NOVERA®

The New Era Begins

Next-Generation Thermo-Reflective Systems

Thermal Intelligence for Buildings & Cities

Microsphere-based technology grounded in science, validated by independent testing, delivering immediate impact on the thermal load of buildings, roofs, façades and urban structures.

CHAPTER 1

INTRODUCTION AND STRATEGIC CONTEXT

MODERN CITIES UNDER EXTREME THERMAL PRESSURE

Cities are increasingly transforming into heat-stressed environments

- Roofs and facades routinely reach 70–80 °C during summer months.
- Urban surfaces absorb large amounts of heat and release it long after sunset.
- This drives thermal stress for residents, extreme energy demand peaks, deteriorating health conditions and accelerated ageing of urban structures.
- Air-conditioning systems operate at the limits of their capacity, resulting in more failures and rising operational costs.
- The Urban Heat Island effect is becoming a critical factor in urban energy stability.

BUILDINGS DESIGNED FOR A DIFFERENT CLIMATE

Most buildings were never engineered for today’s extreme climatic loads

- Historical design standards and material specifications did not anticipate current levels of UV exposure or rapid thermal cycling.
- Waterproofing systems, metal sheets and façade assemblies now reach temperatures that shorten their service life by several years.
- Structures experience thermal expansion, micro-cracking, joint degradation and accelerated ageing of critical components.
- Original certifications and performance assumptions often no longer reflect real operating conditions.

WHY PASSIVE INSULATION IS NO LONGER ENOUGH

Insulation acts only after heat has already entered the building envelope

- The primary challenge occurs at the surface, where solar energy is absorbed.
- Passive insulation does not address the infrared spectrum, which accounts for 50–60% of total thermal load.
- Buildings now require an active surface layer that:
    - Reflects incoming solar heat.
    - Rapidly emits absorbed energy (high emissivity).
    - Prevents overheating of structural layers.

NOVERA intervenes before the heat penetrates the roof, facade or interior.

THE SCIENTIST BEHIND THE TECHNOLOGY:
Dip.-Ing. Alojzy Thiel, CSIO

A world-class scientific authority responsible for transferring advanced military technologies into civilian applications

- 40+ years of research into microsphere-based systems under extreme operating conditions.
- Originally involved in the development of specialised membranes for military submarines (IR stabilisation and microclimate control).
- Long-standing collaborations with Fraunhofer, TÜV, DLR, TECNALIA and CTU Prague.
- Founder of the core principles behind today's NOVERA technology — controlled emissivity, IR reflection and multilayer thermal systems.
- Lead developer and co-owner of NOVERA Technologies.

His work provides the scientific foundation and credibility of the entire NOVERA system.

CHAPTER 2

PHYSICS & TECHNOLOGY

THE PRINCIPLE OF MICROSPHERE TECHNOLOGY

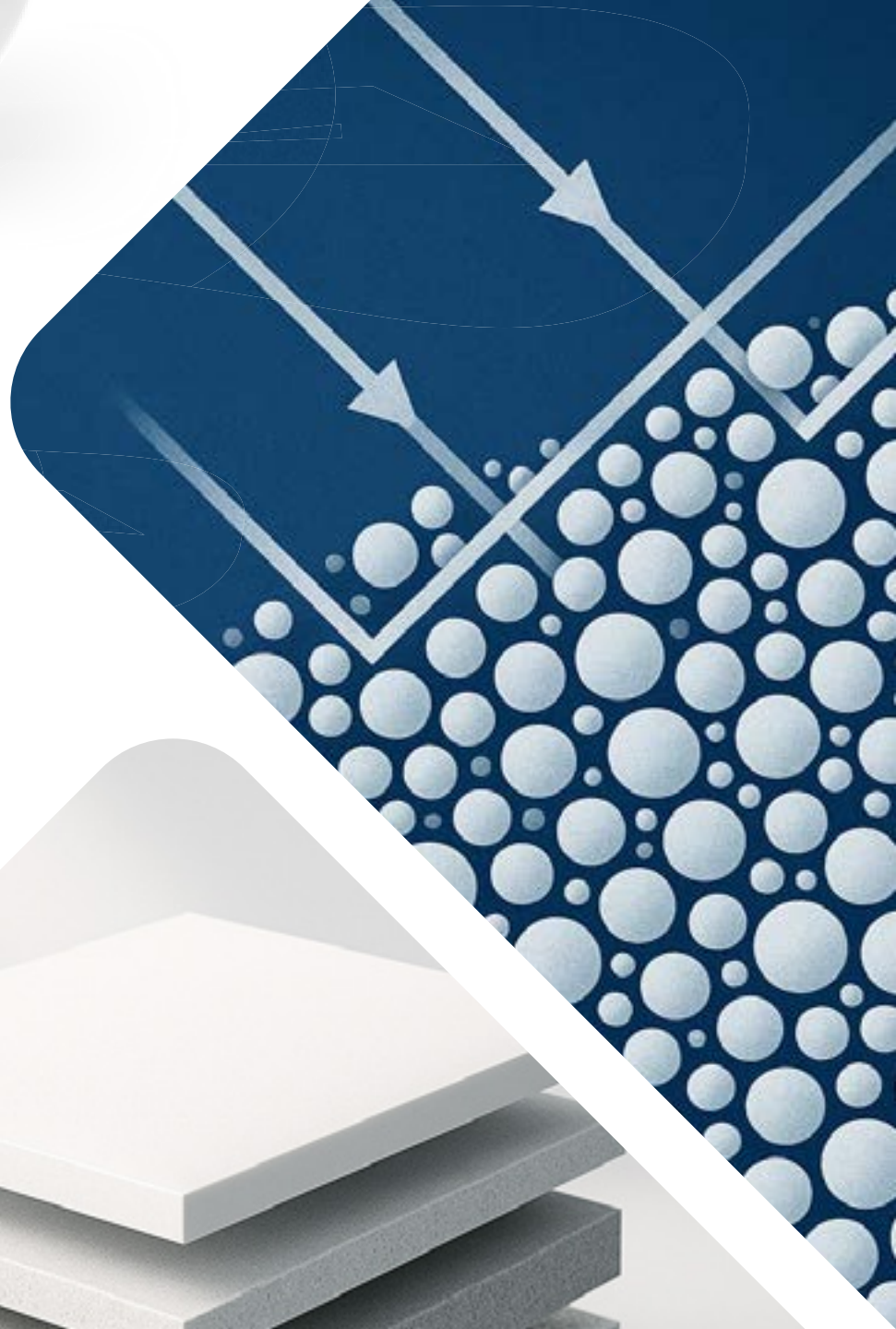
Every millimetre of the layer contains millions of ceramic and glass microspheres

