Detroit Regional Partnership

GLOBAL EPICENTER OF MOBILITY

REVOLUTIONIZING THE DETROIT REGION

THE ROAD TO 2030
POWER ELECTRONICS & THERMAL SYSTEMS (PE&TS)

INTRODUCTION

Mobility Sectors

Mobility Sector Definitions for Road to 2030 Initiative

Light Vehicle: Passenger cars, pickups and light commercial vehicles up to 6 tons

Medium & Heavy: Trucks above 6 tons and bus chassis

Construction, Agriculture, Mining & Off-Road: Tractors, off-road vehicles and ATVs

Aerospace: Aircrafts -Piston airplanes, turboprop airplanes, business jets, helicopters, and eVTOLs

Maritime: Recreational boats - personal watercrafts, wake sport, fishing & pontoon and others

First Mile & Last Mile: Commercial drones

POWER ELECTRONICS & THERMAL SYSTEMS KEY FINDINGS

+833% Growth
Forecast from 2024-2030

In Michigan Power Inverter production

+43.3% Growth
Forecast from 2024-2030

In Michigan employment in Power Electronics NAICS codes

45% Penetration Rate
In the U.S. by 2030

In application of Power Electronics and Thermal Systems for all mobility sectors

+85% Growth
from 2020-2030

In Michigan Thermal System production for Light Vehicles

KEY OPPORTUNITY SECTORS: **Light & Medium Vehicle, Off-Highway, Maritime, First/Last Mile**

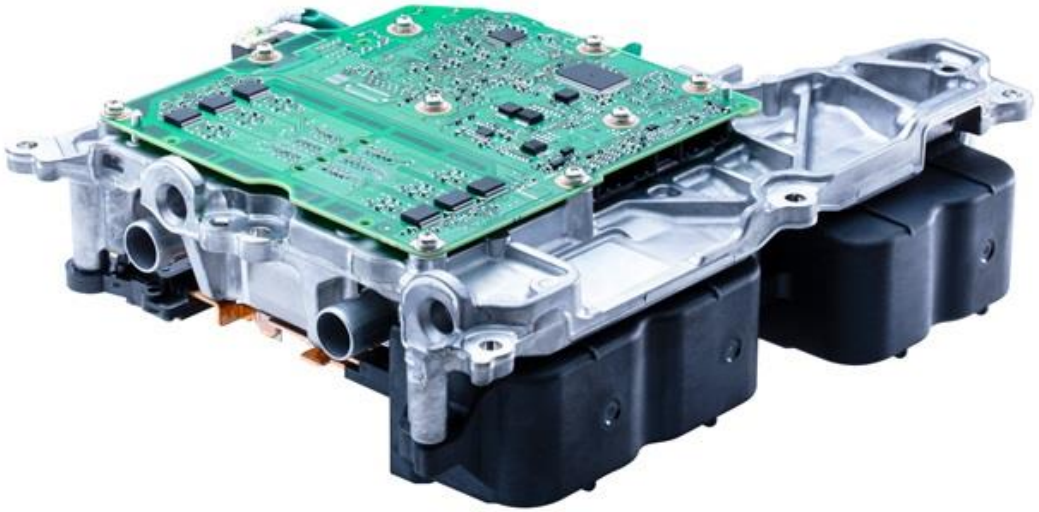
Source: DRP/GEM analysis of data from S&P Global Automotive
For background information and a glossary of terms, please visit https://gemdetroitregion.com/wp-content/uploads/2025/05/3-FMTS-Background-Methodology.pdf

Power Electronics & Thermal Systems (PE&TS)

Power Electronics and Thermal Systems (PE&TS) technologies are critical in electrified vehicle propulsion. They include a variety of components that convert Alternating Current (AC) to Direct Current (DC), manage current voltage levels, and ensure that battery temperatures remain with safe levels

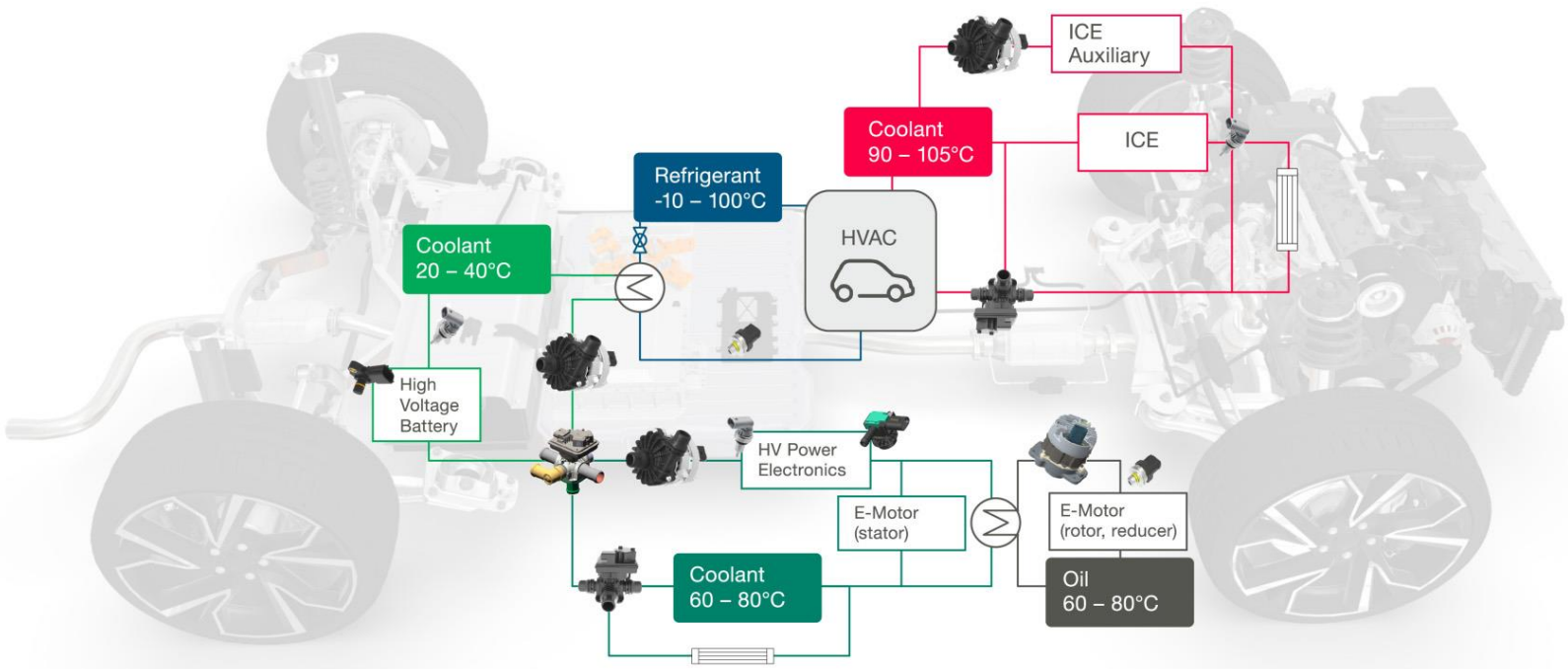
Together, they ensure that the large amounts of electrical and thermal energy involved in powering a vehicle are both optimized and safely managed.

