

Supplementary Table S1. Reasoning for exclusion/inclusion of questions and variables in the questionnaire.

Question number(s)	Question	Number of variables	Included (X) Excluded (—)	Reasoning for inclusion or exclusion
1	In which municipality do you work in?	1	X	Question was used to identify the municipality categories based on Eurostat's Degree of Urbanization categorization.
2–8	Questions 2–8 were all related to respondents' backgrounds.	-	—	Questions address respondents' educational and professional background and are not in the study's scope nor related to RIS subsystems or sustainability objectives.
9	How well do the following urban sustainability related concepts fit with your municipality's land-use planning objectives? Concepts are based on a study by de Jong et al. 2015: "Sustainable-smart-resilient-low carbon-eco-knowledge cities; making sense of a multitude of concepts promoting sustainable urbanization" (Journal of Cleaner Production).	6	—	Our study has an objective in assessing regional differences in municipalities land-use planning between regions classified on an urban-rural scale. Consequently, questions that unambiguously mention or emphasize one specific kind of region were decided to be excluded from the study. The definitions by de Jong et al. (2015) that were used in this question focus directly on urban and exclude rural regions. Therefore, this question was not considered suitable in our analysis.
10	Field for open comments	-	—	Open comments were not directly used in the study.
11	How important are the following material and technology solutions in steering your municipality's land-use planning, especially in relation to multistory houses?	6	—	All variables of this question address multistorey building and thus connect with cities (urban regions). Therefore, question was excluded from the study.
12	How important do you consider the following industries as employers in your municipality?	10	—	Question does not address municipalities land-use planning per se and therefore does not directly link to the RIS framework. It neither relates to municipalities sustainability objectives in land-use planning. Thus, question was excluded from the study.
13	How important do you consider the following industries as employers in your municipality's working area?	10	—	Same reasoning than in the previous question.
14	How important are the following options for implementing the land-use planning aims in your municipality?	8	X	Question was used in the study to assess the importance of different institutions in municipalities' land-use planning.

15	Field for open comments	-	—	Open comments were not directly used in the study.
16	How important is collaboration with the following actors?	4	—	Consultants present in the Finnish land-use planning system outsourced and paid service providers, and they may even participate directly in same planning tasks as municipal civil servants. Thus, they are very different stakeholders than other actors (questions 17 and 19). For the sake of validity of the results, question was not included in analysis with other questions regarding collaboration in land-use planning. All four variables inquired with this question present consultants with different field of expertise: zoning, environmental impact assessment, participatory planning and decision making and stakeholder communication related consultancy services.
17	How important is collaboration with other municipalities to fulfill the land-use planning aims in your municipality?	2	X	Question was used to assess collaboration with other municipalities in land-use planning. Based on the earlier scientific literature, other municipalities are considered as stakeholders and peers who produce and circulate knowledge regarding topics in land-use planning (e.g., about climate change mitigation).
18	Field for open comments	-	—	Open comments were not directly used in the study.
19	How important is collaboration with the following actors to fulfill the land-use planning aims for residential areas in your municipality?	9	X	These actors directly connect with RIS stakeholder subsystem. Question was used to assess collaboration with various actors in land-use planning.
20	How important are the following matters in your municipality's land-use planning in residential areas?	28	X	Question was used to assess municipalities' sustainability objectives in land-use planning. The variables represent especially ecological issues through ecosystem services, which can be affected through land-use planning.
21	How important are the following objectives in your municipality's infill development?	4	X	Question was used to assess municipalities' sustainability objectives in land-use planning.
22	How well do the following claims fit with your municipality's land-use planning in residential areas?	17	X (partially)	Question variables 1 and 2 were included in the study, since they address construction materials used in all types of residential buildings both in urban and rural areas connected to sustainability aims in the built environment. Variables 3–5 relate specifically to multistorey building and thus connect with cities (urban regions). Therefore, variables were excluded from the study. Variables 6–17 address segregation related issues (i.e., social sustainability). Since the focus of this study was on ecological.
23	Field for open comments	-	—	Open comments were not directly used in the study.