- The microspheres act as 360° micro-mirrors, reflecting infrared radiation.
- Their gas-filled hollow structure significantly reduces thermal conduction.
- The material remains stable from –35 °C to +80 °C.
- Microspheres do not age or deform, as they are not pigments but a physical structural element.

Result: the surface resists overheating and the underlying structure stays cool.

SR, EMISSIVITY & SRI: THE CORE PHYSICS

NOVERA Reflex — the fundamental physical parameters that enable a permanently cool surface



SR ≈ 0.88

Solar Reflectance — proportion of incoming solar energy reflected away

Emissivity ≈ 0.86

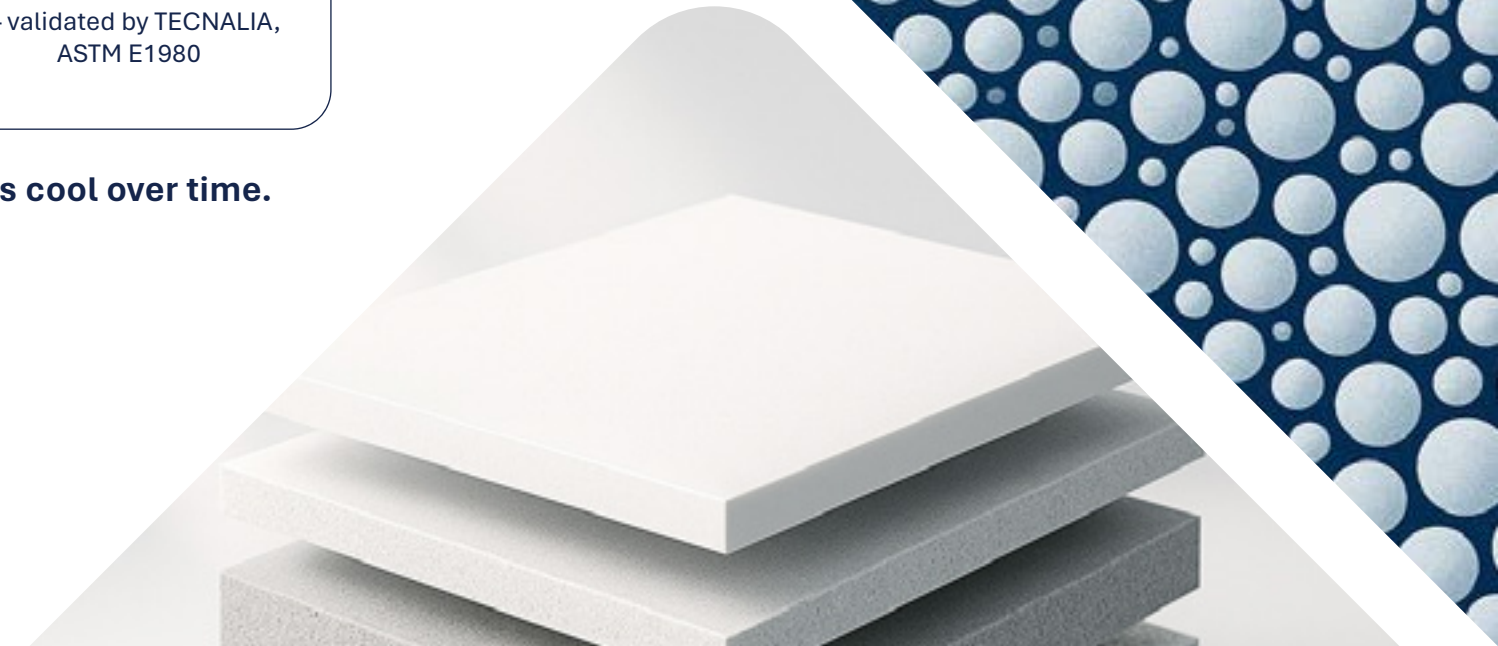
Rate at which the surface releases absorbed heat

SRI ≈ 107

Solar Reflectance Index — validated by TECNALIA, ASTM E1980

High reflectance + high emissivity = a surface that remains cool over time.

NOVERA ranks among the world's most effective thermal-cooling surface technologies.



NOVERA & THE INFRARED SPECTRUM

**Real thermal load lies in the infrared range,
which represents 50–59% of all solar energy — not in visible light**

- Conventional pigment-based coatings reflect visible (VIS) light, but not IR.
- NOVERA operates across the NIR, MIR and FIR bands.
- Its performance does not decline with dust, pollution or urban smog.
- The technology maintains a stable physical effect over many years.

