Med-EcoSuRe

EnergyMed

Convegno

VERSO LA NUOVA DIRETTIVA EPBD

Piano di Azione politico, strategico e di progetto per edifici universitari Carbon Neutral

Napoli, Mostra d'Oltremare
Venerdì, 31 marzo 2023

Metodi e strumenti di progettazione urbana multiscalare per la resilienza e la neutralità climatica

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enicbcmed.eu/projects/med-ecosure

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FROM SEAP TO SECAP - RESEARCH-INFORMED PLANNING

CLARITY DEMONSTRATION CASE 1 – NAPOLI
MULTI-SCALE CLIMATE-RESILIENT URBAN PLANNING

CLIMATE PROJECTIONS

Climate change profile **Napoli**
2020-2100

STRATEGIC PLANNING

Support to the implementation of the **Sustainable Energy and Climate Action Plan** for Napoli (SECAP)

CITY PLANNING

Update of **Napoli City Plan** (PUC)

DISTRICT PLANNING

Ponticelli Urban Regeneration Plan (PRU)

Adaptation measures technical cards

Multi-scale planning and design guidelines for climate adaptation

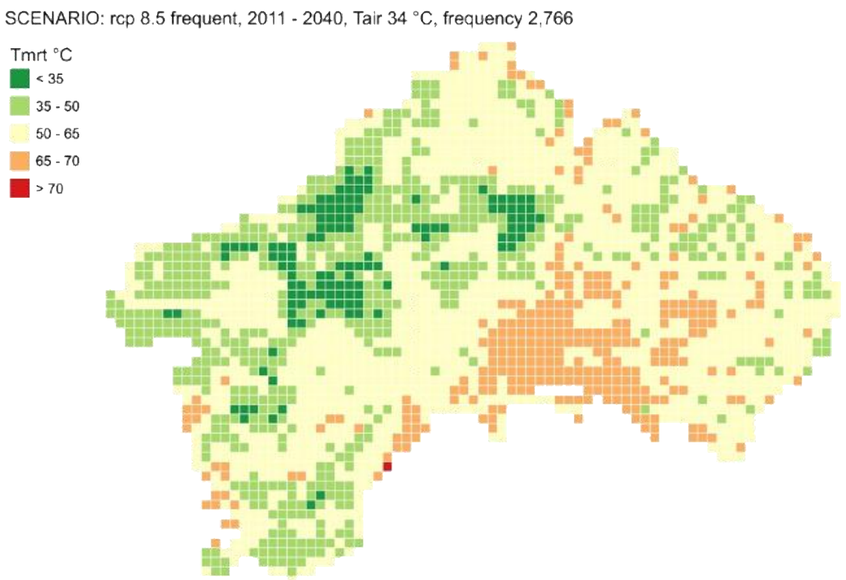
Clarity

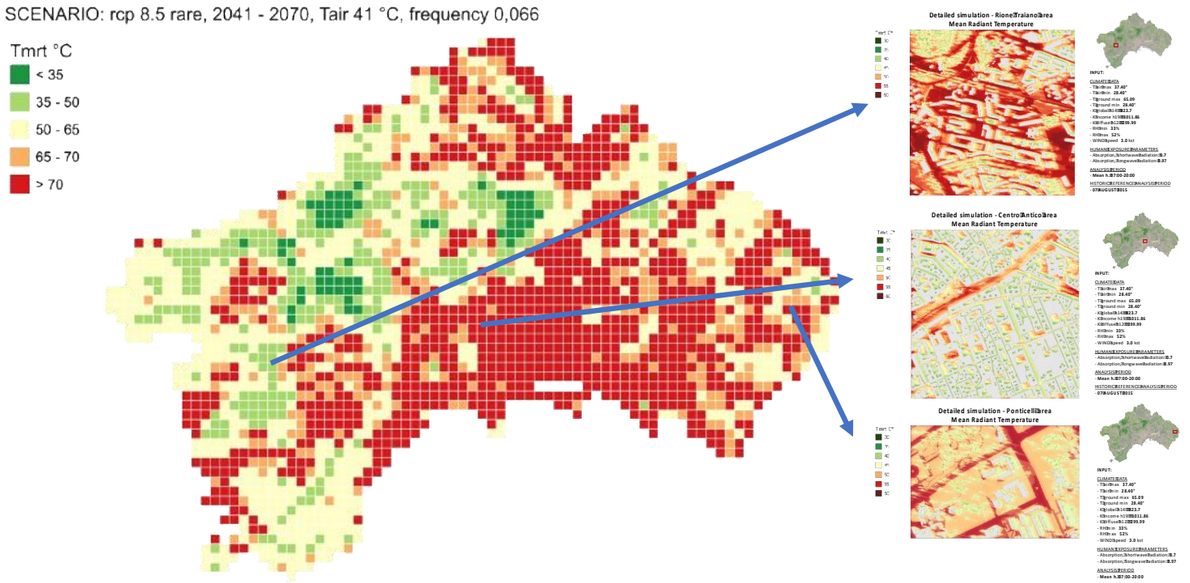
PLINIVS HAZARD/IMPACT ASSESSMENT TOOLS

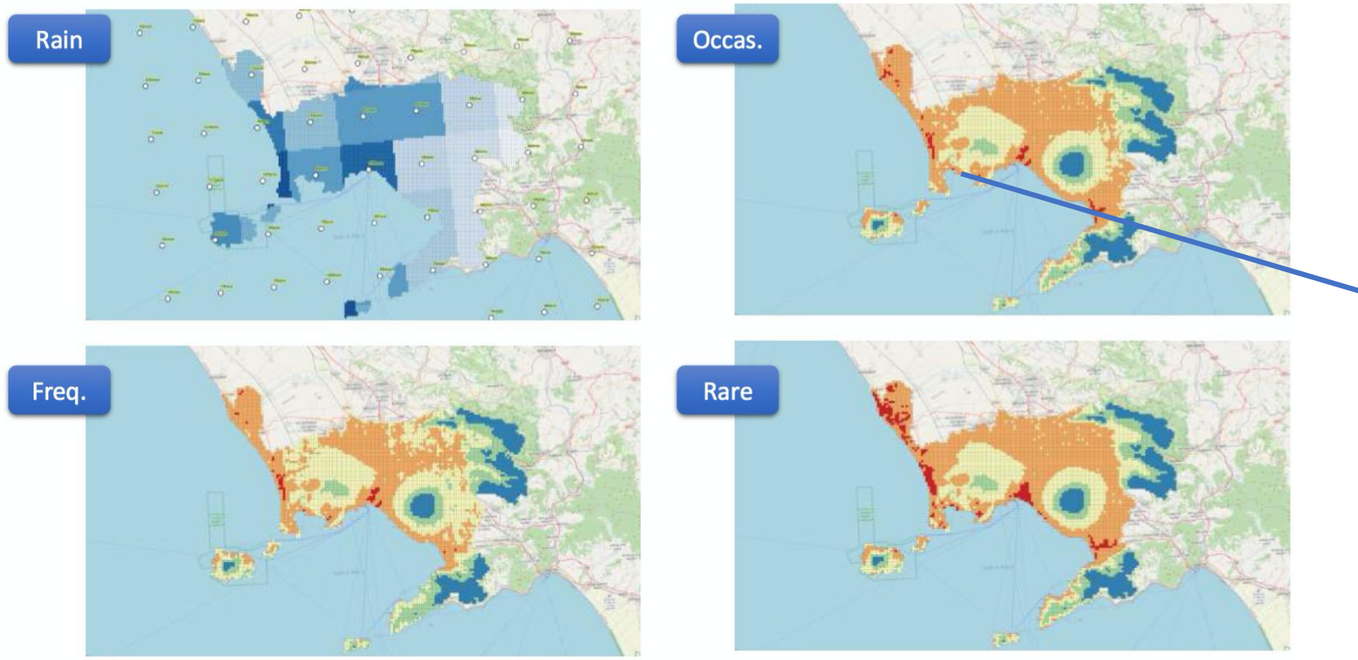
Clarity

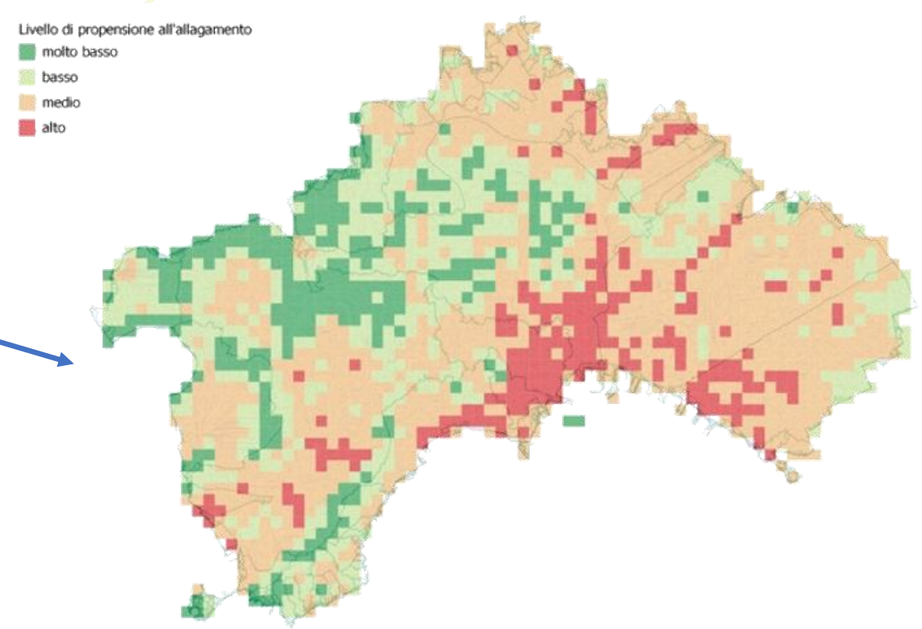
Heat Waves

Pluvial Flood



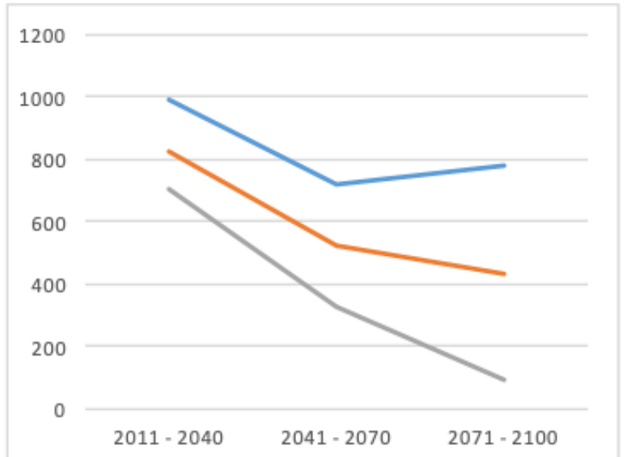


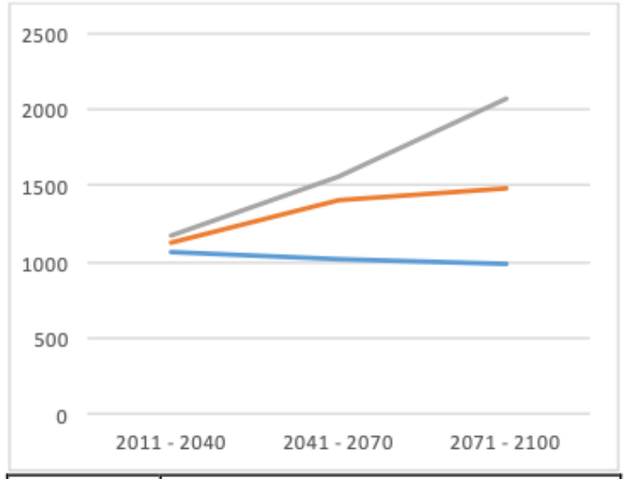




Climate Adaptation - Multi-scale planning measures responsive geospatial DSS

PLINIVS CLIMATE&ENERGY ASSESSMENT TOOL





HDD	historical 1970 – 2000: 1389		
	2011 - 2040	2041 - 2070	2071 - 2100
RCP 2.6	987	714	780
RCP 4.5	827	521	432
RCP 8.5	702	323	93

CDD	historical 1970 – 2000: 772		
	2011 - 2040	2041 - 2070	2071 - 2100
RCP 2.6	1057	1014	990
RCP 4.5	1128	1405	1476
RCP 8.5	1168	1551	2065

	2011-2040	2041-2070	2071-2100
Variation of heating needs in Napoli area during cold spells			
RCP 4.5	-4%	-35%	-46%
RCP 8.5	-13%	-60%	-89%
Variation of cooling needs in Napoli area during heat waves			
RCP 4.5	+22%	+38%	+41%
RCP 8.5	+25%	+43%	+58%

