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Home & Small Business Tech Solutions

AN EXTENDED GUIDE · NO. 2430

Updated November 2026

N-Type TOPCon vs Older P-Type (PERC) Panels — What Changed and Why It Matters

The newer mainstream panel, the older one it replaced, and how much the gap really matters

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SUMMARY

The 60-Second Version

PERC and TOPCon are both modern silicon panels. PERC is the older P-type mainstream; TOPCon is the newer N-type that has largely replaced it. TOPCon is a little more efficient, handles summer heat a bit better, and loses its power more slowly over the decades — real gains, but modest, not night and day.

Because factories have switched over, TOPCon is often now the standard price, not a luxury, so if it costs little more, take it. But a good PERC panel from a reputable brand with a strong warranty is still a sensible, often cheaper choice. The installer's quality and the warranties matter more than the acronym.

- TOPCon (N-type) = the newer mainstream; PERC (P-type) = the proven older one.
- The real-world gap is small for most homes.
- Don't overpay on the TOPCon name; let price and warranties settle a close call.

1 The Short Version

You may see two acronyms on solar quotes — PERC and TOPCon — and be asked, or quietly nudged, to choose between them. Both are kinds of modern silicon panels, and the short story is that TOPCon is the newer mainstream and PERC is the older one being phased out. Neither is a bad panel, and you do not need to fear this choice.

This guide explains what the two really are, what actually changed between them, and why it matters a little — but probably less than a salesperson implies. You will leave knowing which is the forward-looking choice and when PERC is still a perfectly fine, often cheaper, option.

- PERC is the older mainstream panel; TOPCon is the newer one that has largely replaced it.
- TOPCon is a bit more efficient, handles heat slightly better, and degrades a touch slower.
- The differences are real but modest for most homes — not night and day.

- PERC at a good price can still be a sensible, honest choice.

> **TIP**
> If a quote offers TOPCon, you are getting the current mainstream, and that is a fine default. If it offers PERC at a lower price, that is not a trick — it is the previous generation, still solid, usually cheaper.

2 P-Type and N-Type, Without the Chemistry

The deepest difference hides behind two letters you will sometimes see: P-type and N-type. These describe how the silicon is treated when the panel is made. PERC panels are the common P-type; TOPCon panels are N-type. You do not need to know what the letters stand for to understand what they buy you.

The practical upshot is that N-type silicon, used in TOPCon, tends to lose less power over the years and handle heat and certain aging effects a little better. That is the real reason the industry has been moving from P-type PERC toward N-type TOPCon — not a gimmick, but a genuine step forward.

> **GOOD TO KNOW**
> You will hear "N-type" used almost as a badge of newness on quotes. It is a fair shorthand: N-type panels like TOPCon are the current generation, and P-type PERC is the one on its way out. That is all the letters really signal to you.

3 What PERC Actually Is

PERC was itself a big improvement in its day. It added a reflective layer at the back of the cell so light that would have escaped gets a second chance to be absorbed. For most of the last decade, PERC was simply what a good home panel was, and millions of them are quietly working on roofs right now.

So when you hear PERC spoken of as "old," keep perspective. It is old only in the way last year's reliable car is old. A PERC panel from a reputable brand is a proven, dependable product, not a relic — it is just no longer the newest design.

- Added a back reflective layer to capture more light — a real advance in its time.
- The mainstream home panel for roughly a decade.
- Still on millions of working roofs and still sold, often at a lower price.
- Proven and dependable, just not the current generation.

4 What TOPCon Changed

TOPCon adds a thin, carefully made layer that reduces small energy losses inside the cell, built on the better-aging N-type silicon. The result is a panel that is a little more efficient, holds up a touch better in heat, and tends to lose its power more slowly over the decades.

None of these gains is dramatic on its own. Together, over twenty-five or thirty years, they add up to a modest but genuine edge — a bit more power from the same roof and a bit more of it still there late in the panel's life. That steady, long-run advantage is why TOPCon became the new default.

	PERC (older)	TOPCon (newer)
Silicon type	P-type	N-type
Efficiency	Slightly lower	Slightly higher
Heat behavior	Good	A little better
Yearly power loss	A little faster	A little slower
Status in 2026	Being phased out	Mainstream

TIP

Think of TOPCon's advantages as small interest that compounds over decades, not a jackpot. Each one is minor; the sum, spread over the life of the system, is worth having when the price is close.

