

Der Sonnenfleck

Sunshine Bimmers Newsletter

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Annual Meeting and Dinner December 2014

The 2014 annual meeting and dinner was held at a new location in December, at a restaurant named Al Fresco's in Winter Garden on W. Plant Street, Al Fresco's also continues to be the location of the regular "Teutonic Tuesday" function. The annual meeting was well attended with lots of interesting conversations about cars and life in general. It was also the last official function for Al Butler as chapter president; Al worked tirelessly on behalf of the chapter and we thank him for all his efforts, the good news is that Al is still an active member of the chapter and he is also still continuing serving as the webmaster for the chapter website. Amy Rutenberg is now the chapter president and I am one of the new members of the board and the new Newsletter editor.



“Teutonic Tuesday”, February 24, 2015:



Three Days in a BMW i3: Did I Just Pass the Last Charging Station?

By Joseph Lenart

Feb 2015

In Leipzig, Germany, a short drive south of Berlin, just off of the A9 autobahn; set among an array of gigantic wind powered turbines producing electricity from the wind as it races through the hilly terrain, wind turbines so large and numerous that they would strike fear into the heart of Don Quixote; another i3 is “baked” and glued into existence. It is built from carbon fiber in a quiet environment, so hushed that workers are not required to wear hearing protection; this modern plant is also home to other BMW vehicle production such as the X1.

The vehicle is environmentally friendly to say the least; it is constructed from many recycled and renewable materials, the material seats are made from re-cycled plastic, now I know where all my old plastic bottles go; the dashboard wood comes from fast growing renewable forests; the leather seats are naturally dyed with olive oil and come in only one color, dark brown. Overall, BMW made a large investment in the entire production environment for new vehicle construction due to the expansion of electric and hybrid vehicles in its total vehicle range.

The electric motor is located in the rear of the vehicle on the driver side and the lithium-ion batteries used to power the electric motor are located at the bottom of the vehicle for a low center of gravity. The i3 electric motor produces the equivalent of 170 horse power (hp) or 125 kilowatts (kW) and 184 foot-pounds of torque; this power plant can propel the 2,700-pound i3 to 60 mph in just over 7 seconds. The power source is a 22 kilowatt-hour (kWh) lithium-ion battery estimated by BMW to have a driving range of 80 to 100 miles on average, longer in economy mode.

Under the front hood is a small trunk to store the charging cables and other small items; more storage is available in the back similar to the BMW X1. The “kidney grills” in the front of the vehicle are of course decorative since a radiator is no longer required, as well as no oil changes, no water pump, no valves, no oil cooler, and no gas station, all this of course is without the range extender option.

My first exposure to the new BMW i3 was a brief test drive during a BMW North America sponsored test drive event that was touring the US; the vehicles they were using were European models temporarily allowed in the US for this product demonstration tour. Since that first drive, I also took some very short test drives after the US version of the vehicles arrived at the local dealership.

I was presented with an opportunity to drive the i3 for three days; I thought this would be a reasonable test of the daily driving experience of this electric vehicle. After making arrangements, I arrived at the dealership first thing on a Thursday morning with some excitement and anticipation of an extended time in an electric vehicle, in typical driving situations. They gave me a 2014 i3 with the range extender option, the range extender is a small motorcycle engine used as a generator to charge the battery for additional range; with 2.4 gallons, it provides approximately another 100 miles without stopping; the small gasoline engine does not provide any propulsion. This version of the i3 was the top of the line “Tera World” in what was described on the sticker as “Laurel Grey/ BMW i Frozen Blue” in color.

The base price of this Tera World version was \$45,200; with all the options, the sticker price increased to \$56,050, one could easily debate the usefulness of any of the options depending upon personal viewpoints as being necessary or not needed at all. There are different versions of the i3 available, the 2015 base model, “Mega World”, without the range extender is \$43,900, including destination and handling, the base version is already well equipped with most of the options one would want from a modern vehicle.

The fuel economy rating on the sticker was 117 “miles per gallon equivalent” and 39 miles per gallon for the small motorcycle engine, the direct tailpipe emissions of course were zero; however, the Florida utility power rating of 0.5 pounds of carbon dioxide per mile equivalent was from the Tesla website, that is, the charging byproduct of using the utility company is as if there were 0.5 pounds of carbon dioxide emanating from the tail pipe per mile. As a comparison, a typical hybrid is 0.3 lbs/mile of carbon dioxide, a Diesel Golf is 0.6 lbs/mile, a 2013 328i is 0.7 lbs/mile, and a Mercedes-Benz S63 AMG is 1.09lbs/mile.

I was handed the key fob remote control, which is slim and fits well in the pocket and pushed the “start” button to activate the vehicle; it should really be called an “activate” button as nothing really “starts” as much as “turns on” when I press the start button. I quickly took note of the available range as it displayed 72 miles; the range display is the functional equivalent of looking at the gas gauge before driving off in a gasoline powered vehicle. The prior two times I drove the i3 and a Tesla, were just local short test drives and I paid no attention to the range display other than curiosity about the battery drain rate.

