

September 2022

CSE: ATHR

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AETHER CATALYST SOLUTIONS, INC.

Aether is a material science company developing catalytic materials, primarily for gasoline internal combustion engines (ICEs), **ultimately looking for a large share of a massive market (<US\$25 Billion PER YEAR).** We will accomplish that with an ~90% cost reduction versus incumbent PGM catalyst with equal performance.

Our current level of development and performance is not yet ready for automotive OEMs, but does offer significant **near-term commercial opportunities** in the following markets:

- Small Motors currently unregulated (because, until now, there's not been acost effective solution), but contributing a significant amount of urban air pollution and drawing the attention of regulators
- Large Vehicle Aftermarket large vehicle catalytic convertors are the most commonly stolen, and the large amounts of catalyst required make even the aftermarket catalytic converters (with lower performance requirements, and hence less PGMs) expensive.

We are currently in development programs with partners targeting these markets while continuing work on enhancing our catalyst to attain automotive OEM commerciality.



ACTIVE CATALYST PROGRAMS

"Fleet Co." - Large commercial vehicle fleet

- >150,000 vehicle fleet size
- Nasdaq listed (Market Cap > \$10,000,000,000)
- Catalytic converter theft costing more than \$5,000,000 annually (just part replacement; not including towing and fleet downtime – which are highly significant)
- "Fleet Co." looking for a non-PGM based catalytic converter to reduce costs and deter theft.
- Aether has scaled up and sent "calibration" catalyst and is awaiting first in-vehicle field tests. NDA in place.



<u>City of Burnaby – Urban Small Motors Emissions Abatement</u> <u>Project (USMEAP)</u>

- 6 of Burnaby's riding lawnmower fleet have been equipped with Aether catalysts
- Year two of program has resulted in near 100% NO_x reduction
- Cost and performance prove commercial viability

Automotive Catalyst Research & Development

- Aether's automotive catalyst is approaching PGM catalyst performance in an unoptimized form – post aging – with the goal of an OEM part that supplants incumbent technology.
- "Fleetco" represents an opportunity to access the market with an "after market" part not held to the same standards as OEM parts
- Aether has been approached and is in discussions with a large material sciences company with a novel (chemically complementary) substrate and existing OEM customers. NDA in place



Catalytic Converter Theft

Catalytic converter theft is a growing problem worldwide that is especially problematic for fleet operators. Commercial vehicle catalytic converters are larger, containing more precious metals and rare earth elements; they are also easier to access as the vehicles have higher ground clearance than passenger cars. This is further compounded by unsecured marshalling yards and "company trucks" where the operators park the vehicles at their homes (rental trucks are particularly vulnerable).

The costs are significant – Fleetco represents that its part costs alone are mid 7 digits...and overall costs are a multiple of that with replacement labor costs, fleet downtime, and transportation of disabled vehicles (commercial operators can't drive the vehicle without a catalytic converter so they must be towed).

- Thieves can access and remove a catalytic converter in as little as 30 seconds and receive \$50 to \$250 from recyclers.¹
- For the first 7 months of 2022 US catalytic converter theft is up 15.8% from 2021 and is already twice 2020s full year total.¹
- Stricter emissions standards increase the PGM loadings, drive demand for PGMs, and further incentivize theft.

Aether's catalyst would eliminate any reason for theft.



City of Burnaby:

Urban Small Motors Emissions Abatement Project (USMEAP)

- 4.2 Million¹ premature deaths occur globally every year from air pollution. This includes 14,600² deaths in Canada
- High NO_X concentrations in the short term aggravate existing respiratory diseases, and in the long term can contribute the development of these diseases and increase the susceptibility of persons to respiratory infections. NO_X reacts with other chemicals in the air to form both particulate matter and ozone which are also harmful.
- A study³ by the United States Environment Protection Agency Found:

Gasoline-Powered lawn and garden equipment are a significant contributor to urban air pollution

¹World Health Organization (2020) <u>Ambient air pollution: Health impacts</u>.
²Health Canada (2020) <u>Health effects of air pollution</u>.

- The Company's catalyst, in the field currently on a Ferris Pro Cut S, is reducing almost 100% of No_x. The catalyst is applicable to other small motors products such as:
 - Stationary Power Generators
 - Pressure washers
- Aether's catalyst can replace the existing muffler and be contained by its housing.
- With additional engineering (passively increasing oxygen availability), HC and CO can also be significantly reduced







³https://www.epa.gov/sites/default/files/2015-09/documents/banks.pdf



Additional Highlights & Future Milestones

Highlights

- Aether's catalysts are low-cost and scalable
- Aether's catalysts would seamlessly enter the existing supply chain without significant retooling
- Aether's catalysts are rapidly approaching the performance required by OEMs for use in new vehicles
- Aether's catalysts are proving to be effective and commercially viable for small motors
- The Company has a history of overcoming technological hurdles.

