value Chain – 10% 价值链——10%
- Derivative market outlook – 40% 衍生品市场前景——40%
- Feedstock 25% 原料——25%
- Operations – 15% 运营——15%
- Technology – 5% 技术——5%
- Financing – 5% 融资——5%

Chemical Opportunities 化工良机

Derivative Ranking Results



Capital Costs in Alberta 艾塔省资金成本



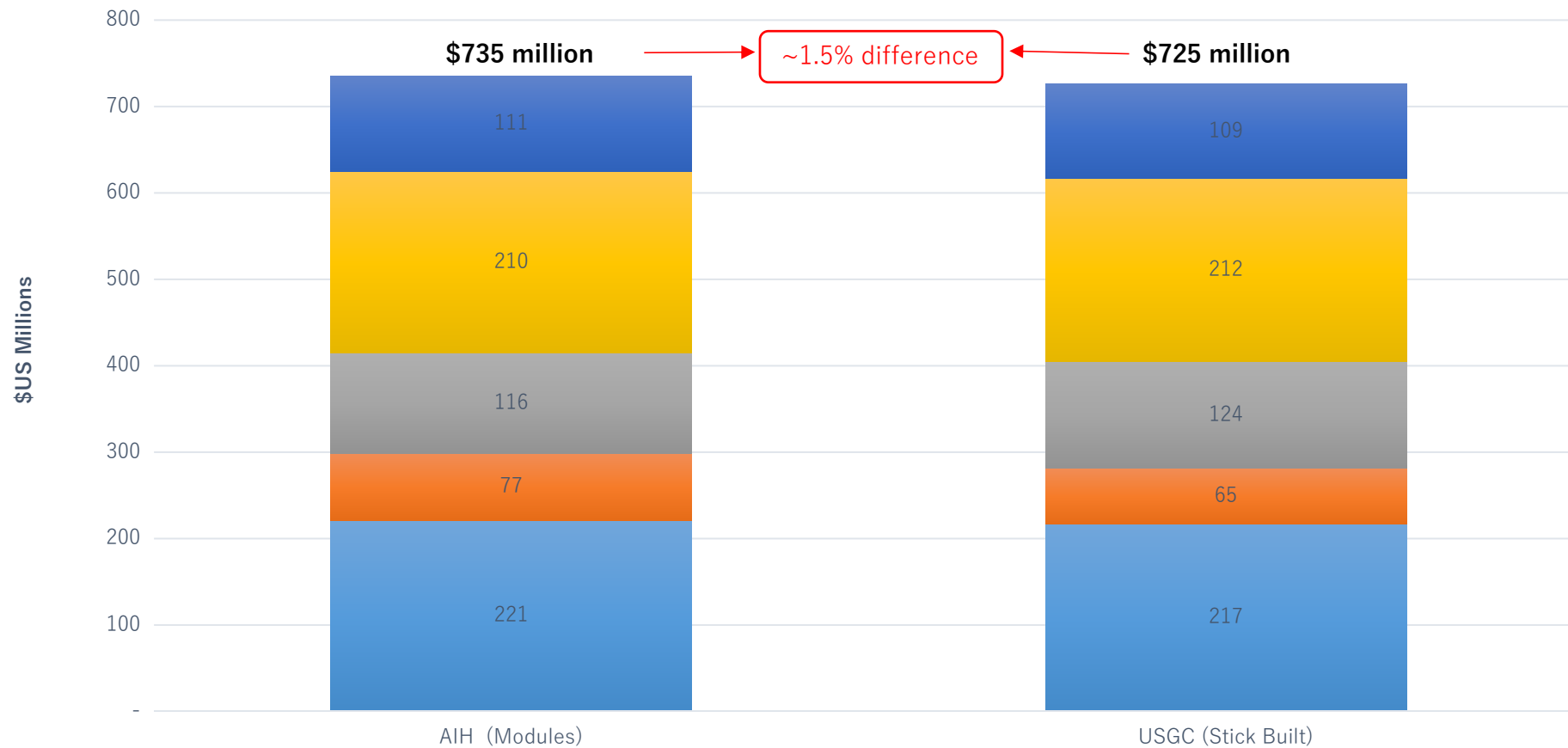
In 2016, AIHA engaged Advisian (WorleyParsons) to undertake a study to examine the capital costs for developing chemical projects in Alberta relative to the USGC

2016年，AIHA聘请Advisian (WorleyParsons)进行了一项研究，考察相对于USGC，艾伯塔省开发化工项目的资本成本

- Scope: Methanol Plant 范围：甲醇厂
- Capacity: 1 MTPY 产能：100万吨/年
- Locations: 位置：
 - Greenfield, USGC 格林菲尔德，USGC
 - Greenfield, Alberta Industrial Heartland 格林菲尔德，艾伯塔核心区工业园
- ACCEI Classification: Class 4 ($\pm 30\%$) ACCEI分类:第4类(30%)
- Pricing Validity: Q2 2017 定价有效期:2017年第二季度
- Currency: US Dollar 货币:美元
- Technology: Two-step reforming 技术:两步革新
- Contracting Execution: EPC 合同执行:EPC

