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The extraordinary prosperity of the twentieth century was built on cheap oil and gas. When they are no longer either cheap nor reliably available, the economic consequences will be far greater than can easily be imagined

Beneath the seabed off the coast of Saudi Arabia, there is an oil field called Manifa. It is a giant, and its riches are almost untapped.[1] There is, however, a snag. Its oil is heavy with vanadium and hydrogen sulphide, making it virtually unusable. One day, the technology may be in place to extract and dispose of these contaminants, but it will not be for some time and when, or if, it does happen, it will do no more than slightly reduce the rate at which world oil supplies slip away towards depletion. However, even this field has advantages relative to the massive reserves of oil which Middle East suppliers are said to hold ready to keep oil prices low and secure the future of civilisation. Unlike those fantasy fields, Manifa actually exists.

Hydrogen and Fuel Cells

Why do we need a hydrogen economy? The United States – indeed, the world — has a fundamental strategic interest in pursuing the hydrogen economy • Commercial fuel cells and hydrogen would yield benefits to society unmatched by alternatives. • Our nation's reliance on fossil fuels presents fundamental challenges to our economic security, environmental security and homeland security. We must pursue every promising pathway to a more secure energy future. • Hydrogen can be produced renewably and from local conventional energy sources; the result is fuel flexibility and energy security. Hydrogen is well matched with renewable energy technologies like solar and wind power. • Hydrogen fuel cells generate electricity with no conventional pollutants. • Fuel cells produce less carbon dioxide per unit of work, usually much less, than conventional alternatives • Transitional strategies like hybrid vehicles will help, but because of growth in vehicle use, even if every single vehicle in the U.S. was a hybrid by 2025, we would still need to import as much oil as we import today. We need a permanent solution. Will consumers be able to afford fuel cell vehicles? • Fuel cell vehicles will be affordable by the time they reach the marketplace. • Hydrogen opponents look at the price of today's hand-built prototypes and today's stationary power generation systems and leap to the conclusion that fuel cell vehicles will not be cost-competitive. They ignore that prototypes and first-generation systems are almost always very expensive compared with mass produced units. Just like gasoline powered cars, personal computers, digital cameras, and many other innovative products, the price will come down. • Costs have come down dramatically. The Department of Energy, based on current best technology, projects cost of a fuel cell vehicle engine at $225 per kilowatt in mass production. Industry's ultimate goal is $30 to $50. • General Motors says it can achieve a competitive cost by 2010 and it is investing hundreds of millions of dollars in the technology. They would not be doing this if they did not expect to earn a profit. • The California Air Resources Board sees mass production volumes by 2014.

Vehicle types

It is generally possible to equip any kind of vehicle with an electric powertrain.

Hybrid electric vehicle

Main article: Hybrid electric vehicle

A hybrid electric vehicle combines a conventional (usually fossil fuel-powered) powertrain with some form of electric propulsion. Common examples include hybrid electric cars such as the Toyota Prius.

On- and off-road electric vehicles

Electric vehicles are on the road in many functions, including electric cars, electric trolleybuses, electric bicycles, electric motorcycles and scooters, neighborhood electric vehicles, golf carts, milk floats, and forklifts. Off-road vehicles include electrified all-terrain vehicles and tractors.

Railborne electric vehicles

Main article: Railway electrification system

A streetcar (or Tram) drawing current from a single overhead wire through a pantograph

The fixed nature of a rail line makes it relatively easy to power electric vehicles through permanent overhead lines or electrified third rails, eliminating the need for heavy onboard batteries. Electric locomotives, electric trams/streetcars/trolleys, electric light rail systems, and electric rapid transit are all in common use today, especially in Europe and Asia.

Since electric trains do not need to carry a heavy internal combustion engine or large batteries, they can have very good power-to-weight ratios. This allows high speed trains such as France's double-deck TGVs to operate at speeds of 320 km/h (200 mph) or higher, and electric locomotives to have a much higher power output than diesel locomotives. In addition they have higher short-term surge power for fast acceleration,

and using regenerative braking can put braking power back into the electrical grid rather than wasting it.