Future Milestones

- Move current discussions towards a Joint Development Agreement with an OEM to develop our catalyst for the automotive market.
- Continue to work with "Fleet Co." with a goal of achieving commerciality in the aftermarket for large vehicle catalysts
- Exploit performance in USMEAP to develop commercial opportunities in the small motors marketplace with the goal being a JDA with a small motors OEM
- Longer term, Aether plans to explore alternative markets for its catalyst in other industries

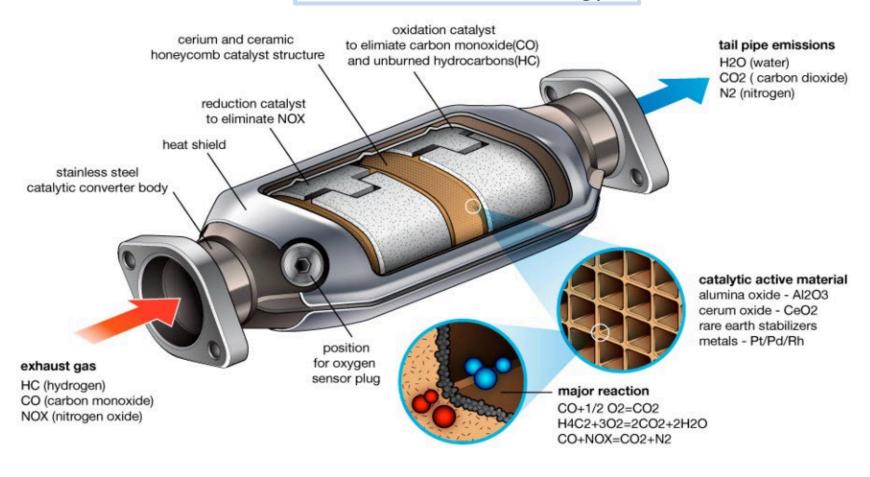


Aether Technology

- ➤ Replaces costly precious metals in reduction and oxidation catalysts
- Performance levels approaching incumbent technology at a fraction of the cost
- ➤ Amenable to existing supply chain infrastructure

What is a Catalytic Converter?

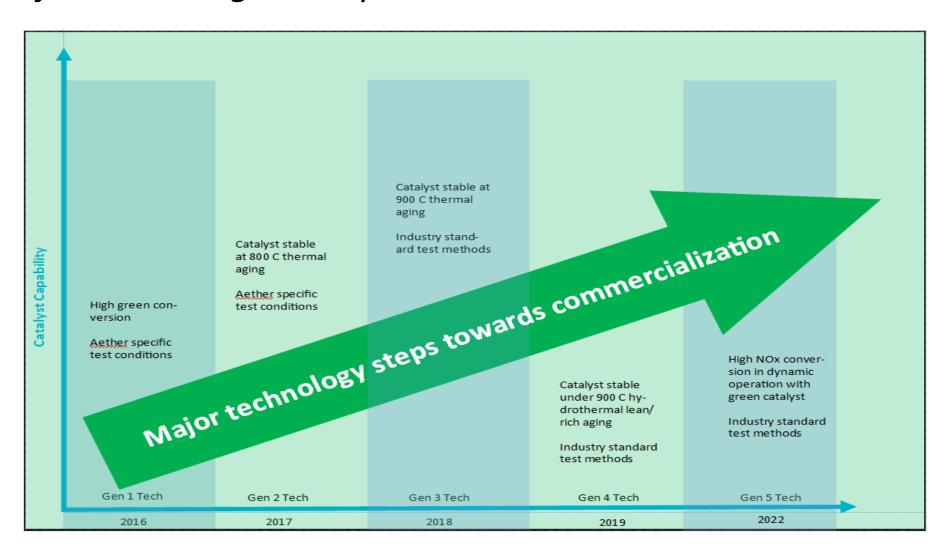
Incumbent Technology





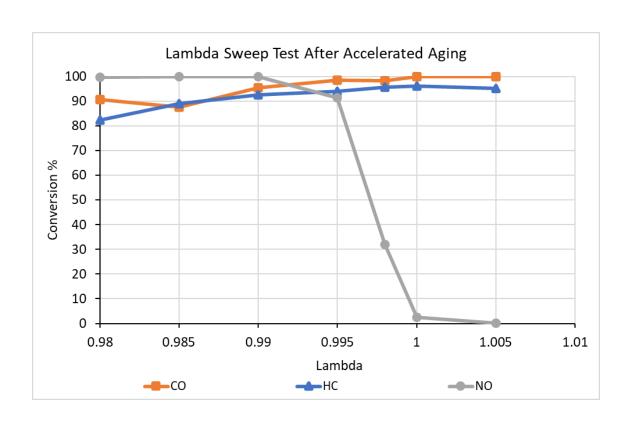
Major technological steps towards commercialization

Aether has overcome many of the known technical challenges inherent with base metal catalysts in a very short time frame





CURRENT STATUS:After Accelerated Aging



Graph demonstrates high exhaust gas conversion after 100 hours of 900° C hydrothermal rich/lean accelerated aging as seen by a Lambda Sweep Test done at a temperature of 450° C

