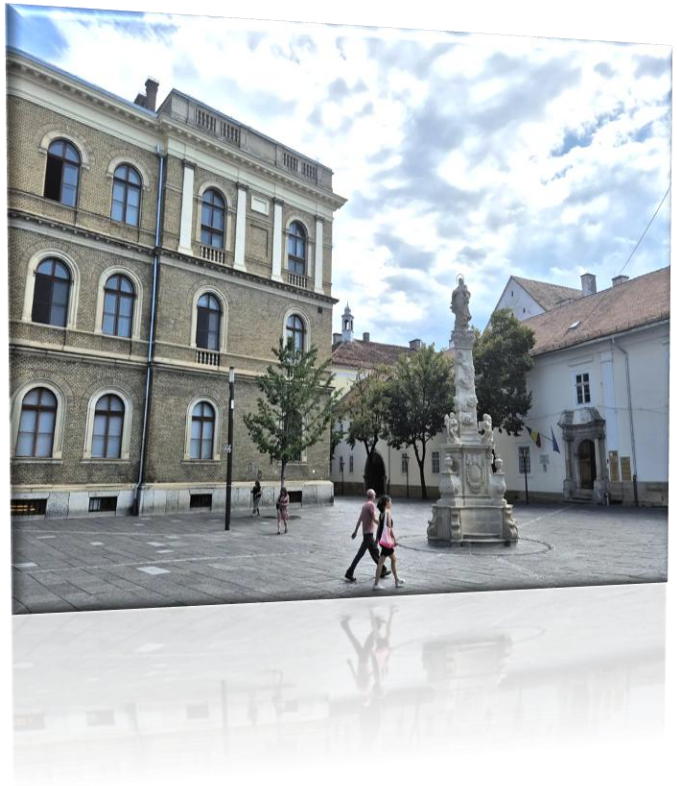
# CONTENTS




# Cluj Metropolitan Area in a snapshot

# Cluj Metropolitan Area - a CORESpaces area



**A very short CORESpaces ID:**

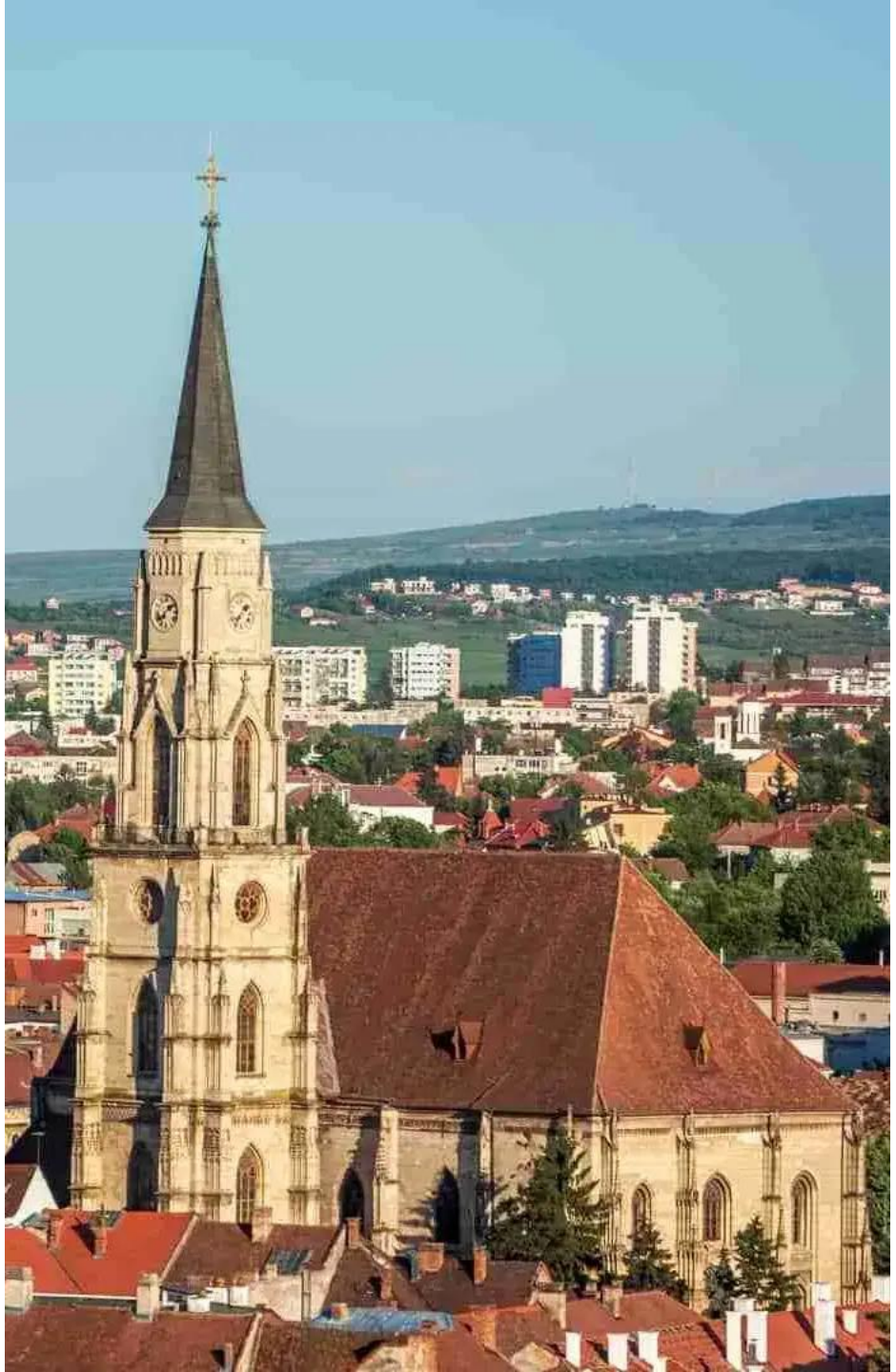
- Over 420,000 residents in the wider metropolitan area, approx. 290,000 within the municipality
- Dense urban core, strong innovation and university ecosystem and growing mixed-use development
- EU Mission City – Climate City Contract & Sustainable Urban Mobility Plan (SUMP, 2021)
- Rapid urban growth is reshaping land use dynamics
- Around 300.000 registered cars, generating increasing congestion and curbside pressure
- Strong progress in public transport electrification (52% electric fleet, targeting 100% by 2030)
- Strong focus on active mobility and energy efficiency
- Requirement for integrated energy and mobility solutions across the CMA

