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Edmonton Urban Growth Model as a Support Tool for the City Plan Growth Scenarios Development

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Abstract : Edmonton is currently one of the youngest North American cities and has achieved significant growth over the past 40 years. Strong urban shift requires a new approach to how the city is envisioned, planned, and built. This approach is evidence-based scenario development, and an urban growth model was a key support tool in framing Edmonton development strategies, developing urban policies, and assessing policy implications. The urban growth model has been developed using the Metronamica software platform. The Metronamica land use model evaluated the dynamic of land use change under the influence of key development drivers (population and employment), zoning, land suitability, and land and activity accessibility. The model was designed following the Big City Moves ideas: become greener as we grow, develop a rebuildable city, ignite a community of communities, foster a healing city, and create a city of convergence. The Big City Moves were converted to three development scenarios: 'Strong Central City', 'Node City', and 'Corridor City'. Each scenario has a narrative story that expressed scenario's high level goal, scenario's approach to residential and commercial activities, to transportation vision, and employment and environmental principles. Land use demand was calculated for each scenario according to specific density targets. Spatial policies were analyzed according to their level of importance within the policy set definition for the specific scenario, but also through the policy measures. The model was calibrated on the way to reproduce known historical land use pattern. For the calibration, we used 2006 and 2011 land use data. The validation is done independently, which means we used the data we did not use for the calibration. The model was validated with 2016 data. In general, the modeling process contain three main phases: 'from qualitative storyline to quantitative modelling', 'model development and model run', and 'from quantitative modelling to qualitative storyline'. The model also incorporates five spatial indicators: distance from residential to work, distance from residential to recreation, distance to river valley, urban expansion and habitat fragmentation. The major finding of this research could be looked at from two perspectives: the planning perspective and technology perspective. The planning perspective evaluates the model as a tool for scenario development. Using the model, we explored the land use dynamic that is influenced by a different set of policies. The model enables a direct comparison between the three scenarios. We explored the similarities and differences of scenarios and their quantitative indicators: land use change, population change (and spatial allocation), job allocation, density (population, employment, and dwelling unit), habitat connectivity, proximity to objects of interest, etc. From the technology perspective, the model showed one very important characteristic: the model flexibility. The direction for policy testing changed many times during the consultation process and model flexibility in applying all these changes was highly appreciated. The model satisfied our needs as scenario development and evaluation tool, but also as a communication tool during the consultation process.

Keywords : urban growth model, scenario development, spatial indicators, Metronamica
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