RA-ESG SOLAR SOLUTIONS

DISCUSSION DOCUMENT · SEPTEMBER 2026

Solar on the mountains around Port Louis

Solar efficiency, terrain shading and the best low-shade places

SUMMARY

Port Louis sits on the dry, sunny leeward (north-west) side of Mauritius, with an excellent solar resource. The mountains that ring the city (Signal Mountain, Le Pouce, Pieter Both and Long Mountain) cast long shadows early and late in the day. The question for any hillside solar scheme is not how much sun Port Louis gets, but **which slopes still see the sun when it is low**. This paper uses satellite irradiance data, a solar-geometry model and the terrain-shading screenshots taken on 28 September 2026 to answer that at a general, discussion level.

KEY FINDINGS

- **Resource:** about 1,810–1,890 kWh/m² of sunshine a year on the horizontal. A well-built PV plant would produce roughly **1,530–1,590 kWh per kWp**, which is high by international standards.
- **Best panel set-up:** facing north, tilted 15–25°. On a north-facing slope, panels can follow the ground and lose almost nothing.
- **Shade rule of thumb:** if the surrounding ridges stand no more than about **15° above the site** (low-shade), mountain shading costs under ~3% of annual energy. Deep valleys with ridges of 25–30° on both sides lose 9–13% or more.
- **Best low-shade places (indicative):** the gentle eastern flank of Long Mountain towards Notre Dame and Baillache, the Crève Coeur foothills, and pockets of the upper Vallée des Prêtres. The Signal Mountain north-west flank is good but loses late-afternoon sun.
- **Places to avoid:** the Vallée Pitot gorge, the forested west face of Long Mountain, and the steep upper slopes of Le Pouce and Pieter Both.

This is a desktop discussion paper. The figures are indicative and meant for choosing where to look. Any real project needs a site horizon survey, geotechnical and planning checks, and a formal yield study (for example PVsyst) before investment.

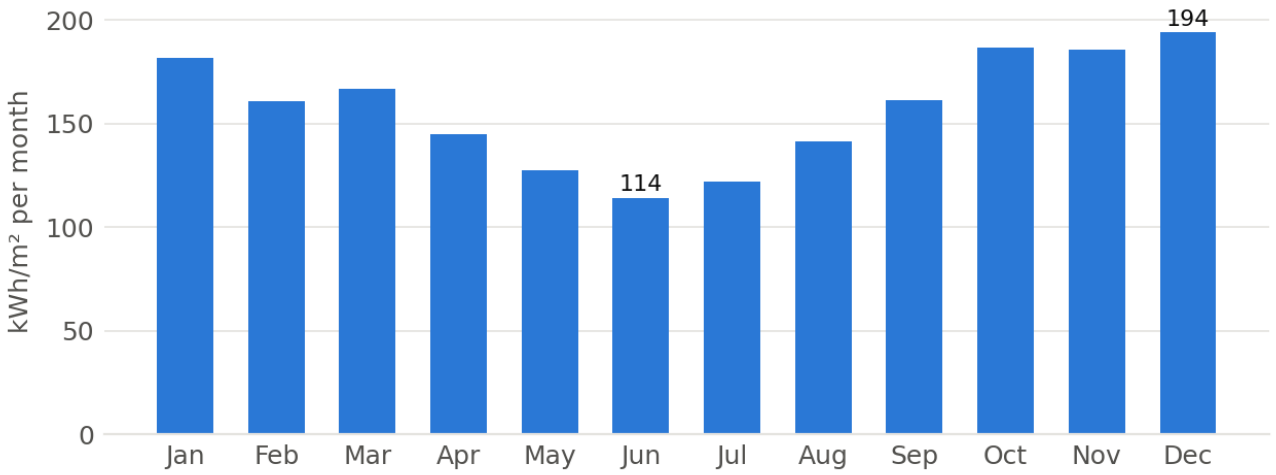
1 · THE SOLAR RESOURCE

How much sun reaches Port Louis?

Long-term satellite data (Solargis, via the World Bank Global Solar Atlas) for four points across the study area show a strong, consistent resource. The coastal lowlands are sunniest. Higher ground towards Le Pouce and the central plateau loses a few per cent to cloud that builds over the mountains, mostly in the afternoon.

