Financial Modeling of Water Utilities and Projects

Session 9

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Learning Objectives

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Learning Objectives

- Understand how can financial models help utilities to plan, forecast, and anticipate long-term investments and cost impacts

- Understand how to use and evaluate financial models of water utilities

What Are Financial Models?

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Definition of a Financial Model

- Computer-based model used to develop financial projections using historical data and assumptions
- Financial Model of a Water Utility:
  - Has projections of financial and physical flows

Standard Architecture for Financial Models

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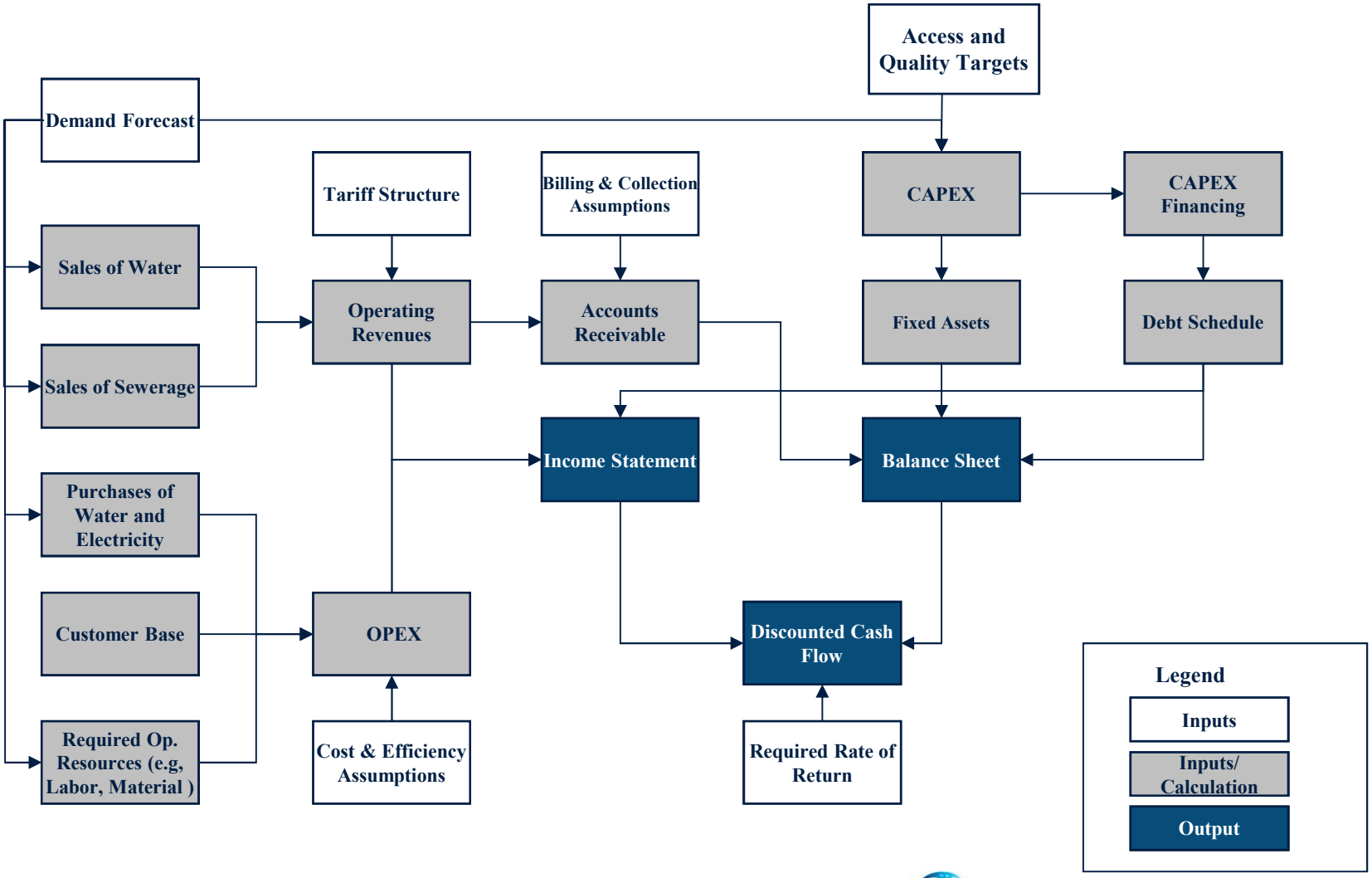
Standard Modules

- Assumptions
- Financial Statements
  - Balance sheet
  - Income statement
  - Cash flow statement
- Demand projections
- OPEX projections
- Debt schedule
- CAPEX plan

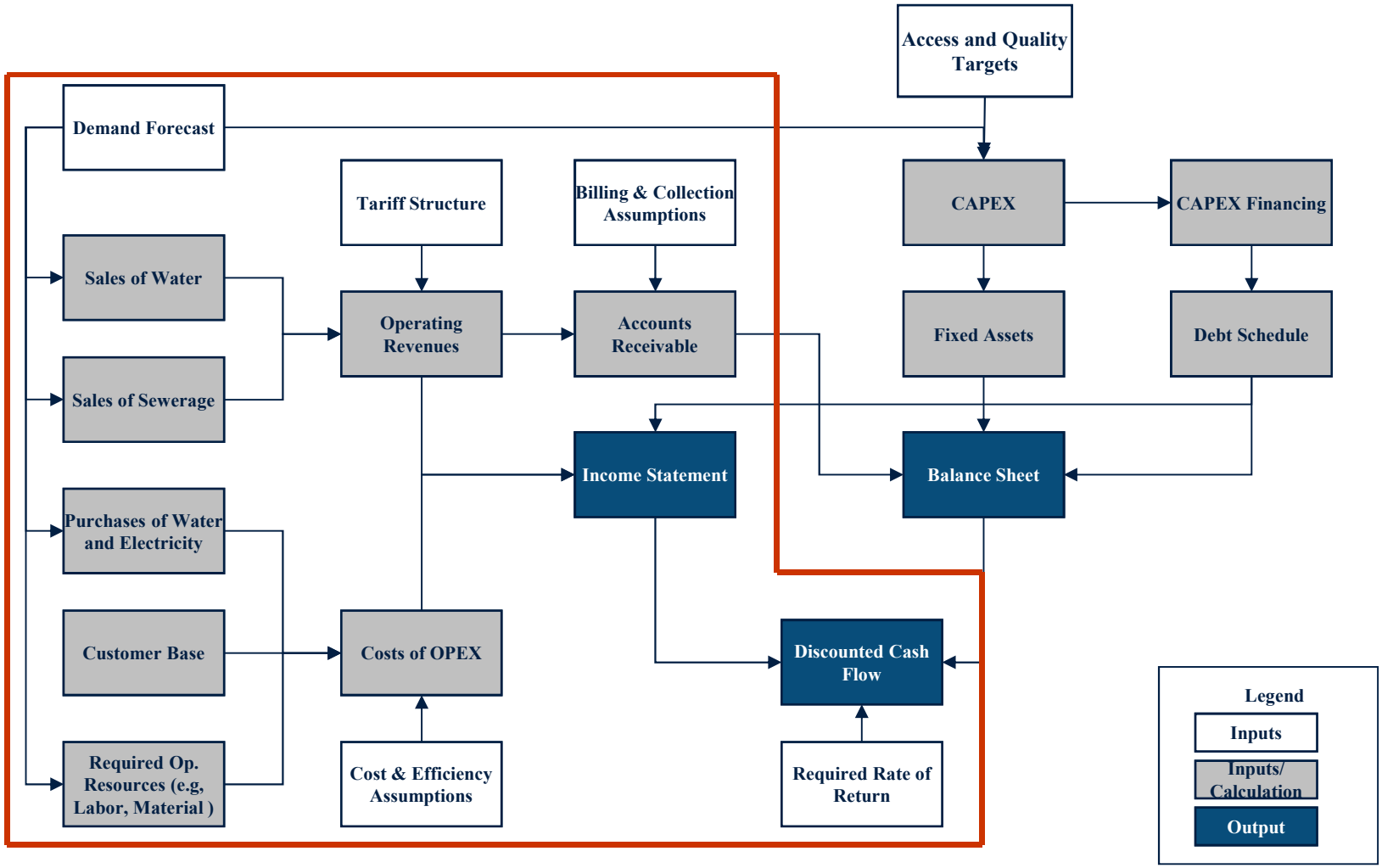
Physical and Financial Flows



Physical and Financial Flows – Cost of Service

- **Demand forecasts.** To forecast sales of water and wastewater services. It is the first step in estimating the cost of service, because sales drive operating expenses and asset expansion plans.
  - First forecasts water consumption, then water production (by adding non-revenue water to water consumption). It then forecasts wastewater service volumes.
- **CAPEX Capital Expenditure Plan.** The capital expenditure and financing plans are key inputs to estimate depreciation, loan interest, and return on equity. The capital expenditure plan is also crucial to operational efficiency and coverage.
- **Cost and Efficiency Assumptions - Efficiency Plans.** Efficiencies that a utility will achieve from its capital expenditure and other institutional strengthening plans.

