MEER | MIRRORS FOR EARTH'S ENERGY REBALANCING

# Why MEER Exists

Mission and Scientific Rationale | November 2026

> *Protecting communities from extreme heat. Advancing the science of cooling. Helping restore balance to Earth's energy system.*

## 1. The Problem – A Planet Out of Balance

Our planet is warming, and the consequences are becoming increasingly apparent. Across the world, heatwaves are intensifying, glaciers and ice sheets are losing mass, oceans are accumulating heat, and communities are experiencing growing pressures on health, livelihoods, infrastructure and natural ecosystems.

Behind these changes lies a fundamental physical problem: Earth is currently absorbing more energy from the Sun than it releases into space.

This is known as Earth's energy imbalance.

### 1.1 Understanding Earth's Energy Imbalance

Earth receives enormous quantities of energy from the Sun. Some incoming sunlight is reflected back into space by clouds, atmospheric particles and the Earth's surface. The remainder is absorbed by the atmosphere, oceans and land.

The Earth system also releases energy into space as thermal infrared radiation.

Over sufficiently long periods, a relatively stable global climate requires incoming absorbed solar energy and outgoing thermal radiation to be approximately balanced. When the planet absorbs more energy than it releases, energy accumulates within the climate system, contributing to warming.

Human activities have disrupted this balance.

The burning of fossil fuels, changes in land use, deforestation and industrial activities have increased atmospheric concentrations of greenhouse gases, particularly carbon dioxide and methane.

These gases absorb and emit infrared radiation, reducing the amount of energy escaping to space at a given temperature and atmospheric state. This creates a positive radiative imbalance, causing the climate system to accumulate additional energy until warming and other adjustments increase outgoing radiation sufficiently to restore balance.

Most of the excess energy accumulated by the Earth system enters the oceans, with smaller amounts warming the atmosphere and land and contributing to the melting of ice.

This continuing accumulation of energy is a fundamental physical consequence of anthropogenic climate change.

### 1.2 Sunlight In, Heat Out

There are two principal components of Earth's planetary energy balance.

The first is incoming solar radiation. Some sunlight is reflected into space, while the remainder is absorbed by the Earth system.

The second is outgoing thermal infrared radiation, through which Earth releases energy back into space.

Most established climate mitigation strategies focus on reducing greenhouse gas emissions and atmospheric greenhouse gas concentrations. These actions address the principal human cause of the present energy imbalance and are indispensable to long-term climate stabilisation.

However, the planetary energy balance can also be influenced by the amount of incoming solar radiation that is reflected back into space.

Increasing reflection can reduce the amount of solar energy absorbed by the Earth system, provided the reflected radiation ultimately escapes to space.

This represents an additional physical pathway worth investigating.

MEER exists to explore how managing energy exchanges at Earth's surface can provide practical cooling benefits while potentially contributing to a more balanced planetary energy system.

## 2. The Opportunity – Surface Radiative Thermal Management

MEER's scientific and technological approach is centred on Surface Radiative Thermal Management (SRTM).

SRTM concerns the management of energy exchange at exposed surfaces, particularly through the reflection of incoming solar radiation and the emission of thermal infrared radiation.

The underlying physics is well established.

A dark roof exposed to strong sunlight typically absorbs a large proportion of incoming solar energy. This energy increases the roof's temperature and can subsequently be transferred to the surrounding air and the building interior.

A highly reflective roof absorbs less incoming sunlight and can therefore remain considerably cooler under comparable conditions.

Similarly, materials designed to emit thermal infrared radiation efficiently can help surfaces release heat to their surroundings and, under suitable atmospheric conditions, contribute to radiative cooling.

MEER investigates how these principles can be applied through practical, affordable and scalable technologies.

### 2.1 Reducing Solar Energy Absorption

Solar reflection reduces the amount of incoming radiation absorbed by a surface.

This can be achieved using reflective coatings, films, mirrors and suspended structures that intercept or redirect sunlight.

The cooling effect depends on the material's spectral reflectance, the intensity and angle of incoming sunlight, surface geometry, local weather conditions and interactions with surrounding surfaces.

Highly reflective materials can reduce solar heating of buildings, outdoor environments and other exposed surfaces.

However, the direction of reflected sunlight is also important.

A mirror-like surface may redirect radiation in a relatively concentrated direction, whereas a diffusely reflective coating scatters sunlight over a broader range of angles.

