

# Net Zero Living

<https://www.climateone.org/audio/net-zero-living>

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Announcer: This is Climate One, changing the conversation about energy, economy and the environment.

Conservation often begins at home - literally. Net Zero homes are designed from the ground up to produce as much energy as they use.

Sven Thesen: We wanted a reasonable home that was extremely comfortable, extremely functional and still had an extremely small carbon footprint. And then the joy is we won, we did most of the things right.

Announcer: Reducing our home energy use is one thing. But what about all the other waste we produce in our day-to-day lives?

Samuel McMullen: We call it trash goggles where once you've done it, you start seeing trash everywhere.

Announcer: Is it really possible to recycle and compost all the mountains of junk generated by our consumer lifestyles?

Diana Dehm: We're really trying to help everyone understand that we can create a zero waste world.

Announcer: Net Zero Living. Up next on Climate One.

Announcer: How little waste could you generate in your day-to-day life? Welcome to Climate One - changing the conversation about America's energy, economy and environment. I'm Devon Strolovitch. Climate One conversations - with oil companies and environmentalists, Republicans and Democrats - are recorded before a live audience, and hosted by Greg Dalton.

On today's show, we learn about how we can reduce the trash on our backs - and in our backyards. Americans create an average of four and a half pounds of waste a day. But some cities are trying to get their residents to cut that to zero by recycling, composting, and being more mindful about what they consume. More than dirty sidewalks are at stake. Landfills are a big source of methane, a potent greenhouse gas that amplifies severe weather. In the first part of today's show, Greg talks trash with three people at the forefront of slimming our consumer waste lines. Kevin Drew is the Residential Zero Waste Coordinator of the San Francisco Department of Environment. Lauren

Hennessy is Outreach Manager at Sustainable Stanford. And Diana Dehm is a sustainability consultant and founder of the Trash on Your Back challenge.

Here's our conversation about getting to zero waste.

Greg Dalton: Diana, let's begin with you. You were doing an interview a few years ago and you came up with this idea spontaneously of walking around with trash on your back. What prompted such a moment of insanity?

Diana Dehm: It was a definite moment of insanity which turned into something pretty cool. I was interviewing MIT at that time, I do a radio show as well, and it's all about solutions for the planet. And they were talking about this climate simulator tool. Anyway, one of the guys on the show was so excited, so I had to stop the show I go, "What is your passion? Why are you so excited?" His name is Drew Jones, he's amazing, he's a wonderful guy. He's the executive director for MIT's climate simulation. Anyway, so he came back, he goes, "Back in 1989, I was at Dartmouth College. And bunch of radical buddies and I decided to go out and see what our impact was." So they walked around with their trash for a week. And I said, "You know, Drew that sounds like an idea that needs to be recycled." And he's like, "You'll do it, Di?" and I'm like, "Yeah, let's do it. What the heck." So the next day I called about 17 really good friends. One is Matt Bogoshian who is pollution prevention guy for the US EPA. "Hey, Matt, will you carry your trash on your back for five days?" So he said, "Yes." He was the first early adopter. And what ended up happening, we had 17 people in 16 States the first year and that was four years ago. We did it on Earth Day. And every year we have an annual Earth Day thing and we would just talk about the learnings. The first year we did have quite an amazing turn out. The second year, we had about 2500 people from around the world, 27 states and 6 countries. So when you see Israel and Australia, and you see all these little kids getting on board, we're really trying to help everyone understand that we can create a zero waste world and we can do it. We were able to knock the 4.4 pounds of trash average per person down to 0.8 pounds per day, right, just by doing this. So it's turned into a very interesting thing and kids are just grabbing onto this like in amazing ways. It's a Math issue if you think about it, you know, weighing things and measuring things, and it's also a Science issue. So STEM is playing a huge role on this.

Greg Dalton: Lauren Hennessy, you created a video that caught our attention sort of a parody of a Meghan Trainor video, "All About That Bass." So tell us how you came up with that video and what you're trying to do to inspire college kids to be more mindful about their waste at Stanford?

Lauren Hennessy: Well, also I'll point out that it's not just college kids. We have a significant population of staff and faculty on campus. So it really needs to pertain to a wide audience. So I really sought to kind of come up with something that would just catch and I really have to say --

Greg Dalton: But do professors know who Meghan Trainor is?

Lauren Hennessy: You would -- I'm not kidding. People are singing this song. But I have to be honest. It really started when a friend sent me a YouTube link of a bunch of frat boys lip-syncing to a Taylor Swift song. And this video had half a million hits on YouTube. And I was just sitting there thinking how -- they are not even doing anything, they're just mouthing the words to the song, there must be a way to get people talking about environmental and sustainable actions in the same kind of fashion. So it kind of struck me that music is this grand communicator that a lot of people don't really take advantage of. And I think it's been a crucial point that's missing in environmental communication.

Greg Dalton: So let's queue up a little video at Stanford.

[Video Playing]

Thanks. So a video riffing on a pop tune, what impact did that have, Lauren Hennessy, at Stanford?

Lauren Hennessy: It -- well, I'm here today, aren't I?

[Laughter]

Greg Dalton: Yeah, right. We found you on the internet because of this video. Yes.

