



# Chart & Cryomotive

May 19, 2021



# Forward-Looking Statements

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Chart Industries, Inc. is a leading independent global manufacturer of highly engineered equipment servicing multiple applications in the Energy and Industrial Gas markets. Our unique product portfolio is used in every phase of the liquid gas supply chain, including upfront engineering, service and repair. Being at the forefront of the clean energy transition, Chart is a leading provider of technology, equipment and services related to liquefied natural gas, hydrogen, biogas and CO<sub>2</sub> Capture amongst other applications. We are committed to excellence in environmental, social and corporate governance (ESG) issues both for our company as well as our customers. With over 25 global locations from the United States to Asia, Australia, India, Europe and South America, we maintain accountability and transparency to our team members, suppliers, customers and communities. To learn more, visit [www.Chartindustries.com](http://www.Chartindustries.com).



# Hydrogen Macro Update

**75 countries with “net zero” targets; 31 with hydrogen strategy**

**\$345 billion total investment announced until 2030**

**3 times increase in announced clean hydrogen production capacity compared to last year**

**228 Hydrogen Projects under development globally**

## News Already This Week:

- Energy Estate has proposed the Hunter Hydrogen Network (H2N) to create Australia’s first hydrogen valley, including production, transportation and export of hydrogen in the region
- Mitsui OSK Lines & Mitsui E&S Machinery are evaluating installing hydrogen-powered port cargo handling machines in Japan
- Germany provided a roadmap for increased use of sustainable aviation fuels, with a target of annual production of 200,000 tonnes of green kerosene by 2030

*Takeaway: Chart having the broadest set of process technologies, products and solutions for the expanding and diverse hydrogen market will provide the most market penetration*

# Inorganic Investment Principles

*(1) Brings Chart access to customers and commercial projects that could not be accessed without significant organic investment*

*(2) Brings Chart access to geographies that otherwise could not readily be accessed due to lack of product experience in the region, certification requirements, or government funding and relationships*

*(3) Adds equipment or process that builds out the “a la carte” menu or full solution menu for applicable markets... for example:*

- BlueInGreen water treatment technology + Chart bulk tanks*
- Cryo Technologies He and H<sub>2</sub> liquefaction process + Chart storage, transport, and BAHX*
- Chart IPSMR® + Chart ACHX/BAHX/cold boxes*
- SES cryogenic carbon and direct air capture technology + Chart ACHX, BAHX and storage tanks*
- And now... Chart HLH<sub>2</sub> onboard vehicle tanks + Cryomotive CcH<sub>2</sub> modular tanks*

# Chart's Strategic Acquisitions and Investments

## 2018 / 2019



**2018:**  
Completes BAHX capacity expansion in La Crosse, WI



**2018:**  
Acquires Skaff Cryogenics



**2018:**  
Acquires VRV



**2018:**  
Divestiture of oxygen concentrator business



**2019:**  
Acquisition of Air-X-Changers

## 2020



Divestiture of cryobio product line to Cryoport for \$320M cash



Development Agreement for LH2 automotive



Completed master supply agreement



30M Euro investment with commercial MOU



Acquisition of cryogenic and H2 trailer business and former microbulk business



Acquisition of water treatment business



Investment in Canadian H2 integrator



Acquisition of SES, carbon capture technology

## 2021



\$15M Investment and commercial MOU Completed Feb 2, 2021



Joint development MOU February 10, 2021



Acquisition of Cryo Technologies for \$55 million cash (Feb 16, 2021)



Investment of \$25 million for 5% ownership and commercial MOU (March 31, 2021)



Intend to be Cornerstone, early investor in forthcoming Five T Hydrogen Fund (50 million Euro investment over coming years)