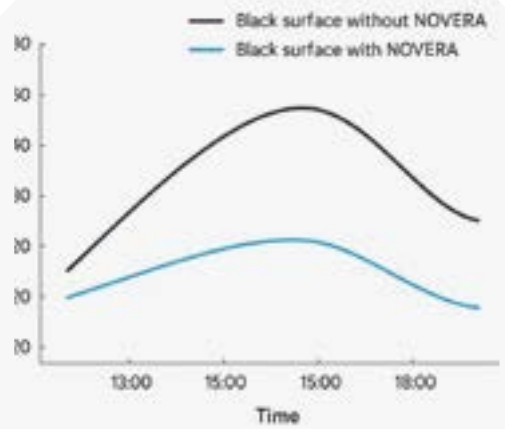
This is why NOVERA delivers reliable performance in urban environments, industrial settings and extreme conditions.

STABILITY OF THE THERMAL GRADIENT

NOVERA fundamentally transforms the temperature profile of the entire structure

- Reduces heat build-up in structural layers and waterproofing systems.
- Minimises both daily and seasonal thermal expansion.
- Slows the development of micro-cracks and joint failures.
- Measured data (ČVUT Prague):
  - Heat flux without NOVERA: 110–145 W/m^2
  - Heat flux with NOVERA: 45–70 W/m^2 → 45–60% reduction in thermal load

The structure operates in a cooler, more stable thermal regime.



ECOLOGY, HYGIENE & TiO_2

NOVERA is a 100% environmentally safe technology with 0% VOC

- Water-based formulation with no toxic solvents.
- Odour-free — suitable for interiors, schools and healthcare facilities.
- TiO_2 content enables photocatalysis, breakdown of organic contaminants and a bactericidal effect.
- Self-cleaning properties activated under UV exposure.

Fully compliant for use in food-processing environments, healthcare settings and residential buildings.

CHAPTER 3

THE NOVERA SYSTEM

NOVERA = A SYSTEM, NOT A COATING

NOVERA is a physically engineered multilayer architecture

- **NOVERA Cleaner** – Removal of grease, biofilm and surface contaminants.
- **NOVERA PNT** – Penetration primer ensuring uniform absorption and adhesion.
- **NOVERA HydroRepair + Spider** – Elastic waterproofing layer with structural reinforcement.
- **NOVERA Reflex / Exterior / Interior** – Functional microsphere-based thermal membranes.

The system delivers full performance only when applied as an integrated whole.

SYSTEM ARCHITECTURE STEP BY STEP

Diagnostics → Cleaning → Priming → Repair → Functional Layer → Performance Verification

- Diagnostics include IR thermography, substrate assessment and adhesion testing.
- Each substrate type (concrete, metal sheet, bitumen, PVC) follows clearly defined application procedures.
- **Objective:** physical integrity, strong adhesion and maximum functional performance.

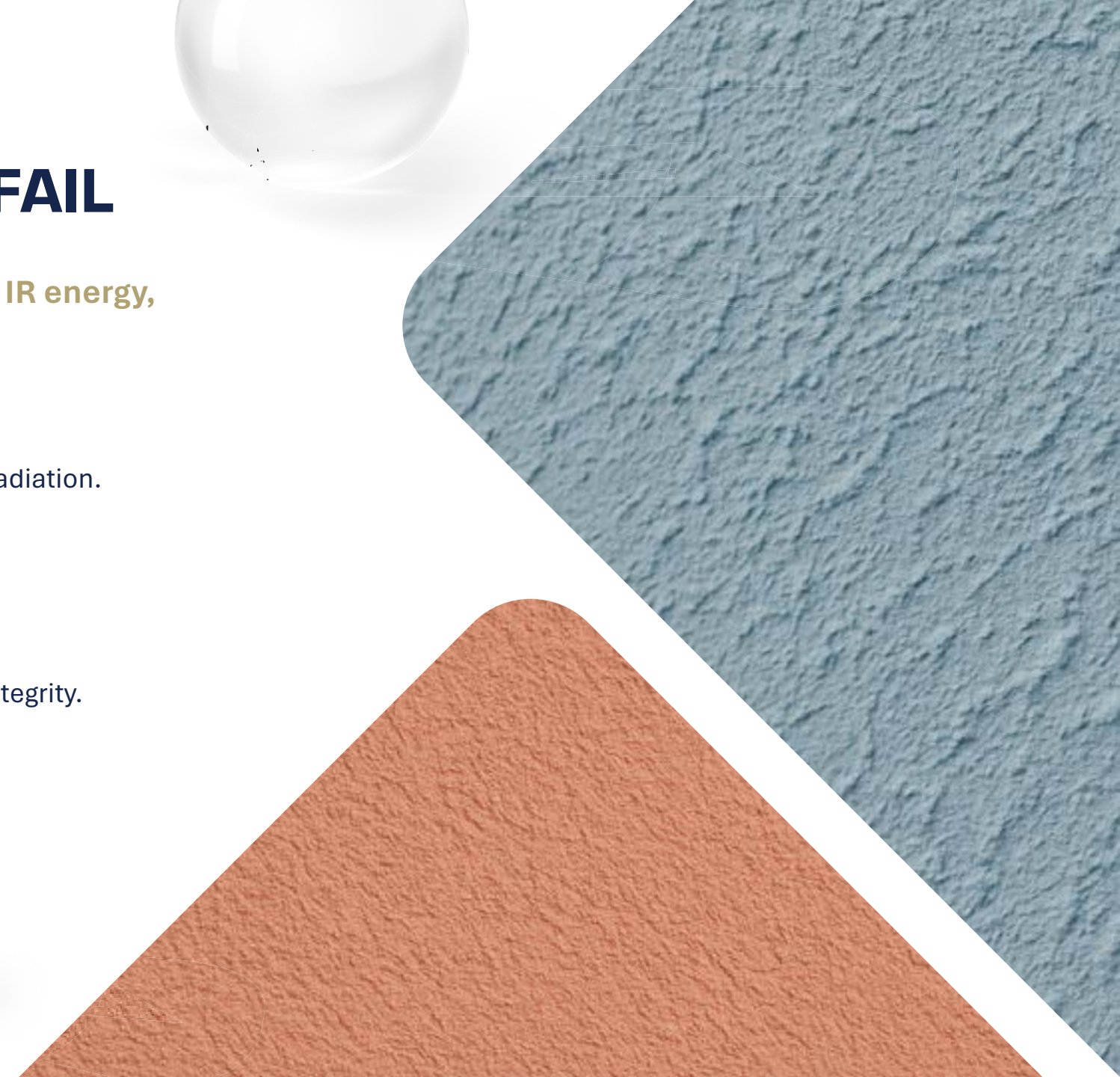
The system provides a 25–30 year service life, including the waterproofing layer.