Low uncertainty	Medium uncertainty	High uncertainty

Climate Adaptation - Temperature extremes and energy needs variation

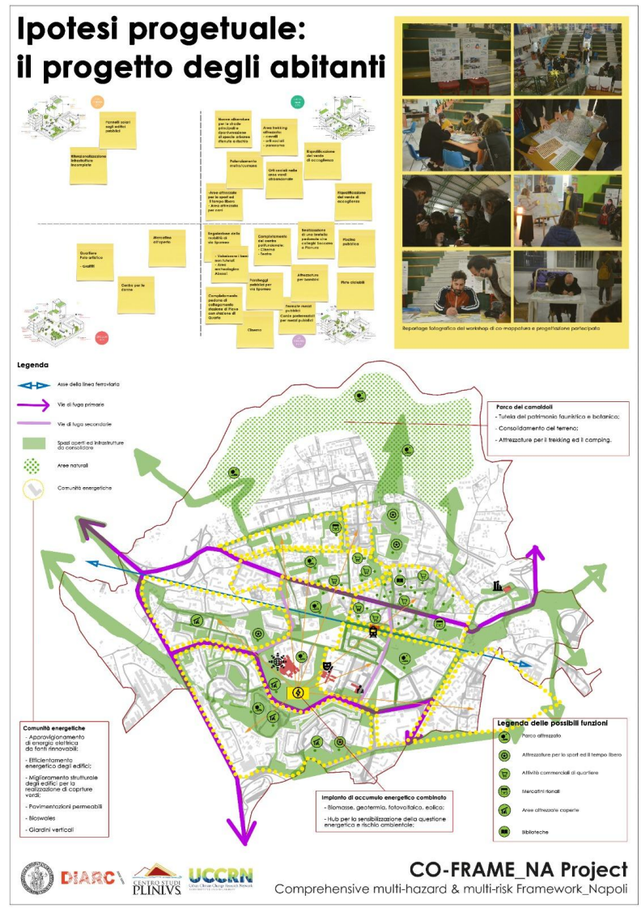
Settore politico impattato	Impatto/i atteso/i	Probabilità dell'evento	Livello atteso di impatto	Periodo di tempo	Indicatori relativi agli impatti
Edifici	Impatto degli allagamenti sugli edifici	RCP 4.5 frequente	Low	2011-2040	Impatto economico per danni strutturali e al contenuto degli edifici
		RCP 8.5 frequente	Low		
		RCP 4.5 occasionale	Medium		
		RCP 8.5 occasionale	Medium		
		RCP 4.5 raro	High		
		RCP 8.5 raro	High		
		RCP 4.5 frequente	Low	2041-2070	
		RCP 8.5 frequente	Low		
		RCP 4.5 occasionale	Medium		
		RCP 8.5 occasionale	Medium		
		RCP 4.5 raro	High		
		RCP 8.5 raro	High		
		RCP 4.5 frequente	Low	2071-2100	
		RCP 8.5 frequente	Low		
		RCP 4.5 occasionale	Medium		
		RCP 8.5 occasionale	High		
		RCP 4.5 raro	High		
		RCP 8.5 raro	High		
Trasporto	Impatto degli allagamenti sulla rete stradale	RCP 4.5 frequente	Low	2011-2040	Impatto economico per la pulizia e la riparazione delle strade
		RCP 8.5 frequente	Low		
		RCP 4.5 occasionale	Medium		
		RCP 8.5 occasionale	Medium		
		RCP 4.5 raro	High		
		RCP 8.5 raro	High		
		RCP 4.5 frequente	Low	2041-2070	
		RCP 8.5 frequente	Low		
		RCP 4.5 occasionale	Low		
		RCP 8.5 occasionale	Medium		
		RCP 4.5 raro	High		
		RCP 8.5 raro	High		
		RCP 4.5 frequente	Low	2071-2100	
		RCP 8.5 frequente	Low		
		RCP 4.5 occasionale	Low		
		RCP 8.5 occasionale	High		
		RCP 4.5 raro	High		
		RCP 8.5 raro	High		
Energia	Impatto dei trend di temperature estivi e invernali sul consumo di energia	RCP 4.5	22%	2011-2040	Aumento della domanda di energia elettrica per l'aria condizionata in ambito civile
		RCP 8.5	25%		
		RCP 4.5	38%	2041-2070	
		RCP 8.5	43%		
		RCP 4.5	41%	2071-2100	
		RCP 8.5	58%		
		RCP 4.5	-4%	2011-2040	Riduzione della domanda di gas per il riscaldamento in ambito civile
		RCP 8.5	-13%		
		RCP 4.5	-35%	2041-2070	
		RCP 8.5	-60%		
		RCP 4.5	-46%	2071-2100	
		RCP 8.5	-89%		

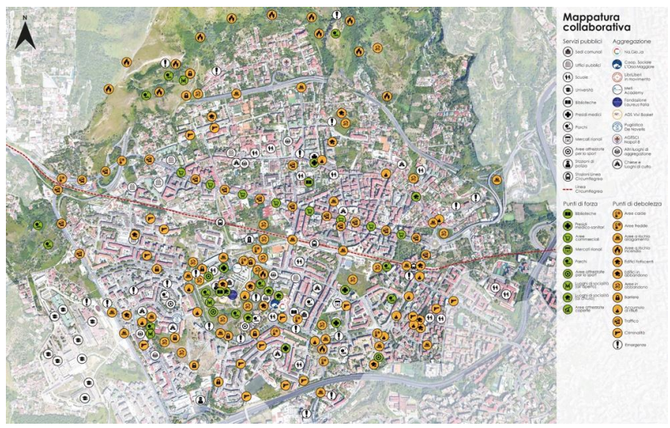
Climate Adaptation - SECAP Quantitative Impact Indicators

FROM SEAP TO SECAP - SETTING INTEGRATED MITIGATION/ADAPTATION TARGETS

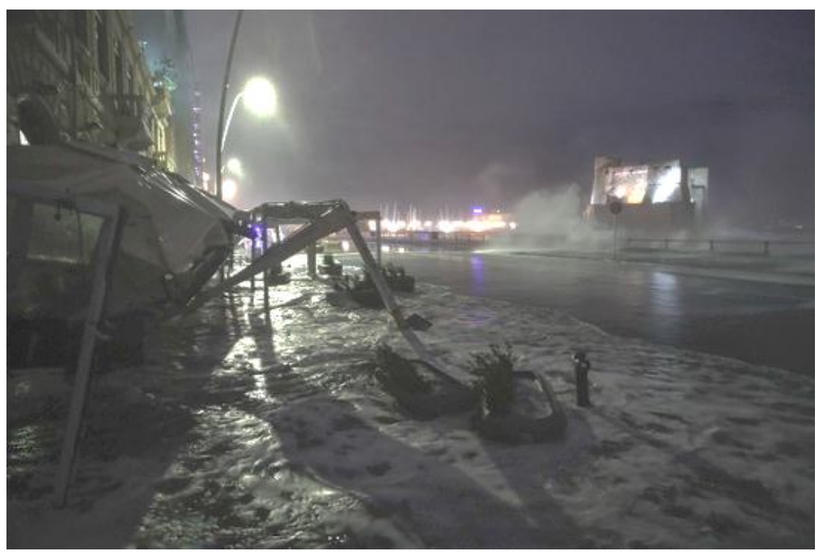
Tools supporting collaborative mapping and co-design processes
UCCRN → CO-FRAME_NA

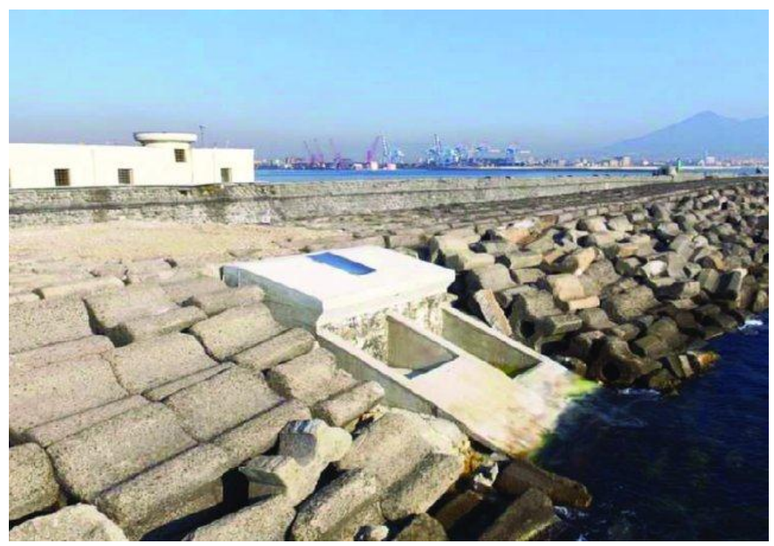
- Strategic planning vision and backcasting
- Stakeholders and community engagement and co-creation of solutions





FROM SEAP TO SECAP - RESEARCH-INFORMED PLANNING

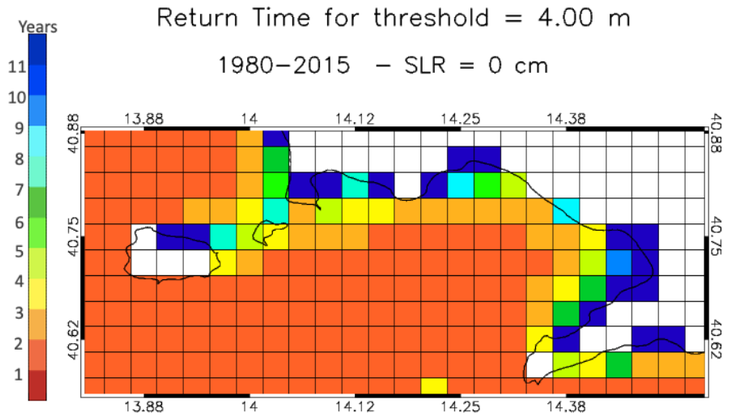




NAPOLI DEMONSTRATOR FOCUS:

