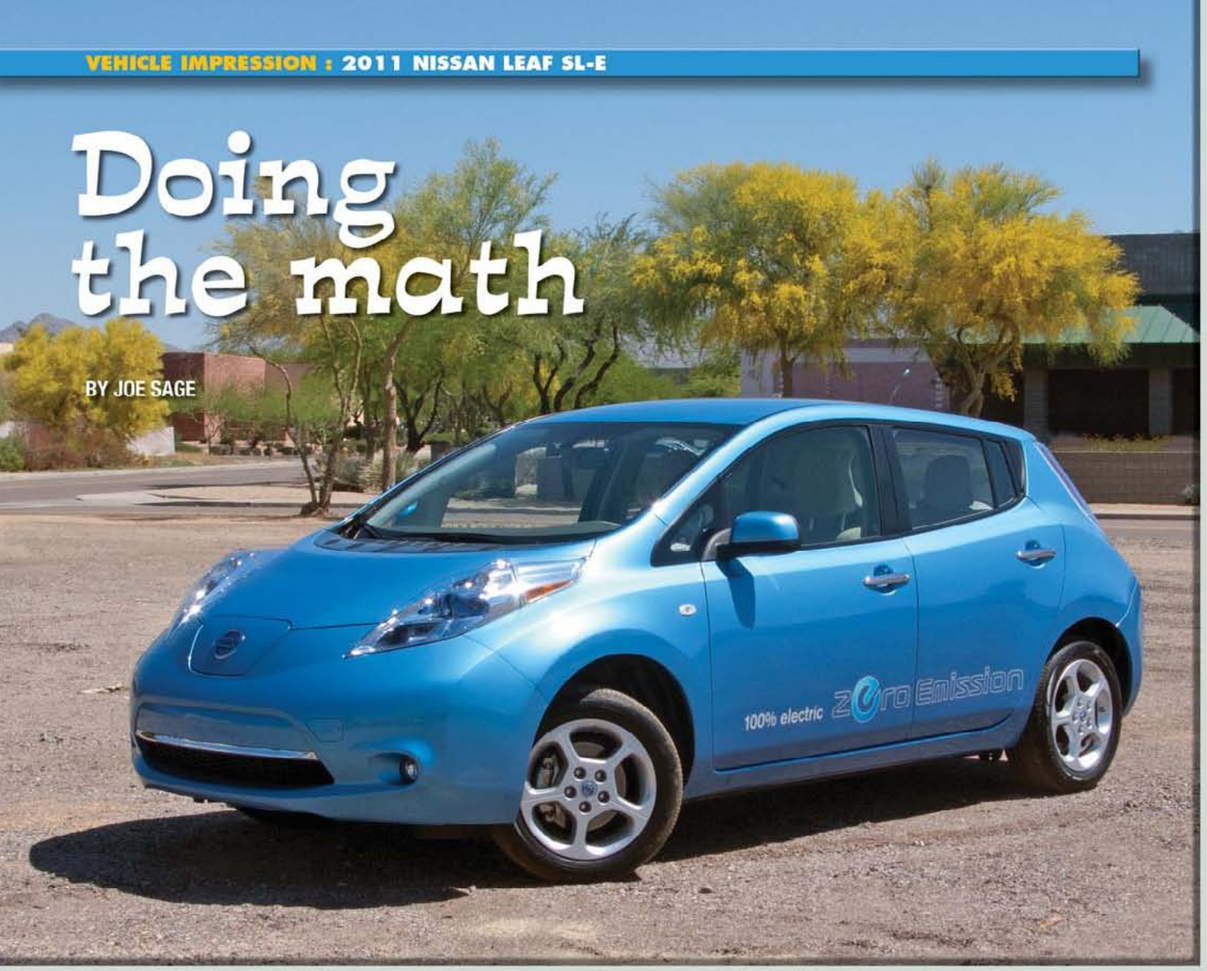
Doing the math

BY JOE SAGE



It's not really all that different. At least when we were young, new drivers, we all did the math, regularly. How far can we go without having to put gas in the car? How far is it to that station where gas is 10 cents less a gallon? We'd bargain with ourselves, and we'd find a way to make it work. Is it any different, driving an electric vehicle today? Not really. The range is shorter, yes. And the refueling spots are, if not rare anymore, less familiar. And it does take longer to "refuel." But dad still doesn't want the car coming home empty.

