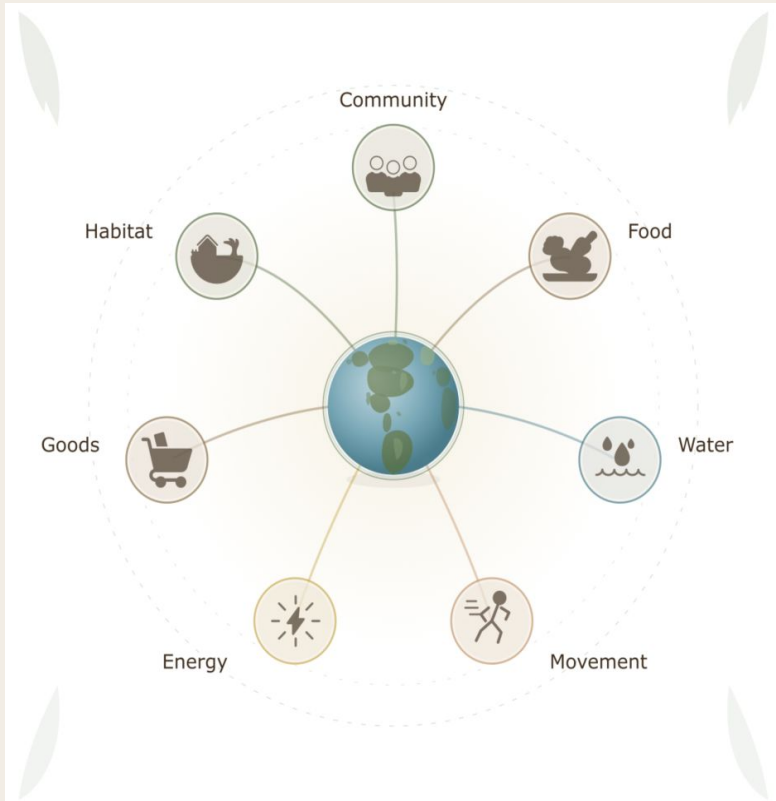


YOUR Earth Share

SEVEN PATHWAYS TO SUSTAINABLE LIVING



Fred Horch
SUSTAINABLE PRACTICE
2026 EDITION

SUSTAINABILITY TOOLS AT
WWW.SUSPRA.COM

Your Earth Share

Seven Pathways to Sustainable Living

2026 Edition

Fred Horch

Peggy Siegle, Editor

SUSTAINABLE PRACTICE

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For parents on Earth, especially those who love their children.

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Preface

Welcome to *Your Earth Share*. Whether you're ready to take your next step toward sustainability or just curious about effective environmental action, you've found the right resource!

This book shares sustainable practices that succeed in apartments and houses, cities and suburbs, households and organizations. Many of them—eating less meat, washing clothes in cold water, walking more—are easy to try, cost nothing, and save money.

We update our books every year to reflect the latest environmental science and best technology widely available, so if you have an older edition, you'll learn something new and valuable in this 2026 edition. We share what we've tested and know works well for homeowners in the United States. But we're also planning other editions:

- **International:** for diverse climates and cultures
- **Renters:** for those who can't renovate or build
- **Budget:** emphasizing free and money-saving practices for people on tight financial budgets
- **Regional:** adapted to specific locations

If a practice doesn't quite fit your situation, consider the general principle. Can't install solar modules? Support community solar. No yard? Find a composting drop-off. While this edition's examples focus on U.S. households with the wisdom, courage, and capacity to change their practices, the sustainability principles are universal.

Thank you for showing your love for Earth and the people it sustains. Whether you perfect every practice or try just one, you make our world better in whatever ways make sense for you now.

—Fred Horch and Peggy Siegle

Brunswick, Maine

April 2026

P.S. See any way we can improve this book? Tell us at EarthShare@SustainablePractice.Life.

Introduction: Your Earth Share

You love our Earth. You feel it in the warm sun on your face on a crisp winter morning, in the sight of a hawk majestically circling overhead, in the garden taste and tingle of a tomato just picked from the vine. But you're concerned there's a gap between your love and your lifestyle, between your dearest values and your daily practices.

You recycle dutifully, but suspect there's a better use of your time. You'd like to eat better for your health and the planet, but need a little nudge to make it a habit. You've heard about heat pumps, but don't know if they make sense for your house. The love is there. But how do you show your love for our Earth in the everyday choices you make to live?

I give many talks about environmental sustainability. Afterwards, people will often come up to me and explain, almost apologetically, why they aren't doing more to save and share our planet. I sometimes feel like I'm doing environmental guilt therapy.

But guess what? I'm not doing everything I possibly could, either. No one is. And no one has to. No one has to do *everything* if everyone does *something*.

That's why I wrote this book. Not to tell you what you should or shouldn't be doing, but to share what I've learned in more than thirty years of working in sustainability—running a store that sold everything from solar modules to worm bins, talking to thousands of people about their environmental journeys, and trying everything I could do in my own home. Some of what I tried worked beautifully. Some of it didn't. All of it taught me something worth passing along to you.

If you're reading this, you already care about our planet. You don't need me to convince you that our Earth needs more love. What you might need is a clear, practical guide to turning your love into sharing and caring action that makes a meaningful difference for our planet. That's what this book is.

Earth Is a Gift

As you read these words, Earth is working for you. A field is growing wheat for the breakfast toast you might eat next month. Sunlight is sending electricity humming through outlets in a factory, making a shirt you could wear next year. A forest is pulling carbon dioxide from the air that blew past you last evening. Soil is filtering water that will flow from your tap next spring.