5 How Much Does the Difference Really Matter?

Here is the honest part a sales pitch may skip. The gap between a good PERC panel and a good TOPCon panel is real but not large. For most homes, the choice between them will not make or break whether solar is worth it, and it is a smaller factor than the installer's quality or the overall price.

That means you should neither dismiss TOPCon as marketing nor pay a wild premium for it. If TOPCon is offered at a fair price — and it increasingly is the standard price, not a luxury — take it. If PERC saves you a meaningful amount, it remains a perfectly respectable choice.

> *TOPCon is the better panel, and also the new normal. But a good installer putting good PERC panels on your roof beats a poor installer putting the fanciest panels on it. The people matter more than the acronym.*

6 Why the Industry Switched

Understanding why the whole market moved helps you trust that TOPCon-as-default is not hype. Manufacturers did not switch to sell you something; they switched because the economics and performance both tipped.

- N-type TOPCon ages more gracefully, which matters for 25-to-30-year warranties.

- Factories retooled, so TOPCon is now made at scale and priced like the standard.
- The efficiency edge means slightly fewer panels for the same power.
- Better heat behavior suits real rooftops, which run hot in summer.

GOOD TO KNOW

Because factories have largely switched over, TOPCon is often no longer a pricey upgrade — it is simply what is being made now. In many quotes, choosing TOPCon costs little or nothing extra over what PERC would have cost a couple of years ago.

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7 When PERC Is Still the Right Call

PERC is not something to avoid. There are sensible situations where it is the better-value choice, and knowing them keeps you from overpaying for a marginal gain.

- The PERC quote is meaningfully cheaper and your roof has room to spare.
- You are expanding or repairing an existing PERC system and want to match it.
- A reputable installer offers quality PERC panels with strong warranties at a good price.
- Your priority is the lowest sound price, not squeezing the last few percent of output.

WATCH OUT

The one thing to check either way is the warranty. A newer TOPCon panel with a weak warranty is not automatically better than a PERC panel with a strong one. Let the warranties, not just the acronym, guide a close call.

8 What the Gap Looks Like Over 25 Years

It can help to picture the difference in concrete terms rather than decimals. Imagine two similar systems on two similar roofs, one with quality PERC panels and one with quality TOPCon panels, both from reputable brands. For the first several years they will perform so closely that you would struggle to tell them apart on your electric bill.

The TOPCon system will pull a little ahead in two quiet ways: it makes a touch more power on hot summer days, and it loses its output slightly more slowly year after year. By the far end of the warranty, the TOPCon panels are likely still making a few percent more of their original power. Over decades that adds up to a modest bonus — real, worth having when the price is close, but not the kind of gap that decides whether solar makes sense for you.

- Early years: nearly identical output; you would not notice a difference.
- Hot summers: TOPCon holds a little more power when the roof bakes.
- Later years: TOPCon has usually lost less of its original output.
- Over 25-30 years: a modest, steady edge for TOPCon — nice, not decisive.

> **GOOD TO KNOW**
>
> This is why the honest framing is 'TOPCon is a bit better and now the default,' not 'TOPCon is a different league.' If a pitch makes the gap sound enormous, this picture is a useful reality check.

9 Spotting an Overblown Pitch

Because TOPCon is the current buzzword, it is sometimes used to justify a price that does not match the real advantage. A few phrases should make you pause and ask for specifics.

- "TOPCon is twice as good" — it is not; the gains are modest.
- A large price jump "because it's N-type" — ask exactly what you get for the extra money.

- Dismissing all PERC as "obsolete junk" — it is proven, working technology.
- Pressure to decide today to "lock in" TOPCon — reputable installers do not rush you.

WATCH OUT

If someone is charging a steep premium purely on the TOPCon name, that is a fair thing to question — or to have a neutral person question for you. The technology is good; the pitch around it is sometimes stretched.

10 A Note on Warranties by Type

The move to N-type TOPCon arrived alongside longer warranties, and the two are connected. Because N-type silicon tends to age more gracefully, makers grew confident enough to promise more — often a twenty-five-year product warranty and a performance guarantee stretching to thirty years with very little power lost.