WHY CONVENTIONAL REFLECTIVE COATINGS FAIL

Traditional reflective coatings cannot manage IR energy, and light reflection alone is insufficient

- Pigments reflect visible light but do not control infrared radiation.
- The performance of standard coatings drops sharply when contaminated with dust or pollution.
- After 1–2 seasons they grey, crack and delaminate.
- They do not address structural issues or waterproofing integrity.
- NOVERA can also work with other pigments.

NOVERA is a physical system — not a pigment-based coating.



PERFORMANCE IN REAL-WORLD OPERATION

Typical results measured across Europe, Asia and the GCC:

- Surface temperature reduction: **–27–40 °C**
- Extreme reductions on dark substrates: **up to −43 °C**
- Cooling energy savings: **25–40%**
- Lower structural thermal stress: **10–18%**
- Heat-flux reduction: **45–60%**

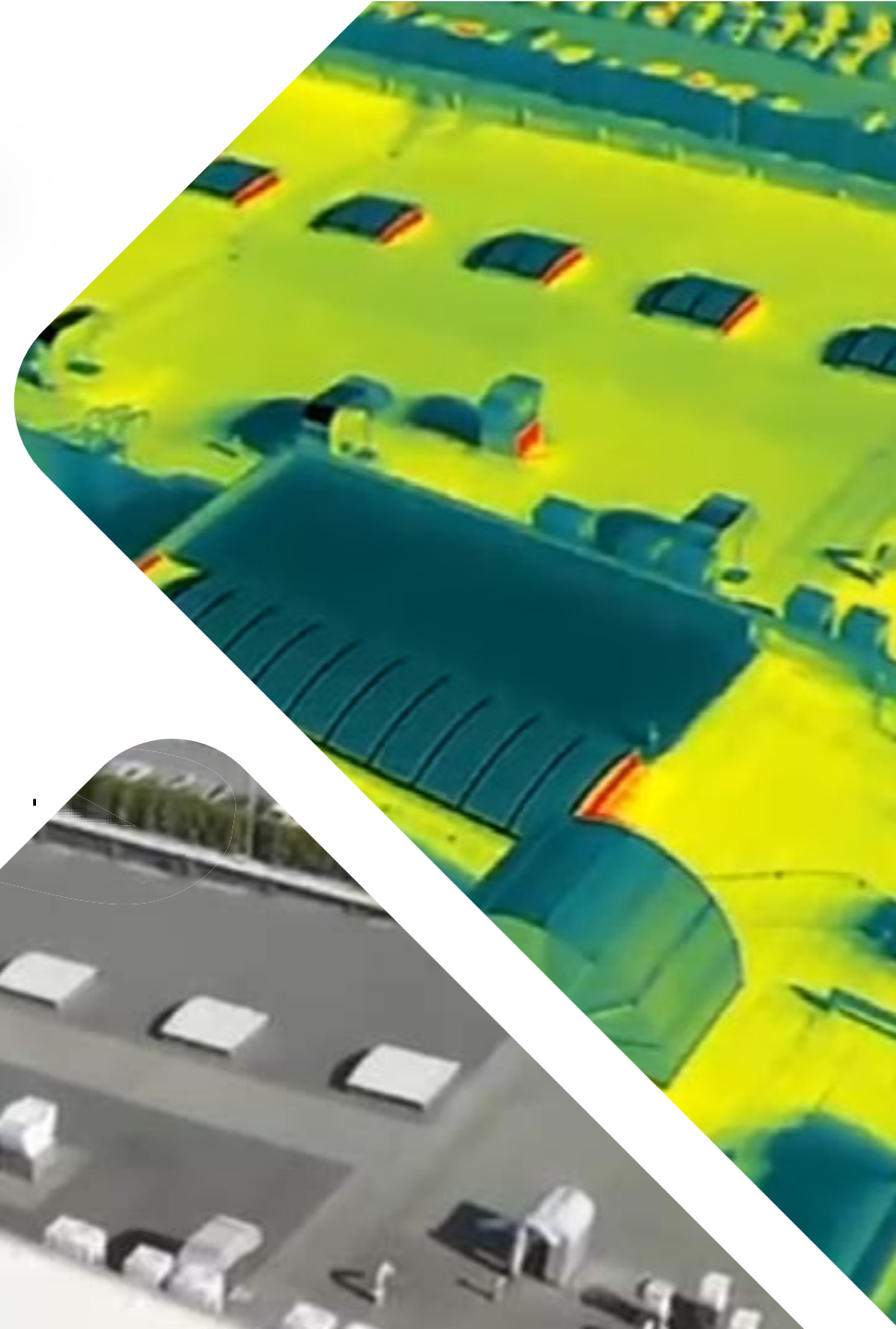
Performance remains consistently stable across multiple climate zones.