Imagine you could look down at our planet from space and light up every patch of land that's working right now to support your life—growing your food, cycling your water, absorbing your waste, providing your materials, generating your energy. You'd see a constellation of glowing spots scattered across continents and hemispheres. Your wheat ripening in Kansas. Your carbon pollution being sequestered in Canada. Your clothes being sewn in India.

How big is your constellation of demands? Now light up everyone's constellations. How can they all fit on one planet? Earth has roughly 16 billion acres of habitable land—farms, forests, grasslands, wetlands, streets, and neighborhoods available to grow food, filter water, absorb waste, provide materials, capture sunlight for energy, and provide all the necessities of life—for 8.3 billion people.

If we all had an equal share of Earth, the land in each *Earth share* would be about the size of one soccer field. This isn't a metaphor or a policy proposal; it's an accounting of how much planet we have per person. (For the detailed math, see Appendix A.) If we demand more than one Earth share, somewhere on our planet, we're forcing another person to get by with less than one. Most Americans' constellations of demand require about *three* Earth shares to satisfy—roughly triple what Earth has available to provide for everyone.

One Earth share is enough for a good life, if you choose practices that work with Earth's natural flows instead of against them. And when you go further—when you help restore what previous generations have damaged or destroyed—you're making our planet more abundant for the future, making it possible for billions *more* people to share one world in peace and prosperity for generations to come.

What It Takes

Most people love Earth and believe everyone has a right to enjoy a good life. So why aren't more people showing their love by living sustainably? After thousands of conversations about how to save and share our planet, I've come to believe that there are four *empowering elements* people need before they can live up to their own values and live in harmony with others. Many of us lack at least one of these elements:

Knowledge. We need to understand, from a scientific perspective, how our choices affect Earth's ability to sustain life. Without good science, even well-intentioned efforts can backfire. Consider California's plastic bag ban, passed in 2014 to reduce plastic waste. The policy banned thin bags but allowed stores to sell thicker reusable

plastic bags for ten cents. Californians bought those thicker bags in enormous quantities but rarely reused them. By 2022, the weight of plastic bag waste had increased by 47%. Good intentions didn't deliver good results. (The good news: California learned from its experience and passed a law in 2024 banning all plastic checkout bags, which took effect in January 2026.)

Wisdom. Knowledge tells us *how* to take steps to protect our planet. Wisdom helps us decide *which* steps to take, given our particular situation. Should you invest in a heat pump or solar modules? Is it wiser to spend Saturday volunteering for a river cleanup or weatherizing your attic? The answers depend on where you live, what you've already done, and what resources you have. This book and its companion tools at www.suspra.com help you weigh your options and focus your efforts where you can do the most good.

Courage. Changing how you live takes guts, especially when your choices are different from your neighbors'. Hanging laundry instead of running a dryer, skipping the steak at a barbecue, biking to work when everyone else drives—these are small acts that can feel conspicuous. Courage is easier when you're not alone. It grows when you can point to real results. And it blossoms every time someone says, "Tell me more about what you're doing."

Capacity. Some sustainable practices are free—drinking tap water, eating more whole grains, fruits, and vegetables, turning down the thermostat. Others require time, money, skills, or resources that you may not have yet. Capacity ebbs and flows over time. This book is organized to help you start with what you can do today and work toward bigger changes when you're ready.

If you feel like you're not doing enough to save and share our planet, it's not because you're a bad person. You're just still building one or more of these four empowering elements. Brush off nagging doubts. Affirm your agency to take positive steps toward meaningful and rewarding goals you set for yourself!

Seven Pathways to Sustainability

Improving your daily practices—how you meet your needs for food, shelter, transportation, and everything else—is a journey toward a world with clean air and water, a stable climate, abundant biodiversity, and thriving communities. To make this rewarding journey more manageable, I organize sustainable practices into seven pathways with clear, evidence-based strategies for guidance:

Your Earth Share: Seven Pathways to Sustainable Living



1. **Community** — learning environmental science, leading by good example, and nurturing a network of people who support each other as they become more sustainable



2. **Food** — eating more plants and less meat, reducing food waste, sourcing from regenerative farms, and choosing eco-friendly ingredients



3. **Water** — reducing water consumption with conservation measures and efficient fixtures, protecting water quality, and managing runoff from your property



4. **Movement** — walking, cycling, and using public transit for daily trips; driving electric when you need a vehicle



5. **Energy** — reducing energy consumption with conservation measures and efficient equipment, electrifying your home, and generating clean power from solar energy



6. **Goods** — consuming less, choosing durable and non-toxic products, composting biodegradable waste, and recycling materials that can be fully recycled



7. **Habitat** — choosing sustainable shelter, landscaping with native plants, and conserve land for nature

These pathways are grounded on the work of evidence-based environmental frameworks—the Ecological Footprint, the Planetary Boundaries, and Project Drawdown among them—that study and categorize the relationships between human needs and Earth’s systems.

All seven pathways interconnect. Eat more plants, and you’ll save water and energy. Walk or cycle more, and you create opportunities for community connection. Progress along any one pathway often propels progress in others.

Each pathway draws on your Earth share in different ways. Your food requires cropland and pasture. Your water comes from rain. Your energy arrives as sunlight. Your goods are materials made or mined. Your waste must be absorbed and processed. And the habitat you share with other species keeps all of these systems functioning. One soccer field, many needs. The pathway chapters ahead will show you how to make the most of every square inch.

What Matters Most (20 Practices)



Of the myriad steps you could take, twenty practices deliver the greatest positive impact. Some you can start today at no cost. Others are longer-term investments. All of them are explained in the chapters ahead (look for the “step up” icon).