Location (approx.)	Elevation	GHI kWh/m²/yr	Optimum-tilt kWh/m²/yr	PV output kWh/kWp/yr
Port Louis lowlands (Vallée Pitot)	134 m	1,886	1,989	1,564
Long Mountain / Sainte-Croix side	153 m	1,890	1,984	1,591
Upper Vallée des Prêtres	326 m	1,813	1,913	1,533
Foothills below Le Pouce	384 m	1,833	1,911	1,539

GHI = sunshine on a flat surface. Optimum tilt is 20° facing north at all four points. PV output assumes a typical, well-built ground-mounted plant. Source: Global Solar Atlas / Solargis long-term averages.



Monthly sunshine on the horizontal, Port Louis lowlands (kWh/m²). December is the peak and June the low point; the June output is about 60% of December's on flat ground, but only ~80% on a north-tilted panel.

Why the sun's path matters on a slope

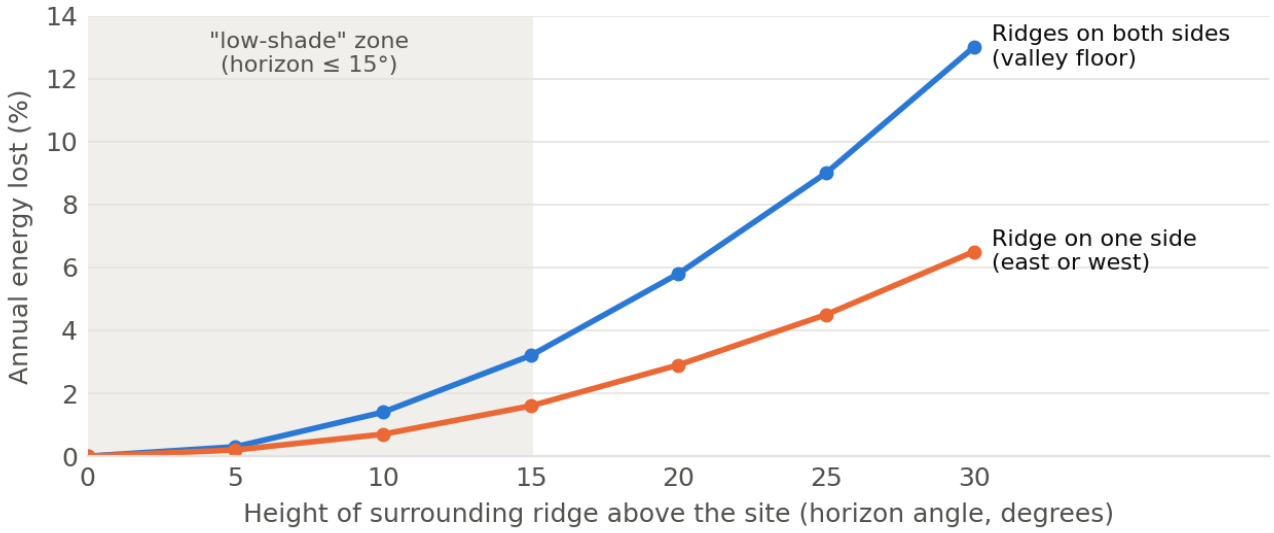
Date	Sunrise	Sunset	Noon sun height	Sun above 15°
21 June (winter)	6:44	17:39	46° (to the north)	8:01 – 16:22
28 September (screenshots)	5:55	18:07	72° (to the north)	7:02 – 16:59
21 December (summer)	5:27	18:48	87° (almost overhead)	6:40 – 17:35

Calculated for Port Louis (20.2° S). In winter the midday sun sits in the northern sky at under 50°, so slopes facing south lose most in the months when output is already lowest. The screenshot times line up with the model: at 7:01 am and 4:56 pm on 28 September the sun was about 15° high, so any ground still in shadow at those moments has a ridge more than 15° above it.

2 · TERRAIN SHADING

How much do the mountains cost?

We modelled a north-facing panel tilted at 20° with ridges of different heights to the east (blocking morning sun) and the west (blocking evening sun), using the Port Louis monthly irradiance above. Low morning and evening sun carries little energy, so modest ridges cost surprisingly little. The losses climb quickly once the horizon passes about 20°, and valley floors pay twice, morning and evening.



