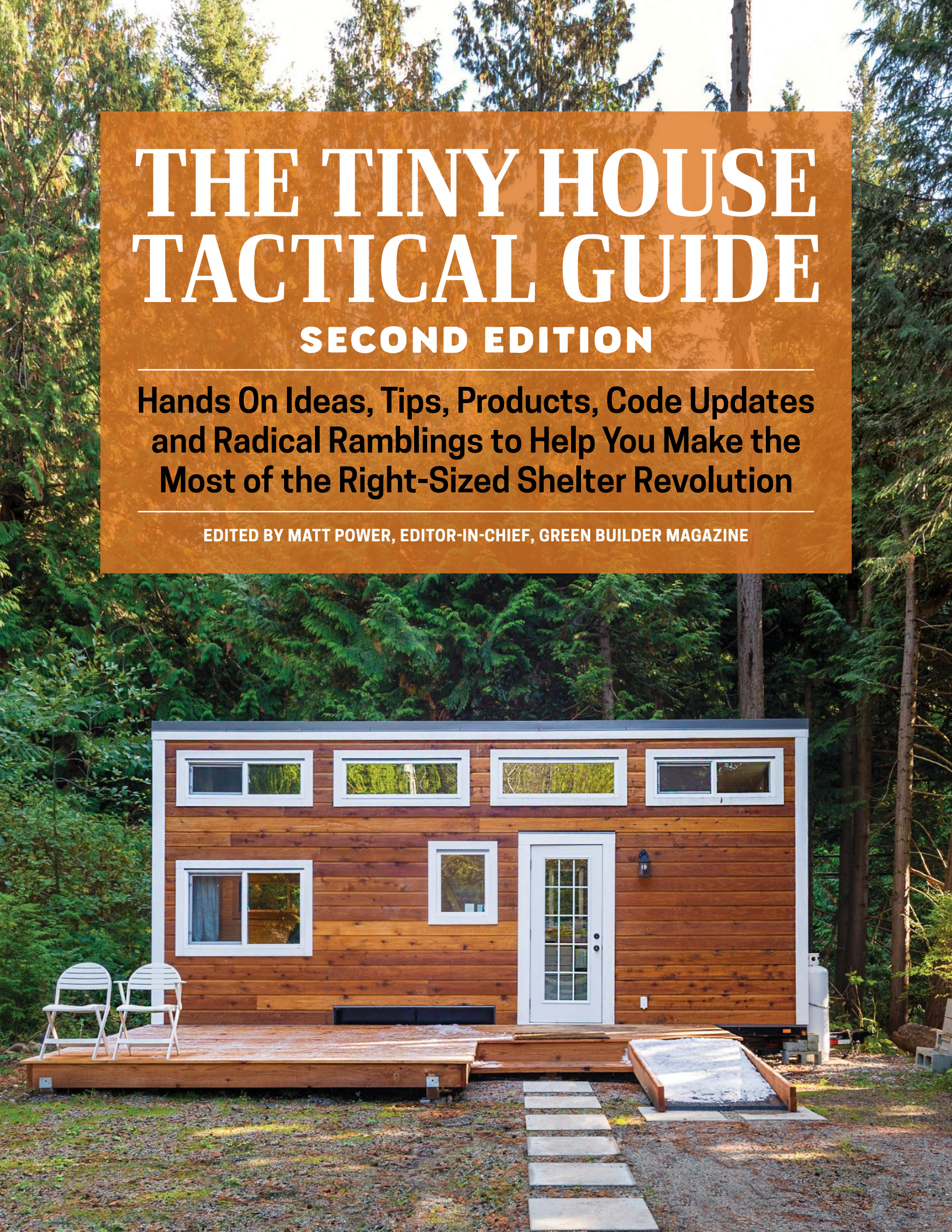


THE TINY HOUSE TACTICAL GUIDE

SECOND EDITION

Hands On Ideas, Tips, Products, Code Updates and Radical Ramblings to Help You Make the Most of the Right-Sized Shelter Revolution

EDITED BY MATT POWER, EDITOR-IN-CHIEF, GREEN BUILDER MAGAZINE


Coming together.
Building together.
You're building more than a home, you're building your reputation. That's why Dow and DuPont have come together as DuPont Performance Building Solutions—so you're covered top to bottom, inside and out on every job. And, the unprecedented portfolio of products from two of the foremost leaders in the building industry provides the freedom, flexibility, and confidence to make every house you build home worthy.
DuPont Performance Building Solutions
Build your way at PerformanceBuildingSolutions.DuPont.com
DUPONT™
Copyright © 2019 DuPont and Dow. All rights reserved. The DuPont Oval Logo and DuPont™ are trademarks of E.I. du Pont de Nemours and Company or its affiliates. The Dow Diamond Logo and Dow™ are trademarks of the Dow Chemical Company or its affiliates.

Seattle Cascades

VISION House by Green Builder Media

Imagine what your house would look like if the greatest minds in sustainability, performance, and design came together to build it – with the goal of remaining within your design parameters and budget.

THE EXPERIENCED PROFESSIONALS at Green Builder Media have joined forces with internationally-acclaimed building scientist and production builder CR Herro (VP Innovation, Meritage Homes) and pioneering green architect Stace McGee (Founder, Environmental Dynamics Inc) to create the VISION House Seattle Cascades: The House the Experts Built.

Located in Enumclaw, WA (the gateway to Mount Rainier National Park) the VISION House Seattle Cascades features the most advanced products, systems, and technologies to achieve extraordinary performance results – all at a reasonable price point. The net-zero, solar powered, high performance, resilient, healthy, and intelligent home boasts stunning design details, an open floor plan, and innovative materials.

Through meticulous planning, space is optimized to significantly reduce material use, jobsite waste, and cost. By deploying advanced building science and superior construction techniques, the home will exemplify resource efficiency and promote occupant well-being.

The result: a simple, replicable template that homeowners and builders can follow, based on decades of experience in the fields of green building, sustainable design, and building science.

FOR MORE INFORMATION:

Look for ongoing editorial coverage about the VISION House Seattle Cascades from Green Builder Media in the coming months. In the meantime, be sure to check out the project microsite at www.greenbuildermedia.com/vision-house-cascades for updated articles, videos, and news about the project.

PROJECT SPONSORS:

Whirlpool Corporation · Panasonic · Panasonic HIT Photovoltaic Module · Control4 · uponor · western window systems · BoralSTEEL Stone Coated Roofing · Cultured Stone · Square D by Schneider Electric · Schott Robax · Premier SIPS Structural Insulated Panels

MIRAI

ACTUALLY,
IT IS ROCKET SCIENCE.

INTRODUCING THE HYDROGEN-FUELED TOYOTA MIRAI.
CONSIDER IT ONE GIANT LEAP FOR MANKIND.

TOYOTA | *Let's Go Places*

AVAILABLE NOW ON TOYOTA.COM/MIRAI

Personal flair. Tiny house advocates worry that as big business co-opts interest is compact living, creativity will be curtailed.

PHOTO: TINY HOUSE COMMUNITY

Vive la Petite Maison!

It's time to push the tiny house revolution to the next level.

The Tiny House Tactical Guide isn't a coffee table design book. It's a call to action, for everyone who wants the freedom to build small, to live differently—to challenge the status quo of taxes, debt and the right to grow old in a safe, affordable home.

What you'll learn (as we did, compiling the *Guide*) is that the deck is often stacked against would-be tiny house owners and builders--and that simply living in a tiny house does not guarantee you'll achieve a greener, leaner, affordable lifestyle. Local politics, code definitions and zoning matter—as does every decision you make about how to occupy your new right-sized home.

In the *Guide*, we're not pretending we all have equal opportunities. The vast income gap between the top and bottom is forcing Americans young and old to look more seriously at small homes. The middle has been hollowed out, and the old American dream of a big house in the 'burbs is now largely a fantasy for those on the outside, looking in.

But there may be a silver lining. Living small, done right, can greatly reduce our impact on wildlife and natural resources. Small homes also open up new doors to young adults caught in the hamster wheel of stagnant incomes and overpriced rentals. They offer affordable housing to low-income citizens and new Americans—and also can offer a new kind of independent living as we navigate our twilight years.

At the same time, tiny homes are just plain cool. They fuel our human need for novelty and change.

So join us, as we explore this fast-changing shift in American housing. Whether you're part of the supply chain, or just fascinated with the possibilities of going small, you'll find something in *The Tiny House Tactical Guide* that you can apply to your own vision of living smaller.

— MATT POWER, EDITOR

Grounded. To meet building codes, most tiny homes are anchored to permanent foundations.

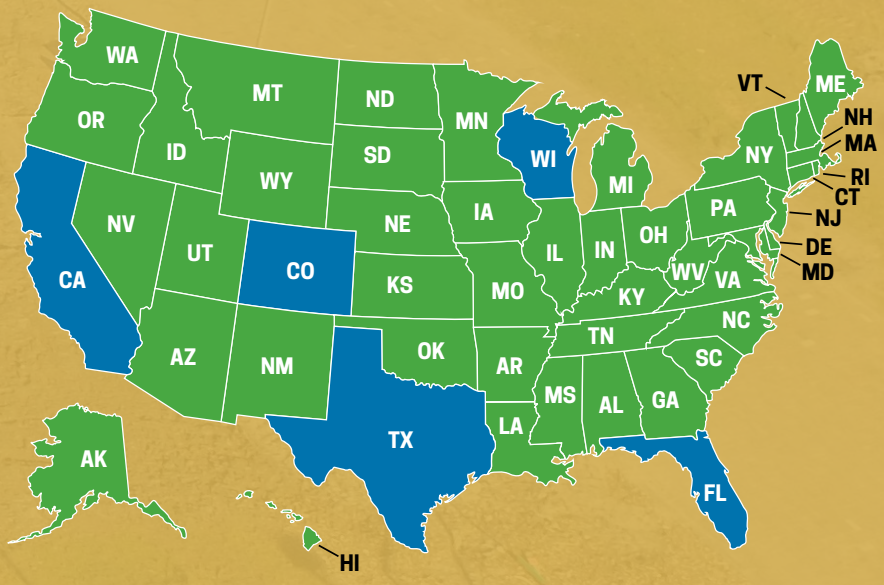
The beauty of utility. A combination of hip, custom design and affordability have captured the imagination of millennial buyers.