These differences can affect local radiant exposure, atmospheric interactions and the proportion of reflected radiation that ultimately escapes into space.

MEER therefore considers both the amount and the direction of reflected energy when evaluating reflective technologies.

## 2.2 Improving Thermal Radiation

All objects above absolute zero emit thermal radiation.

At temperatures typical of Earth's surface, much of this emission occurs in the infrared region of the electromagnetic spectrum.

Passive Daytime Radiative Cooling (PDRC) materials are designed to combine high solar reflectance with strong thermal infrared emissivity, particularly within wavelengths where the atmosphere can be relatively transparent to outgoing radiation.

Under favourable conditions, such materials can reduce surface temperatures and may achieve temperatures below the surrounding ambient air.

Their effectiveness depends on atmospheric humidity, cloud cover, wind, solar radiation, material properties and the thermal connection between the surface and its surroundings.

Importantly, radiative cooling does not depend on water consumption or evaporation as its primary cooling mechanism.

However, surfaces also exchange energy through conduction, convection and, where relevant, evaporation. These processes continue to influence the overall cooling performance.

Radiative cooling should therefore be understood as part of the complete surface energy balance rather than an isolated mechanism.

## 2.3 Why This Matters

By reducing solar absorption and improving thermal emission, SRTM technologies can change how surfaces accumulate and shed waste heat.

Potential benefits include lower roof and surface temperatures, reduced indoor heat exposure, improved outdoor thermal conditions and reduced demand for mechanical cooling in suitable applications.

Unlike conventional air conditioning, passive cooling materials generally do not require continuous electricity consumption to produce their primary cooling effect.

They may therefore offer important opportunities in communities where electricity is expensive, unreliable or unavailable.

MEER's objective is to translate these established physical principles into technologies that are practical, durable, safe, environmentally responsible and affordable to deploy.

## 3. The Immediate Need – Protecting People from Extreme Heat

Extreme heat is already a serious and growing threat to human health and wellbeing.

Even with rapid and sustained reductions in greenhouse gas emissions, societies will continue to face substantial heat-related risks because of existing warming and further warming that may occur.

Adaptation is therefore essential.

For millions of people, cooling is not simply a question of comfort. It is increasingly important for health, productivity, education, food security and the ability to undertake everyday activities safely.

The consequences are particularly severe in communities with limited access to reliable electricity, insulated buildings, mechanical cooling and healthcare.

### 3.1 Cooling Buildings and Communities

Buildings can become dangerously hot when exposed surfaces absorb substantial quantities of solar radiation.

Metal roofs, poorly ventilated structures and buildings without effective thermal protection may experience elevated indoor temperatures, particularly during periods of intense sunlight.

Reflective roofing materials and passive radiative cooling coatings can reduce solar heat absorption and, under appropriate conditions, lower indoor temperatures.

Suspended reflective canopies offer a different approach by intercepting incoming solar radiation before it reaches the underlying surface.

These systems may provide cooling opportunities for homes, schools, healthcare facilities, markets, outdoor workplaces and public spaces.

MEER is developing and investigating technologies intended to improve thermal conditions without requiring continuous energy consumption.

The organisation's emphasis is on solutions that can eventually be manufactured, installed and maintained affordably in the places where they are most needed.

### 3.2 Evidence from Sierra Leone

MEER's field research in Sierra Leone has provided encouraging evidence of the potential for reflective technologies to reduce heat exposure.

Measurements from selected installations have indicated indoor temperature reductions of approximately 3–6°C under particular conditions.

These observations demonstrate the potential for meaningful local cooling, but they should not be interpreted as universal performance expectations.

Actual results depend on the intervention, building construction, ventilation, weather conditions, measurement methodology and the comparison used.

Further controlled monitoring is required to establish reproducibility, seasonal performance, durability and the conditions under which similar benefits can be achieved.

MEER's research programme seeks to move beyond individual temperature observations towards more comprehensive evaluations of thermal performance, environmental conditions and human exposure.

## 3.3 Protecting Human Health

Extreme heat can increase the risk of dehydration, heat exhaustion, heatstroke and cardiovascular strain. It can also exacerbate existing health conditions and impair physical and cognitive performance.

The risks are especially significant for older people, individuals with underlying health conditions, outdoor workers and those living in poorly protected buildings.

MEER's physiological heat research aims to investigate how changes in environmental conditions affect human thermal exposure and physiological responses.

