metrovancouver

Metro Vancouver Growth Projections – A Backgrounder

Metro Vancouver's mandate in preparing, implementing and monitoring *Metro Vancouver 2040: Shaping our Future (Metro 2040),* the regional growth strategy, requires a variety of land use and development analytics. The most fundamental analytical tasks in this role are to coordinate, establish and monitor projections for population, housing, employment and land use.

As a part of a collaborative regional agency, Metro Vancouver's Regional Planning Division works closely with other Metro Vancouver departments, member jurisdictions and other regional agencies. The Regional Planning Division works especially closely with Metro's member jurisdictions in coordinating the implementation of *Metro 2040*'s policies with local Official Community Plans (OCPs) through the preparation and updates of Regional Context Statements. This work establishes a shared regional / local perspective on growth that is applicable to Metro Vancouver's regional water and liquid waste utilities demand planning and to TransLink's transportation demand modelling to ensure that an appropriate integration among critical regional infrastructure planning and implementation is achieved.

Metro Vancouver's process in preparing regional growth projections includes establishing a Baseline Scenario, i.e. monitoring current activity and projecting future activity based on the current policy framework and trends. Statistics Canada, through the Census, provides the most reliable comprehensive source of baseline and trend data for population, housing and employment. A variety of other data sources are used to monitor current population, housing, employment and land use activity, which is appended to the baseline data to prepare current estimates and to assess variations in these growth trends. Projections then extend the current estimates out to a desired time horizon based on the indicators, trend analysis and scenario assumptions regarding the many factors influencing regional growth.

A primary methodological tool in Metro Vancouver's population / demographic projections is the Cohort Projection Model. This well-established modelling tool utilizes a base year population by gender and single year of age for defined geographies, and projects the change in the next year population due to natural increase and migration trends and assumptions on drivers affecting those trends. This demographic model provides the foundation for estimating household formation within the population and associated housing demand. Census trend data on household maintainer rates (i.e. the person identified on Census forms as the primary person in the household) and average household size (i.e. the number of persons per household / dwelling unit) are applied to the population projections to estimate overall regional housing demand and likely choices in structural types of dwelling.

Regional employment projections are derived through comparative projections of the labour force and regional economic sector / employment trends. The allocation of regional employment to each

municipality is estimated by the regional share of established economic sector employment within each, and by relating the regional share of population serving sector employment growth to the regional share of population growth within each respective area.

From a 2016 Census baseline, the Baseline Scenario includes annual growth projections to the year 2050, and more generally extended to the year 2121. Base year (2016), current annual estimates and short term projections (under 10 years) are necessary for numerous program monitoring applications. Longer term projections are more speculative, but necessary in anticipating and assessing potential future land use and infrastructure planning, policies, investment impacts and outcomes.

All projections are, explicitly or implicitly, scenario based. Metro Vancouver's Baseline Scenario generally assumes that the existing regional growth policy framework remains in place, and that a variety of external factors potentially affecting the region (i.e. migration, the global and national economies, climate impacts, and politics) will remain consistent and stable using 2016 as the benchmark.

Finally, for each of the projections there can be various depths of research, analytics and resources involved in exploring the historic trends and patterns of association among all contributing factors that can influence future events. This can involve very intensive modelling and data acquisition programs, but the intensity and complexity of analytics must be balanced with practical application, resources and time considerations. Given the potential resource demand, Metro Vancouver attempts to combine available staff knowledge and resources from the regional and municipal agencies with commissioned studies to provide reasonable assumptions and estimates of future growth.

Overview of Methods and Assumptions

1.1 Population

Population is the most commonly applied element in regional growth projections and provides a basis for projecting housing, employment and related land use. Metro Vancouver's population projections are based largely on Census data base counts and trend demographic indicators, and how those trend indicators may evolve in the future. A cohort survival model is used to coordinate the relationships among the component demographic indicators and dynamics: natural increase – births minus deaths; international immigration and emigration flows; domestic migration flows to and from other areas of British Columbia (intra-provincial migration) and Canada (inter-provincial migration); and inter-municipal migration as residents move among municipalities within Metro Vancouver.

The Cohort Model establishes population by gender and single year of age for a given base year. Then for every subsequent year, the population for that single year of age is predicted by estimating the additions and subtractions due to births, deaths or net migration for that single year of age. Metro Vancouver's Cohort Model is built for projecting both at the regional level and for each municipality.

Figure 1 shows the projected components of Metro Vancouver's population growth to the year 2050. From a 2016 base population of 2,570,000, it is anticipated that the population will increase by about 1 million to 3,600,000 by the year 2050.

Figure 1. Metro Vancouver Baseline Scenario - Projected Population 2016 - 2050
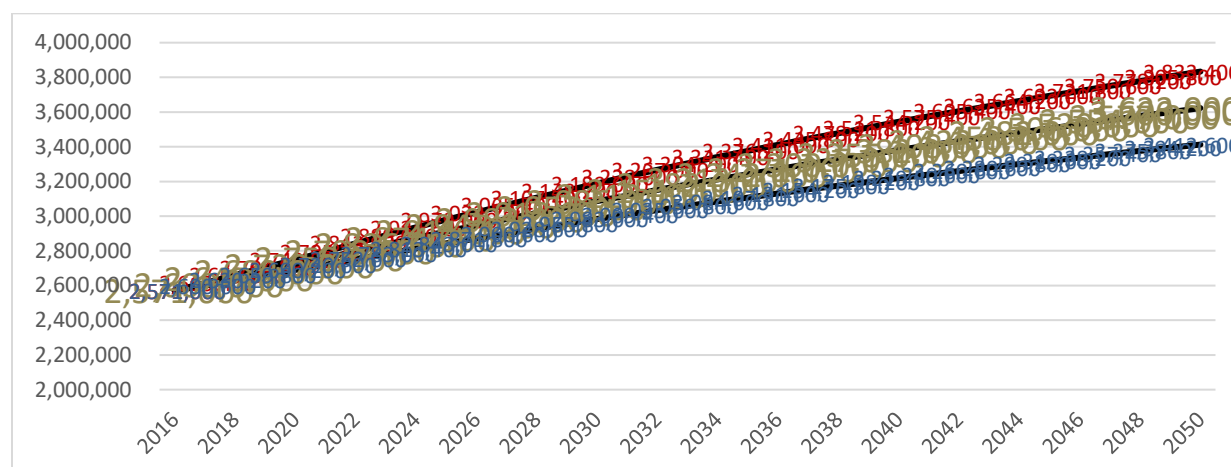
Natural Increase

Natural increase is the capacity of a population within a given jurisdiction to regenerate or degenerate only through births and deaths within the current population. The projected population includes the cumulative projected immigration or migration in estimating births and deaths of the future population.