Annual energy lost to blocked direct sun for a 20° north-facing array. A ridge to the east and a ridge to the west of the same height cost the same, because the model's weather is symmetrical through the day.

Two extra effects make valleys worse than this chart shows:

- **Less open sky.** About 40% of Port Louis sunshine arrives as diffuse light from the whole sky. A valley floor that sees only part of the sky loses a share of that too. For ridges of 25–30° on both sides this adds roughly another 3–6%.
- **Afternoon cloud.** Cloud tends to build over Le Pouce and Pieter Both during the day, so west-facing hollows under the peaks lose more than the model suggests. The satellite data already show about a 3–4% drop at the foot of Le Pouce.

Rule of thumb for "low-shade" sites

Horizon (ridge height above site)	One side only	Both sides (valley)	Verdict
up to 10°	< 1%	~1–2%	**Excellent**
10–15°	1–2%	2–4%	**Good (low-shade)**
15–25°	2–5%	4–9%	**Acceptable if other factors are good**
over 25°	5%+	9–13%+	**Avoid**

Losses include blocked direct sun and, for valleys, an allowance for reduced sky view. They are indicative only.

3 · SLOPE DIRECTION AND STEEPNESS

Which way should the slope face?

If panels are mounted flat on the hillside (the cheapest option on steep ground), the direction and steepness of the slope set the yield. The table shows annual energy relative to the ideal: facing north, tilted 20°.

Slope faces	0°	5°	10°	15°	20°	25°	30°	35°	40°
North	96%	98%	99%	100%	100%	100%	99%	97%	95%
North-east	96%	97%	98%	98%	98%	98%	97%	95%	94%
East	96%	96%	95%	94%	93%	92%	90%	89%	87%
South-east	96%	94%	92%	90%	87%	84%	80%	77%	74%
South	96%	94%	91%	87%	83%	79%	75%	70%	65%
South-west	96%	94%	92%	90%	87%	84%	80%	77%	74%
West	96%	96%	95%	94%	93%	92%	90%	89%	87%
North-west	96%	97%	98%	98%	98%	98%	97%	95%	94%

Slope steepness in degrees (5° ≈ 9% gradient, 15° ≈ 27%, 25° ≈ 47%). Green: 97% or more of the ideal; pale green: 92–97%; amber: 85–92%; salmon and red: under 85%. East and west are equal in this model; in practice west-facing ground near the peaks suffers slightly more from afternoon cloud.