This work includes environmental monitoring, personal temperature measurements and other physiological observations.

An important scientific distinction must be maintained between reducing environmental temperatures and demonstrating improvements in human health outcomes.

Lower temperatures can reduce certain forms of heat exposure, but the resulting health benefits must be assessed using appropriate physiological and epidemiological evidence.

MEER's longer-term objective is to develop a stronger evidence base connecting passive cooling technologies with meaningful improvements in human health and wellbeing.

## 3.4 Protecting Livelihoods and Essential Services

Extreme heat also affects education, labour productivity, agriculture and the delivery of essential services.

Outdoor workers may face reduced working capacity and increased occupational health risks. Schools and healthcare facilities may become uncomfortable or unsafe during periods of intense heat.

In agricultural settings, excessive temperatures can affect crops, livestock, soil conditions and water demand.

MEER is investigating applications that may help address these challenges.

In India, the organisation is developing cooling approaches for street vendors, including technologies intended to reduce solar exposure around mobile vending structures.

Research may also investigate whether improved thermal conditions can contribute to preserving fresh produce and supporting livelihoods.

In Sierra Leone, MEER has explored cooling applications involving homes and community infrastructure, alongside research into human heat exposure.

These activities represent practical climate adaptation: helping people and communities cope more safely with the consequences of a warming climate.

At the local level, MEER's objective is to reduce harmful heat exposure, improve thermal conditions and strengthen community resilience.

## 4. The Bigger Opportunity – Investigating Climate Mitigation

Climate adaptation helps people and ecosystems cope with the consequences of climate change.

Climate mitigation addresses the processes driving climate change.

Reducing greenhouse gas emissions remains the most important and established pathway for limiting future warming. Carbon dioxide removal may also play an important role in reducing atmospheric concentrations of greenhouse gases.

These approaches are essential.

However, Earth's temperature is ultimately governed by the balance between absorbed solar radiation and outgoing thermal radiation.

If the amount of solar energy absorbed by the Earth system could be reduced, this could influence the planetary energy balance.

MEER investigates whether reflective technologies deployed at sufficiently large scales could contribute to such an effect.

### 4.1 From Local Reflection to Planetary Energy Balance

Increasing the reflectivity of a surface generally reduces the amount of solar energy absorbed by that surface.

However, additional sunlight reflected from the ground does not necessarily escape into space.

Some reflected radiation may be absorbed or scattered by atmospheric gases, clouds and aerosols. Its subsequent behaviour depends on wavelength, direction, atmospheric conditions and the geographical location of the intervention.

Consequently, additional reflection measured at the surface cannot automatically be treated as an equivalent change in Earth's top-of-atmosphere energy balance.

This distinction is fundamental.

For example, a reflective material may produce substantial local cooling while having a smaller or more complex effect on planetary radiation.

Conversely, the wider climatic consequences of a reflective intervention may depend on where and when it is deployed, not simply on its total area.

MEER therefore seeks to connect measurements of surface radiative performance with atmospheric modelling and estimates of top-of-atmosphere radiative effects.

### 4.2 Understanding the Potential Scale

Earlier simplified MEER calculations have explored scenarios in which highly reflective surfaces increase reflected solar power by approximately 100–112 W/m² relative to the surfaces they replace.

Such values may be useful for illustrating the potential magnitude of surface-level changes under particular assumptions.

However, they are not universal performance figures and should not be interpreted as validated estimates of planetary radiative forcing.

The resulting climate effect would depend on deployment location, seasonal and daily sunlight, background surface reflectivity, cloud cover, atmospheric absorption, material performance and other factors.

Earth's total surface area is approximately 510 million square kilometres. An area equivalent to 1% of Earth's surface would therefore be approximately 5.1 million square kilometres.

Deploying reflective technologies across an area of that magnitude would represent an exceptionally large engineering, economic and environmental undertaking.

It would also require careful consideration of land use, materials, manufacturing capacity, maintenance, governance and potential unintended consequences.

Although simplified calculations can help frame research questions, they cannot establish a particular global temperature reduction.

Any credible estimate of planetary cooling would require robust atmospheric and climate modelling, including the effects of feedbacks and regional climate responses.

### 4.3 Could Reflective Surfaces Contribute to Global Cooling?

In principle, increasing the amount of incoming sunlight reflected back into space could reduce Earth's net energy gain.