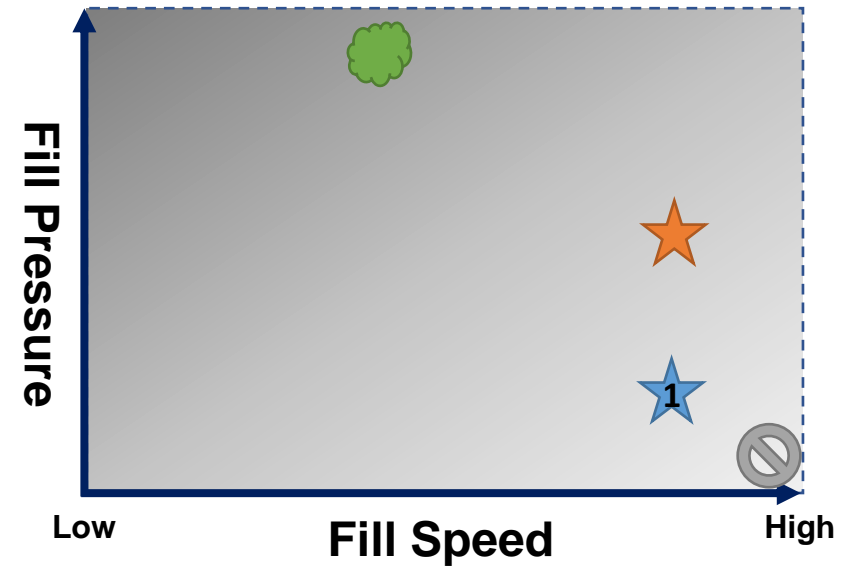
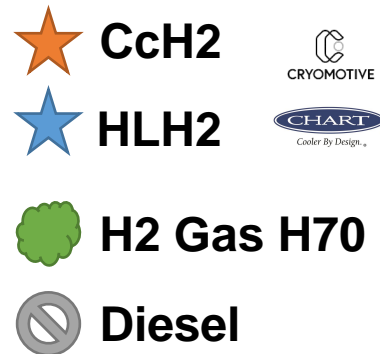
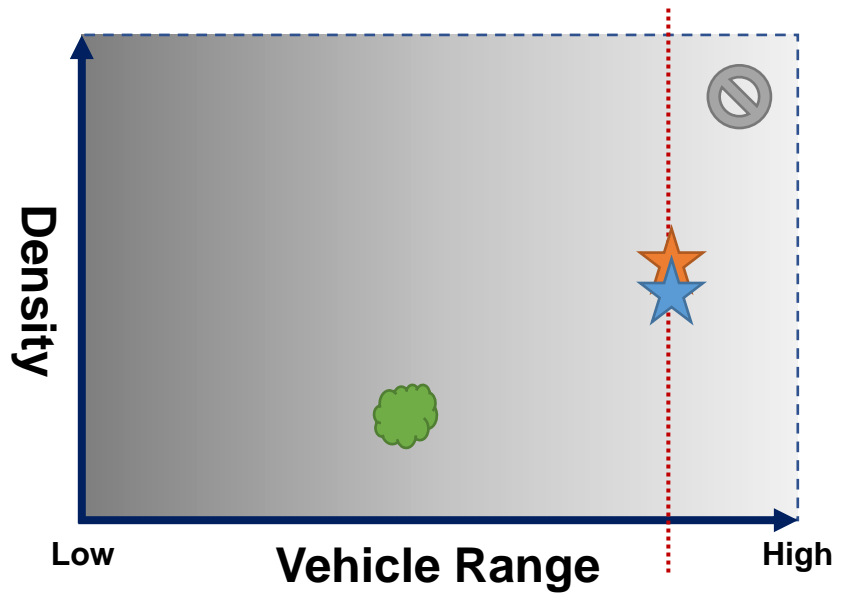
Commercial and development MOU (no investment) for control systems and instrumentation in our modular solutions



**Minority investment of 6.5M Euros with commercial agreement**

- Based in Germany with strong relationships across Europe, China, Korea and Japan
- Owner of cryogenic storage and refueling technologies for long-haul comml vehicles, buses and other vehicular applications
- Deliver modular, compact and cost-effective cryogenic hydrogen stations
- Technology piloted and demonstrated by BMW & partners
- Several patents owned for Cch2 technology

# Cryomotive CcH2 and Chart HLH2 Technologies



## Storage & operation

- Highest H2 to volume ratio
- Long hold time, no venting losses in normal operation
- Sufficient operating pressure to feed all types of FCs
- No pressure building after fueling

