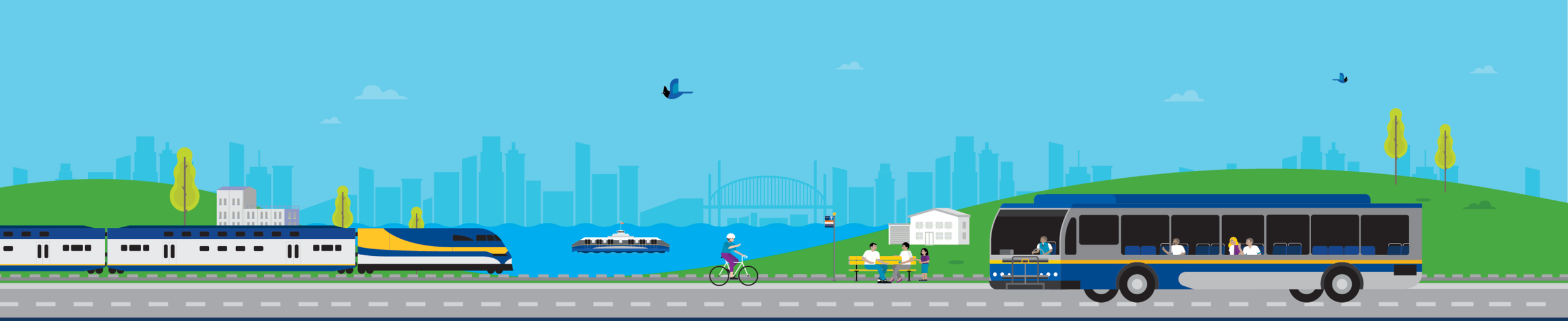

# Economic Evaluation

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Together all the way

TRANSLINK

# Introduction

# Economic Evaluation

- Multiple Account Evaluation (MAE) is an important part of project assessment in British Columbia
  - Assess projects on the basis of numerous 'accounts' related to users, finance, environmental considerations, etc.
  - Some accounts are 'quantifiable', we can estimate numbers for the results of the proposed project, and usually we attempt to put these benefits in dollar terms
  - We can then compare the total dollar value of the benefits against the estimated project costs to help assess the project, or compare different projects in terms of impact
  - For the purpose of this presentation this will be the **‘Economic Evaluation’**
  - One premise of MAE is that some benefits are not quantifiable but should still be considered. These benefits are important but not part of this discussion, we are interested in quantification here

# Today’s Topics

- We have a new tool to do the data extraction and calculation direct from RTM outputs for project economic evaluation for the quantifiable benefits MAE accounts

- Won't discuss the tool details here, that will be covered in a separate tool workshop, but we will discuss for which accounts the tool produces calculations

- The new tool implements a new (to us) method to calculate some key MAE accounts and introduces simplified quantification for other accounts

# Claim

## The new method is superior to the old one

- Arguments:
  - New method shows stable performance against old version for overlapping accounts - we will discuss
  - New method accounts for various aspects of the transit system that were not previously quantified, such as reliability and ambiance (more on this later)
  - Methodology to quantify accounts that were previously difficult or not possible to quantify, such as agglomeration and auto travel time reliability

# Further Considerations

- Tools outputs need to be further processed by the user

- The user should seek the most up-to-date assumptions from the relevant source

# MAE Accounts

# MAE Quantifiable Accounts

Conventional Benefits:

- Typically accruing directly to the project users or those directly served by the project

- Travel time savings are typically the main conventional benefit for transportation projects

Wider Benefits:

- Accruing to society more broadly

# Conventional Benefits

| Type | Account | Description | Source of Measurement |
|---|---|---|---|
| **Conventional Benefits** | Transit travel savings | Time and cost savings | Direct RTM Output (Logsum Method) |
| | Auto travel savings | Time and cost savings | Direct RTM Output (Logsum Method) |
| | Transit Fares | Incremental Transit Fares | Direct RTM Output |
| | Truck travel savings | Time and cost savings | Direct RTM Output (Rule of Half) |

# Wider Benefits

| Type | Account | Description | Source of Measurement |
|---|---|---|---|
| **Wider Benefits** | Auto Reliability | Time and cost savings | TransLink Forecasting Tool Using RTM Outputs |
| | Transit Reliability | Time and cost savings | Included in Transit travel savings account* |
| | Safety | Reduction in collisions | VKT based measure |
| | GHG emissions | Increase/Decrease in CO2 emissions due to reduction in VKT | VKT based measure |
| | Wider Economic Benefit | Agglomeration | RTM travel time output with employment data from demographics file |

*Included in mode choice logsum.  Can be estimated separately and removed from transit travel savings account

# Tool Output Units

- In general, measures not monetized in the tool
  - Allows changing assumptions for monetary value
- All time-based measures output in minutes
  - Allows changing assumptions for Value of Time (VOT)
  - Travel cost converted to minutes through mode choice logsum (more on that later)
- Other measures put out in their natural units
  - GHGs and safety as VKT, users to convert to collisions and GHGs based on updated rates and assumptions at the time of analysis
  - Etc.