Sample PE&TS Component: Denso AC/DC Inverter



Source: Denso

Power Electronics & Thermal Systems (PE&TS)



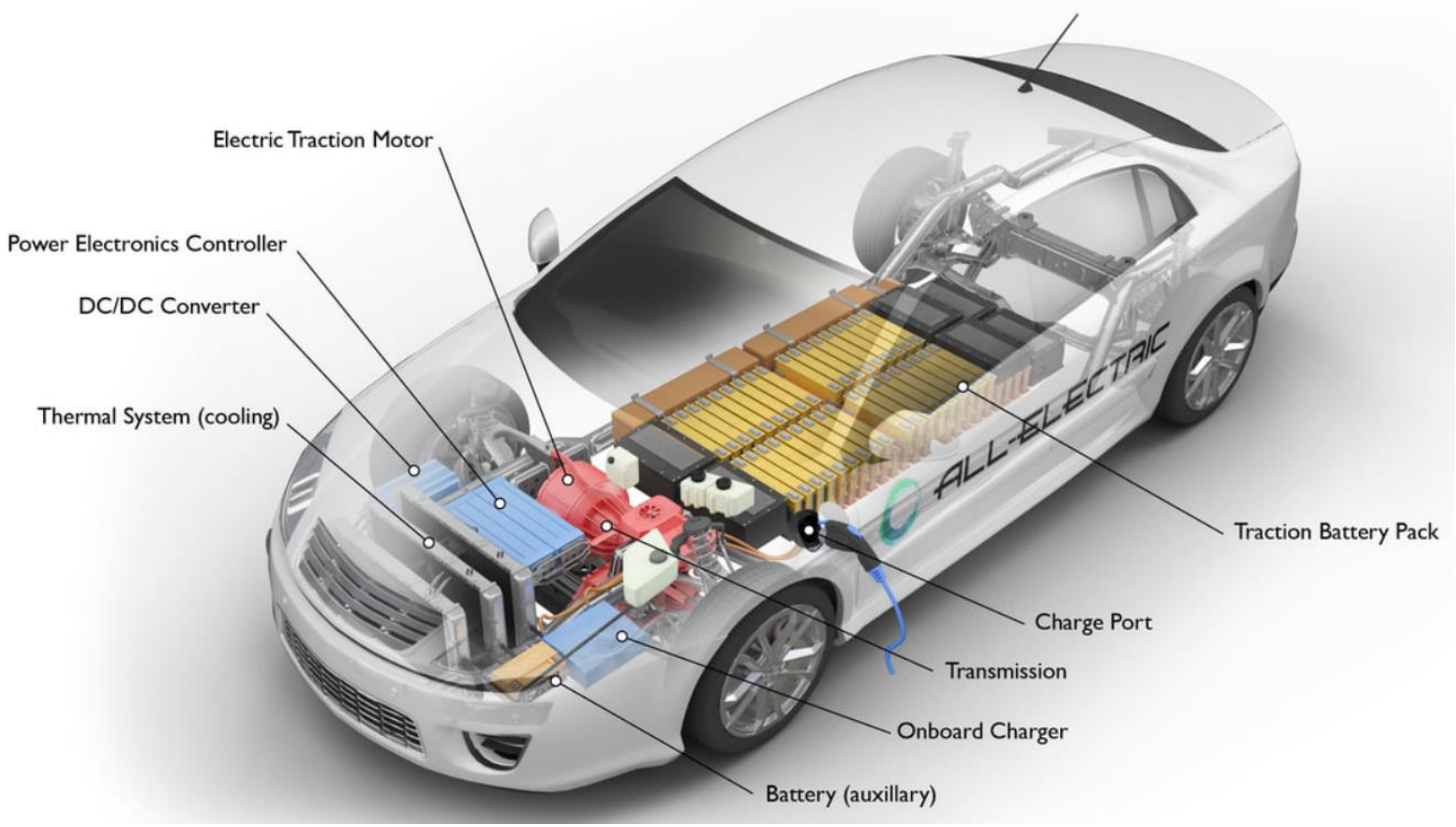
Source: Vitesco Technologies

Power Electronics and Thermal Systems components are typically both installed on electrified vehicles in tandem, resulting in matching statistics regarding production volumes, technology penetration rates, etc. The only exception to this pattern is the First & Last Mile (commercial drone) sector, in which Power Electronics are always necessary (resulting in a 100% penetration rate) and typical Thermal Systems are not used. This analysis therefore presents data for these two technologies together, with specific mobility sector applications identified throughout.

Power Electronics Key Components

Power Electronics Key Components

- DC-DC Converter
- AC-DC Inverter
- On-board Charger
- Battery Management System