Capital Costs in Alberta

化工装置建设在艾塔省资金投入和每周其他地区对比



■ Material
 ■ Labour
 ■ Indirect
 ■ Non-field
 ■ Contingency

Transportation Costs 向美洲和太平洋市场的运输成本



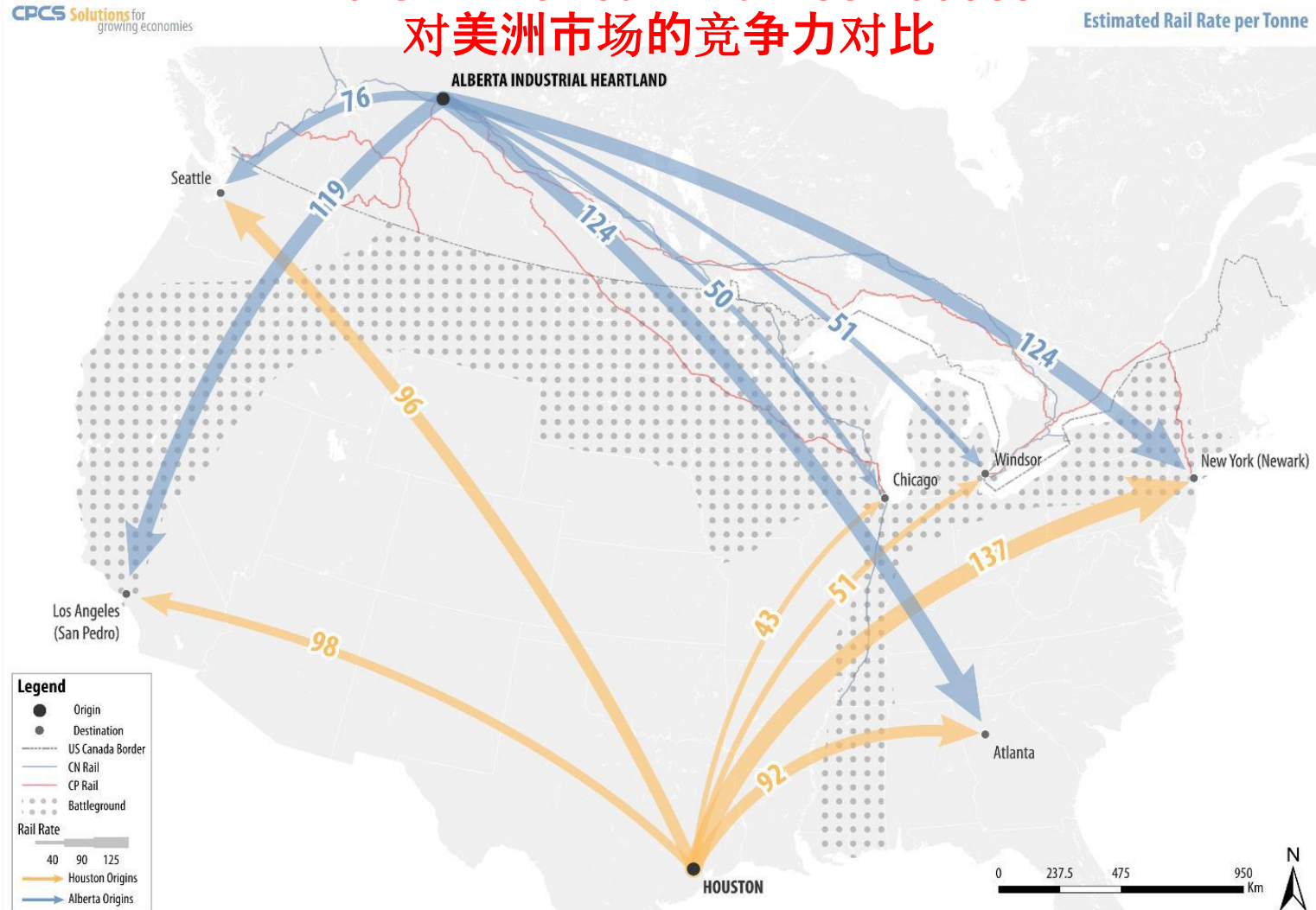
AIHA engaged CPCS Transcom Limited (CPCS) to carry out a comparative study of the costs of moving petrochemical products from production locations in Alberta to market, versus other competing regions in North America and Nationally.