Maglev trains are also nearly always electric vehicles.

Airborne electric vehicles

Since the beginning of the era of aviation, electric power for aircraft has received a great deal of experimentation. Currently flying electric aircraft include manned and unmanned aerial vehicles.

Electric boats were popular around the turn of the 20th century. Interest in quiet and potentially renewable marine transportation has steadily increased since the late 20th century, as solar cells have given motorboats the infinite range of sailboats. Submarines use batteries (charged by diesel or gasoline engines at the surface), nuclear power, or fuel cells [11] run electric motor driven propellers.

Electric power has a long history of use in spacecraft. The power sources used for spacecraft are batteries, solar panels and nuclear power. Current methods of propelling a spacecraft with electricity include the arcjet rocket, the electrostatic ion thruster, the Hall effect thruster, and Field Emission Electric Propulsion. A number of other methods have been proposed, with varying levels of feasibility.

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Eliica, the eight wheeled electric car of Hiroshi Shimizu.

The **Eliica** (or the **E**lectric **Li**thium-**I**on **Ca**r) is a battery electric vehicle prototype or concept car first shown in 2004 and designed by a team at Keio University in Tokyo, led by Professor Hiroshi Shimizu. The 5.1 m (17 ft) car runs on a lithium-ion battery and can accelerate from 0–100 km/h (62 mph) in four seconds (faster than the Porsche 911 Turbo

at the time).[1] In 2004, the Eliica reached a speed of 370 km/h (230 mph) on Italy's Nardò High Speed Track. The team's goal is to exceed 400 km/h (250 mph), breaking the record set by today's street-legal gasoline-powered vehicles.

KAZ

KAZ

The Eliica is a refinement of the earlier KAZ (Keio Advanced Zero-emission vehicle), a 6.7 m (22 ft) limousine-sized 8-wheel 8-person electric vehicle prototype of 2003 that also set speed records.[2][3][4]

Design details

Eliica shown at Intex Osaka.

The Eliica weighs in at 2,400 kg (5,300 lb) and seats the driver and three passengers. The body was tested in a wind tunnel. The front doors open forward and the rear doors open upward like wings. The car's platform contains 4 tracks of 80 batteries, which make up one third of the vehicle's cost. They currently require about 10 hours of recharging at 100 volts from empty to full charge, and can be easily charged off a residential power grid.

The car has eight wheels enabling it to be closer to the ground for better traction. Each of the wheels has a 60 kW (80 hp) electric motor, giving a 480 kW (640 hp) eight wheel drive which can tackle all kinds of road surfaces. The four front wheels steer. The electric

motors mean that the Eliica can deliver a smooth acceleration free from gear shifts of about 0.8 *g*. Each wheel contains a disc brake and employs a regenerative brake system to recover energy.

There are currently (as of 2005) two versions of the Eliica: a *Speed model* and an *Acceleration model*. The Speed model is made to challenge gasoline-based records and has a top speed of 370 km/h (230 mph) with a range of 200 km (120 mi). The Acceleration model is made for the street and has a top speed of 190 km/h (120 mph) with a range of 320 km (200 mi).

The estimated cost of development was in excess of US$320,000.[*citation needed*] Once the team receives corporate sponsorship, they plan to produce at least 200 units. As of early 2007, the projected price was ¥30,000,000 JPY (about $255,000 USD).

On December 19, 2005, then-Prime Minister of Japan Junichiro Koizumi tested this vehicle in a 10-minute ride to the Japanese Parliament. In 2006, the car was tested by Shintaro Ishihara, the governor of Tokyo, as well as by Naruhito, Crown Prince of Japan.[*citation needed*]

