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Solar Panel Efficiency — What the Percentage Really Buys You

Why efficiency is a space number, not a savings number — and when to pay for it

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SUMMARY

The 60-Second Version

A panel's efficiency is the share of sunlight it turns into electricity — most good panels are around 20-23 percent, premium ones 24-25. The big misunderstanding is thinking higher efficiency means more savings. It does not directly: two systems that make the same total power save you the same money.

What efficiency really buys is power in less space, so it matters when your roof is small, broken up by vents and chimneys, or shaded, and barely matters on a large open roof where a few more standard panels do the job for less. Read the module (whole-panel) number, not the higher cell figure, and be wary of any pitch that sells efficiency without mentioning your roof size.

- Efficiency is a space number, not a savings number.
- Pay for it when space is tight; skip it when the roof is roomy.
- Compare module efficiency, and weigh it alongside warranty and heat behavior.

1 The Short Version

Efficiency is the solar number everyone brags about, and it is also the one most often misunderstood. In plain terms, a panel's efficiency is the share of the sunlight landing on it that it turns into electricity. A twenty-two percent panel converts twenty-two percent of that sunlight; the rest becomes a little heat.

Here is the part the brochures skip: a higher efficiency number does not directly mean lower bills or more savings. What it really buys you is power in less space. This guide explains what efficiency does and does not do, so you know when to pay for it and when to let it go.

- Efficiency is the percent of sunlight a panel turns into electricity.
- Most good modern panels are around 20 to 23 percent; premium ones reach 24 to 25.
- Higher efficiency mainly means more power per square foot — a space benefit.

- On a roomy roof, higher efficiency may change almost nothing you notice.

> **TIP**
> The single most useful thing to remember: efficiency is about fitting power into limited space. If space is not your limit, efficiency is not your priority. Keep that one idea and the rest falls into place.

2 What Efficiency Really Measures

Picture a panel as a window that catches sunlight. Efficiency is how much of that caught light it manages to convert into usable electricity. The leftover does not vanish; most becomes heat, which is why panels warm up in the sun. A twenty percent panel and a twenty-four percent panel both work; one simply converts a bit more of the same sunlight.

Crucially, efficiency does not mean one panel gets 'more sun' than another. Two panels in the same spot catch the same sunlight. The efficient one just turns more of it into power. So the benefit shows up as more watts from the same-sized panel, not as magic extra energy from the sky.

> **GOOD TO KNOW**
> Efficiency has not changed nearly as fast as prices. The reason solar got affordable is mostly cheaper manufacturing, not a huge leap in efficiency. Today's panels are more efficient than a decade ago, but the dramatic change has been cost.

3 The Big Misunderstanding

The most common mistake is believing a higher-efficiency panel will straightforwardly save you more money. It can, but only indirectly. Two systems that produce the same total power will save you the same amount, whether they got there with fewer efficient panels or more ordinary ones.

What efficiency changes is how much roof you need to reach that total power. If your roof is large, a lower-efficiency panel reaches your target using a bit more space, for less money, and saves you exactly the same. The savings come from total power produced, not from the efficiency percentage itself.

> *Efficiency is not a savings number. It is a space number. Two systems that make the same power save you the same money, however efficient the panels that got them there.*

4 When Efficiency Is Worth Paying For

There are clear cases where higher efficiency earns its price, and they all come back to space. When you cannot fit enough ordinary panels to meet your needs, efficient panels let you fit more power into the room you have.

- A small roof that cannot hold enough standard panels for your usage.
- A roof broken up by chimneys, vents, dormers, or skylights, leaving little prime space.
- Heavy shade that limits you to a few good spots you want to maximize.
- A desire to leave room for future additions on a limited roof.

TIP

The test is always the same: can you fit enough standard panels to meet your needs? If no, efficiency buys you the power you could not otherwise fit. If yes, it is optional.

5 When Efficiency Barely Matters

Just as often, efficiency is something you can happily let go of. On a generous roof, chasing the highest percentage is money spent for a difference that never reaches your electric bill.

- A large, open, well-oriented roof with plenty of room.
- A budget where the soundest value beats the highest spec.
- A case where two or three more standard panels close the gap for less money.
- Any time the efficiency upsell is not tied to a real space limit on your roof.

