

## FORD ESCAPE HYBRID – FUEL ECONOMY ISSUES

### **1.0 INTRODUCTION**

This guide was developed to assist new Ford Escape Hybrid (FEH) owners with achieving good fuel economy, as well as explain FEH fuel efficiency issues.

### **2.0 FEH FUEL ECONOMY ISSUES**

*Don't expect to achieve the EPA miles per gallon on FEH in all conditions.* Fuel economy estimates are based on results of tests required by the U.S. Environmental Protection Agency (EPA). For frequently asked questions about fuel economy, see [www.fueleconomy.gov/feg/info.shtml](http://www.fueleconomy.gov/feg/info.shtml).

To summarize, the ratings are derived in controlled laboratory conditions that are not representative of real world driving conditions, for example the highway test simulates a 10-mile trip and averages only 48MPH, with maximum speed of 60MPH. Test results are adjusted down to attempt to correspond more closely to the actual fuel economy realized by the average driver. The city estimate is lowered by 10% and the highway estimate by 22% from laboratory test results.

Your fuel economy will probably differ from the EPA estimates due to any of several factors related to driving conditions, driver behavior, fuel characteristics, added weight carried, vehicle maintenance, and after market add-ons.

*Driving conditions can affect your fuel economy, such as:*

- In cold weather your FEH doesn't operate efficiently until it is warmed up.
- Driving in rain/snow or on unpaved roads can reduce fuel economy.

*Driving behavior can affect your fuel economy, such as:*

- Aggressive driving (rapid acceleration and speeding and braking) can decrease fuel economy by as much as 33% at highway speeds and 5% around town.
- Taking frequent short trips, where the engine does not have time to warm up, will reduce fuel economy.

### **3.0 FORD ESCAPE HYBRID SPECIFIC ISSUES**

Your new FEH requires time for break-in prior to achieving the best average expected fuel economy. Breaking in a new engine is a process of properly wearing-in the pistons/cylinders/rings, bearings, camshaft, lifters, rockers, etc. that is important to fuel efficiency and life cycle duration. During the first 50 miles, expose your engine to multiple heating and cooling cycles under various loads and RPMs to assist in proper engine parts wear-in. The hybrid system break-in takes a few thousand miles before achieving optimum fuel efficiency.

- The FEH 2005 Owner's Guide (page 276) instructs to NOT calculate MPG until *after* the first 1000 miles [*break-in period*]. The guide further states you will get a more accurate measurement of fuel economy after 2000-3000 miles. Part of the break-in process is the 'training' of FEH's PCM interactive software.
- Selecting MAX AC, defrost, or defrost/floor mode (orange symbols) on climate control system will reduce fuel economy from the energy consumed and will force engine to run continuously when driving at low speeds or during stops.

- The stock FEH has low-weight alloy wheels and Continental EcoPlus low-rolling resistance tires. If you change to heavier wheels or tires that are not rated as low rolling resistance, then expect a significant drop in your fuel economy.
- The FEH requires a few minutes with engine running before being fuel efficient. This is because of the onboard computer requires the engine and exhaust to get up to the right temperature before allowing for the best possible air/fuel ratio tuning. After engine warm-up the FEH may operate as electric vehicle (EV).
- The FEH should be able to stay in EV mode if keeping the Battery Gauge pointer in the "Assist" green band by performing slow accelerations, unless driving up an incline. This maneuver gets better after break-in period.
- The ICE will always snap on at 40MPH, so keep under this speed to stay in EV longer. TIP: When starting to coast and Tachometer is at 1000RPM, you can tap the brakes (sometimes twice) to get the ICE to shut off and go into EV mode. A more efficient trick is to switch to Low gear, where the generator slows the vehicle (charging battery) and turns off the ICE quickly.
- Slow deceleration is better for charging battery with regenerative braking system, where fast stops starts using hydraulic brakes where energy is lost. Using the Low gear for deceleration at stops and turns helps to charge battery while saving wear on brakes.
- The FEH high voltage battery pack operates more efficiently in moderate temperatures, so keep vehicle parked in garage or places that avoid extreme cold or heat loads from direct sunlight.

