#	Description	2016 Baseline: Start of Modelling	2050 Business As Planned	2020-2030 Model Outputs 80% and 100% Target Scenarios	2030-2050 Model Outputs 80% Target Scenario	2030 - 2050 Model Outputs 100% Target Scenario
	Description			Actions are common to 80% and 100% except as noted.		
	Demographics					
	Population	969,318	Preliminary Growth Projections, dated August 22, 2019 with linear extrapolation after 2046. Revised projections will be incorporated into future models.	1,200,449	1,509,358	1,509,358
	Background employment	565,955	Preliminary Growth Projections, dated August 22, 2019 with linear extrapolation after 2046. Revised projections will be incorporated into future models.	750,727	954,765	954,765
	LAND USE					
1	Dwelling units	385,074	2046 (Official Plan limit) New: 236,696 Existing: 359,377	New: 126,312 Existing: 370,581	New: 274,611 Existing: 357,738	New: 274,611 Existing: 357,738
2	Non-residential floor space (sum)	23,697,909	2046 (Official Plan limit) New: 17,453,027 Existing: 19,936,373	New: 11,909,833 Existing: 20,282,103	New: 20,735,100 Existing: 19,723,201	New: 20,735,100 Existing: 19,723,201
3	Spatial distribution	50% greenfield development, 50% infill	Current official plan until 2031 and a similar plan thereafter	90% of new development is in transit access zones or adjacent to existing or new LRT, BRT after 2025.	90% of new development is in transit access zones or adjacent to existing or new LRT, BRT after 2025.	90% of new development is in transit access zones or adjacent to existing or new LRT, BRT after 2025.
	BUILDINGS					
	New buildings					
4	Dwelling size	Single-detached: 264m2 Semi-detached: 160m2 Rows: 150m2 Apartments: 110m2	2016 dwelling sizes maintained	The average dwelling size is 10% smaller relative to 2016	The average dwelling size is 20% percent smaller in 2050 compared to 2016	Decrease the average new dwelling size by 20% relative to 2016
5	Housing mix	Single-detached: 45% Semi-detached: 7% Rows: 21% Apartments: 27%	Allocation to dwelling types based on Scenario T2 DN Hybrid, 2019-07-23 provided by City of Ottawa Research and Forecasting with linear extrapolation after 2046 Type shares of new dwelling units by 2046: Single-detached: 36% Semi-detached: 5% Rows: 33% Apartments: 26%	New dwelling unit single share is at 28% at 2030	Share of new single family homes decreased by 40% from 2016 by 2050	New dwelling unit single share is 24%*
6	Efficiency of new homes	2012 Building Code	10% improvement every 5 years for new construction	N/A - superseded by "Net Zero Homes"	N/A - superseded by "Net Zero Homes"	N/A - superseded by "Net Zero Homes"
7	Net zero homes	N/a	2016 efficiencies held constant	100% of new construction is net zero energy after 2030	100% of new construction is net zero energy after 2030	Hold 2030 Target
8	New commercial buildings	2012 Building Code	10% improvement every 5 years for new construction	All buildings built to a high performance building standard similar to what exists in Toronto and Vancouver by 2030	The 2030 measure is carried on	Passive house for new commercial and retail*

Note:
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#	Description	2016 Baseline: Start of Modelling	2050 Business As Planned	2020-2030 Model Outputs 80% and 100% Target Scenarios	2030-2050 Model Outputs 80% Target Scenario	2030 - 2050 Model Outputs 100% Target Scenario
	Existing buildings					