Projecting natural increase involves methods for projecting the future number births and number of deaths by age within the population.

Births

Projecting births begins with historic trends in fertility rates (i.e. births) for women of child bearing age. Vital statistics data is provided annually by each of the BC Health Authority jurisdictions showing current and historic births per 1,000 women aged 15-44 (by component age cohorts).

- Births = Total number of women by age cohort within in the current population * fertility rate for women by age cohort

Fertility rates have shifted by large margins over the past 20 years. Overall, rates have been decreasing, with rates for younger women (i.e. 15-30) decreasing while rates for older women (i.e. 30-45) have been increasing. Projecting future patterns in these trend rates must moderate the rates of change in these trends to avoid reaching extreme / unrealistic levels. For example, pure extrapolation of rapidly decreasing rates for women under 25 would result in negative rates in the later 2020s. Therefore, for each cohort, the change in past trend rates are assumed to continue at a

decreasing annual rate over the next 10 years, and to stabilize thereafter throughout the projection period.

Figure 2. Example of Projected Fertility and Survival Rates by Age

Fertility – Birth rates per 1000 women by age cohort   Survival rates by age
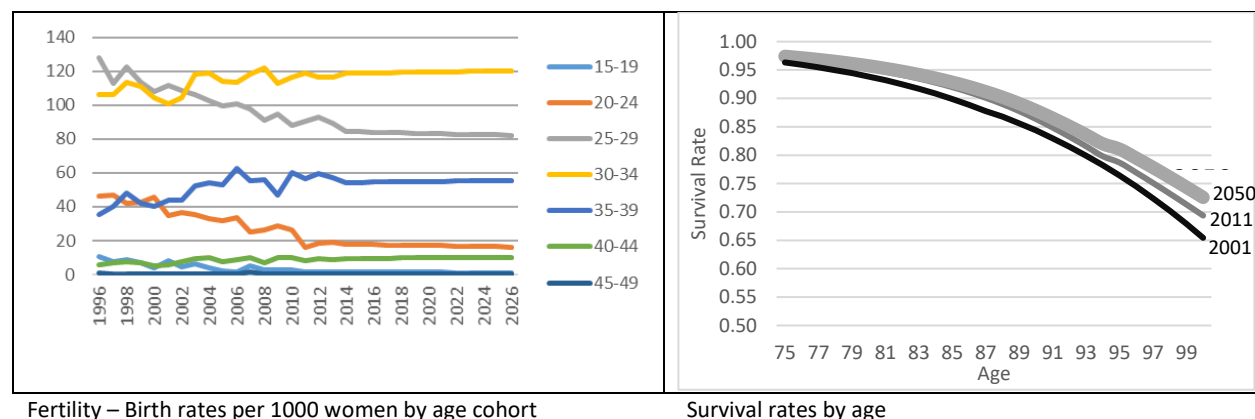
Deaths

Projecting future deaths in the Metro Vancouver population is based on historic trends in death/survival rates by age, and assumptions how those rates may change in the future. Statistics Canada assembles vital statistics data on deaths by age and publishes the data annually as Life Tables.

From historic data in the Life Tables, Metro Vancouver's death projections utilize a survival rate – which is the probability that males and females of a specific age will survive another year.

- Deaths = total persons by single year of age * survival rate for that single year of age

For example, current infant mortality rates indicate that there is a survival rate of 0.996 for males under 1 year of age, or a 99.6% chance that male child will survive past his 1st birthday. Similarly, the survival rate for a female aged 91 is 0.88, or an 88% chance of surviving one more year.

Survival trend rates will continue to increase, especially for older cohorts. However, because rates cannot exceed 1 (i.e. living forever), the rate increases are modified such that rate increases will decrease as the rate approaches 1.0, and cannot reach or surpass 0.999.

The Metro Vancouver projections assume that fertility trends will continue but stabilize within a 10-year time frame, and continue at a constant rate for the remainder of the projection period. With increases in health technology, survival trend rates will continue to increase, especially for older cohorts. However, with the overall aging of the population and a growing share of the population in the older age cohorts, the number of deaths will increase more rapidly than the number of births. Based on these assumptions, population growth by natural increase will decrease from to zero by the early 2030s, and become natural decrease thereafter as deaths will continue to exceed births.

Immigration

Future immigration will be the primary variable affecting future population growth and related, housing, employment and land use considerations in Metro Vancouver. Assumptions for the future number of immigrants to Canada choosing to settle in the region are based on the following:

- Federal immigration policy and annual admission quotas; historic regional trends in the annual share of Canada immigration settling in BC and Metro Vancouver. Immigrants are categorized primarily by age, gender, country of origin, but also with regard to admission type classification (i.e. permanent, non-permanent, economic, family, refugee, etc.). Immigrant settlement patterns are based on 2 sources: Census data on place of residence and mobility, and the periodic data published by Canada's Ministry of Immigration, Refugees and Citizenship.
- Emigration of persons leaving Metro Vancouver to live in other countries. The emigrant estimates are based on periodic data published by Canada's Ministry of Immigration, Refugees and Citizenship.
- Historic trends in the municipal share of Metro Vancouver settlement destinations for immigrants by age and sex, as indicated by Census mobility data.