Supplementary Table S2. Land-use planners' views of the importance of regional innovation system (RIS) variables (% of responses). (I) denotes informal planning, and (S) statutory planning variable. (1 = Not at all important, 2 = Not very important, 3 = Neither important nor unimportant, 4 = Quite important, 5 = Very important).

Q14 Socio-institutional subsystem variables		1	2	3	4	5	mean
a.	Strategic alliances for development projects (I)	4.6	6.5	17.0	41.8	30.1	3.9
b.	Municipal development programs (I)	3.8	8.8	16.9	43.1	27.5	3.8
c.	Regional development programs (I)	3.9	11.6	23.2	48.4	12.9	3.6
d.	National development programs (I)	4.6	14.6	30.5	41.1	9.3	3.4
e.	Statutory plans made by the authorities at a detailed municipal level (S)	0.6	3.7	2.5	18.6	74.5	4.8
f.	Statutory plans made by the authorities at a general municipal level (S)	0.0	1.9	3.1	11.7	83.3	4.6
g.	Statutory plans made by the authorities at a regional level (S)	1.9	3.1	10.7	50.9	33.3	4.1
h.	Statutory decisions made by the authorities at a national level (S)	1.3	8.3	15.3	41.4	33.8	4.0
Q19 Knowledge generation and diffusion subsystem and knowledge application and exploitation subsystem variables		1	2	3	4	5	mean
a.	Collaboration with companies	0.0	2.5	11.9	42.1	43.4	4.3
b.	Collaboration with interest organizations	5.5	15.8	26.7	39.0	13.0	3.5
c.	Collaboration with the authorities outside the municipality	0.6	3.1	8.0	37.0	51.2	4.4
d.	Collaboration with research organizations	7.8	23.5	36.6	29.4	2.6	3.0
e.	Collaboration with educational and teaching organizations	4.5	22.9	31.2	33.8	7.6	3.2
f.	Collaboration with non-governmental organizations	2.5	8.2	20.8	42.1	26.4	3.8
g.	Collaboration with citizens	0.6	1.9	4.9	28.4	64.2	4.5
h.	Collaboration with the media	3.9	7.1	25.8	45.8	17.4	3.7
Q17							
a.	Formal collaboration with other municipalities	3.5	14.6	24.3	40.3	17.4	3.5
b.	Informal collaboration with other municipalities	5.5	15.8	26.7	39.0	13.0	3.4

Supplementary Table S3. Distribution of responses regarding sustainability objectives related to residential areas in connection with ecosystem services, infill development, and building materials. Frequencies in percentages (%).

