Passive House Technology Underlies Going 'Net Zero Energy'

Feb. 6, 2020

"Passive House" is a concept born in Germany as "PassivHaus" but growing in popularity here in America. Although its primary focus is on reducing the heating and cooling needs of a home through proper north/south orientation, the placement of windows, and roof overhangs, it also includes design elements that make a home better for its inhabitants. It has many other positive impacts as well, including healthier and quieter spaces, greater durability, and greater comfort for inhabitants."

Prior to the oil embargo of 1973, home builders did not concern themselves much with making homes energy efficient, but that all changed as we quickly realized how dependent we were on foreign countries for fossil fuels to heat our homes and fuel our cars. Homes built before then were poorly insulated, drafty and less healthy. (Lead-based paint was only banned in 1978.)

The passive house concept took off in America as a result of that wake-up call. The "Lo-Cal" house created in 1976 consumed 60% less energy than the standard house at the time, and the concept continues to mature.

If you participated in any of the "green home" tours that Golden Real Estate co-sponsors each fall, you've learned about various passive home strategies in addition to "active" strategies such as solar power, heat pumps, geothermal heating, and energy recovery ventilators.

When "active" systems are introduced to a home with passive house design, they work more easily to create the ultimate goal of a "net zero energy" home — one which generates all the energy needed to heat, cool and power the home and, perhaps, charge the owner's electric vehicles. Without passive house design features, you can still achieve net zero energy, but it may require substantially more solar panels to compensate for such factors as inferior orientation, fenestration (windows) and insulation.

You can learn all about passive home technology, including trainings and public events, online at **www.phius.org**. Also, search "Passive House SW" at **www.meetup.org** for local events.

An excellent example of new construction which combines passive house design with smart active systems in the Geos Community in Arvada, which you can learn about online at **www.DiscoverGeos.com**. The homes in Geos are all oriented to maximize solar gain in the winter, but also designed for sun shading in the summer. Some have a geothermal heating, while others have air source heat pumps and conditioning energy recovery ventilators (CERVs). None use natural gas, just solar-generated electricity. There's more to say about the Geos Community, but just visit that website and you'll be amazed!

Is Your Gas Furnace or Water Heater About to Fail? Consider a Heat Pump

Jan. 23, 2020

A reader called me last week because her gas furnace had quit working and, knowing my expertise regarding sustainability, she wanted my advice on replacing it.

I told her that this was an opportunity to do something other than buy a new gas furnace. I told her about my Carrier "Hybrid Heat" furnace which uses an air-source heat pump for heating as well as cooling and only burns gas when the outdoor temperature dips well below freezing. With her solar panels, it's possible she won't even pay for the electricity consumed by the heat pump, and her gas consumption will plummet.

That hybrid system would use her home's existing ductwork, but, since she has a one-story

home, I suggested she consider a ductless mini-split heat pump system like the one we have at our office. I gave her the name of the vendor who installed both my home and office systems who could advise her which system was best for her.

I also suggested that she look into replacing her gas water heater with a heat-pump model when it fails. My gas water heater is over 15 years old, so I'm thinking of replacing it before it fails. Home Depot sells a Rheem 50-gallon heat pump water heater (model #XE50T10HD50U1) for $1,299. Best off all, Xcel Energy gives its customers a $500 rebate for purchasing it. I have enough solar panels to handle the extra electrical demand and eliminate much of my current gas usage, which is mostly for water heating, since I have that Carrier hybrid furnace. Our only other gas usage is for cooking and grilling.

Your Car Battery Could One Day Be Your Home Backup Power

Feb. 2, 2020

Perhaps you, like me, have considered investing in a home battery system — not to go "off grid" so much as to survive blackouts. Simply having solar does not give you such protection, because when the grid goes down, your solar panels do not generate electricity. That's required by power companies, because they don't want you pumping electricity into downed power lines as their technicians work to repair them.