Within Metro Vancouver's Growth Model, the net annual number of immigrants projected for Metro Vancouver is estimated for each projection year, and allocated by gender, single year of age and trend distribution share to each member jurisdiction. It is assumed that the gender and age structure of immigrants and emigrants will remain relatively constant over time, i.e. that Federal immigration policies will maintain approximately 300,000 persons per year for Canada over the short term, with gradual increases based on the aging profile of the national population, economic sector change and labour force demand. The Metro Vancouver share of Canada's immigration (currently about 11%) is assumed to marginally decrease as larger shares of immigrants settle in other areas of Canada and elsewhere within BC. Therefore, net immigration settling in Metro Vancouver is assumed to be in the 30,000 to 40,000 per year range through the projection period.

Within Metro Vancouver, municipal allocation trends are assumed to continue within the 5 to 10-year term, with a gradual shift toward a more balanced share / distribution of immigrant settlement in relation to overall population growth capacity in each member jurisdiction. The data trends show that the City of Vancouver has accommodated the region's largest share of recent immigrants over the past 20 years, but has declined substantially from 36% to 30% over that period. Much of this reallocation has been to the City of Surrey which has increased from 13% to 22% over that period, as well as toward a broader distribution among other municipalities.

Alternative scenarios, prepared using a number of identified drivers and disruptors, will consider the potential implications of factors such as climate change on population migration in the world and potential implications for Metro Vancouver's population growth.

Inter-Provincial Migration

Inter-provincial migration includes the annual number of persons moving to or from Metro Vancouver / each municipality and other provinces in Canada. Trends in the rates of inter-provincial migration primarily relate to the comparative strength of the regional economy, employment opportunities and lifestyle choices in Metro Vancouver versus other regions in Canada.

Net inter-provincial migration in the Metro Vancouver region generally ranges between -5,000 and +5,000 residents per year. However, while the overall regional net flow is relatively minor in overall regional growth projections, there has been an average regional in-migration of 12,000 per year and out-migration 11,000 per year over the past 15 years with varying impacts for each municipality.

Figure 3. Inter-Provincial Migration Patterns Among Metro Municipalities – 5 Year Totals 2011-2016
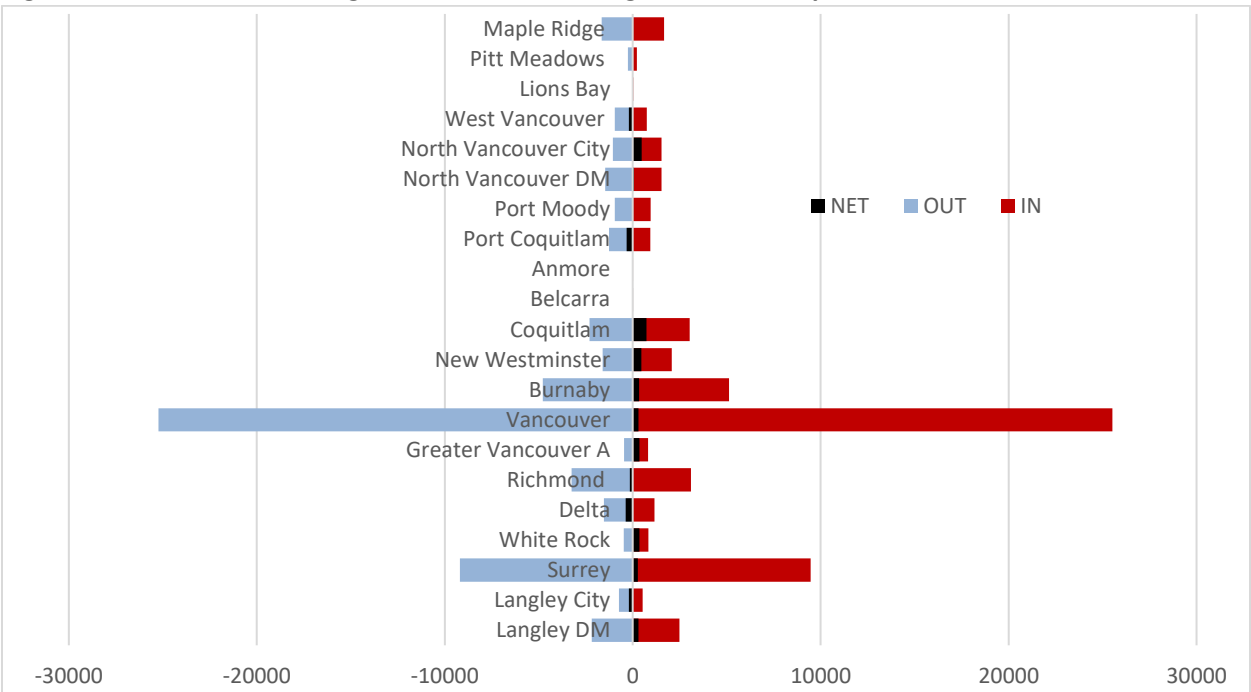

Within Metro Vancouver's Growth Model, it is assumed that there will be a modest net inflow of +/- 2,000-4,000 persons per year to Metro Vancouver, and that the historic inter-provincial flow distributions among municipalities will remain relatively consistent. Regional in and out flows are allocated by age and respective jurisdiction. For example, a projected inflow of 12,000 is allocated into historically profiled age and gender cohorts, then allocated to each municipality based on the historical inflow share of those cohorts to each municipality.

Trend data on inter-provincial migration flows for Metro Vancouver and its member jurisdictions is derived from a custom acquisition of Census mobility data – current Census residence and place of residence 5 years ago. This data is cross-referenced by gender, age and municipality to produce a trend profile of migrants and municipal distribution patterns.

Intra-Provincial Migration

Intra-provincial migration includes the number of persons moving to or from Metro Vancouver / each municipality and other regions of British Columbia. Trends in the rates of intra-provincial migration typically primarily relate to the comparative strength of the regional economy and opportunities in Metro Vancouver verses other regions in BC. However, Metro Vancouver's climate, geography, lifestyle (e.g. cost of living) are also factors that can encourage or discourage this type of migration.