9	Retrofit older homes (pre-1980)	N/A, estimated 1% annual renovation rate	No additional retrofits	Scale up rate of retrofits to 16% of all dwellings by 2030; achieve thermal savings of 60%; electrical savings of 50%	Scale up rate of retrofits to 98% of all dwellings by 2050; achieve thermal savings of 60%; electrical savings of 50%	Scale up rate of retrofits to 98% of all dwellings by 2040; achieve thermal savings of 70%; electrical savings of 30%*
10	Retrofit newer homes (post-1980)	N/A, estimated 1% annual renovation rate	No additional retrofits	Scale up rate of retrofits to 16% of all dwellings by 2030; achieve thermal savings of 60%; electrical savings of 50%	Scale up rate of retrofits to 98% of all dwellings by 2050; achieve thermal savings of 50%; electrical savings of 40%	Scale up rate of retrofits to 98% of all dwellings by 2040; achieve thermal savings of 70%; electrical savings of 30%*
11	Retrofits for small commercial and office buildings	N/A, estimated 1% annual renovation rate	No additional retrofits	Scale up rate of retrofits to 16% of all buildings by 2030; achieve thermal savings of 50%; electrical savings of 40%	Scale up rate of retrofits to 98% of all buildings by 2050; achieve thermal savings of 50%; electrical savings of 40%	Scale up rate of retrofits to 98% of all buildings by 2040; achieve thermal savings of 60%; electrical savings of 30%*
12	Retrofits for commercial, office and industrial buildings	N/A, estimated 1% annual renovation rate	No additional retrofits	16% of the existing building stock is retrofit by 2030 with average savings of 50%	95% of the existing building stock is retrofit by 2050 with average savings of 50%	95% of the existing building stock is retrofit by 2040; achieve thermal savings of 60%; electrical savings of 20%*
13	Municipal buildings retrofits	N/A	Current efficiencies held constant	16% of existing municipal buildings are retrofit to net zero emissions by 2030	99% of existing municipal buildings are retrofit to net zero emissions by 2040	99% of existing municipal buildings are retrofit to net zero emissions by 2040
14	Federal building retrofits	N/A	15% savings for both heating and cooling for 50% of the buildings by 2030 and 15% for the remaining buildings by 2050.	50% savings for both heating and cooling for 50% of buildings over 5000 m2 by 2030	Same results for remaining 50% of buildings by 2050	Same results for remaining 50% of buildings by 2050
	Industry					
15	Industry process improvements	4,877 TJ	Hold process efficiency constant	Increase efficiency by 22.5% by 2030	Increase efficiency by 75% by 2050	Increase efficiency by 75% by 2050
	Building Equipment					
17	Low-rise residential heat pumps in existing buildings	0 Heat pumps, 21,522 TJ natural gas consumption	Fuel share from 2016 maintained until 2050	34,377 heat pumps installed by 2030 Air: 67% Ground: 33%*	150,491 heat pumps installed by 2050 Air: 50% Ground: 15%	424,281 heat pumps installed by 2050 Air: 74% Ground 26%*
	Low-rise residential heat pumps in new buildings				89,145 heat pumps installed by 2050 Air: 50% Ground: 15%	
18	Apartments heat pumps in existing buildings	0 heat pumps, 3, 678 TJ natural gas consumption	Fuel share from 2016 maintained until 2050	9,782 heat pumps installed by 2030 Air: 67% Ground: 33%*	67,669 heat pumps installed by 2050 Air: 50% Ground: 15%	159,300 heat pumps installed by 2050 Air: 74% Ground 26%*
	Apartments heat pumps in new buildings				21,948 heat pumps installed by 2050 Air: 50% Ground: 15%	
19	Commercial heat pumps in existing buildings	0 heat pumps, 18, 327 TJ of natural gas consumption	Fuel share from 2016 maintained until 2050	9% of floor space by 2030	31.0% of floor space	71% floor space by 2050*
