The Great Simplification

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[00:00:00] **Leo Trasande:** The chemicals used in plastic materials are essential to the lifespan of petrochemical companies and countries, I might add, that are poisoning us. So we have to get out of the mindset that plastic is essential for human life because that is a manipulation of the message. In fact, plastic is only essential for certain people's profit and plastic is essential piece of the unraveling of our human existence.

[00:00:32] **Nate Hagens:** Joining me today are Linda Birnbaum, Dr. Leo Tresande and Christina Dixon, three individuals deeply involved in research and advocacy for the regulation of plastic production and consumption. Linda Birnbaum was formerly the director of the National Institute of Environmental Health Sciences of the National Institute of Health and the National Toxicology Program.

[00:00:55] She is now a scholar in residence at the Nicholas School of the Environment at Duke. University. Leo Tresante is the Jim G. Hendrick, MD professor, director of the division of environmental pediatrics and vice chair for research in the department of pediatrics at NYU school of medicine. Christina Dixon is a campaign leader at the environmental investigation agency in the United Kingdom using.

[00:01:20] Policy advocacy and corporate campaigning skills towards issues in particular, plastic pollution and ocean conservation. This episode, in my opinion, is a dynamic and eyeopening conversation about the current state of plastics in our world. If you find this topic as interesting and concerning as I do, I encourage you to also give our other previous episodes on plastics a listen, which cover.

[00:01:47] The details of, plastic food packaging with Jane Munka, PFAS with Martin Scherringer, plastic effects on fertility with Jeremy Grantham and Shana Swan, and the supply chain of Supplastics, all of which are linked in the description of this episode. But before we begin, in order to hit the ground running, as it were, I thought it would be helpful to have a quick primer on how the world currently uses plastic and the effect it is having on our health.

[00:02:14] Currently we make. humans, around 500 million metric tons of plastic per year. And the industry is aiming for a doubling of that in the next 25 years. All of this plastic eventually ends up in our global ecosystems in some form or another. and size much of it stays in the environment for a very long time, in some cases forever.

[00:02:39] much of the plastic we come in contact with every day is invisible to us or not even on our sentry radar. it is now in most or even all of the tissues of our bodies, including our brains, as well as in every ecosystem around the world that's been tested. We discard. Incomprehensible plastic waste, including 5.

[00:03:02] 7 million toothpaste tubes, 570, 000 cell phones, and 2. 3 million pairs of sneakers every hour around the world. The supposed silver bullet of the industry is the recycling of all this plastic. Yet the reality is recycling is at best an energy intensive delay and it's eventual disposal in the environment.

[00:03:25] There are three primary problems that plastic causes. Number one, the pieces of plastic that physically interfere with normal ecosystem functions. Number two, the toxic chemicals that plastics leach out throughout their production, use, and disposal. And number three, the fact that plastics are at the heart of the consumptive culture that drives the economic superorganism and western lifestyles.

[00:03:49] Plastics contain thousands of chemicals with only a handful haven't been tested for toxic properties and impacts. Those that we know about are associated with nearly all of the major health problems that plague us, including fertility loss, diabetes, obesity, cancer, neurological orders, such as autism and ADHD, and the list goes on for quite a while.

[00:04:14] For those listening who are familiar with the narrative of the great simplification and the human superorganism, there are several factors unfolding in finance, energy, global supply chains, and politics that will all affect the future of plastic. Like all that we talk about in this podcast, it is unfolding rapidly in a complex and.

[00:04:36] Unpredictable way, efforts to address the problems of plastic have escalated rapidly in the past couple of years, including an ongoing attempt at a global plastics treaty through the United Nations. Many NGOs and individuals are

working on this, among whom are the three individuals joining me today who know a lot and care a lot.

[00:04:57] About this issue with that, please. Welcome Linda Birnbaum, Leo Tresande and Christina Dixon. Leo Tresande, Linda Birnbaum and Christina Dixon. Welcome to the show. I have just, read an intro on some plastics headlines, relevant to our world. and I'd like to get into that, but if you would briefly each introduce yourself, your name and where you work currently, and then we'll get started.

[00:05:28] **Leo Trasande:** My name is Leo Trisande. I'm a pediatrician and epidemiologist, and I direct the Center for the Investigation of Environmental Hazards at the NYU Grossman School of Medicine in New York City.

[00:05:38] **Linda Birnbaum:** I'm Linda Birnbaum. I'm, I retired a number of years ago from being the director. I'm the National Institute of Environmental Health Sciences, which is part of the NIH, and I was also the director of the National Toxicology Program, which also in addition to NIH, involves FDA and CDC.

[00:05:58] I'm currently a scholar in residence at the Nichols School of the Environment at Duke University and spending my time making good trouble. You must know my friend Pete

[00:06:08] **Nate Hagens:** Meyers. I know Pete very well. and last but not least, Christina.

[00:06:15] **Christina Dixon:** Yeah, my name's Chris Dixon, or Christina as you like. and I am a campaign leader at the Environmental Investigation Agency, based in the UK.

[00:06:24] And, I work on a lot of issues across our ocean program, but predominantly on securing a global plastics treaty, which is how I fill my days.

[00:06:34] **Nate Hagens:** Excellent. So thank you all for being here. Jeremy Grantham was recently on the program and he told me that he believes plastics and specifically endocrine disrupting chemicals are a bigger threat to humanity and the future than climate change, which from a Plastics advocates or scientists

that might be one thing, but this guy has been a staunch climate change, warrior and activists.

[00:07:05] That's quite a strong statement. do you, do any of you agree with that or, or what's your take on, on that statement?

[00:07:13] **Linda Birnbaum:** I'll say that I think It's partially true, because at least at this point, climate change, or much of it, may still be reversible. I am not positive that we can reverse the contamination of our world, and maybe more than our world, maybe our solar system, with the tremendous amounts of plastic that will essentially Never go away, or at least some form of them will never go away.

[00:07:44] **Christina Dixon:** I would maybe add something to that, which it's not disagreeing. I think it's complimentary. But, from my perspective, plastic pollution and the health crisis that relates to plastic pollution is also really interlinked to the climate emergency. And so one thing I think that it was missing from the sort of list of headline kind of terrifying facts about the issue is that we're not really talking about the fact that plastics are actually fossil fuels.

[00:08:08] So the continued expansion of plastics, that is the plan B for the oil and gas industry. this is what they're looking to do, make more plastics over the coming decades. And recent modeling has shown that it's impossible to stay within the 1. 5 degree trajectory of the Paris Agreement, unless we reduce the production of plastics, because emissions are really concentrated in the production of plastics.

[00:08:30] So I see plastic pollution and climate as very interlinked. I don't see them as separate issues, but I also understand that the growing understanding of the health impacts of plastic that is an emerging area of research, which I'm sure Leo and Linda can tell you a lot about. but. They're all connected.

[00:08:47] and we can't really, I don't think we should silo the topics in that way. If that makes sense,

[00:08:51] **Nate Hagens:** it does make sense. Not to mention the fact that if we gave up all, oil and gas, gasoline and diesel fuel, we would still have all the fractions left in a barrel of oil that are processed into plastics. And if we were

somehow able to give up plastics, We would also have all the diesel and gasoline, and other fractions.

[00:09:12] So they are joint products, from, from a barrel of oil. Leo, did you have any comments on, on that opening statement?

[00:09:21] **Leo Trasande:** Sure. I have two. So Chris really beautifully described it. plastics are fossil fuels, so I can't really distinguish the threats. And in the context of the California wildfires, it's no secret that the wildfires are burning plastic.

[00:09:38] That those particles are going into the environment, they're causing increased air pollution, and that is further accelerating climate change, and then the climate change in turn is inducing fires. So we're talking about a vicious circle, and that is to me why I find it really the better way to describe this is that it's fossil fuel production and consumption that's at the core.

[00:10:04] of both of

[00:10:05] **Nate Hagens:** these interlinked threats. Well, at the core of that might just be consumption. Agreed.

[00:10:13] **Leo Trasande:** I think the second statement that I would, I would quibble with or I would add to clarify is why these are such threats. So, these are threats not because the population is going to decline, but because we are sicker and fatter and poorer as a result.

[00:10:36] So, it's not just because. These chemicals in plastic decrease sperm count or affect our ability to conceive alone. It's because they contribute to heart disease. They contribute to prematurity. They contribute to a variety of cancers that and conditions chronically that run the lifespan from womb to tomb.

[00:10:59] That is why Plastics are such a crucial threat to our ability as humans to sustain ourselves on the planet. The planet will be fine. That's the irony of all this. We like to say that the planet is going to burn up, but our ability to survive as humans on the planet is what's at risk.

[00:11:25] **Nate Hagens:** Said differently, C02 in the atmosphere is one of the waste products from fossil hydrocarbons, and it's affecting our external environment, but the other waste product from fossil hydrocarbons is in our bodies.

[00:11:38] It's an internal poison, if you will, and both are invisible, so they're difficult for people to emotionally immediately see, the negative external and internal impacts of our consumption and our incentives and our prices and our things.

[00:11:56] **Leo Trasande:** That's right. So microplastics have really brought this issue to the fore because they've made what we knew was invisible and a huge problem more directly visible and they've caught the public attention in a way that chemicals used in plastic materials simply didn't.

