

Occupation Demand Model: Methodology

Occupation Demand Forecasts

The occupation demand forecasts are a product of several information sources:

- 2004 NWT Community Survey
- National Occupation Classification Statistics (NOCS)
- North American Industry Classification System (NAICS)
- NWT Resource Development Employment Impacts

These four information sources are effectively merged to produce the occupation demand forecasts. The process essentially follows the following sequence:

1. The base, or current level, of occupation demand is taken from the 2004 NWT Community Survey, which assessed employment as at winter 2004. Employment results from the survey are coded by both NAICS and NOCS.
2. The NAICS and NOCS information is merged to form a matrix that links each industry to each occupation and vice versa.
3. The NWT Resource Development Employment Impacts are a product of the NWT Bureau of Statistics input-output (IO) model. A series of development projects¹ that are either underway, in progress, expected, or thought to have high probability of occurrence were selected and input to the IO model. The IO model yields a number of outputs including estimates of GDP, labour income and employment.
4. The employment outputs from the IO model, for each project, were categorized to a specific industry (e.g: Ekati to diamond mining, etc.). The results were then applied against the NAICS/NOCS matrix to yield an occupation demand profile for each project.
5. The occupation demand profile for each project was then applied to the life of each project (e.g: for the Snap Lake project, the occupation demand component for the construction phase was based on the period 2004 to 2006, and the diamond mining operations phase was based on the period 2007 to 2014), and the results for all projects for the period 2004 to 2014 were aggregated to produce an occupation demand forecast by NOC.

Occupation Demand Rankings

The base, or current level, of occupation demand is taken from the 2004 NWT Community Survey, which assessed employment as at winter 2004. The forecast of occupational demand covers the period 2004 to 2014.

Peak Demand

The peak demand measure is intended to capture the nature of demand over time. For example, is demand concentrated over a short period of time, or distributed over the entire forecast period?

Peak demand is determined based on the standard deviation of demand over the period 2004 to 2014. The standard deviation tells us how volatile demand is expected to be over time for each occupation – the volatility is measured relative to the average demand over time. Peak demand is determined for each occupation grouping.

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¹ The projects include: Ekati and Diavik diamond mines, Snap Lake diamond project, Gahcho Kue diamond project, Mackenzie Gas Project (MGP), GNWT/federal infrastructure program, Mackenzie River Bridge project, Cameron Hills development, Talston and Bear hydro electric developments, incremental oil and gas exploration, and development activity associated with the MGP.



The demand duration measure is intended to estimate the sustainability of occupation demand over the period 2004 to 2014. For example, how does demand at the end of the forecast period compare to demand over the entire period?

Peak demand for all 141 occupational groupings is then segregated into quartiles² – each quartile contains 25% of the total observations, with the highest observation in each quartile representing the threshold. For example, assume the following distribution:

Minimum Value:..... 0.0
 1st Quartile: 2.0
 2nd Quartile: 6.2
 3rd Quartile: 18.7
 Maximum Value:..... 150.9

The occupational demand ranking of High, Medium and Low is then assigned as follows:

If the peak demand of an occupation is greater than (>) the 3rd quartile, then demand is High; if the peak demand is > the 1st quartile, but less than (<) the 2nd quartile, then demand is Medium; and if peak demand is < the 1st quartile, then demand is Low. In the above example, a peak demand value of 15.1 is determined to be Medium.

Demand Duration

The demand duration measure is intended to estimate the sustainability of occupation demand over the period 2004 to 2014. For example, how does demand at the end of the forecast period compare to demand over the entire period?

The demand level at the end of period (2014) is taken as a ratio over the average level of demand between 2004 to 2014. For example, if end period demand is 6 in 2014, this is taken as a ratio of the average demand estimate of 18.0, resulting in a value of 0.3. Demand duration is determined for each occupational grouping.