Personally, I'm holding out for a future in which the energy stored in my EV batteries can be tapped to power my home during a blackout. There's a term for this called vehicle-to-grid, but a more accurate term would be vehicle-to-home, since it would be done in isolation from the grid.

Because I have two EVs with combined battery capacity of 170 kilowatt-hours, I have a lot of stored power available to me at any time, even if those cars are not fully charged. For example, 100 kilowatt-hours can provide 5,000 watts of household electricity for 20 hours.

There are commercially available inverters for creating a 120-volt outlet in any car, either gas or electric, but inevitably some automaker — probably Tesla — will create an interface that allows for the electricity stored in one's EV battery to be tapped for household use during a blackout.

Several electric trucks are going to hit the market in 2020 and beyond, and each will have 120 and possibly 240-volt outlets for field power, which is a good start. You could run an extension cord to power critical home appliances.

The Future of Heating is Heat Pumps, Not Gas Forced Air

Dec. 26, 2019

Here in Colorado, as in much of the country, the typical home heating system is gas forced air. A gas flame heats up a plenum across which a fan blows air through ductwork into the various rooms of a house. For cooling, the same ductwork and fan are used, but instead of the flame heating that plenum, the air passes over a set of coils beyond the plenum with super-chilled fluid created by an outdoor compressor.

Gas forced air, however, is relatively inefficient and is only common in the United States because of our exceptionally low cost of natural gas and other fossil fuels.

Elsewhere in the world, heating is done using heat pumps. What is a heat pump? Your central air unit is a heat pump, but it operates in only one direction—extracting heat from indoor air and dissipating it outdoors. A heat pump **heating** system simply reverses that process, creating heat by extracting heat from outdoor air and dissipating it in your home, either through your existing

ductwork or through wall-mounted “mini-splits.” Unlike gas, a heat pump ***moves*** heat instead of ***creating*** it.

Rita and I replaced our gas furnace in 2012 with a hybrid system by Carrier. It heats our home using the heat pump unless the outdoor temperature falls below freezing, at which point a gas burner kicks in. With our solar panels providing the electricity for the heat pump, our highest mid-winter Xcel bill is under $50. Meanwhile, at our office we got rid of our furnace ***and*** ductwork and installed a mini-split system, also powered by solar panels. As a result, our Xcel bill is under $11/month year-round.

Winter Is When Electric Vehicles Really Shine

Nov. 7, 2020

You may think this claim is counterintuitive, but consider the following.

Electric cars never need to warm up. Get in, put it in drive and go! (In Teslas, there’s not even a “Start” button.) Moreover, your cabin will be warm in less than 1/2 mile, because it doesn't depend on an engine warming up.

You’ll never break down. There is nothing to fail. Remember, it’s just a battery and a motor (or two). **You’ll never stall and you’ll never need a boost**. There are only 50 moving parts in an electric car. What can fail? I like to tell people that the only time you’ll see an EV on the side of the road is if there’s an accident or a flat tire or the driver needs to duck behind a bush.

With their low center of gravity and 50/50 front-to-back weight distribution, **electric cars handle better** and more safely on wet or snow-covered roads. The battery in most EVs is mounted underneath the cabin. My AWD Teslas perform better in snow than my AWD 2009 Lexus RX 240h did.

Imagine the worst winter scenario, where you get stranded in the snow and need to survive overnight or longer in your car. An EV is perfect for that situation, because you won’t have to stop and start your gas engine to keep warm and worry about carbon monoxide poisoning. The EV will lose less than 5 miles of range per hour to keep you warm. And it won’t matter if your car is upside down. If you charged your car beforehand, you’ll have long-term warmth.

One of my favorite EV features is the ability to **leave the climate system on when I go into a store** or meeting on a frigid (or super hot) day. When I return to the car, it will be at 70 degrees. If I’m going to be in a long meeting, I can turn on the heat or A/C using my smartphone app as I’m leaving the meeting room and know that the car will be comfortable by the time I get in it.