[00:12:16] **Nate Hagens:** I still can't get my head around all the things in my life that have plastics, that I do these podcasts on plastics, and I'm very concerned about it, and yet I go back to my own life, I have a sleep apnea, so I wear a CPAP machine at night, and it's this plastic pliable mask that I put on every night, I have no idea what's there.

[00:12:39] What's little micro things are leeching off of that and going into my body. and the thing is, is I don't think, I mean, corporations use narrow boundary goals for their profit, investment revenue in, tech decisions and all these things you're mentioning, we don't. Even study the impact. I mean, aren't there like thousands or tens of thousands of potential chemicals and chemical compounds?

[00:13:06] Like, how do we even test what the impact on humans are on those things? So I'd

[00:13:12] **Linda Birnbaum:** like to distinguish a little. Okay, please. Or, or it's not distinguished. It's integrate, I think. And, and I love the idea, the comments that both Chris and Leo were making about the integral integration of climate change and plastics and being driven by fossil fuels.

[00:13:31] But I think when we talk about plastics, it's both the physical nature of the plastics, which themselves, the microplastics and even tinier pieces of plastic called nanoplastics, and the physical nature of how that can irritate a biological

system. And we have a lot of data now from aquatic wildlife, and we're beginning to get it from animals and people.

[00:13:59] But it's the chemicals that are used both making the plastic, that are in the plastic, and I should say many of these chemicals are not tightly bonded to like the backbone of plastic, but they're just kind of mixed in. It's kind of like when you make a super saturated sugar solution. And if you get to a point and stuff can come out, well overuse, these plastics come out and over time.

[00:14:28] And, and what you alluded to, Nate, was you, you compartmentalized into different areas. And people think, oh, there's problems with when you make the plastics, with pollution happening. And then there's problems when you use the plastic with pollution happening. And unfortunately, most of our policies and regulations talk nothing about, well, what happens when you stop using the plastic?

[00:14:55] We don't look at the entire life cycle of the plastic. And that's why people forget that the styrofoam that you have your coffee in today, that that styrofoam is still going to be around a million years from now. A million years.

[00:15:12] **Nate Hagens:** So. So we took fossil carbon and hydrocarbons that were stored underground for millions to tens or even hundreds of millions of years in the, in the, you know, case of coal and we applied technology, to those things and we use them in a geological tiny fraction of a second of time and their byproducts are going to be here for millions of years after and in a form that the environment cannot assimilate.

[00:15:44] **Linda Birnbaum:** I think that's a fair statement. In other words, we have been successful, and I use that term in quotes, we've been successful in creating things that we really don't understand what their long term impact is. And, and to back up a scent, I think we all need to remember when plastics were first created, many of us, Thought they were miracles.

[00:16:09] Wasn't it wonderful? I could have a bottle that I didn't worry about it breaking. I think the problem is people didn't think about the consequences of these things. So, when we look at plastics or so many chemicals, we have to begin to ask questions. Do we really need it? When do we really need it? Sleep apnea, at this point in time, you may really need it for your health.

[00:16:37] Okay? And maybe your plastic sleep apnea tubing and stuff that you use for many years is not a major problem. But think of all the single use plastics, all the unnecessary uses.

[00:16:51] **Nate Hagens:** But here's the thing, for, for the Sleep apnea company or for any company to actually test all the adverse impacts, especially over years of something that uses plastics would render every product unprofitable.

[00:17:07] So our entire system is based on narrow boundary criteria of making decisions. Is there considerable testing now, at least, a power loss sort of thing where we get 80 percent of, of the problem with 20 percent of the testing. Are there like massive new tests on plastic compounds and their health on humans, or is it kind of the same as it always has been?

[00:17:32] **Linda Birnbaum:** Well I think as far as the health effects and the stuff, we know that there are like 350, 000 or more chemicals that have been intentionally synthesized in the last 70 years. That doesn't talk about things that have happened because some of those chemicals interacted with the atmosphere or interacted with others, but even of those 350, 000, less than 20 percent have any testing at all, and very few have.

[00:17:58] any kind of extensive testing. There are new approaches that are being developed for more rapid kind of screening testing, but nothing, let's just say the great majority of things are not tested and will not be tested because at least in the United States, and I'm not sure about the UK, I know a little more about the rest of the EU, Chris, maybe you can comment, you know, the attitude with chemicals is innocent until proven, proven guilty.

[00:18:28] **Christina Dixon:** I think that's a fair assessment across the board, actually, unfortunately. And I've just attended a treaty negotiation where we couldn't even really agree on the concept of chemicals of concern used or present in plastic in order to create a kind of global understanding of how we might regulate. So I don't have full confidence that, you know, the level of knowledge and understanding that you're imparting right now, that that's shared or understood universally, unfortunately.

[00:18:54] and so that kind of miracle product that you described has really quickly become a nightmare and one that a kind of regulatory nightmare as well, because policy is not keeping pace with the speed of development within like the technology of plastics, for example.

[00:19:07] **Nate Hagens:** So I. Work in systems ecology, where I talk about the carbon pulse, which is we're alive at this time where we're drawing down ancient carbon millions of times faster than it was trickle charged, by photosynthesis.

[00:19:22] And we are, farm animals outweigh wild animals, 50 to one humans and our farm animals. And yeah. Factoids like that, that are disturbing once you fly up high enough and look down at the road map, each of you are working, you know, diligently in the plastic space. What are some of the things that I didn't mention in my intro that are hooked?

[00:19:51] in, and, and factoids, that you bring up in your, discussions with people, you know, Jeremy Grantham is very focused on sperm count and endocrine disrupting chemicals. Martin Scheringer, talked about PFAS as the forever chemical. What, what are some of the, the hooks, that you're particularly concerned about and, and speak about?

[00:20:14] **Linda Birnbaum:** Some of the greatest concerns I have with plastic, and I should back up and say, I'm not an expert in understanding the physical impacts that tiny plastic particles can have on our bodies. I think we all are disgusted by the fact that we poop out a credit card's worth of plastic every week. Wait,

[00:20:37] **Nate Hagens:** what?

[00:20:38] Every human, like in industrialized world, I mean, it wouldn't be shaped like a credit card because that wouldn't work well, but that, that size.

[00:20:46] **Linda Birnbaum:** You're getting a little too graphic for me, but yes. We excrete

[00:20:50] **Nate Hagens:** that amount of plastic?

[00:20:51] **Linda Birnbaum:** Correct. And I'm not sure if that is not even an an underestimate of the total.

[00:20:57] But I think what I have more knowledge about, about the chemicals that are used in plastic to give them the properties that you like, whether it's hardness, and that was things like, for example, bisphenol, BPA was used to give you nice hard bottles, for example, or things like phthalates that in some cases are used to give you flexibility.

[00:21:21] Or things like flame retardants, which theoretically we're supposed to prevent things from rapidly bursting into flames. Or the PFAS, which are in everywhere, everything, all of us. I think it's the chemicals and their long term impacts, and I would say some of my biggest concerns are in the brains, for the brains of our children.

[00:21:44] **Nate Hagens:** So I read recently that like something like 0. 5 percent of the weight of our brains is made up of microplastics. Is that a valid stat?

[00:21:53] **Linda Birnbaum:** I can't say that's the number. I do know that you can find plastics in the brain that you can, they are able to traverse the blood brain barrier. They're also able to traverse the placental barrier, so they're getting into our brains, into our unborn children, they're getting into men's testes, they're getting throughout our body.

[00:22:20] **Nate Hagens:** So, in the 300, 000 years of our species history, this is the first generation that babies are born with plastic in their bodies already, on day one.

[00:22:31] **Linda Birnbaum:** Our babies are born pre polluted.

[00:22:34] **Leo Trasande:** You know, microplastics. have gotten the attention of the public profoundly, but we still don't know how much plastic are in people's bodies.

[00:22:45] The technology of measurement is such that, we can't compare across studies. The New England Journal of Medicine's study that documented the fourfold increase in heart attack, stroke, and even death as a composite event was

based on technology that arguably can't be fully reproduced across individual studies.

[00:23:09] What I can tell you, as Linda alluded to, is that phthalates were associated with early cardiovascular mortality a couple years earlier, such that 50, 000 American adults, men and women, between the ages of 55 and 64, die each year. As a result of phthalate exposure, the irony is that there's actually concordance between that New England Journal of Medicine study and the previous work looking at phthalates because it was polyvinyl chloride plastic that was also associated in the microplastics and nanoplastics in the carotid arteries with heart disease and so, we're actually a lot closer, to what you might call causal evidence.

[00:23:52] That plastics kill people through early heart disease. I'm not going to tell you it's 100 percent definitive, but we're quite well on the path. And so when people say to me, okay, we're reducing fertility and unable to, produce a population that's supposed to grow even further than it is. I'm also saying, look, it's killing people in the airport at Newark.

[00:24:17] People are dropping dead early. And I think that should really get people's attention even more. then the fact that it's, reducing the ability of our population to reproduce. I think some would argue that our planet is overpopulated right now as it is.

[00:24:34] **Nate Hagens:** I have so many questions, but, let me allow Christina to, answer my original question, especially as a communicator, and, and campaign leader on policy and such.

[00:24:46] what are some of the, No hooks and summary points that you use on on this issue

[00:24:52] **Christina Dixon:** well actually something that I just kind of popped into my head whilst I was listening to everyone talking was really around the framing of the problem and what the solutions might be because we've just heard. A lot of really scary information about the health impacts of plastics and our levels of exposure but if you were to take the kind of industry narrative on face value it would be that we can all just.

