



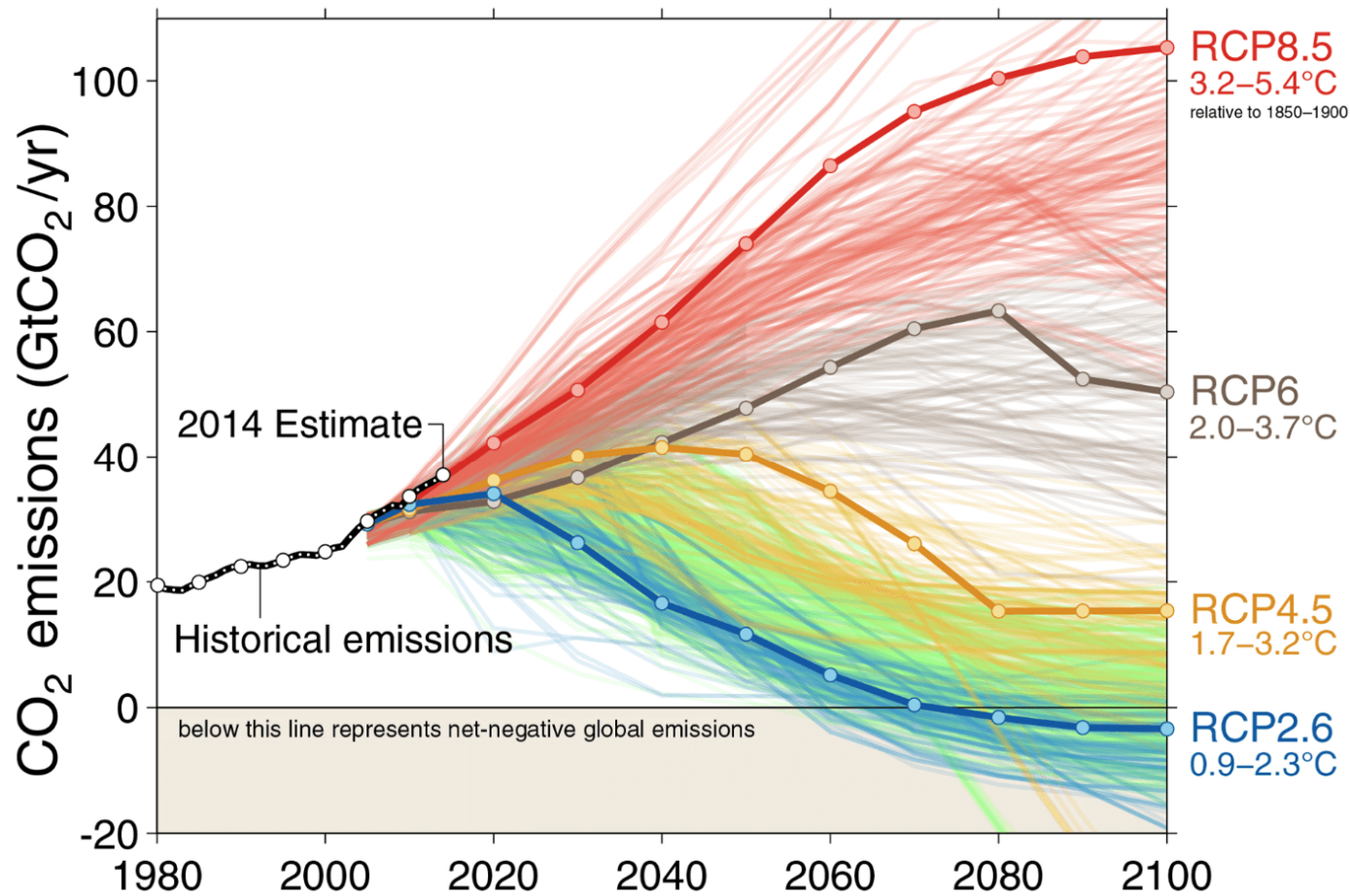
New Technologies for Decarbonizing Future Earth: from Global to Local