Heat Waves & Health
- Improve outdoor dynamic simulation
- Integrate indoor comfort and energy consumption

Coastal flooding & Infrastructure
- Implement hazard/impact assessment tools based on advanced wave+SLR model
- Nature Based Solutions and Water Energy Converters to integrate mitigation and adaptation



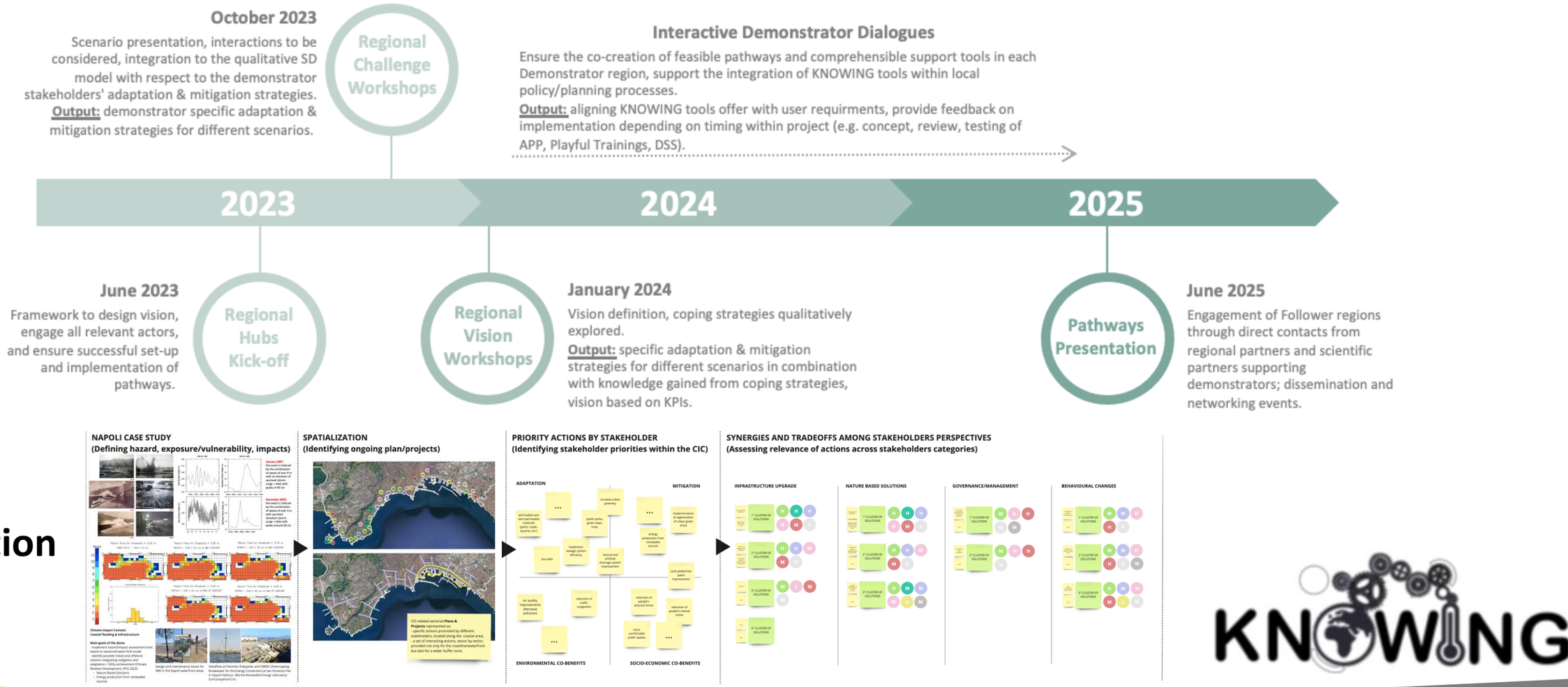
Stakeholders and community engagement
- Climate Local Hub establishment and 8 co-creation workshops with stakeholders and community

FROM SEAP TO SECAP - RESEARCH-INFORMED PLANNING

Stakeholders and community engagement

- Napoli Local Hub establishment and co-creation workshops with stakeholders and community
  - Public stakeholders (state, regional and local level)
  - Private stakeholders (business sectors and service providers)
  - Citizens and communities (non-profit organizations)

Interaction design



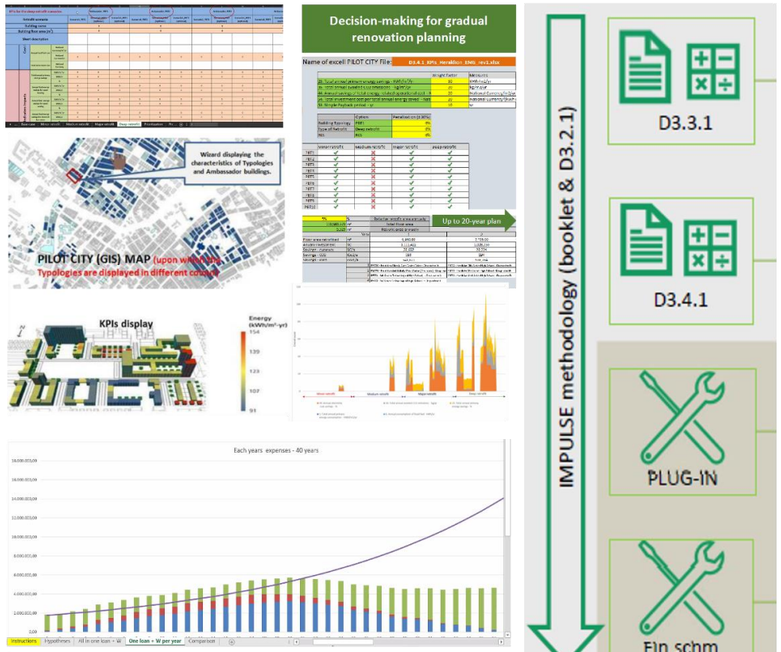
SEACAP4SDG PRELIMINARY ASSESSMENT OF TOOLS

IDENTIFIED TOOLS AND METHODOLOGIES	RELEVANT OUTPUT	LIMITS FOR IMPLEMENTATION
IMPULSE	Structured database of characteristics of public building stock to monitor emissions and potential reduction; GIS based KPIs-processor, financial scheme evaluation tool	Needs a systematic methodology for data collection of each public building
EDUFOOTPRINT	LCA of Carbon Footprint and environmental Footprint; high involvement of users and engagement of local communities, influence on behaviour at local scale	Needs a systematic methodology for data collection of each public building
CESBA MED S – SBT and SNT	Indicators and assessment process for retrofit strategy and scenarios, quantitative and qualitative aspects taken into account to assess both mitigation and adaptation criteria	Requires structured stakeholders involvement
MED-ECOSURE- LIVING LABS	Build effective governance structures, influence on behavioural aspects through user engagement)	Educational buildings only, methodology could be extended to other typologies

SEACAP4SDG tools/methodologies integrated in the Napoli planning and design support toolkit