[00:25:15] you know, choose to reuse our bag or to do our recycling and everything will be fine. This is basically a waste management problem. And if we manage our plastic waste correctly, there's not really a problem. and it's, it's, you know, everything will be okay. And that's really not the case. there are many things in life where you can make informed kind of consumer choices, that protect yourself.

[00:25:37] Like I'm going to wear a helmet when I ride my bike, or I'm going to put a seatbelt on in the car. And that might. make it a bit safer for me. But the level of exposure to plastics in the environment make those kind of, decisions basically out of our hands. They take them, they take that informed choice away from us.

[00:25:54] We know there's a problem. and ultimately plastics are everywhere in the air that we're breathing. Plastics are in our bodies before we're even born. so we have no agency then. And in making those choices to protect ourselves. So, that's not really answering your question, Nate, actually, but it was just something that from a communications perspective, I think, is really important because we are now beyond the point where our kind of individual actions, can really help protect us.

[00:26:20] What we actually need is a collective perspective. global response to the problem of plastic pollution that really gets at the root of what the problem actually is. So it's not a waste management problem, although, of course, we're structurally dependent on, for example, exporting our plastic waste to the global south, where it's not properly managed because we're overburdening countries.

[00:26:39] So there are waste management problems. There are waste pickers who are exposed to terrible health impacts from handling plastic weights. But the problem goes way, way bigger than that. We're talking about upstream, the overproduction of plastics, the use of fossil fuels to make plastics. The communities that are living on the front line of a massive petrochemical build out, where these communities are exposed to terrible, terrible pollution, in their water, in their air.

[00:27:08] and that is like on a projection to grow exponentially in the coming decades, because there isn't a collective global understanding about plastics in the high level sense. This is no longer about, you know, reusing your plastic bottle. I mean, that's nice to do. I recommend that you do it, but that's actually not.

[00:27:25] where we are right now. It's much, much bigger than that. So when I talk to people about plastics, for me, the main message that I'm trying to convey is that this problem is much bigger than a simple behavior change thing. Like, yes, we can change behaviors that might help. We can reuse, refill, repair, use less in the first place, of course.

[00:27:46] but ultimately we need a massive system change that would actually create a whole new society that is far less dependent on the production and use of plastics. and that's scary. That's economically terrifying. it's big system change. but until we understand that that's what's required to protect communities and the environment into the future, we're actually going nowhere.

[00:28:09] **Nate Hagens:** Oh, we all just met. So you don't know that I often use the phrase. I have so many questions on my podcast, but I seriously have so many questions as you were speaking. I had a glimmer of hope. which was then just crushed by another insight, which I will share. The things you're talking about should be nonpartisan, bipartisan, apply to liberals and progressives and conservatives and, Republican.

[00:28:42] I mean, this affects all of us and our children. So that's the glimmer of hope. Is, unlike the way that the climate change and ecological, biodiversity and such has, has kind of been, siloed on, on one side of the political spectrum, this, at least in theory, could be, galvanizing for both sides.

[00:29:06] However, it's not like chlorofluorocarbons or unleaded gasoline or DDT that you could keep everything in the economy the same except for you fix that mosquito, spray because plastics are everywhere. They're in everything that we do. So would, popular. Mass education and awareness of the things that you all work on and the danger to our babies and to our hearts and to our brains and all the things, what would be the consequences of that?

[00:29:42] Would it be another, 1980s Exxon said that we're aware of climate change and it's not an issue like the big business would just sweep it under the The carpet with, with lobbying and such, or, or could it actually lead to, the policy and, and responses globally? It sounds like it would be necessary, or is this, is this different than climate change, like the United States or France or New Zealand or wherever could get their act together on plastics and be better off?

[00:30:14] **Leo Trasande:** So I, I have a little bit more hope because ultra processed food is a heavy pathway for plastic use and for contamination of food with plastic associated chemicals. And insofar as Because when you,

[00:30:29] **Nate Hagens:** when you heat it, it, it, the packaging, it leaches into the food.

[00:30:34] **Leo Trasande:** It doesn't have to necessarily heat. Linda can tell you a lot more of it.

[00:30:37] It happens on its own. These are chemicals not covalently bound to the plastic in the first place. They absorb under normal conditions. They absorb without acidity, without alkaline conditions, the whole spectrum of pH. These chemicals, phthalates, And break down because they're additives to plastic, they're not covalently bound, and then under normal conditions, normal temperature conditions, goodness gracious, polycarbonate, polyethylene plastics, they break down, these are polymers, these are chain, billion long chains of molecules, and they're not impervious to just the conditions that, under which they're used.

[00:31:15] And so when you think about what gets into our bodies, as a result, that has many people on both sides of the aisle very enraged. and they feel like the Food and Drug Administration, which is largely a drug administration in the United States, has, has been asleep at the wheel. And they're ready to, step in and really address the issue.

[00:31:40] The question is, is that going to hit a brick wall in the form of the petrochemical industry? Because the chemicals used in plastic materials are essential to the lifespan of petrochemical companies and countries, I might add, that are poisoning us in our food. Directly above all, but not just food. and in the meantime, they unfortunately are essential to the death and poor well being of all of us across the planet.

[00:32:14] So we have to get out of the mindset that plastic is essential for human life because that has is fundamentally Manipulation of the message. In fact, plastic is only essential for certain people's profit and plastic is essential piece of the unraveling of our human existence.

[00:32:35] **Nate Hagens:** Do we have the, the academic research, capacity generally to say.

[00:32:44] These 20 percent of plastics and chemical compounds are probably responsible for 80 percent of the damages and let's focus on those. Or is it a like complete, like all of them are bad or or are there, there's some culprits that would be targeted first if we were to start to, reduce.

[00:33:06] **Linda Birnbaum:** I'd kind of like to go back a little.

[00:33:09] we know that some are very bad, but our whole history. And it's a short history, we're talking, you know, decades, not millennium, is that we substitute, you know, we say this chemical's bad, so we come up with another chemical, which kind of looks like the one we had, and you don't have to change the process, and you don't have to change the product, and then ten, twenty years down the road you find out, oh my god, it's worse.

[00:33:40] So we have, we call this unfortunate substitution, or whack a mole, or the chemical conveyor belt. You can pick the, the terminology, but the point is instead of focusing on a solution, we focus on the problem. So instead of saying we need a way to safely package something, You know, we need safe packaging.

[00:34:01] We say, oh, we've had all these PFAS lining the plastic, or we've got all these PFAS that are on the side chains of our plastic, and we'll just change to another PFAS because there are 15, 000 of them. Or we'll do the same thing with BPA, you know, why do

[00:34:19] **Nate Hagens:** we do that? Because this PFAS number a has been shown by people like the three of you to be bad.

[00:34:26] And so the industry is like, well, we can't use PFAS a, but let's try PFAS X because you are not aware of it yet. Is it something as simple as that?

[00:34:34] **Linda Birnbaum:** Yeah, I think some of it's just, it's easy. It's easy to change. So I think BPA is a beautiful Hello. Oh, not beautiful. A very sad example, mothers and young parents didn't want their babies to be poisoned by BPA that was in baby bottles and sippy cups.

[00:34:54] So they protested and they stopped buying baby bottles and sippy cups with BPA. And so, industry FDA to get BPA out of baby bottles and sippy cups. But guess what? They didn't switch to BPF, or BPB, or BPAF, or BPSIP. And I could go on with the whole alphabet soup of very minor changes they made in the original molecule, which didn't change the function of the product.

[00:35:29] And why, why haven't we learned? That if you don't change the function of something, if you don't change how you can use something in production, why would we think biology wouldn't, would change? I mean, that's, that's, I'm kind of getting a little maybe over the top here. I, I don't know, Nate, whether I'm really answering what you want.

[00:35:52] No,

[00:35:53] **Nate Hagens:** you're not over the top. Unfortunately, I'm experiencing a little dissonance here because off camera, when we introduced ourselves, we were laughing and joking. And so I feel like this is a fun conversation with the three of you, that have aligned values and it's fricking disgusting and hitting me in the stomach.

[00:36:12] The, the gravity of, of. What you're saying, some of which I knew, but not all of it. So there's nothing over the top here. what's over the top is that our culture has, by solving the problems, of the past, the solutions have brought us to today and that it takes podcasts to get people more aware of these things, although I do think.

[00:36:38] You, the three of you have been working on this a long time. I think you would agree that even relative to three or four years ago, interest and awareness is exploding on these issues. So that's a good thing. Yes.

[00:36:49] **Christina Dixon:** Definitely. I think, from, in the UK at least, but I would say it's, it's kind of been mirrored globally.

[00:36:55] We call it the blue planet effect because of the TV show blue planet kind of catapulted. That was the scene with plastic floating in the, in the ocean and it kind of Catapulted the issue of plastic pollution onto the public agenda, but that

put it onto the political agenda because you suddenly had people going into their supermarkets and saying, actually, we don't want all of this plastic crap.

[00:37:18] You know, we don't need like a banana wrapped in plastic. That's crazy. Just give it to us. It's got its own skin, you know, and it created that consumer pressure. sort of created the wave that we're riding now where we do see, and yeah, if I may be a little positive, a kind of global policy response, it's happening much slower than I would like.