While others build hybrids or devote vast resources to quixotic quests like the hydrogen car, Nissan (with partner Renault) has devoted its efforts singlemindedly to the electric car. Unlike similar efforts of a couple of decades ago, they are tackling one of the most important aspects, comprehensively and globally: they have worked to establish a standard plug-in, and they are working (as are others) to see these installed—meaningfully, plentifully and clearly identified—worldwide. (Granted, "J1772" isn't a catchy name, but there will surely come a more tongue-friendly alternative, as surely as few users remember WiFi is really IEEE 802.11.)

We've been seeing the Nissan Leaf at big auto shows for well over a year, so its arrival on our test schedule came with much anticipation. Or at least with much aforethought. In the sickly pale green of the original show car, the Leaf had been of interest but hadn't inspired lust. (What's more, the test cycle was going to be shorter than usual: just four days. And for us, it overlapped a week with the Porsche Panamera, a vehicle decidedly from the other end of the scale.) We admit we hadn't fully absorbed just how cool the Leaf is, until it arrived and we got behind the wheel.

Simple arithmetic

We received our Nissan Leaf on a Thursday, along with a bit of an orientation. The shifter is a little knob, basically functioning like a switch. It could have been joysticked any number of ways, but despite not mimicking a shifter handle, it presents a familiar shift pattern. Slide it to the left and forward for reverse, or back for drive. Jog it to D again and it goes into Eco; jog it again and it comes out of Eco. It's an elegant solution, fully integrated and not button-happy. The electronic parking brake is right behind that.

The main instrument cluster is all about electric: a recharge and drain gauge, battery temperature, and both a graph (much like a fuel gauge) and digital-numeric readout of estimated range. As delivered, fully charged (it was brought by flatbed to a staging point a block or two away), range was stated as 108 miles in Eco; click the shifter to come out of that, and it says 98 for regular Drive. Not a big difference, but we weren't driving yet.

We were still sitting in a parked car, and it was getting stuffy, so we asked whether we could turn on the a/c for a minute. We did, and our range (still sitting, not running) dropped to 80 miles. That was particularly noteworthy to us, as we had about a 70- to 80-mile drive on the books for the next day.

There's a second binnacle above the steering wheel showing speed, the high position of which makes it like a heads-up display, handy and cool. This also can display an alert triangle, in which case you refer back to the larger display below. We decide this is handy, too, and clean, sort of a cross-reference, like a footnote.

A colleague of ours in the Pacific Northwest was driving the Leaf at the same time we were, and hers came with its own iPhone, for purposes of using a dedicated Leaf app. Ours did not, but we have the phone so we figured we'd just download the app. Unfortunately it requires a longterm subscription, available to owners, so we had to pass. Too bad, as we might have liked to experiment with reading the charge, or starting the air circulation, from the office desk. We did, of course, download an app for locating charging stations.

In the nose of the Leaf, there are two plug-ins: one is for a charging cable (we were provided with a 120-volt cable, though it can plug into, and charge must faster from, 240). Next to that is the cleverly named "turbo charger," for dedicated rapid charging stations.

Trial by fire

Knowing we had an e-challenging drive to make on Friday (and knowing it had arrived fully charged), we left our Leaf parked on Thursday, ready for morning. We had to make it from the northeast Valley to Glendale for a midday event—and back, we would hope—about 35-40 miles each way. Based on our readout, we might be pushing it, especially if a couple of hours of driving were more than we wanted to do with no interior airflow.

That same colleague in the Northwest had already informed us that range numbers "aren't necessarily reliable and can in fact be downright confounding." We had already seen that if we turn on the a/c, we'd have an 80-mile range, and we were hoping not to have to recharge en route. Our iPhone app indicated quite a few charging locations, though. (In fact, compared with most of the country, metro Phoenix is very well equipped.) Three of these were Nissan dealerships that were within reasonable distance of our route. But we didn't know how much explaining we might have to do, to waltz in and hustle the process, and recharging does take some time, while our own outlet awaited us back at the office.

We vowed to of course use Eco mode, skip a/c and try not to use any accessories. Our Northwest colleague drives some 25 miles each way, each day, and had warned us to be frugal. Even though she'd achieved 100 miles of new range on her best overnight charge, she was driving with the wipers off (in greater Seattle), the heat off (in 35-degree temps), everything off except the radio—"to distract me from the hypothermia." We were about to tackle the warm-weather equivalent challenge.

