Climate Positive Organisation

Definition Climate Adaptation

CREATING MEANINGFUL EXPERIENCES

ER&IM

<Date>

Breda University OF APPLIED SCIENCES

Climate Adaptation: Executive Summary

BUas will transform climate risks into opportunities by building a naturally resilient campus that protects against extreme weather whilst restoring thriving ecosystems.

1 Why it matters

Climate change poses significant risks to BUas' campus operations through increased flooding, heat stress, drought, and water safety challenges. Climate adaptation is essential to maintain operational continuity whilst advancing BUas' climate positive ambition. By implementing strategic adaptation measures, BUas addresses vulnerability to extreme weather events whilst demonstrating that adaptation and mitigation must be integrated rather than separate strategies.

2 Climate adaptation at BUas

Climate adaptation at BUas means proactively adjusting campus infrastructure and water systems to reduce vulnerability to flooding, drought, and heat stress. BUas' approach delivers multiple climate benefits: managing excess water during heavy rainfall, retaining water during dry periods, reducing heat stress, and enhancing the campus environment's capacity to support climate positive objectives.

3 Our ambition

BUas aims to be a good example of integrated climate adaptation by creating a campus that withstands climate extremes whilst actively contributing to climate mitigation. The ambition is to achieve measurable reductions in flood risk, heat stress, and water scarcity whilst demonstrating quantifiable contributions to our climate positive targets. BUas will show that climate adaptation measures are essential components of becoming climate positive, not optional additions.

4 Making it happen

BUas will begin with a commissioned baseline assessment to understand our current climate vulnerability and identify value-added interventions. An assignment will be commissioned to second year ABEL students to develop water management system proposals. Implementation will follow a phased approach addressing flooding, heat stress, and drought through targeted infrastructure improvements. Progress will be measured through climate risk indicators including water retention capacity, temperature reduction, and contribution to climate positive targets through transparent monitoring and evaluation.

5 Investment

Currently no dedicated investment is allocated for climate adaptation. These measures need to be integrated into BUas' regular budget cycle. Based on sector benchmarks, climate adaptation interventions typically require significant upfront investment in infrastructure improvements, followed by annual maintenance costs. Management needs to prioritise budget allocation for the baseline assessment as the critical first step to determine specific investment requirements and implementation phasing.

The investment in adaptation is an investment in BUas' resilience, reputation and regenerative future.

1 Available information

Scientific Knowledge and Key Frameworks
Climate Change Context: The Netherlands faces increasing risks from flooding, waterlogging, drought, heat stress, and water quality challenges due to climate change. These impacts significantly affect human health and the built environment.

Essential Frameworks:

- Framework Climate Adaptive Buildings (FCAB) - Standardized methodology developed by Dutch Green Building Council (DGBC) for assessing physical climate risk in buildings across five themes: flooding, waterlogging, drought, heat, and water quality.
- Klimaateffectatlas - Comprehensive mapping of climate impacts across the Netherlands, providing contextual information on soil conditions and adaptation opportunities.
- Biophilic Design Principles (Stephen Kellert) - Research-based methodology demonstrating that incorporating natural elements into built environments significantly benefits occupant mental health, productivity, and wellbeing.
- Het Nieuwe Normaal (HNN) - Framework for standardizing circular construction practices with specific performance levels for buildings (education building standards under development as of December 2024).

Current and Anticipated Legislation
Active: Energy Performance of Buildings Directive (EPBD) IV covers energy and climate adaptation considerations; Environmental Performance of Buildings (MPG) currently applies to new office buildings >100m².
Anticipated: Corporate Sustainability Reporting Directive (CSRD) will likely extend to educational institutions; MPG expansion to other building types including education facilities expected.