All of a sudden 72 miles did not sound like much, I started having this uneasy feeling, like that feeling of being stranded at the side of the road, usually when it is raining and dark; so this is what “range anxiety” actually feels like. While sitting there in the parking lot of the dealership, I started quickly adding up the miles until I reached home that night. Let me see, 6 miles to my office, perhaps 5 miles during my lunchtime routine and then 20 miles back home. Okay, that total was well within the displayed range of the vehicle.

One small problem; there was no accounting yet for my driving style and it also matters if one is driving on the highway or local roads, local driving with frequent braking does provide some additional battery recharging through regenerative braking; regenerative braking captures energy during braking to help re-charge the batteries. When I did return from lunch, the range displayed 46 miles, the distance home was 19 miles, surely this is more than enough. The displayed range was more than twice that I needed; I still did not know how my driving style, the use of headlights, air-conditioning use, heat, or other use of other electronics affected the rate of the battery drain.

In addition, the drive home would almost exclusively be on the highway and under normal driving conditions, there would not be much opportunity for regenerative braking, a traffic jam would help, although that would be undesirable. I observed this braking effect going out for lunch and returning, driving through downtown actually added a mile or two in range, as displayed on the readout.

As tempting as it was, I decided not to plug the i3 in for any charging in the afternoon, I had the vehicle’s low voltage charging cable; in any event, the range extender would allow me to get home, although I wanted to avoid using it.

All went well on the way home, I arrived with 31 miles displayed on the range indicator; using the trip odometer, I drove 33.7 actual miles since the morning and I used 41 miles in electrical range. The 41 miles equates to approximately 10.7 kWh of the total battery power, the utility company charge for replenishing this amount of electrical power is \$1.40 using \$0.13 a kilowatt-hour as an average price.

I use \$0.13 a kilowatt hour as the total price of electricity from my utility company, the electric bill indicates a lower rate for the actual kilowatt charge; however, there are additional fees that are added to the bill; I simply divide the total amount of the bill by the number of kilowatt-hours consumed for a annual average rate of \$0.13 per kilowatt-hour.

I estimate that a 328i would consume 1.38 gallons of fuel for the equivalent miles, using \$2.59 per gallon at today's price; the total for the identical distance in the 328i would be \$3.57. The difference in price is a function of the price per kilowatt-hour by the utility company in the fluctuation of fuel prices and the fuel (or energy) efficiency of the vehicles.

Just as a note, a kilowatt (kW) and a kilowatt-hour (kWh) are two different units of measure, kilowatt refers to power and kilowatt-hour refers to energy. A watt is a measurement of power and it can be compared to the measurement of "horse power" (hp), the prefix "kilo" means "1,000"; hence a kilowatt is a 1,000 watts. For example, the i3 is rated at 170 hp or 125,000 watts, usually shown as 125 kW, these are equivalent measures. In Europe and elsewhere in the world, automotive horsepower ratings are also expressed in kilowatts. The kilowatt is an international standard, horse power ratings are not standard; there are international differences in the way horse power is calculated.

The kilowatt-hour is a unit of energy; it represents a measure of 1,000 watts per hour, a unit of measure familiar to anyone who pays an electric utility bill. A kilowatt-hour is a unit of energy equivalent to one kilowatt of power expended for one hour. The i3 battery is rated at 22,000 watt-hours or a 22 kWh energy source, technically speaking this is a "gross" amount; as not all of the electrical energy is drained completely from the battery, the practical useable energy is slightly less than the gross amount. As an example, the i3 battery of 22 kWh could power a 100 watt light bulb for 9 days. In summary, the horse power rating of an electric car can be stated in kilowatts and the battery capacity is rated in kilowatt-hours.

The Environmental Protection Agency (EPA) established a new metric in November 2010 referred to as miles per gallon equivalent (MPGe); this rating is based on the EPA's formula in which 33.7 kWh of electricity is equivalent to 1 gallon of gasoline and using 5 standard driving cycle tests simulating varying driving conditions.

Using only the conversion of 33.7 kWh to 1 gallon of gasoline, I averaged approximately 105 MPGe, the sticker for the i3 stated 117 MPGe for electric only propulsion; the range extender engine was rated at 39 miles per gallon in the traditional sense, it is a small

motorcycle engine being used as a generator; as noted earlier, the small engine does not provide direct propulsion to the vehicle, the engine is used to charge the battery.

After dinner I used the standard 110 volt cable that is included with the vehicle, referred to as the "Occasional Use Cable". I made sure to use a heavy-duty extension cord as I knew the cord would heat up from the current flow. After one hour of charging, the range increased from 31 miles to 49 miles, as with most batteries that can be recharged, it charges quickly at first and then it takes a while to get to full charge; this is due to the nature of battery charging and chemical processes.

For example, smart phones charge quickly to 50 or 60% and then above 90% it takes a while to finish and reach 100%. It is like filling up the trunk of a car with a lot of luggage for a long trip; it is easy at first to put in luggage items and then it gets harder and harder to put in the last items as the trunk is filling up, even though these last items tend to be smaller.