Demand duration for all the occupations groupings is then segregated into quartiles. Each quartile contains 25% of the total observations, with the highest observation in each quartile representing the threshold. For example, assume the following distribution:

Minimum Value:..... -0.8
 1st Quartile: 0.7
 2nd Quartile: 0.9
 3rd Quartile: 1.0
 Maximum Value:..... 28.4

The occupational demand ranking of High, Medium and Low is then assigned as follows:

If the demand duration of an occupation is greater than (>) the 3rd quartile, then demand is High; if the demand duration is > the 1st quartile, but less than (<) the 2nd quartile, then demand is Medium; and if demand duration is < the 1st quartile, then demand is Low. In the above example, a demand duration value of 0.3 is determined to be Low.

2 A quartile refers to the division into four sections. For example, 100 divided by four creates the first 25th percentile, then the 50th percentile and the 75th percentile. The value of the boundary at the 25th, 50th and 75th percentiles of a frequency distribution divided into four parts, each containing a quarter of the population.



Opportunity

The opportunity measure is intended to estimate any level changes in demand for occupations relative to the current level of demand. For example, how does forecast demand compare to current levels?

The average demand over the period 2004 to 2014 is taken as a ratio over the current level of demand. For example, if average demand is 18.0, this is taken as a ratio of the current demand estimate of 353, resulting in a value of 5.1.

Demand duration is determined for each occupational grouping.

Demand duration for all occupations groupings is then segregated into quartiles – each quartile contains 25% of the total observations, with the highest observation in each quartile representing the threshold. For example, assume the following distribution:

Minimum Value:.....	-3.5
1st Quartile:	5.3
2nd Quartile:	16.5
3rd Quartile:	27.3
Maximum Value:.....	270.7

The occupational demand ranking of High, Medium and Low is then assigned as follows:

If the demand duration of an occupation is greater than (>) the 3rd quartile, then demand is High; if the demand duration is > the 1st quartile, but less than (<) the 2nd quartile, then demand is Medium; and if demand duration is < the 1st quartile, then demand is Low. In the above example, a demand duration value of 5.1 is determined to be Low.

Limitations

There are a number of limitations that need to be considered when using the occupation demand outputs.

Forecast Estimates

The occupation demand forecasts are based on modeled results, which incorporate a number of assumptions. These assumptions include:

- The relationship between industries and occupations is fixed over the life of the forecast.
- The timing, scope and occurrence of specific projects that underlie the overall economic forecast may change, therefore changing the profile occupation demand.

As with any forecast, reliability diminishes and uncertainty increases as you move further away from the current period.

The opportunity measure is intended to estimate any level changes in demand for occupations relative to the current level of demand. For example, how does forecast demand compare to current levels?



Understanding how the occupation demand rankings are determined is important, but equally important is understanding how to interpret the rankings.

Turnover

The forecast of occupation demand does not include the impact of turnover. The occupation demand forecasts look at positions (i.e: jobs) rather than the persons needed to fill positions. Therefore, for occupations where turnover has been historically high, or occupations where retirement of an aging workforce may increase turnover significantly, it is important to remember that these occupational demand results are not intended to capture these turnover impacts.

Relative Measures

In examining the occupational forecast rankings it is important to understand that the rankings are relative rankings and not absolute. The rankings (low, medium and high) are determined for each occupation relative to all other occupations, and not in isolation. If aggregate occupation demand in the NWT over the forecast period is high in absolute terms, then the ranking of each occupation is relative to this overall trend. Therefore, it is not possible to compare these NWT occupational demand rankings with rankings from other provincial or territorial jurisdictions.

How To Read the Rankings

Understanding how the occupation demand rankings are determined is important, but equally important is understanding how to interpret the rankings. Below are several examples that describe an approach to interpreting the rankings.

Projected Demand to 2014

Peak Demand	Duration of Demand	Job Opportunities
Low	Short-term	Low
Medium	Medium-term	Medium
High	Long-term	High

Projected Demand to 2014

Peak Demand	Duration of Demand	Job Opportunities
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Medium	Medium-term	Medium
High	Long-term	High

Example 1:

215 Architects, Urban Planners and Land Surveyors Medium High Medium

The architects, urban planners and land surveyors occupation will experience a moderate level of short-term, intense (peak) activity over the period 2004 to 2014. This occupation is typical of occupations that are indirectly affected by resource development activities.

