The Urban-Energy Nexus – An Integrated Systems Approach to Analyzing and Advancing Sustainability

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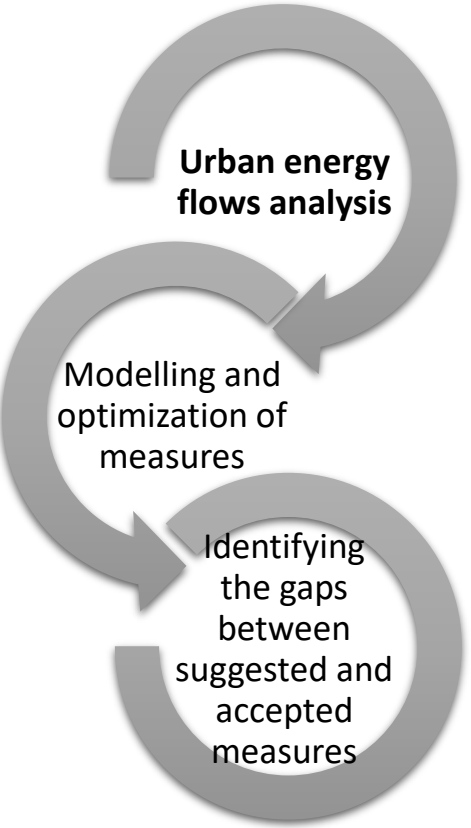
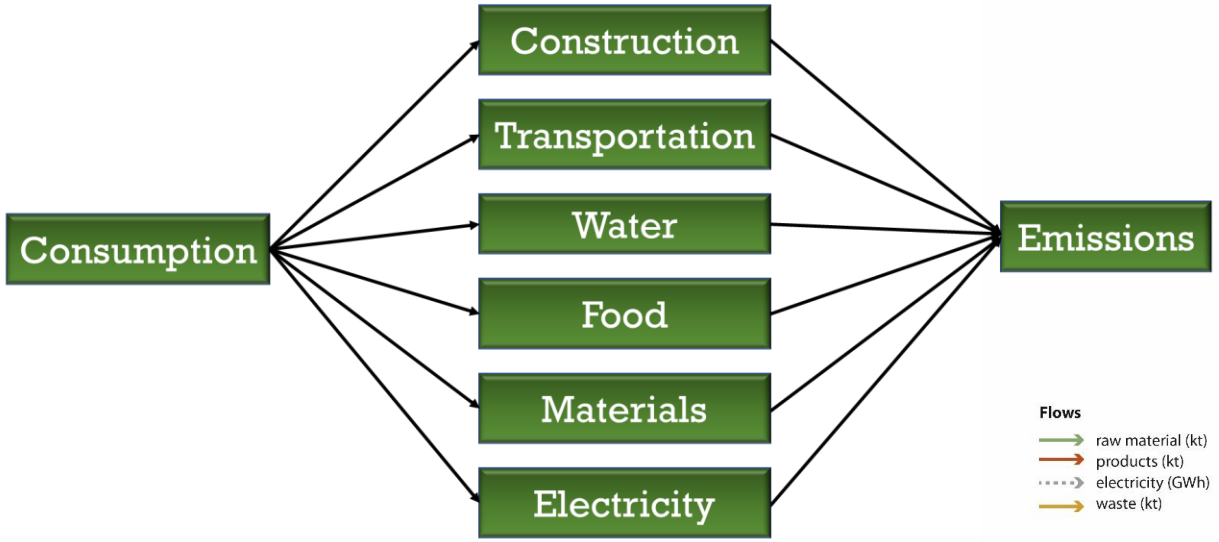
Background and motivation:

- Cities are the most intensive nodes of energy consumption – requiring supply of direct energy in the form of fuel and power, along with indirect energy in embedded in resources like food, water, building materials, etc..
- Advancing urban sustainability requires implementing various measures (Policy, Behavioral change, Technological development, etc.) at various spatial scales (from local to global).
- Choosing the right measures requires considering their potential contribution, while considering limitations given social, economic and political circumstances.
- The effectiveness of various measures should be assessed. Efforts can then be targeted toward measures with the greatest potential benefits to minimize the urban energy throughput.

