

DON'T GET SCAMMED BUYING SOLAR IN NIGERIA

Know Your Exact KVA Needs in 15 Minutes



By Jonathan Onovo, Founder, Eccentric Solar Limited

INTRODUCTION



You've probably already gotten three quotes.

One installer said ■3 million. Another said ■6 million. A third said ■8 million. All three were describing what sounded like the same job — solar for your home or your office.

Nobody explained why the numbers were so far apart.

If you're sitting with that confusion right now — three different prices, three different confident salesmen, and no clear way to know who's telling you the truth — I built this guide for exactly that moment.

My name is Jonathan Onovo. I'm the founder of Eccentric Solar Limited, a registered and certified solar company based in Abuja, with a store in Lokoja as well. We design and install residential and office solar systems, we run energy audits and consultancy, and we have a trained team of technicians we deploy for every contract we take on.

I've sat across the table from hundreds of clients doing one specific exercise: helping them figure out what they actually need powered, before anyone quotes them a single naira. Almost every time, once we do that exercise honestly, two things happen. The price comes down to something they can actually afford. And the system we eventually install actually carries the load, instead of collapsing under it six months later.

This guide is that same exercise, written so you can do it yourself — before you talk to me, before you talk to any installer, before you send a single deposit to anyone.

Here's what you'll walk away with by the end of this guide:

- Your own real, calculated KVA number — for your home, your office, or both
- A way to instantly tell if a vendor's quote is honest or inflated
- A checklist to vet any installer before you pay them anything
- A simple system to compare multiple quotes side by side
- A realistic projection of how much your NEPA bill could actually shrink
- The early warning signs that a system was undersized or a component is failing
- What actually causes solar-related electrical fires, and how correct cable, breaker, surge protection, lightning arrestor, and earthing work prevents it
- How Nigeria's dust, rainy season, and roof conditions affect real performance, and how a properly planned installation accounts for it
- Clear guidance whether you're a homeowner, a tenant, a landlord, or managing this purchase for family from a distance

You don't need to be technical for any of this. You need about 15 minutes, your last NEPA bill or meter token, and a willingness to be honest with yourself about what you actually use every day — not what you wish you could run.

Let's start.

CHAPTER 1: NEEDS VS. WANTS — THE EXERCISE THAT CHANGES EVERYTHING



Why Your Quotes Don't Match

Here's something most installers won't tell you plainly: a "5KVA system that powers your whole house" and a "5KVA system that powers your fan, TV, fridge, and lights" are two completely different promises — even though they use the exact same number.

The difference isn't the size of the system. It's what you're asking it to carry.

Solar sizing is arithmetic, not guesswork. Every appliance in your home or office has a wattage rating, and every hour you run it adds to what your system has to supply that day. The formula behind every honest solar quote is simple:

Wattage × Hours of use = Watt-hours needed per day

Add up every appliance you plan to run, multiply each by how long you'll run it, and you get your real daily energy requirement. That number — not a salesman's confidence, not an advert's promise — is what should determine your system size.

The problem is almost never the arithmetic. The problem is what goes into it. Most people, when asked "what do you want to power," answer with everything in the house. Every socket. Every AC unit. The freezer, the pumping machine, the entertainment system, all of it — at the same time, all day.

That's not a needs list. That's a wants list. And here's the part that costs people millions of naira: the moment you try to size a system for every want simultaneously, the cost multiplies fast, because you're not just adding appliances — you're adding hours of simultaneous demand on top of each other.

The Exercise

Before you get quoted, before you set a budget, you need two separate lists.

Your NEEDS list is what actually matters to you daily — the things that, if they stopped working, would genuinely disrupt your day. For most people this is: lighting, fans, a phone/laptop charging point, a television, and a refrigerator. For remote workers, it usually includes an air conditioner during work hours. For offices, it's the equipment that runs during core business hours specifically.

Your WANTS list is everything else — things that would be nice to have powered but that you could live without for now, or that you could add later once your needs are solidly covered. A chest freezer you rarely open. A second AC unit in a guest room. A washing machine you use twice a week.

Here's the honest truth about this exercise, from years of doing it with real clients: almost everyone starts with a wants list disguised as a needs list. The moment we separate the two and put a real cost next to the full wants list, most people scale back on their own — not because I convinced them, but because the number finally made sense to them.

YOUR NEEDS VS. WANTS WORKSHEET

Grab a pen. Fill this in honestly — not what you'd like to say you need, what you actually rely on every single day.

Step 1 — List everything you currently want powered by solar.

Write down every single appliance or piece of equipment you're thinking about, with no filtering yet:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Step 2 — Sort each item into NEEDS or WANTS using this test:

Ask yourself honestly: *"If this stopped working for a week, would my daily life or work genuinely be disrupted — or would I just be mildly inconvenienced?"*

If the honest answer is "genuinely disrupted" — it's a NEED. If the honest answer is "mildly inconvenienced" or "it would just be nice" — it's a WANT.

MY NEEDS:

1. _____
2. _____
3. _____
4. _____
5. _____

MY WANTS:

1. _____
2. _____
3. _____
4. _____
5. _____

Step 3 — Be honest about the pattern.

If your NEEDS list has more than 6-7 items on it, go back through it one more time. In our experience, once people are being fully honest, most households have somewhere between 4 and 7 genuine daily needs — not 12 or 15. If your list is long, some of those items are wants wearing a needs costume.

THE QUICK WIN: YOUR FIRST REAL NUMBER (15–20 MINUTES)

Now let's turn your NEEDS list into an actual number — the number that should be driving your solar conversation, not the salesman's number.

Below is a reference table with realistic wattage ranges for the appliances that show up on almost every Nigerian household's needs list. These are typical ranges — always check the actual nameplate/sticker on your own appliance where possible, since wattage varies by brand and model.

Common Household Appliance Wattages (Reference)

Appliance	Typical Wattage
LED bulb (per bulb)	8–12W
Standing/ceiling fan	60–80W
LED television (32"–43")	60–100W
Laptop (charging)	45–65W
Phone charger	5–10W
Refrigerator (running average)	150–300W
Chest freezer (running average)	200–400W
1HP split AC unit	750–900W
1.5HP split AC unit	1,100–1,500W
Water pump (small, domestic)	750–1,100W

Now do the math for your NEEDS list only:

Appliance: _____	Wattage: _____	Hours/day: _____	= Watt-hours: _____
Appliance: _____	Wattage: _____	Hours/day: _____	= Watt-hours: _____
Appliance: _____	Wattage: _____	Hours/day: _____	= Watt-hours: _____
Appliance: _____	Wattage: _____	Hours/day: _____	= Watt-hours: _____
Appliance: _____	Wattage: _____	Hours/day: _____	= Watt-hours: _____

TOTAL DAILY WATT-HOURS NEEDED: _____

A worked example, so you can see it in practice:

A remote worker running 4 LED bulbs (10W × 6 hours), a ceiling fan (75W × 8 hours), a laptop (55W × 8 hours), a fridge (200W running average × 24 hours, cycling), and a TV (80W × 4 hours) comes out to roughly:

- Bulbs: $40W \times 6h = 240Wh$
- Fan: $75W \times 8h = 600Wh$
- Laptop: $55W \times 8h = 440Wh$
- Fridge: $200W \times 24h = 4,800Wh$
- TV: $80W \times 4h = 320Wh$
- **Total: roughly 6,400Wh (6.4kWh) per day**

That number — not "power my whole house" — is what an honest installer should be sizing a system against, with battery capacity and panel output built around it, plus a reasonable safety margin (installers typically add 20–25% on top of your real number to account for real-world losses — this is normal and expected, not a sign of overselling).

Your "aha" moment: If you already have a quote in hand, compare the system size it recommends against your own NEEDS-based number. If the gap is large, you now know exactly why — and exactly what question to ask the installer next: *"Walk me through what load you sized this for."*

What Comes Next

You now have your real number for your NEEDS. In the next chapter, we'll go deeper into how solar sizing actually works — panels, batteries, and inverters — so that when an installer explains their recommendation, you understand exactly what they're telling you, instead of nodding along.

If you run an office or a small business, keep this worksheet — you'll use the same method again in Chapter 4, adapted specifically for office equipment and working hours.

CHAPTER 2: HOW SOLAR SIZING ACTUALLY WORKS



Three Numbers, Not One

Every time someone tells me "I want a 5KVA system," I ask them one question: 5KVA of what, running for how long, and stored where?

Most buyers only ever hear one number in a solar conversation: the KVA rating of the inverter. But an honest solar system is really three separate numbers working together, and understanding the difference is what lets you catch an inflated or mismatched quote before you pay for it.

Number 1: The Inverter (measured in KVA or kW) This is the gatekeeper. It converts the DC power stored in your batteries into the AC power your appliances actually use, and it has a hard ceiling on how much load it can carry at any one instant. If you switch on more appliances at once than the inverter can handle, it doesn't try harder. It trips, shuts down, or throws an error.

This is the number most vendors advertise loudly, because it sounds impressive. It is also the number that says the least about whether your daily life will actually be comfortable.

