



Evaluate methane pyrolysis as a low-emission fuel pathway.

info@ekonapower.com

Low-Emission Fuel for Industrial Heat

A LOWER-EMISSION FUEL OPTION FOR INDUSTRIAL HEAT APPLICATIONS, INCLUDING CEMENT AND LIME KILNS, GLASS FURNACES, STEEL REHEATING AND FORGING, AND CHEMICAL PROCESS HEATERS

Industrial heat is primarily generated through the combustion of gaseous, liquid, and solid hydrocarbon fuels. Natural gas is the dominant fuel in developed economies and the most widely used gaseous source for industrial heat.

Combustion of these fuels results in varying levels of greenhouse gas emissions. A direct pathway to reducing GHG-emissions intensity is to remove carbon from the fuel before combustion, producing a hydrogen-rich synthetic gas (syngas) stream composed primarily of hydrogen, with some methane and residual carbon monoxide. This gas can be used directly as a lower-emission fuel or upgraded to pure hydrogen, depending on cost and system requirements. This analysis considers the use of low-emission syngas for industrial heat.

LOW-EMISSION FUEL REQUIREMENTS

For any low-emission fuel to function as a viable replacement for natural gas under current and emerging conditions, its production must meet a narrow set of simultaneous requirements.



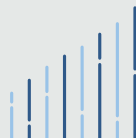
COST COMPETITIVENESS

Must remain cost competitive with natural gas across regions to be viable in industry



EMISSIONS REDUCTION

Lifecycle emissions must be reduced to satisfy regional legislated emissions-reduction mandates and corporate ESG targets



INDUSTRIAL SCALE

Continuous, high-volume production is required to meet the requirements of industrial processes



INFRASTRUCTURE ALIGNMENT

Must integrate with existing industrial infrastructure – on-site production has advantage



OPERATIONAL RESILIENCE

Requires predictable supply with minimal exposure to feedstock, power, or logistics volatility

Challenges with industrial heat decarbonization pathways



ORGANIZATIONS SEEKING TO REDUCE EMISSIONS FROM INDUSTRIAL HEAT APPLICATIONS FACE STRENGTHS AND LIMITATIONS.

Conventional natural gas combustion remains cost-effective and widely available but carries significant greenhouse gas emissions.

Natural gas + CCS can reduce emissions but introduces additional cost, as well as capture, transport, and storage infrastructure requirements.

Renewable natural gas (RNG) can lower lifecycle emissions but is constrained by limited supply and relatively high cost.

Hydrogen-based fuel pathways can support decarbonization but often require significant energy inputs, new infrastructure, and production of higher-purity hydrogen than many industrial heat applications require.

Ekona's methane pyrolysis pathway

Methane pyrolysis leverages existing natural gas infrastructure to produce a low-emission fuel while avoiding many of the cost, infrastructure, and scalability challenges associated with alternative approaches.