Lauren Hennessy: So I'm -- the video today on YouTube had close to 5000 hits which is 100 times greater than any of the other videos that were entered into the competition. We far exceeded our waste minimization in the competition than in years past. And it was -- we doubled our participation in the competition than last year. So it really went far in as far as spreading awareness.

Greg Dalton: Make it fun. Kevin, let's talk about the City of San Francisco which has a zero waste goal. Where in San Francisco is zero waste really possible?

Kevin Drew: Well, that's a very interesting question, very difficult goal that we've set for ourselves, it's very aspirational when we set it. Some of us who were in the business at the time said that's a little bit aggressive, but you can't get halfway there; you gotta just go for zero. And if we get to 99, that's doing really well. But what your guest just talked about was exactly the kind of spreading that's got to happen. It's going to happen to people getting charged up about it and carrying their trash on their back, it's going to happen to college kids and the kids -- the other folks on the campus to find a way to get to zero waste. It's going to take a million little ways to get there. It's like the same -- it's like the organism that we are and the organism of the planet is. It takes lots of little pieces to really get everything done. You can see the big garbage truck driving by but the bacteria in your gut is doing just as much to keep your system going as that garbage truck and everything in between. So zero waste is really a beautiful kind of a biological construct that we still have to invent. We don't know what it is yet. Everybody's asking us, you know, how are you going to get there, do you have a precise plan? No, we're making up as we go along, frankly. And for God's sake, let's get out there and do it. I mean, that's what we've just seen here.

Greg Dalton: Specific question. I remember being in Starbucks a couple of years ago and seeing on a printed -- on a napkin, "We care about the environment, waste, et cetera." And then I looked for a place to recycle that napkin in Starbucks and I couldn't find one. So does the City of San Francisco require businesses to have receptacles for compost and recycling and that they're actually in a place that a human can see?

Kevin Drew: Yes, we do. We require that. Is it perfectly implemented, no. But it's -- we're getting there. And actually Starbucks is one that we've worked a lot with, I think we need to get further with them because they are -- they have a lot of control, they have a lot of social ethic in a lot of their business so that they could be a tremendous leader. If they would make their lids and their stirrers compostable along with their cups and take some of the plastic out of the lining in their cup, pretty much everything in the store would be compostable.

Greg Dalton: Tell us where the stream of compost in San Francisco, someone puts something in a compost bin at home or at the office, where does it go? Tell us briefly the life of a compost.

Kevin Drew: It gets consolidated into bins in your house or your business and it gets picked up by a Recology truck and taken down to the transfer station down by Candlestick Park, where it's consolidated it into a big 20-ton transfer trailer which goes about -- there are now 700 tons of organic material being collected every day in San Francisco. And most of this is transported either

to Jepson Prairie Organics out near Dixon or to Grover Compost Facility out near Merced where it's turned into compost. Of those 700 tons they end up with about 350 tons of finished compost.

There's a tremendous water reduction because most of our food, most of our compost, most of our organics is water. And then that's primarily sold to vineyards, golf courses, organic farms. They like this compost, it's a very rich compost because it has a lot of meat and bones and other things. Most composts tend to be agricultural in nature, like from leftover crops or leftover agricultural products.

And you don't have -- they're sort of one dimensional. So this, we call it four-course compost because it has a little bit of every course in the meal in it. And it is a very rich product because of that.

Greg Dalton: Lauren Hennessy, composting at Stanford?

Lauren Hennessy: Composting in Stanford is it goes to a Newby Island Facility, so that's actually across the bay. And this is an industrial facility. We actually have a pretty high ability to accept composting, but it is a voluntary composting program right now. So the buildings on campus actually have to elect, to participate at a building wide level. So unless you have that champion who's willing to do it or there is an opportunity with the RecycleMania campaign, we actually give an individual the opportunity to become a compost captain for their floor. So it is on a voluntary basis right now, it's not a mandatory composting program.

Greg Dalton: Diana Dehm, you're from Orange County. How much composting is happening in Orange County?

Diana Dehm: Still getting -- it's not there yet.

Greg Dalton: Yeah. Kevin Drew, why not -- why don't -- is it cost?

Kevin Drew: It is a certain amount of -- it's just really political will. I mean, when you think about garbage, you know, trash, the trucks are there, they drive around, they pick it up. I'd like to tell people, it's just about driving it to a different location in the same truck. It weighs about the same.

And there are some programs in Orange County that friends of ours have started, Stephanie Barger in Zero West Group down there and they focused on restaurants and grocery stores first because that's what we did. It's just where the concentration is. You don't have to drive around and pick up a thimbleful. You can pick up a lot in a restaurant, in a produce store and then you can kind of expand from there. So there's many good examples like that, and it's happening. There's more happening than you know because the industrial people don't want to pay to throw it in the landfill, that's very expensive. You can pay less and go to a compost facility and you avoid all those methane.

Greg Dalton: Diana Dehm, a lot of kids, certain generations, learned recycling from their parents. Maybe the current kids are learning composting the way you and I learned recycling. But tell us how kids are getting involved in your campaign?

Diana Dehm: You know, it's interesting when you -- one of the things I love to say is love them, educate them and get the heck out of the way. Kids get it. What I'm always amazed at is K through 12 students, they are fearful. They know that there's an issue, right? And it's thanks to our teachers, it's thanks to our parents, it's thanks to the messaging that we're getting out there. I think media is so important to get this message out there. We've had some kids come back with some amazing statements on what they've learned in just collecting their trash to understand what their own personal impact is. Then what happens which is really interesting, they go to their parents and they say, "You know what, Mommy, Daddy, we're only going to buy compostable, biodegradable or recycled products." That's the power of the pocket book that these kids are getting. It's pretty interesting.