Number 2: The Battery Bank (measured in kWh) This is your storage tank. It is how much total energy you have available to draw down over a day or night, not how fast you can draw it. A large inverter attached to a small battery bank is like a wide tap connected to a small drum of water. It can pour fast, but it runs dry quickly.

This is the number that determines how long your needs list from Chapter 1 can actually run once the sun goes down, especially overnight.

Number 3: The Solar Panels (measured in watts of generation capacity) This is your daily refill. Panels only generate power during usable daylight, realistically four to six hours of strong generation in most parts of Nigeria even on a sunny day. If your panel capacity is too small for your battery bank and daily usage, you drain your batteries faster than they refill, and within a few days you are back to rationing power.

Why "5KVA Powers Your Whole House" Can Be True and Still Misleading

A 5KVA inverter genuinely can power a fridge, a few fans, some lights, a TV, and an AC. Usually not all of them switched on together for extended hours, and often not for long once the battery bank underneath it is undersized.

The claim is not a lie about the inverter's rating. It is a misleading silence about the other two numbers, the battery capacity and the panel size, that actually determine whether your day to day experience matches the promise.

This is why your NEEDS number from Chapter 1 matters. A trustworthy installer sizes all three components around your real daily watt-hour requirement, with a sensible safety margin. An installer chasing a quick sale often quotes an impressive inverter size and stays vague about battery and panel capacity, because that is where the real cost and the real limitations live.

The Real-World Losses Nobody Mentions

Even a correctly sized system does not run at textbook efficiency, and a good installer accounts for this upfront:

- Battery depth-of-discharge limits: most batteries should not be drained fully and regularly without shortening their lifespan, so usable capacity is typically 60 to 90 percent of the rated total, depending on battery type.
- Inverter conversion losses: some energy is lost as heat converting DC to AC, typically 5 to 10 percent.
- Panel derating: dust, heat, cloud cover, and imperfect roof angles usually reduce real-world panel output below the ideal number printed on the panel.

This is why installers build in a safety margin, usually an extra 20 to 25 percent on top of your calculated need, and why two seemingly identical quotes can differ so much depending on whether that margin was honestly applied.

The One Question That Changes Every Vendor Conversation

Once you understand these three numbers, one question separates an honest installer from an oversell:

"Can you break down the inverter size, the battery capacity, and the panel wattage separately, and tell me what daily load in watt-hours you sized this system for?"

A vendor who answers clearly, with numbers that roughly match your own Chapter 1 calculation plus a reasonable margin, is doing honest work. A vendor who deflects or only wants to talk about the inverter's

KVA rating is a reason to slow down and ask more before you commit.

What Comes Next

You now understand why two "5KVA" quotes can behave completely differently. In the next two chapters, you'll turn this understanding into your own real numbers, first for your home in Track A, then for your office or business in Track B. By the end of Chapter 4, you won't just understand solar sizing in theory, you'll have a specific figure in your hand that no vendor can talk you out of.

CHAPTER 3: HOME LOAD CALCULATOR (TRACK A)



From Rough Estimate to Real Number

In Chapter 1, you did a quick version of this exercise with five items, just to get a feel for the math. Now we do it properly: every appliance on your NEEDS list, a full wattage reference table, and both numbers a vendor needs to size your system honestly: your daily energy requirement and your peak simultaneous load.

These are two different questions, and a lot of buyers only ever think about one of them:

- Daily energy requirement (measured in watt-hours) answers: "How much total power do I use in a day?" This determines your battery and panel size.
- Peak simultaneous load (measured in watts, then converted to VA) answers: "What is the most I will ever need all at once?" This determines your inverter size.

A system sized only for daily total, ignoring peak load, will constantly trip when you switch several things on together. A system sized only for peak load, ignoring daily total, will run out of stored power by evening. You need both numbers, and this worksheet gives you both.

FULL HOME APPLIANCE WATTAGE REFERENCE

Use these as a starting point. Where you can, check the actual sticker or nameplate on your own appliance, since printed wattage can vary by brand, age, and size.

Appliance	Typical Wattage
LED bulb	8–12W
Standing fan	60–75W
Ceiling fan	60–80W
LED TV (32"–43")	60–100W
LED TV (50"+)	120–180W
Laptop (charging)	45–65W
Phone charger	5–10W
Wi-Fi router/modem	10–20W
Refrigerator (running average)	150–300W
Chest freezer (running average)	200–400W
Microwave	900–1,300W
Electric kettle	1,000–1,500W
Blender	300–500W
Iron (electric)	1,000–1,500W
Washing machine	400–800W (up to 2,000W on heating cycle)
Water pump (small domestic)	750–1,100W
1HP split AC	750–900W
1.5HP split AC	1,100–1,500W
2HP split AC	1,500–1,900W
Security/compound light	20–60W
CCTV system (DVR + 4 cameras)	30–60W

YOUR HOME LOAD CALCULATOR WORKSHEET

Part 1: Daily Energy Requirement

For every item on your NEEDS list, fill in wattage and realistic hours of use per day:

Appliance	Wattage(W)	Hours/day	Watt-hours(Wh)
_____	_____	_____	_____

TOTAL DAILY Wh: _____

Convert to kWh by dividing by 1,000. For example, 6,400Wh equals 6.4kWh per day.

Part 2: Peak Simultaneous Load

Now think about your "worst normal moment", the point in your day when the most things are realistically running at once. For most homes, this is evening: lights on, TV on, fan on, fridge cycling, maybe an AC running.

List only the items that would genuinely be on together at that one moment:

Appliance running simultaneously	Wattage(W)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

TOTAL SIMULTANEOUS WATTS: _____

To convert watts to VA, the unit inverters are rated in, divide by a typical power factor of 0.8:

Simultaneous Watts ÷ 0.8 = Required VA

Then add a 20 to 25 percent safety margin on top, since this is what a professional installer would do to account for real-world losses covered in Chapter 2:

Required VA × 1.25 = Recommended Inverter Size

A WORKED EXAMPLE

A household running six LED bulbs (10W × 5 hrs), a ceiling fan (75W × 10 hrs), a fridge (200W × 24 hrs), a TV (90W × 5 hrs), a laptop (55W × 6 hrs), a router (15W × 24 hrs), and a 1.5HP AC (1,300W × 8 hrs, evening only).

Daily Energy Requirement:

- Bulbs: 60W × 5h = 300Wh
- Fan: 75W × 10h = 750Wh
- Fridge: 200W × 24h = 4,800Wh
- TV: 90W × 5h = 450Wh
- Laptop: 55W × 6h = 330Wh
- Router: 15W × 24h = 360Wh
- AC: 1,300W × 8h = 10,400Wh

- Total: 17,390Wh, approximately 17.4kWh per day

Peak Simultaneous Load (evening, everything but the AC's full runtime overlapping with lights, fan, TV, fridge cycling):

- Bulbs (60W) + Fan (75W) + Fridge (200W) + TV (90W) + AC (1,300W) = 1,725W
- $1,725W \div 0.8 = 2,156VA$
- $2,156VA \times 1.25$ (margin) = approximately 2,700VA recommended inverter size

So this household's honest numbers are roughly 17.4kWh per day of battery and panel capacity needed, and an inverter in the 2.5 to 3KVA range, not the 5KVA "whole house" package a vendor might push by default, and not an undersized 1KVA unit either. This is what a fair quote should reflect.

What To Do With Your Two Numbers

Once you have your daily Wh and your recommended VA, you are ready to hold any vendor's quote to account:

- If their inverter size is far above your calculated VA, ask what additional load they are accounting for. There may be a legitimate reason, such as future expansion or a specific high-draw appliance, or there may not be.
- If their battery and panel sizing seems to ignore your daily Wh entirely, that is a sign the quote was not built around your actual usage.

What Comes Next

If you run a home only, you can move straight to Chapter 5 (NEPA Bill Reduction) and Chapter 6 (Vendor Vetting Checklist). If you also run, or are sizing for, an office or small business, Chapter 4 walks through the same exercise adapted for business equipment and working hours.

CHAPTER 4: OFFICE & BUSINESS LOAD CALCULATOR (TRACK B)



Why Offices Need a Different Calculation

If you are sizing solar for an office, shop, or small business rather than a home, the calculation method is identical to Chapter 3, but one assumption changes completely: your hours of use.

A home runs its fridge 24 hours a day, whether anyone is awake or not. An office does not run its computers, printers, and air conditioners at 2am. This single difference is why using a home-style "24 hour thinking" to size a business system almost always leads to an inflated, overpriced quote, and why using a home installer's default assumptions on a business job is one of the most common sizing mistakes I see.

The good news is this makes your real number smaller and more affordable than most business owners expect, once you size it around actual working hours instead of a full day.