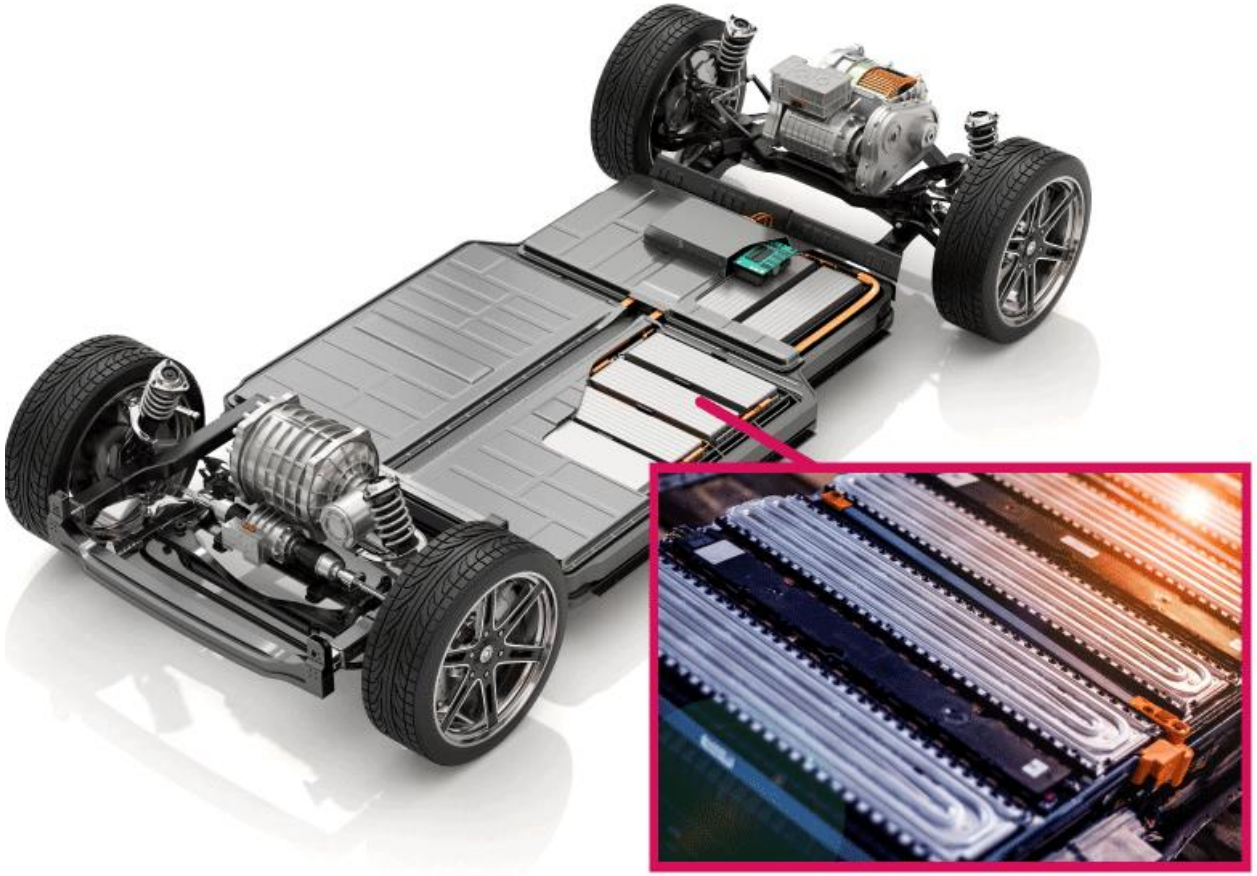


Source: U.S. Department of Energy, Alternative Fuels Data Center

Thermal Systems Key Components

Thermal Systems Key Components

- Heat Exchanger
- Battery Coolant System
- Fan System
- Refrigerant System



Source: Polyplastics, DAICEL Group

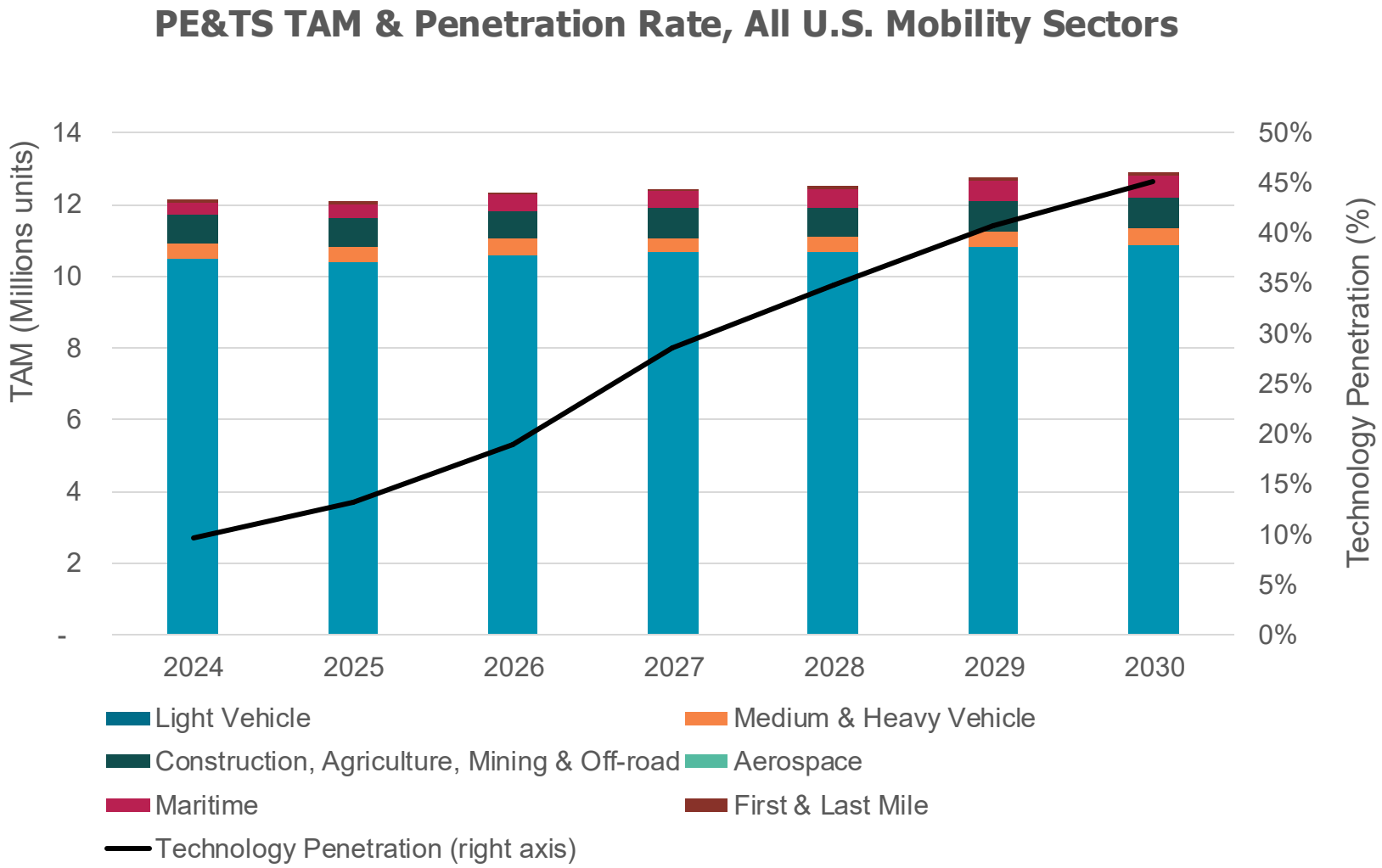
DATA & FORECASTS

U.S. PE&TS TAM & TECHNOLOGY PENETRATION

The Total Addressable Market (TAM)* is the same for Power Electronics and Thermal Systems technologies, with the exception of the First & Last Mile (commercial drone) sector, which is only applicable to Power Electronics. Since this sector represents just 0.5% of the TAM in 2025 and .6% in 2030, the volumes are nearly identical.