GCP Tsukuba International Office (Head)
IPCC/SRLCC (RE) and
AR6/WG3/Urban Systems (LA)

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opinion & comment

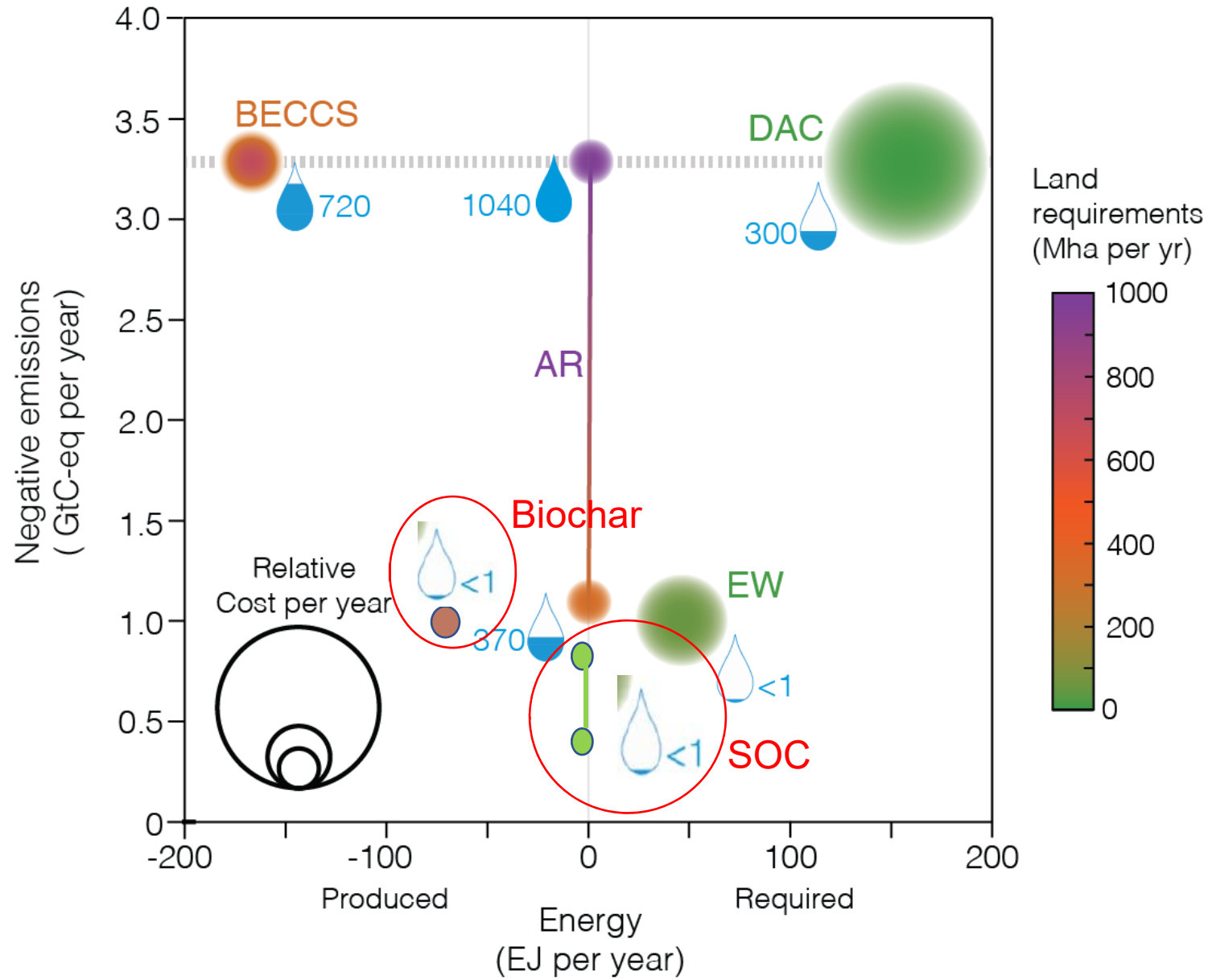
COMMENTARY:

Betting on negative emissions

Sabine Fuss, Josep G. Canadell, Glen P. Peters, Massimo Tavoni, Robbie M. Andrew, Philippe Ciais, Robert B. Jackson, Chris D. Jones, Florian Kraxner, Nebojsa Nakicenovic, Corinne Le Quéré, Michael R. Raupach, Ayyoob Sharifi, Pete Smith and Yoshiki Yamagata

Bioenergy with carbon capture and storage could be used to remove carbon dioxide from the atmosphere. However, its credibility as a climate change mitigation option is unproven and its widespread deployment in climate stabilization scenarios might become a dangerous distraction.

Source: Fuss et al. (2014),
Nature Climate Change.

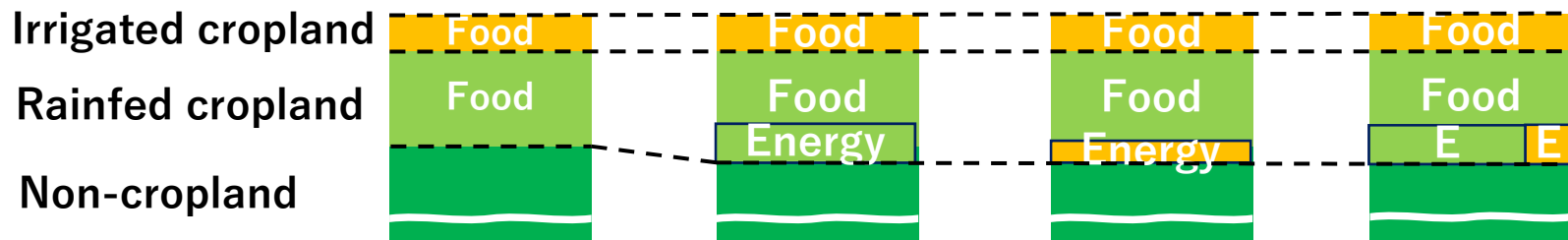


Smith *et al.* (Nature Climate Change 2015)

Sustainability Assessment for RCP2.6 BECCS Scenarios

Scenario analysis for the land use and irrigation

	Base	S1 (rainfed)	S2 (irrigation)	S3 (sustainable)
Year	2000	2100	2100	2100
Total cropland [Mha]	1570	2120	2120	2120
Bioenergy cropland [Mha]	0	500	250	500
Irrigation for bioenergy crop	No	No	Yes, uniform	Yes, if river water available