1. Learn science so you can protect life-sustaining processes.
2. Share your knowledge and volunteer in your community.
3. Eat more plants and less red meat.
4. Drink more water and fewer bottled beverages.
5. Grow food or buy from local organic farmers.
6. Clean with safe products in minimal packaging.
7. Use water-efficient fixtures and smart irrigation.
8. Minimize polluting runoff from your property.
9. Walk, cycle, or take public transit for local errands.
10. Drive an electric car when you can't walk, bike, or take public transportation.
11. Seal and insulate attics, basements, and exterior walls.
12. Upgrade to energy-efficient and hazard-free lighting.
13. Wash and dry clothes using energy-efficient techniques.
14. Cook with induction ranges and efficient ovens.
15. Use electric heat pumps for heating and cooling.
16. Generate solar electricity or subscribe to a solar farm.
17. Compost biodegradable solid waste.
18. Recycle metal, clean cardboard, and glass; avoid plastic.
19. Landscape with native plants using organic methods.
20. Conserve land for nature.

Many of these practices are simple, habitual changes that cost nothing—and quite a few save money from the get-go. You might try starting with one or two that match your interests and build from there. To prioritize based on your situation, visit www.suspra.com/practices.

What We're Protecting

A practice that “makes a real difference” has an impact on one or more of nine critical Earth systems—called *planetary boundaries*—that sustain human life. When these systems operate within safe limits, Earth can support billions of people indefinitely. When we push them past safe limits, billions of people face persistent poverty or worse.

Here are the nine boundaries and their current status:

Climate — the long-term weather conditions on Earth due to our heat-trapping atmosphere *Danger zone*

Biosphere integrity — the web of species and ecosystems that supports all life *Danger zone*

Biogeochemical flow — natural nitrogen and phosphorus cycles that fertilize plant growth *Danger zone*

Land-system biomes — forests, wetlands, and natural grasslands that provide ecosystem services *Danger zone*

Freshwater supplies — rivers, lakes, and aquifers that provide clean water naturally *Danger zone*

Novel entities — pollution from synthetic chemicals, plastics, and manufactured substances *Danger zone*

Ocean acidity buffer — basic ocean chemistry that allows marine life to grow shells and thrive *Leaving safe zone*

Stratospheric ozone — our ozone layer that protects us from harmful solar radiation *Safe zone*

Atmospheric aerosols — particles suspended in our atmosphere that influence the weather *Safe zone*

Climate change gets most of the attention, but it's only one of six boundaries we've already pushed into the danger zone. This book helps you understand what we can do to pull each critical planetary life-support system back toward safety. (For complete definitions, see Appendix B.) Notice that two boundaries remain in the safe zone. That tells us when we commit to protecting Earth systems—as the world did with the ozone layer through the Montreal Protocol—we can find a way to solve our problems, no matter how large and scary they are.

How to Use This Book

Each pathway chapter is self-contained, so start wherever you like. Curious about food? Start there. Want to save money on energy bills? Jump to the energy chapter. Not sure where to begin? Proceed to the community chapter, which helps you build the knowledge and relationships that sustain every other effort.

Three things make this book different from other sustainability guides:

1. **It's grounded more in science than sentiment.** Most sustainability books are lighter on the science and heavier on the sensibility. I assume you already know *why* you love our Earth, and just need to know exactly *what* you can do to show your love and protect it. In these pages, you'll find facts and figures that connect your personal practices directly to Earth's planetary boundaries.
2. **It measures what matters.** Your carbon footprint is important, but it's just one of many environmental impacts to manage. This book and its companion tools at www.suspra.com help you measure your progress across all nine planetary boundaries—so you can see the full picture and focus where it counts most.
3. **It's focused on what you control.** Personal and political action work well together, and I applaud both. But this book concentrates on practical steps you can take at home and in your community. I leave it to other capable authors to guide you in the realm of politics.

Protecting the planetary life support systems of our Earth takes knowledge, wisdom, courage, and capacity. This book gives you knowledge. Discussing it with other people and using our online tools help you build wisdom by assessing where you are and prioritizing your next steps. Courage and capacity come from practice and from community—which brings us to the most important point.

A Book for Your Group, Not for Your Shelf

This book is meant to be shared, discussed, and acted upon—not read idly at bedtime or left to sit on a nightstand collecting dust. It works best when a family, a congregation, a neighborhood group, or any circle of friends who care about our planet reads it together and uses it as a common framework for disciplined action.

I've watched dozens of passionate Earth Care teams, green committees, and environmental groups form. They typically rally around a single urgent issue—climate change, or plastic waste, or blocking a local

project—and they bring tremendous enthusiasm to their cause. But passion without a framework tends to fall down a familiar arc: the group meets, people share frustrations, write letters and meet with elected officials, and then... the energy fizzles. Within a few years, most of these groups quietly disband, their members no less passionate but no longer making progress together. Meanwhile, our environmental challenges compound.

When a group organizes around raising awareness of a single issue, once you've voiced your concerns, many people move on before it's solved. But when a group organizes around a shared understanding of what sustainability means, a common set of pathways, and an extensive list of practices that each member can adopt and impacts they can measure at any time, something different happens. The conversation shifts from "What can we do?" to "How are we doing?"

This book provides an empowering framework for ongoing action. The seven pathways, the twenty practices, and the planetary boundaries give your group a common language and a shared map. When everyone in your family or organization has a shared understanding of challenges and has leveled up their scientific knowledge, you can have focused and productive conversations about which practices to prioritize next, who needs help with what, and how to track your collective progress.

To put our framework to work in your community, here is what I'd encourage your group to do:

Read the book. Not all at once, necessarily—a chapter a month works well for many. Read the text carefully, with a pen or pencil in hand so you can mark the practices that surprise you, the ones that excite you, and the ones that seem impossible. All three reactions are valuable.

Think about the concepts. Your *Earth share*, the four *empowering elements*, our *planetary boundaries*—these aren't just interesting ideas. They're concepts for making better decisions your entire life. Spend time with them. Mull them over. Talk about what they mean for your household, congregation, or organization. Do additional research to make sure you understand them well.