TINY LIVING, BIG CHALLENGES

Manifesting density. Tiny house villages are springing up internationally and around the U.S., including in Orlando, Austin and Salida, Colo.

HOT SPOTS

There are tiny house builders scattered across the country, with dense populations in **Colorado**, **Florida**, **Texas**, **Wisconsin** and **California**.



SOURCE: TEXT AND IMAGES DERIVED FROM THEMORTGAGEREPORTS.COM

Let's Roll.
Many tiny house companies will ship a tiny house anywhere.

15% YES!

15% Yes.
15 percent of 18 to 34 year olds in the U.S. say they'd definitely live in a tiny house.

19% MAYBE

19% Maybe.
Of that same group, another 19% say they would seriously consider a tiny house.

Rent Fatigue.
More than 50% of 18- to 34-year-olds rent say they rent housing only because they can't afford a down payment to buy a home.

CHAPTER 01

FREE THE TINY HOMES

Confined by archaic zoning laws and over-zealous subdivision rules, compact homes need to be set free, and seen for what they are: the last, best hope for affordable, flexible ownership.

TOO OFTEN, THE MORE AFFLUENT MINIONS of the mainstream media don't seem to"get" or even like the tiny house movement. In their world of gated communities and three-car garages, living small represents a threat—a nose-thumbing at the status quo of suburban living. Who could possibly live in a house smaller than Kris Jenner's pool cabana? *Forbes* magazine, For example, whose average reader is 47 years old and makes about $94,000 a year, calls tiny homes a fad that is "wildly impractical" and "won't be around for long."

The numbers say they're wrong. A new market report from Technavio, for example, (highlights shown at right), says the global tiny homes market will continue to grow at a CAGR of approximately **7 percent** during the period 2018-2022.

Business Wire offers a more honest assessment of the motivators of tiny living, explaining that "a key factor driving the market's growth is the cost-intensive construction of conventional houses. The demand for tiny homes is mainly driven by the high cost of conventional site-built homes. The prices of the latter are increasing at rates higher than the increase in the income levels of people, which is encouraging customers to opt for tiny homes that are less expensive living solutions than constructing a house."

THE CURRENT HOUSING LANDSCAPE

America has a housing problem. A big one. The 1950s dream of a big house in the suburbs has receded out of reach for most people.

On the one hand, that might not be a bad thing. Greenfield development is notoriously resource intensive. It wipes out ecosystems and often doesn't deliver the promised happiness to its, auto-dependent, energy-intensive new residents. Also, the cost of building a new home keeps rising, as the double whammy of high land prices and cost-raising political actions—such as Trump's lumber tariffs on Canadian softwood—ripple through the building industry. Labor is also a huge problem. Much of the nation's new housing stock rests on the guarantee of reliable, low-cost immigrant labor. But skilled immigrants are lying low, understandably shaken by the politics of division and family separations.

Tiny houses offer a partial solution to the problem to some of these social and economic issues. But they've been hamstrung by a frustrating maze of zoning, building codes and homeowner association (HOA) rules.

Here's the problem: If you don't already have a site-built house on property you own, there's often no place you can legally put a tiny house. Even if you own an empty parcel, many townships and HOAs have rules about minimum square footage.

Further confusing would-be owners, these rules apply differently depending what type of small dwelling you build (or buy). For example, a tiny house on wheels is actually classified as an RV. But you can only live in an RV that's not in an RV park for a certain number of days per year. And manufactured homes, modular homes and site-built homes all play by different rules.

Tiny home enthusiasm sometimes leads to changes in local zoning to allow for more flexible use of accessory dwelling units, or ADUs. Some municipalities have taken this a step further.

For example, in British Columbia, the town of Nelson has adopted a "Laneway Housing" ordinance that makes it much easier to add a tiny home-type dwelling next to an existing home. While this change is welcome, it's however, it's low-hanging fruit for planners—hardly radical or especially progressive.

PHOTO: TEN FOLD ENGINEERING

Self Starter. Unusual technology—and structures like this box that unfolds into a tiny home in a mere eight minutes—can't help but get our attention.

THE NOVELTY FACTOR

ECONOMIC FRUGALITY AND NECESSITY are not the only factors driving interest in tiny homes. For every Clarence Thomas, who likes to save money **boondocking his RV in Wal-Mart parking lots** for free, there are others drawn in by the clever products and design elements associated with tiny living.

I once interviewed the late George Basalla, who wrote the book on why and when people adopt new technologies (***The Evolution of Technology***). After decades of research, Basalla concluded that one of the few constants in the adoption of new technology is the human attraction to novelty. We simply can't resist the "next big thing." Show us something shinier, faster, or just different, and most of us will pounce on it—even if it's not always in our best interests.

NAME THAT HOUSE TYPE

DIFFERENT HOUSING TYPES HAVE to adhere to different building codes. This makes sense when the code is intended to increase safety and building resilience. But these rules are sometimes arbitrary and class centric. Jefre C. Outlaw, a financier with a keen interest in tiny homes, offers the following list of housing types to help clarify the current options. Not included are tiny site-built homes which generally must be built to the same building code as other, larger site-built homes.

1. **THOW (tiny house on wheels):** Usually under 400 sf. Built to the ANSI 119.5 certification standard (RVIA). Steel frame with wheels and a VIN and looked at legally as an RV. Built to last 30 years. Up to 12 year loans with not so great terms. Cannot live in them permanently (more than 6 months) per Federal Laws.
2. **Modular Home**: Also referred to as a tiny home on foundation (THOF). IRC certification state by state. Typically over 400 sf so that you can get a 15-or 30-year mortgage on the unit through the secondary market (Fannie Mae/FHA). Built to last 50 years.
3. **Manufactured Homes (HUD homes)**: Single wide, double wide, etc... Built to a generally lower standard than site-built homes. Some zoning does not allow them, even when attached to a foundation. Unless built "above code," we do not recommend them for areas vulnerable to high winds.
4. **Prefab Component Build (PCB)**: Also referred to as a flat pack build. Made with SIPs and dried in approximately threedays. 400 sf to 1,400 sf. Solves many problems when building ADU's/Granny Flats. Building code jurisdiction is local city/county/state regs. Built to last 50+ years.
5. **Park Model RVs**. Larger in both width and interior headroom than road-ready RVs, these units typically can only be place in RV parks, and are classified as RVs for purposes of loans and building codes.

PHOTO: WWW.360ARMENIA.COM

Ready to roll. Modular and mobile homes typically arrive on site on wheels, but are typically removed from the trailer and welded onto a foundation. This is often the only way they can get a certificate of occupancy and a conventional mortgage.

THE "HAVE MORE" PARADOX

The problem with ADU-centric ordinances is that they assist those who already own a property—not would-be owners who purchase or lease land, hoping to build small. Americans tend to think of themselves as class neutral, but housing policies such as these favor the favored. That's not to say the end result is undesirable. It allows families to put in a small house for aging parents, for example. On the other hand, it won't help a young couple stuck in an overpriced apartment move into home ownership.

And of course, because ADUs are frequently "add-on" structures, many owners are (understandably) inclined to use them as rental properties. (See "Case Study: A Florida Getaway"). In a time when middle-class incomes have flatlined, while costs of living keep rising, such rentals can provide relief. Estimates suggest, for example, that Airbnb typically amounts to about a 14 percent income increase for those lucky enough to have the option.

Of course, nothing lasts forever, and short-term rentals are under siege in many cities. Boston politicos have suggested **banning Airbnb rentals altogether**. Portland, Maine, has limited the total number of short-term rental registrations to 300. In nearby South Portland, pressure from NIMBY neighbors has just resulted in a **list of onerous requirements that cut off short-term rentals at the knees**. The list of restrictions includes banning the rental of camper vans, tents, trailers and mobile homes.

Why is this relevant? Because zoning at the local level is often decided by mob rule, it can change rapidly and unfavorably for tiny house owners. This is one of many reasons, in our opinion, why tiny homes—even those on foundations—*should retain their ability to become mobile again*. That way, if sea level rises, wildfire threatens, or local zoning conditions become untenable, owners have the option

FIGHTING FOR FLEXIBILITY

A new tiny house classification that allows for both fixed and mobile use deserves support.

I ASKED ALEX ONTIVEROS of Pacific West Associates, Inc. (PWA) to comment on the idea of creating a new classification for tiny homes that would allow them to be certified for BOTH RV applications and fixed foundations. This concept, he says, has already been suggested to the International Code Council (ICC).

Here's Ontiveros on where the issue stands at present:

"We have been certifying RVs and RPTs for about 30 years under Pacific West Associates, Inc. (PWA) so we took it as a parallel step to certify tiny homes on wheels in either of those two categories for the time being in the interest of safety and providing a nationally recognized building code for jurisdictions to look at when this type of unit comes in.

We agree with the fact that RV certification and grouping of these units together places restrictions on them. Due to this, our parent company, PWA, has been engaged by the Tiny House Industry Association in committees to create a new code that would address the problems that labeling a THOW as an RV brings up. As with any other code, this will be an extensive process.

The 400-square-foot restriction has been in place since about 1979, intended to keep the manufactured home industry separate from the RV and RPT industries.

While having a TH labeled as a Manufactured Home is certainly a solution for the issue of occupancy, it does present challenges that the RV and RPT certifications do not. Manufactured Housing builders are subject to 100 percent visual inspection of their production. This means that either a third-party company or a state assigned inspector would have to have in-plant presence while each unit is being built. This can drive the cost up significantly for the builder and ultimately the consumer. Another consideration of this size of unit would be the ability to pack up and move around, as some people desire it with their THOWs. Transporting a 401-square-foot tiny house may require movement permits or additional licenses that not all TH owners may have, not to mention that transporting a 40' long by 10' wide (at best) unit would be a challenge for the average consumer.