Greg Dalton: Let's talk about another institution that's getting it. You say that the Super Bowl was really zero waste. Talk about professional sports briefly. You mentioned the Mariners earlier. One of your friends is doing a super green stadium for the Atlanta Falcons.

Diana Dehm: Yes.

Greg Dalton: So let's talk about the professional sports which really has a big influence on pop culture.

Diana Dehm: Huge. And that's like the music and the sports and the, you know, doing something crazy like carrying your trash on your back. But one of the things about when we first started, Scott Jenkins, he was the operations director for -- or VP or something for the Seattle Mariners. And if you think about a stadium, it's a city in itself, right? City in itself. So he was able to start down the path, he also co-founded the Green Sports Alliance. He's on my board which I'm so thankful to have him because he sees the fan engagement opportunity here through sports. But the Seattle Mariners became zero waste three years ago. No, I'm sorry, 98% zero waste. So they go back in their supply chain, they look at what they're buying and then they'll take that. And when you go on to the stadium whether it's a hotdog, it's going to be compostable, whether it's a container. The supply chain now says, "Everything, nothing goes to Landfill. So major league sports is getting majorly involved, and they're getting very competitive. Scott left and went to the Atlanta Falcons. And he's designing and building getting back to what we talked --- what you guys talked about earlier was how do we make a Net Zero stadium and how do we make it 100% zero waste? So there's a lot happening and when you go in there as a fan, you experience that feeling, plus they're making money at it, right? This whole Trash on Your Back piece, you know, 4.4 pounds of trash per day, right? We knocked that down to 0.8 pounds per day. Just take 50%, that's an 82% reduction. The U.S. spends \$12 billion -- expected \$12 billion a year in waste management, right? We take 50% in one week. We're able to knock that down. And it's a \$6 billion -- you know, 50%, \$6 billion opportunity for the nation. Wouldn't we rather put that in schools, in compost facilities and, you know?

Kevin Drew: That's what we're doing. That's what -- that's the movement and it's really gratifying to hear it moving into the sports area, in the kids' schools and all of that because it's kind of the hippie dream. But it's, you know, it's being normalized, it's being really globalized, I think.

Announcer: You're listening to a Climate One conversation about getting to zero waste. Up next, we'll hear more from our panel of waste-reduction experts, and Greg Dalton will talk to a University of Michigan student who's walking the zero-waste walk.

Samuel McMullen: Living zero waste, you certainly still use things. You just don't use unnecessary things. You don't ask for production.

Announcer: That's coming up, when Climate One continues.

Announcer: You're listening to Climate One. Greg Dalton is talking about getting to zero waste with Kevin Drew, Residential Zero Waste Coordinator of the San Francisco Department of Environment. Lauren Hennessy, Outreach Manager at Sustainable Stanford, and Diana Dehm, founder of the Trash on Your Back challenge.

Here's your host, Greg Dalton.

Greg Dalton: We're going to go to our lightning round. Diana Dehm, you are a closet-- this is yes or no. You are a closet hippie.

Diana Dehm: Yes.

[Laughter]

Greg Dalton: You have gone dumpster diving.

Diana Dehm: I have.

Greg Dalton: Okay. Lauren Hennessy, pizza leftover from frat parties makes good compost.

Lauren Hennessy: Yes.

[Laughter]

Greg Dalton: Stanford students prefer weed grown with solar power.

[Laughter]

Lauren Hennessy: Yes.

Greg Dalton: Okay.

[Laughter]

Kevin Drew, as mayor of San Francisco, Gavin Newsom, started the city's pioneering composting program. As lieutenant governor, he has a lot of time on his hands and could make a good compost cop.

Kevin Drew: Yes.

[Laughter]

Greg Dalton: A compostable cup or fork thrown into a landfill will biodegrade back into the soil. Yes or no.

Kevin Drew: No.

Greg Dalton: Okay. We got a list here. It's okay to put the following items in the compost bin in San Francisco. Meat.

Kevin Drew: Yes.

Greg Dalton: Bones.

Kevin Drew: Yup.

Greg Dalton: Clam shells.

Kevin Drew: Yes. Clam shell, you mean, from clams or are you talking about --

Greg Dalton: Real clam. About the -- yeah, yeah.

Kevin Drew: Clam shells. Yes.

Greg Dalton: Pistachio shells.

Kevin Drew: Yes.

Greg Dalton: Paper salad containers.

Kevin Drew: Yup.

Greg Dalton: Dog poo.

Kevin Drew: No.

Greg Dalton: Okay. Alright. That ends our lightning round.

Lauren Hennessy: Can we talk about the difference between biodegradable and compostable?

Greg Dalton: Good point. Yeah. It's --

Lauren Hennessy: Cause this is very frustrating for me and I must say I've been trying to purchase compostable balloons for an event that we're having. And the amount of people who will say that they have something that is compostable and then when you say compostable or biodegradable, and they're not quite sure, is astounding. But that's an important distinction.