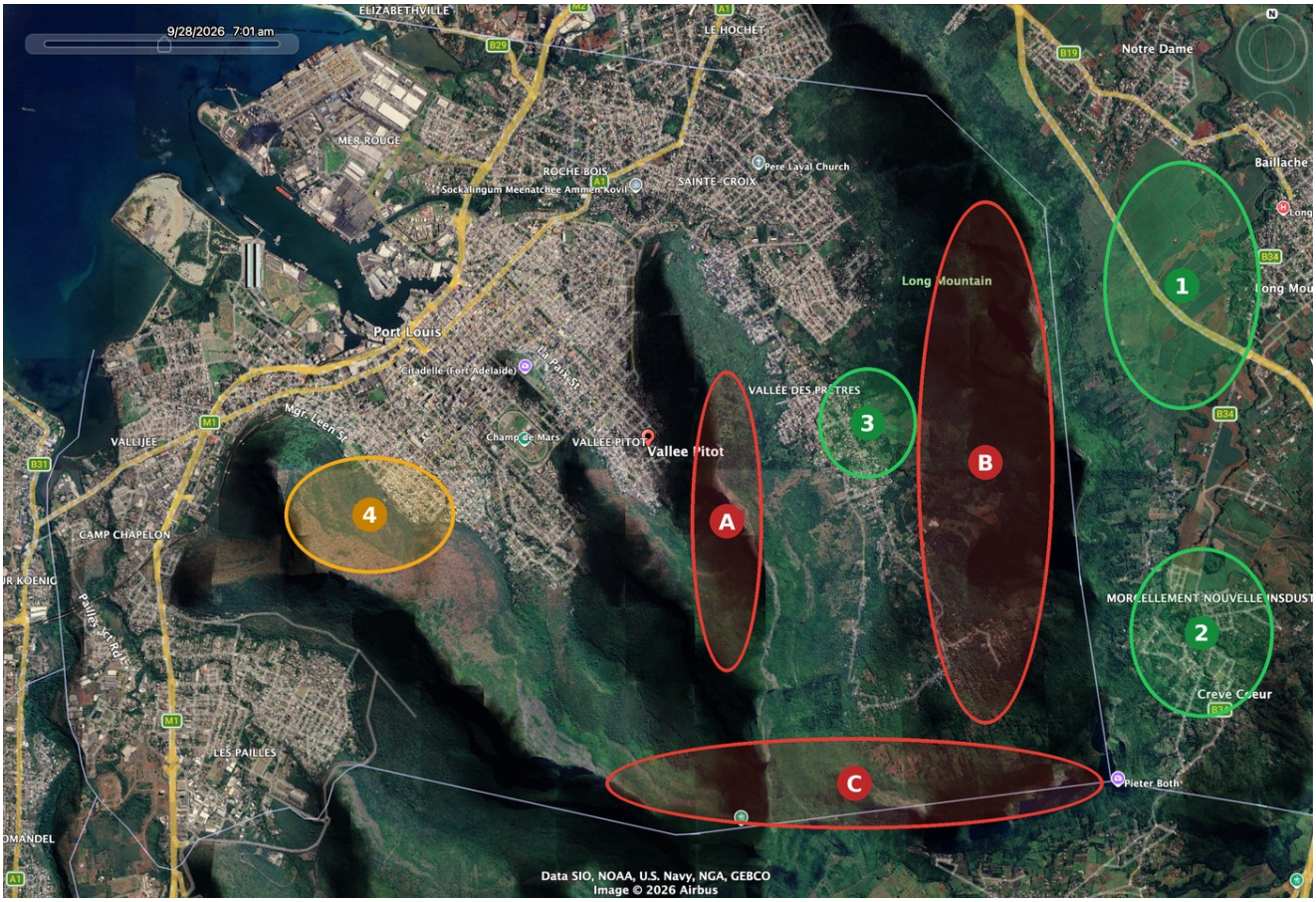
What this means on the ground

- **North, north-east and north-west slopes of up to about 30° are all excellent**: 96–100% of the ideal, with panels simply following the ground.
- **East and west slopes are fine up to about 15–20°** (93–95%). Steeper, they lose more, and the ridge above usually adds shade.
- **South-facing slopes are poor for PV**: 83% at 20° and 75% at 30°, with the worst losses in winter. They are better kept for forest or other uses.
- **Flat or gently sloping land** can carry racked panels at the ideal 20° north tilt, whatever the direction of a slight slope, at the cost of wider row spacing. This is usually the cheapest route to full yield.
- Steep ground (over about 15–20°) raises the cost of civil works, access tracks, drainage and cyclone-rated foundations far more than it raises yield. The best “mountain” sites are really the gentle shoulders and foothills.

4 · THE BEST LOW-SHADE PLACES

Where the shadows fall

The terrain screenshots of 28 September show where shadow lies when the sun is about 15° high, at 7:01 am and 4:56 pm. Ground still dark at those times has a ridge higher than 15° in that direction, the threshold from section 2. The zones below are drawn by eye from those images and are indicative only.



7:01 am, 28 September: sun about 15° high in the east. The west-facing flank of Long Mountain (B) and the Vallée Pitot gorge (A) are still in shadow; zones 1–4 are in sun.



4:56 pm, 28 September: sun about 16° high in the west. Shadow now falls on the east-facing sides of the ridges, including part of zone 4 below Signal Mountain; zones 1–3 remain largely in sun.