> [It's time] "to create a new code that would address the problems that labeling a THOW as an RV brings up."
> – Alex Ontiveros

We have seen positive reception with RPTs as ADUs in Los Angeles, Fresno, Ojai, Jackson Hole and other jurisdictions in Colorado. These are by no means the only ones, but the most visible to our knowledge.

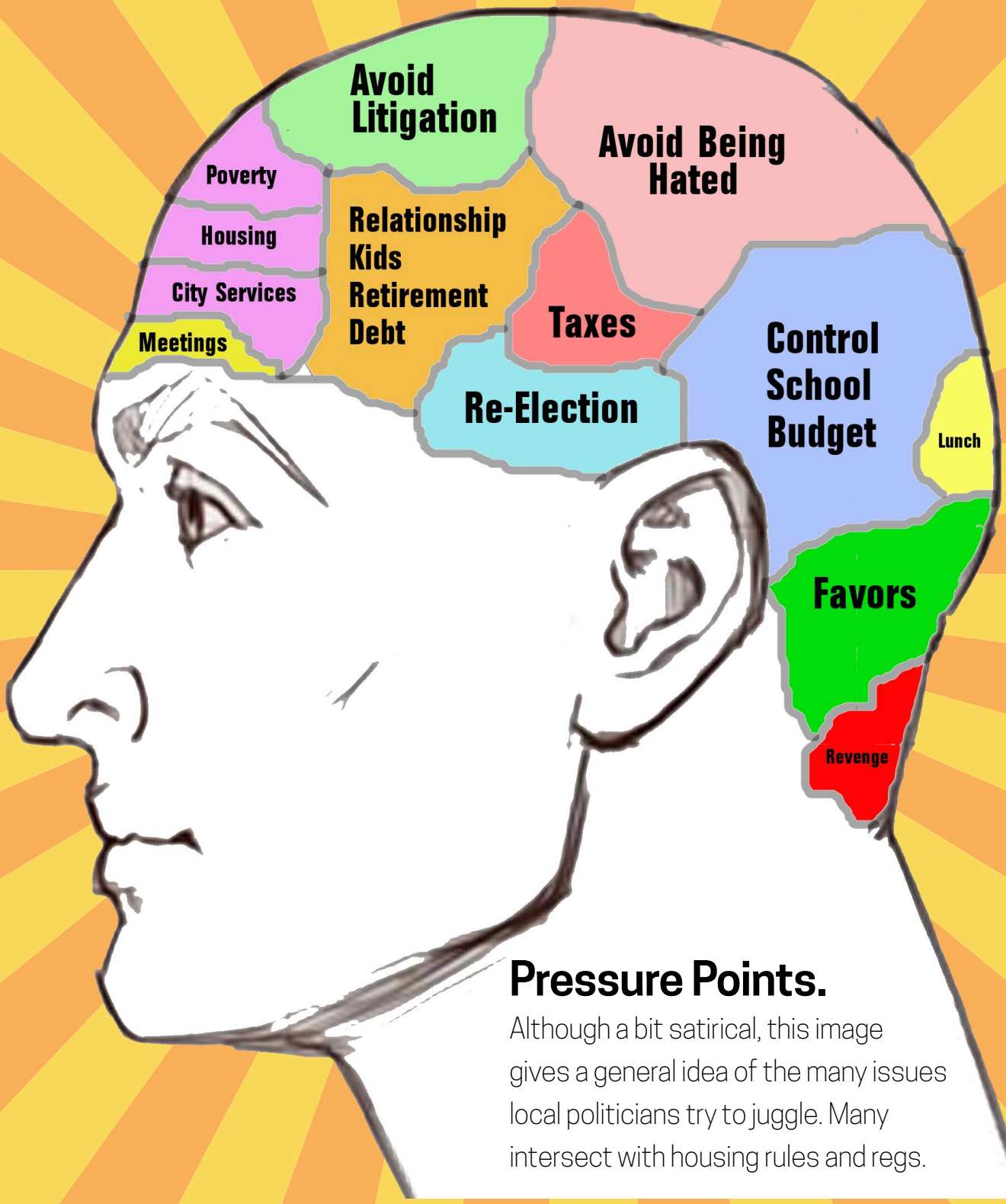
The idea of a flexible tiny home has also been brought up. Some of the challenges we see would include building to a code inclusive enough to encompass most, if not all, building department requirements across the country. Securing units to a permanent foundation also has its own inspections that would be required as the TH rolls in.

These challenges are the reason why we have been engaged in the creation of a new code specific to tiny homes on wheels. Currently, IRC and its Appendix Q attempt to cover tiny homes on foundations, but historically IRC has not covered anything on wheels. We don't expect that they will for the time being."

For an example of some of the complicated wrangling going on behind the scenes as towns try to find a place for tiny homes, read **this PDF** from a hired planning consultant working with the city of Lyons. Note, however, this was penned before the new tiny house section was added to the IRC.

Editor's note: You heard it here first! Let's get out there and give organizations such as the PWA some support. Write to the ICC, and let them know you think a new, flexible hybrid classification for tiny homes is essential for the next edition of the International Residential Code. They take proposals from anyone, and are required to consider all proposals. Contact them **HERE**.

THE MUNICIPAL MIND

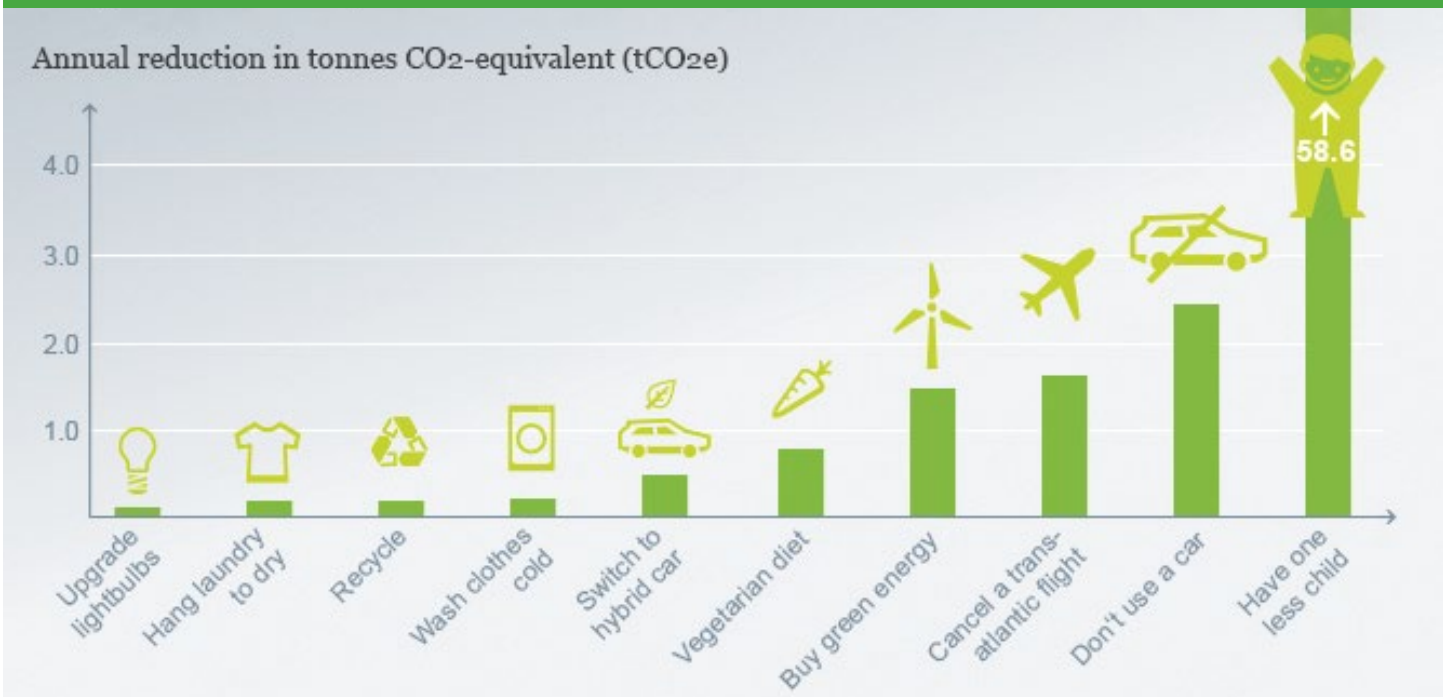


Pressure Points.

Although a bit satirical, this image gives a general idea of the many issues local politicians try to juggle. Many intersect with housing rules and regs.

SOURCE: GREEN BUILDER MEDIA COMPOSITE

Ways to reduce your CO_2 emissions



SOURCE: SETH WYNES, KIMBERLY A. NICHOLAS, ENVIRONMENTAL RESEARCH LETTERS, VOL. 12

Good karma. Living tiny is a great first step in saving the planet. But unless we all adopt other green behaviors, we may simply be trading one resource indulgence for others.

BEWARE THE GREEN HALO

Tiny home owners who assume they have earned a sustainable dividend can end up trading one environmental harm for others.

I READ SOMEWHERE ABOUT A TINY HOUSE OWNER USING her new digs as a base station for her free-spirited, globe-trotting lifestyle "a place to come back to." But this phrase sums up a vexing problem with human nature.

Studies have shown that when people purchase products they perceive as "green," they often undergo a subtle psychological shift. They have now created a green "dividend" for themselves that rationalizes less responsible behavior. In the tiny house example, the new owner may reduce her overall eco-footprint by two-thirds, but that reduction in greenhouse gases vanishes almost immediately as she uses her new freedom (and money saved) to fly to South America or Nepal to go woofing for three months.