Greg Dalton: Confusing labels. Biodegradable like, I mean in 1000 years, sure --

Kevin Drew: Biodegradable doesn't mean anything. Compostable is a very strict standard within the STM certification. And we've had to get legislation passed in California to require that word compostable mean what it means and that biodegradable doesn't mean anything.

Announcer: That's Kevin Drew, Residential Zero Waste Coordinator of the San Francisco Department of Environment, on getting to zero waste. How much would you have to change your lifestyle in order to cut the amount of trash you produce to zero? Samuel McMullen is a student at the University of Michigan who embarked on a one-year journey to do just that. Samuel is the co-founder of Live Zero Waste, an environmental nonprofit that helps people give the zero waste lifestyle a try. Greg Dalton spoke to him to find out what it's really like to live a zero-waste life.

Greg Dalton: Tell me about the first zero waste meal that you try to have. How did that happen tell me about that first meal?

Samuel McMullen: Yeah, it was right after we gave a presentation to sort of launch the zero waste or the live zero waste idea and right after that we went down into the lobby of the NRDC in Beijing and went into the restaurant and had to sort of negotiate our first zero waste meal which has been repeated many times since then in my life and in my sister's life. And it was just a matter of asking if we could have the silverware with no napkin wrapped around it at that particular place. But actually the dinner we had the next dinner we had the silverware came wrapped completely in plastic. Everything, the silverware, the plates, the bowls everything was shrink-wrapped in plastic because in Beijing I think foreigners are worried about germs. So they were sort of proving to people how clean they were. And so we had to ask them for serving if we can eat out of the serving dishes and I ran home, my apartment was not too far. I ran home and got chopsticks that were not wrapped in plastic. So that was an adventure right off the bat.

Greg Dalton: How do people react when you ask for no straw, no plastic wrapping. Do they roll their eyes at you and think, uh, what a pain this guy is?

Samuel McMullen: Yeah, it depends entirely on how you ask. And I've asked many different ways.

The best reactions I get or when I preface it with listen, I'm doing the zero waste challenge and it's a little bit weird and gonna make your job hard but do you mind giving me a water without a straw or this burger without a paper wrapping or sandwich or whatever. But yes, sometimes if you just ask if you say, can I have a water with no straw or the silverware without a napkin around it and you get some eye rolls and muttered things as they leave.

Greg Dalton: And what's the purpose of doing this is this to sort of live the zero waste life for your own identity and comfort, or is it to change other people's thinking and change something bigger than yourself?

Samuel McMullen: Yeah, I mean it's components of both for sure. The impetus was certainly the first thing you said, which was that we're trying to sort of live out our values and we're working on environmental law paper at the time studying renewable energy policy. And so we were feeling great about ourselves as environmentalists, but start realizing that we weren't really doing much in our own lives to address the problems that we are writing about. So that was our reason for doing it. And then as we started encouraging other people to try it, it became much more about the idea that these kinds of changes measured on an individual level, don't make much sense. Like it doesn't really make sense to go zero waste if you're the only one doing it because you save a lot but you don't save that much. Whereas if you measure your community metrics and you try to encourage other people to do it and encourage them to get their friends to do it and get everyone on board, then you start to get real numbers that you can be proud of and that you can say we're actually changing something. So it's definitely turned into a form of like personalized activism. And an activism that's a little bit less in people's faces about why they should change their mind and more just about changing your own behavior and role modeling.

Greg Dalton: Yeah, the Old Gandhi phrase "Be the change that you want to see." So how many people are living zero waste? You started in Ann Arbor where you're been going to school. How many people have been following you?

Samuel McMullen: We're at 305 pledges which -- and they're spread out, they're all over so that's 26 countries now where people are trying to limit. And we're trying to get people hooked up with others that are living zero waste near them. So like we have pledges in Egypt and we have no idea what it's like to live zero waste in Egypt so we try to encourage those people to get in touch with each other and find the resources in their area.

Greg Dalton: So how do you handle things like Christmas, you know, those sorts of things. You give gifts without any wrapping on them or do you give gifts at all?

Samuel McMullen: Yes. So our version of waste or our definition of waste is pretty all-encompassing. So any new product we count as waste because of the eventual, you know, it's been produced and eventually it will go to landfill somewhere. So anything new is off-limits, but thrift stores are totally inbounds, antique shops. I do a lot of Groupon giving. So giving experiences and that ends up people actually think you're really thoughtful if you do an experience with them for the holidays, really value your time or I do web design so I give people websites and people love that.

Greg Dalton: How would you describe your social group and your quality of life? I mean do you hang out with people that have more material possessions and you do the latest whatever, you know, cool to have in college these days?

Samuel McMullen: Yeah, absolutely. I'm in a comedy improv troupe and that was a huge blessing actually because they don't care what you're doing, they're gonna make fun of it regardless. And that actually made it much more accessible to everyone else around me. So I'd often go out to meals

with this person named Guy Major [ph]. He would make fun of me in front of the waiter and he and the waiter would sort of get on a team making fun of me and then I didn't have to explain to the waitstaff that I was doing this thing, they already knew. And it was the same result, they brought me my stuff without waste but they got a laugh and that's which is very helpful. But yeah, I mean my social group it hasn't changed because of this, but they're definitely aware and we do like secret Santas and whoever draws my name gets made fun of because they have to get a zero waste gift, figure out something. So I think if you handle it well and you're not annoying about it, it can be a really fun thing for a whole social group to get behind.