Sustainability variables (esp. ecosystem services) (Question 20)	1	2	3	4	5	mean
a. Protection of biodiversity	0.6	3.7	11.7	36.8	47.2	4.3
b. Preserving living environments	0.6	3.7	11.7	34.4	49.7	4.3
c. Addressing land for agricultural and forestry use	10.1	21.4	27	27.7	13.8	3.1
d. Preserving habitats for collectibles and wildlife	10.1	27.0	32.1	23.9	6.9	2.9
e. Preserving groundwater supplies	1.3	1.9	5.7	19.5	71.7	4.6
f. Regulating water circulation and flood control	0.0	6.2	7.4	36.4	50.0	4.3
g. Pollinator protection	8.9	22.6	40.4	21.9	6.2	2.9
h. Advancing local and regional climate conditions	3.2	15.9	19.7	39.5	21.7	3.6
i. Protecting/advancing recreational uses of nature	0.6	6.1	4.3	31.9	57.1	4.4
j. Protecting/advancing nature's teaching opportunities	0.6	13.3	21.5	43.0	21.5	3.7
k. Preserving traditional landscapes and environments	0.6	5.0	8.8	41.3	44.4	4.2
l. Preserving natural sites' cultural and spiritual values	0.6	2.6	11.0	40.3	45.5	4.3
m. Preserving nature's intrinsic values for future generations	4.0	17.9	20.5	39.7	17.9	3.5
n. Minimizing land treatment expenses on building sites before releasing	2.7	6.1	16.9	48.6	25.7	3.9
o. Prioritizing building on regions with inherent possibilities of energy efficiency	5.2	22.1	25.3	37.0	10.4	3.3
p. Prioritizing building on regions with existing infrastructure	0.0	1.2	3.7	29.6	65.4	4.6
q. Maintaining municipality's land ownership	6.2	12.3	29.5	27.4	24.7	3.5
r. Minimizing noise pollution	1.2	3.7	12.3	41.7	41.1	4.2
s. Enhancing/preserving air quality	1.9	6.5	20.6	43.2	27.7	3.9
t. Repairing previously made esthetic flaws in landscape/urban milieu	3.9	14.3	26.6	39.0	16.2	3.5
Sustainability variables (esp. infill development) (Question 21)	1	2	3	4	5	mean
a. Concentration of community structure and/or reduction of sprawl by increasing interregional commuting connections	1.9	4.3	11.1	29	53.7	4.3
b. Concentration of community structure and/or reduction of sprawl by building additional stories on existing apartment buildings	16.6	19.7	25.5	28.0	10.2	3.0
c. Enhancing carbon neutrality of infrastructure and buildings	5.2	12.9	18.1	39.4	24.5	3.7
d. Enhancing energy efficiency of infrastructure and buildings	3.8	8.3	13.5	48.7	25.6	3.8
e. Introduction of smart technologies	8.7	21.4	30.2	34.1	5.6	3.1
Sustainability variables (esp. building materials) (Question 22)	1	2	3	4	5	mean
a. guides the use of building materials in new construction	13.4	20.9	34.3	25.4	6.0	3.1
b. guides the use of building materials in renovation	11.8	19.1	25.7	36.2	7.2	2.9

Supplementary Table S4. Two-tailed Pearson correlations between regional innovation system (RIS) subsystems' factor loadings and sustainability objectives' factor loadings for the urban municipality group.

		Regional innovation system (RIS)				Sustainability objectives	
		F1: Informal planning	F2: Local statutory planning	F1: Information compilers, deliverers, and users	F2: Research and governance organizations	F1: Sustainable building focus	F2: Ecosystem service focus
Regional innovation system	F1: Informal planning	1.00					
	F2: Local statutory planning	0.666	1.00				
	F1: Information compilers, deliverers, and users	0.053*	0.018**	1.00			
	F2: Research and governance organizations	<0.001***	0.509	0.228	1.00		
Sustainability objectives	F1: Sustainable building focus	0.001***	0.035**	0.101	0.001***	1.00	
	F2: Ecosystem service focus	0.091*	0.014**	0.021**	<0.001***	0.117	1.00

*Suggestive evidence of statistical significance = $0.05 \leq p\text{-value} < 0.1$; **moderate evidence of statistical significance = $0.01 \leq p\text{-value} < 0.05$; ***very strong evidence of statistical significance = $p\text{-value} < 0.01$.

Supplementary Table S5. Two-tailed Pearson correlations between regional innovation system (RIS) subsystems' factor loadings and sustainability objectives' factor loadings for other municipalities.

		Regional innovation system				Sustainability objectives	
		F1: Informal planning	F2: Local statutory planning	F1: Information compilers, deliverers, and users	F2: Research and governance organizations	F1: Sustainable building focus	F2: Ecosystem service focus
Regional innovation system	F1: Informal planning	1.00					
	F2: Local statutory planning	0.777	1.00				
	F1: Information compilers, deliverers, and users	0.001***	0.013**	1.00			
	F2: Research and governance organizations	<0.001***	0.588	0.009***	1.00		
Sustainability objectives	F1: Sustainable building focus	<0.001***	0.493	0.004***	<0.001***	1.00	
	F2: Ecosystem service focus	0.003***	0.237	0.027**	0.124	0.308	1.00

*Suggestive evidence of statistical significance = $0.05 \leq p\text{-value} < 0.1$; **moderate evidence of statistical significance = $0.01 \leq p\text{-value} < 0.05$; ***very strong evidence of statistical significance = $p\text{-value} < 0.01$.