# Further Work

# Further Work for User Outputs

- Further application using three forecast horizon years to calculate benefit stream, NPV, BCR, etc.

# Getting to Dollars

- Need to get from output units to dollars
- Time -> Value of Time (Ministry)
- GHG from emission rates (Metro Van) and social cost of carbon (Environment Canada)
- Crashes -> accident rates from (Ministry).  Also has monetization.  These are updated every 5 years and some change widely

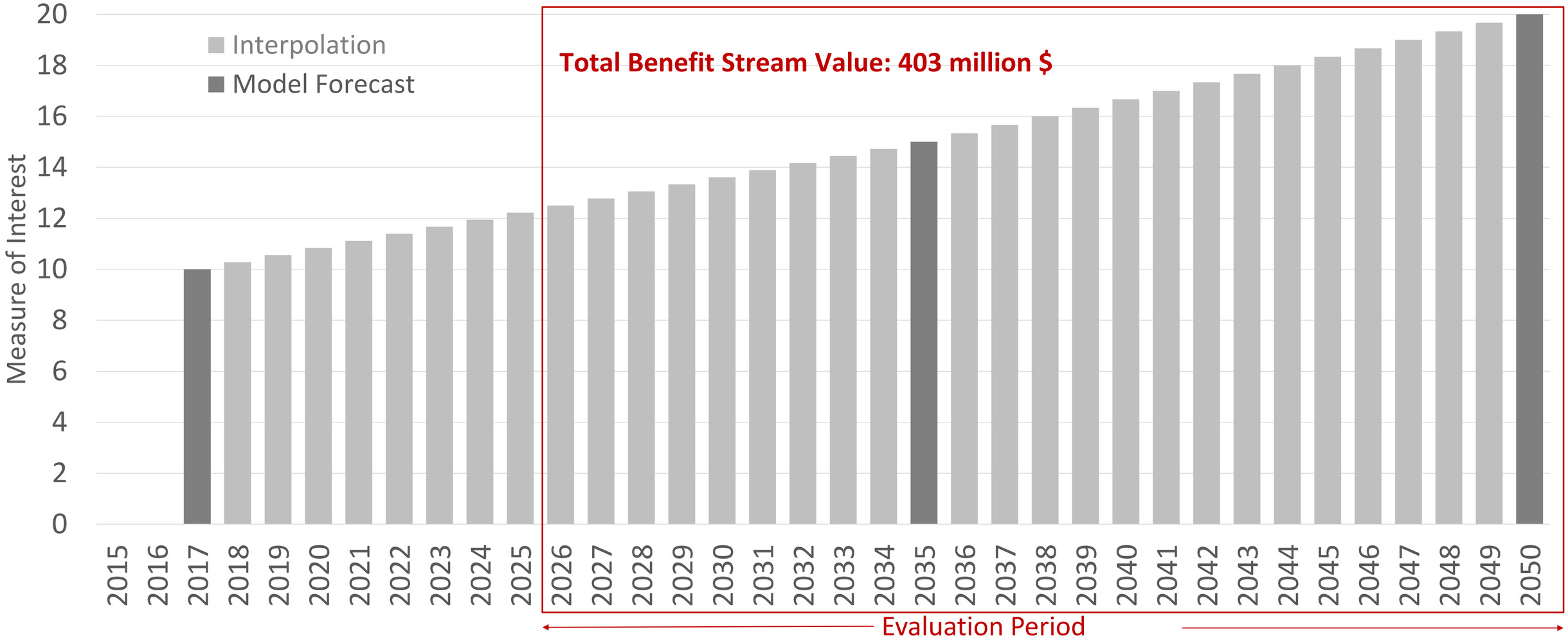
# Project Life Cycle and Benefit Streams