Greg Dalton: And just to be clear. So if you give someone a bottle of tequila for secret Santa and that tequila bottle is recycled, is that count as zero waste?

Samuel McMullen: So we also have included recycling waste just because our main focus is really the production end of things. So as long as something is produced, that's like just because of how much environmental load is upstream of the actual purchasing decision we thought it made sense to include recycling because it still has all the production of that item still happened even though in the postconsumer end of the lifecycle it's recycled and reused or melted down or whatever. So we've decided to include recycling in our definition of trash.

Greg Dalton: Well that's remarkable because a lot of people, even in liberal eco-places like California say oh, I recycle so it's okay I can buy that because it's recyclable. And you're changing the definition of recyclable as waste. And so all of us live in this what we think is an eco righteous coastal lifestyle, not so much, shown up by a student in Michigan.

Samuel McMullen: Yeah, I hope it's not seen as showing up, but definitely I think there's a valid point there and something to be aware of that recycling is not innocent. And it really like recycling doesn't get at the issue that I think environmentalists have, which is that our economy is based on extraction and based on sort of exploiting other people's countries and their natural resources and their environments for our own our own gain. And if you look at it that way then anything that's produced anywhere is suspect and a target for environmental action.

Greg Dalton: So you're calling for like a change in capitalism, throwing our consumer society?

Samuel McMullen: Yes. Yeah, we get this a lot like well if everyone is buying used then there won't be any economy and that's fair and valid. But I think what the counterpoint that I always make is if someone's job is producing straws, we're wasting that human's talent. Like we shouldn't have people whose job it is to produce straws or to produce things that we use for 15 seconds, you know, like napkins. That's not a good use of our economic power and I think if we free ourselves of producing those sorts of things we can start to focus on things that will last much longer. And we can produce things that we need, I mean living zero waste, you certainly still use things. You still use soap you use all kinds of stuff. You just don't use unnecessary things. You don't ask for production that didn't need to happen.

Greg Dalton: So describe to me your bathroom and where you live. So what is it look like, how many things do you have, how many -- describe to me how bare in existence are you leading as a zero waste lifestyle?

Samuel McMullen: Yes. So I've been living zero waste for 2 1/2 years now. And I haven't noticed much of a difference in clutter. I think anyone who knows me will attest to that I'm not a clean roomie. So it's just change what I have has changed certainly. And where I got it mostly has changed. So like sheets I get from the Salvation Army, I have more bags than I used too, more containers, reusable containers. My bathroom is a toothbrush that I got from a donation pile at

Standing Rock, when I was there. So there were donations frozen into all the snowbanks so figured that was fair game because they were getting bulldozed unfortunately, and a little pot of baking soda for toothpaste. My shower is a bar of soap and a washcloth, but otherwise I don't think you'd be able to, I don't think you could look at my life and say oh, this guy's got something going on like there's something significantly different. It's just the procurement aspect is different.

Greg Dalton: Okay so you're not a -- yeah, this lifestyle that you're leading wouldn't be telegraphed by someone looking at you. They wouldn't say, oh this guy is leading a radically alternative different lifestyle. You look like a regular guy.

Samuel McMullen: Yes I think that's a fair assessment.

Greg Dalton: And Samuel, do you think you'll still be living this lifestyle when you get out in the world when you're in your 30s? And it's one thing for a college student to live this zero waste lifestyle often college students living on a tight budget. Do you think you're gonna carry this into adulthood and maybe even the comforts of middle life?

Samuel McMullen: I think it will be difficult not to continue living this way after college. Once you, we call it trash goggles, when people pledge we talk to them. And one thing we say is you get these trash goggles where once you've done it even just for a day, once you've done it, you start seeing trash everywhere. And that's the like golden nugget that we're after is getting people that point where they're like, wow, a lot of things we do create trash and none of them are really necessary.

So I think after I leave college it's not gonna be much of a difference. And I've actually been helped a lot one of the things we offer through our organization is mentorship. And so a lot of people have come with challenges that I don't really have, so moving and dealing with children and cats and all kinds of things. And I've been mentoring them through something that I have no idea what to do about it, but I've done research on it and I can sort of imagine my way through it. So solving those problems creatively with my mentees has really helped prepare me for whatever happens next.

Greg Dalton: And what's one thing an average person can do to reduce the trash in their lifestyle if they were to say as you say, put on those trash goggles. What's a simple thing that a person could do?

Samuel McMullen: Yeah. So one big differentiator that we have that we try to hammer home is that changing little things can be effective and you can get a long way with a little change. But it doesn't accomplish the same sort of cognitive shift that doing a radical change. So we really advocate for completely eliminating trash from your life for a day. Just try it, see what happens. And so like by doing it by time period rather than by items. So like if you were to eliminate aluminum cans that would be great. Aluminums are very high intensity thing to make. But you wouldn't experience the same like wow everything is made of aluminum because not everything is made of aluminum. So doing a big shift for a day I think is the best thing that I can offer in terms of sort of like a lesson learned. Like shifting your mindset for a little bit and then going back to your life and you have that knowledge then oh man, when I was doing my zero waste day I wasn't using this and now I'm using it again. You have to sort of pay attention to it in a way that you wouldn't if it were a small shift.