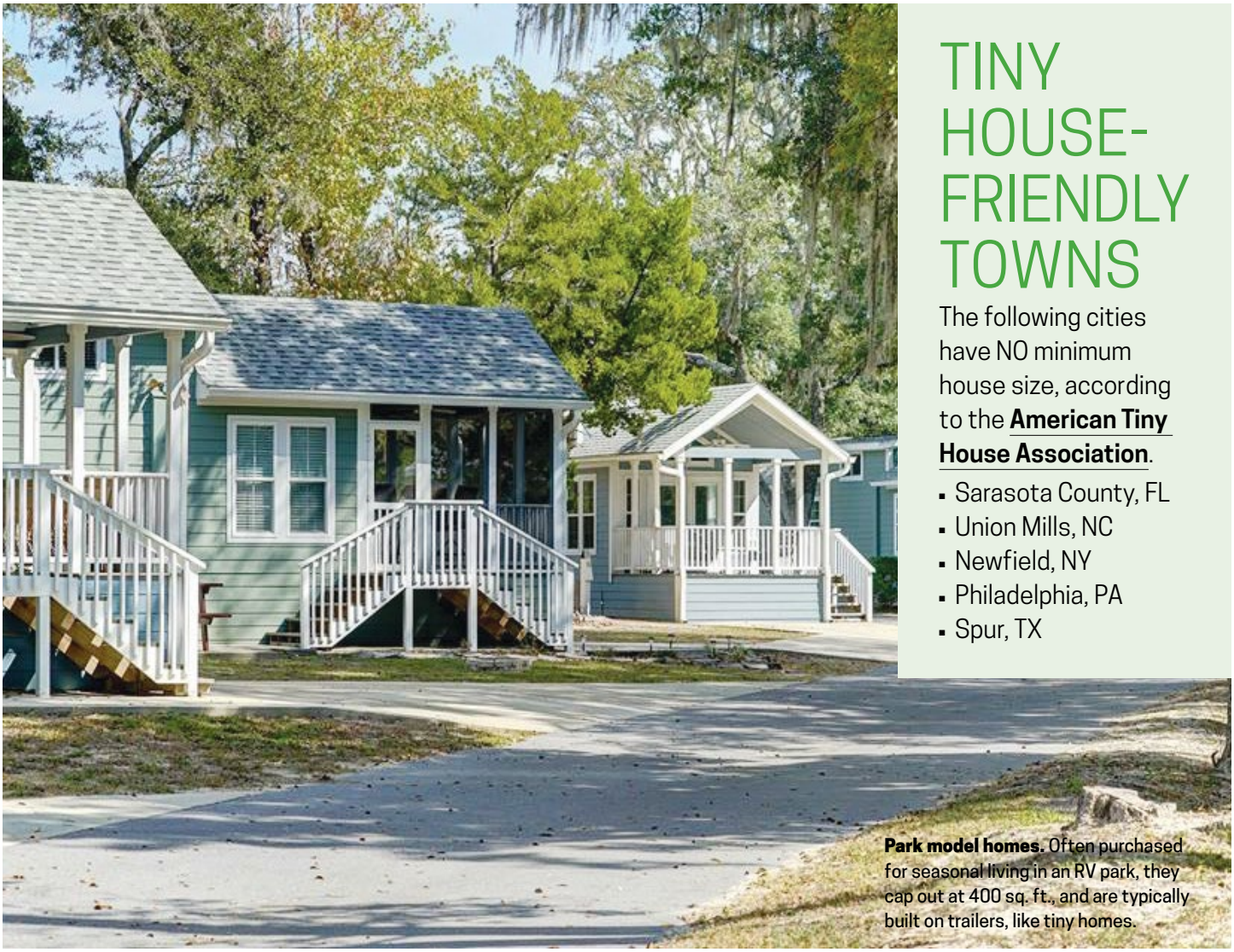
In other words, the only way a tiny house living really "saves" resources is if you actually live in it most of the time, and spend your creative energy locally, not pursuing far-flung journeys to exotic locations.

Also, *Wikipedia* points out that "Increasingly, tiny houses have become larger, heavier and more expensive. The ideal of minimal impact on the environment is being lost, as businesses capitalize on the popularity of tiny homes. The distinction between tiny houses and luxury RVs is diminishing, causing some of the long-time leaders to abandon the movement."

It takes vigilance and honesty to keep tiny homes lean and green. For example, you may have bought into the stereotype that a young couple moving into a tiny homes will tread more lightly on the planet than their elders. Not so. **Research** finds little or no difference in eco-friendly behaviors correlated with age.

To illustrate, Let's begin with the awesome fact that tiny homes at their most optimized **may create only 2,000 pounds of CO_2 per year**, compared with a typical home, which produces about 28,000 pounds. That's no small difference. But this dividend shrinks rapidly if other "bad" behaviors continue: flying, driving, and eating meat, to name just a few (see graphic).

The bottom line: Living small can be a hugely positive lifestyle choice, with positive impacts for ecosystems and residents. But it has to be approached with eyes wide open.



SOURCE: WWW.TITANFACTORYDIRECT.COM

Park model homes. Often purchased for seasonal living in an RV park, they cap out at 400 sq. ft., and are typically built on trailers, like tiny homes.

TINY HOUSE-FRIENDLY TOWNS

The following cities have NO minimum house size, according to the **American Tiny House Association**.

- Sarasota County, FL
- Union Mills, NC
- Newfield, NY
- Philadelphia, PA
- Spur, TX

to pull up stakes and move somewhere more friendly to right-sized living. We're not only ones pushing this idea. Code changes are in the works that may make a hybrid tiny house possible (see "Fighting for Flexibility").

THE MUNICIPAL MIND

Advocates for tiny homes need to understand the priorities of policy makers. Beseiged by taxpayers for every attempt to shift away from "the way it's always been done," they tend to pick their fights carefully, taking the path of least NIMBY pushback. That path, for better or worse, typically leads them to take sanctuary in the bottom line. Whatever costs a lot of money gets pushed to the bottom of the priority list.

Property taxes, unfortunately, have become the primary financial engine that pays for city services. And city services almost never go down in price. To determine tax rates, cities assess properties and assign a value. In some places, such as Texas, the formula is pretty simple. Multiply the appraised value of the property by 1.5 percent. So for a $100,000 home you pay $1,500 annually. A tiny home might appraise for $30,000 or less. That cuts the potential property tax haul to under $500 annually.

In most municipalities, education (schools and related costs) account for about 80 percent of spending. Texas, for example, spends about $10,456 annually per student, **according to the NEA**. If that metric is taken for granted as the primary benchmark for approving new housing, you see why cities might push back. In places where affordable housing is hard to find, "one off" tiny homes built on full-sized lots may be seen as poor use of valuable space. Urban planners like density and proximity, not scattershot development. That's why, in some communities, proposing a "village" of tiny homes on small lots may break through the policy barriers. Alternately, tiny homes built in more rural areas can disappear into the local landscape.

But the metric isn't nearly that simple. Researchers on the impacts of new housing development have found that larger homes, for example, might appeal to larger families (introducing more students to educate). The current level of capacity in local schools also matters. Educating students in schools with empty seats costs far less than when classrooms are maxxed out.

As with any good housing plan, the key to social and financial viability is mixed use—a combination of multi-family, small lot developments and "one off" single-family homes on individual lots.

For example, In Austin, a tiny home village is under construction. **Village Farm** will include 152 homes, many of them at 399 square feet, built around an agricultural theme. GB

CHAPTER 02

HOW MUCH SPACE DO WE NEED TO BE HAPPY?

Your experiences and social status have a direct impact on what you consider “enough” living area.

SOURCE: WIKIPEDIA COMMONS

Early adopter. Henry David Thoreau's famous cabin on Walden Pond in Massachusetts was about the size of some tiny homes.

A RECURRING QUESTION (and criticism) of right-sized, or tiny house, living is whether people can really live comfortably in less than 400 square feet. What metric should be used to estimate the threshhold between comfortable and cramped? An obvious answer is "happiness," but, surprisingly, it's rarely considered directly when planners and pundits talk about how much living space a person needs. Still, let's try.

Henry David Thoreau famously lived in a 10 x 15-ft. cabin on Walden Pond, when he researched his famous book about simplicity. That's 150 square feet—about the size of a 20-ft. travel trailer. If you've ever lived in a travel trailer with another person, you know that it's possible for two people to live in relative happiness in that much space. And yes, as you're probably thinking, it depends on the two people.

It also depends on cultural norms and expectations.

American attitudes toward how much space is enough, for example, are as fickle as attitudes toward privacy. According to a recent **Pew study**, they're willing to give up a lot of personal privacy if the conditions are right, for example—to rewards programs and frequent flier deals, but loathe to share data for free.

"In extended comments online and through focus groups, people indicated that their interest and overall comfort level depends on the company or organization with which they are bargaining and how trustworthy or safe they perceive the firm to be. It depends on what happens to their data after they are collected, especially if the data are made available to third parties. And it also depends on how long the data are retained."

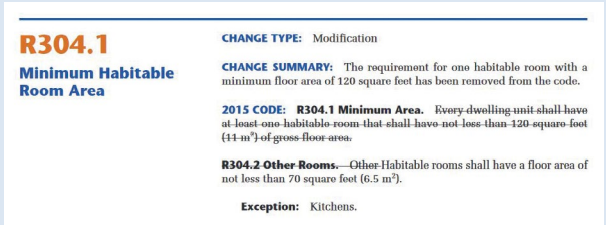
Another possible pivot point that influences acceptable housing size: keeping up with neighbors. According to some **research by** Clément Bellet, for example: "Wealth inequality visible in house sizes fueled the mortgage boom that culminated in the 2008 financial crisis." He argues that since the 1940s, American house size has risen, but relative levels of happiness with housing have remained flat.

To take his analysis further, Bellet found that"when bigger houses get built closer to smaller houses, house satisfaction is lower among the smaller households."

This line of research suggests that the perceptions of optimal home size are least partly rooted in comparison with the Joneses—not

WHAT THE NEW BUILDING CODE SAYS ABOUT MINIMUM HOUSE SIZE

A few **changes** in the latest building code (IRC 2018) make tiny floorplans more flexible.



R304.1
Minimum Habitable Room Area

CHANGE TYPE: Modification

CHANGE SUMMARY: The requirement for one habitable room with a minimum floor area of 120 square feet has been removed from the code.