Ford Edge

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Ford Edge

Manufacturer	Ford Motor Company
Production	2006–present
Assembly	Oakville, Ontario, Canada
Class	Mid-size crossover SUV
Body style(s)	5-door SUV
Layout	Front engine, front-wheel drive / all-wheel drive
Platform	Ford CD3 platform
Engine(s)	2.0L EcoBoost I4 (2011–) 3.5L V6
Transmission(s)	6-speed automatic
Wheelbase	111.2 in (2,824 mm)
Length	2007–2010: 185.7 in (4,717 mm) 2011–: 4,742 mm (186.7 in)
Width	2007–2010: 75.8 in (1,925 mm) 2011–: 2,222 mm (87.5 in)
Height	2007–2010: 67.0 in (1,702 mm) 2011–: 1,709 mm (67.3 in)
Related	Ford Fusion Lincoln MKX Lincoln MKZ

Mazda6

Mazda CX-7

Mazda CX-9

Mercury Milan

The **Ford Edge** is a mid-size crossover SUV (CUV) manufactured by Ford, based on the Ford CD3 platform shared with previous generation Mazda6 and marketed in rebadged form as the Lincoln MKX. The platform is shared with Mazda CX-9 crossover (stretched), the Ford Fusion, Mercury Milan, and the Lincoln MKZ sedans.

First generation (U387, 2006–2010)

The first generation Edge made its public debut at Detroit's North American International Auto Show in January 2006, with production starting in the October 2006 as a 2007 model, with the first ones reaching dealerships just before December 25, 2006, because of a brief delay in production due to issues with the supplier[*citation needed*].

The Edge implements Ford's front end design with a three bar chrome grille.

Trim levels

The **SE** includes cloth seats, single-zone manual air-conditioning, AM/FM stereo with single-disc CD/MP3 player, and 17" painted aluminum wheels.

The **SEL** includes unique cloth seats, 6-way power driver's seat, premium AM/FM stereo with 6-disc in-dash CD/MP3 player, leather-wrapped steering wheel with secondary audio controls, and 18" painted aluminum wheels.

The **Limited** includes leather-trimmed seats, and optionally, 6-way power front passenger fold-flat seat, EasyFold™ second-row seat back release, dual-zone electronic automatic temperature control, SYNC® in-car connectivity system, and 18" premium chrome-clad aluminum wheels. The *Limited* trim level replaced the SEL Plus in 2008.

The **Sport** (2008-) includes leather-trimmed with grey Alcantara® suede inserts, reclining 60/40 fold-flat seats with center fold-down armrest, EasyFold™ second-row seat back release, premium AM/FM stereo with 6-disc in-dash CD/MP3 player, SYNC® in-car connectivity system, larger diameter chrome exhaust tips, and 20" premium chrome-clad aluminum wheels. The Sport appearance package for the Ford Edge debuted at the 2008 Chicago Auto Show, with sales beginning as a 2009 model.[1] It will come with standard all-body colored trim and 20-inch wheels. 22-inch wheels are an optional factory upgrade.

2009 Ford Edge Sport

Specifications

Engine

Type	Years	Power, torque@rpm
3,496 cc (3.496 L; 213.3 cu in) V6 (Duratec 35)	2006-	265 bhp (198 kW)@6250, 250 lb·ft (339 N·m)@4500

Transmission

Standard transmission is *6F* 6-speed automatic transmission.

Safety

The IIHS uses its crash-tested 2007 Edge SEL to demonstrate well-designed crash safety

Safety equipment includes standard dual front airbags, front side-impact airbags, side curtain airbags, anti-lock brakes, traction control, electronic stability control, and a tire-pressure monitoring system.

National Highway Traffic Safety Administration (NHTSA) Crash Test Ratings[2]

- Frontal Driver: ★★★★★
- Frontal Passenger: ★★★★☆
- Side Impact: ★★★★★
- Rollover: ★★★★☆

Awards

The Ford Edge has received several honors:

- Ford Edge recognized as one of "*Best Cars for Families*" in 2007 by **AAA** and **Parents Magazine**.
- Edge earns **IIHS** *"Top Safety Pick"* rating for models built after January 2007
- 3.5L Duratec 35 V6 named one of the world's *"10 Best Engines"* by **Ward**.
- Ford Edge named *"2007 Urban Truck of the Year"* by **On Wheels, Inc.**
- Edge wins **J.D. Power and Associates** 2007 *" APEAL Award"*

Production

The Edge (codename *U387*) is built at Ford's Oakville Assembly Complex in Oakville, Ontario, Canada.