That does not mean every TOPCon panel has a great warranty or every PERC panel has a weak one. But as a rough pattern, the newer panels often carry the stronger paperwork, and the warranty is where that long-run advantage becomes a promise you can hold the company to.

Warranty	Older PERC era	Newer TOPCon era
Product (defects)	Often 10-15 years	Often 25 years
Performance (output)	25 years, more power lost	25-30 years, very little lost

TIP

When comparing a PERC quote to a TOPCon quote, lay the warranties side by side. Sometimes the warranty gap is the clearest, most concrete version of the difference — easier to judge than the efficiency decimals.

11 Does TOPCon Pair With Other Features?

You may see TOPCon mentioned alongside other terms, and it helps to know they are not competing choices but features that can stack. This keeps you from thinking you must pick just one good thing.

- Bifacial: many TOPCon panels can also catch light on their back side, useful on ground mounts.
- All-black looks: TOPCon panels come in the sleek all-black style if appearance matters.
- Higher efficiency tiers: TOPCon spans a range, so there are value and premium versions.
- Strong warranties: as above, newer TOPCon panels often carry the longest guarantees.

> **GOOD TO KNOW**
>
> So "TOPCon" is not one single product; it is a modern family with value and premium members. Asking the brand and model, and the warranty, tells you far more than the word TOPCon alone.

12 A Short Checklist Before You Choose

When a close call between PERC and TOPCon lands in front of you, walk this short list and let it decide calmly.

1. Note which type each quote offers, and the price difference between them.
2. Compare the warranties — product and performance — not just the panel type.
3. Consider your roof space: tight favors the more efficient TOPCon; roomy eases the pressure.
4. Weigh the installer's reputation above the acronym on the panel.
5. If TOPCon costs little more, take it; if PERC saves real money, it is a fine choice.

TIP

There is no wrong answer here that will haunt you. Both are good modern panels. The decision deserves a few minutes of calm comparison, not weeks of worry.

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13 Words You'll Hear on a Quote

Solar quotes sprinkle in a handful of terms that sound technical but mean simple things. Here is a plain-English glossary so none of them can be used to hurry or confuse you. You do not need to memorize these — just knowing they are ordinary words, not warnings, takes the pressure off.

Word on the quote	What it really means
P-type / N-type	How the silicon is treated. P-type is the older PERC family; N-type is the newer TOPCon family.
PERC	The proven older mainstream panel. Not bad — just last-generation.
TOPCon	The newer mainstream panel. A little better, now the normal choice.
Degradation	How much power a panel quietly loses each year as it ages.
Bifacial	A panel that can also catch light bouncing onto its back side.

Monocrystalline	The single-crystal silicon both PERC and TOPCon use. A quality sign, not a brand.

GOOD TO KNOW

If a salesperson uses one of these words as if it settles the whole decision, slow down. Every one of them is just a description of the panel, not a reason to pay more or sign today.

14 A Plain-English Example With Real Numbers

Numbers make this easier to feel. Picture a typical home system of about 7 kilowatts — roughly sixteen modern panels, since a panel today is commonly rated around 430 watts. In our part of Ohio a system that size makes somewhere in the neighborhood of eight thousand kilowatt-hours in its first year.

Now put a quality PERC version and a quality TOPCon version side by side. In year one they make almost exactly the same power. The difference shows up only in how gently each ages. Good TOPCon loses about four-tenths of a percent a year; good PERC loses about half a percent. That is a sliver, but it compounds quietly over twenty-five years.

	Quality PERC	Quality TOPCon
Year-one output	~8,000 kWh	~8,000 kWh (about the same)
Yearly power loss	~0.5% a year	~0.4% a year
Still making at year 25	around 87% of year one	around 90% of year one

- For the first several years, your electric bill would not reveal which panels you have.
- By the far end of the warranty, TOPCon is typically still making a few percent more of its original power.
- That is a modest, steady bonus over decades — worth having when the price is close, not a reason to overpay.