As I wrote last month, the best deal in electric cars is a used one. According to Kelley Blue Book (**www.kbb.com**), my good-as-new 2015 Tesla Model S 70D has a private resale value of $33,402. That is crazy. I paid $93,000 for it new.

Come to Jefferson County on Saturday to Learn From Touring 14 ‘Green’ Homes

Oct. 3, 2020

The **Metro Denver Green Homes Tour** is an annual event that happens on the first Saturday in October, which is this coming Saturday. For $10 per person, you get to go on a self-guided tour of 14 Jefferson County homes with a variety of green features.

I consider myself pretty knowledgeable about solar power and sustainability, but every year I

learn things I didn't already know by touring the homes on this tour.

Golden Real Estate is proud to be a platinum sponsor of this event each year. Also, I serve on the steering committee and help in a variety of ways, such as organizing the **Electric Vehicle Showcase**, which takes place during the post-tour reception, 4 to 6 pm in the **CoorsTek** parking lot at 10th & Jackson Street in downtown Golden. It coincides with the reception and Green Expo in the **American Mountaineering Center (AMC)** across the street.

Sign up for the tour online at **MetroDenverGreenHomesTour.org**, but you'll need to pick up your tour book and map, which you can do anytime on Friday at **Golden Real Estate's office, 17695 S. Golden Road,** or on Saturday after 9am at the **AMC, 710 10th Street.** If you don't register online, you can do so at the AMC Saturday morning.

Then you're on your own, mapping out your own tour based on locations but also on what you read about each house in the tour book.

I couldn't shoot video tours of every home, but I did choose two that the committee felt represented particularly interesting examples of sustainability. You can see those two videos on the website mentioned above. By watching those two videos you will learn things you didn't already know, as I did by shooting them.

To quote from page 3 of the tour book, "Fourteen homes and a net-zero new home development are on the tour this year – from 1960s retrofits to new construction. Our newer name, Metro Denver Green Homes Tour, is intended to encompass all areas surrounding Denver and its suburbs, this year including Golden and its Foothills, Lakewood, Arvada and Morrison. In our ongoing effort to showcase a wide variety of solutions and lifestyles, you will see solar, of course, and also mini splits, ground source heat pumps and passive solar treatments. You can visit an Arvada sustainable new town home community [Geos] and enjoy many other sustainable lifestyle features such as co-housing, electric vehicles and water wise gardens. You will be viewing the tried-and-true in addition to the latest in innovative technologies, plus learning many steps used to eliminate red tape while going green."

If you pick up your tour book at Golden Real Estate, let us show you how we transitioned to "net zero energy" using many of the features you'll see on the tour, including heat pump/mini-split heating & cooling, solar panels, super insulation, and tankless electric water heating. Our monthly energy bill is $10.26 since having our gas meter removed two years ago. If you come in an electric car, you can plug in to our free ChargePoint charging stations — powered by the sun — while we show you around!

This Saturday's tour is one of 79 such tours of 894 private homes happening this weekend as part of the **National Solar Tour** sponsored by the **American Solar Energy Society (ASES).** And that doesn't include, for example, last Saturday's **Boulder Green Homes Tour,** which had 10 homes on it. This is the 25th National Solar Tour, and we have participated for 23 of those years.

Don't forget the **Green Expo** during the reception, 4 to 6 pm following the tour. Many companies which implement green solutions will have booths, and there will be an **Electric Vehicle Showcase** in the parking lot across the street. If you have an EV, bring it for display! If you're interested in going electric, there will be test drives available.

Were Last Week's "Climate Strikes" Enough of a Wake-up Call on Climate Change?

Sept. 26, 2019

We can thank Al Gore for educating us about global warming, but I wish a non-politician such

as Carl Sagan had performed that service. I can't think to any other scientific research which became partisan in a similar way.