FULL OFFICE & BUSINESS EQUIPMENT WATTAGE REFERENCE

Equipment	Typical Wattage
Desktop computer (tower + monitor)	150–250W
Laptop (charging)	45–65W

Equipment	Typical Wattage
LED office lighting (per fixture)	15–30W
Standing/ceiling fan	60–80W
1HP split AC	750–900W
1.5HP split AC	1,100–1,500W
2HP split AC	1,500–1,900W
Photocopier/printer (active use)	300–600W
Photocopier/printer (standby)	20–50W
Water dispenser (hot/cold)	400–600W
Wi-Fi router/modem	10–20W
POS machine/card reader	10–20W
Small chest freezer (shop/cold room use)	200–400W
CCTV system	30–60W

YOUR OFFICE LOAD CALCULATOR WORKSHEET

Part 1: Daily Energy Requirement, Based on Real Working Hours

Only count hours the equipment is actually switched on and in use during your business day, not 24 hours:

Equipment	Wattage(W)	Working Hours/day	Watt-hours(Wh)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

TOTAL DAILY Wh (working hours only): _____

Part 2: Peak Simultaneous Load During Business Hours

Think about your busiest hour of the day, when the most equipment is running together, typically mid-morning to early afternoon:

Equipment running simultaneously	Wattage(W)
_____	_____
_____	_____
_____	_____
_____	_____

TOTAL SIMULTANEOUS WATTS: _____

Same conversion as before:

$\text{Simultaneous Watts} \div 0.8 = \text{Required VA}$ $\text{Required VA} \times 1.25 = \text{Recommended Inverter Size}$

A WORKED EXAMPLE

A small office running 3 desktop computers (200W × 8 hrs each), 6 LED lights (20W × 9 hrs), a 1.5HP AC (1,300W × 8 hrs), a printer (400W active, roughly 2 hrs of active printing plus 6 hrs standby at 30W), and a water dispenser (500W, cycling roughly 4 hrs equivalent active use per day).

Daily Energy Requirement (working hours only):

- Computers: $3 \times 200\text{W} \times 8\text{h} = 4,800\text{Wh}$
- Lights: $6 \times 20\text{W} \times 9\text{h} = 1,080\text{Wh}$
- AC: $1,300\text{W} \times 8\text{h} = 10,400\text{Wh}$
- Printer: $(400\text{W} \times 2\text{h}) + (30\text{W} \times 6\text{h}) = 800\text{Wh} + 180\text{Wh} = 980\text{Wh}$
- Water dispenser: $500\text{W} \times 4\text{h} = 2,000\text{Wh}$
- Total: 19,260Wh, approximately 19.3kWh per working day

Peak Simultaneous Load (mid-morning, everything running together):

- Computers ($3 \times 200\text{W} = 600\text{W}$) + Lights ($6 \times 20\text{W} = 120\text{W}$) + AC (1,300W) + Printer active (400W) + Water dispenser (500W) = 2,920W
- $2,920\text{W} \div 0.8 = 3,650\text{VA}$
- $3,650\text{VA} \times 1.25$ (margin) = approximately 4,560VA recommended inverter size

This office's honest numbers are roughly 19.3kWh per working day of capacity needed, and an inverter in the 4.5 to 5KVA range, sized specifically around an 8 to 9 hour working day, not a 24 hour assumption. This is a meaningfully smaller and cheaper system than what a home-style quote would produce for the same equipment list, because it correctly excludes the 15+ hours per day the office is closed.

Letting the Sun Pay the Bills: Why Oversizing Panels, Not Batteries, Cuts Cost for Businesses

Here is a sizing strategy worth understanding before you accept any quote, because it can meaningfully lower what you pay without lowering what your system delivers.

Of the three components covered in Chapter 2, batteries are consistently the most expensive per unit of capacity, and the component that wears out fastest through repeated charge and discharge cycles. Panels, by comparison, are the cheapest capacity you can buy, and they have no moving parts to degrade the way batteries do.

For a home, this trade-off is limited, because a home still needs power overnight when there is no sun, which means it still needs a battery bank sized to cover those dark hours regardless of how many panels you add.

For an office or business that operates mainly during daylight hours, this changes the entire equation. If your working hours largely overlap with strong sun hours, roughly 9am to 5pm, you can deliberately oversize your panel array so it generates more than enough power to run your equipment directly, in real time, while the sun is out. The battery bank's job shrinks from "store an entire day's energy" to "cover the short gaps": early morning before the sun is strong, brief cloud cover, and perhaps an hour or two after closing.

Why this lowers your cost:

- A smaller battery bank costs less upfront than a large one, often the single biggest cost reduction available in the entire system.
- A smaller battery bank cycles less deeply and less often, since most of the day's load is being carried directly by the panels rather than pulled from storage, which extends the battery's usable lifespan.
- The additional panel capacity needed to achieve this is usually far cheaper, watt for watt, than the battery capacity it replaces.

A worked continuation of our office example:

Recall the office from the worked example above needed roughly 19.3kWh per working day and a 4.5–5KVA inverter. A vendor sizing this the conventional way might propose a battery bank capable of storing close to the full 19.3kWh, to be safe across the whole day.

If instead the panel array is deliberately oversized, say to 6–7kW of generation capacity rather than the bare minimum needed to match daily consumption, the panels can supply most of the midday load directly the moment the sun produces it, with the battery only needed to buffer the first hour of the working day and any brief cloud cover. In practice, this can allow the battery bank to be sized closer to 4–6kWh of usable capacity instead of the full 19.3kWh, a substantial cost reduction, while the office still runs comfortably through its working hours.

The honest caveat:

This strategy works because it matches the shape of your load to the shape of the sun's output. It is a poor fit for a business with significant early morning, evening, or overnight load, since an undersized battery in that scenario would leave you short exactly when the panels are not producing. It also assumes reasonably consistent daytime sun; on a run of heavily overcast days, an oversized-panel, undersized-battery system will underperform more noticeably than a battery-heavy one.

The question to ask your installer:

"Given that my business runs mainly during daylight hours, have you considered oversizing the panel array to carry the daytime load directly, so the battery bank only needs to cover the gaps rather than the full day?"

An installer who understands this trade-off will be able to walk you through the numbers. One who only knows how to quote a standard "panels equal battery equals inverter" package, regardless of your actual usage pattern, is quoting a template, not a system built for your business.

The Business-Specific Question to Ask

When a vendor quotes an office or shop, ask this directly:

"Did you size this system around my actual working hours, or around a full 24 hour day?"

If they sized it around 24 hours for a business that closes every evening, you are very likely paying for capacity you do not need. This is one of the fastest ways to spot a quote that was copied from a residential template rather than built for your business.

What Comes Next

With your real number in hand, whether from Track A, Track B, or both, Chapter 5 shows you how to translate this into a realistic projection of how much your NEPA bill could actually shrink, using current published tariff rates rather than a vague promise.

CHAPTER 5: THE NEPA BILL REDUCTION PROJECTION



Turning Your Load Number Into a Bill Number

You now have a real kWh-per-day figure from Chapter 3 or Chapter 4. This chapter turns that number into something more useful than "solar will save you money": an actual, personalized estimate of how much your monthly NEPA bill could realistically shrink.

This is not a guess or a marketing promise. It uses your own consumption number against current published electricity tariffs, so the projection is specific to you, not a generic percentage pulled from an advert.

Understanding Band A Pricing

If you are on the Band A tariff, the one reserved for customers guaranteed a minimum number of hours of daily supply, you are currently paying somewhere in the region of ₦209 to ₦225 per unit of electricity (per kWh), depending on your distribution company. This rate is reviewed periodically by the regulator based on inflation and exchange rate movements, so it can shift over time, but it gives you a solid current baseline for this projection.

This is exactly why Band A households and offices feel the sharpest pain from electricity bills, and exactly why they stand to gain the most from shifting daytime consumption to solar.

Why This Projection Is an Estimate, Not a Guarantee

Before you run your own numbers, it is worth being upfront about what this projection can and cannot promise:

- It assumes the portion of your load covered by Chapter 3 or 4 is genuinely shifted away from the grid onto solar.
- It does not account for any fixed charges, meter charges, or minimum billing amounts your DisCo may apply regardless of consumption, so check your own bill for these.
- It assumes reasonably consistent sunlight; a run of unusually cloudy days will reduce solar output and reduce your savings for that period.
- Tariff rates change periodically, so treat the rate you use here as a current snapshot, not a fixed constant.

With that said, this is still a far more honest starting point than "solar will slash your bill," because it is built from your own real number.

YOUR NEPA BILL REDUCTION WORKSHEET

Step 1 — Find your current numbers.

Pull your last one or two NEPA bills or check your prepaid meter's recent purchase history:

Current average monthly bill: ■ _____

Current average monthly consumption (kWh, if shown on your bill): _____

Your current tariff rate (■ per kWh, if shown, or use ■209–■225 as an estimate for Band A): ■ _____

Step 2 — Bring in your solar load number from Chapter 3 or Chapter 4.

Your daily kWh requirement (from Chapter 3 or 4): _____ kWh/day

Multiply by 30 for a monthly estimate: _____ kWh/month

Step 3 — Estimate the portion of that load solar can realistically cover.

