Epilogue
Dos and Don'ts

Knowledge is of no value unless you put it into practice.
- Anton Chekhov

Opening Questions:

Is there a road map to guide decisions about building a sustainable home?
What are the things I should be sure to do, or at least consider?
What are the things I should avoid, or hope to minimize?
Can I achieve operational and livable sustainability?
What is the first step? How do I get started?

Data and Analysis:

Thank you for spending time with this resource; our team hopes you find the information both interesting and useful for your needs. We have offered many tips and best practices throughout the book, and in simple lists as *Dos and Don'ts* at the end of each topic. We are using this Epilogue to compile all those ideas into one final section, to organize the information sequentially as choices may be encountered, and to add new suggestions to fill in the gaps between the topics of the book. This is a metaphorical road map for those striving to reduce their ecological footprint and live more sustainably, most notably in their housing and transportation needs.

Conceiving the Project:

Conceiving the Project Dos; things to do or at least consider	Conceiving the Project Don'ts; thing to avoid or minimize
Know that sustainable living is possible with the right (or advantageous) conditions	Do not assume that housing and transport must require fossil fuels in operation
Know that constructing or renovating a home for operational sustainability does not need to cost more; it can cost less!	Do not fail to include the long-term benefits of onsite renewable energy generation, or the long-term cost savings of EV transportation
Inventory current energy and environmental impacts to benchmark and aid planning	Do not fail to log at least one year of data from past or existing housing/transport systems
Learn how local electric utility treats solar PV; specifically, net metering and connect fees	Do not invest too much planning until electric utility provisions for PV solar are known

Begin thinking about indoor space needs and adequate sizes for each room and space	Do not begin planning, or reviewing plans, until adequate space inventory is complete
Begin scouting building lots suitable for onsite solar PV, and possibly passive solar heating	Do not invest too much time before securing a building lot that is advantageous for solar
Ask a broad set of stakeholders for architect and builder references; learn local reputations	Do not delay in learning the reputations of possible professional services in the region
Use this conceiving stage to learn about the stress on Earth's fragile ecosystems, as well as your personal/family environmental impact	Do not assume that the Earth is sufficiently resilient to sustain life long-term in the face of human-imposing environmental degradation
Use this conceiving stage to become aware of global environmental injustices, especially with regard to climate change and impacts	Do not assume that your actions in one part of the world do not have critical impacts on people (especially the poor) in other places
Forge commitments to take personal actions that lead to more sustainable outcomes	Do not allow the complexities or enormity of the challenges discourage personal action

Architectural Services:

Architectural Services Dos; things to do or at least consider	Architectural Services Don'ts; thing to avoid or minimize
Having learned reputations of local architects, conduct personal interviews with several	Do not settle on an architect without a careful investigation of their perspective and services
Ask architects about their sustainability goals, interests, and outcomes on previous projects	Do not fail to gain an objective view of each architect's sustainability commitments/work
Share with potential architects your goals and objectives and take note of their responses	Do not fail to be transparent about your goals and objectives when interviewing architects
Ask architects about serving a quality control function by regular onsite visits throughout	Do not select an architect who is unwilling to do quality control unless there is another plan
Ask architects for builder recommendations based on your sustainability and quality goals	Do not select an architect who has not worked with builders who espouse quality

Site Selection and Architect Hire:

Site Selection and Architect Hire Dos; things to do or at least consider	Site Selection and Architect Hire Don'ts; thing to avoid or minimize

Review possible building lots with preferred architect and discuss viability to meet goals	Do not settle on lot or architect until you have jointly visited and reviewed for project viability
Review with preferred architect electric utility provisions for PV for each building lot option	Do not move forward with lot or architect unless utility provisions make solar PV viable
Retain architect if you feel comfortable with the person after lot and utility review, and if all are viable for meeting net-zero project goals	Do not retain architectural services if lot and utility provisions are not suitable for project, or if concerns arise in the review process
Negotiate a fixed sum contract with architect of choice, including detailed scope of work; design, plans, selections, engineering, liaison with contractor(s), and quality control method	Do not sign a percentage-of-work contract with the architect (would become a conflict of interest), and do not fail to detail scope of work expectations for architectural services

Designing and Planning:

Designing and Planning Dos; things to do or at least consider	Designing and Planning Don'ts; thing to avoid or minimize
Provide architect, in writing, with sustainability and quality construction goals for project	Do not rely on oral exchange of information with architect and other project professionals
Prioritize onsite clean and renewable energy generation and design roof as a capture zone	Do not consider solar PV as an afterthought; build it into the design and plan
Begin process of utility approval for solar PV and net meter installation	Do not assume utility approval and net meter installation will be easy or quick
Plan for electricity to be sole energy source	Do not plan to utilize any direct fossil fuels
Provide architect, in writing, with minimum square footage for each room/space of house	Do not fail to start design without minimum adequate spaces per functional area/room
We recommend a wall structure of 2x4 wood stud with exterior insulation, if client is willing to have electrical boxes surface-mounted. Otherwise 2x6 stud wood studs should be selected if recessing electrical boxes	Do not assume thermal envelope upgrades beyond code return on the investment or are better for the environment; most do/are not. Do not assume electrical boxes must be recessed in exterior walls
Specify all lighting fixtures/bulbs will be LED	Do not assume electricians install LED bulbs
Plan for sufficient air exchange to keep indoor CO2 levels below 1000 ppm for human health	Do not fail to consider indoor air quality and related health concerns; plan for ERV or HRV
We recommend a forced-air HVAC system to	Do not assume air exchange requirements by

aid air movement and air-exchange systems	historical norms; many factors have changed
Consider and decide on window and door selections; consult chapters 5-6 for trade-offs and mismatched elements discussion	Do not fail to understand thermal envelope compromises from windows and doors, or the impact of mismatched elements
Select windows specific to their orientation for best insulating and heat gain performance	Do not select windows that have not been matched to their directional orientation
Work with architect to determine planned materials, systems, finishes, and selections	Do not assume perfect alignment of plans for materials, systems, finishes and selections
Review iterative plans with architect	Do not be absent from evolving plan process
When plans are complete, decide with architect which builder to invite to estimate	Do not assume that the homeowner voice is not important in screening/selecting builder
Review builder estimate with architect and resolve any anomalies or schedule concerns	Do not be passive during this critical stage of refinement of project design and schedule
Together with architect, meet with builder to resolve any issues of scope or cost estimate	Do not absent yourself from processes that may seem beyond comprehension; learn!
If close on scope and cost, negotiate with the builder for a fixed sum contractor's fee	Do not fail to consider a fee method that can structurally remove big conflicts of interest
Sign builder contract that includes as much detail as can be known at this pre-build stage	Do not fail to take as much pre-contract time to settle and write as much detail as possible

Construction Phase: This list could be nearly infinite in detail and length; the items selected here are the most important from a sustainability perspective.

Construction Phase Dos; things to do or at least consider	Construction Phase Don'ts; thing to avoid or minimize
Site clearing for construction should consider year-round local sun angles for solar energy	Do not remove more vegetation (trees) than necessary, unless invasive/non-indigenous
Placement of house within setbacks should consider short and long-term solar shading	Do not fail to consider possible future shading from trees not in the homeowner's control
Orient house footprint as close as possible, within lot constraints, for max. solar capture	Do not rely on a single compass to set house orientation; use several to ensure precision
Spare no level of detail and quality control on foundation and below-grade walls to achieve	Do not rush the critical stage of foundation and below-grade walls for long-term structural

effective shield from water/moisture incursion	integrity & avoiding moisture/mold problems
Spare no level of detail and quality control on under slab/floor insulation and slab/floor edge insulation; ensure cracks/gaps spray-foamed	Do not rush the installation of under slab/floor and edge insulation, which becomes hugely consequential, and inaccessible after build
Daily quality control inspections during rise of superstructure to improve lifetime structural integrity, which also impacts energy losses	Do not fail to plan for daily inspections during the rapid-pace erection of the superstructure for quality, integrity, and fixing/connections
Ensure code-required structural integrity; e.g., sufficient members for strength, but no extra due to thermal bridging & energy compromise	Do not assume that more structural heft is better; follow code for compliance and tested strength, but add no more than necessary
Ensure wall sheathing is installed without gaps and fixed appropriately for long-term structural integrity, which impacts energy loss	Do not fail to inspect every piece of wall sheathing for tight fit and effective fixing, as these will affect both structure and energy
Monitor and inspect window and exterior door installations for fit and the ability to effectively seal gaps and cracks around units	Do not fail to inspect every window & exterior door installation for both structural integrity and provision to seal all cracks and gaps
Ensure conduit or chase inside the thermal envelope for wiring related to rooftop solar	Do not fail to provision for solar PV wiring, or compromise the thermal envelope with it
Ensure builder, subcontractors, and quality control inspector know to avoid or minimize utility incursions in the thermal envelope	Even if stated by plan, do not fail to remind everyone at this stage to keep utilities out of insulation planes to avoid compromises
Where thermal envelope penetrations are necessary (e.g., vents), combine where possible to minimize number, and inspect for sealing of penetrations through envelope	Do not allow more than one plumbing stack vent, or sized larger than min. needed and do not fail to inspect all thermal envelope penetrations for seal through insulation plane
Pull air ventilation exhaust from bathroom(s) to minimize thermal envelope penetrations and recover some energy with an ERV/HRV	Do not vent bath fan exhaust directly outside, as that would add additional week link(s) to thermal envelope and vent conditioned air
We recommend surface-mount electrical boxes to avoid weak links/spots in walls	Do not recess electrical boxes in 2x4 walls, as they displace too much thermal insulation
Strongly consider a whole-house blower door test prior to insulation to identify and seal air leaks in the structural envelope	Do not fail to consider a blower-door test to identify weakness that visual inspections cannot consistently verify
Closely monitor insulation installation, and inspect stages, to ensure optimal coverage, density, and crack-sealing	Do not assume that post-install inspection is sufficient; there should be monitoring of the insulation at critical points during installation