Phase 1 - Developing an integrated multi scale direct and indirect urban energy and materials use analysis.





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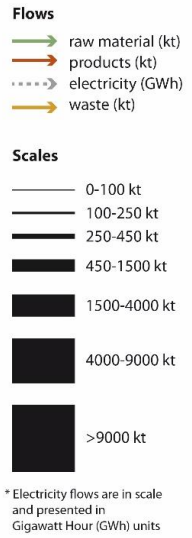
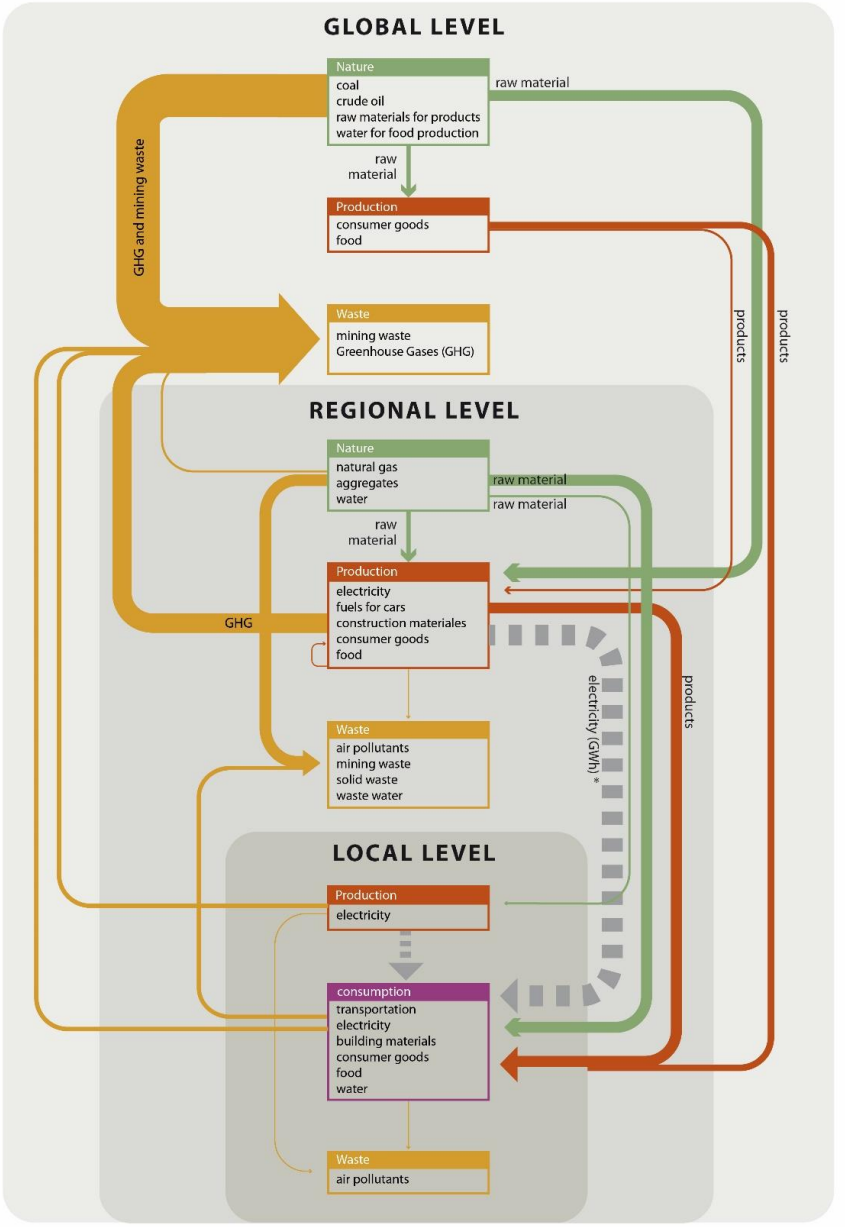
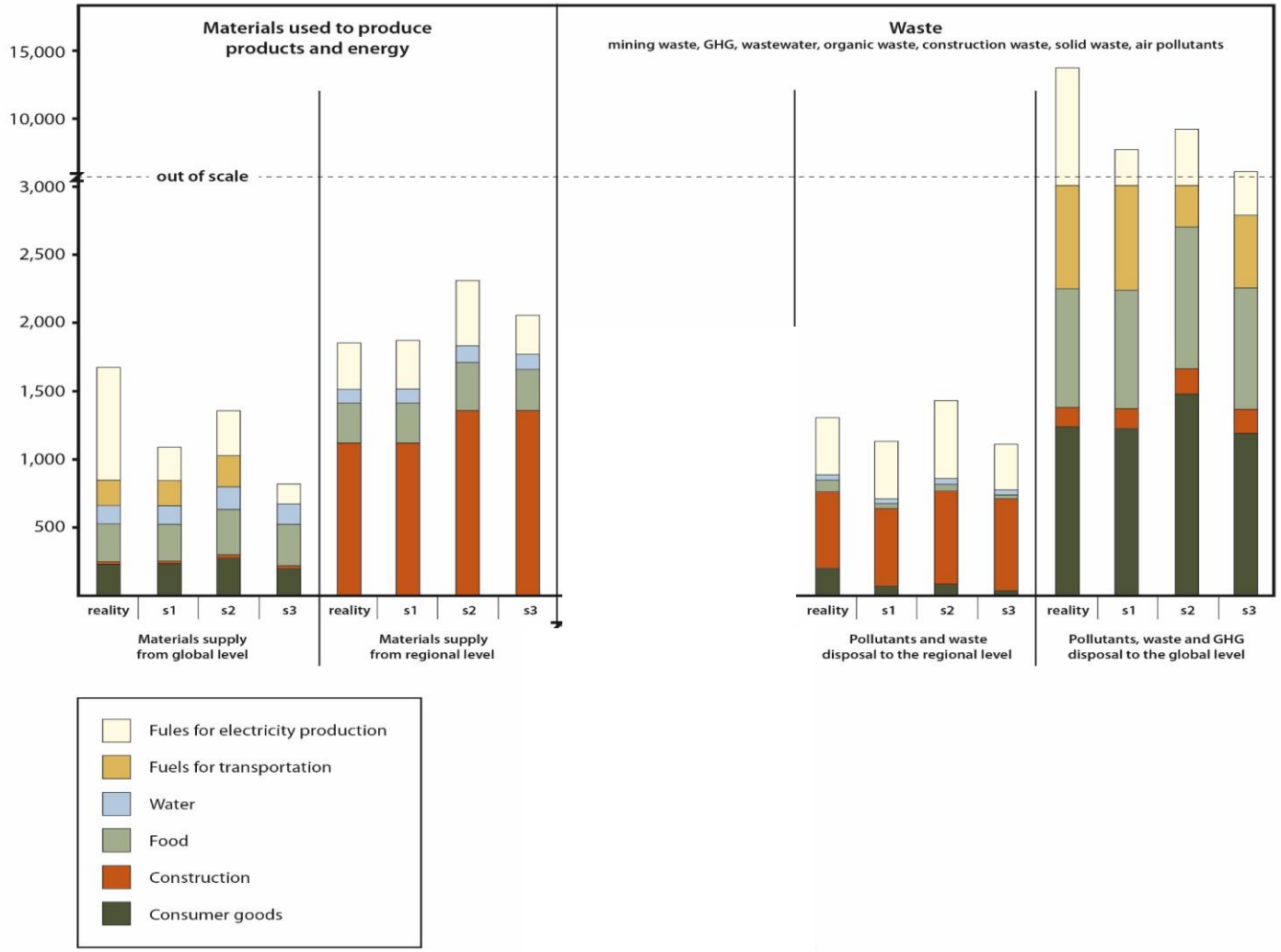