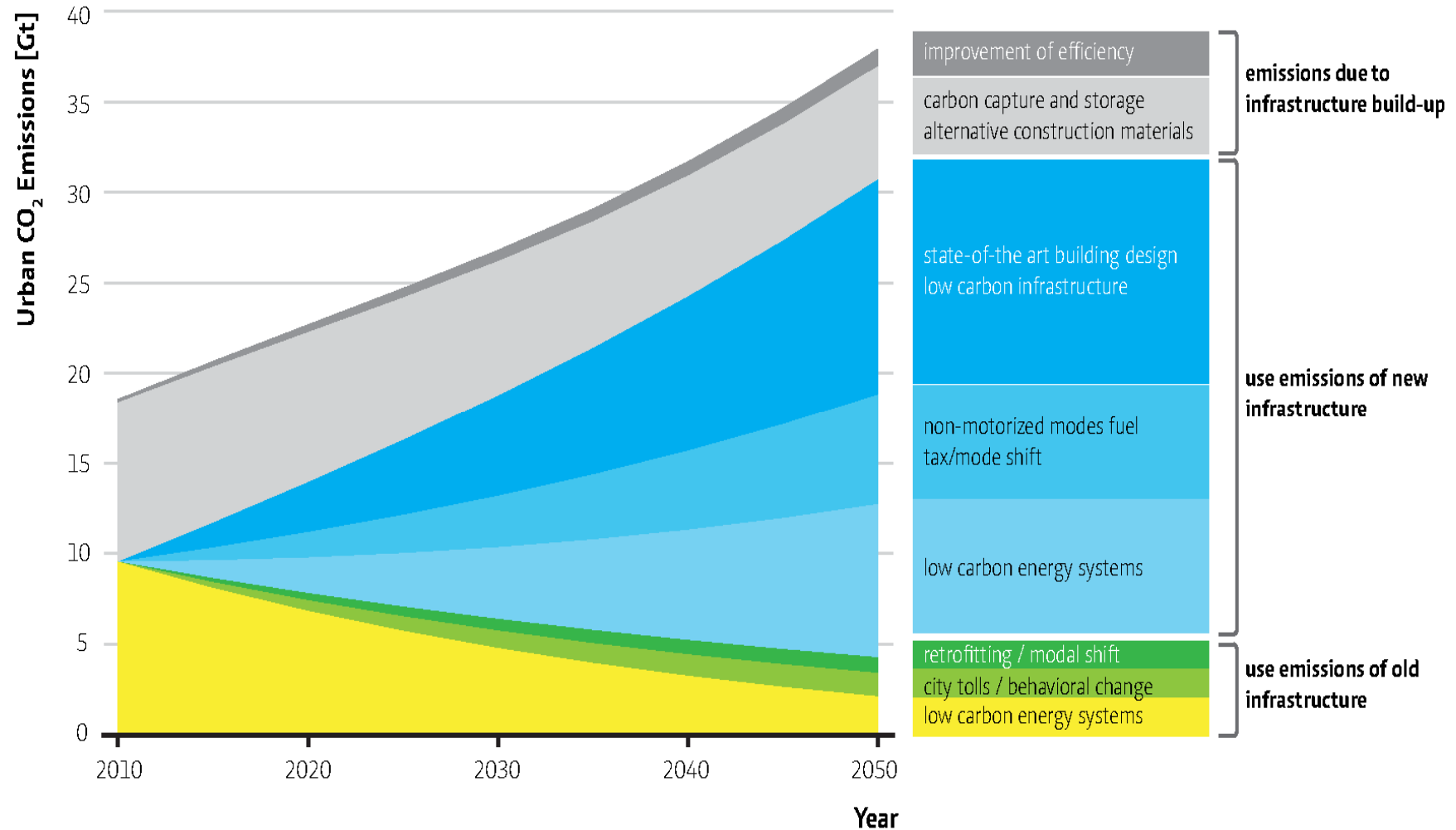
主な結論

- 150 Mha out of 500 Mha will be irrigated.
- 150 Mha of bioenergy irrigation increases water requirement by ~50%.
- Additional abstraction from non-river source is constrained to 260 km³/yr.
- Sustainable irrigation increases bioenergy crop yield by only ~5%.