The combined technology penetration rate for these technologies is expected to grow significantly, reaching over 45% by 2030.

*Abbreviated as TAM, the Total Addressable Market is the total number of vehicles produced on which a given technology can potentially be deployed.

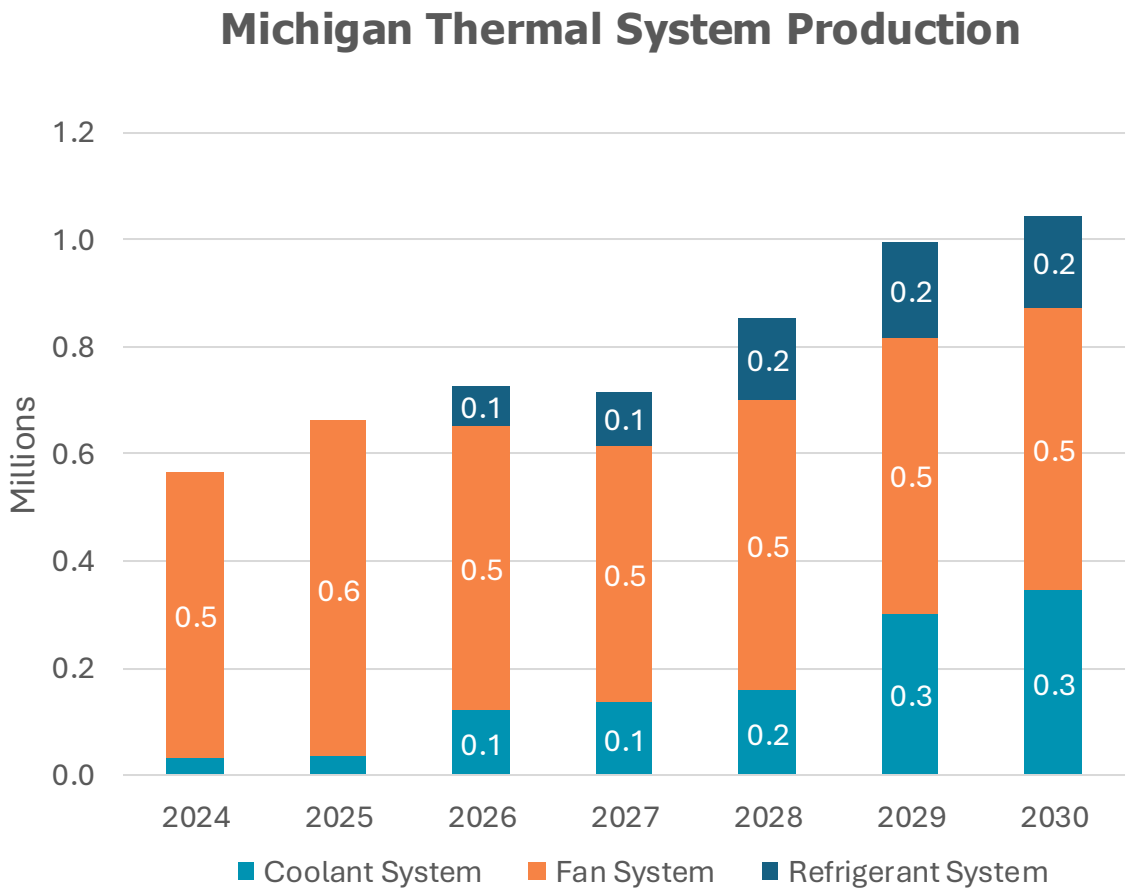


Source: S&P Global Mobility LV/MHCV/Off-Highway Production Forecasts, S&P Global analysis with industry sources (GAMA, NMMA, FAA, AUVSI).

Michigan Thermal System Production Outlook

Light Vehicles are the mobility sector of greatest significance to Michigan and the Detroit Region.

Michigan Thermal System production for Light Vehicle applications is forecast to increase from about 566,000 units in 2024 to over 1 million units in 2030 – an increase of nearly 85%.