WATCH OUT

If a salesperson leans on efficiency without ever discussing whether your roof is tight, treat it as a flag. Efficiency only matters when space is limited. A pitch that sells the percentage in a vacuum is selling a number, not a benefit.

6 How Much Does a Few Percent Really Add?

Let us put the gap in perspective, because the numbers sound bigger than they feel. The difference between a twenty-one percent panel and a twenty-four percent panel is three percentage points. On a given roof area, that is a modest amount of extra power — welcome if you need it, barely noticeable if you do not.

The honest way to see it: that few percent might mean fitting one or two more panels' worth of power into the same space, or getting a slightly higher total from a cramped roof. It is a real gain. It is almost never the difference between solar working for you and not working for you.

Efficiency	What it mainly affects	Who should care
~20-21%	Standard power per panel	Most homes, roomy roofs
~22-23%	A bit more per panel	Moderately tight roofs

~24-25%	The most per panel	Small or broken-up roofs

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7 Cell Efficiency vs Panel Efficiency

One honest gotcha: you may see two efficiency numbers, and they are not the same. 'Cell efficiency' describes a single small solar cell in the lab. 'Panel efficiency,' sometimes called module efficiency, describes the whole finished panel, which always comes out a bit lower because of the frame, gaps, and glass.

For your roof, the panel (module) efficiency is the number that matters, because that is what actually sits up there. A sales sheet sometimes highlights the shinier cell number. It is fair to ask which one you are being shown.

GOOD TO KNOW

If a panel is advertised with an unusually high efficiency, check whether that is the cell figure or the real module figure. The module number — the whole-panel one — is the one you can compare honestly against another panel.

8 Efficiency and Hot Weather

Efficiency as printed is measured on a cool panel in a lab. In the real world, panels heat up in the sun and lose a little output when hot — the temperature effect we cover elsewhere. So a panel's everyday efficiency on a blazing roof is a touch lower than its headline number, for every brand.

This is why the temperature behavior and the efficiency work together. A panel that is both efficient and good in heat holds more of its rated output on the summer afternoons when you are running the air conditioning hardest. It is a quiet pairing worth knowing about.

TIP

If two panels have similar efficiency, the one that handles heat better will quietly out-produce the other on hot days. Efficiency is the lab number; heat behavior is part of what you actually get on the roof.

9 Efficiency Over the Years

Efficiency is not frozen; panels slowly lose a little output as they age, a process called degradation. A panel does not keep its day-one efficiency forever, but on good modern panels the yearly loss is very small, and the panel stays close to its original output for decades.

So when you compare efficiency, remember you are comparing starting points. A slightly less efficient panel that degrades very slowly may hold up as well over twenty-five years as a more efficient one that fades faster. The performance warranty is where this long-run behavior is spelled out.

GOOD TO KNOW

We have a full guide on degradation, so you do not need the details here. Just keep in mind that today's efficiency is a starting line, and how slowly the panel fades matters as much as where it begins.

10 Reading Efficiency on a Quote

When efficiency appears on a quote, a short routine keeps it in proportion. You are checking that it is a fair number and that it fits your situation, not treating it as the headline.

1. Find the panel's efficiency and confirm it is the module (whole-panel) number.
2. Decide honestly whether your roof is tight or roomy.
3. If tight, weigh efficiency more; if roomy, weigh it lightly.
4. Compare it with the warranties and heat behavior, not in isolation.
5. Resist paying a steep premium for a few percent unless space demands it.

> **WATCH OUT**
>
> A quote that sells you on efficiency alone, with no mention of your roof's size or your usage, has skipped the only question that makes efficiency matter. That is worth a pause and a plain question.

11 Does Efficiency Help in Cloudy Ohio?

A fair local question: does chasing efficiency help more in a cloudier place like Northeast Ohio? The honest answer is that efficiency works the same way here as anywhere — it determines power per square foot, in sun or cloud. It does not specially rescue a cloudy climate.

What matters more here is simply that your system is sized for our real sunshine, which a good installer already accounts for. A higher-efficiency panel in Ohio makes a bit more power per square foot than a lower one, just as it would in Arizona; the clouds affect both the same way. So the space-versus-savings rule still holds: efficiency is about fitting power into your roof, not about beating the weather.