[00:37:38] but it's, it is a policy response and a kind, it is that collective global action that I was talking about. Like the idea that we would even negotiate a treaty on plastics five or six years ago with that's bananas, you know, that's actually, we've come a really long way. And with each. round of negotiations that we have for a new plastics treaty.

[00:37:57] I feel like the kind of envelope of what I think is possible is pushed a little bit further. So, for example, you know, now we're talking quite seriously about a global cap in the production of plastics. that is that that was a completely off the wall idea that I don't think anybody thought would be possible.

[00:38:14] Even two years ago. So things are moving. and public awareness is really is there. but, you know, law and policy and science also has to catch up with that. So that's that's where we are now, I think.

[00:38:29] **Nate Hagens:** So, Leo, I know you want to follow up with that, but let me ask a brief question. Climate change is a global thing because we all share an atmosphere.

[00:38:41] but it's plastics the same way it could. Could I asked earlier, could an individual country make draconian rules and changes and improve the health of the ecosystems and the people living in that country? Or is it still there's negative effects in the air from microplastics and nanoplastics that travel around the world?

[00:39:02] Is it a global issue or is it more local and national?

[00:39:07] **Christina Dixon:** I would say that it's a global issue. the reason that we're talking about having, for example, a treaty on plastics is because what's been

happening thus far, you know, the status quo that we have is a complete fragmentation of approaches to dealing with the problem.

[00:39:22] So you have many countries now have bans on certain plastic products. For example, they might have bans on the import of plastic waste that I kind of talked about earlier. So saying, actually, we're not going to import plastic from the US or the UK to recycle it anymore. You guys can deal with that problem yourself.

[00:39:38] But at the end of the day, plastic as a product and as a pollutant is completely trans boundary, you know, something that I lose in the ocean. In Brighton, where I live, could end up in a completely different place in the same way that everything in this room that I'm talking to you from, you know, is produced in a different part of the world.

[00:39:56] So the polymer will be produced somewhere. It could be assembled into the computer that I'm talking to you on in another country, and then it's shipped to the UK. And when I dispose of it as e waste, it could go to, I don't know, Kenya. So it's, it's, we're far beyond a situation where an individual country could actually be.

[00:40:14] Solve this problem themselves and quite critically, the pieces that are most complicated and they relate to the things that Linda and Leo have been talking about, they relate to product design. So what is actually going into products that we're bringing into our homes? So what kinds of chemicals, for example, in those products and product design regulation is completely patchwork across the world.

[00:40:35] So, at the moment we're importing things and we don't have any control over the design of those products. So particularly small countries, for example, where they rely on the import of plastic products, they can't really create any requirements on the production and design of them. So they have no agency over the safety of those products.

[00:40:54] So that's why globally, we need a kind of combined approach.

[00:40:58] **Linda Birnbaum:** Yes. Plastic is a worldwide problem, just as climate change is. In certain cases, countries or states can make a difference by their

regulations. So, for example, in the United States, there are many chemicals, for example, that are banned in California.

[00:41:22] And because California is the fifth or sixth largest economy in the world, producers don't want to make something that they can't cell are used in California. And I think the same thing is true if that it's, it's not the best way, but there are ways that individual states, countries can make a difference for their population that will impact how other, states or countries respond.

[00:41:52] **Christina Dixon:** I think I would agree. The only issue is that it also depends on, you know, what is the size of the market that you're talking about? So the EU is similar, has very progressive legislation related plastics, not perfect, but world leading, I would say. But what about if you're a small island developing state?

[00:42:08] Does that mean that you get all of the crappy products then imported into your country because you don't have that purchasing power? So I think the problem is that, you know, the examples that you gave are good ones, but there's a completely different story. unequitable approach actually. And that's, that's the issue that I was really talking about.

[00:42:25] **Nate Hagens:** So let me, let me ask a follow up to that. So the, the core of this podcast is about the carbon pulse and energy resources, materials, You know, we don't pay for, the creation or the pollution of the main input to our economic system, which is the benefits from from oil and gas. So back 100 years ago, when we had a billion odd people, Things could be grown locally.

[00:42:58] and they wouldn't have to be transported long distances, which would require packaging. So part of the need or the perceived need for plastics today is the cost and, convenience of getting things to where the people are, consumable foods and such. Presumably, if we all lived more locally, and didn't buy stuff that was packaged and shipped around the world, we would need less plastics.

[00:43:28] So how much of this is more local, movements around the world? and would that make a difference or is it much, much larger than that?

[00:43:39] **Leo Trasande:** It's just to take a step back. The, these are externalities that are arising out of plastic production and pollute and consumption. And those, the adverse consequences, the externalities hadn't been quantified until very recently.

[00:43:55] So we had done a series of studies documenting that direct disease costs in the United States due to chemicals used in plastic materials. Or 250 billion a year, 1. 2 percent of the gross domestic product.

[00:44:11] **Nate Hagens:** And that's just that one, that one externality. There are others too.

[00:44:15] **Leo Trasande:** Of course. I mean, if we talk about the, the cost of cleaning up PFAS of an estimated a hundred billion dollars.

[00:44:22] The point being that the ecological costs usually that my ecological economist colleagues usually joke that there's zeros on the right side of the number that we find for disease related costs and Linda's points that apt that the ecological costs are likely higher and then you're forgetting the fence line community impacts.

[00:44:39] **Nate Hagens:** What's that? From,

[00:44:40] **Leo Trasande:** well, communities that are living near plastic production facilities have a disproportionate chemical exposure, and they suffer worse disease and costs more per person. And then the waste pickers are another population. Often women of childbearing age who have a disproportionate exposure compared were these 250 billion in costs per year in the U.

[00:45:03] S. were related to general population exposures to phthalates, bisphenols, PFAS, and flame retardants.

[00:45:11] **Nate Hagens:** Let me ask this, Leo or, or Linda or any of you, This is being recorded on January 21st. It'll be out in a few weeks. We've just witnessed the horrific fires in Los Angeles and only a few months ago, the flooding from Hurricane Helene in North Carolina where there were a lot of chemical plants and other things that washed in.

[00:45:35] I have a friend of mine whose dog died because he ate something that was in the yard that was toxic. That's not something we've talked about, but when there's a disaster like that and things are dispersed or burned like is the air. I mean, people are breathing the air in Los Angeles right now with all these houses that are full of plastics and other things.

[00:45:59] That's also an externality that we don't even have the ability to study. Is that a serious issue?

[00:46:04] **Linda Birnbaum:** Well, there's a lot about it. There are people beginning to address this. we've known that forest fires, you know, the air pollution generated from forest fires is really bad for your health for multiple reasons.

[00:46:16] And now people are looking at the additional contamination that you get, not only from all the chemicals that get burned, but that are generated. So when you burn plastics, you generate some really, really toxic chemicals as well, like dioxins. you know, which I think many people are familiar with dioxin from what happened with Agent Orange, you know, and the Vietnam experience and so on.

[00:46:47] But I think the important thing is people are starting to realize that this is a problem. There were fires in California in 2017 or 18, I think there were the massive fires that also burned whole towns and burned industrial facilities. So then you get not only what ends up in the air, people forget about, and you mentioned it with your friend's dog, things that end up in the water and then get into the soil, leading to terrible contamination as well.

[00:47:19] **Nate Hagens:** Let me ask you a question that I, I really curious about, and I have a upcoming podcast with Shauna Swan, but it's now over three years since my first podcast with her where she mentioned, alligator penises as one of the evidence that, Toxics and plastics are impacting animal species, but are some of the things that we see, do they happen to wild animal species as well that are just out in the mountains and on the plains or in other countries?

[00:47:50] Do we have evidence that plastics are impacting wild animals?

[00:47:57] **Leo Trasande:** The answer is yes, but the, but I want to make, I want to hammer on a point that I think you've missed in the previous question, which I've

studied September 11 effects on children for now 15 years, and we've documented. dioxins and PFAS at higher levels in exposed populations 10 years after the disaster.

[00:48:24] And so my concern is that when we, we, we get past the acute episode of a wildfire, we forget the longer term impacts that come from plastic that are going to arise there. East Palestine, Ohio, there was an explosion of a vital chloride carrying, facility that You know, I've seen some data suggest, well, we don't see dioxin exposure in people, but we saw dioxin exposure well above the safe levels for EPA in soil.

[00:48:54] Those are going to be impacts that reverberate for decades to come. That's never going to show up in a 250 billion a year estimate. It's, you're right. Wildlife effects are going to put additional zeros on the cost of that impact. We are not properly cost accounting. We are overproducing plastic at a lower cost than the society of the optimal amount.

[00:49:18] Adam Smith, the father of modern economics, would be rolling over his grave at this phenomenon because it's causing market dysfunction.

[00:49:27] **Nate Hagens:** But if we really on this issue and others pay the true cost for our products, our economic system, the way we have it now, couldn't exist.

[00:49:37] **Leo Trasande:** Well, I don't think Adam Smith would argue for zero pollution, not, not even, Arthur Pigou, who, is the person who came up with the notion of a tax that would be exactly the amount of the externality that should fix this problem.

[00:49:53] At the same time, we do need to recalibrate our focus if we're going to survive as a species on this planet. And I want to riff a little bit on health care being part of the solution. We haven't talked about health care much at all in this conversation. I think it's really important. We have a paradox in health care.