Physical and Financial Flows - OPEX



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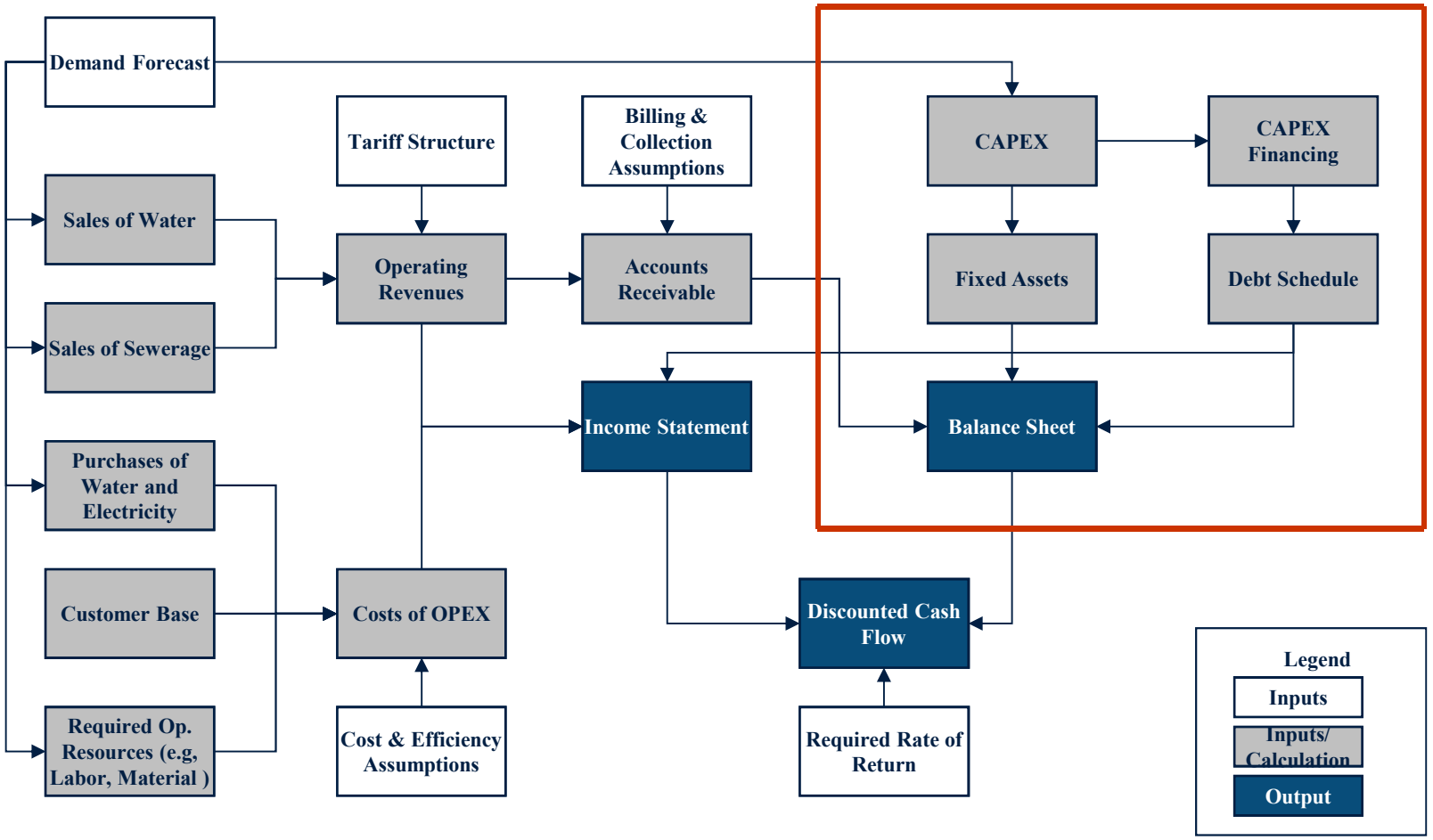
Physical and Financial Flows - CAPEX



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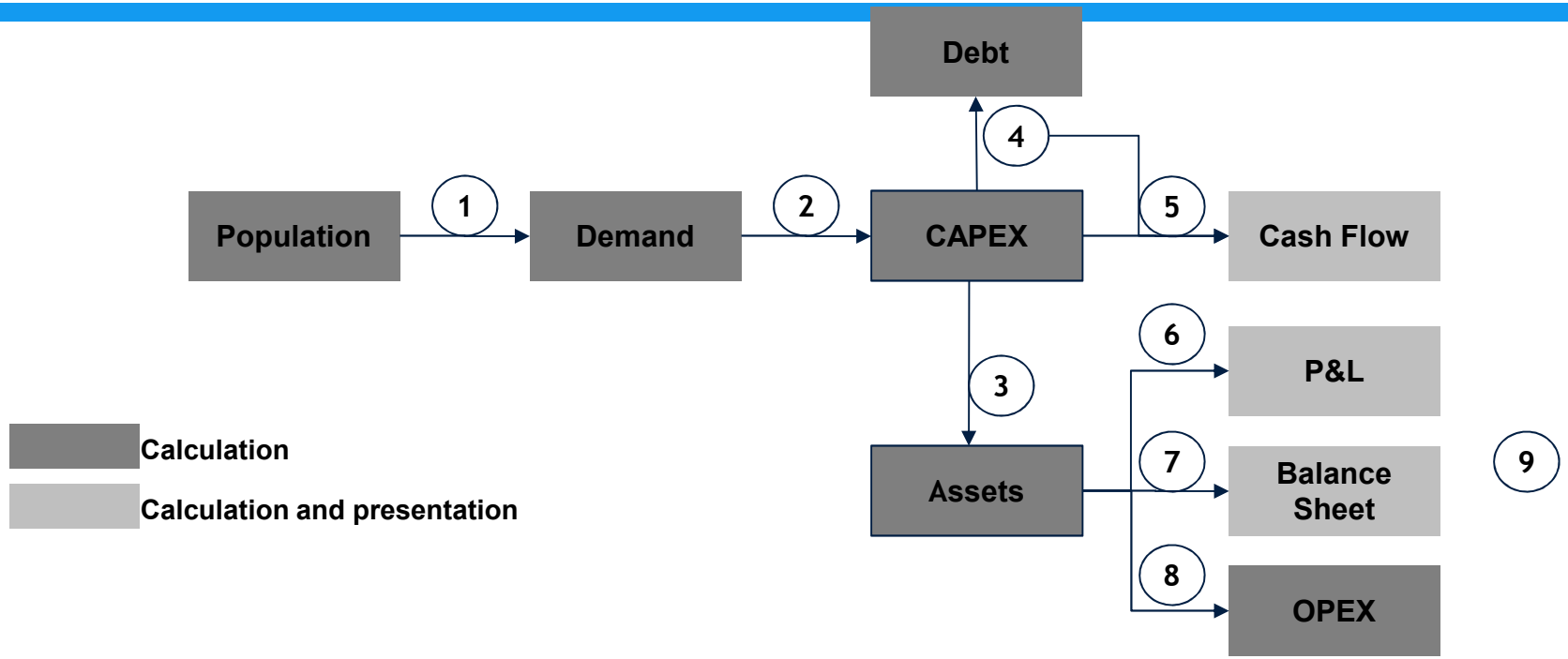
Sub Modules