Be honest here rather than optimistic. A well-sized system covering your full daily NEEDS load (as calculated in Chapters 3–4) can realistically offset close to that full amount on most days, assuming reasonable sun. If you expect your solar system to only partially cover your needs at first (for example, if you plan to expand the system later), estimate a percentage instead:

Estimated % of monthly load that solar will cover: _____ %

Monthly kWh from Chapter 3/4 × that percentage = kWh offset from NEPA: _____

Step 4 — Calculate your projected savings.

kWh offset from NEPA × your tariff rate (■/kWh) = ■ _____ estimated monthly savings

Your current bill – estimated monthly savings = ■ _____ projected new monthly bill

A WORKED EXAMPLE

Continuing with the household from Chapter 3, whose daily NEEDS load came to roughly 17.4kWh/day:

Current average monthly bill: ■65,000

Monthly kWh at Band A rate of ■209.5/kWh: roughly 310 kWh/month

Chapter 3 daily load: 17.4kWh/day × 30 = 522 kWh/month

Realistic solar coverage estimate: 90% (allowing for occasional cloudy days)

kWh offset from NEPA: $522 \times 0.90 = 470$ kWh/month

$470 \text{ kWh} \times \text{₦}209.5/\text{kWh} = \text{₦}98,465$ in theoretical offset value

Notice something important here: this household's calculated solar coverage (470kWh) is actually larger than their current NEPA consumption (310kWh). This is common, and it tells you something useful: this household was likely already rationing usage to control their NEPA bill, running less than they'd like to. Once solar removes that constraint during the day, their comfort level rises even if their "savings" number looks capped by their original bill rather than by the full offset value.

A realistic projected outcome for this household: their NEPA bill drops from roughly ₦65,000/month toward a small residual amount covering whatever isn't shifted to solar (occasional overnight top-ups, cloudy-day shortfalls, and any DisCo fixed charges), often landing in the ₦5,000–₦15,000/month range rather than disappearing to zero.

For the office example from Chapter 4, at 19.3kWh per working day (roughly 425kWh/month across a 22-day working month) against a Band A rate of ₦209.5/kWh, that represents close to ₦89,000/month in offset value, a substantial reduction for a business currently paying ₦100,000–₦500,000/month.

The Honest Way to Present This to Yourself

Do not tell yourself "my bill goes to zero." Tell yourself: "the portion of my load that matches my calculated solar coverage shifts away from NEPA, and my bill shrinks by roughly that value, month over month, with some variation for weather and any fixed charges."

That version is less exciting to say out loud, and it is also the version that will actually match your bank statement six months from now, which is worth far more than a number that sounds better today and disappoints you later.

What Comes Next

You now have three real numbers: your system size, your daily load, and your realistic bill reduction. But numbers alone can't protect you from a vendor who never intended to deliver on them. Chapter 6 hands you the tool that guards everything you've just built: the checklist to vet any installer before a single naira leaves your account.

CHAPTER 6: THE 7-POINT VENDOR VETTING CHECKLIST



Your Numbers Are Only Half the Protection

Everything you've calculated so far protects you from being oversold on system size. This chapter protects you from something different and, honestly, more common: paying a deposit to a company that never delivers, disappears when something breaks, or installs components that were never certified for use in Nigeria in the first place.

This is the exact checklist I'd want a family member to run before they pay any installer, including me. Run it before you send a single naira, not after.

POINT 1 — Does the Quoted System Size Match Your Own Calculated Load?

Pull out your number from Chapter 3 or Chapter 4. Ask the vendor to break down their inverter size, battery capacity, and panel wattage separately (from Chapter 2), and to explain what daily load they sized it for.

Pass: Their numbers roughly match yours, plus a reasonable 20–25% margin. **Red flag:** They can't or won't break the system down into these three parts, or their numbers are wildly larger or smaller than your own calculation with no clear explanation.

POINT 2 — Is the Company Actually Registered?

Every legitimate business in Nigeria should be registered with the Corporate Affairs Commission (CAC). You can check this yourself, for free, in under five minutes:

1. Go to **search.cac.gov.ng** 2. Search by the company's registered name, or ask the vendor directly for their RC (Registration Certificate) number and search by that instead — the RC number is more reliable, since similar-sounding business names can exist. 3. Confirm the registered name matches who you're dealing with, and confirm the status shows as active.

Pass: Company is CAC-registered, active, and the vendor readily provides their RC number without hesitation. **Red flag:** The vendor hesitates, deflects, or cannot provide an RC number at all. A company with nothing to hide has no reason to make this difficult.

Important honest note: CAC registration confirms the business legally exists — it does not, by itself, confirm they're competent at solar installation or that their equipment is certified. Treat this as one check among seven, not the whole picture.

POINT 3 — Do They Hold the Certifications That Actually Apply to Their Work?

This point needs an honest, fair explanation, because it's easy to set an unrealistic bar here that ends up flagging almost every vendor in the market, including good ones.

Under Nigerian regulation, solar equipment is technically required to carry **NEMSA type approval**. In practice, the majority of solar products sold in the Nigerian retail market do not carry formal NEMSA documentation at the point of sale, and this is common across the industry, not a sign that a specific vendor is uniquely dishonest. NEMSA certification becomes a strict, non-negotiable requirement specifically when a company bids for **government contracts**, where documentation is formally checked as part of the tender process.

So for a typical home or office installation, asking "where's your NEMSA paperwork?" and rejecting every vendor who can't produce it isn't a fair or realistic test. What's more useful for a residential or office client is checking the credential that actually reflects whether the *people* doing your installation are qualified: **COREN registration**, specifically under COREN's Renewable Energy/Energy Efficiency (RE/EE) Certification Scheme, which certifies individuals and firms specifically in solar PV and related renewable energy installation work. COREN has also formally partnered with NEMSA (as of mid-2025) to align standards between the two bodies, so COREN registration is a meaningful proxy for competence even where full NEMSA equipment paperwork isn't in hand.

You can check this yourself for free:

1. Go to **portal.coren.gov.ng** 2. Use the verification tool to check a firm's or individual practitioner's COREN registration number. 3. Ask the vendor directly whether their installing engineer or technical lead is COREN-registered, ideally under the RE/EE scheme.

Pass: The company or its lead technical staff can produce a COREN registration number, or clearly explain their team's training and certification background, even if full NEMSA equipment paperwork isn't available for every component. **Red flag:** Nobody on their team has any engineering registration or renewable-energy-specific certification at all, and they can't speak clearly about the qualifications of whoever will actually be doing your installation.

A fair note for installers reading this too: if you're a solar company without formal NEMSA documentation on every product, that alone doesn't make you dishonest — it reflects a real gap in how the retail market currently operates. What separates a trustworthy installer from a risky one is competence and accountability, not paperwork most of the market doesn't have.

POINT 4 — Do They Have a Verifiable Physical Address?

A Facebook page or Instagram account is not a business address. Ask for, and if possible visit, their physical store, office, or warehouse.

Pass: They have a real, visitable location, ideally one that matches what's registered with CAC. **Red flag:** They operate only through social media DMs and WhatsApp, with no verifiable physical presence. This is one of the clearest patterns behind vendors who disappear after collecting payment.

POINT 5 — Are Warranty Terms Written Down?

A verbal promise of "one year warranty" means nothing if there's a dispute later.

Pass: Warranty terms (duration, what's covered, what voids it) are written into your invoice, contract, or a formal warranty document, with the company's registered name on it. **Red flag:** Warranty is only ever mentioned verbally, or the paperwork you're given has no company details on it at all.

POINT 6 — Do They Hesitate When Asked Direct Questions?

This point is less about a document and more about how they respond. Ask them, in the same conversation: their RC number, their technical lead's COREN registration, and their physical address.

Pass: Answers come readily, consistently, and without visible discomfort. **Red flag:** Any combination of hesitation, changing the subject, or vague reassurances like "don't worry, we're the real deal" in place of an actual answer.

POINT 7 — Is the Price Drastically Lower Than Every Other Quote for the Same Calculated Load?

Once you know your real KVA and kWh numbers from Chapters 3–4, you can finally compare quotes on a fair basis: same load, different prices.

Pass: Price differences between vendors are moderate and explainable (brand of components, workmanship, warranty length). **Red flag:** One quote for the exact same calculated load is dramatically lower than all the others, with no clear reason. This is often where corners get cut on equipment quality, or where a deposit is taken with no intention of delivering the full system.

Understanding the NERC and COREN Questions

Two points of confusion worth clearing up directly.

First, for a typical home or office solar installation generating for your own use (self-generation) under 1 megawatt, **no NERC generation licence is required** under Nigeria's Electric Power Sector Reform Act. This

covers virtually every residential or office client. If a vendor presents a special "NERC licence" as a unique selling point for a standard residential or small office job, question it — it may be an attempt to sound more official than the situation requires.

Second, and more useful for you as a buyer: the credential that genuinely reflects whether an installer is professionally qualified is **COREN registration**, particularly under COREN's Renewable Energy/Energy Efficiency Certification Scheme for solar PV. This is separate from NEMSA equipment approval (Point 3) and separate from the NERC licensing question — it's about whether the people designing and installing your system have verified engineering competence, and it's checkable in minutes at portal.coren.gov.ng.

Put simply: don't reject a vendor purely for lacking NEMSA equipment paperwork most of the market doesn't have, and don't be impressed by a vendor waving around a NERC licence you don't actually need. Focus instead on CAC registration (Point 2), COREN-registered technical staff (Point 3), and the other points in this checklist. (Bonus Guide 2, included with this purchase, walks through both of these distinctions in more depth.)