Whether surface-based reflective technologies could achieve a climatically meaningful effect at practical deployment scales remains an open scientific question.

The answer depends on several factors, including the amount of additional radiation escaping the Earth system, the geographical distribution of interventions, atmospheric interactions and the persistence of the resulting radiative changes.

Potential changes in regional temperatures, atmospheric circulation, precipitation and ecosystems must also be investigated.

MEER does not assume that planetary-scale cooling is already achievable through its technologies.

Instead, the organisation aims to establish the scientific evidence needed to assess their potential, limitations and wider consequences.

The objective is to investigate whether practical surface cooling technologies can also contribute to reducing Earth's positive energy imbalance, without overstating what current evidence demonstrates.

## 5. Why Earth's Energy Imbalance Matters

Global warming is not simply a matter of rising air temperatures.

It reflects a continuing accumulation of energy within the Earth system, driven principally by anthropogenic greenhouse gas forcing.

The oceans absorb most of this excess energy, creating long-term consequences for marine environments, sea levels and the wider climate system.

Even if greenhouse gas emissions were reduced substantially, existing atmospheric concentrations and accumulated ocean heat would continue to influence climate conditions.

This is why it is important to distinguish between greenhouse gas emissions, atmospheric concentrations, radiative forcing and Earth's energy imbalance.

## 5.1 Reducing the Causes of Warming

Reducing greenhouse gas emissions addresses the principal human cause of ongoing global warming.

Sustained reductions in emissions, alongside appropriate carbon dioxide removal, can help stabilise and eventually reduce atmospheric greenhouse gas concentrations.

These actions are indispensable for long-term climate stabilisation.

MEER recognises that reflective cooling technologies cannot replace emissions reductions.

They also cannot address every consequence of elevated atmospheric carbon dioxide, including ocean acidification.

## 5.2 Investigating Additional Physical Pathways

SRTM technologies offer a different set of potential interventions.

At the local level, they can reduce solar heating and improve thermal conditions.

At sufficiently large scales, changes in surface reflectivity may influence the amount of solar energy absorbed by the Earth system.

These are distinct physical effects and require different forms of scientific validation.

Local cooling can be investigated through direct measurements of temperature, radiation and heat exposure.

Planetary energy-balance effects require additional atmospheric observations, radiative transfer calculations and climate modelling.

The possibility that reflective technologies could influence Earth's energy imbalance is scientifically legitimate, but its practical magnitude and consequences remain uncertain.

MEER seeks to investigate this possibility through transparent, reproducible research.

## 5.3 Complementary Climate Action

The climate challenge requires both immediate protection from dangerous heat and sustained action to limit further warming.

Emissions reductions, ecosystem protection, climate adaptation and research into additional cooling approaches can be complementary when their benefits and risks are properly understood.

MEER's contribution is to investigate surface-based cooling technologies that may provide practical benefits now while advancing scientific understanding of wider radiative effects.

The organisation does not present SRTM as a substitute for established climate mitigation.

Instead, it seeks to determine whether these technologies can become a responsible and evidence-based component of a broader climate response.

# 6. MEER's Approach – Adaptive Mitigation

MEER describes its approach as adaptive mitigation, an organisational framework connecting immediate climate adaptation with research into potential wider climate mitigation.

The concept begins with technologies capable of providing measurable local benefits.

These technologies are then developed, tested and evaluated for affordability, durability, safety and scalability.

As scientific understanding improves, MEER investigates whether their deployment at increasing scales could also influence wider energy flows and climate outcomes.

The approach recognises that local adaptation and planetary mitigation are related but distinct objectives.

## 6.1 Two Connected Objectives

The first objective is immediate and practical: reducing harmful heat exposure.

Reflective roofs, cooling paints and suspended canopy systems may help improve thermal conditions in buildings and outdoor environments.

Their effectiveness can be evaluated through direct environmental measurements and, where appropriate, physiological studies.

The second objective is longer term: understanding whether surface radiative interventions could contribute to wider climate mitigation.

This requires scientific investigation of atmospheric interactions, radiative forcing, geographical deployment and potential unintended effects.

MEER seeks to advance both objectives while maintaining clear distinctions between established findings, research hypotheses and future ambitions.

## 6.2 Principal Technology Development Programmes

MEER's current technological development strategy concentrates on two principal programmes.