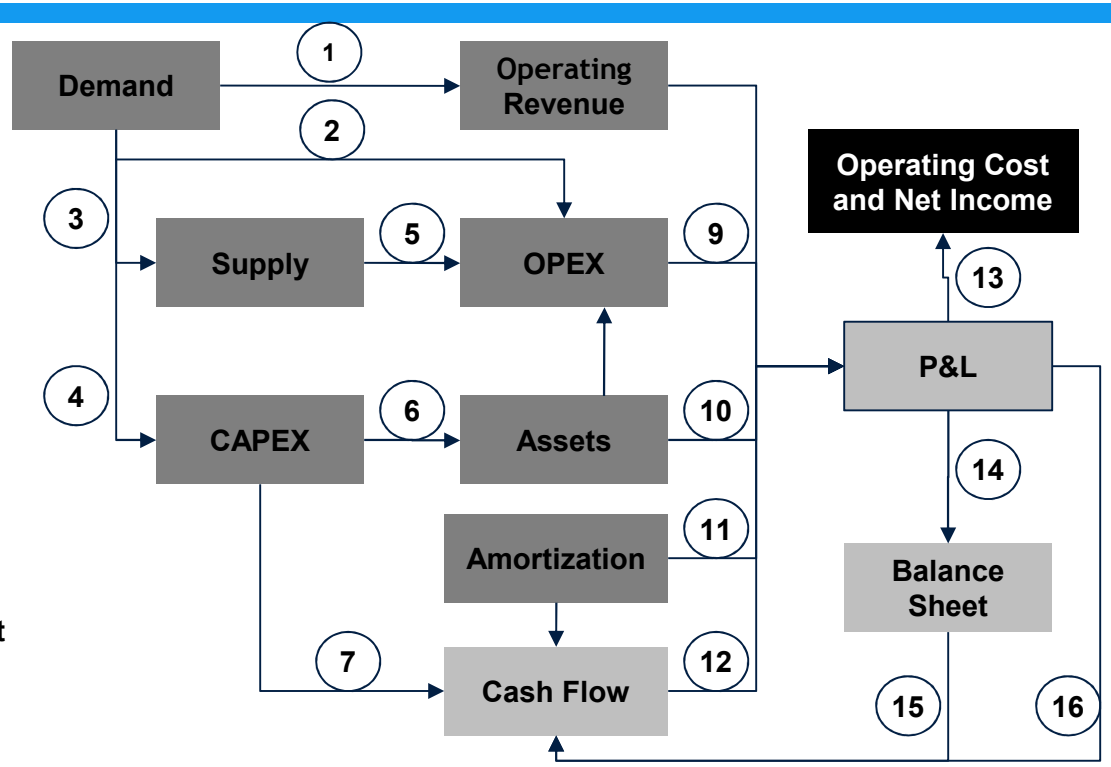
- Financial Statements
  - Balance sheet
  - Income statement
  - Cash flow statement
- CAPEX

Sub Module: CAPEX



1. Population to Demand
2. New connections to CAPEX
3. CAPEX additions to Assets
4. CAPEX additions to Debt
5. Proceeds from long-term debt to Cash Flow
6. Depreciation expense to Income Statement (P&L)
7. Accumulated depreciation current year to Balance Sheet
8. Net book value to OPEX to calculate operating and maintenance costs
9. Current portion of long-term debt to Balance Sheet

Sub – Module: Income Statement (Profit and Loss)



Calculation

Calculation and result

Presentation – Graph

1 Consumption to Operating Revenue

2 Consumption to OPEX

3 Consumption to Supply

4 New connections to CAPEX

5 Water production to OPEX

6 Asset additions to Assets

7 Acquisition of fixed assets and proceeds from long-term debt to Cash Flow

8 Operating revenue to Income Statement (P&L)

9 Operating expenses to P&L

10 Depreciation to P&L

11 Amortization of deferred income to P&L

12 Government subsidy to P&L

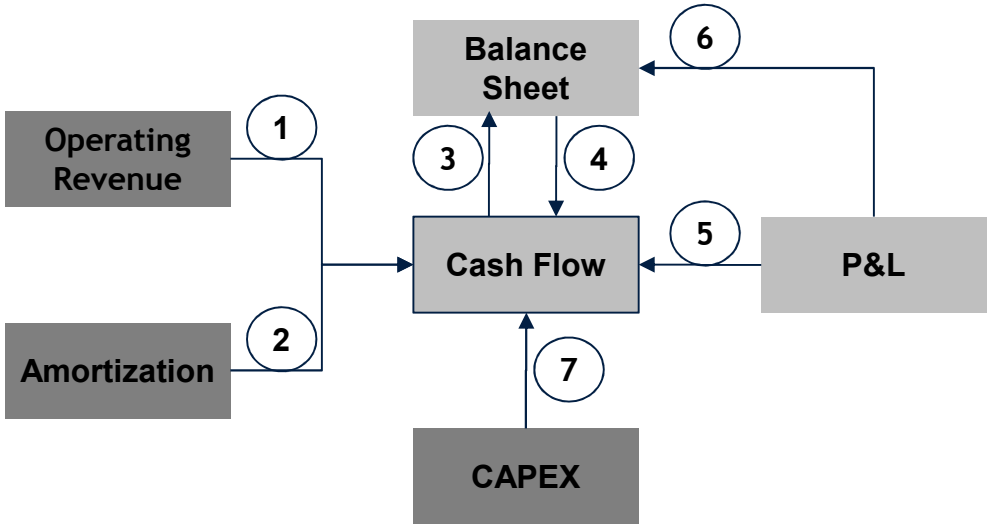
13 Operating cost and Net Income

14 Accumulated deficit to Balance Sheet

15 Accounts receivable, accounts payable, accrued liabilities, materials and supplies, and repayment of long term debt to Cash Flow

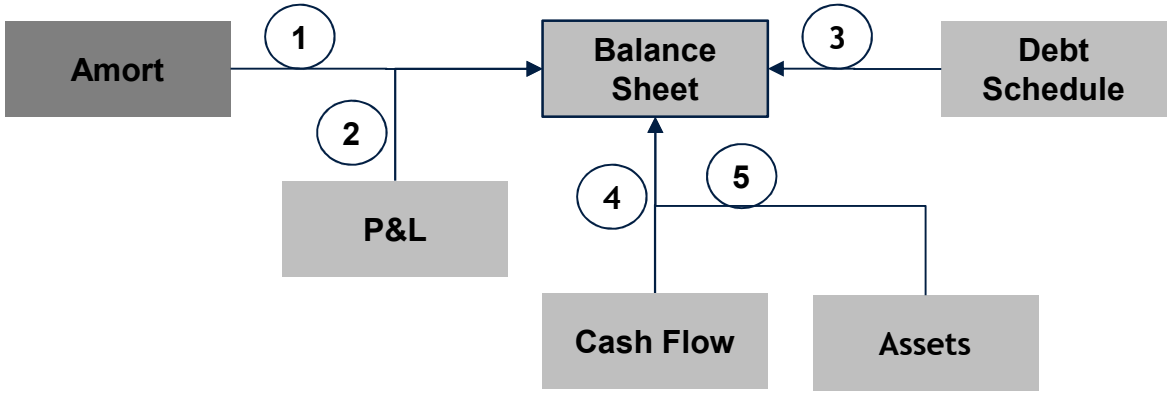
16 Net gain before Gov't subsidy, proposed Gov't subsidy, depreciation and amortization of deferred income

Sub – Module: Cash Flow



1. Operating Revenue Customers' deposits to Cash Flow
2. Customer contributions to capital projects Transfer of third party infrastructure to Cash Flow
3. Cash at end of year to Balance Sheet
4. Repayment of long-term debt, accounts receivable, materials and supplies, prepaid expenses, and accounts payable and accrued liabiilities to Cash Flow
5. Net gains/(loss) before government subsidy, depreciation and amortized deferred income to Cash Flow
6. Retained earnings to Balance Sheet
7. Acquisitions of fixed assets, and proceeds from long-term debt to Cash Flow

Sub – Module: Balance Sheet



Calculation

Calculation and presentation

1 Deferred income to Balance Sheet

2 Accumulated deficit from income statement to Balance Sheet

3 Long-term loans and current portion of long-term loans to Balance Sheet

4 Cash at bank and bank overdraft to Balance Sheet

5 Fixed assets at cost and accumulated depreciation to Balance Sheet

Understanding a Financial Model

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Points to Check on a Financial Model