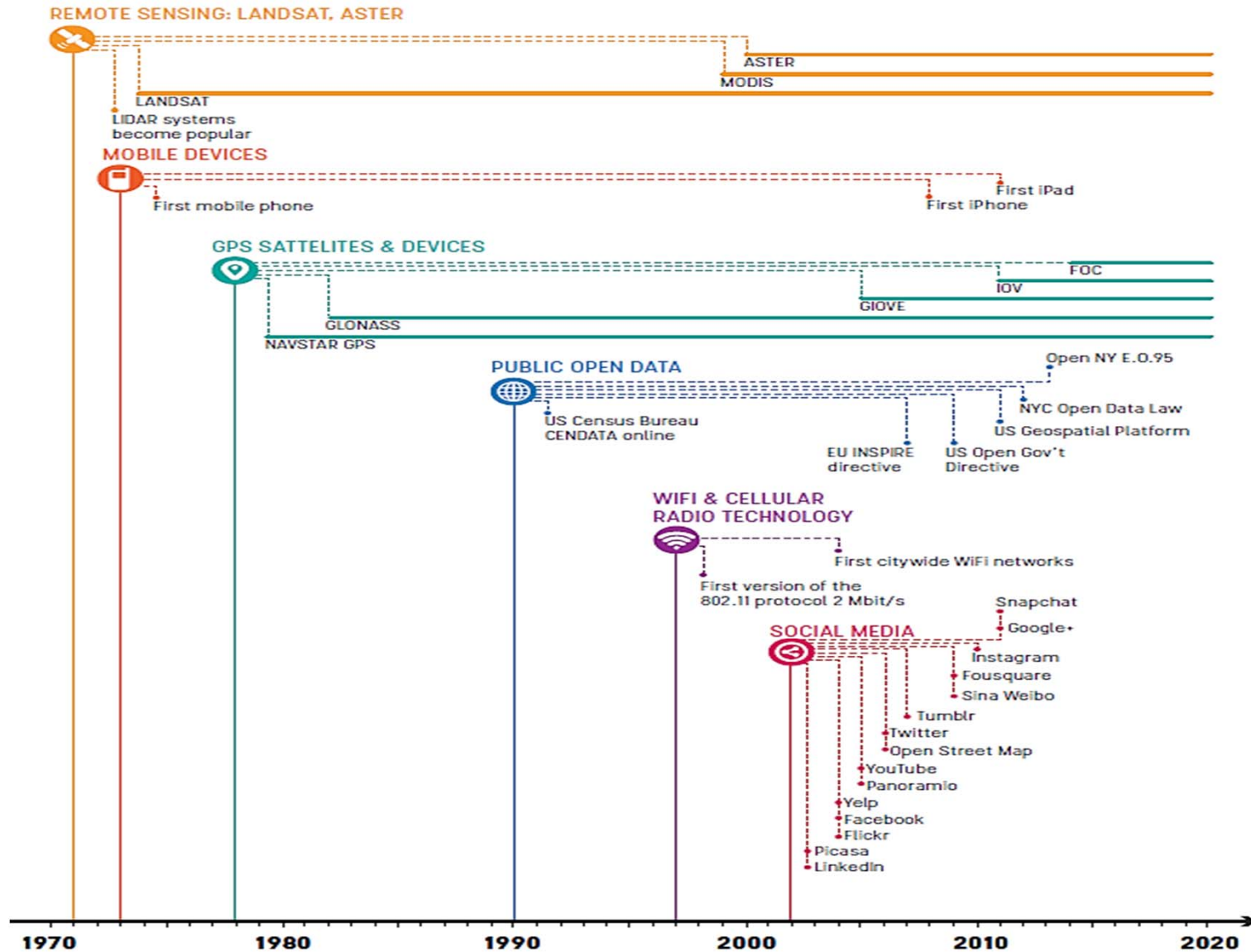
Yamagata et al. 2018;
Hanasaki et al. in prep

Emissions from Cities need to be Decarbonized ASAP



Creutzig et al., Urban Infrastructure Choices Structure Climate Solution. Nature Climate Change 2016

Bigdata in Urban Sciences



Source: Ilieva and McPhearson, Nature Sustainability, accepted

How can we use Bigdata and AI technologies for Decarbonized and sustainable communities?