Increased demand for this occupation has a high duration, meaning that increased employment prospects are significantly higher (in duration) relative to incremental demand of other occupations over the forecast period.

Employment opportunities in this occupation over the forecast period, relative to the level of 2004 employment, are moderate, meaning that there will continue to be new job opportunities.

Example 2:

315 Nurse Supervisors and Registered Nurses Low High Low

The nurse supervisors and registered nurses occupation will experience a low level of short-term, intense (peak) activity over the period 2004 to 2014. This occupation is typical of occupations that are indirectly affected by resource development activities.

According to the MGP Environmental Impact Statement (EIS), it is predicted that 20,269 persons will be involved in construction activities associated with the pipeline and the three anchor fields over the expected four-year construction period.

Examining employment by residency indicates that the total non-resident workforce in the Northwest Territories will peak at 8,351 in 2008. Activity related to the MGP, in addition to other oil and gas activity and other developments, will lead to non-resident employment of more than 4,200 persons following the completion of the construction phase of the MGP.

For residential employment, overall employment of NWT residents is expected to rise by more than 3,100 persons over the period. Resident employment on the MGP is expected to peak at over 600 during construction and will be about 150 during the operations of the MGP. The forecast of 3,100 more territorial residents employed during the peak year compares with 2,454 unemployed persons identified during the 2004 NWT Community Survey. For the peak employment period during construction of the MGP, some additional 2,444 territorial residents are expected to be employed.

These forecasts of demand, coupled with current levels of unemployment reveal part of the challenges of the territorial labour supply. Part of the solution will be through increased migration activity to the Northwest Territories. The potential labour supply in the Northwest Territories is expected to increase by 3,218 between 2004 and 2008 as a result of in-migration and aging in the population.

The impact of the Mackenzie Gas Project (MGP) construction activity on the occupation demand forecast

Because the construction phase of the Mackenzie Gas Project (MGP) is anticipated to have a significant short-term impact on the NWT labour market that will likely involve a significant import of non-resident labour, it seems appropriate to provide some detail on the MGP in terms of the occupation demand forecast results. While other projects included in the occupation demand forecast – e.g: diamond mine construction projects such as Snap Lake and Gahcho Kue – also entail a short-term import of non-resident labour, the relative magnitude of MGP construction requires specific attention.


According to the MGP Environmental Impact Statement (EIS), it is predicted that 20,269³ persons will be involved in construction activities associated with the pipeline and the three anchor fields over the expected four-year construction period. It is also expected that NWT residents will account for approximately 16% of total direct employment⁴ and 26% of total employment (direct, indirect and induced)⁵ during the construction phase.

Because the construction phase is relatively short (four winter construction seasons) and because a significant majority of the direct employment opportunities will go to non-residents who normally live outside the NWT, who will be housed in construction camps during their tenure, it seems important to note the impact the MGP has on the occupation demand forecast. Much of the direct occupation demand generated by the MGP construction phase will have relatively little impact on the employment possibilities for NWT residents.

3 EIS tables 9-4, 9-7, 9-8, and 9-10 to 9-16

4 EIS table 3-82

5 Determined from estimates provided in EIS and proponent responses to Information Requests (IRs): EIS tables 3-82 and 3-83; IR tables 1.73-1, 1.73-2, 1.75-1, 1.75-2, 1.75-5, and 1.75-6.



During the peak of MGP construction activity, between 2008 and 2009, close to 60% of the total forecast occupation demand is attributable to the MGP. This significant contribution to overall demand impacts a wide variety of occupations, but significantly impacts direct employment occupations such as:

- Trades helpers and labourers;
- Carpenters and cabinetmakers;
- Managers in construction and transportation;
- Heavy equipment operators;
- Motor vehicle and transit drivers;
- Administrative and regulatory occupations;
- Contractors and supervisors, trades and related workers;
- Electrical trades and telecommunication occupations; and
- Machinery and transportation equipment mechanics (except motor vehicle).