Imagine yourself taking specific steps. Before your group meets, ask each member to pick two or three practices from the list of twenty that matter most and honestly assess where they stand. What are you already doing well? What could you start tomorrow? What would take six months of planning and saving? The more vividly you can picture yourself composting, or biking to the store, or scheduling a home energy audit, the more likely you are to follow through.

Create a plan together. A plan doesn't have to be elaborate. It can be as simple as each family member or group member writing down three practices they commit to working on over the next year, along with one concrete first step for each. The act of choosing and writing down commitments is what makes success more likely.

Commit to your plan openly. Share your commitments with your community. This isn't about pressure or guilt—it's about support and accountability. When your neighbor knows you're trying to eat a plant-based diet, she might share a family recipe for her grandma's vegetarian lasagna. When your spouse knows you want to bike to work twice a week, he can help rearrange the morning routine. Public commitment transforms private intention into social reality.

Track your progress and revisit. Come back to this book and to your plan regularly—seasonally works well. Celebrate what's working. Troubleshoot what isn't. Adjust your commitments as your capacity grows. The companion tools at www.suspra.com can help you measure where you stand and identify your most impactful next steps.

This cycle—read, reflect, imagine, plan, commit, track—is how to translate verifiable knowledge into transformative action. And it's how a small group of people who love our Earth can build the wisdom, courage, and capacity to protect it.

Not Alone

The most effective sustainability practitioners I know started with one thing—composting, or biking to work, or switching to LED bulbs—and found that it felt good. So they tried another. And then they shared what they learned with a friend. And that friend tried something, too. That's how healthy and sustainable communities grow.

Wherever you are on your sustainability journey—whether you're just getting started or you've been at it for years—you belong in our community of sustainable practitioners. Pass this book to your spouse, your best friend, your children, or your parents. Bring it to your book club, your faith community, your civic group. Start a conversation at the dinner table or after a Saturday or Sunday religious service. The more people in your circle who share a common understanding of how to protect our planet, the easier and more rewarding the work becomes for everyone.

Welcome. We're glad you're here. Let's get started!

Pages 10 to 83 are not included in the free sample of
the 2026 edition of *Your Earth Share*

Appendix A: Your Earth Share—The Math

This appendix provides the calculations and data behind the Earth share concept for readers who want to check our math and science.

The Size of Your Earth Share

Earth's total surface area is 51 billion hectares (126 billion acres), but about 71% of that is ocean. The remaining 14.9 billion hectares is land. How much of that land is productive enough to reliably sustain human needs? That depends on where you draw the line.

Our World in Data, drawing on figures from the UN Food and Agriculture Organization, classifies about 10% of Earth's land as glaciers and 19% as barren (deserts, salt flats, exposed rock), leaving roughly 10.4 billion hectares of *habitable* land—land that supports vegetation and human activity. By this definition, which includes mountains, semi-arid grasslands, and tundra, each of the world's 8.3 billion people gets about 1.25 hectares—nearly two soccer fields.

But a stricter and more conservative estimate asks: how much land is genuinely *productive*—capable of growing food, filtering water, regenerating forests, and absorbing waste at meaningful rates? When you also exclude the roughly one-third of land area that is desert, the quarter that is mountainous, and the land permanently frozen beneath glaciers, you're left with about 6.4 billion hectares of the most productive habitable land for 8.3 billion people:

$$\frac{6.4 \text{ billion hectares}}{8.3 \text{ billion people}} = 0.77 \text{ hectares per person}$$

Three-quarters of a hectare is a little more than one standard soccer field (a FIFA-standard pitch of 105 by 68 meters covers 0.71 hectares). As Earth's population grows toward a projected peak of roughly 10.3 billion around the mid-2080s, your Earth share will shrink to smaller than a soccer field—closer to 0.6 hectares.

Throughout this book, we use the conservative estimate and round to approximately one soccer field per person. Even the more generous calculation gives you less than two. Either way, you're working with a finite, knowable quantity of productive land—and the question this book helps you answer is whether you're living within it.

Note: I use scientific units throughout this appendix for clarity. A hectare is 100 meters by 100 meters (10,000 square meters), while a soccer field is about 105 meters by 68 meters (7,140 square meters).

What Your Earth Share Must Provide

Your Earth share is your life support system. Whatever you'd like to eat, drink, and do, productive land somewhere on Earth must provide it. Energy and materials flow naturally through every hectare. You can choose wise practices to live in harmony with these natural flows—or you can overwhelm them.

The sections below show what your share of land can sustainably deliver in each domain, and how your choices determine whether you're living within its means.

Food Production

Growing crops and raising livestock requires habitable land. How much depends on your diet. Per person, a plant-based diet requires about one-third of a soccer field. A beef-heavy diet requires roughly two soccer fields, because it takes about ten pounds of the kinds of plants that cattle can digest to produce one pound of edible beef. There simply isn't enough Earth for everyone to eat lots of beef at every meal; some of us must eat less beef than the average American, or we'd run out of habitable land for anything other than growing grass to feed and raise cattle.

Water Supply

Rain and snow fall on land and recharge groundwater supplies, with some of that water flowing in rivers to the sea. The global average precipitation rate is about one meter per year. Scaling that to the size of your Earth share, your sustainable water budget is roughly 7,700 cubic meters per year ($0.77 \text{ hectares} \times 10,000 \text{ square meters per hectare} \times 1 \text{ meter of rainfall}$). In practice, much of this water evaporates or supports ecosystems, so your usable personal budget is substantially less—but the key insight is that rain is your water *income*. Groundwater is your water *savings*. You can dip into savings from time to time, but if you consistently pump more water than rainfall replenishes, your wells will eventually run dry.