Climate Change

Heat waves
41.0 °C
105.8 °F



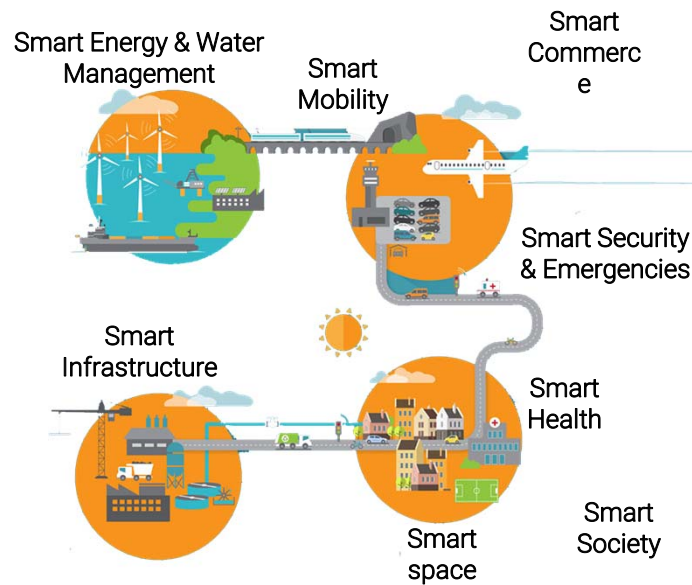
Kumagaya city, north of Tokyo, Monday, July 23, 2018