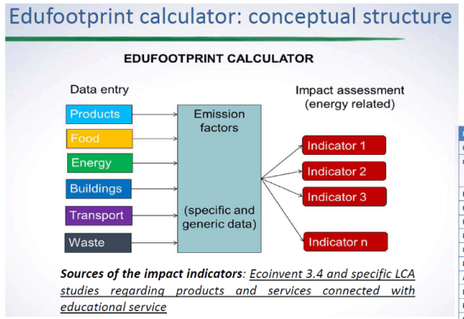
SEACAP4SDG PRELIMINARY ASSESSMENT OF TOOLS

Public Building Energy Renovation - KPIs-processor's GIS plug-in and financial scheme evaluation tool (IMPULSE)



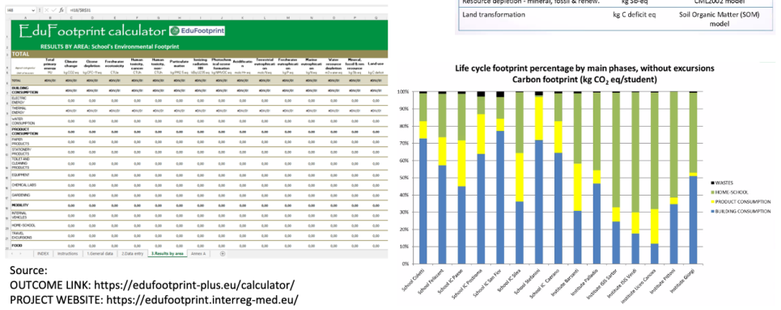
Source
OUTCOME LINK: https://n9.cl/nmq0v
PROJECT WEBSITE: https://impulse.interreg-med.eu/

School LCA Calculator (EDUFOOTPRINT)



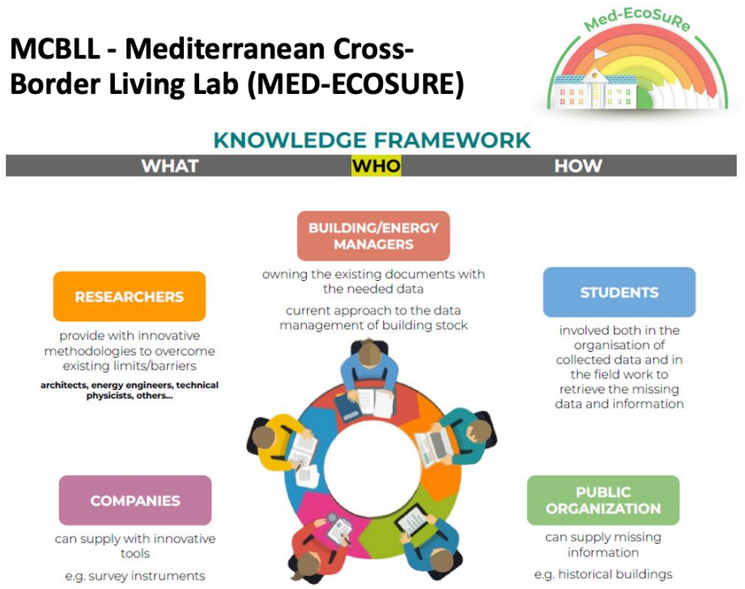
***Sources of the impact indicators**: Ecoinvent 3.4 and specific LCA studies regarding products and services connected with educational service*

Impact categories	Unit of measure	Assessment model
Climate change	kg CO2-eq	GWP 100 years
Ozone depletion	kg CFC-11 eq	EDIP model based on the ODPs of the WMO over an infinite time horizon
Ecotoxicity for aquatic fresh water	CTUe	USEtox model
Human toxicity- cancer effect	CTUh	USEtox model
Human toxicity- non cancer effect	CTUh	USEtox model
Particulate matter / respiratory inorganics	kg PM2,5-eq	RiskPoll model
Ionising radiations - human health effects	kg U235 eq	Human health effect model
Photochemical ozone formation	kg NMVOC	LOTOS-EUROS model
Acidification	Mole of H+ eq	Accumulated Exceedance model
Eutrophication - terrestrial	Mole of N eq	Accumulated Exceedance model
Eutrophication - aquatic freshwater	kg P eq	EUTREND model
Eutrophication - marine	kg N-eq	EUTREND model
Resource depletion - water use	m^3 eq	Swiss Ecoscarsity model
Resource depletion - mineral, fossil & renew.	kg Sb-eq	CML2002 model
Land transformation	kg C deficit eq	Soil Organic Matter (SOM) model



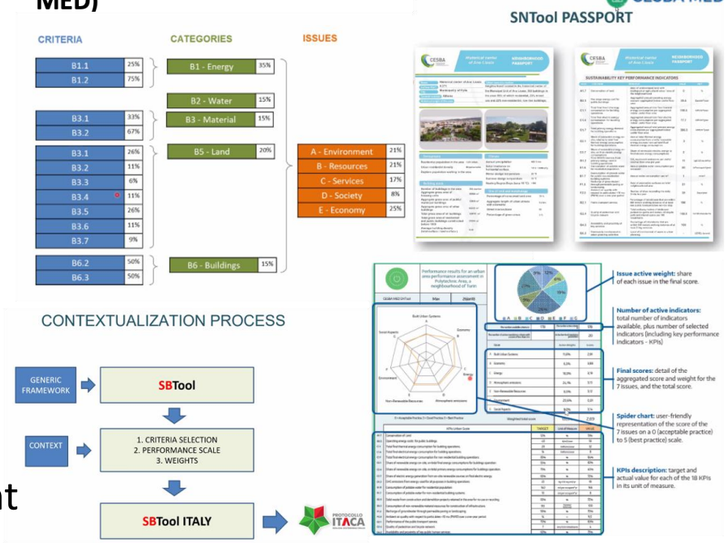
Source:
OUTCOME LINK: https://edufootprint-plus.eu/calculator/
PROJECT WEBSITE: https://edufootprint.interreg-med.eu/

MCBLL - Mediterranean Cross-Border Living Lab (MED-ECOSURE)



SOURCE:
OUTCOME LINK: https://medbexlive.org/
PROJECT WEBSITE: https://www.enicbcmed.eu/projects/med-ecosure

SBT-Sustainable Building Tool and SNT-Sustainable Neighbourhood Tool (CESBA MED)



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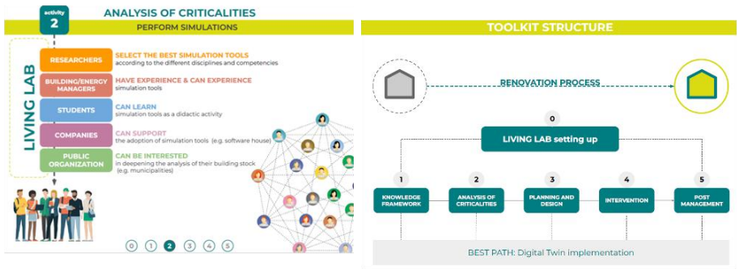


Selection criteria

- Integrability in GIS environment
- Quantitative indicators
- Focus on school/office buildings
- Supporting stakeholders/community engagement

