



# MUNRO



FORD MACH-E  
TEARDOWN AND  
BENCHMARKING  
STUDY



## FORD MACH-E

### NOVEMBER 2021

[www.LeanDesign.com](http://www.LeanDesign.com)  
[www.MunroLive.com](http://www.MunroLive.com)

**FORD MACH-E**  
Available November 30th, 2021



**MUNRO**



**FORD MACH-E**  
NOVEMBER 2021

1

## **FORD MACH-E BENCHMARK REPORTS**

### **Purchasers of this 2,000+ page report will receive:**

- a) Vehicle and Zone Executive Summaries
- b) Zone Eye-Catching Features
- c) Zone Quick Cost Estimate Report
- d) Zone Costed Bill of Material in PDF format
  - Weights and most materials and suppliers identified
- e) Electrical Topology
- f) Cooling Topology (*full details available for purchase in separate Thermal Systems Report*)

**AVAILABLE NOVEMBER 30TH, 2021**

***Individual Reports Are Available***

### **For Those Only Interested in Specific Vehicle Areas:**

- ✓ **Zone 1** *Body and Chassis*
- ✓ **Zone 2** *Controlling Electronics*
- ✓ **Zone 3** *Interiors and Safety*
- ✓ **Zone 4** *Powertrain and Battery Pack*
- ✓ **Zone E** *High Voltage/Low Voltage Electronics, Selections from Zones 1-4, Electrical Topology and Communication Architecture*
- ✓ **Electrical Topology**
- ✓ **Thermal Systems**



[www.LeanDesign.com](http://www.LeanDesign.com)  
[www.MunroLive.com](http://www.MunroLive.com)

**FORD MACH-E**

Available November 30th, 2021



# MUNRO



## FORD MACH-E

NOVEMBER 2021

## DESCRIPTION OF THE ANALYZED FORD MACH-E

### SELECT AWD PACKAGE

- ✓ The Ford Mach-E vehicle which Munro analyzed is the Select All Wheel Drive 5 passenger with a 68 KWH standard battery with a single transmission.
- ✓ This Mach-E is also equipped with the Ford Co-pilot 360 Assist 2.0
- ✓ Prior to Munro's purchase, the car was never driven.
- ✓ Munro conducted a complete Quick Cost Analysis of the vehicle and documented findings related to Eye-Catching Features, suppliers (where possible), weights, number of parts, and materials.

### REPORT DELIVERY

- ✓ All reports and accompanying deliverables will be made available for easy access through a secure File Transfer Protocol (FTP) site.
- ✓ A user-friendly PDF format ensures that subscribers can easily locate a wide range of materials in addition to the reports.
- ✓ The large reports feature a linked table of contents, allowing users to easily navigate the report contents and quickly locate specific data.



[www.LeanDesign.com](http://www.LeanDesign.com)  
[www.MunroLive.com](http://www.MunroLive.com)

**FORD MACH-E**

Available November 30th, 2021



# MUNRO



## FORD MACH-E NOVEMBER 2021

1a

## MACH-E COMPLETE BENCHMARK REPORT

- ✓ The complete Benchmark Report is highly advantageous for OEMs or Tier Suppliers looking to effectively compete and expand their share of new EV markets.
- ✓ The report is a comprehensive analysis of all four Zones of the vehicle.
- ✓ Zone E report available at an additional cost.
- ✓ The report contains descriptive and pictorial detail on every analyzed facet of the vehicle.
- ✓ Those who choose to purchase the complete report will receive:
  - ✓ Vehicle and Zone Executive Summaries
  - ✓ Eye-Catching Features Reports, Quick Cost Estimate Reports, and Summary Costed Bills of Material for each vehicle Zone
  - ✓ Complete Vehicle Summary Costed Bill of Materials (CBOM) in PDF format with associated weights
  - ✓ The Vehicle Summary and Zone Summaries consolidate Munro's technical findings related to features, performance, and technology implementation

## INDIVIDUAL ZONE REPORTS

- ✓ Zone Reports are designed to accommodate Tier Suppliers or non-automotive companies looking to enter the EV market.
- ✓ Zone Reports are similar to the full report with descriptive and pictorial detail on every analyzed facet of the Zone from manufacturing through assembly including cost analysis.
- ✓ Zone E will include selections from Zone 1-4 including High/Low voltage Topology, electronics, and communications architecture.
- ✓ Individually Zone Reports include:
  - ✓ Zone related component weights, materials and suppliers (where possible) and Munro Quick Cost estimates.
  - ✓ Summary Zone Costed Bill of Materials (CBOM)