Remember CFCs and the ozone hole? It wasn't a partisan issue. The issue was addressed quickly in a bi-partisan manner.

It was meteorologists, not politicians, that taught us about El Nino and La Nina—the cyclical events in which changes in ocean temperature create weather patterns affecting our entire continent. No one has said El Nino is not real. It is accepted science — like climate change.

It's only because Al Gore introduced us to the "inconvenient truth" about climate change that his teachings were disputed and rejected as left-wing propaganda by those on the right. How sad, how unfortunate, and how deadly the consequences.

Last Friday I attended the "Climate Strike" event on the Colorado School of Mines campus and watched news coverage of bigger events around the world. I'm 72 now, and, yes, the climate will worsen before I die. But those under 40 and certainly those under 20 are seeing the early effects of global warming and worry that their world will be unlivable by the time they're my age. For them, it's a huge crisis.

Back in June, I attended my 50th reunion at M.I.T, during which there was a Technology Day symposium on climate change. One of the speakers, Prof. Noelle Selin, told us that the global concentration of carbon dioxide was 325 parts per million when we graduated in 1969, but now it was 410 ppm. She made us think about those who graduated in 2019 (who she dubbed "the Class of 410 ppm") and speculated on the class that would be graduating at ***their*** 50th reunion. "Will it be the Class of 600 ppm or the Class of 700 ppm?" she asked. And what will life be like for them at ***their*** 50th reunion?

It was a sobering presentation. And you can be sure that it was even more sobering for the Class of 2019 and for M.I.T. students who have yet to graduate. I have posted a link for Prof. Selin's presentation at **www.GoldenREblog.com**.

The impact on real estate — ***and national security*** — is apparent when you consider all the "climate refugees" who are likely to migrate from heavily impacted areas such as the Bahamas, Florida, Houston — and Syria, where drought, as much as civil war, contributed to the exodus of Syrians to Europe. Indeed, over a decade ago the U.S. Defense Department labeled climate change a threat to national security. You can understand why. I do.

The headline of my column on Jan. 14, 2014 was, "We May Have Already Passed the Tipping Point on Climate Change." That statement was based on the already dramatic reduction in summer sea ice in the Arctic Ocean, as documented by the Earth Policy Institute at Rutgers. I published their chart showing a correlation between the increase in atmospheric CO_2 from 300 to 400 ppm since the Industrial Revolution, and the 50% loss of summer sea ice in the Arctic between the late 20th Century and 2013.

The reason loss of sea ice creates a tipping point for our climate is that sea ice, being white, reflects sunlight, whereas open ocean, being dark, absorbs sunlight, causing more ice to melt and to melt faster. A warmer Arctic region in turn upsets weather patterns worldwide.

Almost six years have passed since I wrote that column, and now the Arctic Ocean is open and navigable for part of the summer. We have learned the term "polar vortex" and experienced the effects of wilder than normal fluctuations of the jet stream. Warmer oceans in the tropics have caused stronger, slower hurricanes, causing 100-year floods to become frequent, as we have already seen in Houston. These effects were already happening back in 2012 with superstorm Sandy in New York and New Jersey and even here in Colorado with the heavy rains and flooding of Sept. 2013.

Unfortunately, we have a president who will never admit he was wrong, so he will never admit that climate change is real, that it is exacerbated by CO_2 emissions, and that the only hope, if there is any this late in the game, of reducing the impacts of climate change is to drastically reduce the output of greenhouse gases like CO_2 and methane. Instead, inaction on climate change, and worse, may be this president's #1 legacy. How sad.

Some Takeaways from Last Saturday's Electric Car Event

Sept. 19, 2019

This was the 6th year that Golden Real Estate has been the site of a local "Drive Electric Week" event.

This year we got our first glimpse of EVs built to compete with Tesla. I got to drive the new Jaguar I-Pace and ride in Audi's eTron, and they are certainly worthy competition for Tesla in the luxury EV field.