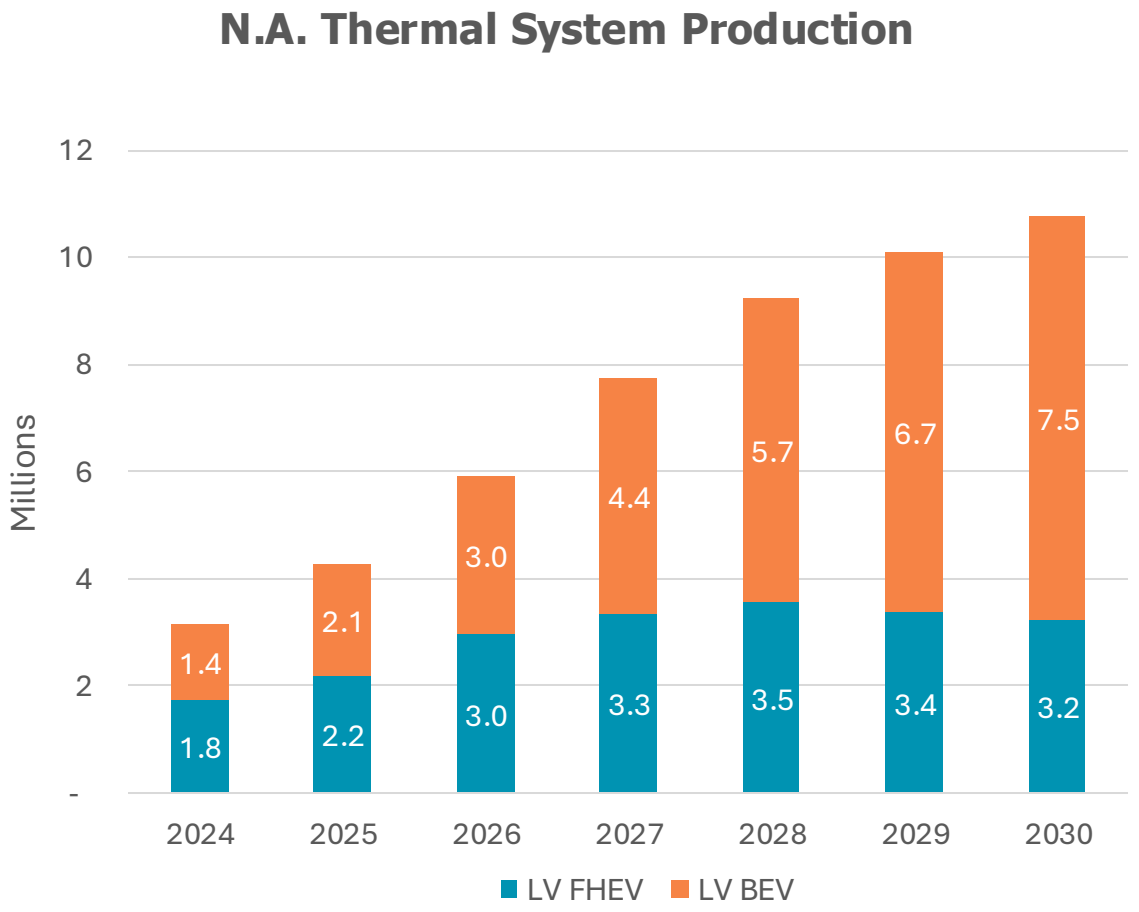


Source: S&P Global Battery Thermal Forecast, July 2024

N.A. LV Thermal System Production

Light Vehicles (LVs) comprise about 98% of United States (U.S.) Thermal System production, which is distributed between Full Hybrids (FHEV) and Battery Electric Vehicles (BEV).

While Thermal System production for FHEVs is forecast to increase by 78% from 2024 to 2030, production for BEVs is forecast to grow by 436% over the same time period.

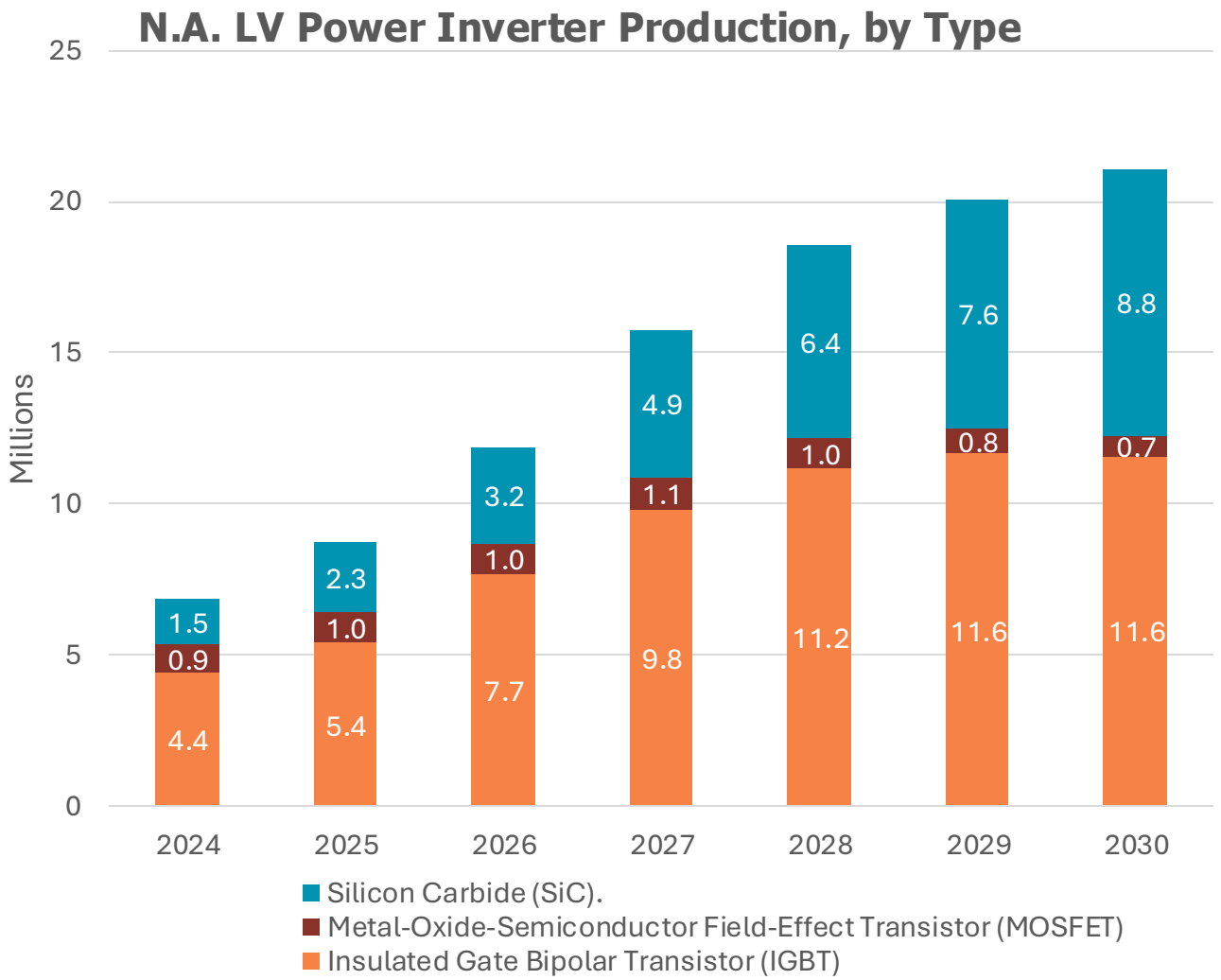


Source: S&P Global Battery Thermal Forecast, July 2024

N.A. LV Power Inverter Production

Total North America (N.A.) Power Inverter production for is forecast to grow significantly, from 6.8 million in 2024 to over 21 million by 2030. This growth represents a 209% increase from 2024 levels.

Silicon Carbide inverters are forecast to experience the largest growth, with 2030 volumes 487% higher than in 2024.