[00:50:13] As a practicing pediatrician, I use plastic. to treat patients and, you know, little babies get, you talked about your CPAP machine, little babies get intubated with breathing tubes made of plastic to deliver surfactant because their premature lungs are not making the lifeblood of the respiratory system.

[00:50:33] **Nate Hagens:** Because of plastic?

[00:50:35] **Leo Trasande:** Because of plastic. Now, I want to be clear, because of essential plastic. And that's the key phrase we have and health care is part of the problem. We have gone way too far to the wrong end. The extremes use the COVID 19 pandemic as an example. A lot of people were wrapping. the trays that we used to give in health care, we gave in health care facilities with an extra layer of plastic, thinking that COVID 19 is something that's on the surface.

[00:51:10] No, it's not. The masks were crucial to prevent the spread of COVID 19, but we went into an over hygiene mode and we used plastic as a justification or as a blanket of safety. There are other situations in healthcare where we use and in the general society, by the way, where we use plastic for no good human health purpose, or we can use alternatives.

[00:51:37] And that's why I'm so glad organizations like Healthcare Without Harm are leading the momentum because the healthcare industry is often actually part of the solution. Think of medical waste incinerators and mercury pollution. They got mercury out of medical waste incinerators before we got it out of coal fired power plants, or at least had put the scrubbers on the coal fired power plants.

[00:51:59] **Linda Birnbaum:** Well, I think, Leo, what you've gotten at a little bit, and I think this is worth mentioning, we always talk about risk benefit. Sometimes we need to talk about risk risk, and there may be risk risk trade offs. So, for example, intubating a brand, you know, a tiny baby with something to give them surfactants may be an essential use.

[00:52:22] of a plastic. We don't need every toy you buy your kid to be covered with plastic that you practically have to get an ax to break it open with. We don't, we don't, you know, there is so much unnecessary. And, you know, I think maybe these are things that, or approaches that could be started. population wide more quickly to say, we don't need everything wrapped in plastic.

[00:52:50] If I order from Amazon, which everybody does today, and I'm getting pills, why should, if I get two bottles of pills, why should the two bottles of pills have to be wrapped in plastic? Absolutely no reason. So, It's a different, a different way

to begin to, to think about things kind of in a, how, how can we reduce our plastic while we figure out approach approaches to totally get rid of it

[00:53:20] **Nate Hagens:** among the ranks of you and your colleagues that are, researching and working and fighting to, address this problem is the, the concept of essential plastic.

[00:53:32] And as that become, Something that, you're galvanized around. And when people agree on these are the essential uses of plastic and everything else is either a strong form or semi strong form, no, is there being work on such categorization?

[00:53:49] **Leo Trasande:** So I think we've got a long way to go, but there is a watershed moment that we have not mentioned, that I know Linda's very proud of.

[00:53:58] So we have, I now have as part of clinical care, a. PFAS test insurance companies cover so plastic first plastic chemical that is. That healthcare providers are supposed to measure in in populations living in contaminated water communities with contaminated water. It's the first time we've had an environmental health test in clinical care for 50 years.

[00:54:29] Lead was the previous one. And I think what we're going and the reason why that moment is really important. Is that it makes the problem visible in a way that directly impacts their patients. You know, the average medical provider gets between three and seven hours of training during the entire four years of medical school.

[00:54:52] Just use medical school as the focus. I think that's more.

[00:54:54] **Linda Birnbaum:** I think that's, that's maybe NYU. I think there are lots of medical schools where if they get an hour, they're lucky.

[00:55:00] **Nate Hagens:** Well, and, and let me, let me put a point on that. I live near Rochester, Minnesota. I swear Mayo Clinic has got to be one of the biggest plastic consumers in the world.

[00:55:11] I mean, it's like everything, every test everywhere. It's single use plastic that costs the. Patient like me, many hundreds of dollars. I mean, do we really need that? Is that an essential use? I don't know. Well, people

[00:55:26] **Leo Trasande:** don't do anything about what they don't see. Right. So if it's not a problem, that's part of the healthcare conversation, of course, they're going to say, well, plastic is fine.

[00:55:37] Of course, they're going to see albuterol inhalers for kids with asthma or gas gastric tubes. These are gastric tubes for folks who are, you know, having a really rough bout of cancer and they have an obstruction. They need to get their stomach pumped. That's totally reasonable. But we've gone, we've forgotten the end.

[00:55:56] We haven't been curious about the invisible. So I'm riffing on Ted Lasso a little bit here, but the point being that we have to be curious as a healthcare community, Invisible, and the PFAS clinical test is really the first step for people to say, Hey, wait a minute. I mean, organizations like Healthcare Without Harm are organizing certain hospitals to be the cutting edge, and I'd like to think NYU is on that cutting edge, but not every hospital.

[00:56:24] It's only when we make the problem visible for the individual health care provider that it really becomes real and we have to, we think really hard about what we're using.

[00:56:33] **Nate Hagens:** What's the real problem here? Is it, unawareness by humans? who buy things and choose things. Is it some cloak and dagger power, profit motive by the chemical companies and the fossil fuel companies?

[00:56:51] is it governments who see this as too big of an issue, to solve? So they kick the can to the future. Is it some, value system of, you know, what. We care about and we don't care about our health and nature enough. We care about convenience and comfort in the short term or some combination of all those things.

[00:57:10] Or what do you think?

[00:57:11] **Christina Dixon:** I would argue that it's a combination of all of the above, right? And so that's what makes it such an interesting problem to try and solve. listening to what Leo was saying about the healthcare sector, I went to Ottawa for some plastics negotiations. And when you arrived at the airport, there were billboards everywhere with, kids with the kind of respirator mask on, and the slogan plastics save lives.

[00:57:38] So the question is, you know, Who's paying for this advertising? Because there is, on the one side you have the groups like Healthcare Without Harm who are saying quite clearly we shouldn't have blanket exemptions for the healthcare sector. There are clearly areas where healthcare practitioners could use less plastic and want to use less plastics.

[00:57:56] And on the other side we have the vested interests of companies who are saying no, no, no, we want the whole sector exempted because, you know, we want to kind of tug on the emotional heartstrings there and say that plastics are essential for human survival. So, For me, it's a kind of combination of all of these things.

[00:58:13] We have, the climate playbook, if you like, being deployed here where you have large companies who are investing a lot of money in lobbying and trying to derail any kind of progressive conversation, which might harm their bottom line. So that kind of undermines the efforts of everybody else who's operating in this space who can't compete with that type of investment in kind of greenwashing, false solutions, yeah, and, and emotive campaigning.

[00:58:41] **Leo Trasande:** Chris is making outstanding points, but this is where it gets a little bit fuzzy is that sometimes the petrochemical companies are actually countries. So Saudi Arabia and some of the Arab nations were some of the loudest advocates in Busan to gum up the works and slow the implementation of a strong plastic treaty.

[00:59:06] for some countries like the BRICS. The fossil fuel trajectory is the pathway to their economic growth. They're arguing that the U. S., Europe, Canada, and other industrialized countries, they had it easy. They were able to pollute the dickens out of the planet, and here we go, and so why can't I have my piece of the pie too?

[00:59:29] So that's going to require, and this is where we're getting into a really tricky spot, a deep and intense conversation about what's fair and sustainable development across the planet. I'm not sure the U. S. and the current administration is willing to have that conversation, but I think there are some countries in the plastic tree negotiations that are too.

[00:59:49] **Nate Hagens:** Let me ask a two part question. I'd like each of you to answer and then we'll get into a quote unquote solutions and direction forward. What is the risk for society and nature if we persist using plastics at the same size and scale as we are now or even growing it in the future? And second part question is what is the risk for governments and industry if they persist using Thank you.

[01:00:17] Plastics in this default scenario.

[01:00:19] **Linda Birnbaum:** Well, we know now that the largest cause of death of disease and disability and death is in, in the U S and in most of the world, is chronic noncommunicable disease. And that is increasing in multiple ways. And with that, I'm really including problems with fertility as well.

[01:00:42] Noncommunicable. problems. And until, if we continue, if that continues to increase, we're beginning to already see some of the impacts on quality of life. So who, who would have predicted 30, 40 years ago that our third of our kids would be overweight or actually obese? That a third of adults would be obese.

[01:01:08] These problems, for example, which is associated with increased cancer, increased heart disease, decreased fertility, all kinds of problems, excuse me, and this is not restricted to the developed world.

[01:01:24] **Nate Hagens:** Most people are aware of the obesity problem and know that it's true. I think very few people would link that to plastics or endocrine disrupting chemicals.

[01:01:34] **Linda Birnbaum:** Because I would say we have not communicated that.

[01:01:38] **Nate Hagens:** So you're confident that is one of the main drivers?

[01:01:41] **Linda Birnbaum:** I think that is the main driver. When I look at the chemicals that are involved in plastics, and I look at chem, things that are associated with the increased risk of obesity, type 2 diabetes, cancer, cardiovascular disease, asthma, small for birth weight babies, preterm birth, less fertility, it's the same.

[01:02:03] Nasty actors

[01:02:04] **Nate Hagens:** in many cases. So instead of me going on a low carb diet, I should go on a low plastics diet?

[01:02:11] **Linda Birnbaum:** The world needs to go on a low plastics diet. We are limited as individuals in what we can individually do to change our own behavior. We really need policy change. And policy change I'll take it as a start at the local level, but we really need it to happen internationally.