## Refueling Benefits

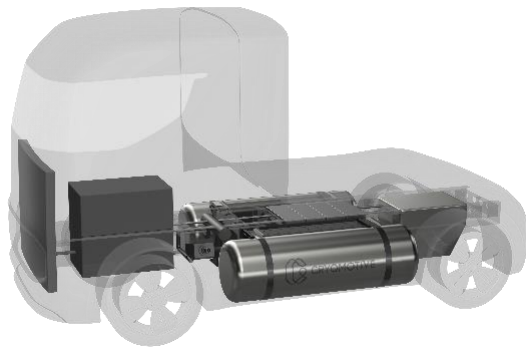
- One-phase fueling
- Single fuel connection
- Shorter fueling times than 700 bar gas H2
- Lower energy consumption of fuel station

(1) This fill time for HLH2 is in regular cold operation with a high flow rate LH2 pump

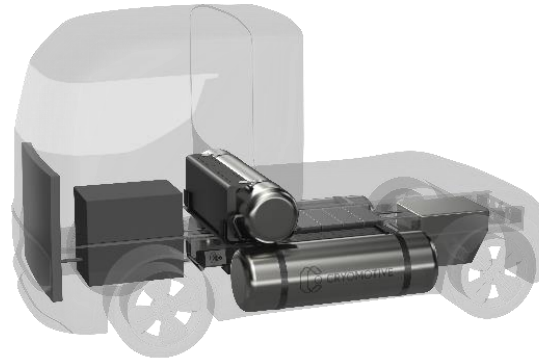
# Modularity of Onboard Tanks is a Differentiator

**Both Cryomotive's CcH<sub>2</sub> CRYOGAS storage and Chart's HLH2 (and HLNG) offers flexible multi-vessel integration options:**

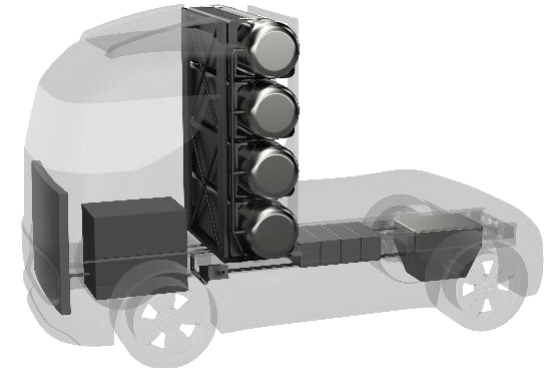
2-tank CcH<sub>2</sub> storage system  
along the frame (Cryomotive picture)



3-tank CcH<sub>2</sub> storage system  
along frame & behind cabin (Cryomotive picture)



4-tank CcH<sub>2</sub> storage system  
behind the cabin (Cryomotive picture)



**Chart Side Mounted:**



**Typical Gaseous H70 Storage System Behind Cab:**



# Cryomotive Leadership Team

## **Dr. Tobias Brunner, CEO and Managing Director, Cryomotive GmbH**

- Managing Director HYNERGY GmbH (April 2015 – present)
- Prior to HYNERGY Dr. Brunner served the BMW Group in various roles for more than 10 years
  - Served as head of BMW's Technology Project Hydrogen Fuel Cell
  - Directed the development of fuel cell electric vehicle prototypes and test fleets as well as novel cryogenic storage and refueling technologies
- Panel reviewer for the European Commission, US Department of Energy and Research Council of Norway
- Author of several publications on hydrogen technology
- Owner of a dozen patents on cryogenic hydrogen storage and refueling technologies

## **Dr. Christiane Heyer, CFO and Managing Director, Cryomotive GmbH**

- Managing Director HYNERGY GmbH (April 2015 – present)
- Prior lead roles in production, strategic planning, marketing, controlling and M&A in the chemical industry.
- Additionally, Dr. Heyer has been a managing partner of a US-based Private Equity firm leading their European business.

## **Christian Forstner, CTO, Cryomotive GmbH**

- Prior to Cryomotive Managing Director at SAG Innovation GmbH, responsible for R&D of LNG and LH2 tanks systems as well as leading positions in the automotive industry (Schaeffler, Miba Group)



# Cryomotive and Chart Synergies

- Leverage both parties' relationships with vehicle manufacturers in Europe and Southeast Asia, specifically Korea, Japan and China
- Gives Chart greater presence in the European H2 market and greater access for liquefaction, storage, transports and does the same for Cryomotive in the United States
- Cryomotive is full member of German Clean Energy Partnership which influences the rule setting on Hydrogen for mobility, in particular around standards and certifications
- The Cryomotive CcH2 fueling option is liquid hydrogen base, not compressed H2, which promotes our full product line. For the high-pressure storage option (CcH2), Chart can supply:
  - Fuel station equipment
  - High-pressure hydrogen pump
  - Aluminum inner vessel, outer vessel jacket and vacuum insulation
  - Hydrogen transport trailers and ISO Containers
  - Engineering to adapt to US codes and standards for the US market

