



TRANSIT CONNECT BATTERY ELECTRIC VEHICLE

**EV SYMPOSIUM
NOVEMBER 30, 2010
NYPA AND NYCLHVCC**

Who is Azure Dynamics?

- > **Azure Dynamics is the industry leader in hybrid electric and electric powertrain solutions for Class 3 & 4 vehicles.**



Driving a *WORLD* of difference.®

AZD

Who is Azure Dynamics?

- > **Azure Dynamics is a leader in the development and commercialization of efficient, cost-effective, environmentally-friendly electric powertrain solutions.**
- > **Headquartered in Detroit with offices in Vancouver, Boston, Toronto and the UK**
- > **Azure's history dates back 20+ years (formerly Solectria)**
- > **100+ engineers/techs comprise one of the largest, most experienced electric powertrain groups worldwide**
- > **Over 25 million miles of “on the road” experience**

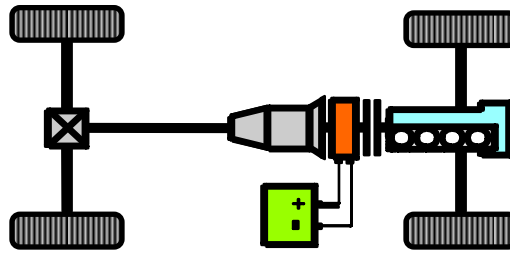
*Driving a **WORLD** of difference[®]*

AZD

What We Build

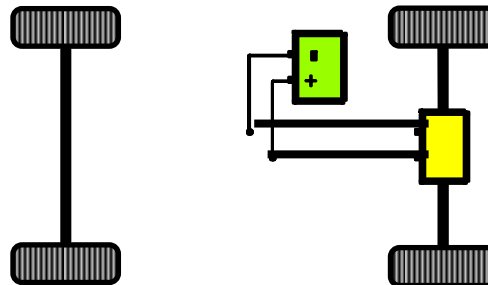
PARALLEL HYBRID

Mechanical connection between engine & electric drive motor (also used as generator during braking)



ELECTRIC

Battery stored energy drives vehicle, zero tailpipe emissions



Driving a *WORLD* of difference.®

AZD

Transit Connect -- History

- > **Over 900,000 sold since 2003 to customers in 58 countries on 3 continents (gas version).**
- > **Introduced to North America in 2009; has proven to be a big success.**
- > **Designed, engineered and manufactured on a dedicated global commercial vehicle platform to meet tough commercial vehicle durability standards.**



*Driving a **WORLD** of difference®*

AZD

Transit Connect

- > **Transit Connect drives like a car, works like a van and is engineered to be as tough as a truck.**



- > **With a global track record of durability, the Transit Connect is a purpose-built commercial vehicle on a dedicated commercial vehicle platform.**

*Driving a **WORLD** of difference.*[®]

AZD

Transit Connect Electric

- > Ford and Azure Dynamics introduced an Electric Transit Connect commercial van to market in 2010.
- > Azure integrated its proprietary Force Drive™ battery electric drivetrain into the Transit Connect Electric.



DUAL BADGE



*Driving a **WORLD** of difference.®*

AZD

Transit Connect Electric

What is it?

Ford's first dedicated small **electric** commercial van

- > **Versatile**
- > **Spacious**
- > **Hard-working**
- > **Proven**
- > **Electric**



*Driving a **WORLD** of difference.*

AZD

Transit Connect Electric



- > **Transit Connect Electric builds on the existing business relationship between Ford and Azure and their experience with the battery supplier, Johnson Controls-Saft.**
- > **Transit Connect Electric uses the same proven battery technology on the road today in Ford's Escape plug-in hybrid. Other components are also shared.**

*Driving a **WORLD** of difference.*

AZD

Battery Electric -- Why Buy?

- > **Car-like driving dynamics, cargo capacity, accessibility, low purchase and operation costs.**
- > **For commercial users traveling predictable, short-range routes with frequent stop-and-go driving in urban/suburban environments, a BEV makes sense.**
- > **If you seek sustainable mobility solutions, Transit Connect Electric provides a zero emissions option.**



Transit Connect Electric Program Timing

- > **Feb 2010** **Introduced at Chicago Auto Show**
- > **May 2010** **Priority production "Slot List"**
- > **Sep 2010** **Driveable demos**
- > **Dec 2010** **First units to Lead Customers**
- > **Apr 2011** **Full production**

- > **Will be sold by Azure with Ford's support via selected Ford dealers**





force drive™ components

1 LEVEL 2 CHARGE PORT
The vehicle is connected to the electrical grid through this port when charging. Capable of 120V or 240V AC charging.