[01:02:31] And when you say what makes the difference, I think, Chris, you mentioned the climate change kind of playbook where they were, you know, kind of obfuscating the facts. It's really going all back to the tobacco industry playback, where you delay, you obfuscate, you deny, and we're seeing the same thing again with Certainly the fossil fuel industry, climate change and plastics.

[01:02:58] And as we started at the beginning with a discussion that climate change and plastics go hand in hand.

[01:03:06] **Nate Hagens:** Did you want to answer my question on, what the future looks like? Is it just, I mean, this whole conversation makes me think we're living the twilight zone, TV show. I mean, I've been living this and not aware of it until just a couple of years ago on the plastic stuff.

[01:03:25] But you, you think the future is grim, all the other issues aside, just because of the plastics, if it's not changed.

[01:03:32] **Linda Birnbaum:** I am concerned whether, I already have grandchildren who are, some of them are already grown up. but when I'm concerned about my great, great, great grandchildren, great, great grandchildren, and I wonder what

kind of, life they will be able to have, in the world with the levels of pollution, and the levels of climate change.

[01:04:02] **Christina Dixon:** I think Linda, well, if I wasn't scared before, I certainly am now, but I think, you know, when I think about your question, I think about the fact that The planet, separate from the health crisis, although it's actually very much part of the same problem, you know, we're facing many intersecting crises, right?

[01:04:20] You know, there's the triple planetary crisis, which is biodiversity loss, pollution and the climate emergency and plastics actually has been shown to sort of be an be directly connected to all three parts of this crisis. and we're on a planet of finite resources. So this trajectory where we constantly extract and produce, that is unsustainable.

[01:04:43] that's obvious, both from a planetary perspective and a humanitarian perspective. So what does that mean for the future? I I don't have the answer to that question. I wish I did. I'd probably be rich or I wouldn't be rich because someone would try to silence me. but you know, we really need to think about how we transition to, kind of, I guess, like, let's call it zero waste, genuine circularity, but basically protecting finite resources, you know, truly valuing the planet's resources, and cultivating a completely different culture that considers reduction.

[01:05:18] the reuse, the repair of things, really valuing what we have. otherwise, you know, we've just seen, you know, consecutive, consecutively the hottest months on record again and again, it's, you know, a record busting couple of years in terms of global heating. So we know we can't continue. You know, I don't have to be a scientist.

[01:05:39] I'm not a scientist. I don't have to be a scientist to tell you that this trajectory is unsustainable. so without a radical pivot, we're on a road to nowhere.

[01:05:48] **Nate Hagens:** I would quibble with one thing you just said, because from what I know about you and what I've read about you, you are already rich, given what you're doing with your life and your personality and, and such, just not in the ways that our culture might, indicate by dollars or pounds in the bank.

[01:06:06] And I think it's. It's language reframings like that, that get at the heart of these issues. But, but thanks for your comment. Leo, did you want to weigh in?

[01:06:16] **Leo Trasande:** Sure. So I, I, again, I think the planet will end up being fine, but I think the human life on the planet will suffer faster, even than Linda described.

[01:06:30] I think this is a one to two generation opportunity. And what will also happen is akin to What was described in the Handmaid's Tale. we will probably have a situation where, and it won't be because of chemicals affecting our potency or ability to, to conceive. It'll be because of a broader array of, of threats.

[01:06:59] But people will be contaminated and there will be a fight over food, water that is safe to eat and consume. And that could very well produce. And enhance global conflicts the way it's already been described for climate change.

[01:07:14] **Nate Hagens:** So instead of fighting over food and energy and water, we're going to be fighting over, consumable, healthy, non contaminated food and water.

[01:07:25] That could be a proverbial end game here. I

[01:07:28] **Leo Trasande:** mean, I don't mean to sound alarmist.

[01:07:30] **Nate Hagens:** I'd never thought of that before.

[01:07:33] **Leo Trasande:** But these are the steps. that we are already traipsing.

[01:07:39] **Nate Hagens:** So, so I haven't asked you this explicitly, though, you've, inferred it. As a pediatrician, what, what scares you most, in your daily work about, toxicity, plastics, and, and such?

[01:07:51] **Leo Trasande:** What scares me the most is, is some of the longer term consequences that we haven't even scratched the surface to our understanding. So, we've alluded to 16, 000 chemicals used in plastic materials. We have no ha no hazard data. None. No information. No se sabe. We don't know about 16, 000. So I'm not saying all 10, 000 are toxic, but I am saying that there are, you know, we

talk about phthalates, bisphenols, PFAS, PFAS is a very big category of chemicals and flame returns.

[01:08:25] Now I'm including the organophosphorus as well as the brominated in that group. But that's, you know, a sliver. Of the category of chemicals and yet we can't wrap our heads completely around all the potential consequences because latency of chronic disease can be in the decades, not in the years and so.

[01:08:48] What I'm, you know, we're seeing an uptick where people are getting colon cancer in their 30s, 40s, and 50s. There is something really problematic about that uptick. It's subtle, but, you know, we're seeing, certain cancers in, in, in reproductive cancers in women go sky high. in ways that we didn't imagine before.

[01:09:11] We used to think of just breast and ovarian cancer as being on the rise. There are others that are going up. So that to me is where I'm getting horrified, is as a pediatrician, people, as Linda said, are being pre polluted, and we have no idea what the long term consequences are of that.

[01:09:28] **Linda Birnbaum:** We also may now know that some of these changes that may take decades to become obvious are going to be passed on to the next generation, too.

[01:09:42] In other words, we're not necessarily changing our genes, but we may be Changing how our genes turn on or turn off. We're beginning to see more and more information for that. And that is super concerning.

[01:10:00] **Nate Hagens:** So what are the, you know, take off your hats as scientists and, and activists in this space, paint me, an imaginary or possibly realistic pathway, a scenario in the coming 10 to 20 years, That we redress the worst of this, what, what would it take?

[01:10:23] and, and what sort of direction I start with you, Chris,

[01:10:27] **Christina Dixon:** I can have a go at this, but you know, this is not, you know, there's going to be many different answers to this question and many different possibilities, but I do like to think about, when I'm looking for some kind of glimmer of positivity, thinking about the hole in the ozone layer, right, which, you

know, I was born in the eighties and when I was in primary school, that was the big environmental topic that which we were scared of as kids.

[01:10:53] You know, there was a lot of awareness about the hole in the ozone layer. It was growing. people were getting skin, skin cancer. It was, you know, a kind of, it was a nebulous and terrifying concept for kids. but it was something that we learned about at school and we were encouraged to write to our members of parliament and kind of, I guess, activate on, on the issue of the hole in the ozone layer.

[01:11:13] and there was quite a rapid. policy response. Once the big threat of the hole in the ozone layer became apparent and the global community came together, and set up the Montreal Protocol, which is considered to be the most successful multilateral environmental agreement in the world. but the Montreal Protocol deals with combating the hole in the ozone layer, right?

[01:11:33] So regulating the substances that were causing that hole and that hole in the ozone layer. is repairing and those substances, whilst they are still being illegally traded and they are present, they, they have been radically reduced. and the problem is, is shrinking because of a collective global response.

[01:11:50] So it's interesting for me, as someone who works in kind of global policy to think about what were the elements of the Montreal Protocol that were successful and how could they be replicated here? Because we had the public awareness. we had the industry realizing that something they were producing was harmful to people and planet.

[01:12:08] it. we had funding in the Montreal Protocol multilateral fund, which was channeled towards helping countries implement the solutions. So this kind of these elements like adequate financing to help solve the problem, a collective and common understanding of what the problem is, and bringing industry on board to regulate harmful substances.

[01:12:28] These are all part of a kind of package of things that need to happen. And I think are happening when it comes to plastics. So I see some some positivity there. and that's kind of one of the areas. there are many other things, but that's

just one thing that I like to think about. You know, what can we learn from where we have had success in combating a complex environmental challenge?

[01:12:49] Yes, the industry producing hydrofluorocarbons was much smaller. It's a much smaller, it's a smaller problem, less ubiquitous, but still significant. we had a lot of the same aspects with that problem that we have here in plastics. know, a concerned industry trying to obfuscate, et cetera. and they were overcome.

[01:13:07] So there's, there's something in that, I think, which I would, I, I'm just going to take a positive because I felt like we did go a bit doom mongering there for a second. quite rightly so, but

[01:13:18] **Nate Hagens:** well, you must not watch this podcast, much because this is, this has got a middle of the road so far. Linda or Leo, do you want to chime in?

[01:13:26] I want to come in

[01:13:27] **Linda Birnbaum:** and, and, and, and also tout the Montreal Protocol, because one of the aspects with, which Chris didn't mention, was the issue of essentiality. So that you continue to use something where it is absolutely essential. if there are, are, if there's safe alternatives, and I want to use alternative in the, in the big sense of solving problem by a different way.

[01:13:56] If you have a safe alternative, you use it. If you don't, you start looking for one. And if there aren't, at the time, you keep using it in essentiality. And I think that needs to be an approach that we need to, support and encourage for many things. Sure, with many of these chemicals, like PFAS, we have to turn off the tap because the more we make, They just are accumulating in us and in the environment essentially forever, for any of them.

[01:14:25] But the point is, there are some essential uses, at least at this point, that we may need. But that would dramatically reduce the total amount. And I think you could say the same thing about plastics. That I agree with. Thank you. First of all, there are some plastics which may be safer than others. How they're made, what they're used, how they could eventually break down.