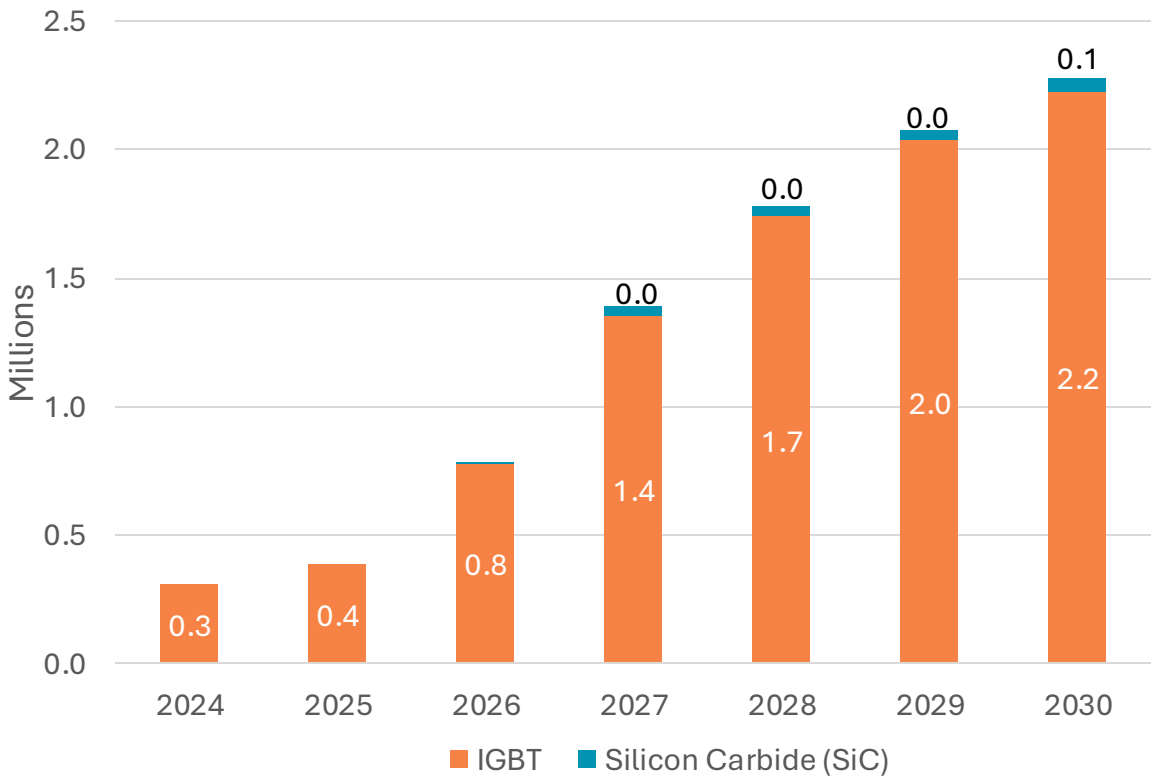
Source: S&P Global Power Electronics: Inverter Forecast, July 2024

Michigan LV Power Inverter Production Outlook

Light Vehicles are the mobility sector of greatest significance to Michigan and the Detroit Region.

Michigan Power Inverter production for Light Vehicle applications is forecast to increase from about 300,000 units in 2024 to over 2.8 million units in 2030 – an increase of more than 833%.

Michigan Power Inverter Production, LV

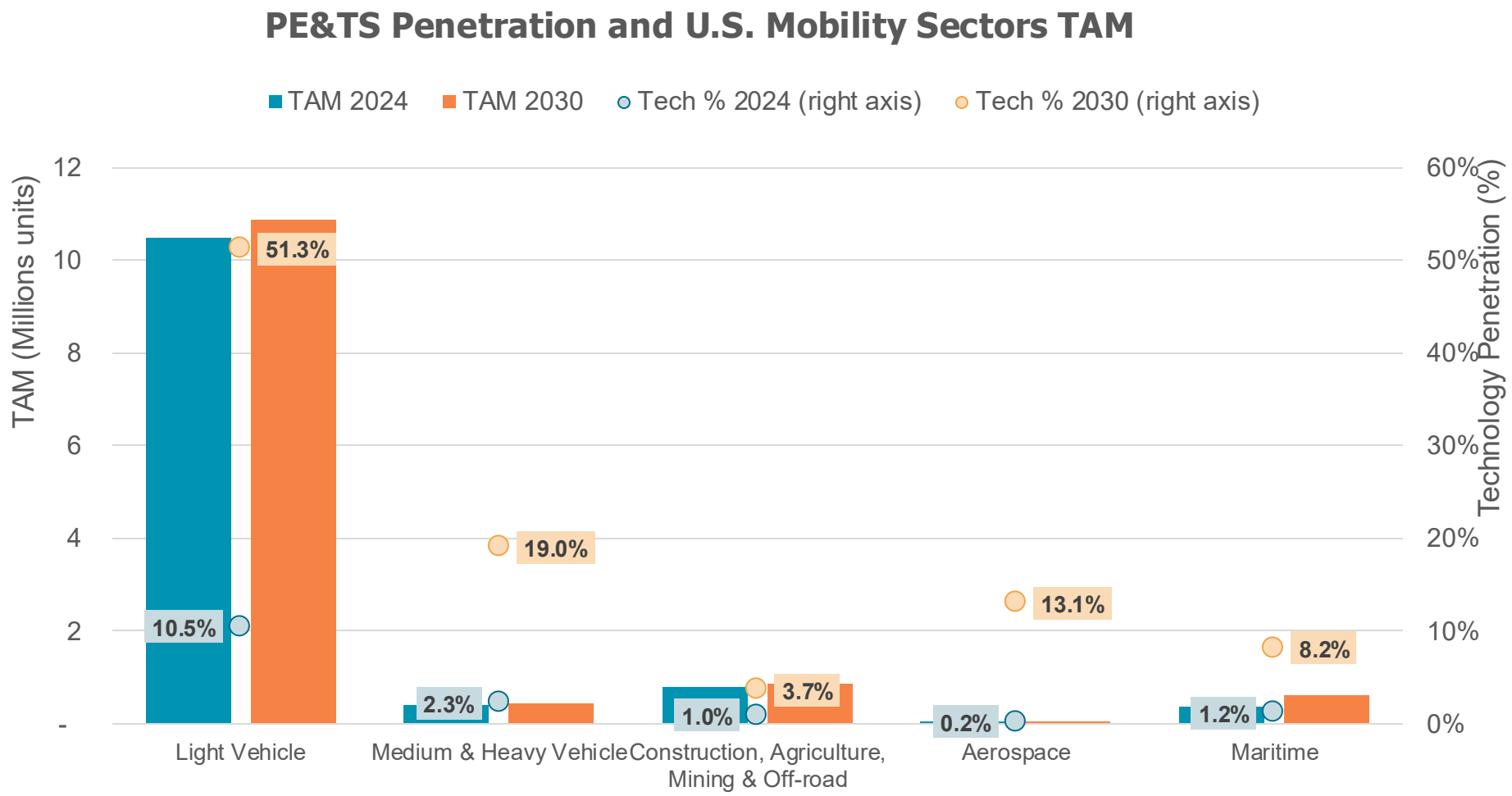


Source: S&P Global Power Electronics: Inverter Forecast, July 2024

PE&TS Total Addressable Market (TAM)

The U.S. PE&TS technology penetration rate for Light Vehicles is projected to grow nearly fivefold from 10.5% in 2024 to over 51% of the total TAM in 2030.

The strongest growth is forecast for the Aerospace sector, where the PE&TS technology penetration rate is forecast to increase from 0.2% in 2024 to 13.1% in 2030.