Greg Dalton: So do a comprehensive shift for a short period of time for the biggest impact.

Greg Dalton: Samuel, thanks for joining us on Climate One.

Samuel McMullen: Oh absolutely. Thanks for having me.

Announcer: Samuel McMullen, a student at the University of Michigan and co-founder of Live Zero Waste. This is Climate One. Coming up, we'll hear about how waste reduction literally begins at

home.

Sven Thesen: My wife's requirement was it had to be beautiful. And then I was -- it has to be functional and comfortable and let's see how energy-efficient we can make it.

Net Zero homes, when Climate One continues.

Announcer: We continue now with Climate One, and the ultimate in energy conservation: a home that produces as much energy as it uses. To talk about these net-zero energy homes, Greg Dalton is joined by three people at the vanguard. Ann Edminster is a green home consultant and author of *Energy Free: Homes for a Small Planet*. Daniel Simons is a principal architect with David Baker Associates. And Sven Thesen is owner of a Net Zero Home in Palo Alto, California.

Here's our conversation about getting to zero right at home.

Greg Dalton: Sven Thesen, let's begin with you. What possessed you to want to pursue a Net Zero energy home?

Sven Thesen: So as a chemical engineer and someone who's done a lot of climate work, I wanted to prove that you could have essentially your cake and eat it too, and that you could have -- well, one of my first -- my wife's requirement was it had to be beautiful. And so it was beautiful. And then I was -- it has to be functional and comfortable and let's see how energy-efficient we can make it. And so our small 5.9 kilowatts system powers the house. It also powers 10,000 miles of electric car carbon-free zero emission driving. And the house uses roughly 25% of the energy of an average house in Palo Alto. People don't notice except in the summertime when it's really hot they walk in and say, "Oh, this is really nice and cool, you must have your air-conditioning cranked," and I get to say with this wonderful grin, "I don't have an air-conditioning system. All I have is good building orientation, a heck of a lot of insulation and some shading on the sunny side, that's it."

Greg Dalton: Do you have to be like Jimmy Carter and wear sweaters in the winter?

Sven Thesen: So that was the whole point was to be able to prove that we could have comfortable, affordable, functional, and that you wouldn't have to sacrifice anything. So, no, I wear no shoes, and t-shirt and shorts pretty much all year round inside and it's nice and warm. And we don't, again, we use 25% of the energy of a conventional house and it's all generated in excess by our solar panels, and it's not a huge solar system.

Greg Dalton: Ann Edminster, you wrote the book on Net Zero homes. Tell us about your home and do you have an 80-inch TV?

[Laughter]

Ann Edminster: No, actually we have a rather petite TV and can't quite even figure out how to use it these days. My teenage son won't give us the answer, so we've given up. We now watch on the iPad.

[Laughter]

Greg Dalton: How hip, yeah.

Ann Edminster: So that's one of the measures that we take to reduce energy in our home.

Greg Dalton: iPad versus a TV. Okay.

Greg Dalton: Any other exotic features?

Ann Edminster: Exotic. We have a living roof, we do have a solar array, it's quite petite, 2.4 kilowatts. We are not at Net Zero yet, we're doing that sort of incrementally. So we have a few stages left to go. Most recent, Andy Wall, who you'll hear from later, actually helped get our attic ready for the installation of some New Zealand sheep's wool insulation. So that's a pretty fun thing. Both my kids want to climb in there and nap.

Greg Dalton: Right.

[Laughter]

Is that expensive, sheep's wool from New Zealand?

Ann Edminster: It is. There is a premium, but I was shielded from that fact by being an advisor to the company.

[Laughter]

Greg Dalton: Inside deal. Okay. Alright. So, alright. So the rest of us have to settle for Levi's or something else. Okay.

Ann Edminster: Well, it's all a matter of priorities.

Greg Dalton: Right. Daniel Simons, tell us about your home.

Daniel Simons: Well, I actually don't live in a Net Zero home but we've designed a couple of them. I think the key with getting to Net Zero or just being efficient is trying to figure out how to reduce the loads, like Sven was saying. Like the goal is really to make the buildings use as little energy as possible. I mean, any reduction that you can make just, you know, switching from an incandescent bulb to an LED bulb or insulating your house or upgrading the windows. All of these things, you know, incrementally reduce the energy consumption of the entire built environment. And when you get down really, really low, then it's easy to put a small PV system on the roof and power the whole thing.

Greg Dalton: Ann Edminster, we replaced the windows on our home and my head started to ache with all the R-factor, those factors that measure the light that comes through and the energy that doesn't come through, and it was mind-boggling. And I was very motivated, geeky, said I got to do this, right, I've got to walk the walk. But it was very complex. How many people really want to bother with the complexity, and that's just one piece of a house, right? Changing the windows is no simple thing.

Ann Edminster: It's true. I think, right now, one of the unique opportunities we have is it's still very much an innovator's world, Zero Net energy. And therefore the people who are willing to play are also willing to sort of absorb a certain amount of that geekiness. And they are in effect paving the path for the others in the future to sort of demonstrate what works, what's a good investment, what was maybe an interesting idea but not necessarily widely applicable. So we're in that process right now. All of us who are pioneering this field are still kind of winnowing those ideas and identifying the ones that are sort of winners across the board.

Greg Dalton: So what are some of the winners?