- Benefits typically accrue continuously for the life of the project

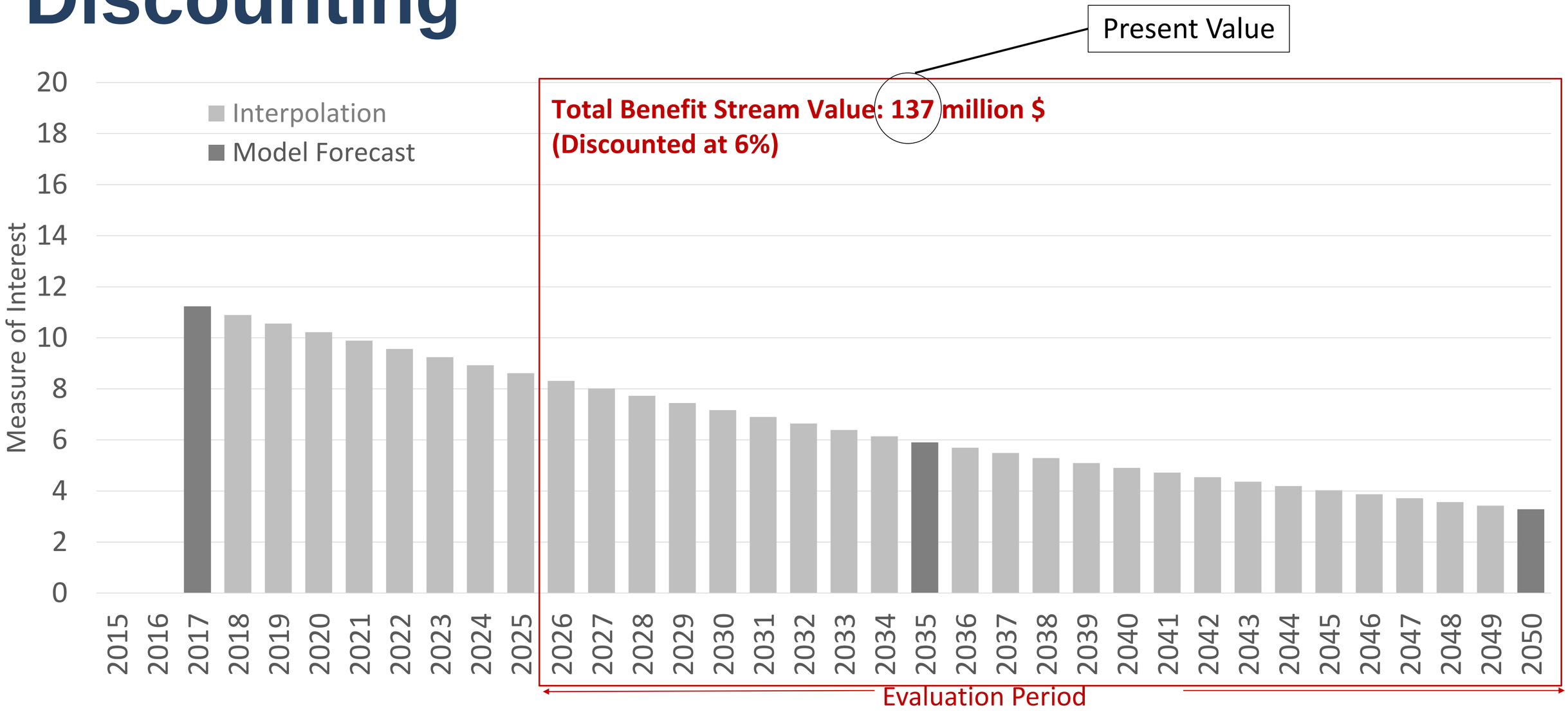
- Want to consider one overall number
  - We consider benefits on an annual basis
  - But only three horizon years for the RTM
  - Interpolate values between years
  - Discount back to get a single value for that account (present value)

- We do this for all quantifiable benefit accounts

# Interpolation



# Discounting



# Benefit cost analysis

- Quantify all possible benefits, estimate over the lifecycle of the project, discount back to present dollars
  - This gives us the present value (PV) of the benefits
- Estimate all possible costs to the extent possible, this includes capitals costs (such as building a guideway, or buying rolling stock) and operating costs. Estimated for the project lifecycle and discounted back to present day dollars
  - This gives us the present value (PV) of the costs

# Benefit cost analysis

$BCR = PV_{benefits} / Pv_{costs}$

$NPV = PV_{benefits} – Pv_{costs}$

Where

- BCR = Benefit Cost Ration (ideally > 1)
- NPV = Net Present Value (ideally > 0)

# Benefit cost analysis

- Purpose/why we do it
  - Key part of Business Case to received project approvals from decision makers and funding decisions from senior levels of government

- Travel time savings, the main account for transportation projects used to be done one way, the '**rule of half'** method

- Now we are advancing a different way '**Logsum method'**
  - Widely adopted in many jurisdictions around the world, including the US Federal Transit Administration for New Starts funding applications