*Two options for heavy truck fuel delivery are at the heart of heavy-duty truck manufacturers hydrogen decision making (and now Chart has a way to offer both):*

- Liquid storage
- Cryogenic high-pressure storage (CcH2)

# Chart Equipment for Cryomotive CcH2 Applications (1/2)



Cryocompressed (CcH<sub>2</sub>) vehicles drive the need for fuel stations with specific technology to prepare and deliver the cold cryo temperature and high-pressure hydrogen that the vehicle fuel tanks require, much of which is provided by Chart:

- LH<sub>2</sub> storage tank, controlled dispensing, for a highly efficient station that will fuel Cryocompressed vehicles faster than today's 700 bar gaseous stations and comparable to the diesel fueling experience
- Most critical in the fuel equipment is the **LH<sub>2</sub> pump**, which Chart is developing for high pressure 700 bar vehicle fueling today and will be capable of dual-use for Cryocompressed fueling

**Liquid hydrogen storage tanks** are utilized in the hydrogen supply chain from production through transport and storage at the Cryocompressed hydrogen vehicle fuel station

# Chart Equipment for Cryomotive CcH2 Applications (2/2)

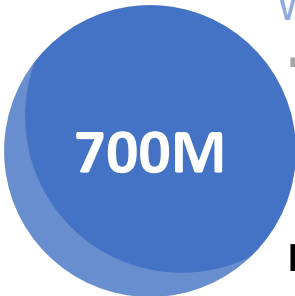
## *Transport Systems*



A critical link in the hydrogen supply chain to Cryocompressed H<sub>2</sub> vehicles is the transport of Liquid Hydrogen to the fuel stations.

- The vast majority of bulk LH<sub>2</sub> transport up until today has been via on-road transport trailers
- Recently Chart developed smaller doubles trailers specifically for the fuel station market
- Looking forward, as there will be more H<sub>2</sub> vehicles in more regions, there will be a need for other modes of transport including ISO container and rail car, both of which we can provide

# Our Specialty Markets Keep Growing



## Water Treatment

- Improving water quality and wastewater reuse utilize liquid oxygen and CO2 in purification process

### Drivers of Size Opportunity

- Regulation on water treatment
- Population growth



## Food & Beverage

- Food preservation equipment
- Nitrogen dosing equipment

### Drivers of Size Opportunity

- Nitro-beverage changeover

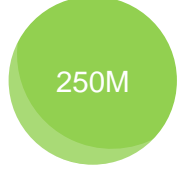


## Carbon & Direct Air Capture

- Air cooled heat exchangers
- Storage tanks
- BAHX and cold boxes

### Drivers of Size Opportunity

- Carbon emissions reduction targets
- CO2 supply shortage



## Cannabis

- Liquid CO2 storage and supply / delivery systems
- Used in grow houses, CBD oil extraction and packaging

### Drivers of Size Opportunity

- Legalization of cannabis
- Regulatory approval for CBD.

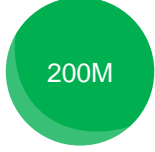


## Helium Liquefaction

- Helium Liquefaction
- Storage
- ISO Containers
- Transport

### Drivers of Size Opportunity

- Differentiated process
- Helium consistently in high demand
- Russia vast natural resources

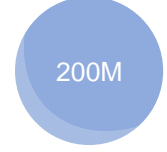


## Molecules By Rail

- Gas by rail tender cars approved for use

### Drivers of Size Opportunity

- Legalization of LNG by train in the U.S.
- Expected growth in EU

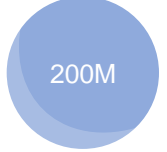


## Industrial Lasers

- High purity liquid nitrogen (gas assist) provides a faster cut and superior edge, free of impurities

### Drivers of Size Opportunity

- Uptime requirements in manufacturing
- Reducing steps in production

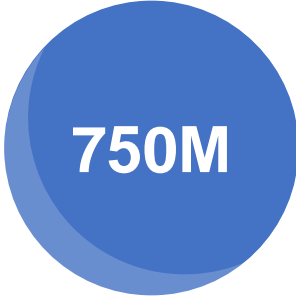


## Space

- Cryogenic liquid propellants are used as fuel for rocket propulsion

### Drivers of Size Opportunity

- Proliferation of private space travel industry



## Over The Road Trucking

- LNG as alternative fuel to diesel for heavy duty vehicles (lower emissions, engine noise, etc.)