Ann Edminster: Well, sheep's wool insulation.

[Laughter]

Really good insulation.

Greg Dalton: If you know the right people.

Daniel Simons: Thank you.

[Laughter]

Ann Edminster: Yeah. No, as Sven said, lots of well-installed -- I think this is one of the things that is sort of unfortunate is, some of the most effective things we can do are the least sexy. So really good job of air sealing, really good job of insulation installation, and that's just not glamorous. But it has tremendous paybacks in comfort, energy reduction and so forth. Also, reducing potential durability issues related to condensation of moisture. So there are a lot of good reasons to do it.

Greg Dalton: Caulking doesn't get a lot of respect.

Ann Edminster: So true!

Greg Dalton: We put solar panels on first because I think they're cooler and sexier. And then did the sealing of the garage, et cetera. That's actually backwards, right? Daniel Simons?

Daniel Simons: Yeah. I mean I think so. And I think it's definitely -- I think that the -- you know, you have to be a little bit more careful when you start really super insulating the building envelope because there are, you know, moisture management things that you have to take into account. And there are, you know, when you really seal a building for air, you have to make sure that there's fresh air. But none of the technologies to do that are that cutting edge. I mean, it's stuff that people have been doing for years, it's just different from the conventional way that buildings are built in this country now. And so it is, it's just sort of shifting the paradigm slightly. And thinking about what's valuable in a new home as being that it has to have, you know, continuous exterior rigid insulation.

And it has to have an HRV. And it has to have these things which, you know, are really jargony and probably don't -- you don't really need to know them as consumers, you more just need to know that it's possible and push the people who are building your house to look for them.

Greg Dalton: Ann Edminster, let's talk about where someone should go. I want to improve energy efficiency in my home, where do I go? Where do I start?

Ann Edminster: Is this a softball for me to pitch my book?

[Laughter]

Greg Dalton: You can pitch it, but other than your book -- yes.

Ann Edminster: Where do you know? I'm a board member of the Net Zero Energy Coalition and I think that's an excellent place to start. We are online at [netzeroenergycoalition.com](http://netzeroenergycoalition.com). And you can peruse our membership directory, that's a great place. We have folks all across North America, actually. You're welcome to e-mail me and I can tell you all about everybody I know who's involved in this world.

Greg Dalton: Sven Thesen, let's talk about cost. This is perceived to be an elite thing for people who've got extra money, deep pockets. How much did you spend on your house?

Sven Thesen: We spent -- the rough estimate is less than 5% above and beyond what we would have paid for the house. So it's not a huge amount. The way I look at it was an investment in green jobs because they spend a lot more time on the framing, and they spend a lot more time putting in insulation. We spend a lot more time doing air checks, the sort of pressurized test to make sure the building was extremely well sealed, all that caulking paid off. And I think people, you know -- how much does a car cost? Well, you can buy a new car for 18,000 or half a million. What sort of car do you want? And so we wanted a home, it's only 2200 square feet; there are four of us living in it. We wanted a reasonable home that was extremely comfortable, extremely functional and still had an extremely small carbon footprint. And then the joy is we won, we did most of the things right, it is really comfortable.

Greg Dalton: Daniel Simons, is this -- are these homes an elite thing only?

Daniel Simons: I mean, you know, to a certain extent, yes. I mean, how many people actually, you know, hire an architect and design and build their own home. I mean -- and I think that as we move into a more sustainable future, you know, single-family homes are a thing that probably aren't the most sustainable model for living. I mean, we probably should be building higher density. We probably should be living more in cities. And there is a point at which buildings get tall enough that it's actually really, I mean, I would say impossible for them to be Net Zero, you know. I mean up to a six-story building maybe, but, you know, when you start getting high rises, there's just not enough roof area to power with PVs. But like I was saying before, that doesn't mean that making those buildings super energy efficient isn't still a really good goal. And hopefully, you know, as we move forward into this more sustainable future, more people will have the option of not going to some great effort to hiring an architect but rather just picking the Net Zero home as the one that they buy or rent. And when that happens, I think it will be more accessible to everyone.

Greg Dalton: Daniel Simons is a principal at David Baker Architect in San Francisco. We're talking about Net Zero homes at Climate One. Ann Edminster, one of the critiques of Net Zero homes is that they are the suburban single-family home. But you say that there's actually some urban examples and it's not just this sort of suburban home with lots of roof area for solar, et cetera. Tell us about the urban application.

Ann Edminster: Absolutely. Yeah. In fact, one of our real rock stars in the Net Zero Energy Coalition is a man named Shawn Armstrong who is developing multi-family, affordable housing that is reaching Net Zero Energy up in Arcata. So these are unit buildings with 2,650 units. And Shawn has been finishing these projects and reaching these goals for about the last three years. And one of our earliest projects here in the Bay Area was a zero lot line, very small townhome over in Oakland.

Greg Dalton: Zero lot line means what?

Ann Edminster: Means wall-to-wall houses built right up next to each other. So it's not the sort of suburban castle and the moat model, much more dense even though it's a single-family home, really different model.