Tomorrow's tech today

Our logbook noted that as far as just driving, the Nissan Leaf is just a perfectly normal and very pleasant little car. Being all-electric, one of the first things we realize is that we don't have to be nursing the pedal, as in a hybrid, to avoid kicking in the engine while trying to be as economical as possible. In this, we always will be, and we just try to drive it well.

Initially we note that it won't get any major awards for steering or suspension, though it's a perfectly capable, typical small car. But minutes later, we take it back: in lane-to-lane slalom, it handles beautifully. And yes, as with any electric car, it pumps out the pound-feet across the full power band, offering plenty of torque, hot off the line. In aggressive surface street traffic, as well as on freeway ramps and entering high-speed traffic, it holds its own very well: we were able to pick a spot in another lane, accelerate and dart into it like a champ.

In typical Nissan fashion, controls are simple and straightforward. The center stack is quite intuitive, and its implementation of a touchscreen interface makes all the difference. Power, park and parking brake are all electronic, so there are a few buttons to push each time, though the brake will release itself in the start-up-and-drive-away sequence.

As we start our Friday range challenge, we pass a popular hybrid and find ourselves thinking: hey, buddy, you're yesterday's news. The Leaf does give us a cutting-edge feeling, not what you'd get from most very small cars. We were then passed by a brand new Buick, thinking that's a good-looking new car, GM is doing its best building into the future, but thinking again that our Leaf is really tomorrow's news. However, we're on our way to a Chevrolet Volt event, so we give them credit for tackling the future many different ways.

A psychologist would have no trouble at all with our other encounters on the mean streets. Fellow motorists with something powerful, expensive and showy seem compelled to see whether they can just dust this little vision of tomorrow. (Answer: not really.)

We tag up with a classic Porsche 356 cabriolet, a great counterpoint that we hope always has its place.

Suspension on the freeway is wonderful: firm, smooth and quiet. We feel what we want to feel, little ribs and bumps, basically the feel of the road, while it delivers an overall silky smooth ride.

When we give it a little gas for another lane change, we hear the slightest whine, plus a little bit of road noise and a little bit of wind. And that's it: nice and quiet. We feel the torque, we hear the whine, and imagine we're straight out of a cyborg sci-fi movie.

We're loving highway speeds in this, so as we note construction on the other side of the freeway, with traffic very thick and slow, we make a note to avoid this on the way back. Wrong idea, as we will soon learn.

Basic subtraction

Yes, we are enjoying the drive, but our focus at the moment is on our 80-or-so-mile round trip. We have the windows open, despite any turbulence that may add, because we don't dare turn on the a/c. The car's estimated range was 107 Econ and 97 regular when we first got in; after about a mile, though, the Econ estimate had dropped to 101. After just two miles, we'd lost nine off the chart. At three miles? Econ range has now dropped to 88 from 107—19 miles lost in those three miles of driving. Worse, this estimate left only a few more than we needed for our trip, and they were disappearing at a much faster than pro-rata pace. At seven miles, we had lost a full 34 from the gauge.

We dropped it out of Eco and into normal drive, just to compare: this cost us just five miles of estimated range, pretty meaningless since we had now lost 39 miles of range in our first ten of driving—in Eco. We of course switched right back to Eco, nonetheless.

We closed the window to reduce freeway noise and high-speed battering, but also to see if it helped the range. It quickly got stuffy inside (outside temp was 74 at the time). We pursued a little airflow, but without a/c.

As we exit the freeway near our destination, we hit a traffic light just as it's turning yellow, but nobody is behind us, so we give it a solid brake. Wow. The brakes are very powerful and very firm. Better than expected and better than most small cars. Range now: just 50, less than half of what we started with (107). Things are looking bad for the return trip.

As we park, though, our range meter has bumped back up to 55 miles, just over half of our initial range. Before we exited the Leaf, we took one phone call. It was not a long call, but the range dropped to 49 while sitting there. Overall, we were hovering just above or just below exactly half of our original estimated range. Would we make it back? Should we plan to blow time on a dealer recharge?