The Jaguar has four electric motors, one in each wheel hub, which is an improvement over Tesla's two motors and is likely to become a favored design for high-end EVs.

The Audi eTron has dual electric motors, like Tesla, centered between the front and rear wheels.

While these are worthy competitors to Tesla in the luxury market (and there will be others), I don't think Tesla has anything to worry about thanks to its proprietary Supercharger network throughout the U/S. & Canada and worldwide.

Electric Vehicle Events in Golden & Denver

Sept. 12, 2019

This Saturday, **Sept. 14th, from 10 am to 3 pm,** Golden Real Estate is hosting National Drive Electric Week in our parking lot at **17695 S. Golden Road in Golden.** This is our 5th year hosting the event. From Sept. 14 to 22 there are 307 events around the country, nine of them in Colorado. In addition to ours on Sept. 14th, there are events in **Denver on Sept. 19th,** Pueblo on Sept. 14th, Longmont and Ft. Collins on Sept. 15th, Avon on Sept. 18th, and Colorado Springs, Durango and Grand Junction on Sept. 21st. Info on all of them is at **DriveElectricWeek.org**. What's so cool about this event is that there are no dealers present, only actual EV owners showing their own vehicles, answering questions and sometimes offering rides "around the block" to interested visitors. At press time, 19 such EV owners had registered to attend our Golden event. On the website you can register as an EV owner or as an attendee. We'll also have a booth from Ecology Solar, which sells home solar systems to fuel your EV as well as power your home, and Pedego Golden, a new bike shop, will be giving free test rides on electric bikes.

All-Electric Homes Are Practical Now, and Can Help Mitigate Climate Change

Aug. 29, 2019

The typical American home is powered electrically but heated by natural gas, propane or other fossil fuels. You and I can generate our own electricity with solar panels, but there's no way for us to generate natural gas or other fossil fuel energy, so the transition to a "net zero energy" lifestyle necessitates turning away from fossil fuels and going all-electric.

Fortunately, technology has advanced — just in the last decade — to the point where going all-electric is totally practical, affordable, and a way you and I can mitigate climate change

At Golden Real Estate, our office was heated with natural gas until November 2017, when we installed a heat pump "mini-split" system and had our natural gas meter removed. With 20 kilowatts of solar photovoltaic panels, we were able to eliminate our natural gas bill but not increase our electric bill. We continue to pay just $11 per month to be connected to the electric grid (which functions as our "battery" thanks to net metering), but we are generating all the electricity needed to power, heat and cool our office building. We even have enough electricity from the solar panels to power our four electric cars without buying any net electricity from Xcel Energy. We hope other businesses will follow our lead.

Making the switch to all-electric ***at home*** is still in our future, because — like you, I suspect — we prefer gas cooking, gas grilling, and having a gas fireplace.

If, however, we can get beyond those preferences, it is possible now to heat our home and domestic hot water using heat pump appliances, and to cook our food with electric or induction cooktops and ovens. Electric grilling is also available, although not as attractive from a taste standpoint to most of us.

All-electric homes was the subject of a talk by architect Peter Ewers at last week's meeting of the Colorado Renewable Energy Society's Jeffco chapter. You can view an archived video of Peter's talk at **www.cres-energy.org/video**.

Once we have removed gas service from our homes (and gas cars from our garages), we will have also eliminated the risks of explosion and carbon monoxide poisoning, too. Wouldn't that be great?

I Think I May Have Purchased My Last Car

Aug. 29, 2019

We all know that a vehicle is "totaled" when the cost of repair is higher than its value after making the repair.

With electric cars such as Rita's and my Teslas, the math changes rather dramatically. Except for collision damage (which is less likely because of the cars' advanced driver assistance features), it's hard to imagine a repair that would not be worth making.

The typical car with an internal combustion engine is often totaled because a new engine or transmission, like many other drivetrain related repairs, can easily cost more than the resale value of the car. Not so with an all-electric car such as our Teslas.