IR THERMOGRAPHY

IR imaging demonstrates changes in thermal behaviour within minutes

- Untreated surfaces: 65–80 °C (red/orange spectrum).
- NOVERA-treated surfaces: 28–45 °C (blue/green spectrum).
- On dark substrates, temperature differences reach up to −43 °C.

Thermography provides the strongest visual evidence of the technology’s effectiveness.

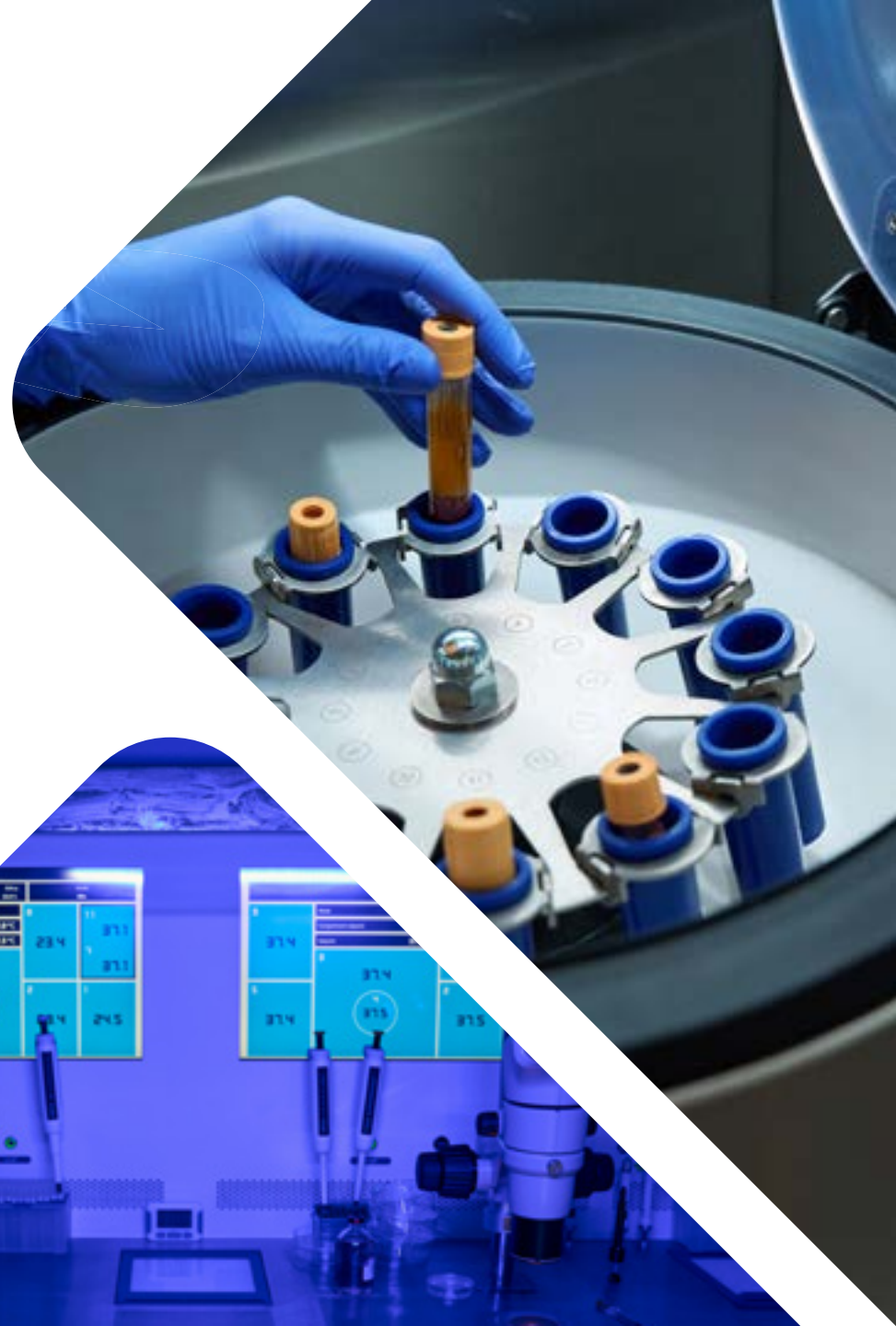


LONG-TERM TESTING (> 25 YEARS)

Validated under extreme conditions and confirmed through long-term exposure

- **UV chambers**
- **Salt-spray testing**
- **Humidity cycling**
- **Thermal shock from −35 °C to +80 °C**
- **Extended outdoor weathering:**
  - No significant loss of SR or emissivity.
  - No structural or functional failure.
  - Polymer elasticity fully preserved.

The technology is engineered to deliver 25–30 years of dependable performance.