[01:14:47] you know, making things that will never go away. 50 years ago sounded like a great idea. We learned that's not such a great idea. But I think that we need to begin to say, let's be prag just put some prag pragmatism. into things, and let's do what is absolutely essential, and let's get rid of the rest.

[01:15:09] **Leo Trasande:** So there are three periods where we have not had an exponential growth of plastics. The 1970s oil crisis, the 2008 financial crisis, and the 2020 COVID 19 pandemic. We are, we have a really tall order before us. The first step, above all, is to flatten the curve. We don't flatten the curve. We are going to have in low and middle income countries the same degree if not more chemical contamination than we do in the US, Europe, Canada, and all the industrialized countries.

[01:15:47] We already see it with PFAS levels. When you look at low birth weight counts due to PFAS, It's not the U. S. that leads the way, it's the Asian countries. Hundreds of thousands of cases of low birth weight babies who are less well able to perform in school, who are more likely to be obese and have early cardiovascular disease, not to mention a few other things.

[01:16:08] **Nate Hagens:** And as a pediatrician, you are confident there's a causal link between that and plastics, toxics?

[01:16:14] **Leo Trasande:** Yes. There's, I mean, we, you know, we hemmed and hawed in expert panels back in 2015, almost 10 years ago, I'm embarrassed to say, and we had 15 exposure outcome relationships directly related to endocrine disrupting chemicals.

[01:16:30] A few years later, that list was at 32. We just continue to keep finding health effects that didn't include cardiovascular disease back in 2020 when we published that review article, but we can debate for hours what causal causality requires. But if we wait for causality. We'll all be dead.

[01:16:53] **Nate Hagens:** Well, that, that's one of the issues, right, is this is a mismatch with our evolutionary wiring as a, finite life, short, discount rate, steep discount rate, short attention span species is this isn't like we had a fire and then we looked at the problem.

[01:17:10] This is a 10 year lag time or longer in some cases of the negative effects of our consumption. And so it's like. Just like climate change. It's almost a perfect storm for our brains to ignore and deny because it's abstract and in the future. So let me ask you this and I'll let you finish my original question.

[01:17:31] Relative to climate change, advocacy, education, communication, research. I would imagine that the plastic space is a tiny fraction of the resources and people like the three of you. And yet, to my original question, Jeremy Grantham thinks this is a bigger risk to civilization than climate change. Is that changing?

[01:17:53] Are we getting a lot more people, on, on fighting on the good team, so to speak?

[01:17:58] **Linda Birnbaum:** I think we're making progress there. in communicating and having people becoming more aware of the problem. Just like for such a long time, when people talk climate change, all they thought about was polar bears, and they didn't think about people.

[01:18:14] And I think for plastic, people think about mounds. you know, of debris. They're not thinking about getting into ourselves and the impacts it's causing on us. I think we're a little behind with climate change, but I think we're coming along. And again, supporting Chris and Leo, these are intimately linked problems.

[01:18:37] **Nate Hagens:** I'm not an expert on this, but the way I see it is there's there's four different leverage points. One is our value system as humans alive during this time, and that not only is relevant to plastics, but the environment and human well being and all kinds of other things that, we're gonna have to be willing to give up some of our convenience and comfort for the greater good on these issues.

[01:19:03] You know, otherwise, otherwise, otherwise, You know, they're otherwise it's difficult. The second is the prices that we pay for things don't include most of the harmful effects to ourselves, and to the broader environment. So the prices have to, at some point, reflect the negative impacts of plastics. in our processes.

[01:19:26] Third is governments may have to play a role, in saying what is essential and what is dangerous. And, and, and then fourth is a crisis response where we see

the smoking gun like DDT or, or the ozone, as Christina mentioned that were like, Oh my gosh, this happened because of plastics. We need to respond.

[01:19:46] So All of those things, I think, need to change. Leo, did you want to add anything more to what you think is possible and what what scenario would allow a quote unquote fixing of this problem other than another recession?

[01:20:04] **Leo Trasande:** So I want to be positive in that. I have been in the Plastics Treaty process since before the first international, intergovernmental negotiating committee meeting.

[01:20:13] I was in, in, Senegal for the first pre meeting and not an iota of human health was mentioned. Human health was in the treaty, but no one was talking about human health. Now we see in Busan, South Korea. Led by countries where there are not a lot of researchers studying the health effects of plastic. Rwanda, Kenya, Panama, screaming and bashing their hands on the wood.

[01:20:46] hopefully tables and they're screaming about the consequences to their populations. So I think we are on a very steep part of the curve. We need to unfortunately replicate the plastic production curve in terms of the exponential growth of scientists in the community. We definitely need to transfer knowledge about the health effects of plastic and the technology to measure plastic in people to those countries or we are never going to have a proper body count.

[01:21:16] We barely body count lead. I can tell you that when we did the global cost of lead exposure, we still don't have data for many of the African countries. And this is a hundred years after we first identified lead poisoning. So we have a huge way to go. But we've come such a long way, and, we're putting a lot of pressure on, on Generation Z and the Millennials to step right up into this.

[01:21:42] I'm an Xer. I'm in the middle. I'm trying to carry the torch as best, as best I can.

[01:21:48] **Nate Hagens:** But what Linda said earlier, this is now beyond individual behavior change because it's embedded in our whole system. So what is your hope for Millennials that they do?

[01:21:57] **Leo Trasande:** They rise up. And they speak out and they, they step up and this is no longer just about a climate change issue.

[01:22:04] Chris said it really well. It's a triple planetary crisis. It's plastic, it's climate change, and it's biodiversity. If we don't address all three of those problems, the good news is there's a vaccine. It's called a global plastics treaty that can address all three of those in one go.

[01:22:23] **Nate Hagens:** So I hope I'm not, divulging any secrets, but I have friends that were at the Busan conference, and they were so, jaded, knowing that countries and the big businesses would, Kind of shrink the bandwidth for people like yourselves that they made bingo cards that had things like red lines, or I'm confused, or there's a plastic bottle on, on the, on the table.

[01:22:53] And it was like, they knew that all the science would be presented, but still the power in the industry to push back on this would, would win the day. And at least on the surface, it seemed like it did. that was a few months ago that, that conference.

[01:23:09] **Leo Trasande:** Yeah, if I can just say for a second, I felt like I was on call the last night of the treaty.

[01:23:13] I was the last, speaker on behalf of the general public, and that was at 2. 30 in the morning on the day after the meeting was supposed to close. So talk about doing an on call night for the planet. That's how I personally felt.

[01:23:27] **Nate Hagens:** And you should have been at prime time, but they delayed and obfuscated, so you went at 2.

[01:23:32] 30 in the morning? Yes. Wow, Chris.

[01:23:36] **Christina Dixon:** Yeah, and I will say I stayed for you, Leo. I was there behind you at 2 30. but yeah, I think so. There's the kind of what happened at the negotiations on on the surface. And I think you alluded to that. I've also been guilty of a bingo card myself. but then I've had the time now since coming back from Busan and admittedly, I felt extremely deflated.

[01:23:58] you know, this is one of the main things I work on. I feel deeply invested in, in trying to get a good outcome. but having had time to sort of step back a little bit, I also think, and I alluded to this earlier, but you know, we worked with governments on trying to get a proposal for, you know, legally binding measures to reduce.

[01:24:17] the production of plastics, right? something that I had thought was, you know, a little bit off the wall, blue sky thinking, but you know, it's something that we're really passionate about at EIA. and at the end of the day, we had over a hundred countries put their name to proposals to to have legally binding measures to reduce the production of plastics, right?

[01:24:37] that's over a hundred countries gathering around that vision. we also had a moment in that kind of nightmare plenary that felt like it would never end. We also had a moment where The delegate from Rwanda gave this really powerful speech where she talked about everything, that was necessary to secure an agreement on plastics, and she talked about the financing that would be required, the need to address production, the need to ban products, the need to address chemicals, and that was on behalf of over 90 countries that she made that statement, and the entire plenary, with some notable exceptions, stood up and gave a standing ovation, and I think that Now we're seeing a tipping point in political momentum, that has been lacking at the previous rounds of negotiations, you know, too much time, too much floor time has been given to the countries that are only there to derail progress, and that group of countries is a small but very vocal minority, but they've been able to kind of Dictate the negotiations.

[01:25:37] And now what we're seeing is a shift actually, where a kind of collective global majority that actually wants something good is standing up and saying, you know what, enough, enough, enough is enough of this time wasting. you know, if you're not going to come with us, we're going to do it ourselves. So I think something meaningful happened in Busan actually.

[01:25:56] despite the, the, the bingo cards and the deflation.

[01:26:00] **Nate Hagens:** Is the United States, one of those countries that's standing in the way of progress.

[01:26:06] **Christina Dixon:** if I was to give a honest answer to that, I would say actually not until recently. I don't know what's gonna change. So, you know, actually, we had the U. S. Supporting conceptually the idea of an aspirational global goal on production, making some quite positive noises.

[01:26:24] And we know that the U. S. Can be a critical player in brokering deals. So I'm a cynical is the next person about the U. S. Position in negotiations. Don't get me wrong. But there were some constructive Movements coming from the U. S.

[01:26:37] **Nate Hagens:** Let me ask each of you this. Are there any important emerging research that you are part of or aware of or anything we should be keeping an eye on in terms of developments of the worlds of plastics or plastic alternatives?