Greg Dalton: And on the cost issue, Sven Thesen said 5%, is that what people think about, you know, in terms of the cost premium for Net Zero or is it --

Ann Edminster: I only wish that's what they thought about. There really is, I think a very widespread thought that there is a dramatic premium for Zero Net energy. My belief and my experience is that there is no cost premium. Because any commissioned project, you're given a charge and a budget and you'll either meet that charge within the budget or you don't. And if you don't, you're generally off the job. So all of the projects that I've worked on, Zero Net Energy hasn't

been achieved accidentally, it's been part of the initial design charge. So we meet it within budget. It doesn't cost extra any more than the kitchen sink would cost extra if you were being asked to remodel a kitchen.

Greg Dalton: Right. But as Daniel said earlier, very few Americans these days start from scratch, they probably buy a house or remodel a house. How about the upgrade path? Getting to zero with an existing building, they're doing it incrementally, is that slow and painful and costly?

Ann Edminster: It's slow and costly. Personally, I think it's really fun.

[Laughter]

I wouldn't call it painful at all. But, yeah, there has to be a certain commitment. You know, we're dealing it for philosophical reasons. On the other hand, I'm a great believer in what I call opportunistic remodeling, which is if you're thinking about remodeling for whatever reason, there always ancillary opportunities that you may not be aware of that you can take advantage of if you are already planning to do x, then you can do y at the same time.

Greg Dalton: So let's go to audience questions. Welcome to Climate One.

Male Participant: Thanks. I'm expanding the definition of home from a single-family home to like home of kids, meaning schools, kindergarten's, home of sick people, hospitals, home of inmates, prisons and home of the worker bees like in the office buildings. So I'm just curious like if you have any examples of like Net Zero in that like arena, sort of like the larger buildings?

Greg Dalton: Institutional owners have a big incentive to save energy on things. Daniel Simons?

Daniel Simons: There's a great -- the West Berkeley Library is Net Zero energy, it's a really great building and they have a dashboard. But it's a really nice library as well. There's also a manufacturer of modular classrooms that just came out with a Net Zero energy module. So that when you're doing the modulars on your local elementary school, they don't have to be those horrible little white boxes that they usually buy, they can be really nice and have no energy use. So yeah, I think there is-- there are tons of examples out there.

Greg Dalton: Interesting. Let's have our next question at Climate One.

Male Participant: Thank you. So many people in San Francisco rent including myself, and my three housemates and I pay our utility bill. And in this situation, our landlord has no incentive to retrofit our building which is an old Victorian building. So my question is, have you thought about this dilemma of decoupling, and is there any way to address it?

Greg Dalton: Ann Edminster, it comes up with solar as well.

Ann Edminster: Really challenging question. I think that there are certain things that the occupant does control, all of the stuff we call plug loads. So you may or may not have the opportunity to decide about what appliances you're going to use. When we do a better job with building enclosures, we find that increasingly the loads are dominated by things like electronics. When you don't have the opportunity to have an impact on the enclosure, it's a little bit tough. But there's an interesting phenomenon. Lawrence Berkeley Lab did a study a couple of years ago where they looked at 10 so-called deep energy retrofits. So this essentially is what Daniel was talking about earlier without the solar necessarily but we're really working on getting the loads down. And one of the interesting conclusions that they arrived at was that there are two primary prongs to the strategy for achieving Zero Net energy, one being behavioral and the other being technological.

And so depending on which case study they were looking at, the solutions were dominated by either the technological or the behavioral approaches. So I'd say as a renter, you're kind of left with the behavioral as your primary strategy, unfortunately. But there are no Zero Net energy buildings without Zero Net energy occupants.

Greg Dalton: Last question, welcome to Climate One.

Female Participant: Hello. Thank you. I have the opposite of the landlord-tenant problem. I have a great landlord and she would like to do these things, but I receive all the benefits. And she's been gradually, painfully retrofitting. Are there any arrangements happening or can you perceive -- can you imagine ways that the incentives could shift so that landlords really do have an advantage to doing this where the tenant receives so much of the benefit?

Greg Dalton: If a landlord improves the building envelope and they're paying utility bills, don't they benefit from better windows and ceilings --

Daniel Simons: Yeah, but a lot of times, they don't pay the utility bills.

Greg Dalton: Alright. They don't pay, the tenants pay utility bills. So there's a problem. I don't care 'cause you're paying, you don't care 'cause I'm paying, how do we solve that?

Daniel Simons: It's really. I mean it's a huge issue. We design a lot of multi-family housing and the whole, you know, incentive metering thing that has come up a couple of times, it's really difficult to navigate for a number of reasons, like photovoltaic systems are really difficult -- or not difficult, but it's difficult to work with PG&E to allow you to put one on a roof and to feed, you know, 15 or 20 or 100 units in the building because they like to just go back into one meter, which is usually not for the residents. So it's a difficult thing. I mean, I think that there are economic models out there that can show where if you're renting and you can prove that you're -- the utility burden for that renter is lower than the rent can be higher. And even with affordable housing, that's the case. So there are ways that it could incent people. But in an existing situation like you described, it would be very difficult to do. I mean, maybe you could figure out some way of splitting the difference with your landlord, you know, where if you could show that you save 20 bucks a month, you give them 10 or something like that.

Announcer: Greg Dalton has been talking about net-zero homes with Ann Edminster, author of *Energy Free: Homes for a Small Planet*, Daniel Simons, a principal architect with David Baker Associates, and Sven Thesen, who owns a Net Zero Home in Palo Alto, California.

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[Applause]

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