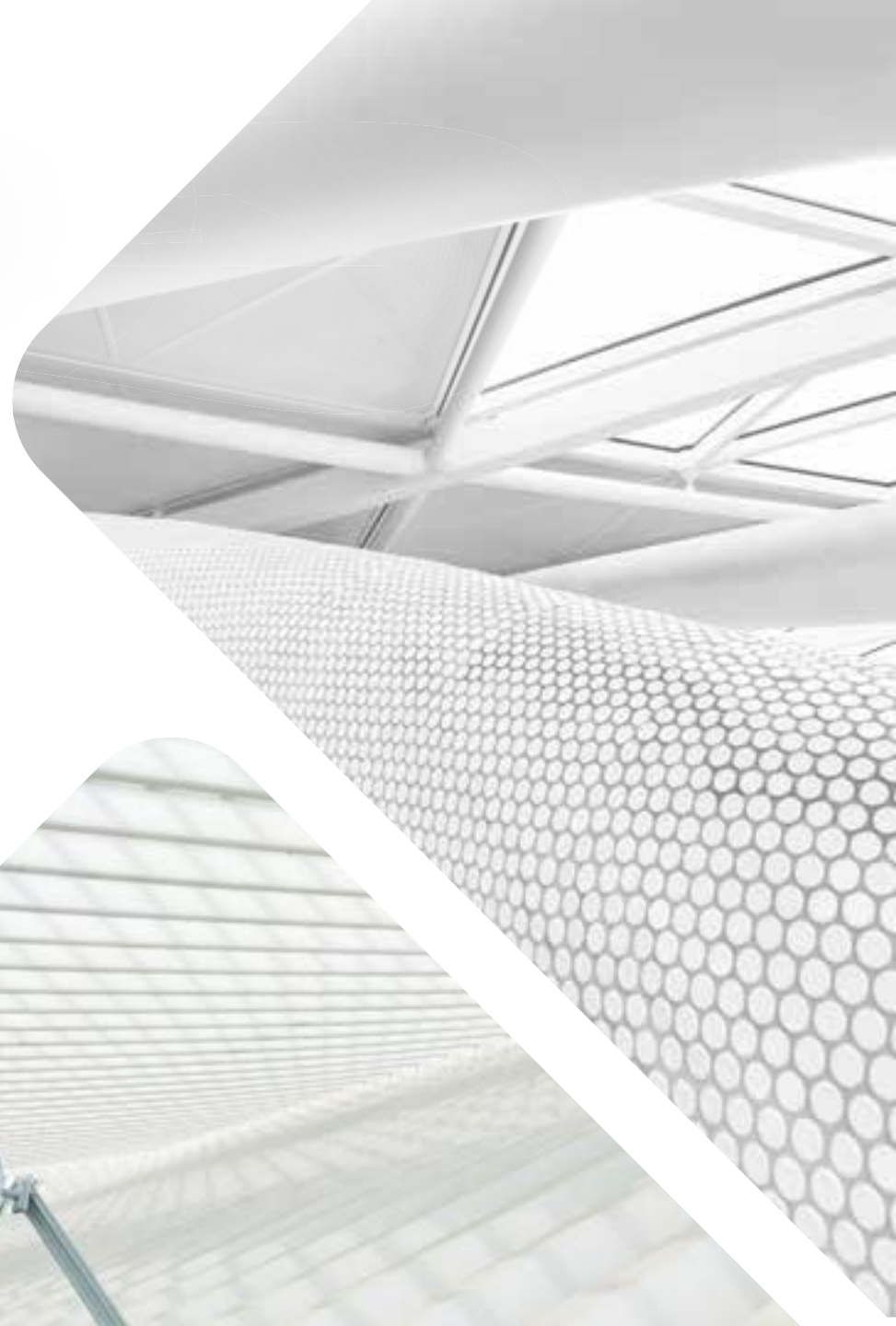


STRUCTURAL LONGEVITY

NOVERA reduces thermal stress within the building envelope, significantly extending roof lifespan

- Reduced thermal expansion of roofs and facades.
- Fewer micro-cracks and structural fractures.
- Slower degradation of waterproofing membranes.
- More stable operating temperatures across the construction layers.
- NOVERA Exterior and NOVERA Interior can be tinted with any water-based paint without losing their original thermal-insulation properties.

Result: roof service life extended by +30–50%.



FIRE RESISTANCE: B ROOF (T3)

NOVERA complies with EN 13501: B ROOF (T3)
— the strictest European classification for roof fire performance

- Does not propagate flame.
- Does not support combustion.
- Resistant to flying fire and external ignition sources.
- Safe even under high-temperature exposure.

Suitable for industrial facilities, hospitals, public buildings, logistics centres and airports.

PERFORMANCE IN REAL-WORLD OPERATION

Data validated in independent audits and confirmed through long-term field measurement.

Measured parameters:

- SRI ≈ 107
- SR ≈ 0.88
- Emissivity ≈ 0.86

ESG Contributions:

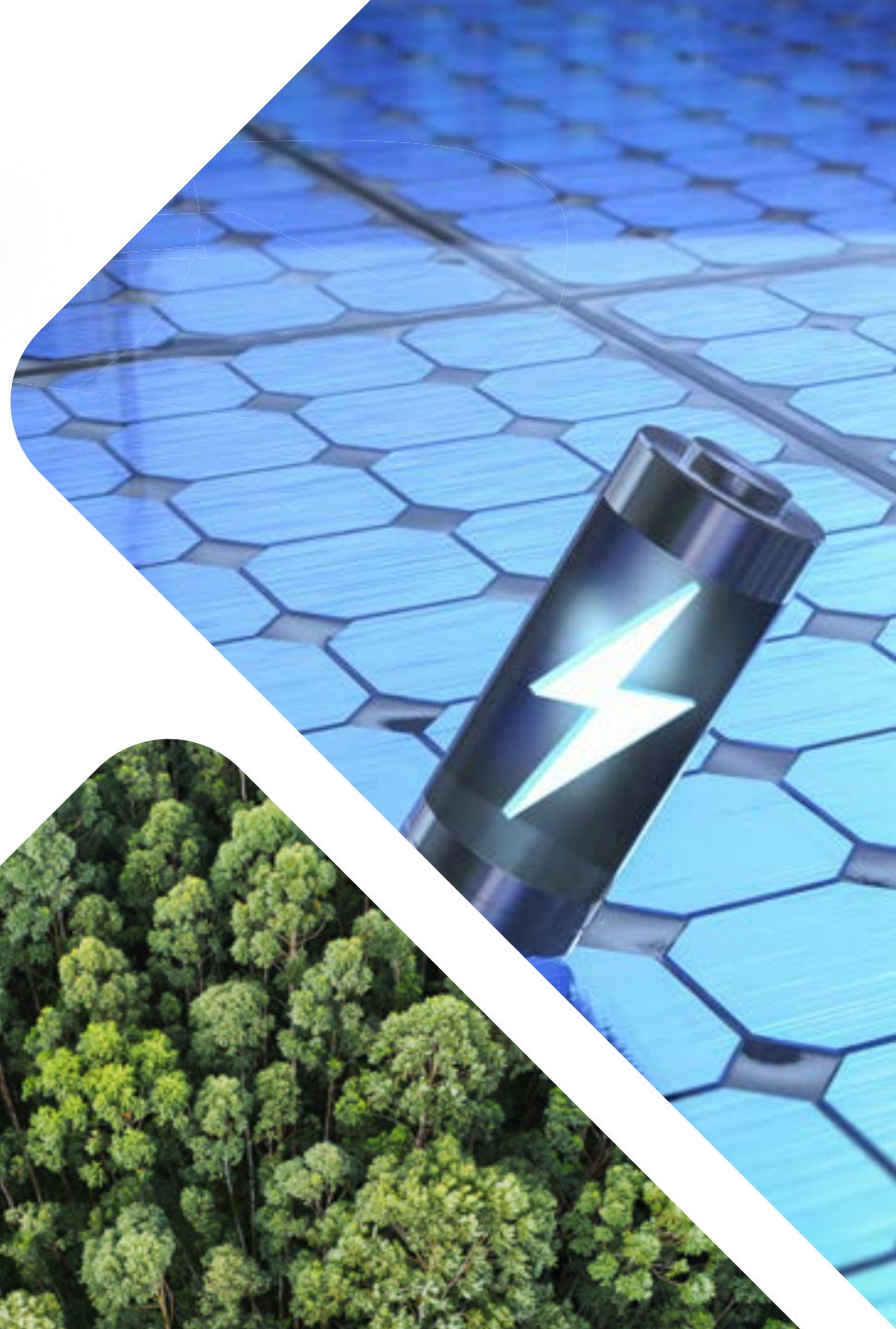
- Environmental: 0% VOC, reduced CO_2 emissions, long service life, urban cooling benefits.
- Social: improved thermal comfort, hygienically safe technology.
- Governance: independent certifications and fully auditable performance data.

CHAPTER 4

ENERGY & ECONOMICS

ENERGY & CO_2 (MODEL: 1,000 M²)

A technology that delivers an immediate reduction in both emissions and energy consumption



Model roof: 1,000 m^2

- Annual energy savings: **20–35 MWh**
- CO_2 reduction: **8.4–14.7 tonnes per year**

A solution with an instant environmental impact.

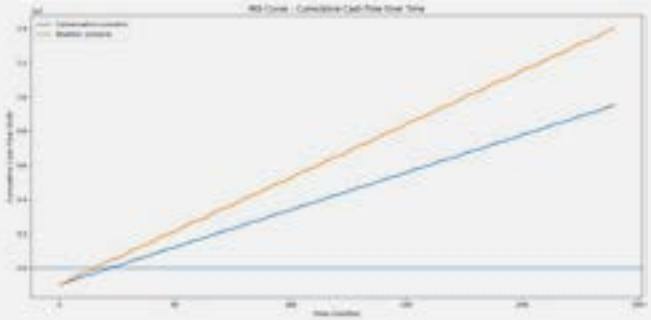
- Equivalent impact:
  - Comparable to the annual consumption of 8–12 households.
  - Equal to 50,000–90,000 km of car travel.
  - 350–600 trees per year.

ECONOMICS & RETURN ON INVESTMENT

Proven results that enhance the value and performance of every building

- Cooling energy savings: 25–40%
- Reduction of peak loads: up to 50%
- Roof lifespan extension: +30–50%
- Lower incidence of HVAC failures

Investment payback: 2–4 years.