One-fifth of our world's population lives in water-scarce regions. In many places, we're "mining" ancient groundwater—what took millennia to accumulate, we're pumping out in decades. Massive

reservoirs like the Ogallala Aquifer under America's Great Plains are being depleted far faster than they naturally replenish.

Energy and Power

Light energy constantly streams from our sun to our planet. You can turn this sunlight into electricity, store it in batteries, and use it to generate heat, spin motors, communicate, and compute.

A “globally average” house with rooftop solar modules and a whole-house battery can generate about one kilowatt of on-demand power per person—enough to satisfy household needs. Here is how the math works:

On average, a square meter of Earth receives about one kilowatt of total solar power at noon. As of 2025, solar modules are about 20% efficient at converting sunlight to electricity. The global average solar capacity factor (accounting for nighttime, clouds, and seasons) is about 16%. Multiplying these together:

$$\frac{1 \text{ kW}}{\text{m}^2} \times 20\% \times 16\% = \frac{0.032 \text{ kW}}{\text{m}^2}$$

Storing solar electricity in batteries loses about 15% as heat (round-trip efficiency of roughly 85%):

$$\frac{0.032 \text{ kW}}{\text{m}^2} \times 85\% = \frac{0.027 \text{ kW}}{\text{m}^2}$$

A four-person home covers about 160 square meters of roof, providing 40 square meters per person:

$$\frac{0.027 \text{ kW}}{\text{m}^2} \times 40\text{m}^2 \approx 1.1 \text{ kW per person}$$

If you keep your household power demand to about one kilowatt per person, you're creating a world that can be powered by endless clean solar energy, stored in batteries, and available on demand.

Biofuels—The Land Glutton

Comparing solar power to biofuels reveals how much wiser it is to generate electricity than to burn fuel. Per square meter of Earth used for energy, a battery-electric car charged from solar power can travel about 350 times farther than a car burning corn ethanol.

Driving on Sunshine: One square meter provides 0.027 kW of battery-stored solar power. Over 8,760 hours per year, at 5 km per kWh for an electric car:

$$0.027 \text{ kW} \times 8,760 \text{ hours} \times \frac{5 \text{ km}}{\text{kWh}} \approx 1,190 \text{ km per m}^2 \text{ per year}$$

Driving on Corn: One square meter of land grows about 1 kg of corn per year, yielding 0.4 liters of ethanol. A fuel-burning car gets about 8.5 km per liter of ethanol:

$$1 \text{ kg} \times \frac{0.4 \text{ L}}{\text{kg}} \times \frac{8.5 \text{ km}}{\text{L}} \approx 3.4 \text{ km per m}^2 \text{ per year}$$

Solar power enables roughly 1,190 km of driving per square meter while corn ethanol enables only 3.4—making solar about 350 times more land-efficient. Why such a huge difference? Solar modules convert 20% of the sunlight they receive into electricity. Plants capture less than 1% of solar energy through photosynthesis. Then more energy is lost processing corn into ethanol, shipping the fuel, and burning it in an engine that wastes most of the energy as heat.

Material Resources

Think of Earth’s materials as a massive set of tiny building blocks. The blocks are atoms, and mostly what we do is rearrange them into different structures. When you “consume” goods, you’re not destroying atoms—you’re temporarily borrowing them in the form of a product, then sending them somewhere else when you’re done.

Your Earth share provides all your material goods, but here’s a crucial insight: some arrangements of atoms cycle easily through natural and industrial uses without negative side effects, while others create lasting hazards.

A Tale of Two T-Shirts. An organic cotton t-shirt is grown from soil and air using solar power and becomes soil and air when composted. Its atoms cycle naturally. A polyester t-shirt is made from petroleum, sheds microplastics with every wash, never fully decomposes, and releases toxic fumes if burned. Both shirts clothe you, but one borrows atoms temporarily and returns them to nature, while the other locks them into problematic arrangements for centuries.

The Aluminum Can Miracle. Making aluminum from bauxite ore requires significant energy—about 15 kWh per kilogram. But once

made, aluminum can be recycled indefinitely using just 0.75 kWh per kilogram—5% of the original energy. The atoms never degrade. A single aluminum can, recycled repeatedly, could provide beverage containers for billions of years. Compare that to a plastic bottle: even if recycled once, it degrades into lower-quality plastic, then becomes pollution requiring energy-intensive processing to manage.

Only one industrial process actually destroys atoms on Earth. Nuclear fission splits large atoms into smaller ones to release energy. Those original atoms are gone forever. Every other industrial activity—including burning fossil fuels—just rearranges atoms. The fossil fuel industry finds underground hydrocarbons, with neatly arranged carbon atoms, then invites you to combine them with oxygen, spreading carbon dioxide throughout our atmosphere. The atoms are still here, just rearranged into a form that traps heat and destabilizes our climate.

Waste Absorption

When you throw something “away,” you’re just moving atoms from one place to another on Earth. Atoms don’t leave our planet (except those converted to energy in nuclear reactors or the few spacecraft we send beyond Earth’s gravity). Every atom in your garbage can, recycling bin, or compost pile stays right here, available for future generations to use.

Composting capacity: Per square meter of Earth, you can fully compost about 500 kilograms of organic matter annually—including food waste, paper, and yard trimmings. When you compost, you’re accelerating nature’s own recycling process in a controlled location.

Carbon dioxide: You exhale about a kilogram of carbon dioxide per day. Plants absorb carbon dioxide and water, then use solar power to produce the food you eat. That’s a sustainable carbon cycle. But burning fossil fuels releases ancient carbon that’s been sequestered underground for millions of years, adding more carbon dioxide to our atmosphere than plants can absorb. Your Earth share can sequester about half a kilogram of CO₂ per square meter per year through plant growth and soil absorption. Burn too much fossil fuel too quickly, and you overwhelm nature’s absorption capacity.