**Key challenges**

•Congestion and inefficient curbside use driven by car dependency
•Fragmented active mobility networks
•Urban heat island and air quality impacts
•Limited integration of energy and mobility planning

**Strategic role within CORESpaces**

•Smart, data-driven curbside and street space management
•Climate-neutral regeneration along the Someș River “blue belt”
•Sustainable mobility transformation along urban and peri-urban corridors
•Integrated energy and mobility planning through digital twins



# Cluj Metropolitan Area needs, objectives & vision within CORESpaces

# Cluj Metropolitan Area within CORESpaces

## Needs

- Data-driven management of curbside and street space
- Better integration of sustainable mobility, energy efficiency and urban planning
- Stronger citizen and stakeholder engagement in urban transformation processes

## Objectives

- Improve accessibility and increase in curbside space efficiency
- Reduce congestion-related $CO_2$ emissions through active travel
- Support the development of climate-neutral and people-oriented districts

## Vision

A climate-neutral urban living lab, empowering people to lead the transition to Net-Zero through innovation, clean mobility and sustainable energy solutions by 2030.

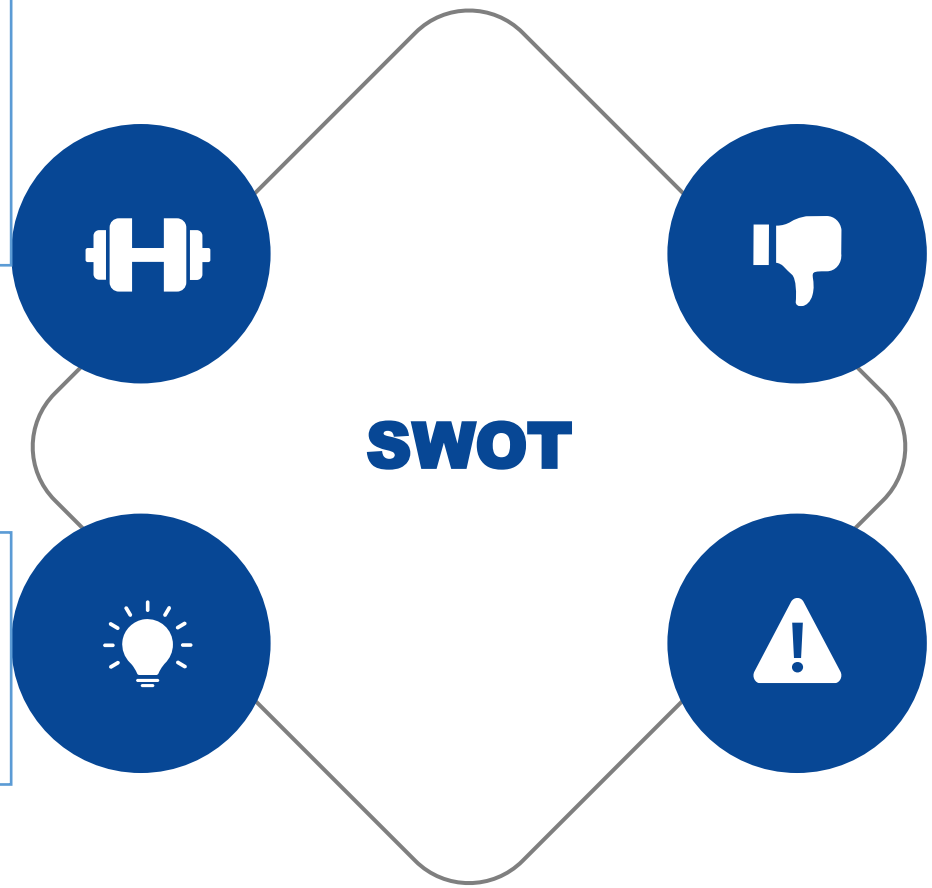
# CMA's CORESpaces QUICK SWOT

## STRENGTHS

- Strong political commitment as an EU Mission City with a Climate City Contract and SUMP
- Advanced public transport electrification (52% electric fleet) and digital twin capabilities
- Active ecosystem of universities, innovators and engaged stakeholders

## WEAKNESS

- High car dependency and growing congestion (~300,000 cars)
- Limited curbside and street space efficiency in dense urban areas
- Fragmented integration between mobility, energy and urban planning




## OPPORTUNITIES

- Using the CMA as a real-life testing ground for integrated mobility, energy and public space solutions
- Building on the Someș River corridor to showcase climate-neutral urban regeneration
- Developing practical evidence and approaches to support scaling beyond the pilot areas

## THREATS

- Social resistance to space reallocation and mobility behavior change
- Challenges in scaling and sustaining pilot solutions beyo nd the project timeframe
- Risk of data interoperability and scaling challenges beyond pilot areas

# Team members & roles

## Cluj Metropolitan Area (CMA) – Local Lead Partner

Overall coordination of the Cluj pilot and stakeholders' engagement.

## Technical University of Cluj-Napoca – Technical Partner

Technical support for modelling, and data analysis.

## Transilvania IT Cluster – Technical Partner

Support for digital twin solutions  and innovation.