Only 3% of the metal in a Tesla is steel — the body and frame are aluminum — so rust is not an issue. The two electric motors, which are not prone to failure anyway, could be replaced in 15 minutes. There is no transmission, timing belt, fuel pump, exhaust system, etc. In fact there are reportedly fewer than 50 moving parts in the entire car.

The battery, which barely degrades at all, can also be replaced in minutes, not hours, and, like the two motors, is warranted for eight years, unlimited miles. For me that equates to a 250,000-mile drive-train warranty. If, say, the battery needs replacing 10 years from now, the cost will probably be $5,000 or less by then — well worth the expense.

As you probably know, the operating system of the car is regularly updated by Tesla "over the air" for free. Our two cars have many features and functions that they didn't have when they were built years ago and will have even more features in 2047, when I turn 100.

So, whereas one can speculate on the useful life of a traditional gas-powered car with a steel

body, you really can't speculate on the life expectancy of an all-electric car.

If you buy a Tesla, you may want to put it in your will, because it may outlive you.

Would you like to learn more about electric cars? On **Sat., Sept. 14**, **from 10 am to 3pm**, we're hosting an EV round-up in our South Golden Road parking lot. More info at **www.DriveElectricWeek.info**.

LED Lighting Has Some Health & Vision Side Effects Worth Considering

Aug. 15, 2019

In my July 18th column, online at **www.JimSmithColumns.com**, I wrote about my favorite home improvements, including the adoption of LED lighting, which I prefer to CFL lighting and is far more energy efficient than incandescent lighting. In particular, I wrote glowingly, so to speak, about "daylight" LEDs — the whitest light available, so well-named for how it matches the color of bright sunlight.

In our office, I replaced all our "soft white" LEDs with "daylight" LEDs to match the color of sunlight coming through our four Velux sun tunnels.

A reader of that column alerted me to some recent research which showed "daylight" LEDs to be harmful to vision, exacerbating macular degeneration, and disruptive of our circadian rhythm (important for good sleep) specifically because it simulates full natural sunlight.

I urge you to Google "daylight LEDs and health," as I did, and you'll find that one of the top links is for a June 2016 American Medical Association policy statement (adopted unanimously at their annual meeting) warning about health and safety problems associated with white LED lighting, so common now in the lighting of American streets.

It was right after learning of this research that I bought a new HP laptop computer and noticed that it offers a "nightlight" setting which automatically changes the screen lighting from white to yellow LED light at sunset. It made me wonder why I was so late to learn about this issue!

The reader who alerted me to this topic suffers from early stage macular degeneration. He said he has replaced all the LED lights in his home with incandescent bulbs. I'm satisfied that changing back to the lower "color temperature" LEDs will be enough. I have noticed that some LED fixtures (like the ones I installed in our conference room) have a switch allowing you to choose between "soft white," "warm white" and "day-light" temperature settings.

Some Reflections on Our 4,800-Mile Tesla Road Trip

June 27, 2019

A couple weeks ago, I wrote about my 50th reunion at MIT. What I didn't say in that column was that Rita and I drove there in our Tesla Model X. After the reunion, we drove north to visit my sister Susan in Maine, then into Canada to explore Quebec City. Returning from there, we drove past Toronto the morning after their NBA victory, noticing many "We the North" banners. Over a 16-day period, we drove 4,800 miles strictly on battery power, stopping at gas stations only to clean bugs off the windshield.

This was our second cross-country trip in the Model X. The first one was to Seattle a year ago. Four years ago we drove to Connecticut and back in a Tesla Model S.

People always ask whether it was hard finding charging stations. No, that's never an issue in a

Tesla, because when you put a destination in the navigation system, it identifies the Supercharger locations along the route and directs you to them like any other destination and tells you how long to charge to reach the next one. These locations are usually adjacent to the highways you'd travel anyway, so it adds little distance to the trip, and the charging sessions are rarely over 50 minutes. Best of all, since we enjoy lifetime free supercharging, the electricity was free. The only cost of the trip was the wear on the tires, various tolls, food and lodging.