2 HIGH-VOLTAGE BATTERY
Liquid cooled 28 kWh lithium-ion battery pack with internal sensors and controller.

3 HIGH-VOLTAGE JUNCTION BOX
Distributes DC power from battery to components and contains high-voltage fuses.

4 LEVEL 2 CHARGER
Uses 120V or 240V AC input from charge port. Converts AC power to DC power to charge battery in 6 to 8 hours at 240V.

5 MOTOR CONTROLLER & INVERTER
Converts DC from the battery to 3 phase AC for the traction motor. Controls the speed and torque of the traction motor.

6 TRACTION MOTOR
Converts electrical energy to wheel torque. Speed & torque outputs are based on accelerator input.

7 A/C COMPRESSOR
Integrated motor, compressor and controller powered by high-voltage DC. Used for interior air conditioning.

8 ELECTRIC VACUUM PUMP
Provides vacuum for the power brake booster.

9 DC/DC CONVERTER
Converts high-voltage DC power to keep the 12V battery charged and to supply power for 12V accessories.

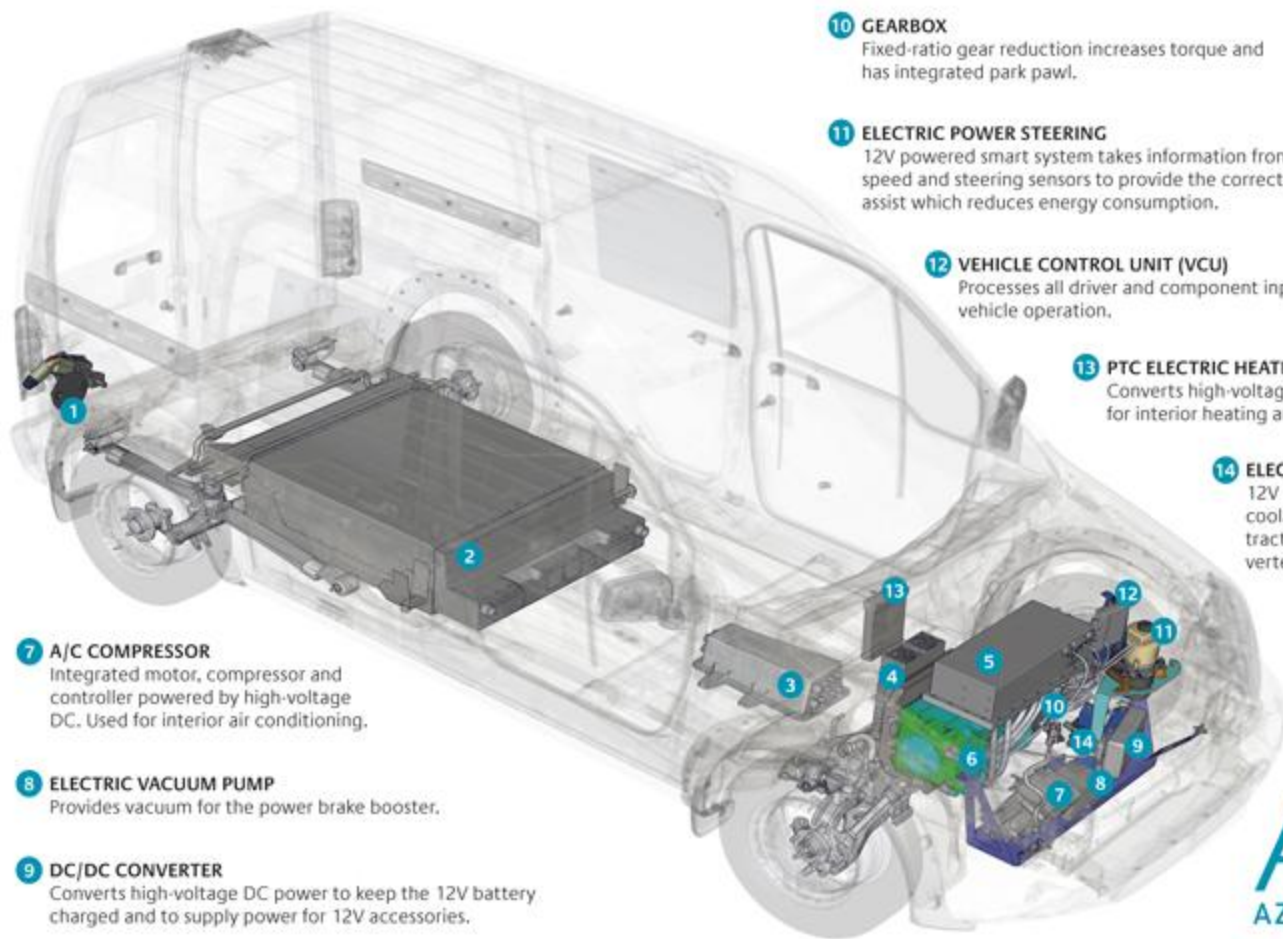
10 GEARBOX
Fixed-ratio gear reduction increases torque and has integrated park pawl.