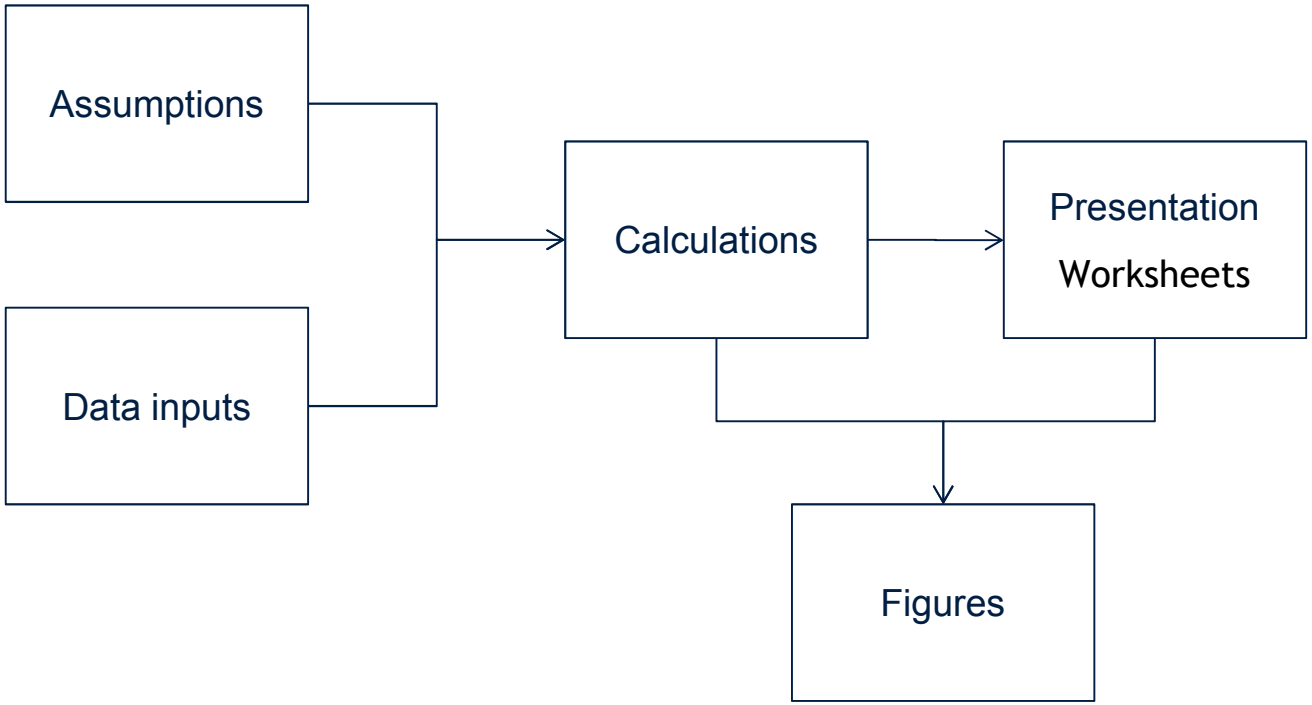
- Historical data
  - Should have at least 3 years of historical operational and financial data
  - Historical financial data must match data in audited financial statements
- Model should include figures that show evolution of key financial and operational indicators
- It should be easy to identify reasons for any unusual changes in evolution of key indicators
- One worksheet that shows key indicators (e.g. EBITDA)
- One worksheet where main assumptions can be seen and changed

Types of Worksheets Used

Spreadsheet Type	Description
Inputs:	Data are hardcoded into these worksheets. This data is then used by the calculation worksheets.
Assumptions:	Data are introduced in separate worksheets that incorporate different scenarios and allow users to introduce changes to see their impacts.
Calculations:	These combine input and assumptions data to calculate various types of data such as demand, revenues, costs, etc. These calculations are then organized into the presentation worksheets. These worksheets may include memo items that aggregate and combine data.
Presentation:	These worksheets present the calculations of the previous worksheets in useable form. These worksheets include Balance Sheets, P&L and Cash Flow statements. These worksheets may include memo items that aggregate and combine data.
Figures:	These worksheets present visual representations of data in the calculations and presentations worksheets

Types of Worksheets Used

Data inputs and assumptions are drawn into calculation worksheets and converted into useful conclusions and indicators in the Presentation worksheets. The effects on Presentation worksheets inform the decision-making process.



Color Coding

Tabs are have the following color coding:

Key Outputs
Assumptions
Projections
Intermediate calculations
Historic Data
Figures

Data has the following color coding:

- Grey shaded: direct input data (e.g. Sales, OPEX)
- Blue font: assumptions (e.g. inflation, fuel costs, staff reductions, financial, supply and demand, tariffs, NRW)
- Red font: cells with links to other worksheets
- Black font: cells with calculations links to the same worksheets

Data from an external source. Insert comment to identify source of data.
Assumption. Insert comment to indicate basis for assumption.
Cell linked to cell on another worksheet.
Calculated cell.

How to Start Navigating a Financial Model

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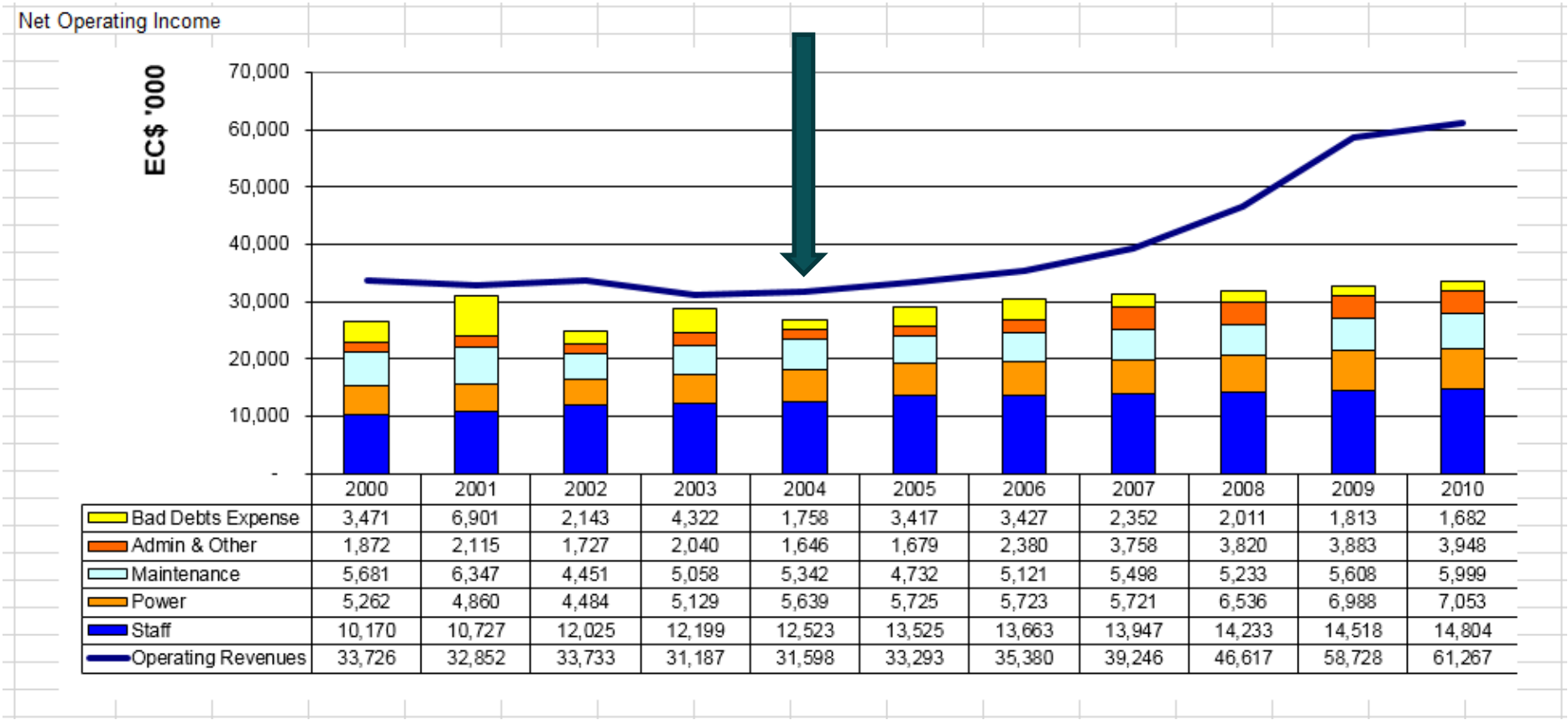
Look for the Graphs