GOOD TO KNOW

Do not let anyone sell you premium efficiency as a cure for Ohio clouds. Our weather lowers everyone's output the same amount. The way to handle a cloudier climate is correct sizing, not a pricier percentage.

12 Efficiency Is One Factor Among Several

It helps to end by putting efficiency back in its place. It is one line on a spec sheet, not the whole story. A sensible panel choice weighs several things together, and efficiency rarely deserves to be the one that decides.

Factor	How much it should weigh
Efficiency	High only if your roof is tight
Both warranties	Always important — long-term value
Heat behavior	Quietly matters every summer
Brand stability	The warranty is only as good as the company
Installer quality	Often the biggest factor of all

> *The best panel on a poorly installed system underperforms a modest panel installed well. Efficiency is worth a glance, but the people on your roof matter more than the percentage on the label.*

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13 A Short Efficiency Glossary

Keep these few terms by your quotes to hold the thread of any efficiency conversation.

- Efficiency: the percent of sunlight a panel turns into electricity.
- Module (panel) efficiency: the whole-panel number — the one that matters for your roof.
- Cell efficiency: a single lab cell's number, always higher than the panel's.
- Temperature coefficient: how much output drops as the panel heats up.
- Degradation: the small yearly loss of output over the panel's life.

TIP

If you remember only one line: efficiency buys space, not savings. Two systems that make the same power save the same money, whatever their panels' efficiency.

14 A Worked Example: Same Roof, Two Efficiencies

Efficiency is easiest to understand with a picture rather than a percentage. Imagine the exact same patch of roof and two panels that are the same physical size — one rated at 20% efficiency, one at 22%. The more efficient panel simply turns a little more of the same sunlight into electricity, so it is rated for a few more watts in the same footprint.

	20% panel	22% panel

Panel size	Same	Same
Watts per panel	~400 W	~440 W
Panels for a 7 kW system	about 18	about 16
Roof space used	a bit more	a bit less

- Higher efficiency does not make free power — it packs the same system into less roof.
- On a roomy roof, you can reach the same system size with a couple of extra cheaper panels.
- On a tight roof, the more efficient panel may be the only way to fit the size you want.

> **TIP**
> So the real question efficiency answers is not 'how much power will I get' but 'how much roof will it take.' Picture it as fitting the system into the space you have, and the percentage stops being mysterious.

15 How to Compare Efficiency Across Quotes Fairly

Comparing the efficiency numbers on two quotes sounds simple, but a couple of small things trip people up. Here is how to line them up so you are comparing like with like.

1. Find the efficiency figure on each quote or each panel's datasheet — it is a single percentage.
2. Confirm both are 'panel' (module) efficiency, not the higher 'cell' efficiency, which is a different, less useful number.
3. Check that both were measured the standard way (you will see the letters 'STC' near the number).
4. Now compare — but weigh the gap against price, warranty, and whether your roof is tight or roomy.

- A two-point efficiency gap is real but small — do not let it outweigh a big price or warranty difference.
- On a roomy roof, a slightly less efficient, cheaper panel is often the smarter buy.
- On a tight roof, paying for the higher number can be what makes your preferred size fit.

> **GOOD TO KNOW**
> Watch for quotes that advertise 'cell efficiency' to look more impressive. The number that matters for your roof is the whole-panel efficiency, which is always a little lower. Comparing one quote's cell number to another's panel number is not a fair fight.

16 Myths About Efficiency

Efficiency is the number salespeople lean on most, so it collects the most myths. Here they are, gently set straight.

- 'The highest efficiency panel is always the best buy.' No — it is only worth paying for on a tight roof or for maximum power.
- 'A more efficient panel will slash my bill further.' Not on its own — a roomier roof can reach the same output with more cheaper panels.
- 'Low efficiency means low quality.' Not necessarily — a solid, reliable panel can sit at a modest efficiency and still be an excellent value.
- 'Efficiency is useless in cloudy Ohio.' It still helps you fit the size you want; cloudy days affect all panels similarly.