Ah, yes, range anxiety. That's the catch-all term GM has picked up on to promote the Chevy Volt, which in addition to its primary electric propulsion has a "range-extending" gasoline motor that doesn't drive the car, but rather tops off the juice to keep the electric power feeding the drive system for many more miles. But that adds weight and complexity, too, giving the Volt less than half the initial electric range of the Nissan Leaf. Then again, the Volt is also a more conventional car, larger and harder to distinguish from a multitude of midsize sedans, which GM felt would be a plus. The Leaf is small, quirky and fun. Apples and oranges on more than one level.

We shared a sandwich with a colleague from GM at our event. He was amused no end, to see us experiencing range anxiety up close. We felt as though we were 30 miles from Moab with an empty tank, and our buddy

KEEP RIGHT >>

had brought a couple of extra gerry cans of gas along, while we had not. The Volt, after all, has its onboard range-extender. Our Leaf does not.

Group-think at lunch concluded we should forego the freeway on the way home, since regenerative braking during slower stop-and-go traffic would provide charge back to the system. We've had considerable experience pushing this on Toyota and Lexus hybrids, and the principle is sound. Of course this would take longer, but probably not as much longer as heading to a Nissan dealership for a rapid recharge. Was it a sure thing, though? Only one way to find out.

Advanced mathematics

We left on our return trip with the gauge reading 49 miles to go, stopped to answer a few questions about the car at the parking lot exit, but found the meter actually went up to 52 over the first few miles. We headed east on Glendale Avenue, figuring we'll see how the numbers stand when we get to I-17. We'll jog up to Bell Road at that point, keeping more Nissan dealerships in range. We travel the surface streets at about 45 mph or so, applying the brakes from time to time to gain regenerative charge. The range meter stays at 50 for awhile.

Our attention is now fixed on a different gauge, a set of little balls with three to the left, one neutral point, and ten or so to the right. This shows whether we are consuming power or recharging, as on a typical hybrid. Our goal is to keep ourselves near that neutral ball, or no more than one ball up on the consumption side. If we can do this, we think we'll make it back.

Are we painting a nightmare scenario? No. It was only our first day with the car, and we were now having fun.

(We do wonder why these balls aren't color coded, red for bad and green for good, perhaps. Instead, we have to scrutinize a bit, to see where we are on a series of blue balls with white dots on the active ones. It's especially hard if wearing polarizing sunglasses.)

We have of course turned off the air for this. Not just the a/c, but we have no airflow whatsoever. If something needs juice from the battery pack, it's not getting any from us today. The temp is now 85 degrees. If our Northwest colleague had used her radio to distract herself from hypothermia, we were wishing we could use it to distract ourselves from heatstroke. Of course it will be 20-30 degrees warmer by the time you read this. We relent, open one window, crack the other.

By 35th Avenue and Glendale, we were still reading 50 miles of range remaining. We have plenty of distance ahead of us, but this is a very good sign. Our consumption is near nothing, with these methods. We get a red light and think, atypically, good! More regenerative energy.

The basic concept now is that surface streets are good, freeways bad. Nonetheless, we stick with our plan to take I-17 a few miles north to Bell. We can see how this goes, then decide whether to indeed exit as planned—continuing the benefits of stop-and-go traffic, while giving ourselves the last two dealership options, as well), or rationalize for time and continue on freeways the rest of the way.

We note the similarities between personal finance and vehicle range efficiency. We drove over, "spending" our range like there's no tomorrow. We then saw our "statement" and received a wake-up call. We became frugal for five or ten miles after that, and now that things were going so well, we were ready to blow it all again on a good freeway. You know what they say: spend it like ya got it.

Driving north on I-17, we stayed in the slow lane, at about 53 mph. There was little braking, and our remaining range indication did drop here, but only from about 50 to 47. Hmm. Making pretty good time, we were tempted to stay on the freeway, taking the 101 east from 17. But our little ball gauge showed we were consuming at all times now. One ball, in fact, was as good as it got. If we were able to hit even a little more freeway speed, we'd be consuming at the two- or three-ball level. We knew that once we got to the 101, it would be pretty impossible to maintain anything like 55 mph. The limit is 65 mph, and most people are cruising along faster than that. So we did exit again at Bell Road, aiming for another stretch of regenerative braking. Good plan.

Our range was now just 41, in fact, so that few miles of freeway had cost us dearly. Watching the clock roll forward as we took the surface streets was costing us dearly, too, though, back at work. By the time we got to Bell and Cave Creek Road, we were reading 37 miles to go, and we figured we had about 12 to actually cover. 25 miles of headroom? Our colleague had commented about making it home with exactly that, which sounded fine to us at the time. Now we realized how uncomfortable that could feel, with the outcome still unknown.