Figure 4. Intra-Provincial Migration Patterns Among Metro Municipalities – 5 Year Totals 2011-2016
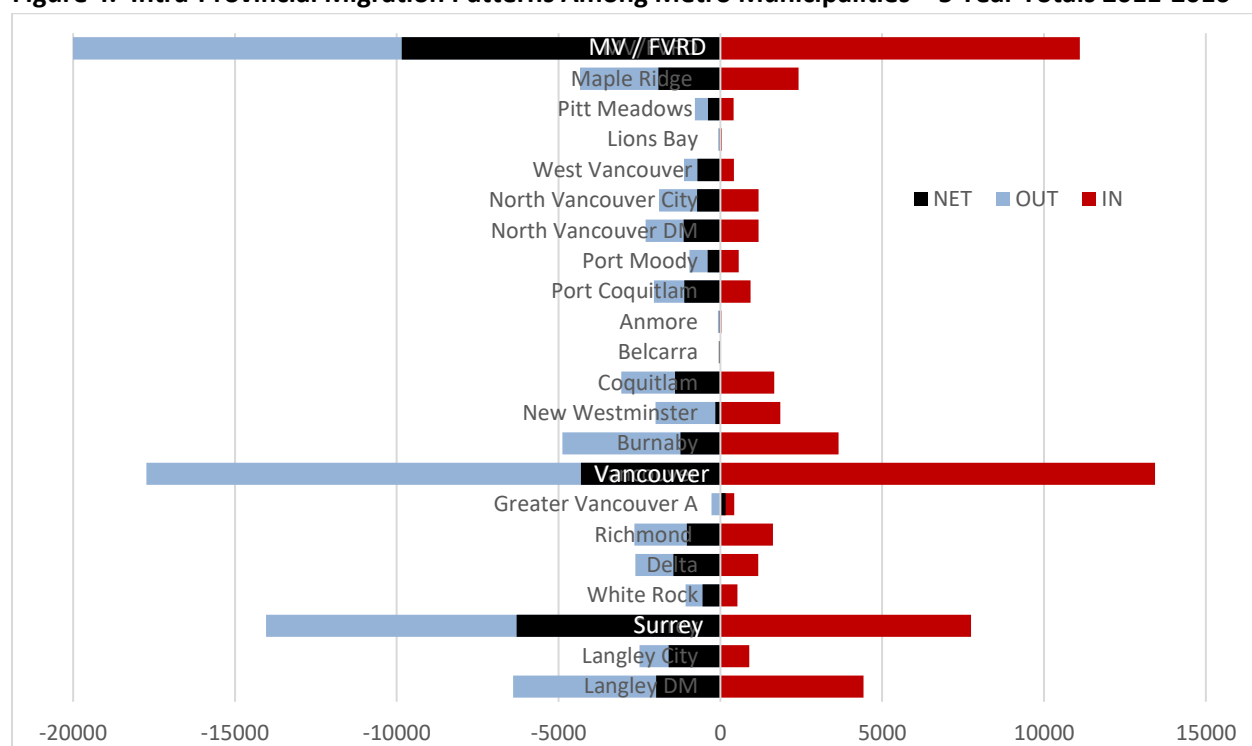
Net intra-provincial migration is a more significant factor in overall regional growth projections in the Metro Vancouver region, generally averaging a net loss ranging between 0 and -10,000 residents per year. Through 2011 to 2016, there was a net out-flow of about 5,300 persons per year from Metro Vancouver to other areas of BC. The intra-provincial flow dynamics vary among municipalities and have a significant impact on growth for particular municipalities. Eastern municipalities of Surrey, Langley Township and Maple Ridge, as well as the City of Vancouver, have the highest net out-flow to other areas of B.C.

This migration dynamic is especially relevant to the inter-relationship between Metro Vancouver and the Fraser Valley Regional District (FVRD) (particularly Abbotsford, Mission and Chilliwack). Net population migration flow from Metro Vancouver accounted for about 40% of the population growth in the FVRD between 2011 and 2016. It is expected that this general pattern will continue and potentially increase in future years.

Net outflow can likely be attributed to the increasing cost of living within the region and the increasing aging population utilizing housing equity in retirement years. Considering these factors, the Baseline Scenario projections assume there will be an average net out-flow in intra-provincial migration ranging to 10,000 persons per year by 2050.

Trend data on intra-provincial migration flows for Metro Vancouver and its member jurisdictions is derived from custom acquisitions of Census mobility data – current Census residence and place of residence 5 years ago. This data is cross-referenced by gender, age and municipality.

Inter-Municipal Migration
Inter-municipal migration includes the number of persons moving from one Metro Vancouver municipality to another. Trends in the rates of inter-municipal migration typically relate to the particular lifestyle preference and choices for residents and the relative housing, employment and amenity options and opportunities in each municipality.

The effect of inter-municipal migration is quite significant within the region. Between 2011 and 2016 about 40,000 residents changed municipalities. While there is no net change for the region, Figure 5 shows there is a high net out-flow in particular municipalities (e.g. City of Vancouver -3,400/year, Burnaby -1,600/year), and high in-flow in other municipalities (e.g. Surrey, Langley, Maple Ridge). It is assumed that the trend flow patterns will generally continue, at a modifying rate, through the projection periods.

Projections for inter-municipal migration is based on the assumption that, on the average, a relative consistent share of Metro Vancouver residents will be moving among Metro municipalities in any given year - about 1.6% per year. Projections also assume some variance in inter municipal migration anticipating Tsawwassen First Nation urban development from 2016 to 2050 will largely come from from inter-municipal migration.

Trend data on inter-municipal migration flows among the municipalities is derived from custom acquisition of Census mobility data – current Census residence and place of residence 5 years ago - cross-referenced by gender, age and municipality.