THE XCALIBER™ REACTOR PLATFORM

INTEGRATED

Co-produces low-emission carbon black and syngas within a single system

FLEXIBLE

Deployable using existing natural gas supply and industrial infrastructure

SCALABLE

Designed for repeatable, industrial-scale deployment across geographies

EFFICIENT

Minimizes requirements for water, new pipelines, and dedicated renewable power

RENDERING:
20 TPD XCALIBER™ PLANT

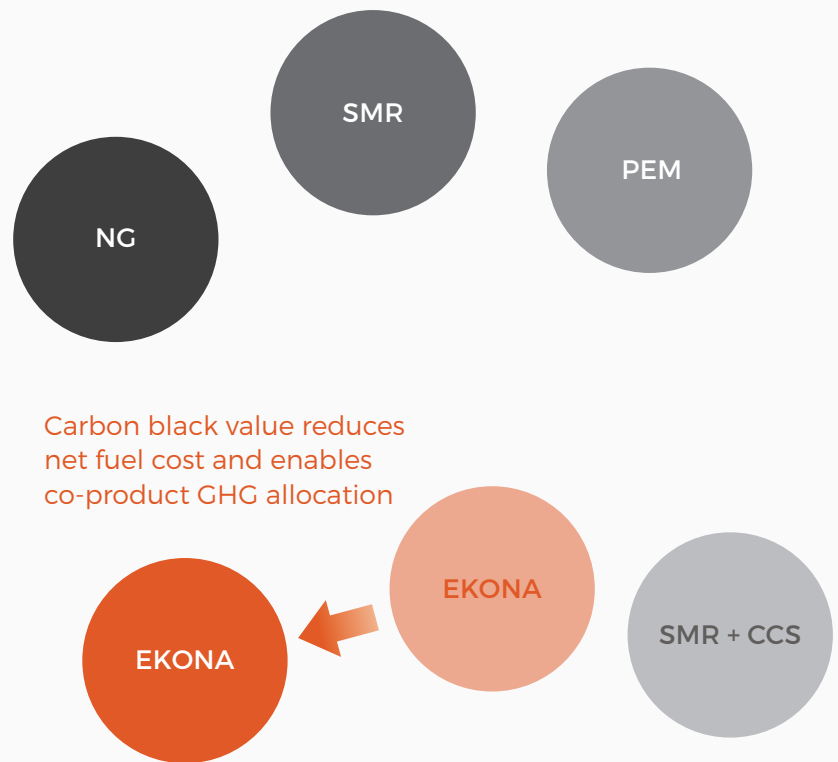
Comparison with natural gas and hydrogen as fuel

Ekona has developed a commercial-scale design package and techno-economic model to evaluate how Ekona's xCaliber methane pyrolysis platform performs in a Canadian industrial use case, producing ASTM-grade clean carbon black and low-emission syngas for industrial heat.

EKONA DELIVERS LOWER-EMISSION FUEL AT COMPETITIVE COST

- Valuable ASTM-grade carbon black co-product reduces net fuel cost and GHG emissions through co-product allocation
- Net levelized cost of fuel approaches cost of natural gas
- Lower lifecycle emissions than hydrogen production with CCS
- Avoids dependence on large-scale electrification or CCS infrastructure
- Low cost of GHG emissions abatement

GHG INTENSITY (KG-CO₂e/GJ)



GASEOUS FUEL COST (\$/GJ)

Assumptions

- Results reflect a commercial-scale system (2,800 GJ/day), aligned with industrial applications
- 80-tpd of ASTM-grade clean carbon black is sold as co-product
- Emissions are allocated both to syngas and clean carbon black co-products
- CCS pathways do not include additional transport or storage constraints

NG: FOSSIL NATURAL GAS
COMBUSTION (UNABATED)

SMR: NATURAL GAS -> SMR HYDROGEN

PEM: GRID ELECTROLYSIS HYDROGEN

CCS: CARBON CAPTURE AND STORAGE

EKONA: NATURAL GAS -> SYNGAS



Explore the underlying low-emission fuel analysis

Detailed technical and regional assumptions underpinning this summary are available on request.



Evaluate methane pyrolysis as a low-emission fuel production pathway.

Connect with Ekona to explore how methane pyrolysis can decarbonize industrial heat with low-emission fuel. info@ekonapower.com

ABOUT EKONA

Ekona develops clean hydrogen and clean carbon black solutions for industrial deployments. Our xCaliber™ methane pyrolysis platform leverages existing natural gas infrastructure to produce low-emission hydrogen and clean carbon black at scale, supporting cost-effective decarbonization across energy intensive industries and materials markets. ekonapower.com

USE CASE SCOPE, LIMITS, AND KEY ASSUMPTIONS

This use case is a summary-level representation of Ekona's low-emission fuel analysis. It is intended to illustrate the operating context, economic considerations, and emissions performance of methane pyrolysis under a defined set of assumptions. A more detailed technical and economic assessment, including full modeling inputs and region-specific results, underpins this summary and is available separately.