## OPSIS Research – Technical Partner

System integration and technical implementation of the pilot solutions

# Cluj Metropolitan Area
# CORESpaces measures

# CN 1: IoT-enabled solutions for curb side management: real-time occupancy monitoring, curbside strategy optimization and illegal parking fee management

- Deployment of IoT-enabled sensors to monitor real-time curbside occupancy and usage patterns
- Optimization of curbside space allocation to better balance parking, loading/unloading and active mobility needs
- Introduction of dynamic pricing strategies to improve efficiency and manage demand
- Data-driven management of illegal parking to reduce congestion and improve street functionality
- Continuous refinement of curbside policies based on real-time data and user behavior

**AoI:** Urban areas of Mănăștur and Plopilor neighborhoods

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# CN 1: IoT-enabled solutions for curb side management: real-time occupancy monitoring, curbside strategy optimization and illegal parking fee

## Missing elements & gaps

- Limited coverage of IoT sensors across all curbside areas
- Need for stronger integration between parking data and enforcement systems
- Limited use of real-time data in day-to-day curbside management operations

## Link to pre-existing assets

- Existing urban sensor network for traffic and parking monitoring
- Local mobility data platforms and traffic management
- SUMP and Climate City Contract frameworks guiding implementation

## Impact area

Smart Curbside / Urban Space Management

## Risks & mitigation

- User acceptance risks → gradual rollout and stakeholder communication
- Technical integration risks → early testing and modular solutions
- Post-pilot sustainability risks → alignment with local strategies and owner ship models

## Equipment, subcontracting and other costs connection

- IoT sensors and monitoring equipment
- Digital platforms for data processing and visualization
- Subcontracted technical integration and system maintenance services

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# CN 2: Revitalizing Cluj-Napoca's ‘blue belt’ by sustainable mobility promotion

- Co-transformation of the Someș River with 200+ citizens and 40+ stakeholders into a unifying natural and mobility corridor
- Development of new pedestrian and cycling routes to promote active and non-motorised mobility
- Ecological restoration of fragmented river landscapes and enhancement of biodiversity
- Creation of inclusive public spaces supporting recreation, health and social interaction
- Mitigation of urban heat island effects and improvement of air quality through nature-based solutions