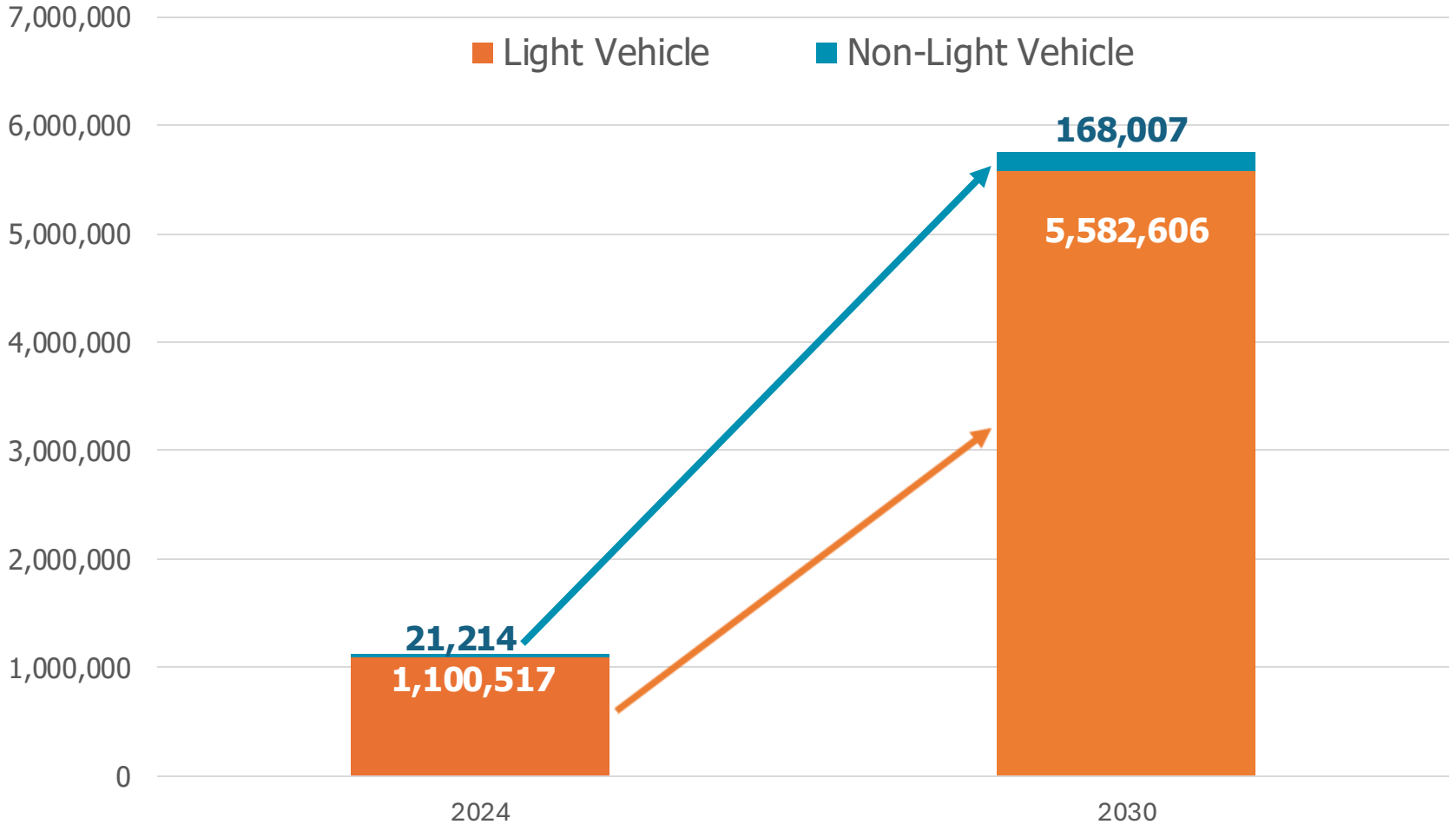


Source: S&P Global Mobility LV/MHCV/Off-Highway Production Forecasts, S&P Global analysis with industry sources (GAMA, NMMA, FAA, AUVSI).
**Note: The technology penetration rate is calculated from the technology TAM from all the related mobility sectors' TAM.*

PE&TS Projected Growth by Mobility Sector

U.S. PE&TS demand for light vehicles is forecast to grow fivefold between 2024 and 2030.

Over the same time-period, PE&TS demand for non-light vehicle mobility sectors is forecast to increase by 692% to over 168,000 units.