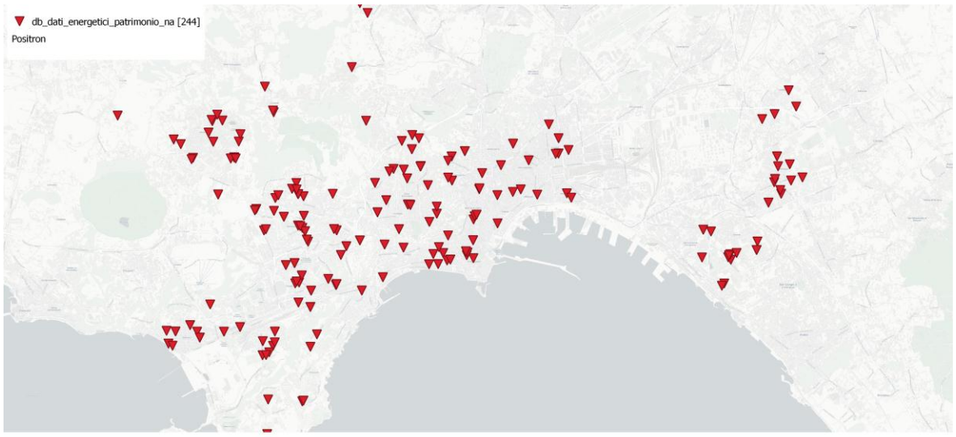
INTEGRATION OF NAPOLI MUNICIPALITY LEGACY TOOLS AND SEACAP4SDG SELECTED TOOLS IN THE NAPOLI SECAP PROCESS

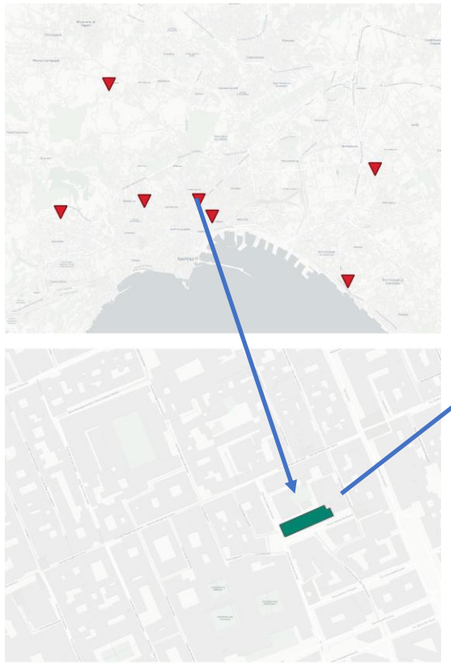
PHASE	ACTIVITY	SUPPORTING TOOLS	SOURCE
ASSESSMENT	• Energy consumption and GHG emissions	Napoli SECAP GIS + Energy Cadaster	Legacy tool
		IMPULSE (classification parameters)	SEACAP4SDG tool
		EDUFOOTPRINT (LCA calculator parameters)	SEACAP4SDG tool

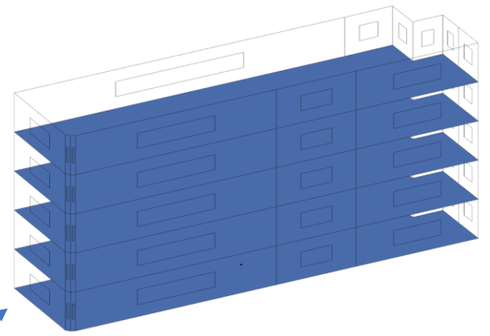
	• Climate Risk and vulnerability assessment
	  • Heat Waves
	  • Pluvial Floods
	  • Coastal Floods
		PLINIVS Hazard/Impact assessment tools	Legacy tool

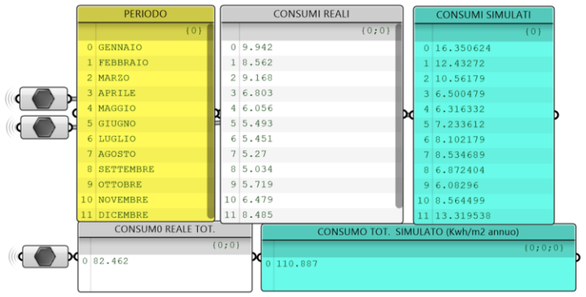
DESIGN	• Renovation targets and financial schemes	Napoli SECAP GIS + Energy Cadaster	Legacy tool
		PLINIVS Climate&Energy assessment tool	Legacy tool
		IMPULSE (financial scheme evaluation tool)	SEACAP4SDG tool
		CESBA MED S (SBT-SNT)	SEACAP4SDG tool
		PLINIVS Hazard/Impact assessment tools	Legacy tool
	• Co-design	MCBLL (Mediterranean Cross-Border Living Lab)	SEACAP4SDG tool
		EDUFOOTPRINT (engagement of users)	SEACAP4SDG tool
IMPLEMENTATION AND MONITORING	• Consumption monitoring	Napoli SECAP GIS + Energy Cadaster	Legacy tool
		IMPULSE (GIS plugin)	SEACAP4SDG tool
		PLINIVS Climate&Energy assessment tool	Legacy tool
		PLINIVS Hazard/Impact assessment tools	Legacy tool
		EDUFOOTPRINT (LCA calculator)	SEACAP4SDG tool
	• Behaviour monitoring	EDUFOOTPRINT (engagement of users)	SEACAP4SDG tool

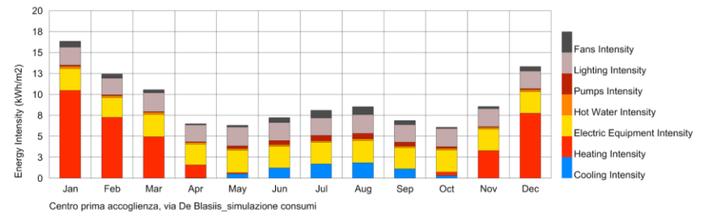
NAPOLI SECAP GIS + ENERGY CADASTER

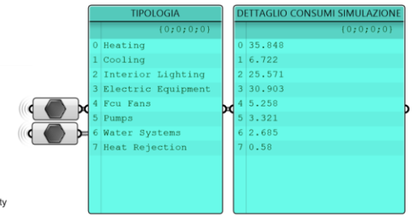










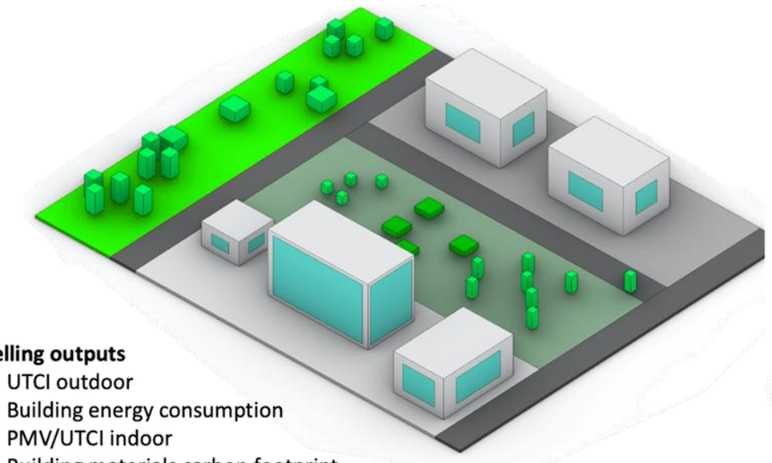


id	denominazione sito	indirizzo	anno di costruzione	latitudine	longitudine	consumo _totale_2021 [kwh]	consumo metano 2021- 2022 (mc)
117	Uffici Comunali	Via Commissario Ammaturo (ex Via Botteghelle, 627)	NULL	40,83072409352719	14,3246218191275554	8703	5900
273_A_acs_B	Centro di prima accoglienza	Via de Blasiis, 10, 80147	NULL	40,8496552922453	14,259527813918101	82462	14582
004_A	SCUOLA 54¯ C.D. "M. SCHERILLO" SCUOLA DELL'INFANZIA "G.E. NUCCIO" 20¯CIRCOLO COMUNALE (Ex 24¯CIRCOLO)	VIA S. MANNA, 23/25, 80126	tra il 1961 e il 1975	40,84733	14,19913	64699	19971
004_B	SCUOLA 54¯ C.D. "M. SCHERILLO" SCUOLA DELL'INFANZIA "G.E. NUCCIO" 20¯CIRCOLO COMUNALE (Ex 24¯CIRCOLO)	VIA S. MANNA, 23/25, 80126	Dal 1976 in poi	40,84733	14,19913	64699	19971