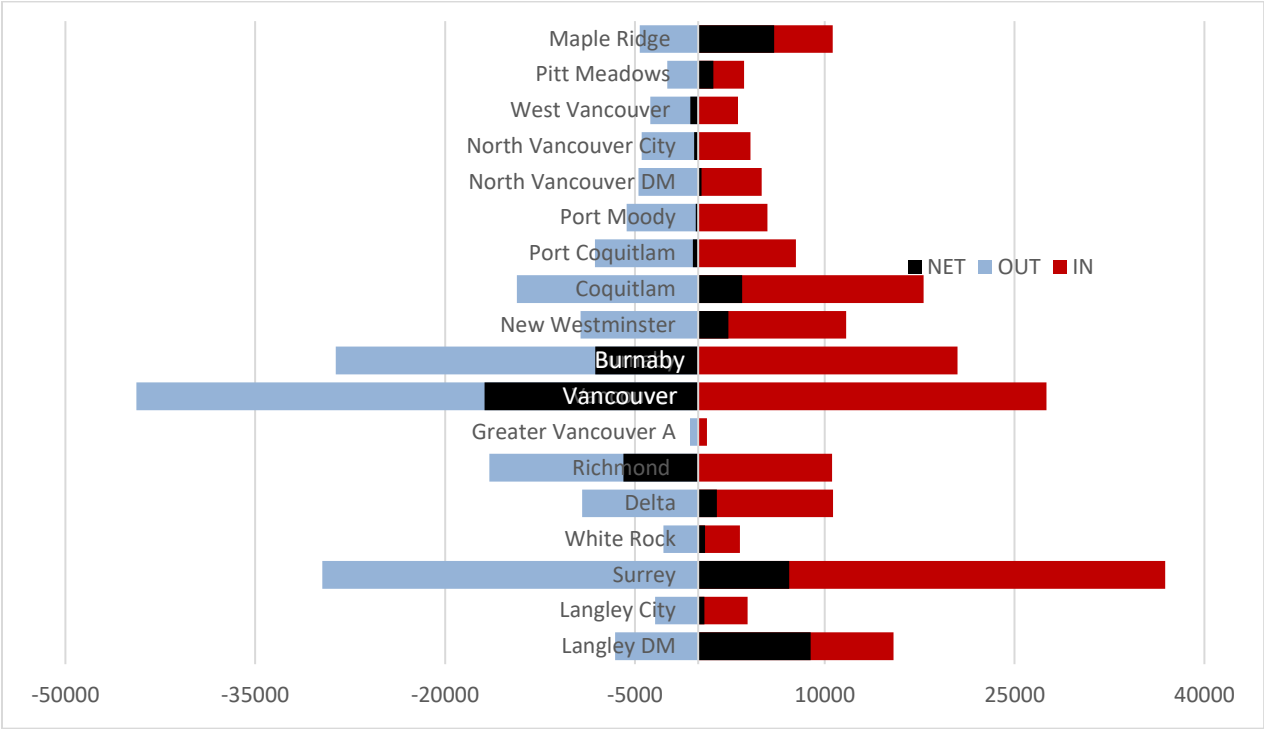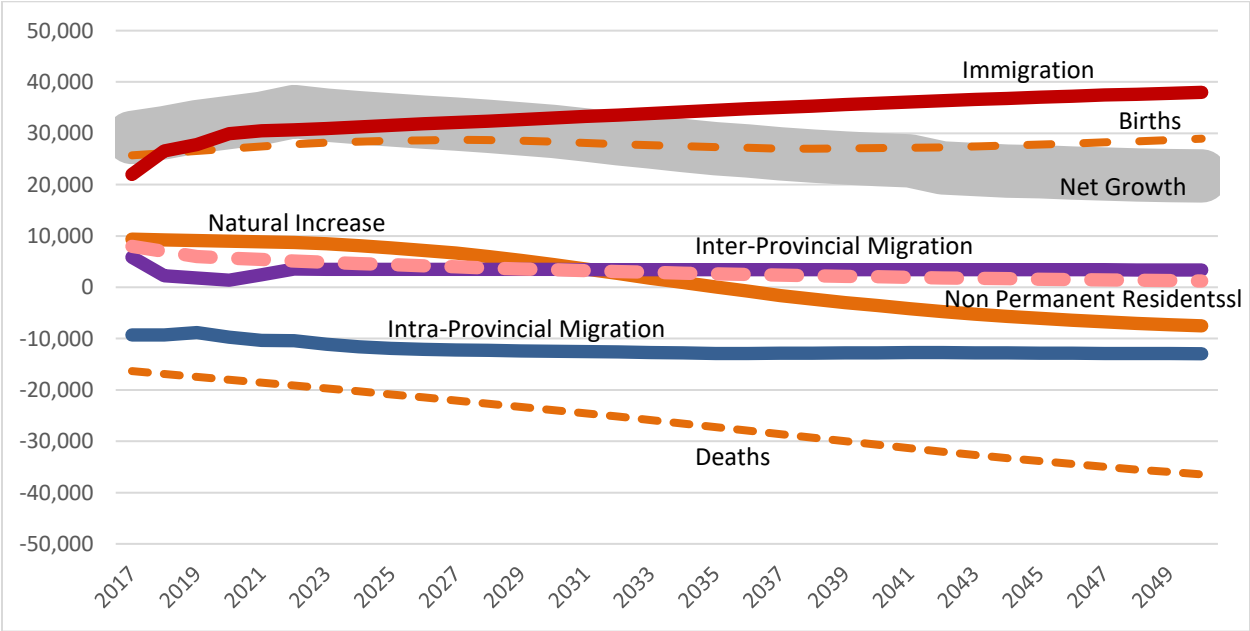**Figure 5. Inter-Municipal Migration Patterns Among Metro Municipalities – 5 Year Totals 2011-2016**

Figure 6. Metro Vancouver Baseline Scenario - Projected Population Growth Components 2016 - 2050

1.2 Occupied Dwelling Unit Demand for the Projected Population

Projecting future housing demand is directly related to the trends and projections in household formation characteristics of the projected population and dwelling choices of those households. Two basic indicators for household formation are the household maintainer rates with the population and average household size.