[www.LeanDesign.com](http://www.LeanDesign.com)  
[www.MunroLive.com](http://www.MunroLive.com)

**FORD MACH-E**  
Available November 30th, 2021



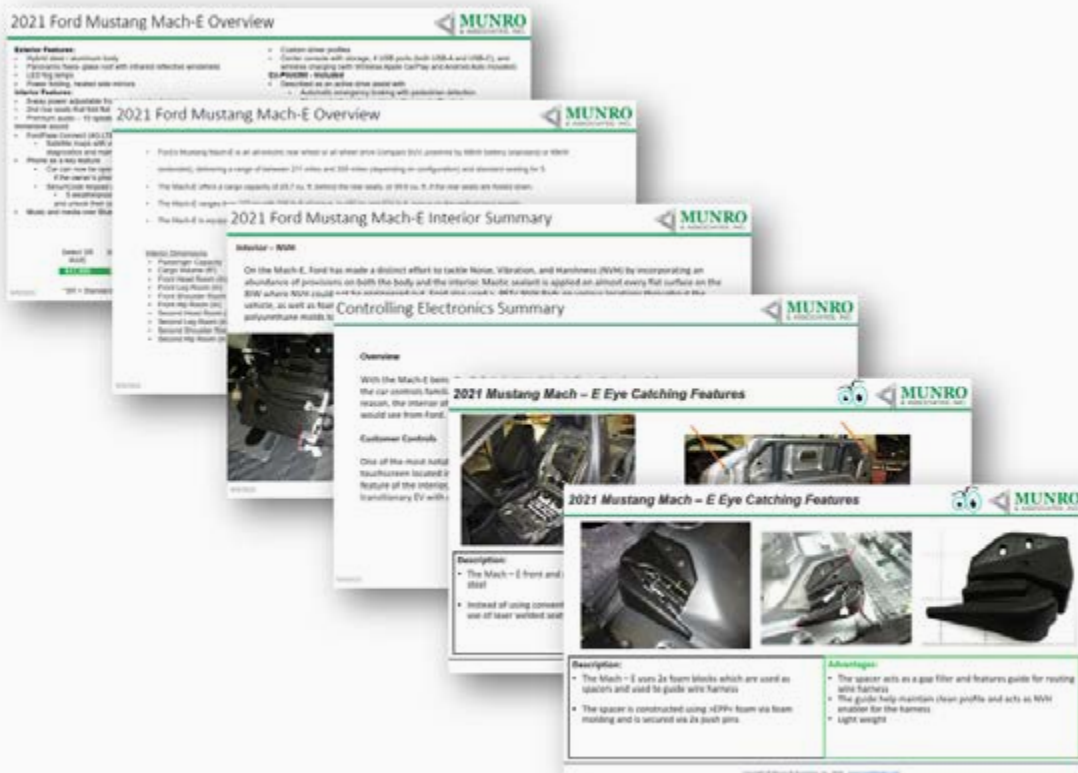
# MUNRO



# FORD MACH-E NOVEMBER 2021

## 1b EYE-CATCHING FEATURES

✓ In each vehicle Zone, Munro has identified specific observations of interest which are called «Eye-Catching Features». These observations can represent both advantages or disadvantages in cost, weight, feature content, or performance as related to material choice and assembly or manufacturing process selection.



[www.LeanDesign.com](http://www.LeanDesign.com)  
[www.MunroLive.com](http://www.MunroLive.com)

**FORD MACH-E**  
Available November 30th, 2021



# MUNRO



## FORD MACH-E NOVEMBER 2021

### 1c QUICK COST ESTIMATES

- ✓ Each Zone is broken down to systems and components for Quick Cost Estimating (QCE). QCE is Munro's proprietary methodology developed in response to the need for speed-driven results and is quickly gaining popularity. Quick Cost estimates provide the customer with approximate versus detailed costs, which are more expensive and time consuming to generate. This level of accuracy provides OEMs and Suppliers the ability to make sound comparisons and directional decisions.