Local Context
Transitievisie Warmte Breda - City aims for complete CO2-neutrality by 2044, with focus on sustainable heating and climate resilience.
Regionale Energy Strategy West-Brabant (RES) - Regional collaboration on energy transition with climate resilience implications

2 BUas definition

Climate adaptation at BUas refers to proactive design and operational strategies that ensure our campus, buildings, and community can withstand and thrive amid climate change impacts. This encompasses protecting our physical infrastructure and occupants from climate-related risks while maintaining comfortable, safe, and functional learning and working environments.

To go beyond merely limiting BUas' vulnerability to climate change, Buas also committed to becoming a ZoOp and lead its sustainability journey through regenerative initiatives. While addressing risk mitigation measures, BUas shall engage annually with an ecological expert (or speaker of the living) to identify interventions that deliver value to nature and support their effective implementation.

For BUas, climate adaptation specifically addresses four primary climate risks relevant to our Breda location:

1. **Flooding** - Managing risks from extreme rainfall and potential water accumulation
2. **Drought and heat stress** - Ensuring campus functionality during prolonged dry periods and extreme heat events
3. **Water safety** - Designing systems to handle increased precipitation intensity
4. **Water management**: Ensuring sustainable control & use of water for human & environmental needs, balancing supply, demand, and ecosystem health.

BUas aims to **set a good example** in climate adaptation, positioning ourselves ahead of regulatory requirements while remaining pragmatic and achievable. This ambition level reflects our commitment to:

- Proactive risk management":
    - Undergoing a Climate Risk Analysis of the campus (Building Environment score + area vulnerability score)
    - Establishing what non-physical, area- and building measures should be taken.
- Integrated design approach - Embedding climate adaptation and impact of living all campus development and renovation projects
- Educational demonstration - Creating a campus that serves as a learning environment showcasing practical climate adaptation solutions

3 Scope

In Scope

Physical Assets:

- All BUas buildings (Ocean, Frontier, Horizon, new build) and their technical systems
- Campus grounds, drainage systems, water retention areas, and building envelopes
- Hard and soft landscaping that affects climate risk management

Climate Risk Management:

- Assessment and monitoring of four primary risks: flooding, drought, heat stress, and water safety
- Fact based decision on the implementation of adaptation measures in existing and new buildings
- Emergency preparedness for extreme weather events

Operational Aspects:

- Water management (potable water use, rainwater collection, irrigation, rainwater tank underground)
- Soil subsidence monitoring

Out of Scope

- Biodiversity Enhancement: *(*Biodiversity and Nature *sub-theme)*
- Biophilic Design: Natural elements for wellbeing, psychological connection with nature (also developed in *Biodiversity and Nature* sub-theme)
- Building cooling and ventilation for heat management (in principle in scope, but extendedly developed in sub-themes Energy and Health)

Coordination Note

Many climate adaptation measures (green roofs, water retention, shade trees, permeable surfaces) naturally support biodiversity and biophilic design. Climate Adaptation defines functional requirements (e.g., "provide shading," "retain stormwater"), while Nature and Health sub-themes define design solutions that deliver multiple benefits across themes.

4 Relation to other CPO themes

Key Interdependencies

Biodiversity and Nature (incl. Bophilia)

- Climate adaptation measures (green roofs, water retention, vegetation) create biodiversity opportunities
- Climate Adaptation sets functional requirements; Nature specifies ecological design solutions
- Adaptation measures (shade, green spaces, water features) enhance occupant comfort and wellbeing

Health

- Thermal comfort standards and heat stress mitigation strategies must align

Energy:

- Building insulation, cooling systems, and shading affect both energy use and climate resilience
- Passive cooling and night ventilation serve both energy efficiency and adaptation goals

Materials:

- Climate-resilient materials (permeable, heat-absorbing, durable) must also meet circularity requirements
- Water management systems support both adaptation and sustainable water use

Mobility:

- Shaded walkways and climate-adapted campus layout support active transport
- Water management infrastructure must not hinder pedestrian and cycling networks

5 Stakeholders and partners

Internal

Departments:

- Back Office team (project coordination)
- CPO Core Team (strategic coordination)
- Procurement
- Janitors (maintenance and monitoring),
- Campus Development body (embedding adaptation requirements in new projects)
- Finance & Control (budget allocation)
- ICT (monitoring systems),
- Marketing and Communication Services (awareness campaigns)
- Safety & Health Committee (risk oversight)

Users:

- Academies and staff (feedback on comfort and resilience, assignement projects and collaboration),
- Students (engagement in adaptation initiatives)
- Climate Adaptation Theme Leader (strategy and planning)

External

Technical:

- Royal HaskoningDHV (roadmap and framework expertise)
- Ecological experts/speaker for the living (annual ZoOp assessment and nature-positive interventions)
- Climate adaptation consultants
- Water management specialists
- Landscape architects specialising in climate resilience
- Contractors (implementation)

Partners:

- Municipality of Breda (Breda City in a Park initiative, Transitievisie Warmte Breda)
- RES West-Brabant (regional climate strategy)
- Dutch Green Building Council (FCAB framework support)
- Klimaateffectatlas (climate data)
- Other Dutch universities (knowledge sharing)
- Keative EU
- Brabant Water (regional water management)

Suppliers:

- Green infrastructure suppliers (drought-resistant plants, permeable surfaces)
- Water management system vendors
- Shading and cooling technology providers
- Monitoring equipment suppliers

Roles

Strategic:

- Executive Board (budget approval)
- CPO Core Team (cross-theme coordination)
- Climate Adaptation Theme Leader (strategy development and oversight, implementation oversight)

Operational:

- Back Office Team (implementation oversight)
- Campus Development (design integration)
- Procurement (supplier management)

Implementation:

- External consultants (design and assessment)
- Contractors (construction)
- Back Office and janitors teams (ongoing monitoring and maintenance)

Quality assurance and engagement:

- Safety & Health Committee (risk monitoring)
- Ecological expert (annual ZoOp assessment)
- Marketing and communication services (stakeholder engagement and awareness)

6 Action plan

Short-term (2026-2028): foundations

2026

- Water management project assignement assignment conducted with the Academy of Build Environment and Logistics
- Heat stress baseline assignment conducted on Frontier building (determine whether 2027 is more suitable).
- Investigate potential partners and budget to establish a Climate adaptation baseline and recommendations. Scope flood, water safety, drought and water management, buildings and campus ground.

2027

- Climate adaptation baseline assignment and mitigation measure advice, reviewed by ecological consultant (speaker for the living), implementation plan and budget submitted to EB for approval and implementation on sustainable MJOP.

Beyond 2028:

- Climate Adaptation plan implementation
- Continuous mitigation and innovative measures review

Cross-cutting measures

- Annual consultation with ecological expert (speaker of the living) to identify nature-positive interventions (starting 2026)
- Integrate climate adaptation requirements into all ongoing renovation and maintenance projects (2026 onwards)
- Develop climate adaptation awareness program for staff and students (2027)

7 Timeline

Short-term (2026-2028): Foundations

2026

- Launch water management project assignment with Academy of Built Environment and Logistics
- First annual consultation with ecological expert (speaker of the living)
- Heat stress baseline assignment on Frontier building (2026 or 2027)
- Investigate potential partners for comprehensive climate adaptation baseline (flood, water safety, drought, water management - buildings and campus grounds)
- Budget scoping for climate adaptation baseline assessment

2027

- Climate adaptation baseline assessment conducted (flood, water safety, drought, water management) and risk mitigation plan delivery
- Ecological expert (speaker for the living) reviews baseline findings and mitigation measures
- Climate adaptation strategy reviewed, updated, budget and submitted to Executive Board for approval

2028

- Climate adaptation strategy implementation and sustainable MJOP integration
- Evaluation point - review foundation phase progress

Long-term (Beyond 2028)

See action plan

8 Measuring and monitoring

Baseline measurement

Current situation:

Climate adaptation baseline will be established through commissioned assessment (2027), including:

- Climate risk evaluation per building (Ocean, Frontier, Horizon) and campus grounds
- Building Environment score and area vulnerability score using FCAB methodology or equivalent
- Flood risk mapping and drainage capacity assessment
- Water safety evaluation for precipitation events
- Drought vulnerability and water management assessment
- Heat stress evaluation (informed by 2026 Frontier baseline assignment)

Data Required (indicative scope):
Climate adaptation baseline assessment will require input data from multiple sources, including but not limited to:
Available from BUas:

- Utility consumption data (water, energy) per building
- Technical documentation of existing drainage and water management systems
- Building specifications and maintenance records
- Historical incident reports from extreme weather events
- Heat stress baseline data from Frontier (2026)

To be determined with selected partner:

- Climate risk assessment methodology and required building data
- Campus mapping requirements (surfaces, vegetation, infrastructure)
- Additional monitoring or measurement needs
- Historical climate impact analysis approach

The selected consultant partner will specify detailed data requirements and collection methodology as part of their proposal (2027).
Collection methods:
Data collection will be determined in collaboration with the selected climate adaptation consultant, combining:

- Existing BUas internal data and documentation
- Professional assessment and measurements by consultant
- Input from Academy of Built Environment water management project (2026)
- Relevant external data sources (municipal climate data, regional studies)

KPI's & Monitoring
Specific KPI targets and monitoring methods will be established following 2027 baseline assessment and ecological consultant review.

Responsible parties:

- Climate Adaptation Theme Leader: Overall coordination, baseline commissioning, implementation plan development
- Academy of Built Environment and Logistics: Water management project execution (2026)
- External consultant partner: Climate adaptation baseline assessment (2027)
- Ecological expert (speaker of the living): Annual review and nature-positive guidance
- Back Office team: Integration in renovation/maintenance projects, future monitoring support
- Executive Board: Approval of implementation plan and budget (2027-2028)

Reporting:

- Quarterly updates to CPO Core Team during foundation phase
- Annual report on foundation phase progress (2026-2028)
- Implementation plan submission to Executive Board (2027)
- Annual sustainability reporting including climate adaptation progress (ongoing)

9 Budget and resources

Financial

Foundation phase (2026-2028):

- ** €[To be determined] for 2027 baseline assessment

- Budget allocation subject to Executive Board approval within BUas' regular budget cycle.

Committed/allocated:

- Water management project assignment with Academy of Built Environment and Logistics (2026): Budget within existing academic partnership framework
- Heat stress baseline assignment entire Frontier building (2026): €8,400 excl. VAT
- Annual ecological expert (speaker of the living) consultations (2026-2028) – reported under full Climate Positive Organisation budget.

Implementation budget and phasing will be defined in the 2027 implementation plan following baseline assessment completion. Budget submission to Executive Board will include:

- Prioritized mitigation measures with cost/impact estimates
- Integration plan with sustainable MJOP
- Multi-year budget phasing aligned with capital planning cycles

All uncommitted implementation budget subject to Executive Board approval

Human resources

Foundation phase (2026-2028):

- Climate Adaptation Theme Leader: 0.2-0.3 FTE (baseline commissioning, implementation plan development)
- Back Office Constructive Project leader: 0.1-0.2 FTE (project support, partner coordination, integration coordination)
- Academy partner (Built Environment and Logistics): Assignment hours within academic program (2026)
- Heat stress baseline assignment partner: Project-based engagement (2026)

Implementation phase (Beyond 2028):

- Human resource requirements will be defined in 2027 implementation plan based on approved measures and timeline. Anticipated needs:

External consultant support:

- Climate adaptation baseline assessment (2027): professional consultant time to be defined
- Ecological expert (speaker of the living): professional consultant time to be defined
- Implementation design consultants: Project-based engagement per approved measures (beyond 2028)

Facilities and materials

Foundation phase (2026-2029):