Household maintainers are the individuals identified in the Census as the primary person in a household. In 2016, 39% of (non-institutional) persons in the Metro Vancouver population were identified as household maintainers. Each household maintainer equals one household, and one dwelling unit. The demographic characteristics of the maintainer (i.e. age, gender) are then associated with the structure type and other household type and tenure characteristics (i.e. single person, couple, multi-person non-family etc.). This rate can be further specified by age cohort and gender to account for shifting demographics, and by municipality to account for locational differences and preferences.

Average household size is the typical number of persons occupying a dwelling unit, and can be further specified to the location, structure type and other characteristics of dwellings or households. In 2016, the overall average household size for Metro Vancouver was 2.60 persons per private occupied unit (including Census undercount estimates) – ranging from 3.2 for a single detached dwelling to 1.93 for an apartment. For example, a population aged 15+ (non-institutional) of 2.17 million would be multiplied by a household maintainer rate of 0.45 (45%), or an average household size of 2.6, to estimate about 975,000 projected dwelling units.

Figure 7. Metro Vancouver Baseline Scenario – Projected Dwelling Units 2016 - 2050
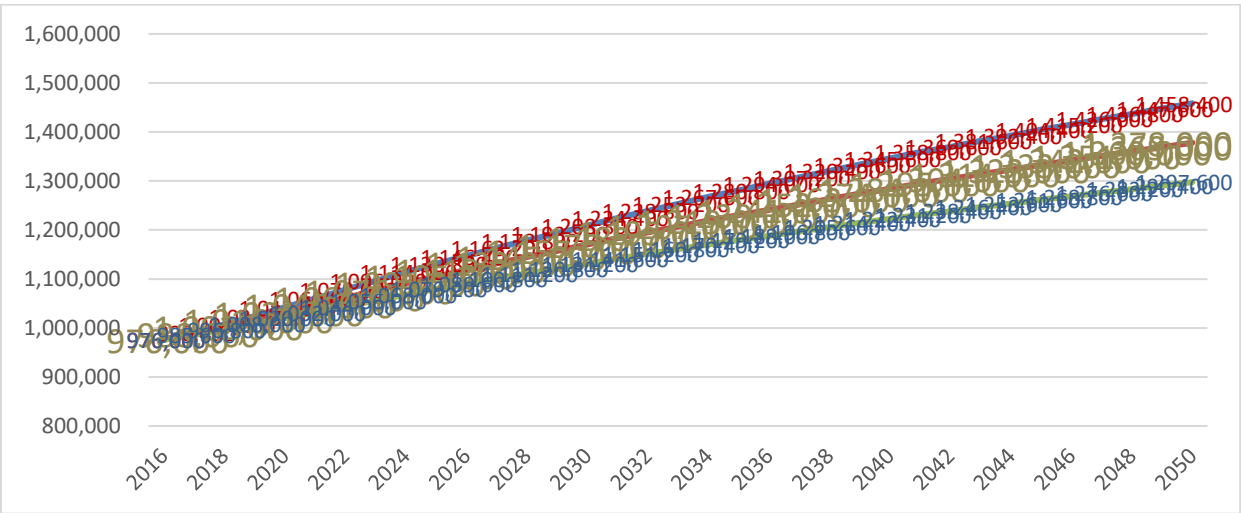
Patterns in household maintainer rates and household size vary over time, affected by changing demographics (e.g. baby boomers' life cycle, changes to immigration), as well as changing external factors affecting housing choice (e.g. household incomes, housing costs and availability). Maintainer

and household size rates and trends also vary by municipality, age cohort, household type and dwelling structure type.

Based on population projections by age cohort, and trends in household formation rates, total housing demand and dwelling structure type are projected for Metro Vancouver and for each municipality, with consideration for the land use and development / density plans prepared by each municipality, knowledge and advice from municipal planners, and overall land base and development potential within the municipalities.

Housing development throughout the region is distinctly trending toward increasingly dense multi-unit forms, with apartments comprising about 60% of new housing growth. Many municipalities have revised development plans and allowable densities for various types of more intense housing development in urban centre areas, major transit locations, as well as redevelopment / intensification of existing and new urban neighbourhoods.

By about 2030-2035 all new housing development will be through redevelopment and intensification of the existing urban land base. This likely will take the form of apartments in and around the core areas (i.e. urban centres and transit station / corridors) and various forms of housing intensification replacing aging single detached dwellings within many existing urban neighbourhoods and throughout the region.

By 2050 the region's projected population of 3.6 million is expected to require about 1.4 million dwelling units. It is anticipated that apartments will continue to take about 62% of new unit growth, increasing the share of the housing stock from 42% to 57%. The other primary source of housing growth, i.e. the redevelopment of the existing single detached dwellings into hybrid forms (e.g. accessory units, x-plexes, laneway units, etc.), will take about 38% of new unit growth, increasing the share of housing stock from about 29% to 34%. The share of single detached units is projected to decrease from 29% to 15% of the total housing stock through the same period. Projections beyond 2050 assume that the land base will remain stable, the forms development will continue and that increasing intensification and resulting densities will be accommodated.

Figure 8 shows the projected change in housing stock to the year 2050. As residential growth is primarily through redevelopment and intensification, it is anticipated a large portion of the existing single detached housing (one unit/one lot) stock will gradually be redeveloped or renovated toward multi-unit ground oriented structures (secondary units, laneway, x-plexes, row houses).