2015 CODE: R304.1 Minimum Area. ~~Every dwelling unit shall have at least one habitable room that shall have not less than 120 square feet (11 m²) of gross floor area.~~

R304.2 Other Rooms. ~~Other~~ Habitable rooms shall have a floor area of not less than 70 square feet (6.5 m²).

Exception: Kitchens.

No limits. Gone is the requirement that homes have one room of at least 120 square feet. Proponents of tiny houses argued successfully that the limit "was not based on scientific analysis or identified safety hazards," and code officials agreed to remove it.

necessarily a "real" consideration of comfort or discomfort. Couldn't we take this line of reasoning to its logical logical conclusion? If you build small, and surround small homes with other small homes, residents will be happier with smaller spaces.

The answer is, yes, it's already happening. It took off about five years ago, when so-called micro-apartments first became popular. Predictably, certain well-heeled messengers of the mainstream media were there to warn us off of the "dangers" of small living. *The Atlantic* cautioned that "Home is supposed to be a safe haven, and a resident with a demanding job may feel trapped in a claustrophobic apartment at night—forced to choose between the physical crowding of furniture and belongings in his unit, and social crowding, caused by other residents, in the building's common spaces."

If that sounds a bit stretched, the argument gets even more outlandish: *"For all of us, daily life is a sequence of events, he explains. But most people don't like adding extra steps to everyday tasks. Because micro-apartments are too small to hold basic furniture like a bed, table, and couch at the same time, residents must reconfigure their quarters throughout the day: folding down a Murphy bed, or hanging up a dining table on the wall."*

Articles like these are part of the reason, in my view, that tiny living has taken a while to gain traction. They zero in on preconceived horrors of tiny living, without actual behavioral observation of the occupants. In my experience, living small often reduces, rather than expands the number of everyday tasks we face. You can only pile so many dirty dishes in a small sink, so you economize. You can sweep a 160-square-foot tiny home in a fraction of the time it takes to clean the floors of a 2,000-square-foot house. Folding up a Murphy bed is a lot faster than making your bed every morning. And most people never even use a dining room table, no matter how big the house. The **dining room is the least used room in the house**.

That's not to say we want to live small for every phase of our lives. Many people shift back and forth between small footprint and bigger footprint living. It's organic and natural. Thoreau, for example, only lived in his cabin on the Pond for two years. He then lived with a friend for three years while he wrote his book, and after that worked in his father's pencil factory.

WHERE'S THE BOTTOM?

According to Quora, German architects in the 1920s and 30s claimed to have developed livable pods that were only 32 square feet. That's on the low side, even by today's tiniest standards. So-called micro-apartments are popping up worldwide. They range widely in size, but that doesn't mean they're inexpensive. In Hong Kong in 2015, a 180-sq.-ft. apartment sold for $500,000. **Apartments in Rome** have been advertised that are as small as 45 square feet.

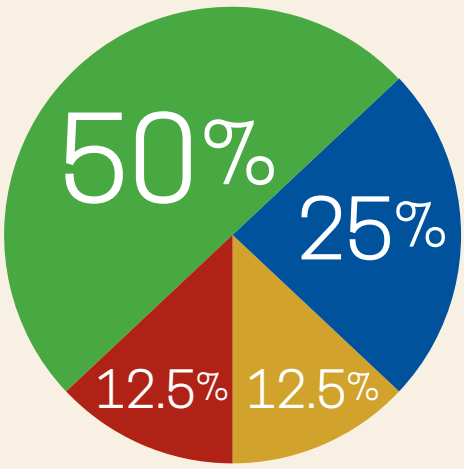
Social scientists and urban planners have set the bar for minimum floorspace at different minimums in recent years. The 2012 International Residential Code (IRC), for example, mandated that any dwelling should have at least one room that's 120 sq. ft. or more, and other rooms shall be 70 sq. ft. But that minimum was **removed in the 2015 version of the IRC**, partly in response to pressure from tiny house advocates. As **TentCityUrbanism** notes, this suggests that the absolute bare minimum for a code-compliant tiny house in the U.S. is now 88 sq. ft. That's one 70-sq.-ft. room plus 18 sq. ft. of bathroom to accommodate water closet, lavatory, bathtub or shower.

High style. Compact kitchens can look upscale, as this well-made *Cypress* model from Tumbleweedhouses.com shows.

STREAMLINING SMALL FLOORPLANS

ONE INTERESTING APPROACH to optimizing space is to look at actual behavior patterns and customize the space to reflect time spent. **Tumbleweed** offers a formula for people interested in buying their mobile tiny house on wheels (THOW). [They refer to them as tiny house RVs.]

They note that most people spend half their time in the bedroom, and that space needs to be reclaimed with a loft-type layout. Tumbleweed takes this a step further, and says that with a 172-sq.-ft. model, if you ignore the upstairs sleeping loft, you can divide the space up more creatively, so it looks something like this pie chart:



- **Great Room**: 50% / **86 square feet**
- **Kitchen**: 25% / **43 square feet**
- **Storage Closet**: 12.5% / **21.5 square feet**
- **Bathroom**: 12.5% / **21.5 square feet**

Maslov's Hierarchy. While people may not require that every need be met to feel happy, needs on the bottom of the pyramid can't be ignored.

WHO DECIDES?

When you search online for how much floorspace a person needs, the one reference that seems to recur is a website called Engineering Toolbox, which says 100 to 400 square feet. Other modern sources such as the London Plan 2011 have created an index of suggested minimal floorspace based on housing type and family size that is about the same range.

Suffice it to say the "optimal" living space is all over the map. Part of the reason for this is that the comfortable minimum is affected by a wide range of variables (and not just the personalities of the other people living with you.) These variables include the availability of outdoor patios, gardens and other amenities, shared public spaces and—notably—cultural norms and expectations.

THE HAPPINESS CONNECTION

One way to get at optimal living size is to overlay relative levels of happiness with shelter trends. Of course, shelter is just one factor in the overall satisfaction of a person, but, if you refer back to Maslov's Hierarchy of Human Needs (shown above), shelter is one of the most basic physiological necessities. Until we feel well housed and well fed, we can't move on to more complex psychological desires.

This is, incidentally, a question that only about 20 percent of the world has the resources and economic freedom to ask. The other two-thirds, according to the UN, live in less than 20 square meters each (about 230 square feet), and have little choice about the matter.

Note that none of the most affluent industrialized countries made the top 10. So people in these 10 countries must live in big, elbow room mansions, right?

Of course not. Take Mexico, for example. A **blistering article** in the *LA Times* recently criticized a housing type that emerged recently in Mexico called "mini-casas." A million homes sized at about 325 square feet were built and quickly occupied. If those million families skewed the national mood toward unhappiness, it's not apparent from studies of national contentment.

Other countries high on the "happiness" list also defy the stereotype that compact living equates with misery and overcrowding. In Bangladesh, the eighth happiest nation on the planet with about 4.5 residents per unit, much of the population lives in compact homes and apartments built with traditional materials.

Somewhere lower on the happinesss spectrum are dense urban parts of the "developed" world that are faced with massive housing shortages. London has absorbed such an intense crush of population, for instance, that heat maps of the city show people packed into apartments and flats like prisoners in a slave ship—densities that make tiny house living seem palatial.

Culturally, some places seem more able to take tight living quarters in stride. If you look closely at living patterns in Bangladesh, for example, small personal living space is mitigated by the broader tapestry of shared communal spaces and close community ties.

Humans can live comfortably in very small spaces. But trying to generalize an exact figure for that "sweet spot" is disingenuous. Every nation, and every person, will have a different answer.

Incidentally, at Green Builder Media, we've launched a new VISION House® exhibition called **The Align Project.** This will be on display in 2019, to explore whether the typical U.S. citizen can live comfortably in 390 square feet of space, given a balanced relationship with the outdoors, the right design and an open-minded attitude. GB

The Happy Planet Index in 2017 identified the following 10 countries as the happiest:

- Costa Rica
- Mexico
- Colombia
- Vanuatu
- Vietnam
- Panama
- Nicaragua
- Bangladesh
- Thailand
- Ecuador

PHOTO: TINYHOMEBUILDERS.COM

Micro messy. A tiny apartment in Hong Kong feels even smaller with so much clutter covering every surface involved.

CREEPING CLUTTER

A cluttered space feels smaller and raises anxiety levels. Go spare, or go home (to your oversized house).

PART OF DETERMINING "RIGHT SIZED" SPACE DEPENDS on how disorganized and acquisitive the occupant is. Is she a grasper or a tosser? Does he let things go easily or is every object his "precious?" Katherine Lawrence of *DailyDeclutter.com* notes that "Often, the space constrains are from too much clutter, not lack of space. When a client has less than 500 square feet per family member, I know we will need to maximize their living space with organizational products."

CHAPTER 03

COMPACT WATER HEATING

Although a bit more expensive, a "triple threat" system of solar, electric and gas backup delivers under every scenario.

PHOTO: HTTPS://TINYWOODHOMES.WEBS.COM/

ONE OF THE SIMPLEST, lowest-tech systems we've seen for water heating on small homes is essentially a black tube mounted on the roof, that's heated by the sun, and gravity feeds hot water to your shower or sink. In southern climates, there are many variations on this concept, and at least one commercial product called *Road Shower 2* ***(Fig. 1)***.

Any number of other solar hot water heaters are available of course, but most require a storage tank inside the structure—more space than you may want to give up. This is the same limitation that applies to an electric hot water heater. There are several compact units on the market now that do a great job in a relatively small space, using 110 volt electric.

For example, Rheem makes a six-gallon electric heater that's well reviewed and retails for about $250 ***(Fig. 2)***.

Also, Bosch offers the *Bosch Tronic 3000 T 7-Gallon Electric Mini-Tank Water Heater* (not shown).

But if you want the flexibility to live off grid or take your home on the road, it doesn't hurt to have a gas-fired backup. A budget approach would be to acquire one from an expired RV at a junkyard. You many also end up with a "hybrid" heater that does both electric and gas heating. Or you can purchase an **inexpensive conversion kit** that allows you to plug in your water heater when you have an electrical hookup ***(Fig. 3)***.