Flooding



Ibaraki prefecture, northeast of Tokyo, Sept. 10, 2015

Smart and Sustainable Community



→ Climate Resilience and Urban Decarbonization

Technical Advancement

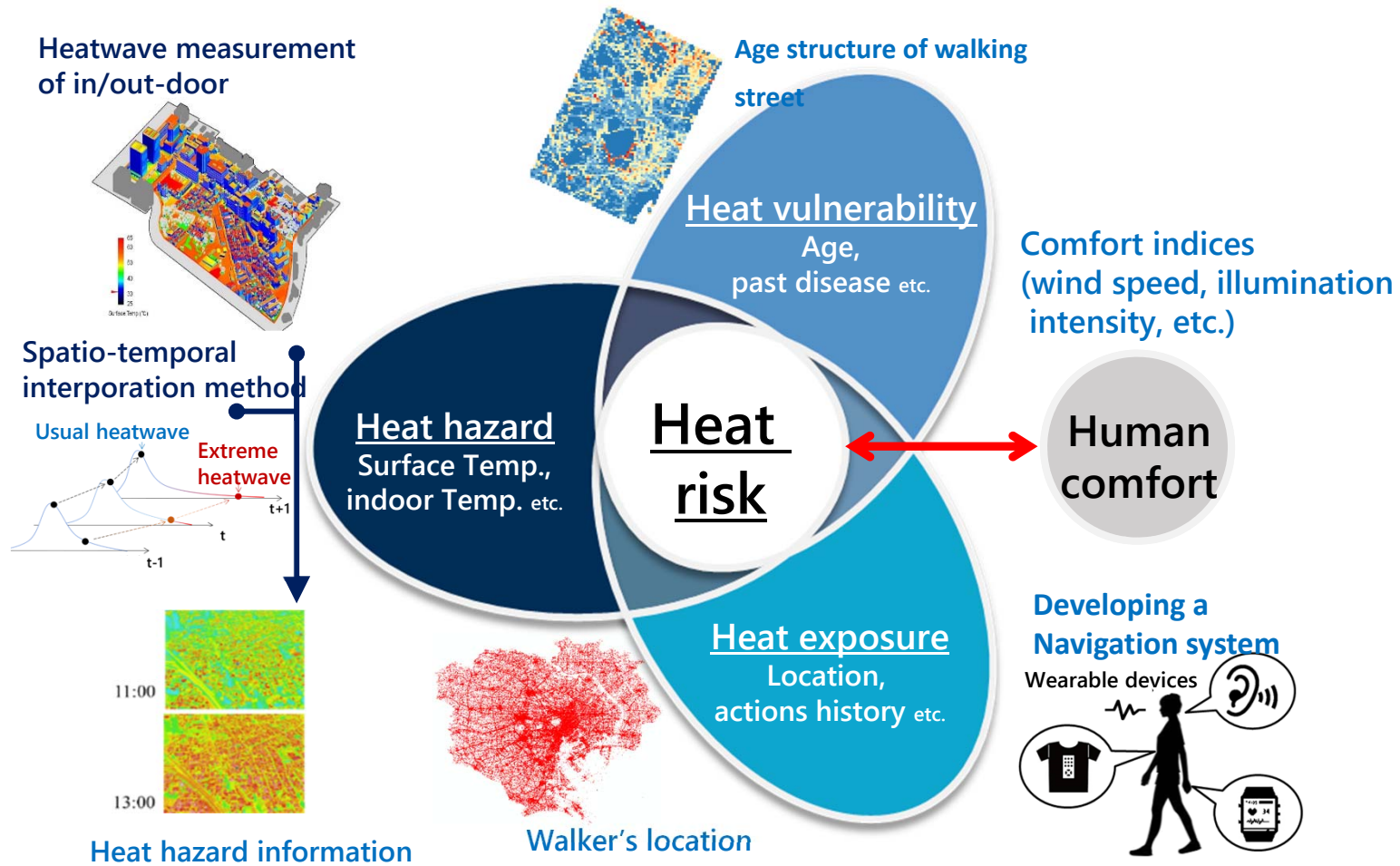


December 28, 2018 by Tony Joseph, Fingent company



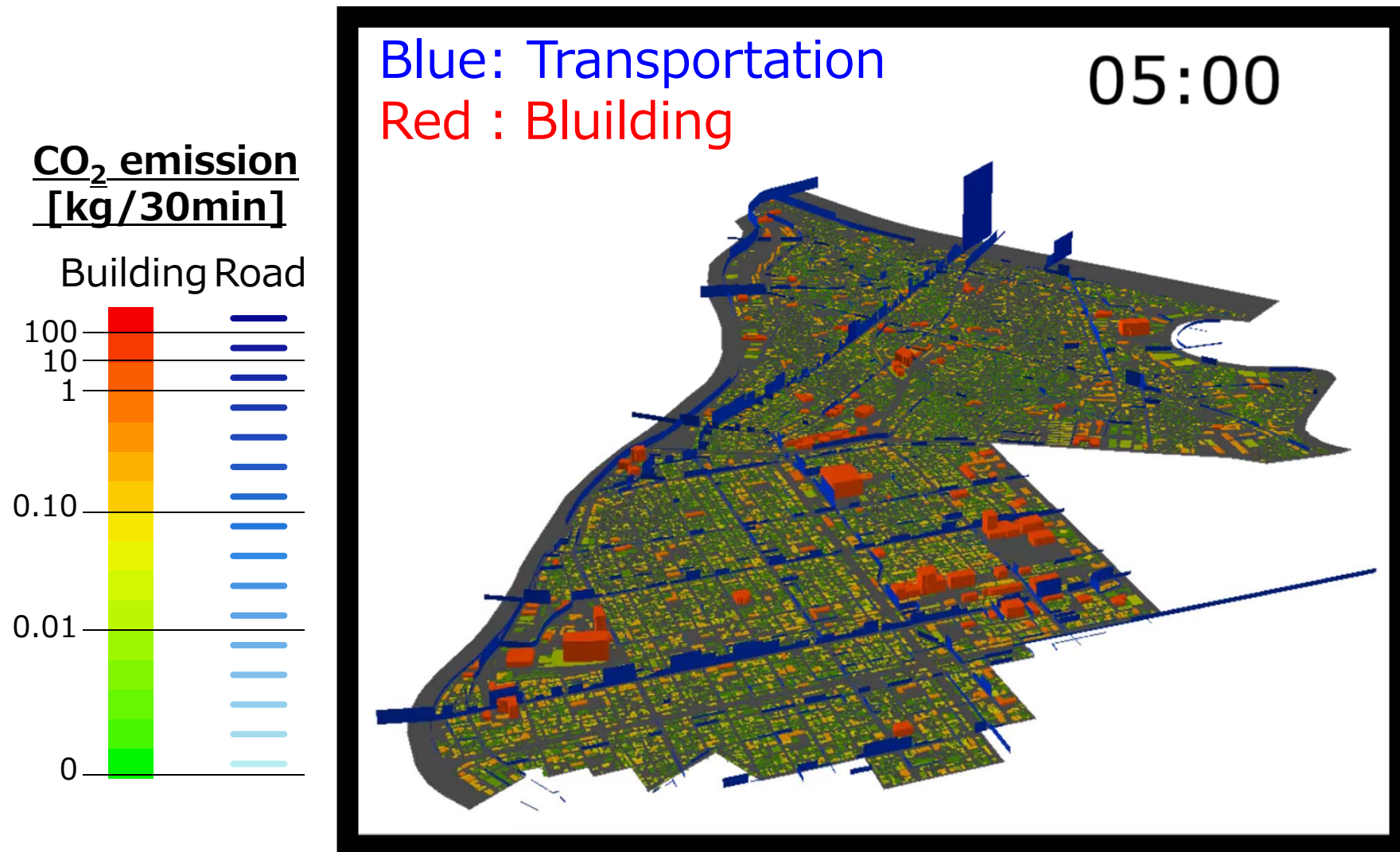
(Yamagata et al., 2019)