HySeries version

Ford Edge hydrogen fuel cell-electric plug-in hybrid concept.

Ford Canada announced in June 2007, that a gasoline-electric hybrid version of the Edge will debut in the 2010 model year. The model is expected to use a new hybrid system from Ford, pairing an electric motor with a V6 engine.[3]

Additionally, after public presentation in 2007, Ford has been carefully pointing at future production of its HySeries Edge.[4] This is a hybrid electric vehicle that uses hydrogen fuel along with plug-in charging of its lithium-ion battery pack, for a combined range of over 320 kilometres (200 mi).[*citation needed*] The HySeries system was first introduced in the Ford Airstream concept from the 2007 Detroit Auto Show. A concept of the Ford Edge with the HySeries Drive was unveiled in the 2007 Washington DC Auto Show. The HySeries system is related to General Motors E-Flex platform. The E-Flex Platform was introduced in the 2007 Detroit Auto Show as the power train of the Chevrolet Volt concept.

This vehicle was featured in the James Bond film Quantum of Solace starring Daniel Craig as Bond, which was filmed in 2008. In 2002, starting with Die Another Day, (Pierce Brosnan as Bond) Ford and EON Productions agreed to a three film contract to

have their vehicles displayed and/or used in the Bond movies. After Quantum of Solace, their contract expired.[5]

Sales

The Edge's U.S. sales have increased since its launch, outselling all other mid- to large-sized crossover SUVs from January to June 2007 with over 58,000 units sold.[6][7] 2007 sales totaled over 130,000 units.

First generation facelift (2011–)

2011 Ford Edge

The facelifted Ford Edge was unveiled on February 12, 2010 at the 2010 Chicago Auto Show. Exterior changes include a new front fascia, wheels, and a revised bumper, while the revamped interior features upgraded materials and capacitive touch controls in place of some conventional buttons and switches, which can also be seen on the second-generation Lincoln MKX.[8][9]

Three new engines are offered for the second generation: a 2.0L EcoBoost I4 engine, a 3.5L Duratec with Ti-VCT making 285 hp (213 kW) and 253 lb·ft (343 N·m) of torque, and for the Sport model, Ford will offer the same 3.7L Duratec engine that is offered in the 2011 Lincoln MKX[10] with 305 hp (227 kW) and 280 lb·ft (380 N·m) of torque.

Trim levels

The **SE** includes cloth-trimmed seats, single-zone manual air-conditioning, MyFord™ with 4.2" color LCD displays in cluster and center stack with 5-way steering wheel controls, and 17-inch painted aluminum wheels.

The **SEL** includes unique cloth-trimmed seats, 6-way power driver's seat, dual-zone electronic automatic temperature controls (DEATC), leather-wrapped steering wheel with cruise control, 5-way switch pads and secondary audio controls, 18-inch painted aluminum wheels, reverse sensing system, and supplemental parking lamps.

The **Limited** includes leather-trimmed seats, 10-way heated power driver's seat, Sony® audio system with High Definition radio with 12 speakers in 10 locations, MyFord Touch™ with (2) driver configurable 4.2" color LCD displays in cluster and 8" color LCD display in center stack, SYNC® including media hub with USB ports (2), SD card

reader and video input jacks, 18-inch chrome-clad aluminum wheels, rear view camera, and 6-way heated power, fold-flat front passenger seat.

The **Sport** includes 3.7L Twin-independent Variable Cam Timing (TiVCT) V6 engine, 6-Speed SelectShift Automatic™ transmission with paddle activation, unique Charcoal Black leather-trimmed seats with Silver Smoke Metallic inserts, 22-inch polished aluminum wheel with Tuxedo Black spoke accents, body-color front and rear lower fascia, 4-inch chrome oval dual exhaust tips, and body-color side lower cladding and rocker molding.

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