20	Commercial heat pumps in new buildings				15.0% of floor space	
21	Electric water heaters in residential and commercial buildings	Unmodeled item	Unmodeled item	Shares for new residential water heaters will be 60% on demand electric and 40% heat pumps by 2030	The 2030 target is the floor on a go-forward basis	75% of non-residential floor space is served by electric water heating by 2040*

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#	Description	2016 Baseline: Start of Modelling	2050 Business As Planned	2020-2030 Model Outputs 80% and 100% Target Scenarios	2030-2050 Model Outputs 80% Target Scenario	2030 - 2050 Model Outputs 100% Target Scenario
	District energy and other heating					
22	District energy system	1673 TJ	Existing 2016 DE capacity is held constant through to 2050	2,465 homes served by expanded DE by 2030 5,647,669 m2 non-residential floor space served by expanded DE by 2030	80% of existing commercial buildings; 80% of apartments; 15% of residential buildings; 100% of the system low carbon (geothermal) 31,434 homes served by DE by 2050 10,962,135 m2 non-residential floor space served by DE by 2050	80% of existing commercial buildings; 80% of apartments; 15% of residential buildings; 100% of the system low carbon (geothermal) 31,434 homes served by DE by 2050 10,962,135 m2 non-residential floor space served by DE by 2050
	Federal district energy systems	1,673 TJ	No changes	Federal DE systems switched to geothermal by 2040 1,445,134 m2 floor space served by federal DE by 2030	Federal DE systems switched to geothermal by 2040 Floor space value from 2030 becomes the minimium value	Federal DE systems switched to geothermal by 2040
16	Waste heat	Not significantly employed	Not significantly employed	100% Scenario Only: 700 TJ of waste heat displaces fossil gas	Waste heat was not considered in the 80% Scenario	1600 TJ of waste heat displaces fossil gas by 2050*
	ELECTRICITY AND DEMAND					
	Solar energy					
24	Residential PV	72 KW	Capacity provided by Hydro One and Hydro Ottawa; no additional capacity added	120 MW by 2030 capacity factor = 15%	320 MW by 2050 capacity factor = 15%	320 MW by 2040 capacity factor = 15%
25	Commercial PV	584 KW	Capacity provided by Hydro One and Hydro Ottawa; no additional capacity added	278 MW by 2030 capacity factor = 15%	740 MW by 2050 capacity factor = 15%	740 MW by 2040 capacity factor = 15%
26	Utility-scale PV	N/A	Capacity provided by Hydro One and Hydro Ottawa; no additional capacity added	233 MW by 2030 capacity factor = 15%	233 MW by 2050 capacity factor = 15%*	233 MW by 2040 capacity factor = 15%*
	Waterpower					
27	Hydropower	6,780 TJ / 260 MW	No additional capacity added	18 MW by 2030 capacity factor = 70%	36 MW by 2050 capacity factor = 70%	36 MW by 2040 capacity factor = 70%
	Wind					
28	Wind	N/A	Existing 2016 capacity is held constant through to 2050	100 MW by 2030 capacity factor = 30%	394 MW by 2050 capacity factor = 30%	4084 MW by 2040 Capacity Factor = 30%*
	Energy storage					
29	Increase energy storage	N/A	No additional storage	73 MW storage by 2030 sufficient storage to reduce curtailment of renewable generation from 15% to 10%	180 MW storage by 2050 sufficient storage to reduce curtailment of renewable generation from 15% to 10%	180 MW storage by 2050 sufficient storage to reduce curtailment of renewable generation from 15% to 10%

Note:
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#	Description	2016 Baseline: Start of Modelling	2050 Business As Planned	2020-2030 Model Outputs 80% and 100% Target Scenarios	2030-2050 Model Outputs 80% Target Scenario	2030 - 2050 Model Outputs 100% Target Scenario
	TRANSPORTATION					
	Transit					
30	Expand transit	12% internal trips, 11% outbound trips, 25% inbound trips	Completion of the Confederation & Trillium Line - Phase 1 and 2	The frequency of light rail transit (LRT) is increased to every 1.5 min in the core area at rush hour Bus rapid transit (BRT) speeds increase by 20% in dedicated bus lanes (currently every 5 minutes at peak times), and every 7.5 minutes for off-peak frequency (currently every 15 minutes for off-peak). Expanded transit to reflect "Concept Transit Network" rather than "Affordable Transit Network"	The frequency of light rail transit (LRT) is increased to every 1.5 min in the core area at rush hour Bus rapid transit (BRT) speeds increase by 20% in dedicated bus lanes (currently every 5 minutes at peak times), and every 7.5 minutes for off-peak frequency (currently every 15 minutes for off-peak). Expanded transit to reflect "Concept Transit Network" rather than "Affordable Transit Network"	The frequency of light rail transit (LRT) is increased to every 1.5 min in the core area at rush hour Bus rapid transit (BRT) speeds increase by 20% in dedicated bus lanes (currently every 5 minutes at peak times), and every 7.5 minutes for off-peak frequency (currently every 15 minutes for off-peak). Expanded transit to reflect "Concept Transit Network" rather than "Affordable Transit Network"
31	Electrify transit	N/A	100% electric by 2050	100% electric by 2030	Transit stays electric	Transit stays electric
	Active					
32	Increase/improve cycling & walking infrastructure	12% internal trips, 11% outbound trips, 25% inbound trips 24-hr mode shares Auto: 73.80% Transit: 12.20% Walk: 10.10% Bike: 3.80%	Active mode shares by O-D zones in 2011 and 2031 model data 24-hr mode shares by 2050 Auto; 68.10% Transit: 16.50% Walk: 11.70% Bike: 3.70%	Mode shift to 50% of the walking and cycling potential away from vehicles and driving. Use 2km for walking and 5km for cycling. **Under defined transportation zones** 24-hr mode shares by 2030 Auto: 57.8% Transit: 21.1% Walk: 13.2% Bike: 7.9%	Mode shift to 50% of the walking and cycling potential away from vehicles and driving. Use 2km for walking and 5km for cycling. **Under defined transportation zones** 24-hr mode shares by 2050 Auto: 56.1% Transit: 22.4% Walk: 10.3% Bike: 11.2%	Mode shift to 50% of the walking and cycling potential away from vehicles and driving. Use 2km for walking and 5km for cycling. **Under defined transportation zones** 24-hr mode shares by 2050 Auto: 56.1% Transit: 22.4% Walk: 10.3% Bike: 11.2%
33	Car free zone	N/A	None	Byward market and downtown Ottawa are car free; Wellington St - Rideau St, Sparks St, Bank St, University of Ottawa campus by 2030	Byward market and downtown Ottawa are car free; Wellington St - Rideau St, Sparks St, Bank St, University of Ottawa campus by 2030	Byward market and downtown Ottawa are car free; Wellington St - Rideau St, Sparks St, Bank St, University of Ottawa campus by 2030
34	Congestion charge	N/A	None	Congestion charge of $20 applied to the downtown core between 6:00 am and 10:00 am on weekdays by 2030	Congestion charge of $20 applied to the downtown core between 6:00 am and 10:00 am on weekdays by 2030	Congestion charge of $20 applied to the downtown core between 6:00 am and 10:00 am on weekdays.