How can we manage Heat Risk and improve Human Comfort in the communities?



(Yamagata et al.,2019)

Urban Carbon Mapping for Tokyo using GPS with Machine Learning techniques



(Yamagata et al.,2019)

Urban Systems Design: Integration with future Living & Mobility services

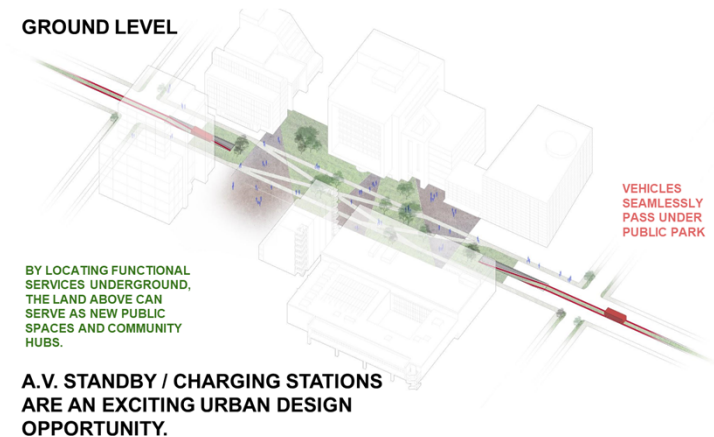
EXISTING STREET



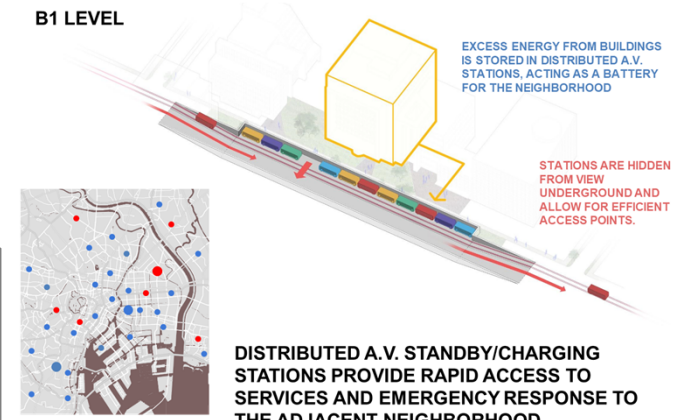
FUTURE A.V. CORRIDOR



GROUND LEVEL



B1 LEVEL



(Yamagata et al.,2019)