AIHA聘请CPCS Transcom Limited (CPCS)对将石化产品从阿尔伯塔省的生产地点转移到市场的成本与北美和全国其他竞争地区的成本进行了比较研究。

- Completion date: H1, 2016
完成日期:2016年1月1日
- Key comparisons:
- 关键的比较
 - Alberta vs USGC into North America
艾伯塔省 vs USGC, 产品进入北美
 - Alberta vs USGC into Asia
艾伯塔省 vs USGC, 产品进入亚洲

North American Market Access

对美洲市场的竞争力对比



West Coast Market Access 西海岸市场通道

AIH has competitive access to key west coast ports through CN and CP:

AIH通过CN和CP能够具有竞争力地进入西海岸的主要港口：

- Port of Vancouver 温哥华港
- Port of Prince Rupert 鲁伯特王子港

Vopak Development Canada is currently developing a new bulk liquids storage facility in Prince Rupert:

加拿大孚宝开发公司目前正在鲁伯特王子港开发一个新的散装液体储存设施

- Start of operations: 2022, subject to FID
开始运营：2022年，受FID约束

▪ Key products:

主要产品

- LPG 液化石油气
- Clean Petroleum Products 清洁石油产品
- Methanol 甲醇



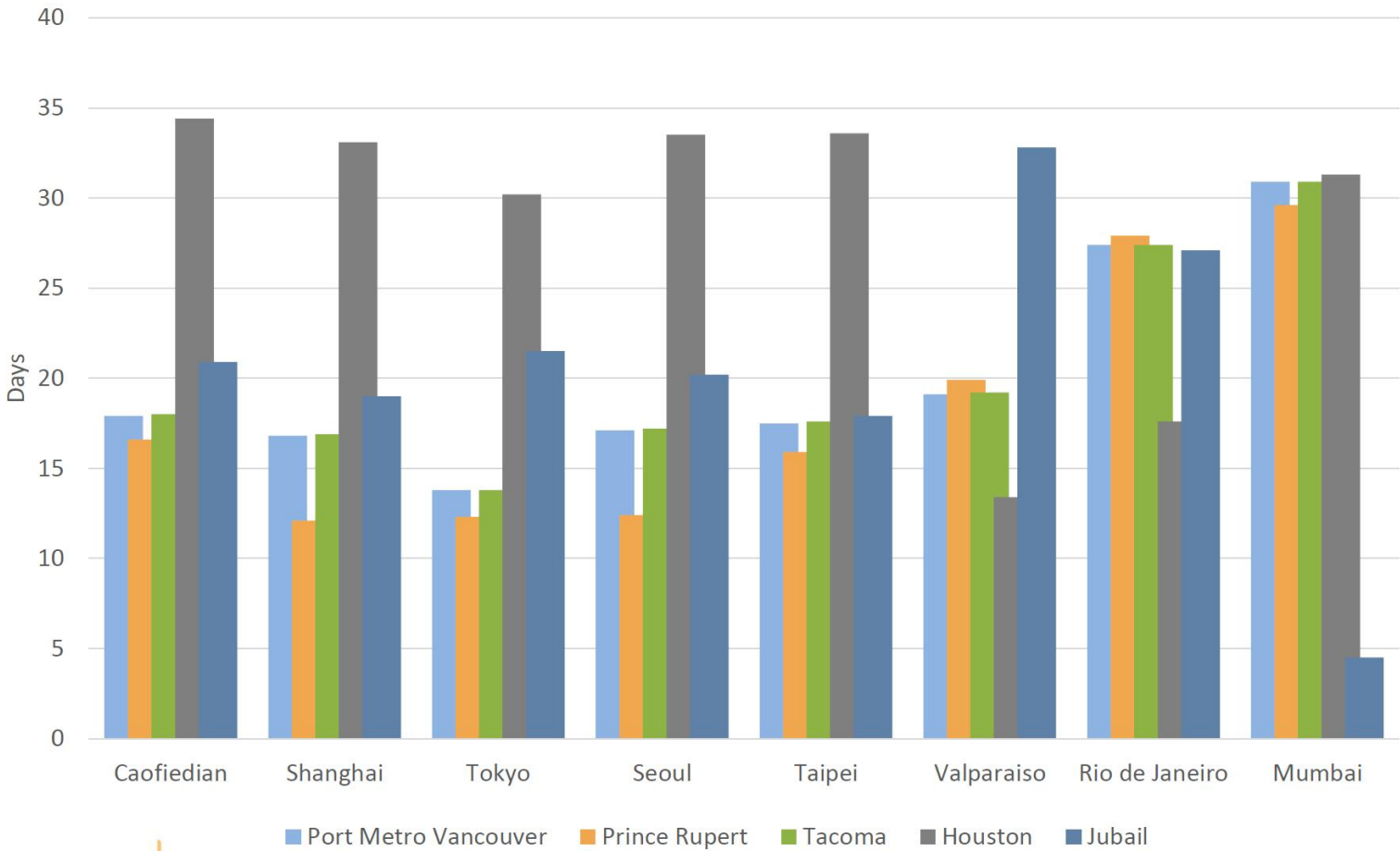
Comparative Container Shipping Transit Times (Days) 集装箱运输中转时间比较 (天)