One criticism of this electrical water heating systems, however is that you're wasting a lot of electricity to keep the water hot 24 hours a day, when you only need it occasionally. You have a couple of options. Put the plug on a timer, or install a smart switch you can control with your smartphone, and turn the water on and off at your whim.

If you use a lot of hot water, or plan to stay put most of the time, an on-demand propane gas water heater makes sense. This is a great technology, but for tiny homes, it's really only suited for areas that don't freeze, because you want to locate the unit outside your living space, as shown in this image of a Noritz on-demand unit posted on **Tumbleweedhouses.com** ***(Fig. 4)***.

SLOW THE FLOW

Key to any efficient, low-volume water system is the use of an extremely efficient showerhead. Most showers operate at 2.5 gallons per minute, but you want a 1.5-gallon-per minute-head. Thus, with a six-gallon tank, you can still take about a six-minute shower (because you're mixing hot with cold water). We've tested **this model**, and it works flawlessly. You hardly notice the flow constriction ***(Fig. 5)***.

While you're at it, go ahead and replace your kitchen and bath sink aerators with **0.5 gpm versions**. We like the ones that allow you to switch between multiple flow rates in case you want to fill the sink quickly. The miserly setting is a silent governess for teenagers who like to run the water while they brush their teeth. GB

1

2

3

4


5

CHAPTER 04

THE BUILDING SCIENCE OF SMALL

Putting readily available commercial systems to work in the Tiny House arena could raise the bar on strength and efficiency.

Light top. Aluminum roofing is just one material that can reduce tiny house weight.

PHOTO: TINYHOUSEROOF.COM

ARE LIGHTER, CODE-COMPLIANT TINY HOMES VIABLE?

We believe the answer is yes, with the right combination of products and engineering.

CAN TINY HOMES BE CONSTRUCTED TO SITE-BUILT STANDARDS at half the weight? Our own *Green Builder* editor Matt Power will be presenting on this topic at the Tiny House Jamboree at the end of August in Austin.

The key is to look at the biggest weight offenders first: framing, roofing, sheathing, insulation and siding. Whittle down the pounds from there.

As just one example, asphalt modified shingles weigh about 3 pounds per square foot. A 160-square-foot tiny house shed roof might weigh 480 pounds by comparison, 16-gauge aluminum standing seam metal roofs **weigh** about 0.7 pounds per square foot, or 112 pounds. Installed properly, both materials can meet stringent building codes.

Then there's the steel framing alternative (see sidebar). The goal is to drop a tiny home's weight below about 6,000 pounds., which is often the limit for standard pickup truck towing.

Power's presentation at the Jamboree will include many other specific recommendations for lowering the overall weight of tiny homes. He'll also explain how lighter tiny homes can still offer superior wind and wildfire resistance.

SPRAY FOAM AND TINY HOMES: A CLOSE FIT

A COUPLE OF YEARS AGO, we asked an RV dealer why spray foam isn't used more to make RVs more energy efficient. He suggested that the foam might disintegrate over time from road vibration.

We were not so sure, so we asked the tech experts at the **Spray Foam Coalition** to look into it. While they're not yet ready to make a statement about spray foam's viability for vehicles that regularly hit the road, we've asked them to study the possibility, and let us know in a year or so.

Our own recommendation is that spray foam is probably fine for any tiny house that won't travel much, which concurs with the Coalition's comments below.

The weight of cured dense cell spray foam, at 2 inches thick, with an R-Value of about R-13, is 0.33 pounds per square foot. For an 8 x 20-foot trailer (plus 8 x 20-foot shed roof), that adds about 158 pounds—not bad, considering the air sealing and strength benefits.

Here's the *Coalition's* take: "When a tiny house is on the move, maintaining structural integrity is key with the unpredictability of the road. A tiny home can be given a new lease of life with spray foam, it can stabilize vehicles during travel through closed cell foam. Spray foam is applied as a liquid, so it expands and seals all crack and seams to create an air-tight home. The stiffened frame reduces rattling and movement within the makeup of the home.

"Tiny homes have big benefits, especially when built with strong building materials. As the tiny house popularity continues to grow, SPF proves to be a strong, reliable product that maintains the structural integrity of homes and buildings—no matter how big or small."

For more information, check out **www.whysprayfoam.org.**

SUN-POWERED AIR CONDITIONING

As average temperatures increase due to climate change, fossil-free cooling is possible for tiny homes.

IT'S TIME FOR TINY HOMES TO GET OFF FOSSIL FUELS COMPLETELY, and go net zero. Solar-powered air conditioning offers a major step in that direction, especially in southern climates, but also as heatwaves roll across more northerly states.

As our friend Lloyd Alter at Treehugger notes, quite succinctly, "it turns out that solar-powered AC is not some new technology, but simply a result of grinding out improvements in existing heat pump split units, combined with the continuing drop in the price of conventional solar panels, with a dollop of building energy efficiency improvements that reduce solar gain and resultant cooling loads."

Even the most-efficient space cooling equipment requires a lot of juice, too much for most small solar arrays to provide in real time. A cloud goes by, voltage drops, and the equipment can be damaged or simply stops working. At least one

Smart andsolar A/C. Now in its fifth iteration, the ***ACDC12C SOLAR AC*** system's secret is variable speed operation that fluctuates with the day's solar production. Optional grid connection allows the unit to be used at night, and also "fills in" for power gaps during the day.

model (shown above) has overcome this limitation by allowing the compressor to operate at variable speeds.

However, for most mini-splits systems the workaround is to use batteries. Unlike panels, batteries feed back current at a predictable constant rate. But here again, it's not that simple. The batteries have to be managed carefully. Overtax them and you may reduce their lifespan and damage their capacity.

Can you cool tiny homes with solar? Yes. But doing so successfully requires a careful balancing act between solar input, battery storage and electrical output—in combination with a well-insulated, energy-efficient building envelope. At present, a flexible system such as the *ACDC12C* is the turnkey option. But a competent solar installer could also help you design your own system.

Storm ready. RVs have their drawbacks, but when monster storms approach, they're able to roll out quickly, unlike most tiny homes.

PHOTO: FLICKR (CC)

OFF-THE-LOT RVs VERSUS TINY HOMES

Tiny house enthusiasts often fail to look closely at the good points of RVs. That's too bad, because although conventional RVs are limited in some ways, they have many positive attributes that can be integrated into tiny home systems.

PRO: YOU CAN MOVE

RVs are designed to travel—If you don't like your neighborhood, drive to a new one.

PRO: SELF CONTAINED SYSTEMS

RVs don't require costly infrastructure such as wells, sewage or even electric hookups, in some models.

PRO: NO COMPOST DUTY

Much as we like composting toilets, they do require a regular commitment and maintenance most people don't expect. They're definitely a better choice for a static tiny house than a rolling home. RVs don't generally offer compost options.

PRO: BUG-OUT READY

On the other hand, when inclement weather approaches, RV owners can quickly pull up jacks and flee at 70 miles per hour from whatever the impending menace is.

CON: MUNICIPAL BIAS

Many cities have rules intended to prevent long-term occupancy of RVs. Typically, if you live in an RV more than 14 days per year, you may get a citation from your city. Tiny homes, if built on a permanent foundation, may be seen as accessory dwelling units (ADUs) with no tenure limits on occupancy.

CON: STORM AND WEATHER VULNERABILITY

RVs are not made to weather major storm events, although due to the fact that they have to withstand driving speeds, most are more resilient than manufactured homes. Significantly, the popular "bump-outs" on large RVs are especially vulnerable. They're not made to handle snow loads or high winds.

CON: SEPTIC DUTY

You'll need a dumping station nearby to occasionally dispose of blackwater waste. This may cost a small fee each time.

FRAMING TINY HOMES WITH STEEL

Although it costs somewhat more up front, using a steel framing kit has many advantages.

Michael Janzen, who partners with **Volstrukt Steel Framing**, lays out 10 reasons he uses steel kits.

1. Higher R.O.I. — Your return on investment is better because with wood framing most of the cost is in the labor. With steel tiny house kits, 80 percent of your investment stays in the quality permanent materials, not lost as a labor cost.

2. Lightweight & Strong — Steel's strength-to-weight ratio is 25 times higher than wood. A steel tiny house frame is 40-60% lighter than wood and 10 times the strength of a comparable wood frame. So it's half the weight and exponentially stronger.

3. Quick Assembly — At the factory, the steel framing is all pre-assembled into wall and roof panels. Once delivered to your job site you can assemble the panels in a day or two with the help of friends.

4. No Special Skills Needed — The pre-assembled steel frame tiny house kits don't require an experienced framing crew. All you do is fasten panels together at square angles and attach it to your foundation.

5. Pest/Rot/Rust Resistant — Galvanized steel comes with a barrier to moisture and rust and makes an incompatible environment (or meal) for pests like termites.

6. Thermal Bridging Defeated — Modern sheathing options like ZIP™ Systems provide the thermal break, structural sheer strength, vapor and air barrier all in one application.

7. Stonger Than Your Average Steel — The structural quality 20 to 22-gauge sheet steel in Volkstrukt kits is rolled through a series of dies and formed into C-sections, and not subject to fragile fold points.

8. ICC Compliant — The cold-rolled steel process used to produce these steel tiny house kits is ICC-compliant and IRC-compliant. Read this **ESR-2361 PDF** for more information about the FRAMECAD technology.

9. Highest Quality — An engineered frame means you can sail past the design phase and avoid the risks for cost increases and delays.

10. Experienced Designer & Manufacturer — Michael Janzen has been designing tiny houses since 2008. Volstrukt uses the industry leading cold-rolled steel framing technology to produce tiny house frames.

Condensed and reprinted from a **blog** *by Michael Janzen.*

CHAPTER 05

CASE STUDY: FLORIDA GETAWAY

To pay for their tiny house dreams, many buyers are offering them as short-term rentals to pay down the mortgage.