Figure 8. Metro Vancouver Baseline Scenario - Projected Dwelling Units by Structure Type 2016 - 2050
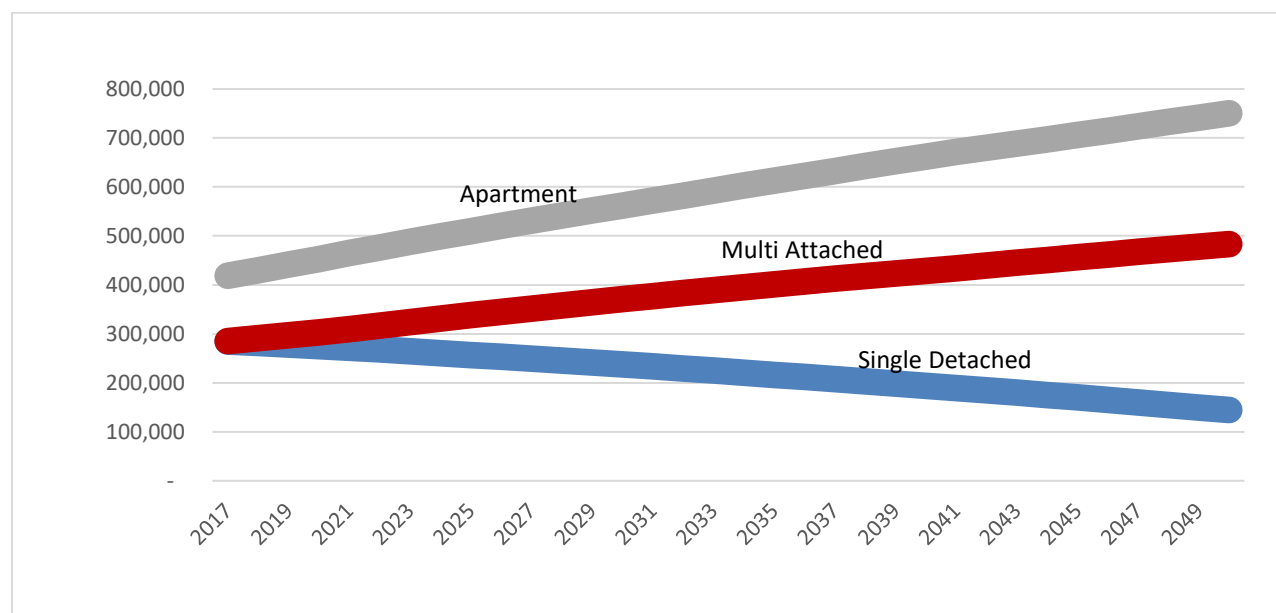

1.3 Land Base and Residential Growth

It is assumed that the existing land base for growth as set out in *Metro 2040* can accommodate the projected population / housing demand through the projection period. The *Metro 2040* growth concept has been incorporated into the respective municipal OCPs to contain 99% of housing growth within the UCB, to have about 40% of new dwelling units within designated Urban Centres, 28% along major transit corridors, and about 30% through intensification of the remaining urban-designated areas. The relative shares of housing growth within each municipality will vary according to the number of Urban Centres, the major transit services available, the availability of undeveloped urban lands, and housing intensification patterns.

There are currently about 6,000 hectares of lands designated General Urban within the UCB that are currently undeveloped or rural and planned for future urban growth. Over the past 20 years Metro Vancouver's growth has been about 20% through new urban development and 80% through intensification of the established / developed areas. It is assumed that the remaining urban lands within the UCB will be largely developed over the next 15-20 years.