### Suspended Reflective Canopy Systems

MEER develops lightweight, modular canopy systems designed to intercept and redirect incoming solar radiation before it reaches underlying surfaces.

Potential applications include agricultural land, outdoor workplaces, healthcare facilities, public spaces and other environments vulnerable to excessive heating.

Functional prototypes have been developed and deployed in Sierra Leone, providing practical experience in reflective materials, structural supports, suspension systems, anchoring, installation and maintenance.

The current engineering programme focuses on improving fabrication methods, mechanical reliability, material attachment, durability and cost efficiency.

Ultrasonic welding and associated attachment technologies are important areas of development.

MEER aims to combine continued engineering improvements with field research using existing functional canopy systems.

Future development will require further structural testing, environmental monitoring, durability assessment and practical evaluation under different operating conditions.

### Passive Daytime Radiative Cooling Paint

MEER is also developing and investigating low-cost PDRC paints and coatings.

These materials are intended to combine high solar reflectance with strong thermal infrared emission, reducing solar heating while supporting radiative heat release.

The programme includes materials research, laboratory testing, field monitoring and evaluation of manufacturing and deployment requirements.

Important development considerations include optical performance, cooling effectiveness, durability, substrate compatibility, material safety, environmental impacts and affordability.

MEER's internal cost objective is approximately USD 5 per square metre or less, where technically feasible.

This is a development target rather than a confirmed cost for a fully validated, widely deployed product.

The organisation aims to establish whether coatings meeting appropriate performance, safety and durability requirements can be produced and deployed economically at increasing scale.

## 6.3 Supporting Scientific and Technical Activities

These principal technology programmes are supported by several interconnected areas of research and development.

Environmental monitoring provides measurements of solar radiation, temperature, humidity, wind and other conditions affecting cooling performance.

Human physiological research investigates the relationship between environmental heat exposure and human responses.

Materials science supports the development and evaluation of reflective and radiative surfaces.

Mechanical engineering addresses structural design, fabrication, installation and maintenance.

Data science and scientific modelling help analyse field measurements, investigate radiative processes and assess the potential effects of deployment across different environments.

Together, these activities form an integrated research and engineering programme.

## 6.4 Developing Technologies for Scale

Scalability is not simply a question of producing larger quantities of material.

A technology must be affordable, reliable, safe, practical to manufacture and suitable for installation and maintenance under real-world conditions.

MEER therefore aims to develop systems that can eventually be manufactured and deployed through local and regional partnerships.

This includes simplifying fabrication methods, reducing material costs, developing installation procedures, improving durability and strengthening technical capacity.

Scientific validation must proceed alongside engineering development.

The organisation's objective is to establish technologies that can move from experimental installations towards wider adoption where evidence demonstrates that they are effective, practical and environmentally responsible.

## 7. Building the Scientific Evidence

The fundamental physics of solar reflection and thermal radiation is well understood.

However, determining how a particular reflective intervention affects local temperatures, human exposure and the wider climate requires careful scientific investigation.

MEER's research programme seeks to connect established physical principles with reliable experimental evidence and increasingly sophisticated modelling.

### 7.1 Measuring Local Cooling Performance

Local performance evaluation requires more than measuring the temperature of a reflective surface.

A complete assessment may include surface temperatures, indoor and outdoor air temperatures, radiant heat exposure, solar radiation, thermal infrared emission, humidity, wind and relevant building or environmental characteristics.

Measurements must be interpreted against appropriate reference conditions.

For example, the temperature of a coated roof compared with an untreated roof is different from the temperature of that coated roof compared with ambient air.

Similarly, a reduction in roof-surface temperature does not necessarily produce an equivalent reduction in indoor air temperature.

MEER aims to use clearly defined measurements, appropriate controls, calibrated instruments and transparent analytical methods to establish reproducible results.

### 7.2 Evaluating Human and Environmental Outcomes

Temperature measurements provide important evidence, but they do not capture every consequence of an intervention.

For human health, the relevant outcomes may include thermal exposure, physiological strain, comfort, activity patterns and, where suitable research designs permit, health-related outcomes.

For agriculture, relevant measurements may include crop temperature, soil conditions, water demand, growth and productivity.

For buildings, evaluations may consider indoor temperatures, cooling-energy demand, ventilation and occupant experience.

MEER seeks to develop evidence that connects physical cooling performance with meaningful practical outcomes.

This is important for determining where technologies provide the greatest benefit and which communities or applications should be prioritised.