Based on OEM feedback, this approaches the range of their expectations



THE COST OF PGM'S:

Catalyst industry pre-existing PGM dependency

The precious metal content of automotive catalyst is a massive expense for OEMs

PGM Utilization in Automotive Catalysis 2021						
	Consumption (oz)*	Avg	Price (2021)**		Value	
Platinum	2,353,000	\$	1,093	\$	2,571,217,220	
Palladium	8,340,000	\$	2,397	\$	19,992,231,000	
Rhodium	946,000	\$	18,074	\$	17,098,004,000	
				\$	39,661,452,220	

*Johnson Matthey

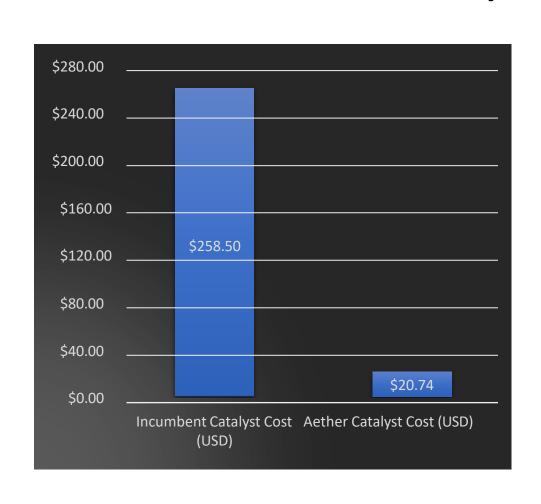
**Kitco

- Aether's catalyst replacement for gasoline powered vehicles is applicable to more than two-thirds of 2021 vehicle production
- This represents a YEARLY cost (to the OEMs) of over \$26 Billion for the precious metals alone.
- PGMs have high geopolitical risks (Russia supplies 40% of the worlds Palladium)



MATERIAL COST COMPARISON:

Aether Catalyst vs. Incumbent PGM-Catalyst

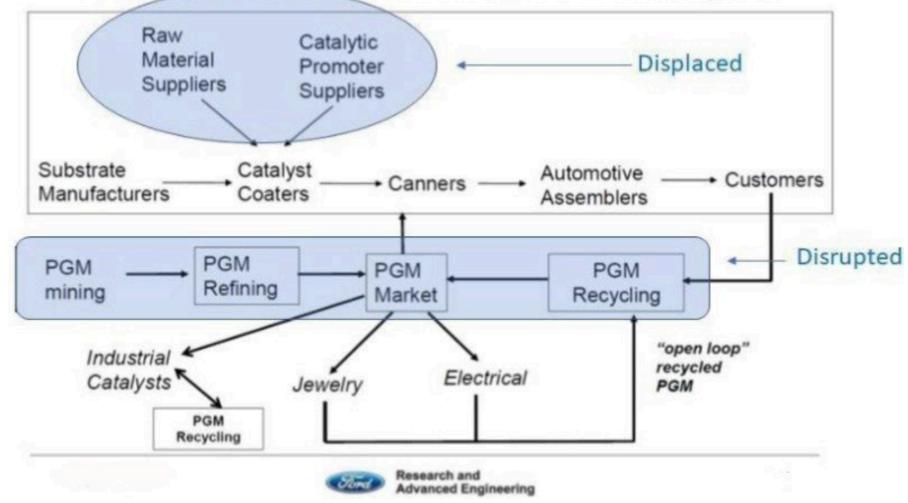


- ~I0X reduction in catalyst material cost
- Aether catalysts utilize base metals inexpensive and common
- Aether catalysts contain minimal rare earth elements



Seamless fit with pre-existing manufacturing chains

Supply Chain for Automotive Catalysts





Corporate Summary

CSE: ATHR OTC:ATHHF Frankfurt:2QZ

49,437,794		
6,650,047		
2,250,000		
>55%		
\$0.085		
\$4,202,212.49		
\$380,000		





NON-DILUTIVE FUNDING SUPPORT

















MANAGEMENT TEAM

Paul Woodward, President. Paul is a former investment banker with more than 25 years of experience in venture capital with a concentration in corporate finance. Mr. Woodward holds a B.A. (Econ) from Simon Fraser University in Burnaby, BC.

Taylor Procyk, Chief Operating Officer. Taylor has been working with Aether for six years developing their base metal oxide catalyst and now focusing on adapting and commercializing Aether's existing technology for the small motor market. Mr. Procyk holds a B.Sc. in Chemistry from Simon Fraser University in Burnaby, BC.

Greg James, Advisor. Greg is the former Chief Engineering at Ballard Power Systems with over 25 years of experience bringing new technology to market. Mr. James holds a B.A.Sc. In Mechanical Engineering from the University of Victoria, BC.

Neil Branda, Director. Neil is Professor of Chemistry and a Canada Research Chair at Simon Fraser University. Mr. Branda is also the Executive Director at 4D Labs. Dr. Branda received his B.Sc. from the University of Toronto and his PH.D. from Massachusetts Institute of Technology.



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