Wasco Model Example

Forecast



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Bad Debts Expense	3,471	6,901	2,143	4,322	1,758	3,417	3,427	2,352	2,011	1,813	1,682
Admin & Other	1,872	2,115	1,727	2,040	1,646	1,679	2,380	3,758	3,820	3,883	3,948
Maintenance	5,681	6,347	4,451	5,058	5,342	4,732	5,121	5,498	5,233	5,608	5,999
Power	5,262	4,860	4,484	5,129	5,639	5,725	5,723	5,721	6,536	6,988	7,053
Staff	10,170	10,727	12,025	12,199	12,523	13,525	13,663	13,947	14,233	14,518	14,804
Operating Revenues	33,726	32,852	33,733	31,187	31,598	33,293	35,380	39,246	46,617	58,728	61,267

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Look for the Assumptions

WASCO Model Example

SCENARIO ANALYSIS				
	Selected Scenario	Base Case	Status Quo	Scenario 3
	1	1	2	3
PRINCIPAL ASSUMPTIONS				
Tariffs				
Nominal increases at rate of inflation				
Annual increase above inflation	0.0%	0.0%	0.0%	
Apply increases?	Yes	Yes	no	Yes
Year to begin implementation	2006	2006	2015	2007
First increase for all but ships				
Year of implementation	2005	2005	2007	2006
Amount of increase	0.0%	0.0%	0.0%	15.0%
Nominal increase for ships beginning in 2006	0.0%	0.0%	0.0%	35.0%
Demand				
% increase in domestic demand per customer	10.0%	10.0%	0.0%	10.0%
xxx				

... | Indicators | Scenario Analysis | Gen - Assume | Tariffs - Assume | OPEX - As: ...

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Consistency of Physical and Financial Flows

A well-functioning financial model must be able to:

- project the company's physical flows such as:
  - number of customers
  - Volumes of water produced and treated
  - changes in fixed assets
- project the company's financial flows such as:
  - rates for each tariff category
  - required investments
  - interest expenses
- reconcile the physical flows with the financial flows...

Objectives of Financial Models for Water Utilities

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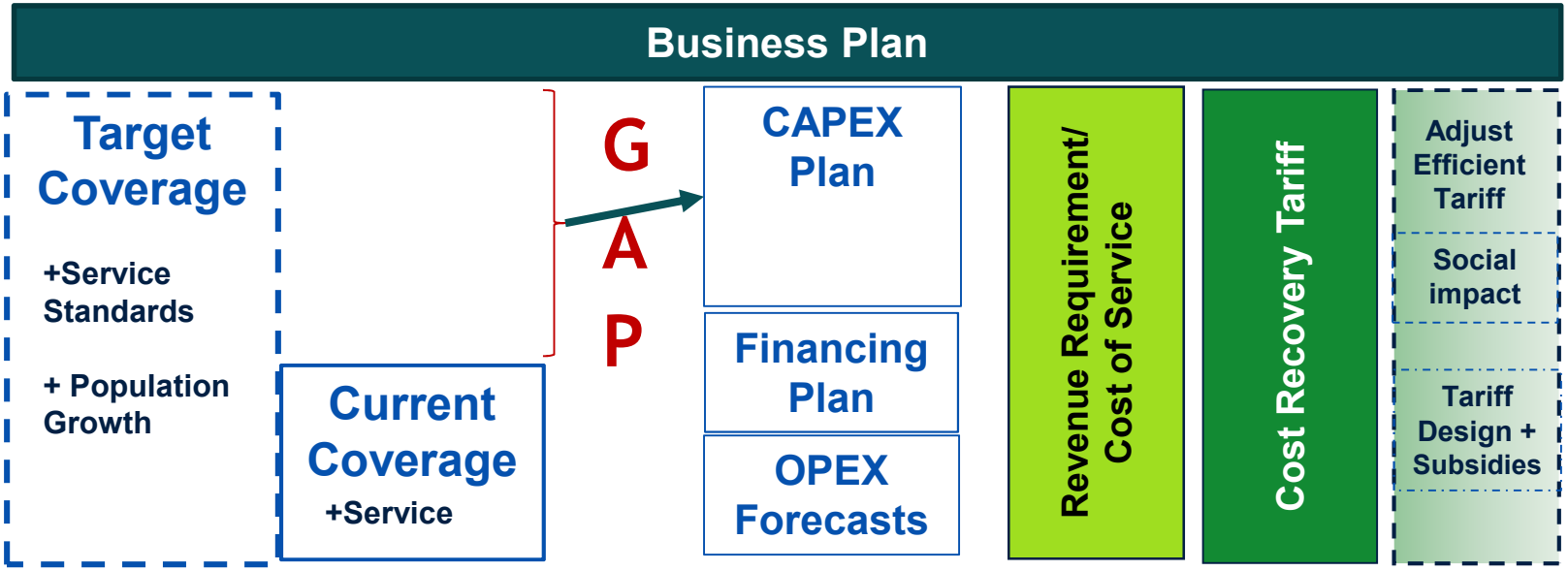
Objectives of Financial Models for Water Utilities

- Financial models are used to project the cash flow of a utility to make investment decisions

- What can you do with a financial model?
  - Analyze a utility's current and projected financial situation
  - Diagnose operating performance
  - Identify main cost drivers
  - Verifying viability of current and proposed tariffs

Financial Models are a Useful Tool to Plan towards Financial Sustainability



Financial Model

Step 1. Diagnose Current Situation to identify what is the GAP

(How far is the utility from meeting targets?)

Step 2. Estimate capital and operating costs of meeting and sustaining target service

Step 3. Estimate Cost of Service and Revenue Requirement

Step 4. Estimate impact of proposed tariffs on utility's customers

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Exercise: Guided Walk-Through of a Financial Model for a Water Utility

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NWC – Jamaica

Open Excel file of NWC Model

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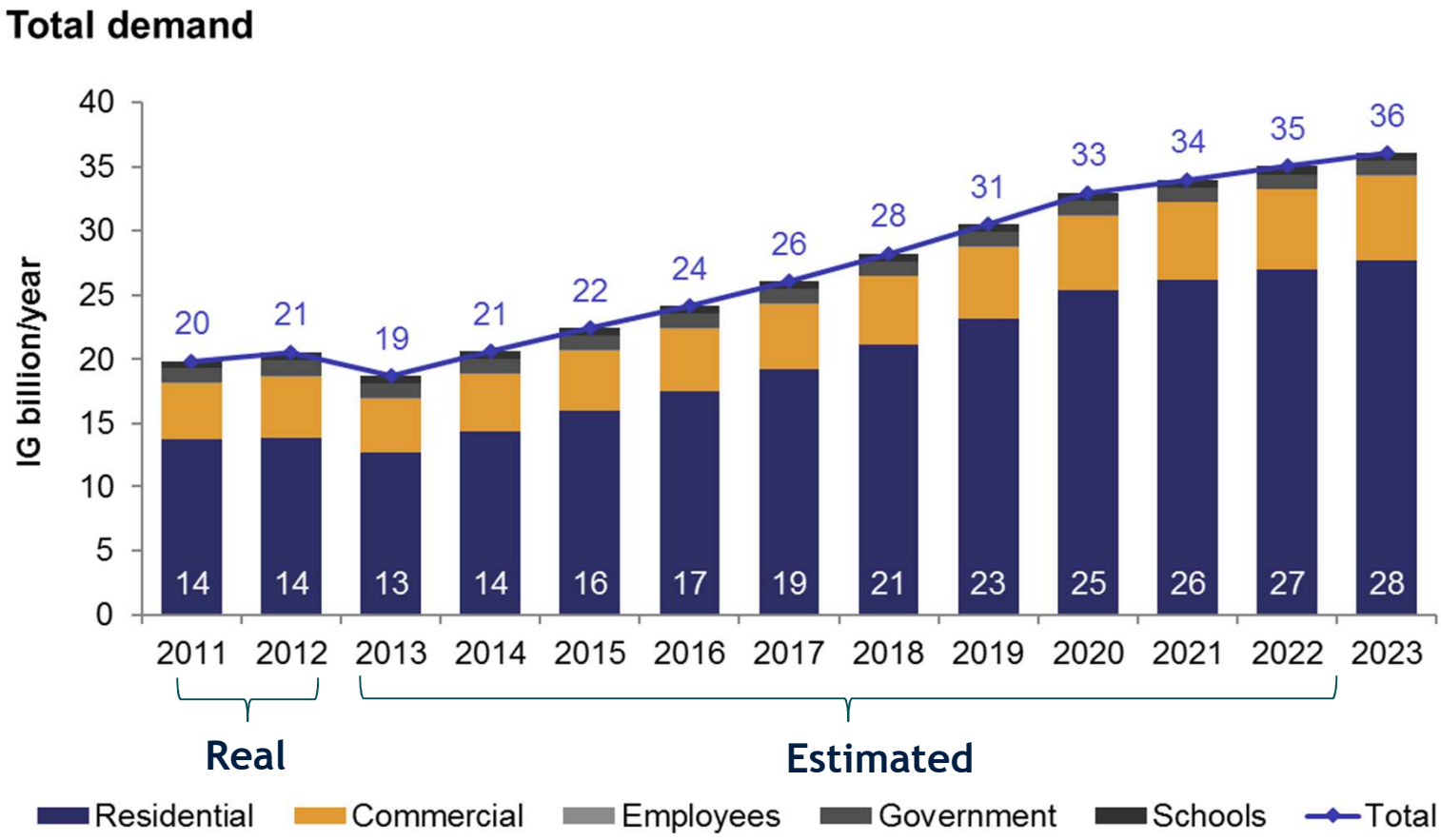
Step 1. Targets

Go to Assumptions in Excel model.