**SoI:** Digitally tested and proof of operation
**AoI:** Peri-urban area of Făget and the Someș River corridor

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# CN 2: Revitalizing Cluj-Napoca's ‘blue belt’ by sustainable mobility promotion

## Missing elements & gaps

•Limited cross-department operational coordination between mobility, environment and urban planning
•Fragmented use of monitoring data across mobility, ecology and climate-related indicators
•Limited integration between spatial design concepts and performance monitoring

## Risks & mitigation

- Cross-department coordination risks → formalised coordination framework
- Data fragmentation risks → common indicators and shared monitoring approach
- Post-pilot uptake risks → alignment with local strategies

## Link to pre-existing assets

- Existing strategies and projects along the Someș River corridor
- Experience with participatory planning and co-design processes
- Availability of environmental and mobility monitoring equipment and datasets

## Equipment, subcontracting and other costs connection

•Environmental and mobility monitoring equipment
•Digital tools for data management and indicator tracking
•Subcontracted support for spatial design and co-design activities

## Impact area

Sustainable Mobility / Nature-Based Solutions

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# CN 3: Transit Corridor Dynamic Lane Management and Multimodal Hubs to support commuting, alleviate congestion and free up space for people

- Explores dynamic lane management to prioritize public transport, e-mobility and park-and-ride solutions
- Tests scenarios integrating dedicated bus lanes and multimodal hubs to reduce congestion
- Supports daily commuting and reduces reliance on private cars along the east–west corridor
- Frees up urban space for people and improves metropolitan connectivity
- Prepares the corridor for future high-capacity public transport integration through data-driven scenario testing

**SoI:** Digitally tested and proof of operation
**AoI:** Florești and the main east–west urban transport corridor

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# CN 3: Transit Corridor Dynamic Lane Management and Multimodal Hubs to support commuting, alleviate congestion and free up space for people

## Missing elements & gaps

- Need to strengthen corridor-level operational data to support dynamic lane management testing
- Limited integration between traffic flows, public transport priority and multimodal hub planning
- Scenario-based analysis not yet embedded in routine corridor management practices

## Link to pre-existing assets

- Existing public transport network and dedicated bus lanes
- SUMP and metropolitan mobility strategies
- Traffic monitoring and mobility data platforms

## Impact area

Transit Corridor / Multimodal Mobility Management

## Risks & mitigation

- Risk of limited behavioural response to corridor measures → combine scenario testing with targeted communication and monitoring
- Risk of uneven benefits across corridor segments → test differentiated scenarios and assess local impacts
- Risk of limited visibility of pilot benefits → produce clear, decision-oriented outputs and visualisations

## Equipment, subcontracting and other costs connection

- Traffic and corridor monitoring equipment (basic traffic sensors and supporting devices)
- Digital tools for scenario modelling, data analysis and visualisation
- Subcontracted technical support for scenario development, configuration a nd validation

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# CN 4: Digital twin – based scenarios for smart energy solutions for building and mobility

- Explores integrated digital twin scenarios for smart energy and sustainable mobility
- Tests interactions between EV charging, public transport, district heating and building energy use
- Builds on Cluj's Residential Digital Twin and CityScape data spaces
- Assesses V2G and solar-powered buildings for climate-neutral districts
- Provides data-driven insights for Net-Zero urban development

**SoI:** Digitally tested and proof of operation
**AoI:** Mănăștur and Plopilor neighbourhoods

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# CN 4: Digital twin – based scenarios for smart energy solutions for building and mobility

## Missing elements & gaps

- Limited integration between building energy, mobility and district heating data
- Need for standardized data-sharing protocols across sectors
- Lack of long-term governance model for digital twin operation

## Risks & mitigation

- Risk of data interoperability issues → use common data formats and incremental system integration
- Risk of limited stakeholder engagement → involve utilities, mobility operators an d city departments early
- Risk of scalability constraints → focus on modular scenarios and clearly documen ted assumptions

## Link to pre-existing assets

- Residential Digital Twin and Mobility & Climate Neutrality CityScape data-spaces
- Existing energy and mobility monitoring systems
- Climate City Contract and Net-Zero roadmap

## Equipment, subcontracting and other costs connection

- Digital twin platforms and simulation tools
- Energy and mobility data integration services
- Subcontracted technical development and system support

## Impact area

Smart Energy / Mobility Digital Twin Integration

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# Cluj Metropolitan Area **specific points for consideration/ discussion points**

- ❑ **Ensuring public acceptance and effective stakeholder coordination for street space and corridor reallocation measures**
- ❑ **Aligning mobility, energy and digital twin approaches with Climate City Contract objectives and reporting frameworks**
- ❑ **Identifying pathways for scaling and institutional uptake of pilot results beyond the project timeframe**