### 7.3 Understanding Atmospheric and Planetary Effects

One of MEER's longer-term scientific objectives is to investigate how additional sunlight reflected from surface interventions interacts with the atmosphere.

A mirror and a reflective white coating may reflect similar total quantities of solar radiation while distributing that radiation differently.

The resulting atmospheric interactions can depend on reflection angle, wavelength, clouds, aerosols and local atmospheric conditions.

MEER therefore seeks to combine surface measurements, atmospheric information and radiative transfer modelling.

A central research question is:

How much additional solar radiation reflected by a particular surface intervention ultimately escapes the Earth system?

Answering this question would help establish more reliable estimates of top-of-atmosphere radiative effects.

However, determining the wider climate consequences also requires consideration of atmospheric adjustments, changes in surface energy exchange, climate feedbacks and regional responses.

This research should distinguish between measured surface reflection, modelled radiative forcing and estimated climatic outcomes.

## 7.4 Scientific Transparency and Reproducibility

MEER's scientific credibility depends on the quality, transparency and reproducibility of its research.

The organisation aims to develop documented experimental protocols, appropriate data-quality procedures, clear analytical methods and scientifically defensible reporting.

Where appropriate, findings should be subjected to independent review and published through recognised scientific channels.

Research should report uncertainties, limitations and negative findings as well as successful outcomes.

The objective is not simply to demonstrate that a technology can produce cooling under favourable conditions, but to establish when it works, how well it performs, where it may be unsuitable and what improvements are required.

## 7.5 Environmental Safety and Lifecycle Impacts

The environmental performance of cooling technologies must be considered across their full lifecycle.

Reflective materials and coatings may require energy-intensive manufacturing, chemical inputs, transportation, maintenance and eventual disposal.

Relevant considerations include embodied carbon, chemical toxicity, material sourcing, durability, waste management and potential environmental effects during deployment.

For coatings, this includes evaluating hazardous constituents, volatile organic compounds, persistent chemicals and long-term material stability.

For canopy systems, relevant considerations include structural safety, material degradation, maintenance requirements and effects on underlying environments.

At larger scales, reflective interventions may also influence local ecology, hydrology, agricultural conditions and atmospheric processes.

MEER aims to assess these factors alongside cooling performance and affordability.

A technology should not be considered environmentally beneficial solely because it reflects sunlight or lowers temperatures.

Its wider environmental costs, benefits and potential trade-offs must also be understood.

## 8. Why MEER Is Needed Now

The climate crisis presents two simultaneous challenges.

The first is immediate: people and communities are already experiencing dangerous heat, and many lack affordable ways to protect themselves.

The second is planetary: Earth continues to accumulate excess energy, creating long-term risks for the climate system, ecosystems and human societies.

These challenges require urgent practical action alongside sustained scientific investigation.

MEER exists to work across both.

### 8.1 Closing the Cooling Gap

Conventional air conditioning provides important protection against heat, but it is not universally accessible.

Its costs, electricity requirements and infrastructure needs can place it beyond the reach of vulnerable communities.

In many locations, passive cooling technologies may provide useful alternatives or complements to mechanical cooling.

Reflective materials and radiative cooling systems offer opportunities to reduce solar heat absorption without continuous electricity consumption.

However, their effectiveness and practicality depend on local conditions, appropriate design and reliable installation.

MEER aims to develop and evaluate technologies that can help close this cooling gap.

### 8.2 Turning Scientific Principles into Practical Solutions

The scientific principles behind reflective and radiative cooling are established, but translating them into affordable, durable and widely deployable technologies remains challenging.

Materials must perform under real environmental conditions.

Manufacturing methods must be reliable and economical.

Installation systems must be safe and practical.

Long-term performance must be demonstrated.

The benefits must justify financial and environmental costs.

MEER seeks to address these challenges through applied research, engineering innovation, field demonstrations and collaboration with scientific and implementation partners.

The organisation's work connects laboratory investigation with practical experience in communities where cooling is urgently needed.

## 8.3 Building Evidence for Responsible Deployment

The potential for wider adoption depends on credible scientific evidence.

Governments, funders, manufacturers, community organisations and other stakeholders need reliable information about performance, costs, safety and long-term benefits.

MEER aims to generate evidence that supports informed decisions rather than relying on theoretical potential alone.

This includes identifying where technologies work effectively, understanding their limitations and developing appropriate standards for future deployment.