Water processing: Soil is nature’s water filter. About 100 square meters of wetland can process all the wastewater from a family of four, delivering nutrients to plants, breaking down pathogens, and returning clean water to the cycle.

Troublesome Substances

Some arrangements of atoms are particularly hazardous:

Radioactive waste: When we split atoms for energy, the smaller atoms remain dangerously radioactive for millennia. Your Earth share has no natural way to process this—radioactive elements must be isolated from the biosphere until they decay to safer forms.

Persistent synthetic chemicals: Some molecular arrangements—like PFAS “forever chemicals”—form bonds so strong that nature has few tools to break them. They accumulate in water, in animals, and in humans. Once dispersed in our ecosystem, it becomes virtually impossible to collect them all for safe breakdown.

Mixed materials: Plastic packaging contains many different elements bonded in complex ways. Separating them for recycling requires far more energy than extracting new materials, which is why plastic recycling remains so difficult.

Habitat

Just as your body needs beneficial bacteria to digest food and fight disease, Earth needs diverse organisms to cycle nutrients, purify water, pollinate plants, and maintain soil health. You can't build on, pave over, or mow your entire Earth share without undermining your own well-being. Some portion of your soccer field must sustain the organisms that create the conditions for your survival.

Free services that nature provides: Every square meter of natural habitat works around the clock. Wetlands filter water naturally. Trees and plants remove carbon dioxide while filtering pollutants. Bacteria, fungi, insects, and worms break down organic matter, cycle nutrients, and maintain soil that prevents erosion and stores water. Pollinators visit flowers to feed while enabling plants to set fruit and reproduce.

Why biodiversity matters: Monocultures—single species dominating an area—are fragile. When disease strikes or conditions change, the entire system can collapse. Diverse ecosystems are resilient. If one species struggles, others fill its role. This redundancy isn't inefficiency—it's insurance. Consider what happened during Ireland's potato famine: when blight arrived, it destroyed most of the harvest because most Irish farms had planted only a single type of susceptible potato.

How much space does nature need? Below a minimum habitat threshold, animals can't find mates or establish territories, and

populations become isolated and vulnerable. To ensure healthy biodiversity, allow about half of your Earth share—half a soccer field—to support native species. This doesn't mean you can't use this land at all. An organic orchard provides habitat and food. A meadow of native plants supports far more biodiversity than a lawn. Even a windowsill flower box provides living space for other species.

Connectivity is key. Your wild spaces become far more valuable when they connect to your neighbors' wild spaces, creating corridors for species to move. Your land isn't an island—it's part of a continent-wide network of habitats.

The Ecological Footprint: A Related Approach

Sustainable Practice grounds our Suspra Score on the idea that many humans share one planet. A related and well-established framework, called the Ecological Footprint, also measures the balance between humanity's demand on nature and Earth's capacity. Developed by the Global Footprint Network, the Ecological Footprint calculates that Earth has about 11.9 billion hectares of biologically productive *land and water*, giving each person about 1.5 “global hectares” of biocapacity.

Every year, the Global Footprint Network announces Earth Overshoot Day: the date when humanity has used up nature's entire annual budget of ecological resources. In 2025, Earth Overshoot Day fell on July 24, meaning that for nearly half the year, humanity was running an ecological deficit, drawing down natural capital faster than it regenerates. Currently, humanity uses nature about 80% faster than Earth's ecosystems can regenerate—the equivalent of needing 1.8 Earths.

Our Earth share concept and the Ecological Footprint approach the same fundamental question from slightly different angles, but they converge on the same conclusion: humanity is consuming more than our planet can sustainably provide, and individual choices about daily practices are a significant part of both the problem and the solution.

The Power of Your Choices

You can meet all your needs using just one Earth share—or force someone else to sacrifice some of theirs. Living within your environmental means isn't about deprivation; it's about choosing wise practices. Knowing that you can drive 350 times farther on solar electricity than on biofuels from the same amount of land, that an aluminum can is easily recycled while a plastic bottle is problematic,

and that even small patches of habitat can mean life or death for millions of native species makes your path forward clearer.

Your Earth share isn't an impossible limit; it's enough for a magnificent, rewarding life well lived. Atoms are abundant, the sun's energy arrives fresh every morning, nature's recycling systems work tirelessly—and this book is available to guide you to align your practices with natural flows. How will you choose to care for your share of our Earth today?

Appendix B: Planetary Boundaries

Planetary boundaries are operating limits, based on scientific evidence, for human pressure on nine Earth systems that keep our planet safe and stable for human civilization. Here's how your practices impact each one:

1. Climate change

Burning fossil fuel adds greenhouse gases to Earth's atmosphere, trapping heat that would otherwise escape into space.

2. Biosphere integrity disruption

Destroying habitat through unsustainable agriculture, logging, and other development drives species to extinction and threatens Earth's energy balance and chemical cycles.

3. Novel entities

Buying "non-stick" pans, GMO food, and other products made with synthetics introduces novel chemicals into our environment, mobilizes materials in novel ways, and modifies genomes differently than natural evolution.

4. Stratospheric ozone depletion

Releasing refrigerants and other types of industrial gases thins the ozone layer in the upper atmosphere, allowing more harmful ultraviolet radiation to reach Earth's surface.

5. Atmospheric aerosol loading

Burning solid fuel and other activities that create particulate pollution alter temperature and precipitation patterns.

6. Ocean acidification

Emitting carbon dioxide pollution into our atmosphere increases the acidity of surface waters.

7. Biogeochemical flow changes

Dumping phosphorus into the ocean and converting stable atmospheric nitrogen into bioreactive forms both disrupt nutrient balances for living organisms.