Just prior to drywall installation, closely inspect entire thermal envelope and correct any problems with insulation, seals, or gaps	Do not hang drywall until there is high confidence that there are no compromises in the thermal envelope structure and insulation
Drywall also helps insulate and minimize heat transfer; seal gaps or cracks after hanging	Do not allow drywall finishing until gaps around cut-outs have been spray-foamed
Whenever appliances are selected, consider that the most basic and simplest models use the fewest resources, & offer best financials	Do not assume that upgraded appliances for energy efficiency is the best environmental choice; in fact, that is almost always worse
Install solar PV array when roof is covered, then request net meter install from utility	Do not allow first meter to be standard issue if net meter can be installed at the outset
Continue daily inspections for quality through entire construction phase to improve odds of long life; this minimizes use of resources	Do not let quality control lapse or ebb through the construction project for the sake of resource/materials use and stewardship
Consider a whole-house blower door test at handover to identify and seal air leaks that are most likely around windows and doors	Do not assume that new doors and windows have perfect seals, either with their own elements or where they meet other surfaces
Commend and thank architect, builder, and subcontractors for good design and work, and for quality construction throughout project	Do not fail to recognize the good work of all professionals involved in the project, notably if they followed the plan and performed well

Post Construction:

Post Construction Dos; things to do or at least consider	Post Construction Don'ts; thing to avoid or minimize
Begin documenting operational energy use immediately after occupancy, as well as solar energy generation from its commissioning	No not assume energy use/gen. performance until they can be measured, documented, and verified against project goals and predictions
Monitor indoor CO2 levels and set timer on ERV/HRV to run no more than necessary, but keep concentrations below 1,000 ppm	Do not fail to monitor, and correct for, any problems with indoor air quality and most notably for high concentrations of CO2
Collect monthly data on energy generation and use for at least one year post-occupancy	Do not fail to collect data on energy use and generation during the first year (or several)
Compare energy use/demand in new house with benchmarked data from previous home	Do not assume with certainty or precision the improvements in energy use from old to new
Perform whole-house inspection at one year	Do not miss the opportunity at the end of the

(typical warranty) with builder and quality inspector to find & correct any compromises to the structure or thermal envelope	warranty period to identify and correct any compromises or defects; materials may warp or change shape as they dry and cure
Match energy generation (via solar PV) with energy use/demand after one full year (both vary by mo.) to determine net energy impact	Do not allow monthly energy data to overly elate or alarm; use and PV generation are typically counter-cyclical through a full year
If energy use exceeds generation, consider adding to PV array, or finding ways to reduce use/demand to achieve net zero or better	Do not fail to be persistent with the goal of achieving operational energy net zero; it is both possible and less expensive
Share the data with the architect & builder for their continued learning, and with friends and family for their consideration of net zero	Do not miss the opportunity to learn from the experience and teach others who may be in a position to achieve sustainable living/driving
Advocate in both private and public spheres for the elimination of climate emissions from housing and household transportation.	Do not miss the opportunity to use a firsthand experience to inform and influence minds and public policy, or regulation and utility provision
Consider actions and commitments in other areas of life to reduce damaging ecological impact (e.g., travel, food, and consumption)	Do not assume that eliminating climate emissions from housing and transportation achieves sustainability; learn of other impacts

Summary and Beyond Housing and Transportation

We hope this Epilogue provides a succinct reference and roadmap for those striving to build a sustainable home. We know this resource is not complete, as it is surely constrained by our own limited perspectives, experiences, and biases. Additionally, materials and technologies are evolving and adapting to new and dynamic realities in science and markets, suggesting that this list will need ongoing review and revision. Our team will continue to research this field and maintain an updated Epilogue on our companion website[1]. The good news is that we can answer the highest order question of this book with confidence and empirical evidence: yes, it is possible to achieve operational sustainability in housing and transportation. This is not only possible, but also practical, with onsite renewable energy powering both home and household transportation. It is important to acknowledge that resources are consumed in the construction of any home, including for any renewable energy generation equipment; resources are also consumed in the manufacture of electric vehicles. However, the perspective taken here, in targeting primarily consumers in the United States, is that this new paradigm will shift consumers from higher to lower-impacting systems and practices. The great surprise--and fantastic news--from this book, is that this is achievable at the least cost financially, and the least damage to environmental resources.

[1] See: https://www.sustainableclimatesolutions.org/housing