I used the Tesla's self-driving feature constantly to maintain my desired speed and to stay in my chosen lane. Cruise control is automatic, slowing down based on the vehicle ahead of me and maintaining a safe separation. These features make driving far less tiring and far safer. The car would alert me if it didn't sense my hand on the steering wheel for 30 seconds, which is a good safety feature. I wish you the same opportunity.

Conserving Water Is Likely to Become More Important in Coming Years

June 20, 2019

My understanding as a layman is that al-though one of the impacts of warmer oceans due to climate change is increased precipitation over land, it won't be as predictable and consistent, so we need to include water conservation in any discussion of sustainability. Or think of it as water ***management***, since we'll need to be concerned about flooding just as much as about prolonged droughts.

At the local level, we need to be smart about conserving water. It's a practice we need to implement in times of abundance, because we can't be sure when the pendulum will swing the other way and we'll endure periods of water shortage.

For homeowners, the biggest consumption of water is typically the irrigation of our lawns and landscaping. Even though Rita and I replaced our Kentucky Bluegrass lawn with Bella Bluegrass, which requires less mowing and watering, we still need to use our sprinklers, although not as much. We would have done better to install buffalo grass, which is not as verdant, but requires zero irrigation and mowing. (I can provide the address of a home I know in Golden that installed buffalo grass a couple decades ago.)

There are sprinkler systems which adjust the amount of watering that is done based on rainfall and ground moisture, but I haven't investigated those devices, since I usually am home and adjust our watering according to the weather. For example, this spring I didn't turn on our sprinkler system until June 1st because of our unusually wet May.

There are other residential strategies for saving water. I have learned to take showers in which I only run the water to get wet and to rinse off, without running the water while washing.

We also installed 1.2-gallon-per-flush toilets, which perform as well as the 1.6-gpf models. We have a sensor faucet on our kitchen sink which operates like those sensors you're probably used to seeing in public restrooms. The faucet (by Moen) also allows us to turn the water on and off manually when needed.

We also installed a recirculation line on our water heater, which saves a lot of water by producing hot water more quickly in the kitchen and bathrooms. Think of all the water you run waiting for it to get hot. Not only are you wasting that water, but you paid to heat that water, only to have it cool off sitting in the pipes between your water heater and your sink. You'll also save energy (i.e., money) by installing such a recirc line. Ask your plumber for an estimate.

High efficiency washing machines are efficient in their use of water, not just energy. Front loaders use less water than the older top loaders, but the new top-loading high efficiency machines, such as our LG unit (the kind with a glass top and no agitator), automatically sense how much water is needed and do an amazing job. We're glad our front-loading high efficiency washing machine died and had to be replaced!

At the governmental level, I'm surprised that CDOT and other jurisdictions don't install buffalo grass in the medians and on the shoulders of our highways. Doing so would not only conserve water but save a lot of money on mowing, which can also endanger workers on high-speed highways.

Recently I saw a report on the blue jean industry, which uses an immense amount of water not just to grow the cotton (1,800 gallons per pair of jeans) but even more water to dye them blue!

I expect to learn even more about water conservation and management at this Thursday's (tonight's) session on this topic at Golden Real Estate's office., 17695 S. Golden Road, Golden. It starts at 5 p.m. and is scheduled to last only 1 hour. We still have seats available. Email me (see below) or just show up. The presenter is Ben Wade from the Colorado Water Conservation Board.

If you can't attend this Thursday's session, a video of it will be archived by Saturday at **www.SustainabilitySeries.info**, where you can already find archived videos of the previous five sessions on other sustainability topics.

Please consider coming if you, too, have water conservation or management ideas to share, such as I have done in this column. I'm certainly looking forward to learning things I don't know.