GOOD TO KNOW

These are planning figures, not promises. The honest way to get a number for YOUR roof is a free tool called PVWatts (run by the U.S. government lab NREL) or an installer's estimate for your exact address. If you would like, I can run it with you.

15 How to Tell Which You're Being Offered

You do not have to take anyone's word for which panel is on your quote. Every proposal names a specific brand and model, and from that you can confirm the type in a minute or two.

1. Find the panel's brand and model number on the quote — something like a maker's name followed by a model code and a wattage.
2. Type that model into a search along with the word 'datasheet.' The maker's own one-page sheet will open.
3. Look near the top for the words 'TOPCon,' 'N-type,' or 'PERC' / 'P-type.' One of them is almost always printed right there.
4. Note the wattage and the warranty years while you are looking — you will want those for any comparison.

- If you see 'N-type' or 'TOPCon,' you are being offered the current mainstream — a fine default.
- If you see 'PERC' or 'P-type,' it is the proven older generation, usually at a lower price.
- If the quote names no model at all, that itself is worth questioning before you sign.

WATCH OUT

Be wary of any quote that will not tell you the exact panel brand and model. A reputable installer always names it. 'A good 430-watt panel' with no maker is not something you can check — and anything you cannot check, you should not pay a premium for.

16 Common Myths and Mix-Ups

A few tidy-sounding claims float around this topic. Here they are, gently corrected, so none of them can push you toward a decision that is not yours.

- 'PERC is obsolete junk.' No — it is proven, dependable, still-sold technology, just not the newest.
- 'TOPCon is a completely different kind of panel.' It is still ordinary silicon; the change is a refinement, not a revolution.
- 'N-type doubles your power.' It does not. The real gap is small — a few percent over decades.
- 'You must decide today to lock in TOPCon.' You never must decide today. Pressure to hurry is the warning sign, not the panel.

> **GOOD TO KNOW**
>
> Notice that every myth points the same direction — toward paying more, faster. That tilt is the thing to watch. The technology itself is genuinely good and does not need a hard sell.

17 A Few Questions People Ask

These are the questions that come up most once the acronyms stop being scary. Short, honest answers follow.

Will I even notice the difference on my electric bill?

Honestly, no — not in any year you could point to. The advantage is spread so thinly across decades that it never shows up as a moment you would feel.

Should I wait for the next big thing after TOPCon?

There is always a next thing. TOPCon is the solid, affordable mainstream right now, and waiting mostly means paying today's electric bills while you wait. Buy when it makes sense for you, not when the technology stops improving — it never will.

Is a cheaper PERC quote a trick?

Usually not. It is simply the previous generation at a lower price. If it comes from a reputable installer with a strong warranty and your roof has room, it can be the better value.

> **TIP**
> If any answer on your own quote does not match these, that is a perfect thing to bring to a neutral person before you sign. You are allowed to take your time.

18 When to Call Bill

PERC versus TOPCon is a small, friendly decision once you see it clearly, but a sales pitch can make it feel larger and more urgent than it is. If you are being pushed hard toward one, or charged a premium you are not sure is fair, a neutral read helps.

I do not sell or install solar — I am the independent local tech who helps people in Portage County understand what is in front of them, with 30-plus years of translating this kind of thing into plain English. I am glad to look at your quotes, tell you honestly whether the TOPCon premium is worth it for your roof, and make sure the warranties back up whatever you choose.

- You are being charged a big premium "because it's TOPCon" and want a neutral check.
- A salesperson is dismissing a cheaper PERC option you were considering.
- You cannot tell which type your quotes are even offering.
- You simply want a clear, unbiased read before you decide.

CHEAT SHEET

Everyday Cheat Sheet

Keep this handy when a quote mentions PERC, TOPCon, or 'N-type.'

I want to...	Do this...
Know the newer choice	TOPCon (N-type) — the 2026 mainstream; a fine default
Understand PERC	Older P-type mainstream; proven, still sold, usually cheaper
Know what changed	TOPCon: a bit more efficient, better in heat, slower yearly power loss
Keep perspective	The gap is real but modest — installer and price matter more
Decide a close call	If TOPCon costs little more, take it; if PERC saves real money, it's fine
Spot an overblown pitch	Big premium 'because it's N-type,' or calling all PERC junk = ask for specifics
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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