8. Freshwater change

Draining wetlands, altering river flows, and extracting water from aquifers affect carbon sequestration, reduce biodiversity, and shift precipitation levels.

9. Land-system change

Clearing natural ecosystems for agriculture, roads, and buildings

destroys habitat, reduces biodiversity, affects carbon sequestration, and disrupts natural water cycles.

In 2009, Johan Rockström and colleagues first described the planetary boundaries framework in a *Nature* paper. It was updated in 2015 by Will Steffen and team, who emphasized that climate change and bio-sphere integrity are the “core” boundaries that strongly shape the rest. The most recent global update in 2023 found that stratospheric ozone is recovering, ocean acidification is close to the edge, and aerosols are at safe levels in some regions; for the remaining six boundaries, Earth is in the danger zone.

How boundaries connect to your practices

1. **Climate change:** All practices help.
2. **Biosphere integrity disruption:** Eat more plants, support regenerative farming, and landscape with native plants.
3. **Novel entities:** Buy less, avoid single-use plastics, choose safer products.
4. **Stratospheric ozone depletion:** Clean with safe products, handle refrigerants safely.
5. **Atmospheric aerosols:** Compost, walk, cycle, or take public transit for local errands, electrify, and go solar.
6. **Ocean acidification:** All practices help.
7. **Biogeochemical flow changes:** Compost, eat more plants, garden wisely, and support regenerative farming, drink more tap water, clean with safe products, and landscape using organic methods.
8. **Freshwater change:** Plant drought-resilient landscapes, wash clothes in an efficient machine, go solar, and use water-efficient fixtures and irrigation systems.
9. **Land-system change:** Eat more plants, grow a garden, drink more tap water, recycle metal, cardboard, and glass.

Planetary boundaries are the science of sustainability. The practices in this book are the step-by-step ways to steer your household, workplace, and community toward a more sustainable future for everyone.

Appendix C: Sustainability Indicators

Our Seven Pathways framework transforms the hitherto overwhelming challenge of sustainability into a practical journey you can confidently undertake step by step toward clear goals, with quantifiable indicators of success. Visit www.suspra.com to measure where you are now and chart your course to live well within planetary boundaries.

Community Pathway

Goal: *A community that understands and practices environmental sustainability*

When you coordinate sustainable practices among your community, your actions resonate into transformative change—like water molecules nudging their neighbors to create waves that circle the globe.

Sustainability Knowledge Score

Milestone	Score (% on tests)
Have Basic Awareness	20%
Understand Core Concepts	50%
Comprehend Systems Thinking	75%
Can Teach Others	100%

High-Impact Practices Score

Milestone	Score (% of 20 practices)
Starting Out	25%
Building Good Habits	50%
Reaching Sustainability	75%
Fully Practicing the Basics	100%

Social Interaction

Milestone	Score (volunteer hours)
Building the Volunteer Habit	50
Estimated U.S. Average	66
Active Volunteer	100
Volunteer Leader	200

Food Pathway

Goal: *Eating within Earth's sustainable agricultural capacity*

If everyone ate like Americans, we'd need to colonize other planets to raise enough beef cattle. Plant-based diets can feed everyone using existing farmland while restoring ecosystems.

Food Waste Rate

Milestone	Score (% of food eaten)
Estimated U.S. Average	62%
Reducing Waste	70%
Mindful Consumption	80%
Minimal Waste	90%
Masterful Management	98%

Eco-Friendly Ingredients

Milestone	Score (% of weekly meals)
Raising Awareness	60%
Conscious Eater	75%
Very Diligent	90%
Fully Responsible	100%

Plant-Based Meals

Milestone	Score (% of weekly meals)
Estimated U.S. Average	16.5%
Flexitarian	50%
Plant-forward	70%
Nearly Vegetarian	85%
Fully Vegetarian	100%

Regeneratively Grown Food

Milestone	Score (% of food budget)
Estimated U.S. Average	6%
Some Organic	25%
Half Organic	50%
Mostly Organic	75%
Fully Organic	100%

Water Pathway

Goal: *Respecting and protecting natural freshwater limits*

If your household consumes no more than 100 liters of water daily per person, you're helping to protect aquifers that took millennia to fill.

Daily Water Use

Milestone	Score (daily liters)
Estimated U.S. Average	310
Becoming Conscious	190
Becoming Efficient	130

Milestone	Score (daily liters)
Becoming Sustainable	100
Water Wise	75

Biodegradable Cleaning and Hygiene Products

Milestone	Score (% of products used)
Taking Some Steps	25%
Halfway There	50%
Mostly Natural	75%
Fully Biodegradable	100%

Movement Pathway

Goal: Planet-friendly mobility that strengthens community

Moving 40 kilometers per day on average or less, mostly under human power and driving fully electric, respects planetary boundaries.

Average Daily Distance Traveled

Milestone	Score (kilometers per day)
Estimated U.S. Average	65
Reducing Travel	55
Local Focused	40
Community Grounded	30
Walkable Life	16

Active Transportation (Walking or Cycling)

Milestone	Score (% of trips)
Estimated U.S. Average	11%
Sometimes Active	25%
Often Active	50%
Active First	80%
Car Free	100%

Electric Vehicle Miles

Milestone	Score (% of distance driven)
Estimated U.S. Average	<2%
Happy Hybrid	30%
Plug Preference	60%
Battery Bravura	100%

Energy Pathway

Goal: *Thriving within Earth’s solar power energy budget*

Your sustainable power budget is one kilowatt—achievable through efficiency and 100% solar electricity stored in batteries.