### RICHMAN FROM EPA:

*"Munro is recognized as being technically competent, highly experienced, knowledgeable and creative in benchmarking and lean engineering of automotive and non-automotive systems. Costing models are thorough covering all elements of total production cost."*



[www.LeanDesign.com](http://www.LeanDesign.com)  
[www.MunroLive.com](http://www.MunroLive.com)

**FORD MACH-E**  
 Available November 30th, 2021



# MUNRO



## FORD MACH-E NOVEMBER 2021

1d

### VEHICLE OR ZONE SUMMARY COSTED BILL OF MATERIAL

- ✓ The Summary Costed Bill of Material (CBOM) is a consolidated view of the information presented in the complete vehicle report or an individually purchased Zone report.

#### The CBOM is in an indented format and includes:

- ✓ Part name
- ✓ Material
- ✓ Supplier (as available)
- ✓ Total Cost
- ✓ Weight
- ✓ Quantity
- ✓ Total Weight



[www.LeanDesign.com](http://www.LeanDesign.com)  
[www.MunroLive.com](http://www.MunroLive.com)

**FORD MACH-E**  
 Available November 30th, 2021



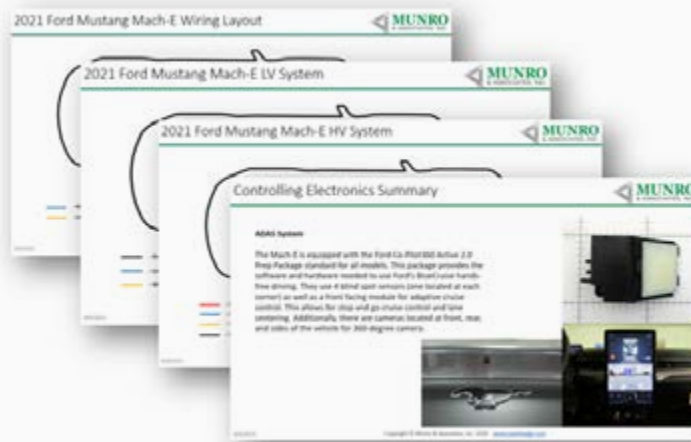
# MUNRO



# FORD MACH-E NOVEMBER 2021

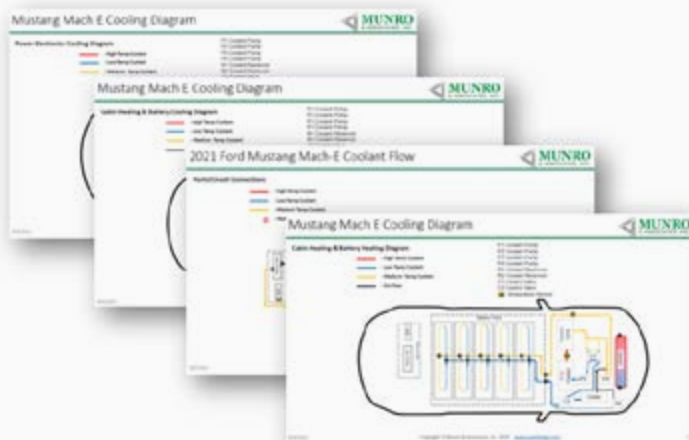
## 1e ELECTRICAL TOPOLOGY

- ✓ This report includes electrical and electronic component location, major HV and LV wire harness layouts, connection points, touchscreen user interface screenshots, and hydraulic brake system topology.



## 1f COOLING TOPOLOGY

- ✓ This report outlines the cooling lines and connections for coolant and refrigeration fluids. Both the heating and cooling circuits are illustrated.



[www.LeanDesign.com](http://www.LeanDesign.com)  
[www.MunroLive.com](http://www.MunroLive.com)