gennaio_2021 [kwh]	febbraio_2021 [kwh]	marzo_2021 [kwh]	aprile_2021 [kwh]	maggio_2021 [kwh]	giugno_2021 [kwh]	luglio_2021 [kwh]	agosto_2021 [kwh]	settembre_2021 [kwh]	ottobre_2021 [kwh]	novembre_2021 [kwh]	dicembre_2021 [kwh]
940	809	744	572	522	561	823	990	717	543	587	895
9942	8562	9168	6803	6056	5493	5451	5270	5034	5719	6479	8485
8333	7752	5714	5398	5540	4153	2386	2247	3765	6511	4962	7938
8333	7752	5714	5398	5540	4153	2386	2247	3765	6511	4962	7938
7779	6697	5956	6111	3964	4311	5165	4498	4189	5178	5900	8043

ENERGY + URBAN CLIMATE SIMULATOR (building and neighbourhood scale)

CONFIGURATION EXAMPLE



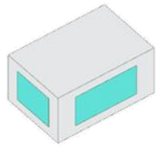
Modelling outputs

- UTCI outdoor
- Building energy consumption
- PMV/UTCI indoor
- Building materials carbon footprint
- Carbon storage potential

BASIC ELEMENTS AND PRESET VARIABLES

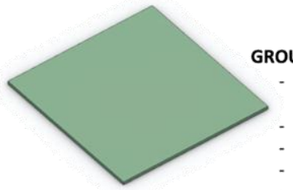
TREES

- Dimensions (height, canopy area, etc.)
- Thermal properties (emissivity, Albedo, etc.)
- Co - Benefits
- …



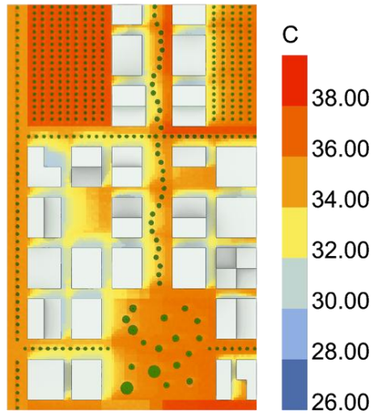
BUILDING

- Typology (use category, e.g. residential, office, etc.
- Dimensions (footprint, n° of storeys, etc.)
- Envelope data (thermal data, surface properties, etc)
- Roof data (thermal data, surface properties, etc)
- Co - Benefits
- …

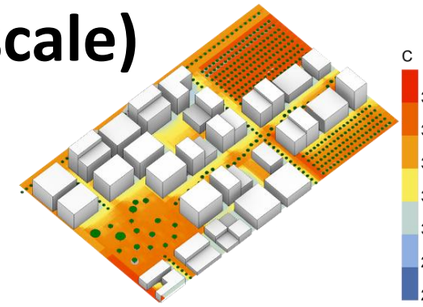


GROUND

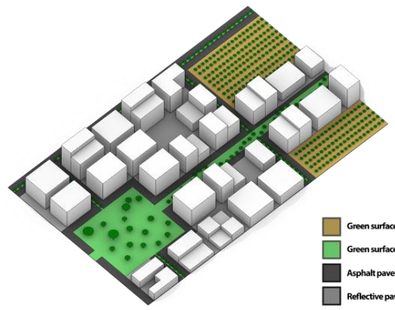
- Land use type (paved/green with sub-categories, e.g. asphalt, reflective surface, bioswale, agriculture, etc.)
- Dimensions
- Thermal properties (emissivity, albedo, etc.)
- Co - Benefits
- …



Universal Thermal Climate Index
8/10 to 8/10 between 12 and 17 @1



Universal Thermal Climate Index
8/10 to 8/10 between 12 and 17 @1



INTEGRATED OUTPUT: KPI&SCENARIO-BASED SUPPORT TO IMPLEMENTATION

Adaptation potential of urban projects

- General guidelines
- Buildings and infrastructure
- Mobility and transport
- Public green areas

Development stage

- Ongoing
- Planned/in planning phase
- In final planning/construction phase
- Completed

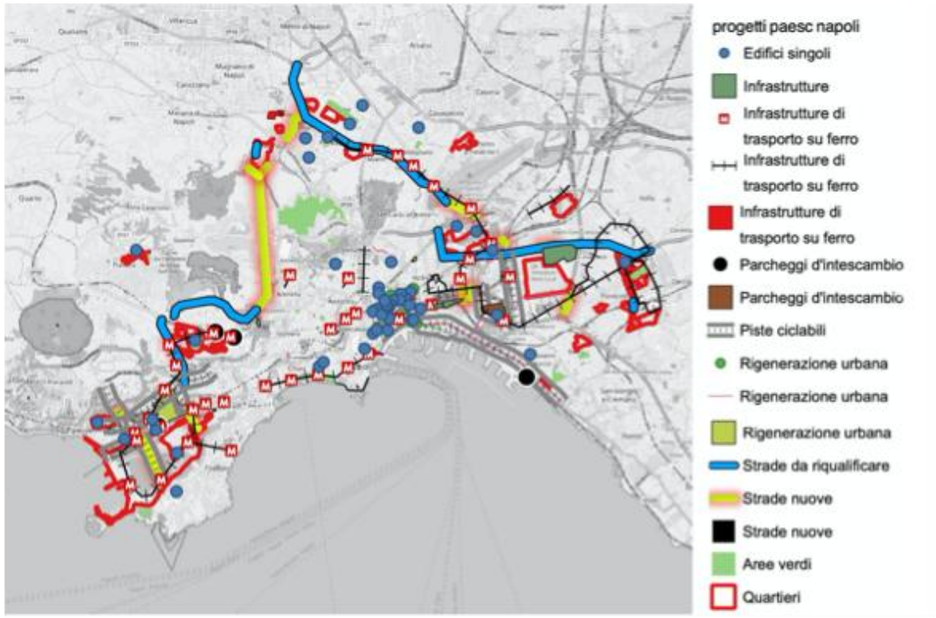


Figura 1: Classificazione dei progetti e interventi in corso nel Comune di Napoli (fonte: PLINIVS-LUPT)