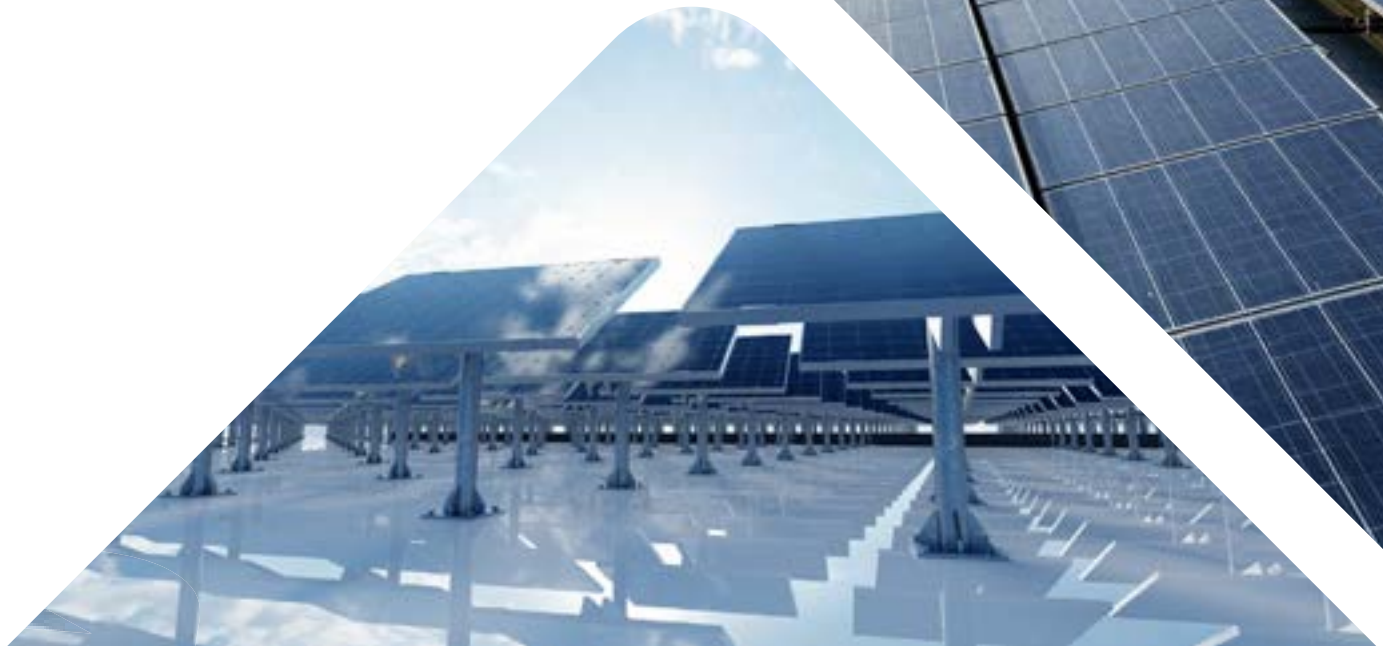


PHOTOVOLTAICS: A POWERFUL SYNERGY

High SRI significantly enhances bifacial PV performance, with reflected irradiance boosting output by up to 50%

- PV modules have a temperature coefficient of –0.45% / °C.
- NOVERA lowers module temperatures by 20–40 °C, resulting in a 20–60% increase in power output, depending on panel type.
- Reduced cell degradation and a more stable voltage profile.

Higher annual yield and extended module lifespan.



CHAPTER 5

APPLICATIONS & SOLUTIONS

RESIDENTIAL & COMMERCIAL

High-performance solutions for homes and commercial buildings — without compromise

Residential buildings:

- Elimination of attic and roof overheating.
- More stable interior temperatures.
- Suitable for both new construction and refurbishment.
- Cooling energy savings of 25–40%.
- Improved HVAC performance and reliability.
- Better thermal conditions in server rooms and technical spaces.

INDUSTRIAL: PERFORMANCE UNDER EXTREME CONDITIONS

When harsh operating environments demand real, measurable performance, NOVERA delivers

- Reduction of internal hall temperatures by **10–18 °C.**
- Reduction of machine operating temperatures by **8–15 °C.**
- **20–40%** decrease in equipment failure rates.
- Improved workplace safety and thermal comfort.

Proven effective in industrial halls where conventional systems fail.

INFRASTRUCTURE: AIRPORTS, STADIUMS & LARGE COMPLEXES

Large-scale assets demand solutions that can withstand continuous operation, thermal load and extensive surface area

- Application possible without operational downtime.
- Significant reduction of thermal stress across large structures.
- Typical use cases: airport roofs, stadiums, transport hubs and large public complexes.

REFERENCE:

Dammam Airport (Saudi Arabia) — 10,000 m^2
treated, with measurable reductions in cooling costs.

SMART CITIES & URBAN COOLING

A key instrument for modern urban climate-adaptation strategies

- Reduction of neighbourhood temperatures by 4–6 °C.
- Lower peak energy demand.
- Improved evening and night-time cooling.
- Higher resident comfort and reduced health risks.

A core technology for climate-adaptation strategies in contemporary cities.

CHAPTER 6

PRODUCTS

THE NOVERA PRODUCT RANGE

A comprehensive technology — from microsphere science to a fully functional system

- **NOVERA Reflex** — Microsphere-based roofing membrane.
- **NOVERA Exterior** — Thermo-reflective façade coating.
- **NOVERA Interior** — Interior coating for condensation and mould prevention.
- **NOVERA HydroRepair** — Elastic waterproofing compound.
- **NOVERA PNT** — Penetration and adhesion primer.
- **NOVERA Spider** — Structural reinforcement fabric.
- **NOVERA Cleaner** — Professional-grade cleaning and surface preparation.

The products operate as a physical system, not as standalone coatings.

TECHNICAL PARAMETERS (CHEAT-SHEET)

The key metrics that define the real-world performance and physical impact of the technology

- SR: **0.88**
- Emissivity: **0.86**
- SRI: **107** (TECNALIA, ASTM E1980)
- Surface temperature reduction: **27–40 °C; extreme cases up to −43 °C**
- Heat flux: **110–145 → 45–70 W/m²**
- HydroRepair: 25 m water column resistance, elasticity > 300%
- System lifespan: **25–30 years**
- VOC: **0 %**

KEY REFERENCES

Independent energy audits confirm stable performance across industries and climate zones.

- **Plakor Czech**
  50,000 m^2 — audited energy savings.
- **Dammam Airport (Saudi Arabia)**
  10,000 m^2 — measurable reduction in cooling costs.
- **Continental (Germany / Hungary)**
  Stabilisation of technical systems and thermal conditions.
- **Poland**
  Sports facilities and food-processing operations.

Consistent, repeatable results across multiple climatic environments.

SUMMARY & CTA

Key performance benefits — and a ready-to-deploy solution that can transform your building

- Surface temperature reduction: 27–40 °C
- Cooling energy savings: 25–40%
- Roof lifespan extension: +30–50%
- PV performance increase: +20–60%
- Compliance: B ROOF (T3), 0% VOC, stable SRI, SR and emissivity parameters

WE ARE READY TO DESIGN
A SOLUTION FOR YOUR BUILDING.

NOVERA®

The New Era Begins

Thank you for your attention.

Let us work together on a pilot project where you can conduct your own measurements and verify the system’s performance first-hand.