	Electric Vehicles					
35	Zero emission municipal fleets	Some transition had started	None	Municipal fleet is 60% zero emission by 2030	Municipal fleet is 100% zero emission by 2040	Municipal fleet is 100% zero emission by 2040
36	Electrify personal vehicles	150 Electric Vehicles (EV)	Vehicle fuel consumption rates reflect the implementation of the U.S. Corporate Average Fuel Economy (CAFE) Fuel Standard for Light-Duty Vehicles. 25,463 EVs (3.5%) in personal use vehicle stock by 2035, 46,403 EVs (5.5%) in personal use vehicle stock by 2050. 4.2% of new personal use vehicles are EVs by 2035	EVs comprise 90% of new vehicle sales after 2030	The 2030 target is the floor value on a go forward basis	2040: EVs comprise 100% of new vehicle sales*
37	Autonomous vehicles (AV)	N/A	No AVs	Personal vehicle ownership declines by 16% by 2030; VKT per capita increases by 116%; AVs are electric only	Personal vehicle ownership declines by 50% by 2050; VKT per capita increases by 150%; AVs are electric only	Same as 80% scenario

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#	Description	2016 Baseline: Start of Modelling	2050 Business As Planned	2020-2030 Model Outputs 80% and 100% Target Scenarios	2030-2050 Model Outputs 80% Target Scenario	2030 - 2050 Model Outputs 100% Target Scenario
38	Parking management	$1.50 - 3.00 / Hour	No change	No off-street parking within 500m of LRT	50% reduction in Centretown; on-street parking fares are doubled during peak hours by 2050; VKT reduction of 15% in relevant zones	Same as 80% scenario
39	Electrify commercial vehicles	N/A	Phase 1 and Phase 2 of EPA HDV Fuel Standards for Medium- and Heavy-Duty Vehicles.	40% of heavy trucks are zero emissions by 2030	100% of heavy trucks are zero emissions by 2040	100% of heavy trucks are zero emission by 2040
40	EV only zones	NA	None	**100% Scenario only:** EVs only inside the area bounded by Bronson Avenue, Catherine Street, and Queen Elizabeth Drive (Rideau Canal) by 2028. (This is the area to which the congestion charge is applied.)	An EV only zone not considered in the 80% Scenario	EVs only inside the area bounded by Bronson Avenue, Catherine Street, and Queen Elizabeth Drive (Rideau Canal) by 2028. (This is the area to which the congestion charge is applied.)
	WASTE AND RENEWABLE NATURAL GAS (RNG)					
	Waste					
41	Leaf and yard waste	NA	NA	All yard and leaf waste goes to compost	All leaf and yard waste goes to compost	All leaf and yard waste gasified after 2030, displaces fossil gas
	Wastewater Generation from RNG			Systems operaterated to reduce electrcity charges and avoid natural gas consumption	Systems operaterated to reduce electrcity charges and avoid natural gas consumption	At 2040 all biogas goes to RNG except for power supply failures
42	Waste diversion	2016 residential waste diversion: Paper: 78% Organics and yard: 58% Plastic/metal/glass: 65%	Existing diversion rate unchanged	98% organics diverted by 2024 Diversion rates by 2030: Paper: 78% Plastic/metal/glass: 40% Route all of organic waste to anaerobic digester	Achieve residential Ottawa waste diversion targets by 2042, increase paper diversion to 100% Non-res targets: Paper: 100% Plastic/metal/glass: 50% Route all of organic waste to anaerobic digester Anaerobic digester gas and landfill gas are used as RNG and displace natural gas use	Achieve residential Ottawa waste diversion targets by 2042, increase paper diversion to 100% Non-res targets: Paper: 100% Plastic/metal/glass: 50% Route all of organic waste to anaerobic digester Anaerobic digester gas and landfill gas are used as RNG and displace natural gas use
	Biogas					
43	Private, non-municipal waste biogas (often farm)	Three farm set-ups in Ottawa	No additional capacity added or changes considered	3 MW until 2030	Biogas to RNG after 2030 with production at 6 MW	Biogas to RNG after 2030 with production at 6 MW
	Power to gas			**100% Scenario Only:**		
44	Power to gas	Not currently happening in Ottawa	Not considered as a Business As Planned measure	2030: 865 TJ hydrogen produced at 70% efficiency, half of waste heat is used. Produced hydrogen is injected into natural gas pipelines. Hydrogen can displace up to 15% of natural gas by volume. Hydrogen production is limited to the amount of natural gas in use in this scenario	Power to gas was not considered in the 80% Scenario	2040 and onwards: 95 TJ hydrogen produced at 80% efficiency, half of waste heat is used. At 2030, although its not modelled, power to methane will be considered as a way to maintain gas production.

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