Climate Change, Our Planet's Most Pressing Issue

June 6, 2019

Colorado has been blessed with probably the least impact of climate change, but eventually it will catch up with us. Meanwhile, we watch, stunned, not only by the tornadoes, hurricanes, wildfires and flooding in other sections of the country, but also by the failure of the major networks to mention climate change as the culprit and to point out that it will only get worse over time.

Over 5 years ago, in 2014, the headline on my column was **"We May Have Already Passed the Tipping Point on Climate Change."** Here is what I wrote back then:

Each January, political leaders shower us with speeches on the State of the Union, the State, the City and other jurisdictions. No one presents a State of the Planet speech, but if someone did, I suspect climate change would be topic #1 — and for good reason.

*My friend and mentor, Steve Stevens, sent me a chart showing the decline in late summer Arctic sea ice. It's a wake-up call regarding climate change. It's posted at **www.GoldenREblog.com**.*

I don't have a degree in science, but I do understand science enough to know this chart's significance.

If you studied any science — or own an automobile — you know that white surfaces reflect solar heat, whereas dark surfaces (open ocean, for example) absorb it. The loss of sea ice does not just indicate global warming, it accelerates it, which makes one worry whether it's already too late to reverse the effects of human-caused global warming.

Climate change deniers may celebrate the fact that the Arctic Ocean is becoming increasingly navigable in the summer, but they need to connect the dots between global warming and the whipsawing we now see in our day-to-day weather.

I'd be curious to see the statistics on how many times the network news programs featured severe weather reports in 2013 versus previous years. I can't remember an evening in which

weather wasn't a major or lead story.

Our earth's climate has been de-stabilized. Had you heard of the polar vortex before this year? I hadn't. The uninformed will say that our cold weather proves that the earth is not warming, but how naïve is that? It's global warming that is causing extremes, both of temperature and precipitation — which is caused by warming. I don't hear them questioning El Nino, in which natural changes in ocean temperature affect climate.

Is there time to reverse this situation? Maybe not. But we certainly don't have time to debate its existence with climate change deniers.

[End of my 2014 column]

Night after night, we see news reports of unprecedented severe weather around the country, but rarely is the connection to climate change mentioned. Our president's failure to address climate change may be part of his legacy.

Do You Practice Sustainability? Home Renovation Can Be Done Sustainably, Too

May 16, 2019

Tonight is the fifth in Golden Real Estate's Sustainability Series. Previous sessions were about home insulation (January), home heating technology (February), solar power (March), and electric cars (April).

This month, the topic is sustainable renovation. Our presenter is an expert in sustainable practices when it comes to home renovation. His name is Steve Stevens, and he has been my mentor regarding sustainable practices for nearly two decades.

A retired scientist from Bell Labs, Steve has made a lifelong project, it seems, out of reducing the carbon footprint of his 1970s brick ranch in South Golden.

Retired and living on a fixed income, he has developed several habits/practices that are not only sustainable but also have saved him a boatload of money.

For example, he only buys cull lumber from Lowe's, and he buys returned products (typically mis-ordered) such as windows and doors, which are then sold for a fraction of their original price.

Steve also seeks out salvaged goods such as windows and doors. As with buying cull lumber and returned products, collecting salvaged products means zero new carbon footprint for doing your renovation.

Steve, being a scientist by training and passion, always considers the ***embedded*** carbon footprint of products, whether it's food or building materials. How much energy is used to transport the goods you purchase? For example, are you buying slab granite mined and shipped from Asia, or an alternative material mined or created closer to home?

Steve will share his shopping and construction tips that save money ***and*** are also sustainable.

For example, he emphasizes insulation, which should always be your first measure when it comes to saving energy. But what products should you buy, and where should you start?

Each of our sessions is videotaped by our friend, Martin Voelker, from the Colorado Renewal Energy Society. You can watch videos of the first four sessions at **SustainabilitySeries.info**. This session will also be recorded and posted there.

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