Step 1. Targets: Water Demand



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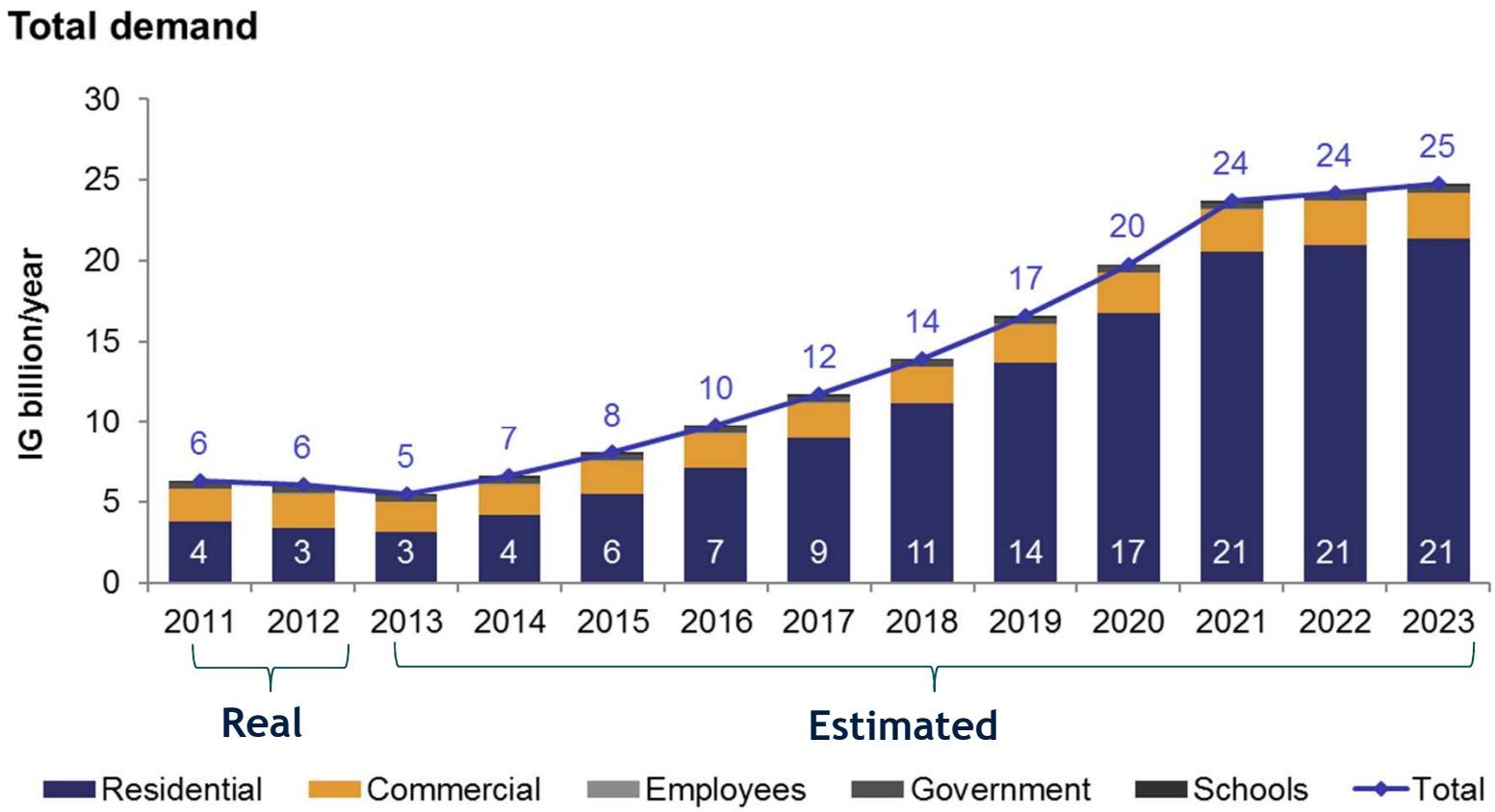
Step 1. Targets: Wastewater Demand



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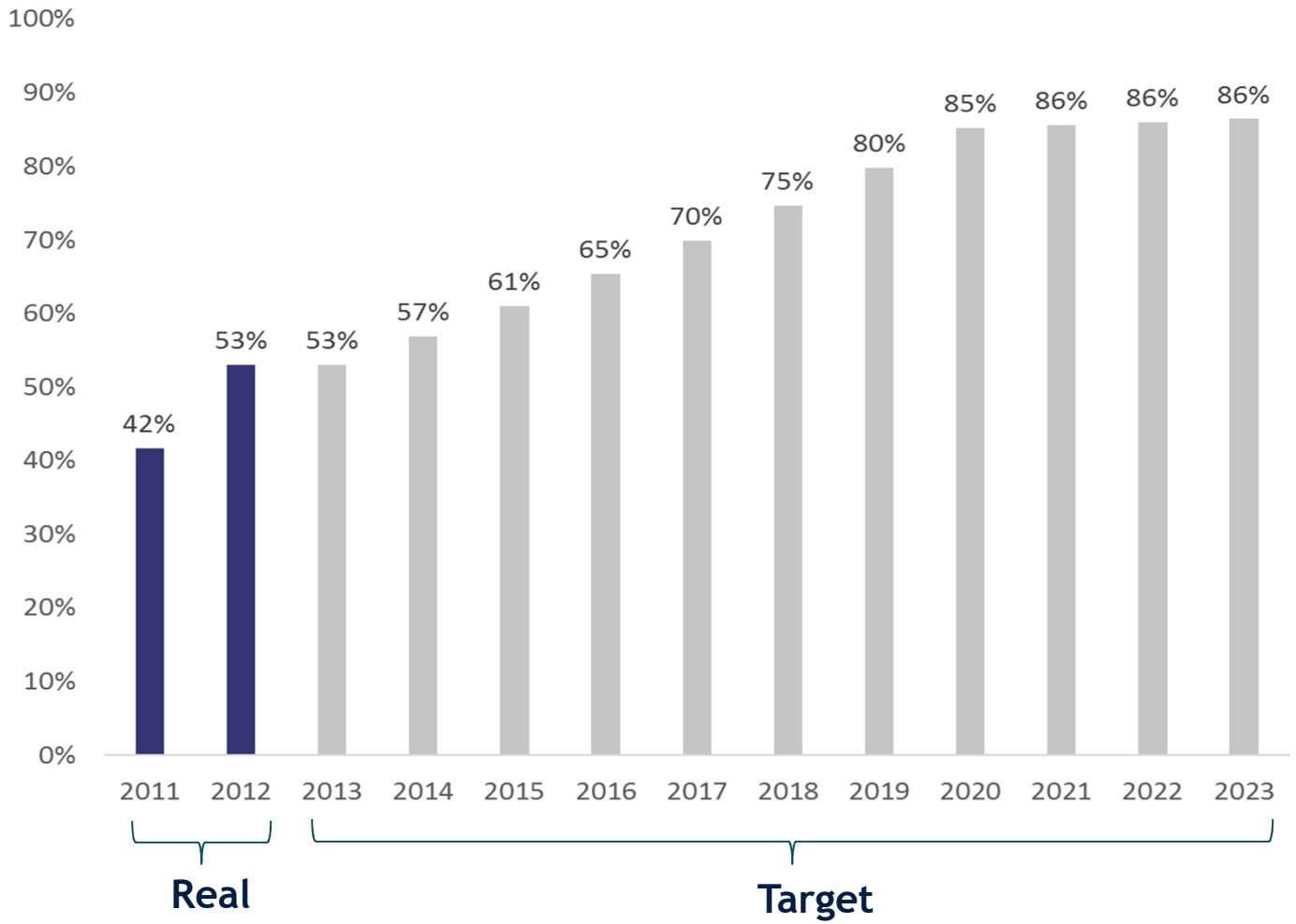
Step 1. Targets: Water Coverage