**FORD MACH-E**  
 Available November 30th, 2021





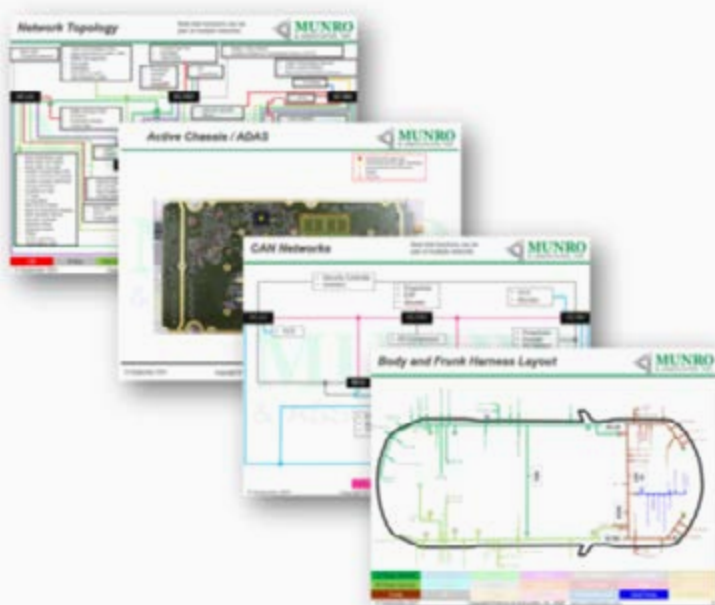
# MUNRO



## FORD MACH-E NOVEMBER 2021

### ZONE E REPORT

- ✔ Zone E is a combination of electronic/electrical components from Zones 1, 2, 3 and 4. This includes High Voltage and Low Voltage components and wiring. Component information includes photos, part name, material, supplier (as available), weight, and estimated cost. The wiring portion is broken down by individual harnesses, and includes layouts, connection points, and connector detail. All parts of section g) included.
- ✔ Major ECUs are thoroughly examined, including communication circuitry and significant microprocessors/SoCs.
- ✔ A network communication topology is included for all serial buses (CAN, LIN, Ethernet, etc.). A network communication topology for all serial buses (CAN, LIN, Ethernet, etc.) This section includes lists of all connected devices - ECUs, sensors, actuators.



[www.LeanDesign.com](http://www.LeanDesign.com)  
[www.MunroLive.com](http://www.MunroLive.com)

**FORD MACH-E**  
Available November 30th, 2021



**MUNRO**



**FORD MACH-E**  
NOVEMBER 2021

## FAQ (FREQUENTLY ASKED QUESTIONS)

✓ **Was Ford involved in the study?**

*No. Neither Ford's proprietary costs nor any Ford Mach-E supplier's quoted costs were used in this study.*

✓ **Is there any Ford Mach-E proprietary (stolen) IP in this report?**

*No. All data was developed through Munro's proven methodologies, analyzing Munro's purchased production-version Ford Mach-E.*

✓ **Are the components costed using USMCA costing centers?**

*Yes. Munro includes Mexican labor rates, factory floor cost, taxes and SG&A for OEM or Tier Suppliers.*

✓ **Is this a Costing or Pricing report?**

*This is a Costing Report, Pricing has too many variables.*

### LEGAL DISCLAIMERS & SALES CONDITION

**How can I see the sample report before purchasing?**

*Please contact your regional Munro salesperson. They can provide sample information in digital PDF format. A list of Munro's regional contacts can be found at [www.LeanDesign.com/Contact/](http://www.LeanDesign.com/Contact/)  
NOTE: Critical data will be hidden in the sample.*

**Is purchaser allowed to reproduce, distribute, disseminate, photocopy, fax, or transmit report content internally within the purchaser's organization?**

*Yes, ONLY INTERNAL Company correspondence is authorized.  
NOTE: The purchasing company shall not be legally permitted to reproduce, distribute, disseminate, photocopy, fax, transmit, sell, publish, or send this material, or any portion thereof, by any means without the express written permission of Munro & Associates, Inc. under penalty of law. The reports are copyright protected.*

**If questions arise, is a Munro expert able to visit and explain the report's details?**

*It is not included in the price of report.  
Munro will visit if the customer pays for the travel and a daily fee.*

**If there are limited specific questions on the content of report, is it possible for a Munro representative to support phone or e-mail communication?**

*Yes, please contact [sales@leandesign.com](mailto:sales@leandesign.com) we will respond with our answers.*



[www.LeanDesign.com](http://www.LeanDesign.com)  
[www.MunroLive.com](http://www.MunroLive.com)

**FORD MACH-E**

Available November 30th, 2021



# MUNRO

*Evolving How You Manufacture...*

---

[www.LeanDesign.com](http://www.LeanDesign.com)  
[www.MunroLive.com](http://www.MunroLive.com)

📍 MUNRO & ASSOCIATES INC.  
1140 Centre Rd  
Auburn Hills, MI  
48326 USA  
Phone: 1-248-362-5110



Copyright © Munro & Associates, Inc.  
1988 to 2021