What Comes Next

With this checklist run against any vendor, you can now compare multiple quotes fairly, side by side, using both your load numbers and your vetting results. Chapter 7 gives you the tracker to do exactly that.

CHAPTER 7: THE QUOTE COMPARISON TRACKER



Why Side-by-Side Comparison Changes Everything

Most people compare solar quotes the way they compare market prices: whoever is cheapest wins. That works fine for tomatoes. It's a dangerous way to compare solar systems, because two quotes at wildly different prices might not be describing the same product at all.

Once you have your real load number (Chapter 3 or 4) and you've run each vendor through the checklist (Chapter 6), this tracker puts everything on one page, so the honest comparison becomes visually obvious.

YOUR QUOTE COMPARISON TRACKER

Fill in one column per vendor. Three or four vendors is usually enough to see a clear pattern.

	VENDOR A	VENDOR B	VENDOR C
Company name:	_____	_____	_____
Quoted price:	■ _____	■ _____	■ _____
Quoted inverter size:	_____ KVA	_____ KVA	_____ KVA
Quoted battery capacity:	_____ kWh	_____ kWh	_____ kWh
Quoted panel wattage:	_____ W	_____ W	_____ W
Your calculated need (from Ch. 3/4):	_____ kWh/day	_____ kWh/day	_____ kWh/day
Does their sizing match your calculation?	Y / N	Y / N	Y / N

CAC registered? (Point 2)	Y / N	Y / N	Y / N
COREN-registered			
technical lead? (Point 3)	Y / N	Y / N	Y / N
Verifiable physical address? (Point 4)	Y / N	Y / N	Y / N
Warranty written down? (Point 5)	Y / N	Y / N	Y / N
Answered questions without hesitation? (Pt.6)	Y / N	Y / N	Y / N
Checklist score (out of 5, Points 2-6):	___ / 5	___ / 5	___ / 5

Reading Your Completed Tracker

Once this is filled in, the decision usually becomes obvious without much further thought:

- **A vendor whose sizing roughly matches your calculation, and who scores well on the checklist, is a strong, trustworthy option** — even if they aren't the cheapest.
- **A vendor who is significantly cheaper but scores poorly on the checklist, or whose sizing doesn't match your calculated need, is the one most likely to disappoint you later** — either through undersizing, poor components, or vanishing after the deposit.
- **A vendor who is significantly more expensive with no clear reason (better warranty, premium brand components, additional services) deserves a direct question about what justifies the difference**, rather than an assumption that expensive automatically means better.

A Worked Example

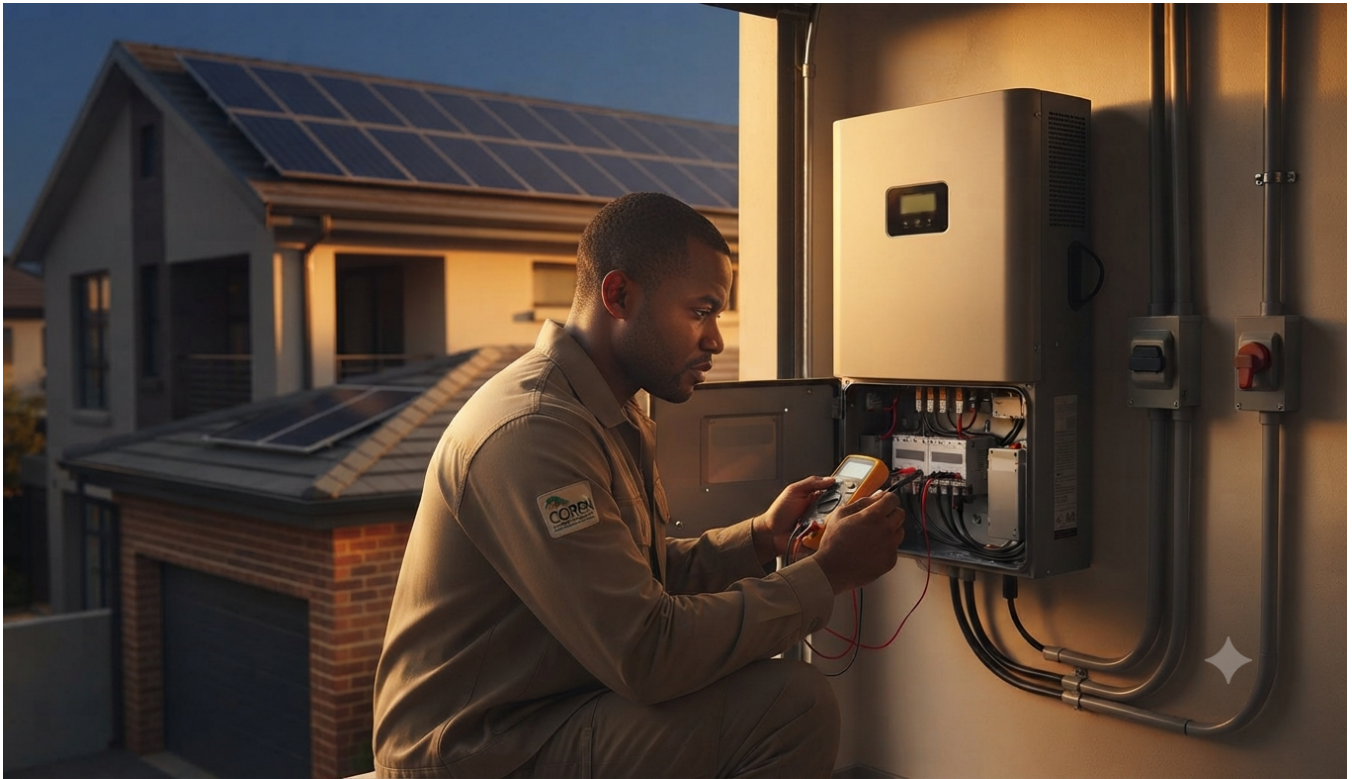
	VENDOR A	VENDOR B	VENDOR C
Quoted price:	■4,200,000	■3,100,000	■6,800,000
Quoted inverter size:	5 KVA	5 KVA	10 KVA
Your calculated need:	17.4 kWh/day	17.4 kWh/day	17.4 kWh/day
Sizing matches?	Y	N (battery too small for stated load)	
CAC registered?	Y	N	Y
COREN-registered lead?	Y	N	Y
Checklist score:	5/5	1/5	5/5

In this example, Vendor B looks attractive on price alone, but fails the checklist and doesn't hold enough battery capacity for the calculated load, both real warning signs. Vendor C is the most expensive with no clear justification yet, worth a direct question. Vendor A, not the cheapest, is the strongest option once sizing and vetting are both accounted for.

What Comes Next

You now have every tool needed to choose a vendor with confidence. The final chapter covers what to watch for after your system is installed, so you can protect this investment for years, not just at the point of purchase.

CHAPTER 8: RED FLAGS AFTER INSTALLATION & MAINTAINING YOUR RESULTS



Why This Chapter Matters As Much As Everything Before It

Everything up to this point has protected you at the point of purchase: right sizing, honest vendor vetting, fair comparison. But a solar system is not a one-time transaction you complete and forget. It's a piece of equipment that lives on your roof and in your home or office for years, exposed to heat, dust, rain, and daily use. Some of the most painful stories I've heard from clients weren't about being sold the wrong system initially. They were about a system that worked fine for the first few months, and then quietly started failing in ways nobody noticed until it was serious.

This chapter exists so that doesn't happen to you. We'll go through each part of your system, one at a time, and cover exactly what early trouble looks like, why it happens, and what to do about it before a small problem becomes an expensive one.

Understanding Why Systems Fail Gradually, Not Suddenly

Before we get into specific components, it helps to understand a general pattern: very few solar system failures happen all at once, out of nowhere. Almost every failure I've been called out to fix had warning signs for weeks or months beforehand, things the owner noticed but didn't recognize as significant, or didn't feel worth mentioning to anyone.

This is actually good news for you. It means that if you know what to look for, you have time to catch problems early, while a small repair is still possible, before the situation becomes a full replacement.

RED FLAG CATEGORY 1: Your Battery Backup Time Is Shrinking

What it looks like: When your system was first installed, your lights, fan, and TV might have comfortably run all night on battery power alone. A few months in, you notice the same appliances now only last until midnight, or 2am, before the system switches back to NEPA or simply goes dark.

Why this happens: Batteries degrade with use, this is completely normal and expected over the years, but the rate of degradation matters enormously. A slow, gradual decline over 3 to 5 years is a normal aging pattern for most battery types. A sharp, noticeable decline within the first 6 to 12 months is a different story, and usually points to one of a few specific causes:

- **The battery bank was undersized for your real daily load in the first place** (exactly the mistake Chapters 3 and 4 are designed to prevent). If a battery is being asked to supply more energy than it was designed for every single day, it wears out far faster than its rated lifespan suggests.
- **The battery is being drained too deeply, too often.** Most batteries have a recommended depth of discharge, meaning they shouldn't regularly be run all the way down to empty. A system that isn't managing this properly, or an owner who is running appliances well past the point the system should have cut off, accelerates wear significantly.
- **Poor quality or counterfeit battery cells**, which is exactly why Bonus Guide 1 exists, since spotting this at the point of purchase is far easier than diagnosing it six months later.
- **Heat.** Batteries installed in poorly ventilated spaces, direct sunlight, or enclosed cabinets without airflow degrade noticeably faster than those kept cool and ventilated.