11 ELECTRIC POWER STEERING
12V powered smart system takes information from vehicle speed and steering sensors to provide the correct amount of assist which reduces energy consumption.

12 VEHICLE CONTROL UNIT (VCU)
Processes all driver and component inputs in order to control vehicle operation.

13 PTC ELECTRIC HEATER
Converts high-voltage DC power to heat. Used for interior heating and windshield defrosting.

14 ELECTRIC COOLANT PUMP
12V powered pump circulates coolant through battery pack, traction system, DC/DC converter and heat exchanger.



battery electric attributes

AZD FORCE DRIVE™ BATTERY ELECTRIC SYSTEM

- 28 kWh, lithium-ion battery (supplied by Johnson Controls-Saft)
- Driving range: up to 80 miles (drive cycle dependent)
- Charge time: 6 to 8 hours with 240V/30A supply
- Max speed: 75 mph
- Able to ascend up to 20% grade
- Ambient operational temp: -30° F to 120° F*

* Some power reduction may occur above 110° F and lower temperatures require pre-conditioning. Specifications preliminary and subject to change upon introduction of the Transit Connect Electric 2010.

Ford transit connect attributes

- GVWR: 5,005 lbs
- Maximum payload: 1000 lbs (estimated)
- 114.6 in. wheelbase and high roof
- Over 135 cu. ft. of cargo space
- 2 sliding side doors, 2 swinging rear doors
- Low side and rear load floor
- AdvanceTrac® with RCS® (Roll Stability Control™)
- Standard front and front seat-side airbags
- Standard Tire Pressure Monitoring System
- 39-ft. curb-to-curb turning radius
- Cargo vans have seating for 2 and an open cargo box

sales inquiries

JEFF HYATT, Director of Sales
T 770.851.3024
E jhyatt@azuredynamics.com

Transit Connect Electric -- Specifications

BATTERY ELECTRIC PROPULSION SYSTEM UPFITTED BY AZURE

- > 28 kWh lithium ion battery
- > Driving range to 80 miles
- > Charge time 6-8 hrs w/240V/30A
- > Top speed 75mph
- > Able to ascend a 20% grade
- > Ambient operating temp -30F to 120F

WEIGHTS/PAYLOAD

- > GVW 5005 lbs
- > Payload 1000 lbs (est)
- > Interior cargo volume 135 cu ft

SAFETY

- > FMVSS certified
- > Collapsible steering column
- > Tire pressure monitoring system
- > Driver, front passenger airbags and front seat side impact airbags

ATTRIBUTES

- > 114.6 in wheelbase with high roof
- > XLT trim package
- > Van or 5-passenger wagon available
- > 2nd row sliding doors, both sides