Destination / Origin	West Coast Ports**	Houston	Jubail
Northeast Asia	19-24	28-33	19-35*
Southeast Asia	25-29	36-41	20-30*
India	37-44*	37-44*	11-20*
Brazil	55-62*	36-43*	45-52*
Chile	57-65*	34-39*	60-61*

Source: CPCS analysis from carrier specific schedules. *Indicates at least one transshipment. ** West Coast Ports is representative of the Canadian and PNW ports, as containerhips will call in Canada either before or after the PNW ports.

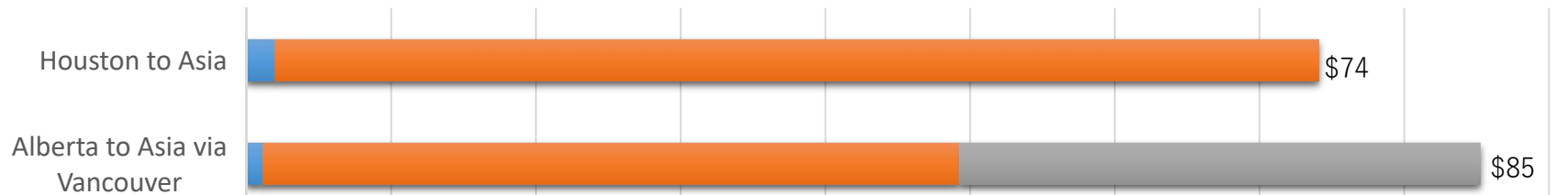
Comparative Bulk Shipping Transit Times (Days)

散货运输中转时间比较(天)

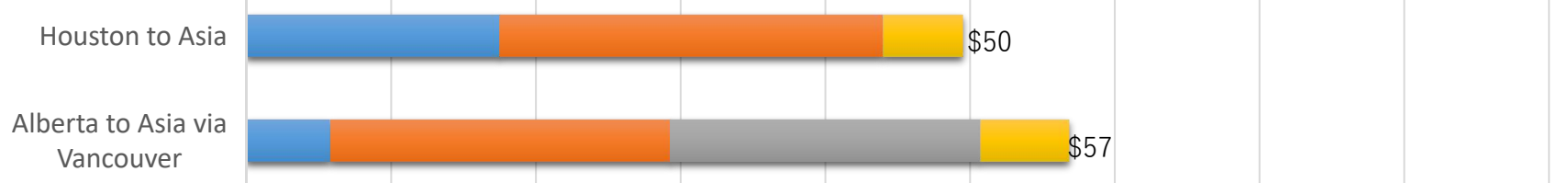


Marine Transportation Costs 海运运输成本

Liquid Products 液体产品



Container Products 集装箱产品



\$US/MT



■ Port Costs*
 ■ Marine
 ■ Rail
 ■ Truck Drayage

*Based on 30,000 DWT Tankers (Pilotage, Tugs, Line handling, Wharfage, Ship Agency Fee, PMV Dues)

Transportation Costs – Summary 运输成本——结论

- Products from Alberta's Industrial Heartland can be competitively transported into Eastern Canada, North Eastern United States, Midwest and Pacific North West
艾伯塔省核心区工业园的产品可以有竞争力地运往加拿大东部、美国东北部、中西部和西北太平洋地区
- Liquids and solids products from Alberta's Industrial Heartland are competitive accessing global markets in China, Northeast Asia and the West Coast of the Americas
来自艾伯塔省核心区工业园的液体和固体产品在进入中国、东北亚和美洲西海岸的全球市场方面具有竞争力



AIH Investment Opportunity Summary AIH投资机会总结

- Global competitive advantage is based on cost advantaged natural gas and natural gas liquids – fuel and feedstocks
全球竞争优势是建立在天然气和天然气液体燃料及原料成本优势的基础上
 - Methane 甲烷
 - Ethane 乙烷
 - Propane 丙烷
 - Butane 丁烷
- Capital costs in Alberta's Industrial Heartland are competitive with competing North American Jurisdictions
艾伯塔省工业中心地带的资本成本与北美司法管辖区的竞争相当
- Transportation costs and time provide advantage access into major North American, Chinese and North East Asian Markets
在进入北美、中国和东北亚主要市场的运输成本和时间具有优势



THANK YOU

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