What to do: If you notice backup time shrinking faster than feels reasonable within the first year, don't wait for it to get worse. Contact your installer and describe specifically what's changed, how many hours you used to get versus how many you get now, and when you first noticed the difference. A reputable installer (one who passed your Chapter 6 vetting) should be willing to inspect the battery bank and explain what's happening, ideally under warranty if it's within the covered period.

RED FLAG CATEGORY 2: The Inverter Is Overheating, Making Unusual Noises, or Shutting Down Unexpectedly

What it looks like: The inverter unit feels noticeably hot to the touch, makes a persistent humming, buzzing, or clicking sound it didn't make before, or trips and shuts down even when you haven't added any new appliances to your usual routine.

Why this happens: Inverters are designed to run within a specific temperature range and load ceiling. A few common causes of trouble:

- **The inverter is undersized for your actual peak simultaneous load** (the exact calculation from Chapters 3 and 4). If you're regularly asking it to supply more watts at once than its rating allows, even briefly, it will shut down as a protective measure, and repeated stress like this shortens its working life.

- **Poor ventilation around the unit.** Inverters generate heat as a normal part of converting DC to AC power, and they need airflow to dissipate it. A unit installed in a cramped, enclosed space, or with something stacked against its ventilation grilles, will run hotter than it should.
- **Voltage or wiring issues from the installation itself.** This is a case where poor workmanship at the point of installation, not a battery or panel problem, can cause ongoing inverter stress. It's another reason vendor quality (Chapter 6) matters well beyond the point of sale.

What to do: Unplug non-essential loads and observe whether the shutdowns stop, this tells you whether it's a sizing/overload issue. If the unit is hot or noisy even under normal, expected loads, this needs a professional inspection promptly. Continuing to run an overheating inverter risks a more serious and more expensive failure, and in rare cases, a fire risk.

RED FLAG CATEGORY 3: Panels Producing Noticeably Less Power Than When Installed

What it looks like: Your system seems to take longer to fully charge during the day than it used to, especially on days that still look sunny.

Why this happens: A gradual, small decline in panel output over years is normal and expected, most panels are rated to still produce a large majority of their original output after 20-plus years. A sudden or sharp decline within the first year or two usually points to something more specific:

- **Dust and grime buildup.** In much of Nigeria, dust accumulation on panel surfaces is one of the most common and most overlooked causes of reduced output, and it's also one of the easiest to fix.
- **Physical shading that wasn't accounted for at installation** — a tree that has grown taller, a new structure built nearby, anything that now casts a shadow across part of the panel array during peak sun hours.
- **Damage to individual panels or connections** — a cracked panel, a loose or corroded connector, or damage from a storm.

What to do: Start with the simplest, cheapest check: clean the panels. A soft brush or cloth and clean water, done in the early morning or evening when panels are cool, is usually enough, avoid harsh chemicals or abrasive scrubbing. If cleaning doesn't restore normal output, or if you can see physical damage, contact your installer for an inspection of the wiring and individual panel performance.

CAUSES OF FAILURE THAT AREN'T THE INSTALLER'S OR BRAND'S FAULT

Everything covered so far in this chapter deals with genuine equipment problems, undersizing, poor components, ventilation issues. But it's worth being equally honest about two other causes of system trouble that have nothing to do with the quality of your installation or your components, because recognizing them prevents you from unfairly blaming a good installer, and helps you actually protect your system going forward.

Unstable NEPA voltage from the grid side. Many solar systems in Nigeria remain connected to the national grid as a backup source, switching between solar/battery power and NEPA depending on availability. This is normal and sensible. The problem is that Nigeria's grid, particularly where local transformers are old, poorly maintained, or overloaded, frequently delivers unstable voltage: sudden high-voltage spikes when

supply is restored after an outage, sustained low-voltage "brownout" conditions, or rapid fluctuations during periods of grid instability. Your inverter and charge controller are the components most exposed to this, since they sit directly at the connection point between the grid and your solar system. Repeated exposure to voltage spikes or prolonged low-voltage conditions can stress these components over time, even when the units themselves are genuine and correctly sized, in the same way that repeatedly exposing any electronic device to power surges shortens its working life regardless of how well it was built.

This isn't a flaw in your solar system, it's a reflection of a genuine, widely acknowledged grid infrastructure issue affecting the whole country. What you can do about it: ask your installer whether your system includes proper surge protection and automatic voltage regulation (AVR) on the grid-connection side, this is a relatively inexpensive addition that meaningfully reduces this specific risk, and a competent installer should be able to explain clearly whether it's included in your system and why.

Usage patterns that exceed what the system was built for. The second honest cause worth naming is usage that goes beyond what your system was calculated and installed to handle, covered in principle back in Chapters 3 and 4, but worth restating directly here: if you add new appliances over time without recalculating your load, if you routinely run the system well past the point it should be resting or recharging, or if you regularly override safety cutoffs because a particular evening feels inconvenient, you are asking components to work outside the conditions they were designed and sized for. This kind of strain accumulates gradually and can look, from the outside, exactly like a defective installation or a bad brand, when the actual cause is a pattern of usage the system was never built to absorb.

This isn't about blame, most people don't do this deliberately, it usually happens gradually, one small addition or one late night at a time, without anyone noticing the cumulative effect. The practical fix is straightforward: whenever your household or office situation changes meaningfully, a new appliance, a change in your working hours, a new tenant or staff member, revisit your Chapter 3 or 4 worksheet and recalculate, rather than assuming the original sizing still applies indefinitely.

BUILDING SIMPLE MAINTENANCE HABITS THAT PROTECT YOUR INVESTMENT

Beyond watching for the specific red flags above, a few simple ongoing habits go a long way toward extending the life of your system and avoiding surprises:

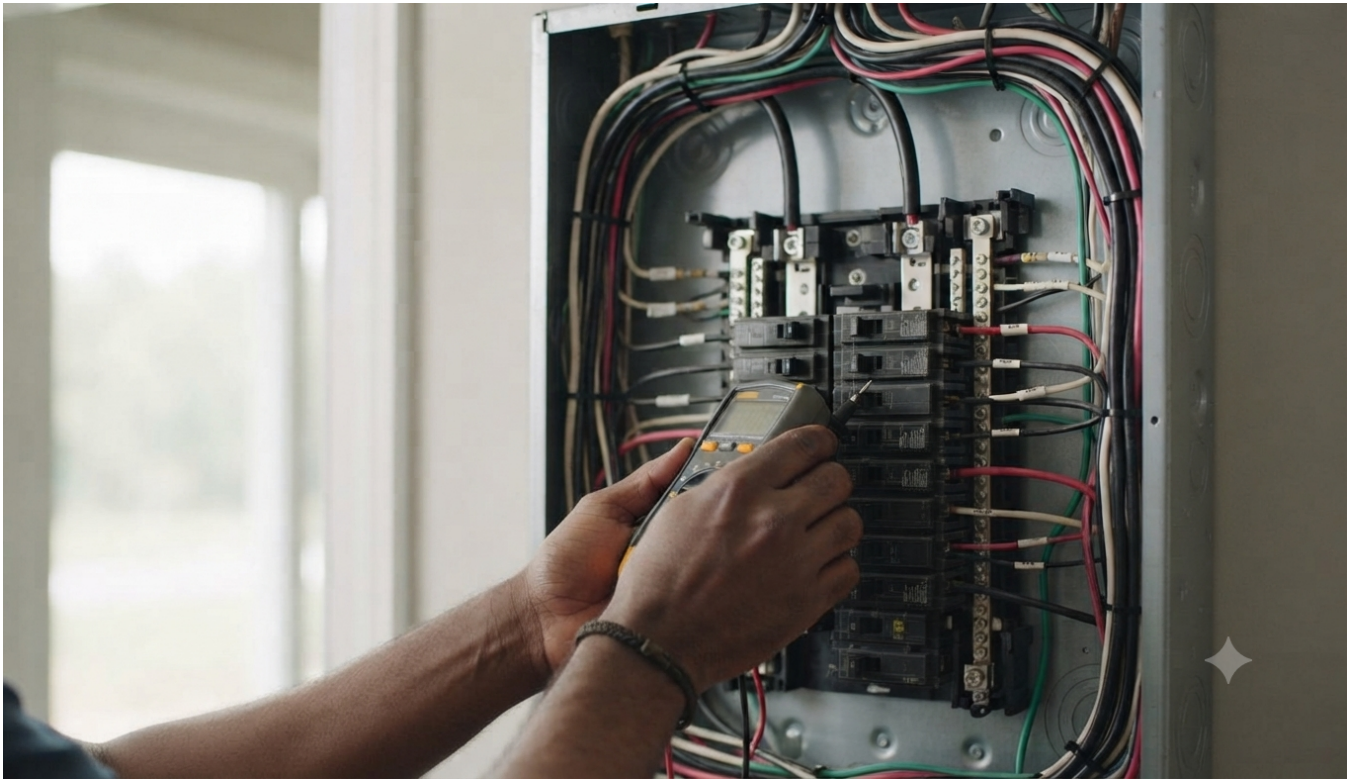
- **Do a visual check monthly.** Look at the panels for dust, debris, or shading changes. Look at the inverter and battery area for anything unusual, unusual smells, discoloration, or loose connections you can see without opening anything up.
- **Keep a simple usage log for the first few months.** Note roughly how many hours of backup you're getting on a typical night. This gives you a baseline, so if backup time starts shrinking later, you'll notice quickly and be able to describe it clearly to your installer, rather than relying on a vague feeling that "something's different."
- **Don't exceed your calculated load, even once the system is running well.** It's tempting to add "just one more appliance" once you're enjoying reliable power. Go back to your Chapter 3 or 4 worksheet before adding anything significant, and recalculate whether your system can genuinely absorb the additional load, rather than assuming it can.