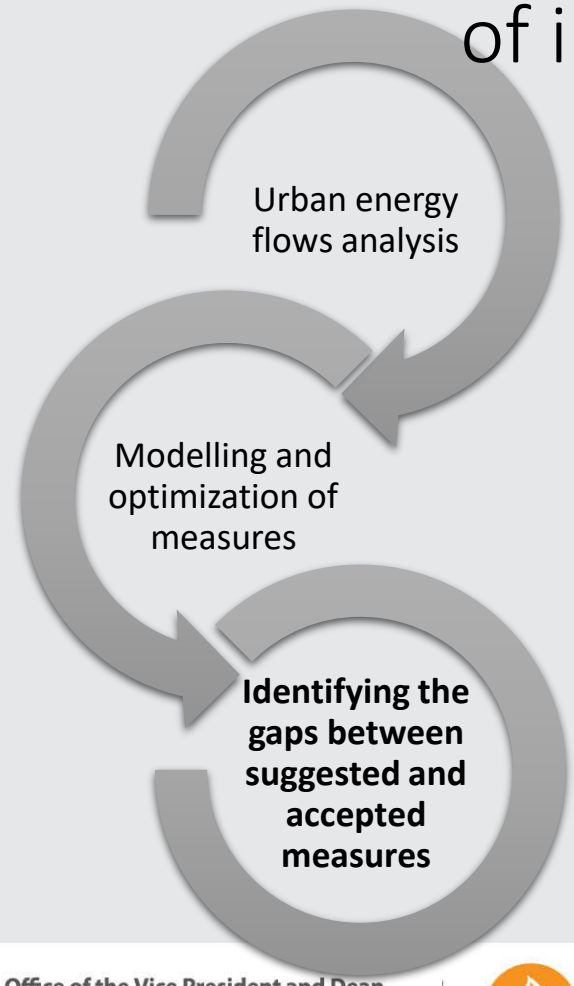


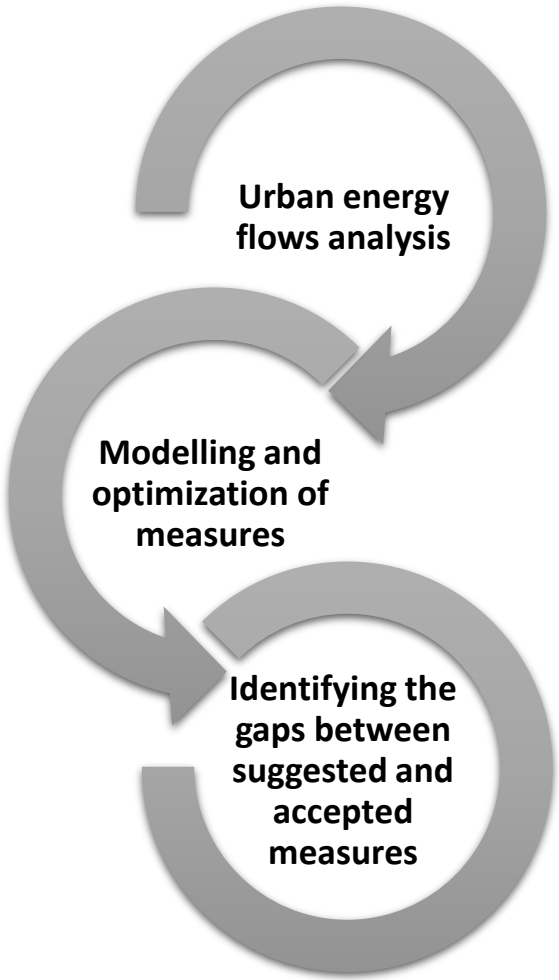
Phase II - Modelling the contribution of various existing and innovating measures and identify the optimal mix.

	s1	s2	s3
population growth by 2030	0%	21%	21%
change in electricity consumption per capita in 2030	0%	35%	35%
Change in desalinated water in 2030	0%	98%	98%
reducing beef consumption	0%	0%	30%
preventing food loss	0%	0	1
electricity production by renewable resources	10%	10%	32%
electricity production by natural gas	63.1%	63%	68%
electricity saving	20%	20%	30%
waste minimization	0%	0%	30%
recycled waste	51%	51%	65%
burning waste	26%	26%	26%
reducing mileage in the city	0%	0%	15%
transition to public transportation	4%	4%	12%
electric private vehicle	0%	0%	20%
electric van vehicle	0%	0%	20%
electric truck vehicle	0%	0%	5%
electric bus vehicle	0%	0%	100%
vehicles with improved emission factors	75%	75%	100%
water saving	5%	5%	18%



Phase III - Exploring the ('real world') potential and limitations of implementing identified measures.




Urban energy flows analysis
Modelling and optimization of measures
Identifying the gaps between suggested and accepted measures

Thank You