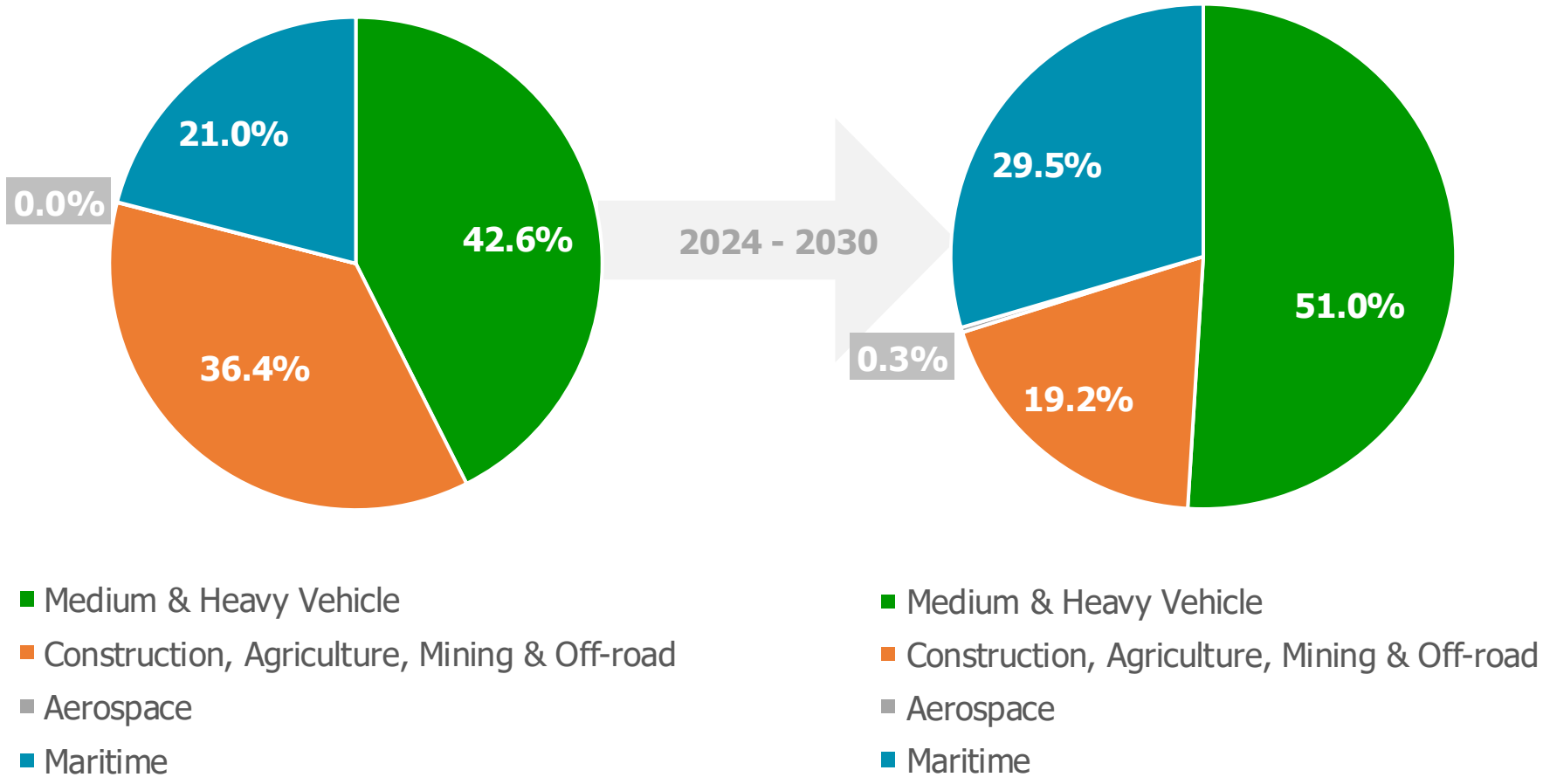


Source: DRP/GEM analysis of data from S&P Global Mobility

PE&TS Projected Growth (U.S.) – Non-LV Sectors

Medium & Heavy Vehicles accounted for the largest application of U.S. PE&TS components in the non-light vehicle mobility sectors in 2024, with a share of 42.6%. While they will still lead in 2030, strong growth is expected in Maritime applications, which are expected to increase from 21% in 2024 to 29.5% in 2030.

U.S. Non-LV Sector PE&TS Share Forecast



Source: DRP/GEM analysis of data from S&P Global Mobility

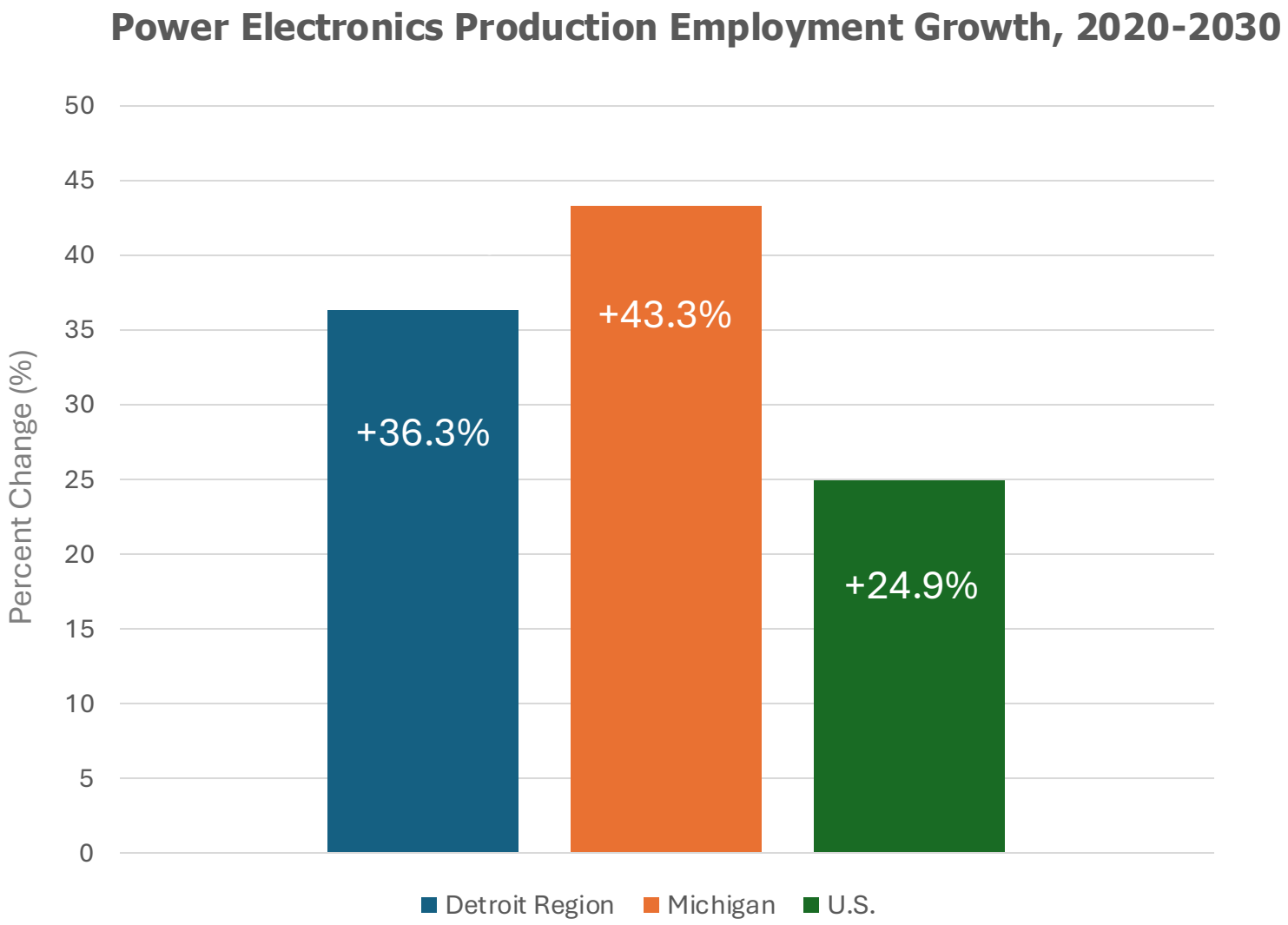
PE&TS EMPLOYMENT ANALYSIS

Power Electronics Production Employment Growth

Power Electronics production is distributed between NAICS 334413, 334418, and 335999.

Between 2020 and 2030, employment in included jobs is forecast to increase by 36.3% in the Detroit Region and 43.3% in Michigan - significantly higher than the 24.9% growth expected at the national level.

Because Thermal Systems are included in the broader 336390 NAICS code, which includes all powertrain cooling products as well as general vehicle components, a breakout forecast for this technology is not available.



Source: Lightcast data and forecast for NAICS 334413, 334418, and 335999

This summary presentation will be updated as additional analysis continues.
New and updated federal policy changes will be monitored and updates applied as needed.