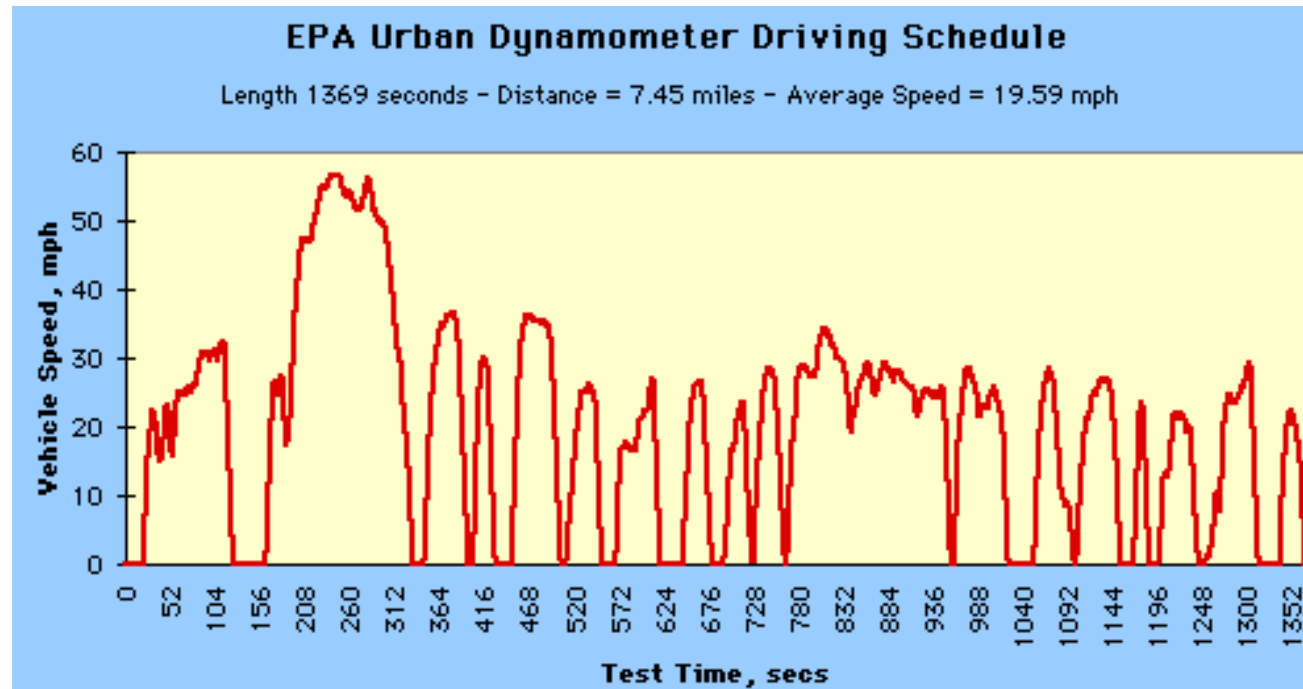
Some power reduction may occur above 110F. Lower ambient temperatures require preconditioning. Specifications are preliminary and subject to change at introduction.

Driving a *WORLD* of difference®

AZD

EV Range

> **Transit Connect
range = 80 miles
EPA "UDDS"
Urban
Dynamometer
Driving Schedule
test**



> **23 minutes, average speed 19.6 mph, distance 7.45 miles**

*Driving a **WORLD** of difference®*

AZD

Local Sales and Service

- > Selected Ford dealers in the New York City area are being set up as sales and/or service locations**
- > Azure will also train your own mechanics if desired**

EV Components and Maintenance

- > Other EV components (i.e. DC-DC converter, power steering system) are common to other Ford vehicles**
- > Motor and controller are sealed, maintenance-free and designed to last the life of the vehicle**
- > No oil changes or other engine maintenance**
- > Fluid levels, tire pressure are the only check items**
- > Reduced brake maintenance**

Warranty and Battery Replacement

- > 5 year/60,000 mile warranty (same as Ford)**
- > At 60 miles/day, 5 days/week, it will be 5 years**
- > Battery projected life 7-10 years**
- > Battery pricing much lower in future (like buying a computer today vs. years from now)**
- > Vehicle would likely be totaled in an accident before battery damage occurs**

EV Charging

- > **EVSE (Electric Vehicle Supply Equipment) available from multiple vendors, SAE J1772**
- > **Level 1 -- 110V any outlet ~18 hrs full charge**
- > **Level 2 -- 240V/30A EVSE ~6 hrs full charge**

"Fuel" Cost for Transit Connect Electric

- > **Gasoline at \$3.00/gal and Transit Connect gasoline vehicle at 22 mpg >>**
\$0.136 per mile
- > **Electricity at \$0.10/kWh and Transit Connect Electric at 350 watt-hrs/mile >>**
\$0.035 per mile

Pricing

- > **\$57,400 plus \$800 destination charge**
- > **\$7,500 US Federal tax credit applies >> \$49,900**
- > **Cargo van or 5-seat wagon same price**
- > **Glass or solid rear/sides for van same price**
- > **255 opening rear doors and rear view camera additional**

AZD
AZURE DYNAMICS
part of the solution



2011

Mid Term

2020



PASSENGER CAR BEV 2011

2011

Mid Term

2020



PASSENGER CAR BEV 2011

Thank you!

Beth Silverman

781-897-6224

bsilverman@azuredynamics.com

www.azuredynamics.com

*Driving a **WORLD** of difference[®]*

AZD

Planning and Sustainability

NYC MAYOR'S OFFICE