Zone summary

Zone	Character	Shade	Indicative yield	Comment
1 Long Mountain east flank (Notre Dame – Baillache)	Gentle east / north-east facing cane land along the B19/B34	Sun from about sunrise; ridge shade only after ~5:15 pm. Loss ≈ 0.5–1%	**~1,560–1,590 kWh/kWp**	Best all-round candidate. Large, gentle, accessible; suits agrivoltaics. Mostly just outside the Port Louis boundary.
2 Crève Coeur foothills	Gentle lower slopes and the industrial estate	Morning sun from ~6:15; evening shade from ~5:00 pm. Loss ≈ 1–2%	**~1,540–1,580 kWh/kWp**	Good for ground-mount on open plots and rooftops in the estate; close to demand.
3 Upper Vallée des Prêtres (shoulder)	North-facing shoulder between the two ridges	Shade both ends of the day, but ridges mostly under 15°. Loss ≈ 2–3%	**~1,480–1,520 kWh/kWp**	Pockets of open land among housing; smaller schemes and community solar.
4 Signal Mountain north-west flank	Dry grassland on steep north-west slopes above Mgr Leen St	Morning sun from ~6:30; eastern part shaded from ~4:30 pm. Loss ≈ 2–4%	**~1,500–1,550 kWh/kWp**	Sunny and dry, but steep and highly visible from the city. Planning and landscape sensitivity likely to be the limit.
A Vallée Pitot gorge	Deep, narrow valley	Ridges well over 20° on both sides	**7–13%+ below the ideal**	Avoid: steep, densely built, slope-stability concerns.
B Long Mountain west face	Forested, west-facing slopes	Morning shade until ~7:30–8:00 am	**5–9% below the ideal**	Avoid: clearing forest undermines the ESG case and increases erosion.
C Le Pouce – Pieter Both upper slopes	Steep summit slopes and cliffs	Long shadows, cloud-prone	**Poor and costly**	Avoid: likely protected mountain land, no access, extreme cyclone exposure.

Yields are indicative long-term averages for a well-built fixed-tilt plant after shading, based on the Global Solar Atlas values in section 1 and the shading model in section 2. Shade times are read from the 28 September screenshots.

Also worth considering: zero-shade rooftops

For comparison, the large warehouse and industrial roofs around the port (Mer Rouge) and in Les Pailles have no terrain shading at all, sit in the sunniest part of the city and are next to strong grid connections and demand. A portfolio that pairs one of the gentle Long Mountain or Crève Coeur sites with rooftop capacity usually gives the best balance of yield, cost and approvals.

5 · PRACTICAL CONSIDERATIONS

What else decides a hillside site

Planning and protected land	Much of the high ground around Port Louis is state land, mountain reserve or visually sensitive skyline. Check the Outline Planning Scheme, Planning Policy Guidance and reserve boundaries early. Larger ground-mounted schemes are likely to need an environmental licence (PER or EIA). Confirm with the Ministry of Environment.
Slope stability and drainage	Steep slopes in the Port Louis ranges have a history of erosion and rock-fall after heavy rain. Hillside arrays need a geotechnical survey, controlled run-off and maintained vegetation beneath the panels.
Cyclones	Structures must be designed for Mauritian cyclone wind loads. Exposed ridges and upper slopes see the highest winds, another reason to prefer sheltered, gentle foothills.
Access and grid	Construction and cleaning need vehicle access. Grid connection cost and CEB capacity often decide the business case more than a few per cent of yield. Sites near existing roads and the urban grid (zones 1–2) score well.
Heat and soiling	Cooler air at elevation slightly improves panel efficiency, but dust from the port and roads, and sea salt, need a cleaning plan. Dry grassland sites also carry a fire risk in the dry season.
Land use and ESG	Clearing native forest would undercut the environmental case. Existing cane land (zone 1) suits agrivoltaics: panels raised above crops or grazing, which keeps farming income.

Suggested next steps

- Shortlist two or three parcels in zones 1–3 and confirm ownership, zoning and reserve status.
- Run a site horizon survey (drone or phone app) at each parcel to confirm ridge heights are under ~15°.
- Commission a formal yield study (PVsyst or similar) using the site horizon and Solargis data, plus geotechnical and grid-connection checks.
- Feed the resulting yields into the RA-ESG project calculator to test tariffs, financing and payback.

Method and sources

Irradiance: Global Solar Atlas 2.x (World Bank / Solargis), long-term averages for four points in the study area, retrieved September 2026. Sun positions: standard NOAA solar-position equations for 20.17° S, 57.51° E, UTC+4. Slope, direction and horizon losses: an hourly model calibrated to the Port Louis monthly totals, with an anisotropic sky model and 20% ground reflectance. Shading zones: interpreted from terrain-rendered satellite screenshots of 28 September 2026 (Apple Maps / Airbus imagery) at 6:02–7:01 am and 4:03–6:02 pm.

This document is for discussion only. It is not a bankable energy yield assessment, planning advice or an engineering design.