> **WATCH OUT**
> If a pitch keeps circling back to one big efficiency number and glosses over price, warranty, and whether your roof even needs it, that is a sign the number is being used to sell, not to inform. Ask what the extra efficiency is costing you.

17 A Few Questions People Ask

The questions that come up most once efficiency stops being intimidating, with short honest answers.

Does higher efficiency mean the panel lasts longer?

Not directly. How long a panel lasts and how slowly it ages are about its build quality and warranty, not its efficiency percentage. A highly efficient panel with a weak warranty is not a better long-term bet than a modest one with a strong warranty.

Will a more efficient panel pay for itself?

Only sometimes. On a tight roof where it lets you fit a bigger system, it can. On a roomy roof where you could just add cheaper panels, the premium often never catches up. The roof decides more than the panel does.

What efficiency should I look for in 2026?

Mainstream quality panels sit in the low twenties in percent, and premium ones a little higher. Anywhere in that range from a reputable brand is a good panel. Chasing the very top number rarely pays unless your roof is tight.

> **TIP**
>
> If two quotes differ mainly on efficiency and you cannot tell whether the pricier one is worth it for your roof, that is exactly the kind of close call a neutral person can settle for you in a few minutes.

18 When to Call Bill

You do not have to sort any of this out alone, and there is real value in having someone with no panel to sell read a quote beside you.

I do not sell or install solar — I am the independent local tech who helps folks in Portage County, with 30-plus years of putting technology into plain English. If you are being sold hard on efficiency, I can help you see whether your roof is tight enough to need it, or whether a sensible standard panel would serve you just as well for less money.

- You are being charged a premium for high efficiency and want to know if it is worth it.
- No one has told you whether your roof is actually tight on space.
- You are confused by two different efficiency numbers on a sheet.
- You want a neutral read before paying extra for a percentage.

CHEAT SHEET

Everyday Cheat Sheet

Keep this handy when a quote starts bragging about efficiency.

I want to...	Do this...
Understand efficiency	It's the percent of sunlight turned into electricity (good panels ~20-23%)
Avoid the big mistake	Efficiency buys space, not savings; same power = same savings
Know when to pay for it	Small, broken-up, or shaded roof where you can't fit enough standard panels
Know when to skip it	Roomy roof where a few more standard panels do the job cheaper
Read the right number	Use module (whole-panel) efficiency, not the higher cell figure
Spot a weak pitch	Efficiency sold with no mention of your roof size = a number, not a benefit
Get help	Call Bill: (330) 200-8042

BEFORE YOU GO

A Note From Bill

A quick note from Bill. I write these guides to make home tech a little less frustrating, and I do my best to keep every step accurate and up to date. Still, every home, device, and setup is a bit different, so I can't promise a guide will match yours exactly or fix your particular problem. These guides are for general information only — they're not professional, legal, or financial advice, and they don't replace your device's own manual or the manufacturer's instructions. Please go slow, use your own good judgment, and use everything here at your own risk. If a step involves electrical wiring, a gas appliance, a water heater, plumbing, or climbing a ladder — or if anything just doesn't feel safe — please stop and call a licensed professional (or give me a call at 330-200-8042). Bill's Home Tech and Bill Davis can't be responsible for any damage, data loss, or injury that results.

HOW I CAN HELP

Your Visit — and My Promise

You don't have to remember all of it — just that a friendly, patient person is one call away, whenever you'd rather have a hand.

KEY SPECS

In your home — $99 flat for the first visit, no contracts and no surprises, with a 30-day come-back-free follow-up. In-home visits cover Portage County, Ohio and nearby communities.
Outside the area? Remotely — $49 for a screen-share session (free for Support Plan members, $39/mo), refundable if I can't fix it — and credited toward a visit if you'd rather have me in person. Book either at billshometech.com/book.

GOOD TO KNOW

My promise — If you're not 100% satisfied with your visit, I'll come back at no charge, or refund the full $99. No questions, no awkwardness. That's how I'd want to be treated.

Whenever you're ready, I'll come to your home anywhere in Portage County, Ohio and nearby communities, at your pace. Too far for a house call? I also help remotely. Book at billshometech.com/book or call (330) 200-8042. — Bill

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