The same principle applies to the investigation of planetary-scale effects.

Any claims concerning global cooling or climate mitigation must be supported by scientifically defensible analysis.

## 8.4 Working Through Collaboration

MEER recognises that addressing extreme heat requires cooperation across scientific disciplines, institutions and communities.

The organisation's work brings together expertise in climate science, materials science, engineering, environmental monitoring, human physiology and practical field implementation.

Collaboration with universities, research institutions, community organisations, manufacturers, funders and public authorities can help strengthen scientific quality and support responsible deployment.

Local knowledge and technical capacity are particularly important.

Technologies intended for widespread use must be appropriate to the environments and communities in which they are deployed.

MEER therefore aims to support approaches that combine international scientific collaboration with practical local participation.

## 8.5 From Local Cooling to Wider Climate Understanding

The potential significance of MEER's work extends beyond individual technologies.

At the community level, successful interventions may reduce harmful heat exposure and improve living and working conditions.

At the technological level, improved materials and fabrication methods may make passive cooling more accessible and affordable.

At the scientific level, research into surface radiation and atmospheric interactions may improve understanding of how changes in surface properties affect energy flows.

At the planetary level, this knowledge may help establish whether appropriately deployed reflective technologies could contribute to wider climate mitigation.

These outcomes are connected, but they must be evaluated independently.

MEER's purpose is to turn promising physical principles into practical cooling solutions while developing the evidence needed to understand their wider potential.

# 9. Our Mission – Protecting Life Through Cooling

MEER is an international non-profit research and development organisation dedicated to investigating practical, affordable and scalable approaches to cooling through Surface Radiative Thermal Management.

Our mission is to protect people, communities and ecosystems from extreme heat while advancing scientific understanding of how reflective and radiative technologies could contribute to restoring Earth's energy balance.

We believe cooling deserves a more prominent place in the global climate response.

Not as a substitute for reducing greenhouse gas emissions, but as a complementary field of scientific research, technological development and practical action.

## 9.1 Our Immediate Purpose

Our immediate purpose is to reduce harmful heat exposure and improve thermal conditions in vulnerable communities.

We aim to develop technologies that can be applied to buildings, outdoor environments, agricultural settings and essential infrastructure.

Through field research and scientific monitoring, we seek to understand how these technologies perform and how they may contribute to improved health, wellbeing and resilience.

## 9.2 Our Scientific Purpose

Our scientific purpose is to advance understanding of how energy is absorbed, reflected, emitted and transferred at Earth's surface.

We investigate how changes in surface radiative properties influence local thermal conditions and, potentially, wider atmospheric and planetary energy flows.

Our research seeks to distinguish measurable local cooling benefits from possible regional and global climate effects.

The latter remain questions requiring rigorous scientific investigation.

## 9.3 Our Technological Purpose

Our technological purpose is to develop cooling systems that are practical, affordable, durable and capable of deployment at increasing scale.

Our principal development programmes focus on suspended reflective canopies and low-cost passive radiative cooling paints.

We aim to improve material performance, engineering reliability, manufacturing methods and installation procedures while evaluating environmental safety and lifecycle impacts.

The objective is to create technologies that can ultimately be adopted and maintained beyond individual research projects.

## 9.4 Our Long-Term Vision

We envision a world in which effective passive cooling is widely accessible, communities are better protected from extreme heat, and scientific understanding of surface radiative processes contributes to more resilient and sustainable societies.

We also envision a future in which the potential of surface-based reflective technologies to influence Earth's energy balance has been rigorously investigated.

If scientifically demonstrated to be effective, environmentally responsible and practical at sufficient scale, such technologies could provide an additional contribution to wider climate mitigation.

This remains a long-term research ambition rather than an established outcome.

## 9.5 Our Commitment

MEER's work is guided by scientific integrity, practical innovation, affordability, environmental responsibility and collaboration.

We are committed to developing technologies that respond to real human needs while maintaining transparency about their performance, limitations and uncertainties.

We recognise that the climate challenge requires both immediate adaptation and sustained mitigation.

Our contribution is to investigate how managing solar and thermal energy at Earth's surface can help address both.

MEER exists because the world needs practical ways to protect people from today's dangerous heat, alongside scientific innovation that may help address the deeper imbalance driving planetary warming.

Our ambition is simple:

**Cool communities. Advance the science. Help rebalance the Earth.**