- **Keep ventilation clear around your inverter and battery installation.** Don't stack boxes, furniture, or storage items against or on top of the units, even if space is tight.
- **Schedule an annual check-in with your installer,** even if nothing seems wrong. A brief professional inspection once a year can catch early-stage issues, loose connections, early battery wear, minor panel damage, long before they become visible problems to you.

What Comes Next

You now know how to protect your system once it's running. But some of the most serious risks in a Nigerian solar installation aren't about sizing or vendor honesty at all — they're about the physical safety of the installation itself: the cables, the breakers, the earthing, and the protection against lightning and power surges. Chapter 9 covers exactly this, because a wrongly-sized cable or a missing earth connection isn't just a performance issue. It can be a fire risk.

CHAPTER 9: WHY BAD INSTALLATIONS CAUSE FIRES — CABLE AND BREAKER SIZING



The Risk Nobody Talks About Until Something Burns

Most solar conversations focus on panels, batteries, and inverters, the visible, "exciting" parts of the system. Almost nobody asks about the cables and breakers connecting everything together, yet these are exactly where a poorly executed installation turns from an inconvenience into a genuine safety hazard.

Here's the simple physics behind it: every cable has a maximum current it can safely carry, based on its thickness (gauge) and the material it's made of. Push more current through a cable than it's rated for, and it heats up. Do that continuously, day after day, and the heat can degrade the cable's insulation, damage nearby materials, and in serious cases, start a fire, often inside a wall, ceiling void, or battery cabinet where nobody notices until it's already spreading.

Breakers exist specifically to prevent this. A correctly rated breaker trips and cuts power the moment current exceeds a safe threshold, before the cable overheats. A breaker rated too high for the cable it's protecting defeats this entire purpose, it simply won't trip in time. A breaker rated too low causes the opposite problem: constant nuisance tripping that frustrates the owner into bypassing or replacing it with something larger, often making the system less safe in the process.

Why This Happens So Often in Nigeria's Solar Market

Cable and breaker sizing is a real calculation, based on your system's current (amps), the cable run length, and the cable material, not a guess, and not something that should be substituted with "whatever cable is available in the shop that day." In a market where installers are often chosen on price alone, cable and breaker sizing is one of the easiest places to cut corners, because it's invisible once the installation is complete and the walls are closed up.

WARNING SIGNS OF UNDERSIZED CABLING OR WRONG BREAKER RATING

- **Warm or hot cables or connection points** — any cable, junction box, or breaker panel that feels noticeably warm to the touch during normal operation is a red flag, not a normal occurrence.
- **A burning smell**, even faint, from anywhere near your inverter, battery bank, or cable runs. Treat this as urgent, not something to monitor casually.
- **Discoloured or melted-looking insulation** on any visible cable or connector.
- **Frequent, unexplained breaker trips** with no clear cause (no new appliance, no obvious overload) — this can mean the breaker is undersized for normal operation, or there's a deeper wiring fault.
- **Breakers that never trip, even when something clearly overloads the system** — this is arguably more dangerous than the opposite, since it means the protection isn't functioning at all.

QUESTIONS TO ASK YOUR INSTALLER BEFORE INSTALLATION

- "What cable size (gauge) are you using for the panel-to-inverter run, the inverter-to-battery run, and the inverter-to-load run, and how did you calculate that?"
- "What breaker ratings are you installing, and do they match the cable sizing at each point?"
- "Are you using cables and connectors actually rated for solar/DC use (such as proper solar cable and MC4-style connectors for panel wiring), rather than standard household AC wiring repurposed for a DC run?"

A competent installer answers these clearly and specifically, using your system's actual current draw, not a vague reassurance. Hesitation or confusion here is worth treating as seriously as hesitation over the vendor vetting questions in Chapter 6.

What Comes Next

Cable and breaker sizing protects you from everyday overload. Chapter 10 covers the protection layer most buyers never think to ask about at all, surge protection, lightning arrestors, and earthing, the safety net for the events you can't predict or control.

CHAPTER 10: SURGE PROTECTION, LIGHTNING ARRESTORS & EARTHING INTEGRITY



Three Protections Most Quotes Never Mention

If cable and breaker sizing protects you from everyday overload, this chapter covers the protection layer for sudden, unpredictable events, voltage surges, lightning, and electrical faults. These three things are rarely mentioned in a standard solar quote, not because they're unimportant, but because they add cost without adding anything visually impressive, exactly the kind of corner that gets cut silently.

Surge Protective Devices (SPDs)

A surge protective device sits between your power source and your equipment, and its job is simple: absorb a sudden voltage spike before it reaches your inverter, batteries, or appliances. Nigeria's grid, as covered in Chapter 8, is prone to voltage spikes, particularly when supply is restored after an outage. An SPD is a relatively inexpensive addition that meaningfully protects your entire investment from this specific, common risk.

Ask your installer directly: "Is a surge protective device included in this system, and where is it installed — on the grid-connection side, the DC side, or both?" A quote with no SPD included at all, for a system that's meant to last years, is missing a genuinely important layer of protection.

Lightning (Thunder) Arrestors

Nigeria experiences a significant number of thunderstorms annually, and a rooftop solar installation, being the highest point on many buildings, is a real point of exposure. A lightning arrestor provides a controlled path for a lightning strike's current to travel safely to earth, rather than through your wiring, your inverter, or your home's electrical system.

This isn't a theoretical risk. A direct or nearby lightning strike without proper arrestor protection can destroy an entire solar installation instantly, panels, inverter, and batteries alike, in a single event that no warranty typically covers as a manufacturing defect.

Ask your installer directly: "Given how exposed my roof is, do you recommend a lightning arrestor for this installation, and is it included in this quote?" The answer should be specific to your building's height, location, and surroundings, not a blanket yes or no applied without any real assessment.

Earthing (Grounding) Integrity

Earthing gives electrical faults a safe path into the ground rather than through your equipment or, worse, through a person who touches something they shouldn't during a fault. Every solar installation should be properly earthed, and just as importantly, connected to an earthing system that's actually in good working condition.

Here's what many buyers don't realise: if you're installing solar on an existing house, your home's earthing system may already be years old, and earth rods can corrode, connections can loosen, and resistance can increase over time without any visible sign. An earthing system that was adequate when the house was built may no longer be performing correctly by the time solar is added to it.

This is why a proper installation should include an earth resistance test (often done with a simple earth tester/megger device) on your existing earthing system before relying on it for your new solar installation, not an assumption that "the house has earthing, so it's fine."

YOUR PROTECTION LAYER CHECKLIST

Run through this with any installer before signing off on a system:

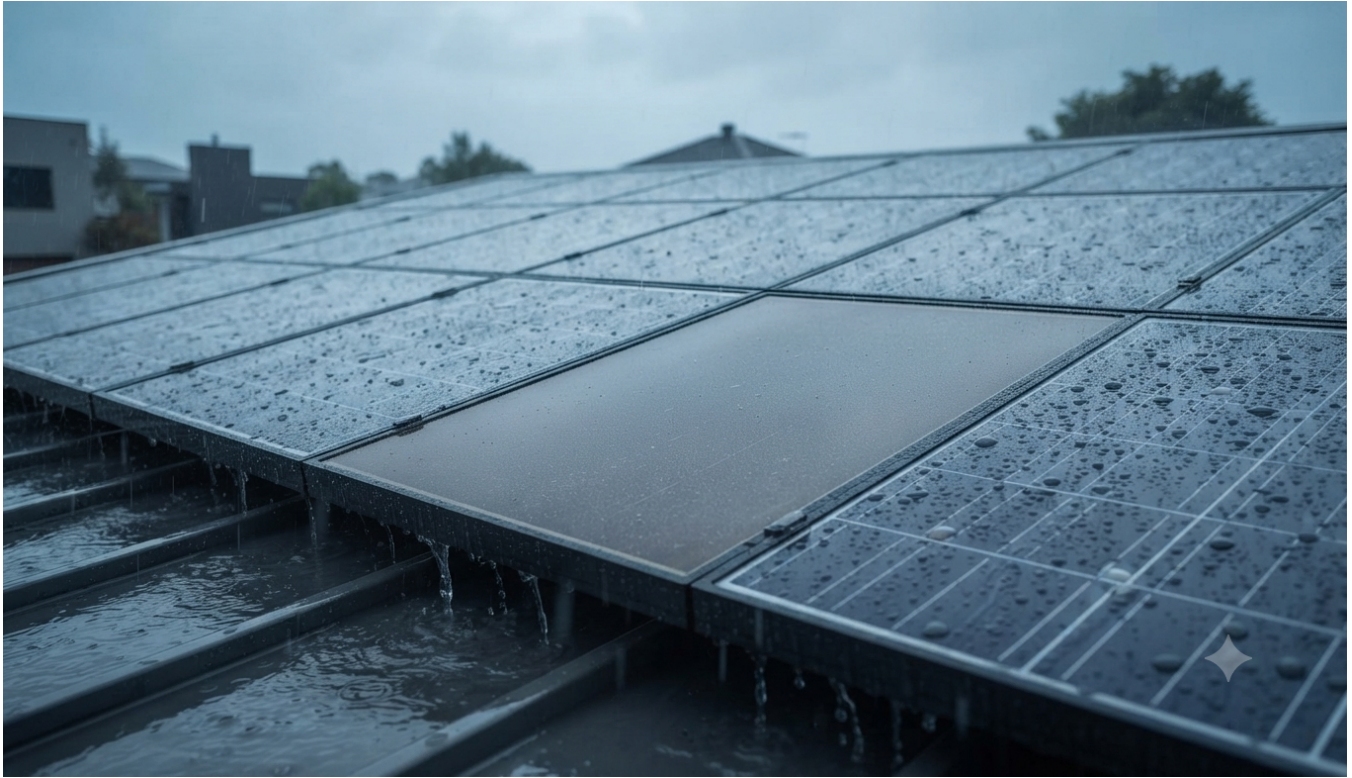
- ☐ Surge Protective Device (SPD) included – Location: _____
- ☐ Lightning arrestor assessed for my building – Recommended: Y / N
- ☐ Existing earthing system tested for resistance – Result: _____
- ☐ Earth rod condition inspected (not just assumed adequate)
- ☐ All these items itemized separately on my invoice, not bundled vaguely

If an installer's quote has none of these items listed at all, it's worth asking directly why, before assuming they're simply included "by default."

What Comes Next

With your electrical safety layer covered, Chapter 11 turns to a different kind of challenge, one that has nothing to do with vendors or wiring, but everything to do with Nigeria's climate: dust, rainy season, and getting your panel placement right from day one.

CHAPTER 11: NIGERIA'S WEATHER REALITY — DUST, RAINY SEASON, TILT ANGLE & PLACEMENT



Your System Has To Survive Nigerian Weather, Not Lab Conditions

Every solar panel is tested and rated under standard laboratory conditions. Your roof is not a laboratory. Nigeria's climate, harmattan dust, intense heat, and heavy rainy-season cloud cover, all affect real-world performance in ways that a spec sheet alone won't tell you, and a good installation plans around this from day one rather than treating it as an afterthought.

Dust and the Harmattan Season

During harmattan, dust accumulation on panel surfaces is one of the most common, and most overlooked, causes of reduced solar output in Nigeria. A layer of dust blocks sunlight from reaching the cells underneath, and the effect compounds the longer it's left unaddressed.

What actually helps:

- **Tilt angle matters more than people realise.** A panel installed at a reasonable tilt (rather than lying nearly flat) allows rain to help naturally rinse dust off between cleanings. A flat or near-flat installation accumulates dust faster and holds onto it longer.

- **A simple cleaning routine**, a soft brush or cloth with clean water, done in the cool early morning or evening, restores most of the lost output. During peak harmattan months, this may be worth doing every few weeks rather than waiting for a visible performance drop.

Rainy Season Underperformance

Heavy, sustained cloud cover during the rainy season genuinely reduces how much energy your panels generate on a given day, this is a real, expected seasonal dip, not a sign of a faulty system. A well-planned installation accounts for this in one of two ways, or both together:

- **Sizing panel capacity with a reasonable buffer** above your bare minimum calculated need (revisit Chapter 2's discussion of safety margins), so that reduced rainy-season output still comes reasonably close to meeting your daily needs.
- **Ensuring adequate battery capacity** to smooth over a run of several consecutively overcast days without leaving you completely without backup power.

Water ingress protection also matters here. Ask your installer whether your inverter, junction boxes, and outdoor connectors carry an appropriate IP (Ingress Protection) rating for outdoor/rainy-season exposure, this is a specification, not a guess, and a genuine one is usually printed directly on the equipment.

Tilt Angle and Orientation

Nigeria's position near the equator means the sun's path overhead is less extreme than in temperate countries, but tilt angle and orientation still meaningfully affect how much energy your system generates over a full year. As a general starting point, panels performing well across the full year are typically tilted at an angle in a similar range to your local latitude, adjusted based on your specific roof structure, with orientation chosen to capture the most consistent sun exposure across the day. Your installer should be able to explain the specific tilt and orientation chosen for your roof, and why, rather than simply mounting panels flush with whatever the roof pitch happens to be by default.

Placement: Shading and Access

Two placement mistakes show up repeatedly:

- **Shading from nearby trees or structures** that weren't accounted for at installation, sometimes because a tree was smaller when the system went in, or a new structure was built nearby afterward. Even partial shading on part of an array can disproportionately reduce total output.
- **No safe, practical access for cleaning and maintenance.** A technically well-placed system that nobody can safely reach to clean or inspect creates its own long-term performance problem.

What Comes Next

Weather and physical placement affect everyone's system equally. But not everyone buying solar is doing so in the same situation, some are tenants, some are landlords sizing for multiple units, some are managing a purchase for family they don't live with. Chapter 12 addresses these specific situations directly.

CHAPTER 12: BUYING SOLAR AS A TENANT, LANDLORD, OR ON BEHALF OF FAMILY



Why Your Situation Changes the Conversation

Everything in this guide so far applies whether you own the property or not. But a few situations come with extra questions worth addressing directly, because the "right" decision isn't always just about sizing and vendor honesty, it's also about who owns what, who's responsible for what, and who's actually going to use the system day to day.

If You're a Tenant

Installing solar in a rented property raises questions that have nothing to do with KVA calculations:

- **Get your landlord's written permission before installation begins**, not a verbal understanding. This protects you if there's ever a dispute about rooftop access, structural changes, or wiring done to the property.
- **Clarify ownership of the equipment before you install anything**. Is the system considered a fixture that stays with the property when you move out, or is it yours to take with you? This should be agreed in writing, not assumed.
- **Consider installation methods that support future removal**, where possible, if you expect to move before you've gotten full value from the system. Discuss this directly with your installer as a design

consideration, not an afterthought.

If You're a Landlord or Property Developer

Sizing solar across multiple rental units or a development project introduces its own considerations:

- **Standardizing system specifications across units** simplifies future maintenance considerably, mixed brands and sizes across a property make troubleshooting and spare parts sourcing more complicated for years afterward.
- **Decide upfront how solar factors into rent or property value**, and communicate this clearly to tenants, whether the cost is absorbed into rent, offered as a premium feature, or provided as a base utility.
- **Run the Chapter 3 and Chapter 4 calculations per unit type**, rather than assuming one system size fits every unit in a development. A one-bedroom flat and a family duplex have genuinely different real loads.

If You're Managing a Purchase for Family or Someone Else

This is common among diaspora buyers (also covered from a verification angle in Bonus Guide 2) and adult children managing a parent's home, but the core challenge is the same: you're not the one who will physically use the system day to day, which makes accurate information even more important, not less.

- **Get the actual end user's real usage patterns**, not your assumption of what they need. Have a direct conversation, or better, walk through the Chapter 3 or 4 worksheet together over a phone or video call, using their real appliances and real daily routine, not yours.
- **Establish one trusted local point of contact** who can be physically present during installation and any follow-up service, even if that's a family member rather than a technical expert. Being available by phone isn't the same as being able to verify what's actually happening on-site.
- **Share the vendor vetting checklist (Chapter 6) and both bonus guides with whoever is local**, so more than one person understands what to look out for, not just the person paying from a distance.

The One Constant Across All Three Situations

Whether you're a tenant, a landlord, or managing this for family, the core tools in this guide don't change, the same sizing calculations, the same vendor checklist, the same component and company verification steps. What changes is who needs to be part of the conversation, and making sure the right people actually are.

A Final Word on Protecting What You've Built

You started this guide holding three or four confusing quotes and no clear way to know which one to trust. You now have your own real numbers, a way to vet any vendor honestly and fairly, a way to compare quotes side by side, a realistic projection of what your NEPA bill could become, a way to protect the system itself once it's running, an understanding of the safety layer that protects your home and your investment, a grasp of how Nigeria's weather affects real performance, and clarity on your own specific buying situation, whatever

it is.

That's the complete picture, from the first calculation to years of reliable, safe use afterward. Keep these worksheets somewhere you can find them again, not just for this purchase, but for every solar conversation you have from here on.

A note before you go: the bill reduction figures, wattage references, and worked examples throughout this guide are based on typical Nigerian usage patterns and current published tariff data. Results described are individual experiences, drawn from real client scenarios. Your own results may vary based on your specific appliances, sun exposure, grid stability in your area, and how closely your installer follows the sizing your own calculations produce.