Power Demand

Milestone	Score (kW average)
Estimated U.S. Average	3.75
Reducing Waste	2.50
Becoming Efficient	1.75
Sustainable	1.00

Energy Wise	0.50
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Home Electrification

Milestone	Score (% of energy)
Estimated U.S. Average	40%
Getting Started	50%
Making Progress	60%
Mostly Electric	80%
Fully Electrified	100%

Solar Power

Milestone	Score (% of energy)
Estimated U.S. Average	5%
Adding Solar	15%
Green Power	50%
Mostly Solar	75%
Fully Solar	100%

Goods Pathway

Goal: *Material flows that safely cycle*

Your sustainable consumption budget is 25 kilograms per day that is safely cycled through natural composting and industrial recycling systems.

Material Consumption

Milestone	Score (daily kg per person)
Estimated U.S. Average	48

Your Earth Share: Seven Pathways to Sustainable Living

Milestone	Score (daily kg per person)
Reducing Consumption	40
Moderate Consumer	30
Sustainable Consumer	25
Minimalist	15

Composting (Natural Process) Rate

Milestone	Score (% waste composted)
Estimated U.S. Average	8.5%
Better Than Average	10%
Making Progress	15%
Good Practices	25%
Excellent Practices	40%
Super Practices	60%

Recycling (Industrial Process) Rate

Milestone	Score (% waste recycled)
Estimated U.S. Average	32%
Better Than Average	35%
Sustainable Recycling Rate	40%
Overshoot (Compost More)	50%

Reuse Rate

Milestone	Score (% reused)
Estimated U.S. Average	10%
Starting to Reuse	20%

Building Good Habits	30%
Regular Reuser	50%
Reuse Economizer	75%
Ultimate Reuse Expert	100%

Sustainable Materials

Milestone	Score (% safe and manageable)
Good	50%
Better	75%
Excellent	90%
Perfect	100%

Habitat Pathway

Goal: *Shelter that enhances rather than destroys ecosystems*

Your sustainable habitat budget is 50 square meters for your housing, with your land managed wisely to support native biodiversity.

Living Space

Milestone	Score (square meters)
Estimated U.S. Average	85
Somewhat Space Efficient	75
Downsizing	65
Sustainable Housing Size	50
Tiny Home	37

Green Building Certification

Milestone	Score (standards value)
Level 1 Standard	1
Level 2 Standard	2
Level 3 Standard	3
Level 4 Standard	4

Native Habitat

Milestone	Score (% of property)
Estimated U.S. Average	5%
Some Native Areas	25%
Half Wild	50%
Mostly Natural	75%
Wildlife Refuge	90%

Land Management

Milestone	Score (% organic practices)
Estimated U.S. Average	10%
Reducing Chemicals	50%
Mostly Organic	75%
Fully Organic	100%

Appendix D: Suggested Resources

The facts and figures in this book are drawn from the ongoing research we conduct at Sustainable Practice. If you'd like to do your own research or learn more about any of the statistics or ideas you've come across in this book, we recommend starting with these resources.

Artificial Intelligence

Large language models provide access to distilled versions of the world's knowledge. Chat interfaces allow you to have a conversation and ask for research reports on any topic. Before relying on anything a "chatbot" tells you, verify the information from another source.

- ChatGPT (chatgpt.com)
- Claude (claude.ai)
- Gemini (gemini.google.com)

Data

Curated datasets provide access to facts and figures derived from public and private research efforts.

- Our World in Data (ourworldindata.org)
- U.S. Energy Information Administration (eia.gov)
- World Environmental Situation Room (wesr.unep.org)

Environmental Frameworks and Projects

Our Earth share and pathways concepts draw from established environmental frameworks and projects, such as these.

- Ecological Footprint (footprintnetwork.org)
- Planetary Boundaries (stockholmresilience.org)
- Project Drawdown (drawdown.org)
- Rewiring America (rewiringamerica.org)

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Notes and Observations

Use this page to keep a sustainability journal for yourself or to share your thoughts for the next person to read this book!

Your Earth Share: Seven Pathways to Sustainable Living



About the Author

For over thirty years, Fred Horch has dedicated his professional and personal life to empowering people to not only envision a sustainable future but to take effective action to help create it. A sustainability advisor and small business owner, Fred is the former proprietor of F.W. Horch Sustainable Goods & Supplies, a retail store specializing in sustainable living, and is currently one of the owners of Spark Applied Efficiency, an electrical contracting firm with a mission to help people create more valuable and sustainable businesses through efficiency.

In 2023, with Peggy Siegle, Fred founded Sustainable Practice to provide empowering resources for individuals and organizations committed to environmental sustainability. Before he began working in the sustainability field, he was a corporate attorney, Internet project manager, and computer network sysadmin.

Fred earned a Juris Doctor degree from the University of California, Berkeley, School of Law, and a Bachelor of Arts degree in Political Science, with concentrations in international relations and computer science, from Swarthmore College. He has studied and lived in France, the Soviet Union, Japan, Chile, and New Zealand. In the United States, he has lived in Utah, Pennsylvania, California, North Carolina, New York, and Maine.

When Fred is not working on business projects, writing about sustainability, developing software, or enjoying life with friends and family, he is busy as a Rotarian and a Master Gardener volunteer, living with his good-natured wife Hadley in a solar-powered all-electric house built in 1828 in Brunswick, Maine.

More from Sustainable Practice

Sustainable Practices: Your Handbook for Effective Action

Join a community of positive change agents who are creating a better future for everyone on Earth. Transform your community into a catalyst for global environmental stewardship. Get our most comprehensive “how-to” handbook for the serious sustainability practitioner.

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Every dollar you spend or save is a powerful choice. Your money can either fund practices that protect our planet or finance its destruction. What if every financial decision you made could help build a more sustainable world?

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“One Step This Week”

Get a practical action idea for sustainability delivered to your e-mail inbox every Sunday morning. Available on Substack and Medium.

For more information, please visit us at

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