### Drivers of Size Opportunity

- Regulations

## Hydrogen

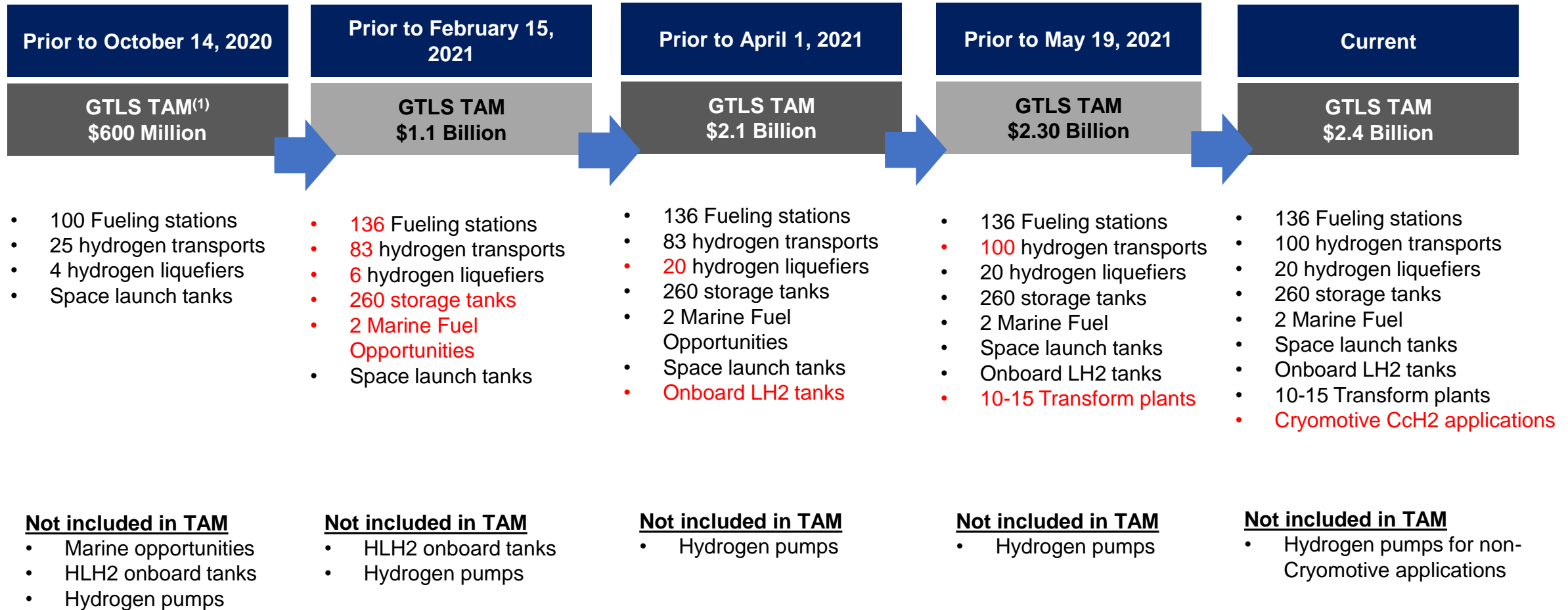
- H2 vehicle fueling stations, transport equipment and liquefaction storage at H2 production sites
- H2 storage and mobility equipment
- BAHX for H2 liquefaction
- H2 liquefaction
- CcH2 equipment

### Drivers of Size Opportunity

- Buildout of hydrogen fueling infrastructure
- Development of "green hydrogen" industry
- Government stimulus packages
- Brand name fast followers



# Measuring Progress on Our H2 Addressable Market



(1) TAM = Total Addressable Market for Chart existing process and equipment

# Net Leverage Ratio

*March 31, 2021 Actual and Pro-Forma for Cryomotive investment*