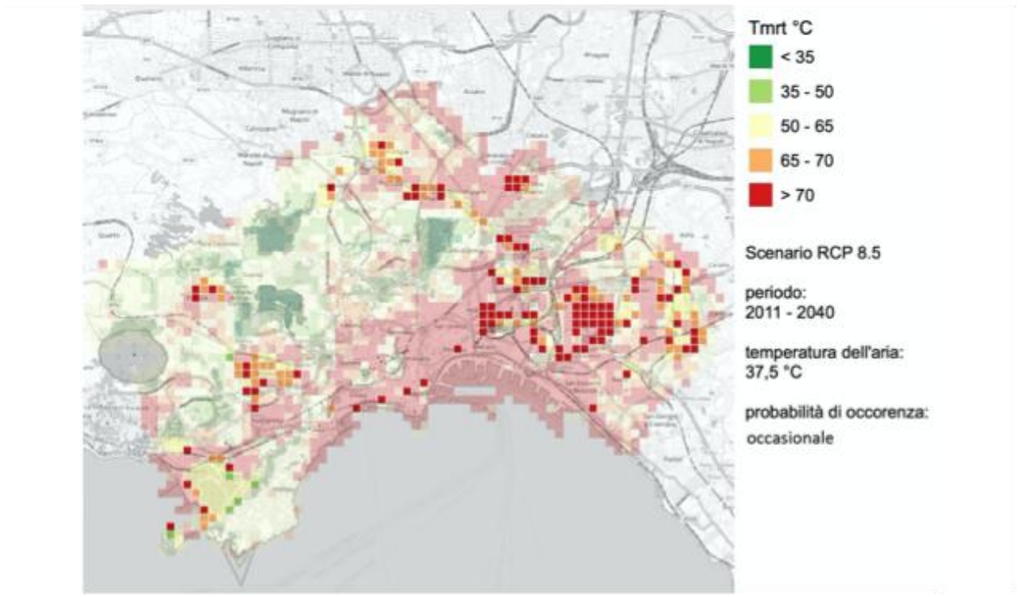


Figura 1: Evidenziazione delle celle interessate da interventi in corso o programmati, relativamente ai valori calcolati di Temperatura Media Radiante (Tmrt) (fonte: PLINIVS-LUPT)

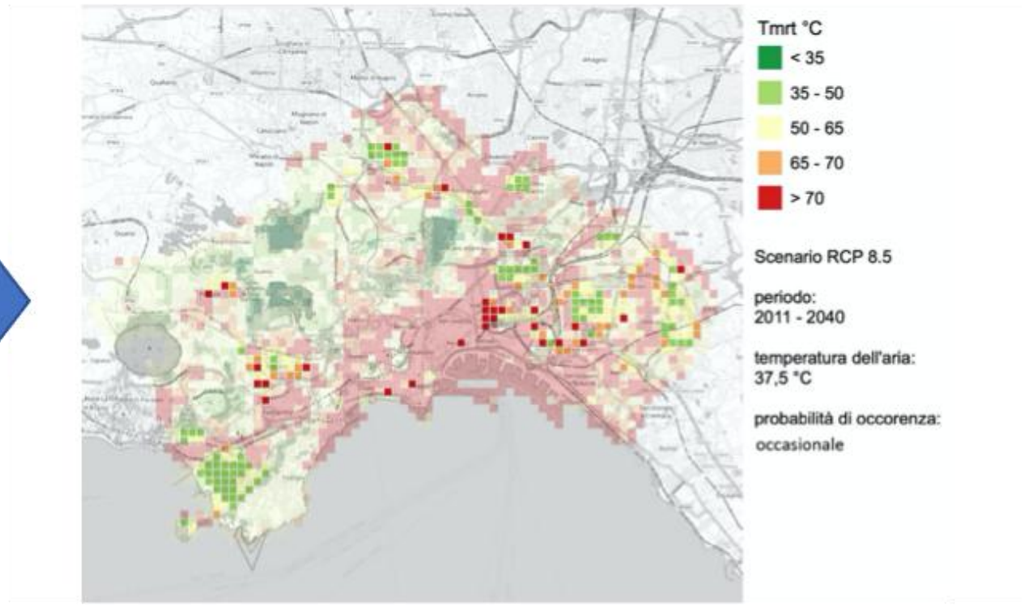
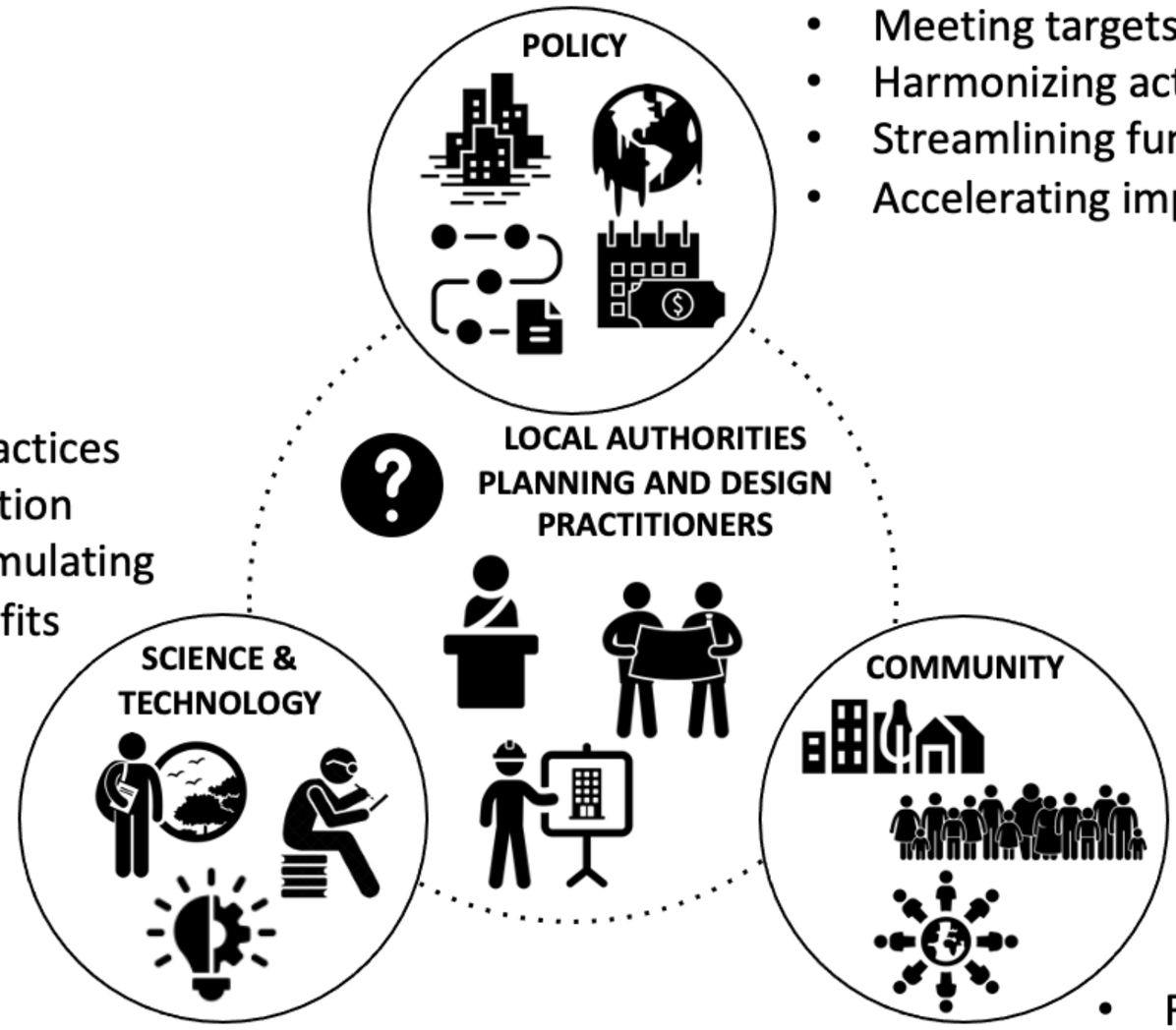


Figura 1: Analisi dei progetti e interventi in corso con indicazione del potenziale miglioramento delle condizioni di isola di calore, indicatore Temperatura Media Radiante (Tmrt) (fonte: PLINIVS-LUPT)

- Meeting targets
- Harmonizing actions
- Streamlining funding
- Accelerating implementation



- Adopting best practices
- Exploiting innovation
- Modelling and simulating
- Quantifying benefits

- Fostering equity
- Co-producing knowledge
- Co-designing
- Co-implementing
- Co-evaluating

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