THIS FLORIDA GEM offers the kind of million-dollar water view none but the wealthiest of us ever see, except perhaps when camping at a seasonal resort. The reason for renting this tiny unit is obvious, but short-term rentals such as this sometimes puts tiny house owners at odds with local planners, especially in areas short on housing.

Here's the owner's description. Note that she goes out of her way to remind renters how small certain rooms are, such as the bathroom:

"This "modern meets industrial" tiny house is a foundation build. Location is Polk County, Fla. (Babson Park on Crooked Lake). Took me quite a bit to go through the proper channels and get everything approved but this is a "legit" (legal) tiny house with permits pulled and certificate of occupancy issued.

Interior dimensions are 12 × 24 (288 square feet) with a 100 square-foot loft with queen bed and sitting area (388 square feet total). Two bedrooms—one on the lower level (full bed).

Appears roomier than most due to high ceilings-—14 feet—in the front sloping to 12 in the back which also provides a loft ceiling of 6 ft. on one side sloping to 4 feet on the lower side. Concrete floors were stained to complete the sleek "industrial" look.

Features a 5 × 5-foot bathroom with a 33-inch corner shower, locker "console" table pops up and serves as dining for four. Locker also offers ample storage. Concrete counter top, leftover roofing material used as a back splash, used metal dental wash station was turned into great kitchen cabinets and pantry.

*Home is eventually going to be my retirement home but for now is posted/listed on **Airbnb**."* GB

CHAPTER 06
GALLERY: TINY

ESCAPE TRAVELER XL, Woodstock, GA
$89,000 • 1 bed, 1 bath • 344 Sq Ft

CUSTOM ONE-OF-A-KIND TINY HOME, Sheldon, ND
$50,000 • 1 bed, 1 bath • 260 Sq Ft

TINY HOUSE ON WHEELS, Webster, MA
$69,000 • 3 beds, 1 bath • 350 Sq Ft

HARVEST MOON GYPSY STYLE TRAILER, Twain, CA
$21,000 • 2 beds, 1 bath • 120 Sq Ft

NEW TINY HOME, HEBER CITY, UT
$33,900 • 1 beds, 1 bath • 240 Sq Ft

CUSTOM TINY HOUSE, San Marcos, CA
$53,450 • 2 beds, 1 bath • 378 Sq Ft

These homes, listed on www.tinyhomebuilders.com in August, 2018, demonstrate the highly creative world of tiny house design and custom structures.

HOMES FOR SALE

BUNGALOW, Carlsbad, CA
$34,450w • 1 bed, 1 bath • 198 Sq Ft

"ZEN DEN" FEATURED ON TINY HOUSE NATION, Tenino, WA
$89,000 • 1 bed, 1 bath • 320 Sq Ft

PORCHLIGHT FROM HIDEAWAY TINY HOMES, Denver, CO
$65,900 • 2 beds, 1 bath • 288 Sq Ft

THE SOLAR, SAN ANTONIO, TX
$29,500 • 1 bed, 1 bath • 160 Sq Ft

BEACH HOUSE ON THE BEACH, Savusavu Town, Vanua Levu
$36,800 • 1 beds, 1 bath • 190 Sq Ft

A TINY HOME TO HELP TINY TOTS, Dearborn, MI
$48,000 • 1 beds, 1 bath • 280 Sq Ft

CHAPTER 07

THE RIGHT (SMALL) STUFF

The combination of low-tech ingenuity and high-tech capabilities can solve many of the living challenges with small spaces.

THREE TECHNICAL WONDERS TO SET YOU (GRID) FREE

New and improved technologies promise to make tiny homes more resilient and self sufficient. Here are some of our favorites.

1. Induction Cooktops

Unlike other glass-topped electric cooktops, induction systems heat the pan directly. They capture 90 percent of the energy from the unit, whereas both gas and glass top electrics lose up to 40 percent of their heat around the pan. What this means is that my cast iron pan is hot enough to fry an egg in 9 seconds.

A well-designed solar setup with batteries and 1,000-watt inverter could operate a single burner top, such as the 800-watt model shown. Multiple burners would likely be too power intensive for off-grid use.

2. Lightweight Peel and Stick Solar for Standing Seam Panels

Although you might think Elon Musk invented the idea of solar panels that look like roofing, building integrated photovoltaics, or BIPV, have been around for decades. But some of the latest ones are the most flexible—literally. New PV products are flexible, and you can adhere them directly to a metal standing seam roof. We like metal, because it's also one of the lightest types of roofing that meets high wind requirements.

3. Solar Refrigeration

Although you can buy off-the-shelf solar powered DC coolers, these don't have the oomph most people want for full time living. But as an intrepid RV owner **proved recently**, do the math right, and you can install a full-time, off-the-grid refrigerator that requires just two 100 amp hour 12-volt batteries. **Here's the small refrigerator** that worked for them. The unit has an operating range of 30 to 60 degrees Fahrenheit.

FLEXIBLE FURNISHINGS

Tiny living can be far more comfortable when furnishings perform multiple functions. Here are several of the best multi-purpose solutions we've seen.

Ana White Tiny House Guest Bed

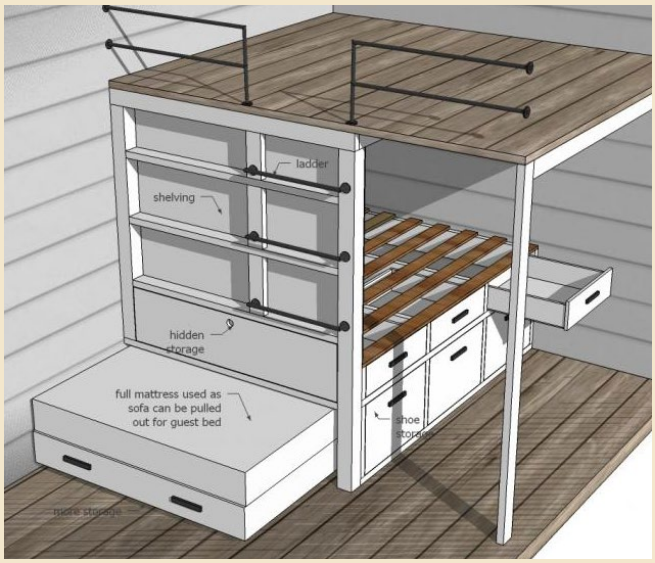


PHOTO: ANA WHITE

Tub Beneath a Murphy Bed

PHOTO: TREKKER TRAILERS

Pullout Kitchen Countertop *Worktop Plus*

PHOTO: MAGNET CO

Foldaway Pia Pop-Up Kitchen

PHOTO: DIZZCONCEPT

Ozzio *Smart Living* TV Wall Unit Plus Seating for Six

PHOTOS: OZZIO (ITALY)

ENVISION EVERY HOME

POWERED BY THE SUN

UTILITY | COMMERCIAL | RESIDENTIAL BUILDING YOUR TRUST IN SOLAR. JINKOSOLAR.US

CHAPTER 08

LOANS FOR TINY HOUSE FINANCING

Obtaining financing for a tiny house varies by the type of construction and mobility of the project.

1 RV Lending

If you are looking for a THOW, consider an RV Industry Association-certified tiny home. These are considered RVs for the purposes of lending, which helps open up a wide range of lending companies. For example, US Bank, LendingTree, SunTrust and Southeast Financial all provide RV loans. **Southeast Financial** does not provide financing unless you are currently a homeowner, so they may not be the best option for everyone.

2 Tiny Home Loan Specialists

LightStream, a division of SunTrust Bank, is a loan company that provides tiny home-specific financing. This is one of the few tiny home specific loan products on the market.

Other options include **RockSolid Funding**, which specializes in trailer and recreational equipment financing, and **Bildsworth International** .

Also, **First Southwest Bank** provides RV or travel trailer loans for tiny homes, but only in their market.

3 Tiny Home Builder

Some tiny home companies provide in-house financing services. These include:

Tumbleweed
Escape
Indigo River
Tiny House Chattanooga
Sunwest Tiny Homes

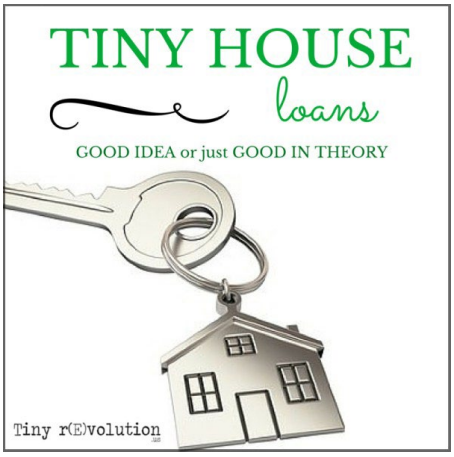


PHOTO:

4 Personal Loans

If the first three options aren't accessible for you, consider a personal loan. There are two options with a personal loan: a secured loan (you have collateral), and an unsecured loan (you don't have collateral). **SoFi** and **Prosper** have been known to provide personal loans for financing a tiny home. Both companies provide unsecured personal loans to borrowers.

5 VA loans

VA loans are possible as a financing option for tiny homes, but you can't use this type of loan unless the home sits on a permanent foundation. This means your tiny house has to meet site-built building codes all the way through the build process. Also, **USAA** won't qualify you for any mortgage under $50,000.

6 FHA Loans

The FHA's rules, according to Jefre C. Outlaw of Sprout Tiny Homes, are rather circumspect about what constitutes a tiny home. "They require only that "a home be marketable in the area and have adequate space necessary to assure suitable living, sleeping, cooking and dining accommodations and sanitary facilities." He adds that the FHA requires all manufactured homes to have a "minimum size of 400 square feet to qualify for FHA financing. A tiny house is not a manufactured home, but it's generally a lot smaller and less expensive than a conventional home, and the loan will still require it be built on a foundation. Banks often add additional fees to loans of $40,000. Here's how it works, from **mortgagereports.com**:

"Low loan amount surcharges catch many borrowers off-guard…if it costs $1,000 to process, underwrite and fund a home loan, and the profit on a $400,000 mortgage is $2,000, the lender makes money if it gets a .5 point origination charge. But if the loan is just $40,000? That 0.5 point origination fee is only $200, which means the lender would lose $800 by funding that loan. So either lenders stop making smaller loans, or they have to charge more to cover their costs. So in this case, there might be a "low loan amount" add-on of three more points. The total origination would be $1,400, allowing the lender to cover its costs and earn $400 on the loan."