#### **4.0 GENERAL GUIDELINES FOR FUEL ECONOMY**

- Drive at reasonable speeds, traveling at 60MPH uses about 20% less fuel than at 70MPH. Driving at smooth constant speeds causes less operating mode changes that will decrease efficiency. The FEH seems to get best fuel economy at about 40-50MPH, so select alternate routes to a freeway if possible.
- FEH Owner's Guide (pg 278) states: Carrying unnecessary weight may reduce fuel economy approximately 1MPG for every 300 pounds of additional weight.
- Since a vehicle is more fuel-efficient when the engine is warm, drive to farthest destination first when doing errands and combine errands when possible.
- Maintain momentum by keeping a good distance from the car in front so you can decelerate slowly without braking and time stoplights (if possible).
- If needed, use AC with windows closed above ~55MPH, otherwise windows down at lower speeds will be more economical. Also, use AC interior air recycle setting instead of MAX AC that forces ICE to stay on (at low speeds & stops).
- Keep tire inflation at proper level between 36-44psi. If tires become under inflated to just 28psi, then it will increase tire rolling resistance by about 12.5%. Also keep wheels properly aligned and rotate tires for even wear.
- For hilly areas, select route to go up short steep incline and down the long way.
- Reduce wind resistance by removing roof racks (or by NOT installing bug shields, step bars, mud flaps, antenna balls, flags, etc.).

## 5.0 AUTHOR'S COMMENTARY / OPINION

Many new FEH owner's experience lower fuel economy than expected during the initial few gas tanks. Almost universally, hybrid owners have noticed a continuous improvement in mileage until about 5000 miles. It seems that the FEH engine break-in occurs in the first 5000 miles; one possible reason is that the High Voltage Nickel Metal Hydride battery becomes more efficient over time. I also firmly believe that a hybrid driver improves his/her driving technique over time as they experiment and read up on how to take advantage of the most efficient modes of driving their car. Some say the FEH PCM also "learns" an owner's driving style and compensates accordingly for best possible fuel efficiency. Some Prius owners, with similar hybrid technology to FEH, also noted a second MPG improvement after about 20,000 miles.

There seem to be two schools of thought with respect to hybrid fuel economy driving. One is to attempt to stay in EV mode as long as possible; the other is to drive with ICE in the most efficient speed range as possible.

Rationale includes that EV is most economical since it does not use fuel. The contrasting rationale is that the majority of battery recharging is done by the ICE (not regenerative braking) such that using ICE as generator to create electrical power for charging battery has efficiency losses, so it would be more economical to run the ICE.

I tend to believe the latter, but think the most fuel-efficient driving should consider engine warm-up period at start-ups, especially on short trips. Initially, I had below EPA MPG average, which caused me to experiment with different driving methods. My main disadvantage is I only have a 5-minute commute to work and most of my errands are short trips. Hybrids (as other cars) have their lowest fuel economy in the first 5-10 minutes of driving because extra fuel is used to warm up the engine and catalytic converter. Thus, those of us with only a 5-10 mile commute are unlikely to ever get the car into the most fuel efficient operating condition.

So far, the following driving style has been working the best for me. I drive on 45MPH road right after start-up, with ICE on during engine warm-up period, then attempt to keep the FEH in EV mode as long as possible toward the end of trip. To go in EV mode after warm-up, I switch to Low gear when coasting to a corner to turn on street with 25-35MPH speed limit for last couple miles. Rationale is to discharge battery before turning off FEH for prolonged stop, such that the next start with forced engine warm-up period (that automatically runs the ICE) will also recharge the battery.

There also seems to be two schools of thought with respect to acceleration from stops. One is to accelerate as slowly as traffic will allow, the other is to get up to cruising speed briskly to extract the maximum energy from the gas engine if it is running anyway. Since most of my traffic conditions are too busy to allow for slow accelerations in EV mode, I usually get up to cruising speed with Tachometer ~2000-2500RPM, then try to maintain speed with Tachometer ~1500RPM and coast as much as possible.

I hope this guide will prove helpful in assisting you to improve fuel efficiency.