**Figure 9. Metro Vancouver's "General Urban" Land Base**
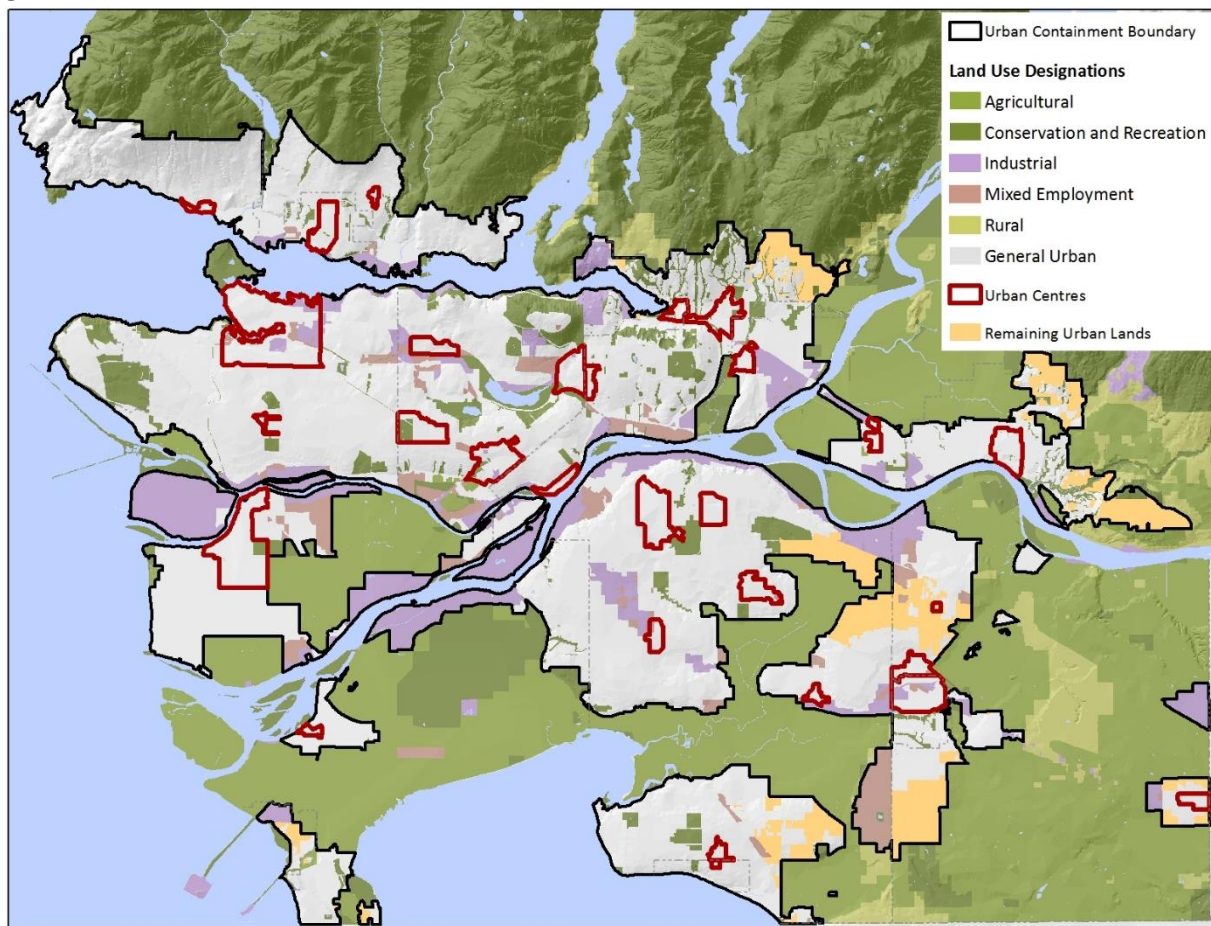
1.4 Employment

Projecting future employment growth is inter-related between the type and level of economic activity in the region, trends in employment demand, and the regional population labour force. Although all projection work is speculative, employment projections are much more speculative in relation to indicators, trends and monitoring data, and more volatile in relation to periodic fluctuations in the regional economy.

Metro Vancouver establishes a Census baseline for labour force and allocations of employed labour force by industry and occupation sectors of the regional economy, as well as the inter-regional residence-work flow. The Statistics Canada Labour Force Survey is used as an inter-censal monitor of employment activity. However, as this a small sample survey, it is used only to estimate total employment estimates at the regional level, and to assess employment sector trending at the regional level.

Under the Baseline Scenario, it has been assumed that Metro Vancouver's regional economic growth and sectoral composition will be relatively stable in future years, with some trending projected

among the component industry sector shares of regional economic / employment activity. Significant factors such as technology, aging population / labour force, and the part-time / gig employment will affect employment demand trends, but the projections do not attempt a detailed modelling of these factors. Although they are multi-dimensional, it is generally and simply assumed that the economy and employment will be proportionately consistent with the current status, but with trends in sector composition, employment demand and labour force demographics reducing overall employment in relation to population / labour force.

Figure 10. Metro Vancouver Baseline Scenario – Employment Projections 2016 – 2050
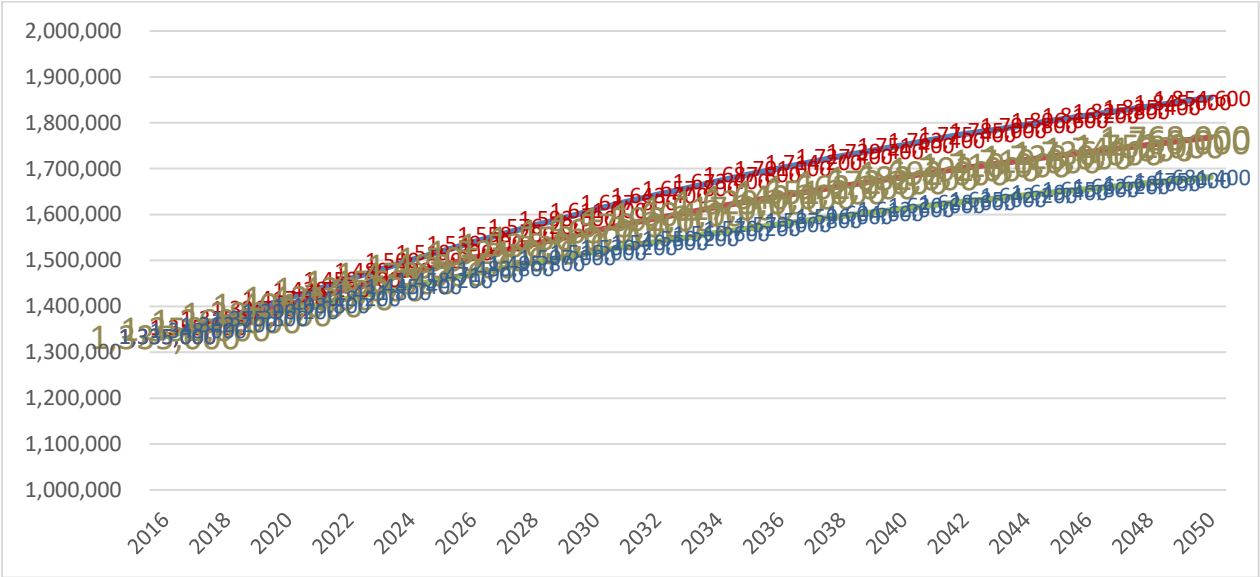
Metro Vancouver's sectoral employment trends and projected population / labour force is used as a reference for estimating regional employment. Assumptions on the proportional share for growth among industry sectors, and in the proportions of jobs within each sector, are used to estimate future employment in the region. This work is informed and supplemented by analysis commissioned from external agencies including the Conference Board of Canada and local consultants, and compared to other available studies and projections – including existing municipal economic development studies or strategies which include employment goals or projections.

The regional level growth projections are assumed to distribute among municipalities according to the share of industry employment in each municipality, and share of population growth in each municipality. Employment in each industry sector is assessed according to the likelihood that future employment will be location dependent (e.g. ports, agriculture, education institutions) or population serving (e.g. retail, food services). Subsequently, the employment in those sectors is proportionately allocated to municipalities based on the shares of industry related employment within that municipality and that municipality's share of projected regional population growth. The draft results are discussed with member jurisdiction staff and iterated with consideration for existing local plans, policies and studies.

From a 2016 base of 1,335,000 jobs, Metro Vancouver's Baseline Scenario assumes an increase in the range of 460,000 for a total of about 1.8 million jobs by the year 2050. However, implicit in this total is a general assumption that there will be a decreasing ratio of jobs to population and a much higher proportion of part-time in relation to full time jobs. Metro Vancouver will be exploring employment trends and potential scenarios through 2019.

Conclusion

Metro Vancouver's projections are updated on a regular basis, as new sources of data become available and as the Census is undertaken. The projections are not static, but rather evolve over time. The currency of the projections is critical to utility, transportation, housing and other forms of long range planning in the region. Metro Vancouver continues to work closely with member jurisdictions, other regional agencies and key stakeholders to provide and share data to build accurate and consistent population, housing and employment projections.