[01:26:52] I'll let you each speak to that. Linda.

[01:26:54] **Linda Birnbaum:** I think the science, is clearly demonstrating not only that plastics are in all of us, as well as in the whole ecosystem, but that they are having health impacts. And those health impacts are not necessarily, readily, readily visible like it does if you get a bug, and you get sick, and you get rid of the bug, and you get better.

[01:27:21] Because many of the changes that are brought about by the plastics are going to be lifelong, especially things that impact our, Our fetuses, our infants, our children, and I have lifelong impacts and I think the fact that it's not just one health impact, but there's a plethora of responses is something that we need to be aware of.

[01:27:48] **Christina Dixon:** I would plug, you know, two fantastic things that came out over the last year or so. One was the, Monaco Minduru Commission on Public Health, which kind of synthesized all the information around plastics and health in a very accessible way, which I was then able to use, to communicate. very effectively in my work.

[01:28:06] And the second was, from Lawrence Berkeley National Laboratories, looking at plastics and climate and modeling different scenarios around polymers and the relationship to, to climate. And so I really felt, when we commissioned some

research, last year around scenarios for plastics 1. 5 trajectory, there's just not enough research on plastics and climate actually.

[01:28:29] so I would feel like. My recommendation or my request would be to invest more in that space, because we are finding, you know, everything we're learning about the relationship between plastics and climate and the growth trajectory that Leo was talking about extremely alarming. And that's also because of the health impacts, right?

[01:28:48] Build out means more health impacts as well. So, my, yeah, my call to action would be to dedicate time in the research field to that.

[01:28:57] **Leo Trasande:** I think we focus too much on documenting the human costs in developed countries, the petrochemical countries are not going to change their ways as easily as the low and middle income countries are really going to drive.

[01:29:14] the conversation forward. And stay tuned for more work that really documents the impact there, because the assumption is, well, you know, in Africa, they don't get exposed to chemicals used in plastics. We know that the OECD estimates that chemical production and consumption is actually going to be majority low and middle income countries by 2030.

[01:29:35] **Nate Hagens:** Let me ask you this question. and as we approach our, our, our time limit here as a podcast host who is deeply concerned about this and willing to try to communicate, to our listeners and to the wider world, what are some key research questions or, or key topics? we don't have to discuss the person at this point, but what really needs to be wider, understood and disseminated in our world about the This issue, and podcasts and movies and documentaries, everything.

[01:30:08] I'll, I'll let each of you give a brief answer to that.

[01:30:11] **Linda Birnbaum:** I think we have to be pragmatists and focus on what we can stop using and stop needing now. In other words, let's take the easy wins first. And I think the second thing is, is we need to make people realize that recycling

doesn't work. For plastics and stop, you know, we're all trying, everybody I know tries hard to recycle.

[01:30:38] **Nate Hagens:** So, so real quickly, when I have a styrofoam coffee cup and I throw it in the recycle bin, what, what ends up happening to that? Especially if you're not supposed

[01:30:50] **Linda Birnbaum:** to. I mean, styrofoam can't be recycled. Okay.

[01:30:53] **Nate Hagens:** So then I put it in the garbage. So it sits in a landfill for a million years.

[01:30:58] **Linda Birnbaum:** Correct. And I think, I think people need to understand that, and that nobody

[01:31:04] **Nate Hagens:** Well, I care about this issue, and I didn't know that.

[01:31:08] **Linda Birnbaum:** And I think that that's an example. You know, I think a number of years ago, Nate, probably 20 years ago, when recycling really got going, at that point, you had to separate. Your plastic was in one container, and your paper was in another, and your aluminum was in another, and so on. And your paper, you know, it's And that worked actually for recycling because you can recycle paper and you can recycle aluminum and you can recycle glass, but the problem is plastic can't be recycled more than once.

[01:31:38] And even then, most of it is already too contaminated to use. There should

[01:31:42] **Nate Hagens:** be a social, like a disgust slash shame factor when we're using styrofoam cups, like that should be the anti flex, symbol. Like, I don't even think about it, but look at all the office buildings in the world that have stacks and stacks of styrofoam cups that everyone gets coffee in the morning.

[01:32:01] We should bring a ceramic cup and fill it up with our coffee and then wash it or whatever. anyways.

[01:32:08] **Linda Birnbaum:** These are societal changes that I think appropriate messaging, appropriate social media kind of examples could help bring about. And you do have more and more people doing that kind of thing, that kind of limited thing.

[01:32:25] It's a good start

[01:32:26] **Nate Hagens:** real quick, Chris. And then Leo on research topics or things that we should address more.

[01:32:32] **Christina Dixon:** I mean, I think there are too many to pick, but if I was just going to pick one, I would say something that I work on quite a lot because, in the kind of UK context, I work on a campaign related to.

[01:32:44] supermarkets in the UK and plastic reduction in the grocery retail sector. and one thing we promote heavily is the transition to reuse systems as well as refill initiatives and, and also kind of separately to the supermarket work. You know, something I'm really passionate about is repair. And I don't think there's been enough work to really explore the commercial and financial levers that are necessary to dramatically scale up, reuse, refill and repair initiatives because they've been trialed.

[01:33:12] They've been piloted. It's also historically how a lot of our consumption was done, right? Think of the milkman. I have actually a milkman here. I leave out my glass bottles. They come and collect them. They replace them with my oat milk and it's just on my doorstep in the morning. these, these.

[01:33:27] projects and these schemes, they've existed for generations. but we have basically, because of the kind of, I guess, not having really the true costs, that we've talked about, we, we're being pumped with single use plastics because it's more convenient. and it suits our convenience culture, our throwaway culture, but there is a system that has existed that we could return to, but it needs to be commercially viable for businesses to want to invest in the, in that transition.

[01:33:53] Right. And Currently, any sort of, I guess desire to transition is being hindered by a lack of enabling policy and a lack of kind of commercial viability. No single company wants to have that kind of first mover disadvantage where

they're investing in the necessary infrastructure. They want to have investment in the infrastructure at the national level so that these systems can actually function effectively.

[01:34:15] And It would be great to see more research and development going into that, because when you look at the UK investment finance in the kind of plastic sector, it's predominantly going into things like chemical recycling. That's where the bulk of the funding is going. And for me, chemical recycling is a complete false solution, and we're not matching that investment in what would be considered by me to be more sustainable alternatives.

[01:34:39] **Nate Hagens:** A full episode on why recycling is not the answer for plastics. I would be interested in that because I, I, I need to know more about that. Leo, what, what were your thoughts?

[01:34:49] **Leo Trasande:** We put a lot of public media attention on microplastics and seem to, and, and there are some campaigners, no offense to Chris, you're not one of them.

[01:34:59] For sure. That have minimized chemicals used in plastic materials as a problem, and focused on the microplastic. Look, I get it. Visible matters, but I again go back to being curious, as curious about the invisible as the visible. So we need, particularly to document chemical exposure in populations where we assume plastic doesn't exist.

[01:35:24] Look, I mean, in Amish populations, you find phthalate exposures at really high levels. So, it's everywhere, but we don't talk about it. And I'll just add one other thing. We do need to, in parallel, study microplastics together with chemicals used in plastics in the same studies. Because the question is always going to be, is it the particle that's delivering the chemical, or is it the particle itself that's causing the damage?

[01:35:48] That's a huge un, Unopened riddle.

[01:35:52] **Nate Hagens:** Thank you, all for your time and continued work, on this issue. it's, it's fascinating and horrifying. and as much as I already knew, I've, I've taken some things away. first of all, no styrofoam cups ever . but, but there are

others. could each of you just give 30 seconds max of, of closing comments that you'd like our listeners to.

[01:36:18] Take away with, Christina, start with you.

[01:36:21] **Christina Dixon:** Oh, no, I was hoping you weren't going to ask me first. but okay. I think that, As I've said, I work on the plastics treaty. I don't think the plastics treaty is the be all and end all. It's not going to be the kind of silver bullet for solving all of our problems, but this opportunity, it should be the catalyst for system change, right?

[01:36:40] and national change, regional change, international change, and it should be sending a signal to companies all around the world. That change is coming and we need to rapidly start shifting to alternatives and looking at the viability of alternatives on at the local level, we can already be implementing a lot of changes that can trigger kind of inspiration, broadly speaking.

[01:37:01] So I think, plastics treaty, I'm fully invested, I want a good one, but I also think we don't need to wait for a treaty to start solving the problem of plastic pollution.

[01:37:11] **Nate Hagens:** Thank you. Leo.

[01:37:13] **Leo Trasande:** Reducing plastic consumption and production, can not only improve human health for generations to come, but can actually provide economic benefits that are greater than the costs of the plastic substitutes that we would entertain.

[01:37:30] **Linda Birnbaum:** As a society, we need. To start thinking about what do we really need instead of conspicuous consumption

[01:37:41] **Nate Hagens:** here here Thank you all for your work and this conversation and and to be continued This issue is on my front burner. Thanks Thank you. If you enjoyed or learn from this episode of the Great simplification, please follow us on your favorite podcast platform.

[01:38:01] You can also visit the great simplification. com for references and show notes from today's conversation and to connect with fellow listeners of this podcast, check out our discord channel. This show is hosted by me, Nate Hagans, edited by No Troublemakers Media, and produced by Misty Stinnett, Leslie Batlutz, Brady Heine, and Lizzie Sirianni.