CHAPTER 09

NEW CODE FOR SITE-BUILT TINY HOUSES

The residential building code makes specific rules about minimum sizes in site-built homes (which include tiny dwellings). The new Appendix Q in the IRC 2018 code addresses ceiling heights, fire egress and stairways in tiny homes.

APPENDIX Q TINY HOUSES

This provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

User note about this appendix: Appendix Q relaxes various requirements in the body of the code as they apply to houses that are 400 square feet in area or less. Attention is specifically paid to features such as compact stairs, including stair handrails and headroom, ladders, reduced ceiling heights in lofts and guard and emergency escape and rescue opening requirements at lofts.

SECTION AQ101

GENERAL

AQ101.1 Scope.

This appendix shall be applicable to tiny houses used as single dwelling units. Tiny houses shall comply with this code except as otherwise stated in this appendix.

AQ102.1 General.

The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

- **EGRESS ROOF ACCESS WINDOW**. A skylight or roof window designed and installed to satisfy the emergency escape and rescue opening requirements of Section R310.2.
- **LANDING PLATFORM.** A landing provided as the top step of a stairway accessing a loft.
- **LOFT.** A floor level located more than 30 inches (762 mm) above the main floor, open to the main floor on one or more sides with a ceiling height of less than 6 feet 8 inches (2032 mm) and used as a living or sleeping space.
- **TINY HOUSE.** A dwelling that is 400 square feet (37 m) or less in floor area excluding lofts.

SECTION AQ103

- 2
- 1/4

CEILING HEIGHT

AQ103.1Minimum ceiling height.

Habitable space and hallways in tiny houses shall have a ceiling height of not less than 6 feet 8 inches (2,032 mm). Bathrooms, toilet rooms and kitchens shall have a ceiling height of not less than 6 feet 4 inches (1,930 mm). Obstructions including, but not limited to, beams, girders, ducts and lighting, shall not extend below these minimum ceiling heights.

Exception: Ceiling heights in lofts are permitted to be less than 6 feet 8 inches (2,032 mm).

SECTION AQ104

LOFTS

AQ104.1 Minimum loft area and dimensions.

Lofts used as a sleeping or living space shall meet the minimum area and dimension requirements of Sections AQ104.1.1 through AQ104.1.3.

AQ104.1.1 Minimum area.

Lofts shall have a floor area of not less than 35 square feet (3.25 m).

AQ104.1.2 Minimum dimensions.
Lofts shall be not less than 5 feet (1,524 mm) in any horizontal dimension.

AQ104.1.3 Height effect on loft area.
Portions of a loft with a sloped ceiling measuring less than 3 feet (914 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required area for the loft.

Exception: Under gable roofs with a minimum slope of 6 units vertical in 12 units horizontal (50 percent slope), portions of a loft with a sloped ceiling measuring less than 16 inches (406 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required area for the loft.

AQ104.2 Loft access.
The access to and primary egress from lofts shall be of any type described in Sections AQ104.2.1 through AQ104.2.4.

AQ104.2.1 Stairways.
Stairways accessing lofts shall comply with this code or with Sections AQ104.2.1.1 through AQ104.2.1.5.

AQ104.2.1.1 Width.
Stairways accessing a loft shall not be less than 17 inches (432 mm) in clear width at or above the handrail. The width below the handrail shall be not less than 20 inches (508 mm).

AQ104.2.1.2 Headroom.
The headroom in stairways accessing a loft shall be not less than 6 feet 2 inches (1,880 mm), as measured vertically, from a sloped line connecting the tread or landing platform nosings in the middle of their width.

AQ104.2.1.3 Treads and risers.
Risers for stairs accessing a loft shall be not less than 7 inches (178 mm) and not more than 12 inches (305 mm) in height. Tread depth and riser height shall be calculated in accordance with one of the following formulas:

1. The tread depth shall be 20 inches (508 mm) minus four-thirds of the riser height.
2. The riser height shall be 15 inches (381 mm) minus three-fourths of the tread depth.

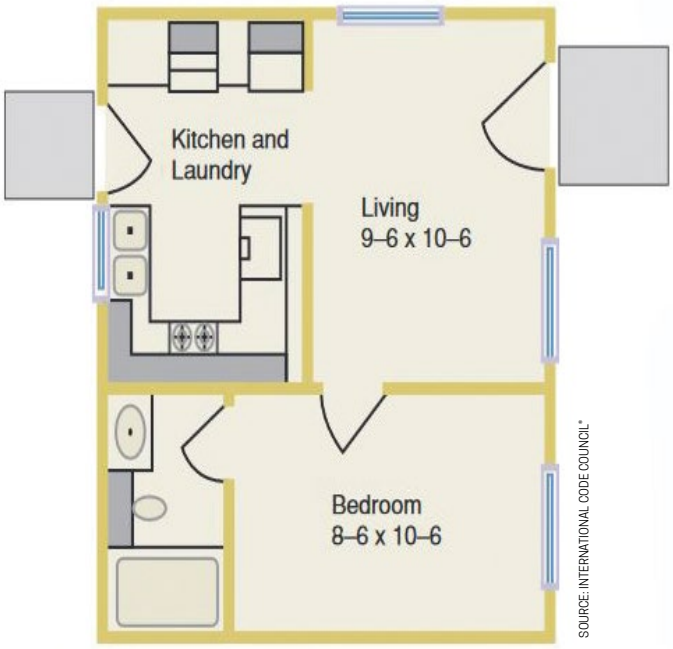
AQ104.2.1.4 Landing platforms.
The top tread and riser of stairways accessing lofts shall be constructed as a landing platform where the loft ceiling height is less than 6 feet 2 inches (1,880 mm) where the stairway meets the loft. The landing platform shall be 18 inches to 22 inches (457 to 559 mm) in depth measured from the nosing of the landing platform to the edge of the loft, and 16 to 18 inches (406 to 457 mm) in height measured from the landing platform to the loft floor.

AQ104.2.1.5 Handrails.
Handrails shall comply with Section R311.7.8.

AQ104.2.1.6 Stairway guards.
Guards at open sides of stairways shall comply with Section R312.1.

AQ104.2.2 Ladders.
Ladders accessing lofts shall comply with Sections AQ104.2.1 and AQ104.2.2.

AQ104.2.2.1 Size and capacity.
Ladders accessing lofts shall have a rung width of not less than 12 inches (305 mm), and 10-inch (254 mm) to 14-inch (356 mm) spacing between rungs. Ladders shall be capable of supporting a 200-pound (75 kg) load on any rung. Rung spacing shall be 3.75 uniform within /inch (9.5 mm).



Small dwelling complying with minimum area requirements

New rules. A tiny house floorplan compliant with IRC 2018 space restrictions.

AQ104.2.2.2 Incline.
Ladders shall be installed at 70 to 80 degrees from horizontal.

AQ104.2.3 Alternating tread devices.
Alternating tread devices accessing lofts shall comply with Sections R311.7.11.1 and R311.7.11.2. The clear width at and below the handrails shall be not less than 20 inches (508 mm).

AQ104.2.4 Ships ladders.
Ships ladders accessing lofts shall comply with Sections R311.7.12.1 and R311.7.12.2.
The clear width at and below handrails shall be not less than 20 inches (508 mm).

AQ104.2.5 Loft Guards.
Loft guards shall be located along the open side of lofts. Loft guards shall be not less than 36 inches (914 mm) in height or one-half of the clear height to the ceiling, whichever is less.

SECTION AQ105
EMERGENCY ESCAPE AND RESCUE OPENINGS

AQ105.1 General.
Tiny houses shall meet the requirements of Section R310 for emergency escape and rescue openings.

Exception: Egress roof access windows in lofts used as sleeping rooms shall be deemed to meet the requirements of Section R310 where installed such that the bottom of the opening is not more than 44 inches (1,118 mm) above the loft floor, provided the egress roof access window complies with the minimum opening area requirements of Section R310.2.1.

GREEN BUILDER® MEDIA PRESENTS

THE ALIGN PROJECT

RENDEZVOUS WITH REALITY

THE ALIGN PROJECT is a one-year demonstration project designed to challenge entrenched ideas about how we live in the U.S. and offer suggestions for how we can align our lifestyles with our changing socio-economic and environmental realities.

Whether we like it or not, the changing climate is demanding a sweeping overhaul of the way we live. Fortunately, advances in high-performance products and enabling technologies are providing viable solutions for enhanced efficiency, resiliency, sustainability, and connectivity.

The centerpiece of The Align Project is a small-footprint, net-zero, connected independent dwelling unit. The precision-engineered home takes advantage of every square foot of space and comes with an integrated smart home technology platform, which seamlessly integrates devices, appliances, lighting, and mechanical systems.

Recognizing that sustainable living extends beyond the home, The Align Project also focuses on revamping our cities, energy infrastructure, mobility solutions, and finances, highlighting sustainable choices that align with our moral compass to ensure a flourishing future.

Visit The Align Project

The Align Project has been permanently located in Downtown Las Vegas and available to visit!

If you're interested in touring or staying in The Align Project, contact sara.gutterman@greenbuildermedia.com.

Project Sponsors

Rheem, JinKO Solar, Andersen, viega, ROCKWOOL, DUPONT, TOYOTA, TABUCHI ELECTRIC, DELTA, LOXONE, flo by MOEN, Trex, CORIAN DESIGN, AWAIR, accoya, Delta, FRANKE, KWC, Volte

For More Information

Visit www.greenbuildermedia.com/vision-house-the-align-project
or email Cati O'Keefe at cati.okeefe@greenbuildermedia.com