(Right about now, we also glance at the recharge-time readout. It says if we recharge at 120 volts—our office option—it will take 16 hours to recharge to 100 percent. Okay. If we do make it back, and we plug it in about 3pm, we can leave it till 7am, no problem.)

Entering the Loop 101 Freeway at Cave Creek Road, the gauge said we had 33 miles to go. Actual distance was more like eight. We remembered the earlier stop-and-go construction traffic on this stretch, and now we actually hoped we got that. Alas, we did not. By Scottsdale Road, about four miles later, 33 had dropped to a balance of 22 miles. Actual remaining distance, about four. Exiting near the Airpark, we had dropped by only one more, to 21. The last few miles were close to pro-rata on the gauge, and we pulled up to the office (and a blessed outlet) with 19 miles left on the gauge.

Triumph.

We gave the Leaf a full 19 hours of 120-volt charging—which is what the meter ultimately suggested—from 3pm on Friday to 10am Saturday. Our new numbers, however, were less than they had been upon initial delivery: an 85-mile range in normal, or 93 in Eco.

In retrospect, our self-inflicted bleeding-edge range challenge was not quite the intended use of the Leaf. And it was just our first day with the car. For someone tackling a more predictable daily commute, the math will become well known, second nature. If your work is, say, 25 miles or less from home, you should be able to do the round trip every day, even if you add in some errands on the way. You may be able to handle double that. If you're able to plug in while at work, double it again. (But if you can't plug in, and your workday may require an unexpected dash to a meeting 30 miles away, you may hope for a recharge there, too.)

For new technology, this is a tremendous start. The ultimate product is so well executed, it's hard to even believe it's a new idea. There are always things you can do to be more frugal, but we're quite sure that anybody who buys the Nissan Leaf is going to want to know one thing: can I just drive this like a normal car? Yes, you can.

Honey, I forgot the milk

For our last couple of days with the Leaf, we enjoyed the heck out of it. This actually is one of those rare cars, when you're as jaded as we are, that makes you glad you have to run out and do another errand you forgot. It's flat-out fun to drive.

The car handles well, with smooth and balanced cornering and no noticeable front-drive torque steering. Weight distribution from the low-center-mounted battery pack is surely a big contributer to this.

Scientists and engineers (as well as marketing people) can make a solid case for the all-electric approach, as in the Nissan Leaf and others, or for the extended-range approach, as in the Chevy Volt. We conclude that it's largely philosophical or emotional for most buyers. Beyond the variables of size, of cost, of feel and finish, and of conventionality, it may likely become mostly a matter of personal comfort and taste. Of course your specific driving formula is key: do your own math.

A new lifestyle of range and recharges is part of the magic. And this time around, we expect electrics to catch on in a big way, so this won't be fringe but rather early adopter behavior. Ultimately, it's no different from having to keep an eye on your gas gauge and knowing where the pumps are. No-one has invented a perpetual motion machine, and there is no free lunch. If you can stop for gas, you can stop for a plug-in. Range is shorter at this point, and charging times generally longer than fuel refills, but increasingly fast options are coming.

As we grab our camera, we think about how long we'll be out and how many shots we may take, grab an extra battery and put it in our pocket. We realize this is all familiar terrain in its own way.

Electric cars certainly generate conversation from skeptics who point out that they are not zero-emission but rather zero-tailpipe-emission vehicles, and rightly so. We find that most skeptics then point their blame right at coal, even though slightly less than 50 percent of US power stations are coal-fired. (The rest include natural gas, nuclear, a little oil, then renewables such as wind and hydroelectric.) Most importantly, those are issues that warrant being addressed in their own right. And they are. The electric car conversation encourages the overall conversation. All for the better.

Our last weekend is much more routine. After running a number of errands in multiple trips, the gauge is sitting at 72 miles in Eco, 66 in normal Drive. We've had the a/c running, the windows open and the radio on. We ran in Eco mode the whole time, as we never found a reason to change; Eco is plenty peppy.

Next to a high-end European SUV on an open boulevard, we realize its driver is trying to be a tough guy, perhaps smoke our little blue car off the road. It's fun to find that this car can match their every move, or in fact exceed their every move since their car has to perform shifts. The Leaf will leave you feeling as though you have many tricks up your sleeve. ■