- Monitoring equipment for heat stress baseline (Frontier): Temperature and humidity sensors, data logging equipment
- Climate adaptation awareness program materials: Educational resources, communication tools
- Data management: Storage and analysis tools for baseline data

Implementation phase (Beyond 2029):

- Required facilities and materials will be specified in 2027 implementation plan based on approved mitigation measures. Potential categories include: Monitoring equipment (water metering, climate sensors) Infrastructure materials (drainage improvements, water management systems, shading) Software tools (monitoring platforms, data analysis). Ensure coordination with Smart Campus and building measurements to avoid duplicate monitoring/measurement systems.

10 Risks and barriers

Financial constraints

Risk: Limited budget availability for comprehensive climate adaptation baseline assessment and subsequent implementation measures, particularly if assessment reveals need for significant infrastructure investments.

Impact: Delayed baseline establishment, inability to develop evidence-based implementation plan, increased vulnerability to climate events, potential emergency costs from weather-related damage.
Mitigation:

- Conduct thorough partner investigation in 2026 to identify cost-effective baseline assessment options
- Leverage academic partnerships where possible (water management project with Academy of Built Environment and Logistics demonstrates this approach)
- Phase implementation through sustainable MJOP to align with regular capital planning cycles
- Present business case to Executive Board emphasizing long-term risk reduction and cost avoidance
- Integrate climate adaptation requirements into scheduled projects to avoid standalone costs
- Explore external funding opportunities (government grants, climate adaptation subsidies)

Organisational and coordination challenges

Risk: Climate adaptation requires coordination across multiple themes (Energy, Health, Nature, Materials), departments, and external partners during both baseline establishment and implementation phases.
Impact: Fragmented baseline assessment, missed synergy opportunities in implementation planning, delayed decision-making, competing resource allocation.
Mitigation:

- Establish clear governance through CPO Core Team with Climate Adaptation Theme Leader coordination
- Involve ecological consultant (speaker of the living) early to identify nature-positive synergies
- Ensure baseline assessment scope covers integration points with other themes
- Require climate adaptation consideration in all renovation and maintenance project briefs (from 2026)
- Create cross-functional review process for 2027 implementation plan development
- Maintain regular communication between Theme Leaders during foundation phase

Knowledge capacity gap

Risk: Internal expertise in climate adaptation is limited; dependence on external consultants for baseline assessment and implementation planning; uncertainty about appropriate methodology and standards.
Impact: Difficulty selecting qualified partners, potential for suboptimal assessment scope, delayed baseline completion, challenges implementing and monitoring approved measures.
Mitigation:

- Leverage 2026 foundation activities (water management project, heat stress baseline) to build internal understanding before major baseline assessment
- Investigate multiple potential partners in 2026 to understand options and approaches
- Require baseline consultant to provide capacity building and knowledge transfer
- Engage ecological expert (speaker of the living) annually to build ongoing relationship and knowledge
- Utilize student and researcher expertise through Academy partnerships
- Participate in knowledge networks (DGBC, other universities, municipal partnerships like Breda City in a Park)
- Document lessons learned systematically throughout foundation and implementation phases

Technical limitations and building constraints

Risk: Baseline assessment may reveal significant technical barriers (monument status for Horizon, structural limitations, existing system constraints) that limit adaptation measure feasibility or increase costs substantially.
Impact: Implementation plan may be constrained, reduced effectiveness of adaptation strategy for specific buildings, higher-than-expected costs requiring additional Executive Board approvals.
Mitigation:

- Ensure baseline assessment scope explicitly addresses building-specific constraints
- Request baseline consultant to provide alternative measure recommendations where primary options are infeasible
- Accept differentiated approach across buildings based on technical realities
- Prioritize passive and low-intervention measures where structural changes are limited

- Engage specialist consultants early for monument buildings
- Present realistic implementation scenarios to Executive Board including cost implications of constraints

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