I started charging at 7:10 PM and the dashboard display indicated that charging would complete by 2 AM, I do not know if this was the case, I was long asleep by then. It is possible to charge the 22 KWh battery energy source for the vehicle, using a standard outlet, in 6 to 8 hours. Charging could even be completed faster with the higher voltage "fast charge" unit; the 240 volt fast charge option requires an installation for the connector.

An interesting option currently available in Europe is a \$9,000 carport with solar panels to charge the i3, this solar carport can be bundled into the price of the car for financing options; there are similar plans for the US market using a company called Solar City; this is an exciting option in addition to using standard house current.

My wife drove the i3 to work the next day and she drove a total distance of 26 miles, and she used 35 range miles to cover that distance, resulting in a 95 MPGe estimate. This result was bit surprising; it is not readily apparent why I seemed to achieve better fuel economy for my driving, knowing that I probably used a little more of the horsepower for some brisk driving.

Perhaps it was because it was cool and dark that morning and the use of the high output and bright light emitting diode (LED) headlights and the vehicle heater together made the difference in the reduced MPGe for her. As an interesting note, the heater immediately provides warm air, no need for anything to warm up; the batteries provide instant heat, just like a hairdryer or an electric space heater.

As we were returning the i3 on Saturday afternoon, I was thinking about the overall experience; this electric vehicle has a lot to offer, I enjoyed driving it, especially around town and on the local roads, I experienced what I call a little bit of "twitching" at highway speeds; perhaps due to the light weight, the steering or, the very thin tires. As an electric vehicle, it is very good, I'm not sure I would trade my 328i for the i3 just yet; it will continue to evolve and improve.

Certainly range anxiety is a strong consideration, the Range Extender is an option, planning ahead and thinking about charging options is a shift in thinking; by the third day, I was thinking about places I could re-charge while combining errands. In the early days of gasoline powered vehicles, I am sure it also required planning to find fuel stations that were not as abundant as they are today, in addition to carrying extra gasoline.

I believe the i3 is much better than some other electric vehicles such as the Nissan leaf, although it is more expensive, in some cases with certain options, much more expensive. The i3 has brisk acceleration and responsive steering; 0 to 60 MPH acceleration is on par with the 2002 BMW 530i.

There was an immediate strong linear acceleration without any torque steer or shifting of gears when I “floored” the accelerator; the full torque of the electric motor is immediately available; only a slight pleasant whirring sound was noticeable during hard acceleration and an eerie sensation of rushing forward without noise in a hushed cabin as if an unseen force was pushing the vehicle.

The steering response is very good, although the vehicle was not pushed to any degree; the steering wheel had a nice feel to it, it is not too large or small and the cross section of the steering wheel has a nice rounded feel in the hands.

There were no strange sounds emanating from the vehicle, as is the case in some hybrids such as the Toyota Prius. In the past, we noticed some annoying high-pitched humming sounds in a Prius V that we rented for several days. Only a slight wind rush was discernible in the i3; no other annoying sounds.

“One pedal” driving is possible under most normal driving circumstances due to the regenerative braking, the regenerative braking slows the vehicle as if slight braking pressure is being applied, in addition, the vehicle’s brake lights also illuminate. Under normal driving conditions, releasing the accelerator quickly slowed the vehicle without pressing the brake pedal. If the accelerator is slightly depressed, the i3 will roll without braking action as is typical of a standard vehicle.

There was great outward visibility through the large windows and the dashboard area is very functional and appealing, even with the large center display; described by some as a “floating display”. The large center display seemed more integrated and visually appealing than the display on the current generation 3 Series vehicles. There is a smaller display screen in front of the driver that displays such things as the speed of the vehicle. It is a digital readout and I am not fond of digital speed displays, I would prefer an electronic analog dial display of the speed, which would be very easy to do or offer a setting to change between the two options.

I will leave the styling to the beholder, as I personally don’t mind the functional design with the large glass view from inside the vehicle; however, there are many people with a contrary viewpoint for the vehicle styling; styling is always debatable and subjective,

unless it is a Pontiac Aztec. I would give the i3 a B+ overall grade; using a point evaluation scale I developed to compare cars. The i3 is currently well positioned in the middle of electric cars with the Nissan leaf below and the Tesla model S above in terms of price and performance. More electric and hybrid vehicle options have been announced by BMW in the near future.

Upcoming Events for 2014

In addition to the regular “Teutonic Tuesday” dinners at Al Fresco’s, there will be a lunch at the Bavarian Haus in Mount Dora from 11am to 1pm on March 22nd, in May there will be a driving event with NASA, May 1-3 and the picnic is scheduled for June 6th in Satellite Beach from 11 to 4pm.

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Special Note: The Sunshine Bimmers Chapter was required to rent an official post office box as a condition of charter by BMW CCA. Our new official address is PO Box 3214, Windermere, FL 34786-3614; however, you should directly contact the person

listed above who is most likely to be able to respond to your need, as the post office box is not checked daily.