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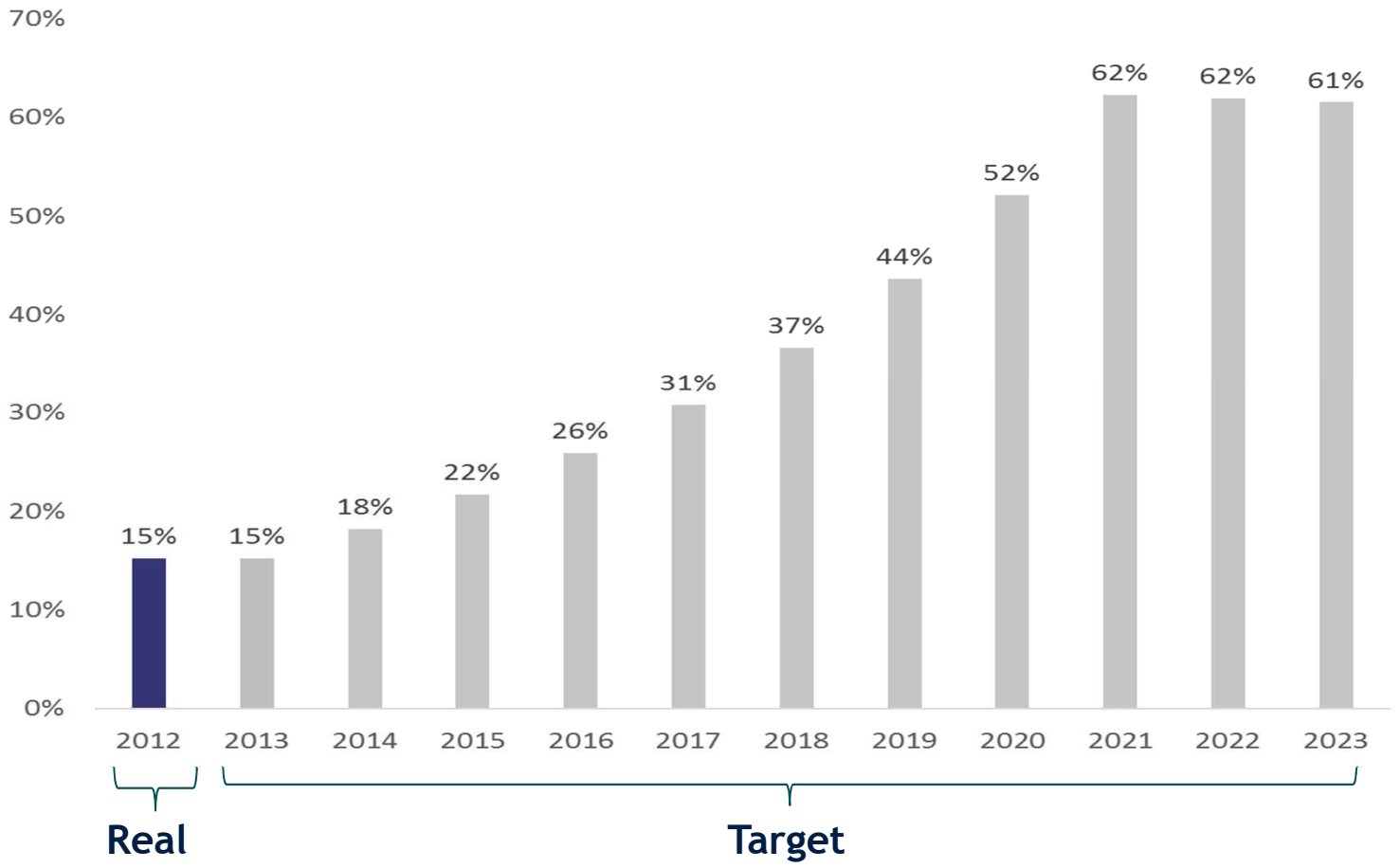
Step 1. Targets. Wastewater Coverage



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Step 2. Estimate Capital and Operating Costs of Meeting and Sustaining Target Service

CAPEX Plan

Financing Plan

OPEX Forecasts

Step 2. Estimate capital and operating costs of meeting and sustaining target service

Data Inputs:

- Historical Financial Statements
- Historical Operational Data
- Historical Water Balance
- Technical Studies
- Urban Plan

Other Inputs

- Cost and Efficiency Assumptions
- Targets

How it works :

- Develop CAPEX Plan
- Develop Financing Plan based on CAPEX investments
- Forecast OPEX, taking into account OPEX for new investments and assumptions

Step 2. Estimated CAPEX

Project Name	Total Value (US$mn)	Total Investment (US$mn) 2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Water supply improvements	267	76	84	54	18	13	6	11	5	-	-
Water supply, sewerage and Drainage	40	2	12	3	-	10	13	-	-	-	-
Sewerage Works - K - Factor	240	6	27	28	27	45	52	33	13	10	-
Central Sewerage Systems	951	-	28	63	106	108	89	121	155	154	128
K-Factor NRW	300	-	23	47	50	10	10	10	50	50	50
GRAND TOTAL, US$million	**1,798**	**84**	**174**	**194**	**201**	**186**	**171**	**175**	**223**	**214**	**178**

Project Name	Total Value (US$mn)	Kfactor 2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Water supply improvements	267	38	46	20	10	10	-	-	-	-	-
Water supply, sewerage and Drainage	40	-	-	-	-	-	-	-	-	-	-
Sewerage Works - K - Factor	240	6	27	28	22	30	27	28	12	10	-
Central Sewerage Systems	951	-	23	47	50	10	10	10	50	50	50
K-Factor NRW	300	-	23	47	50	10	10	10	50	50	50
GRAND TOTAL, US$million	**1,798**	**44**	**119**	**142**	**132**	**60**	**47**	**48**	**112**	**110**	**100**

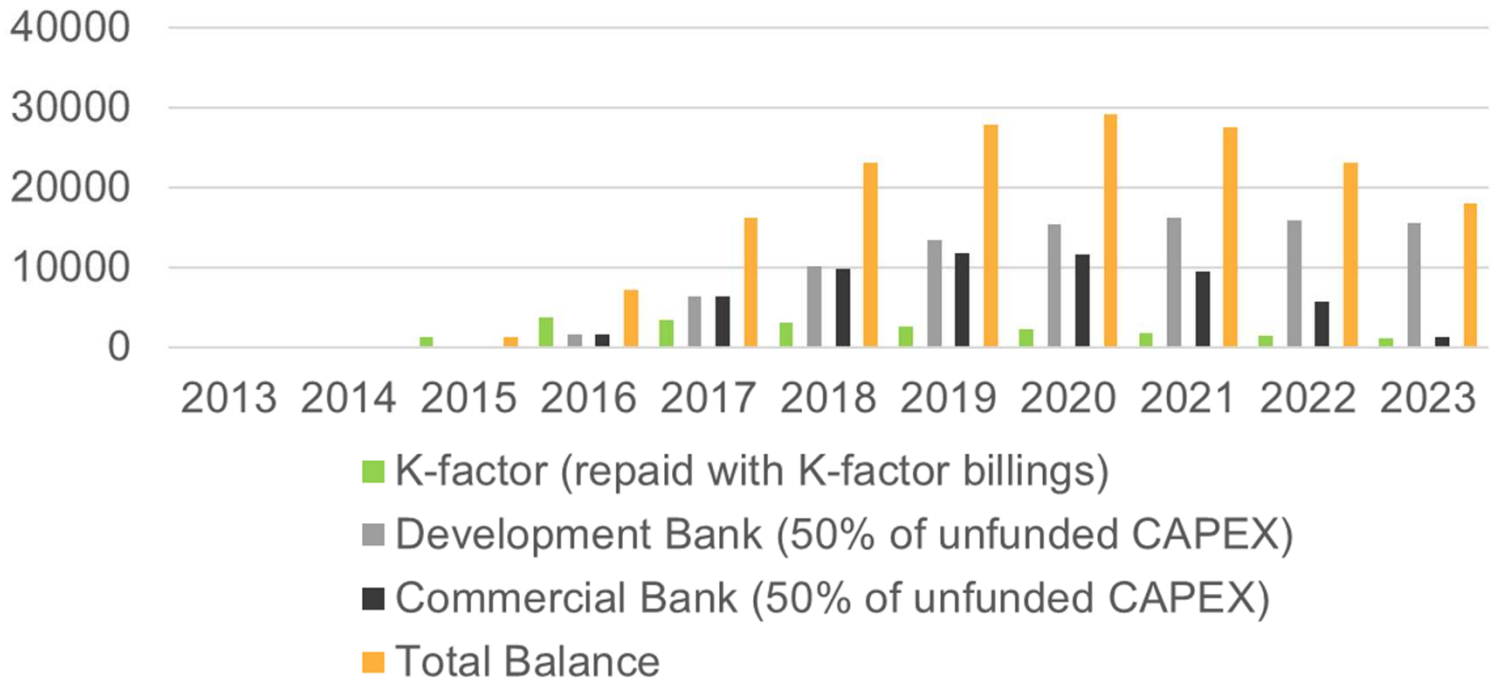
Step 2. Financing Plan

Look in the model for:

- Assumptions
- Debt Schedule

Step 2. Financing Plan

Debt Principal Schedule



Commercial Financing + Concessional Loans

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Step 2. OPEX Forecast

Step 2. Estimate capital and operating costs of meeting and sustaining target service

OPEX Forecasts

Data Inputs:

- Historical Financial Statements
- Historical Operational Data
- Historical Water Balance
- Technical Studies
- Urban Plan

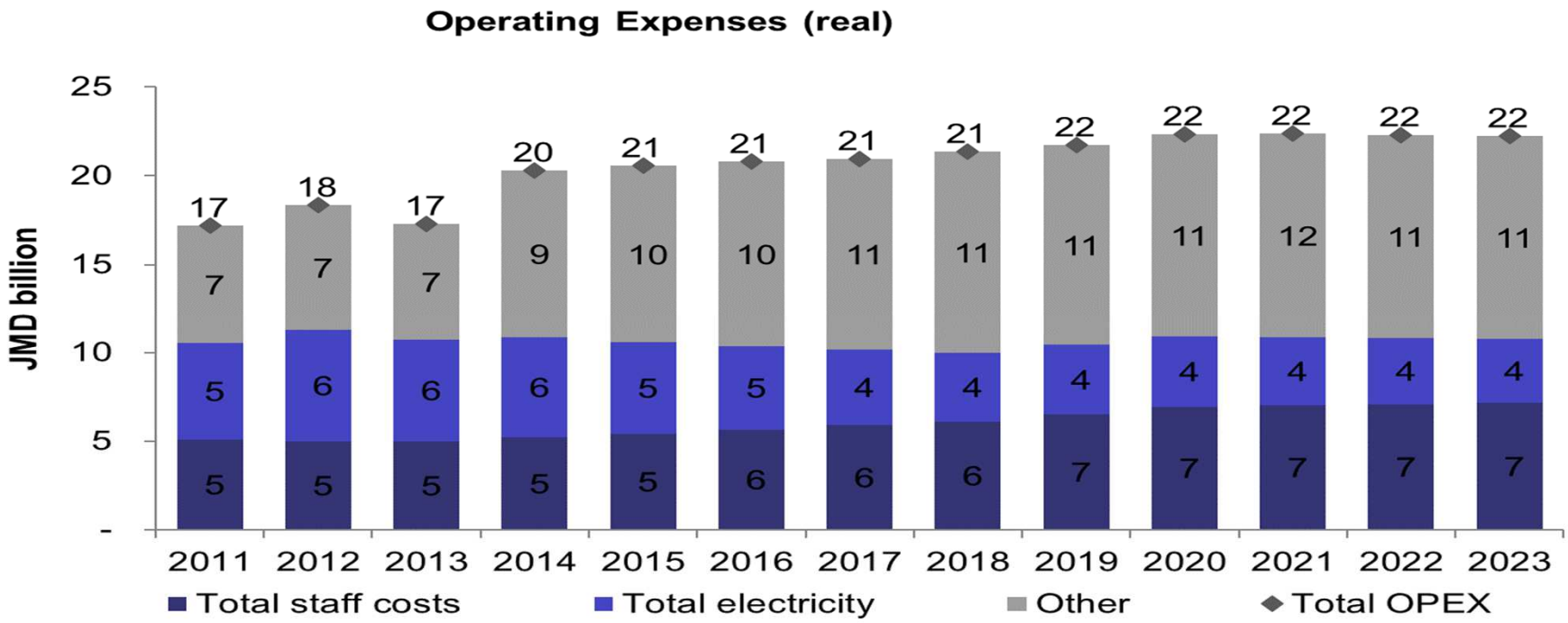
Other Inputs

- Cost and Efficiency Assumptions
- Targets
- Water Balance

How it works :

- Use cost and efficiency assumptions
- Identify which is the cost driver for each component of the OPEX (e.g. number of connections , m3 consumed?)
- Lets see some examples …

Step 2. OPEX Forecast



Look in the model for:

- Assumptions
- OPEX in Calculations Worksheets

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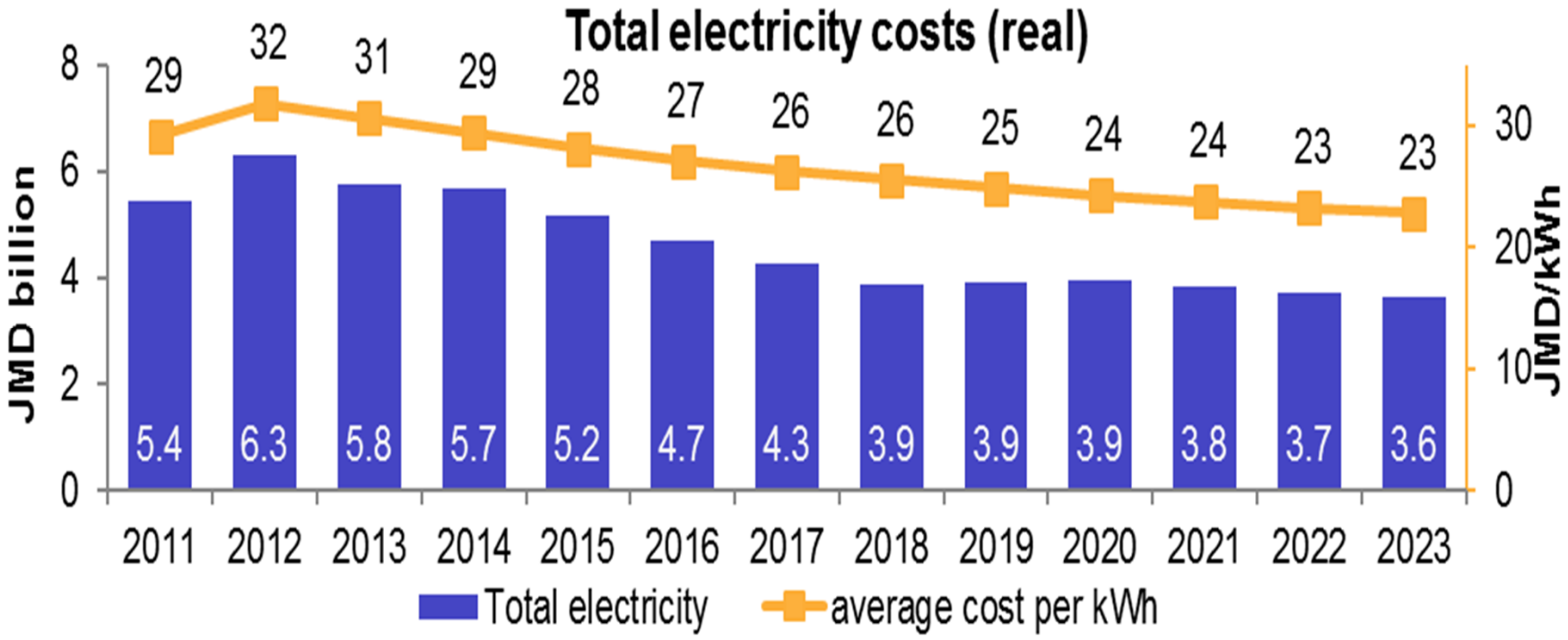
Step 2. OPEX Forecast: Electricity Costs



What is the main cost driver? Water quantity or number of connections ?

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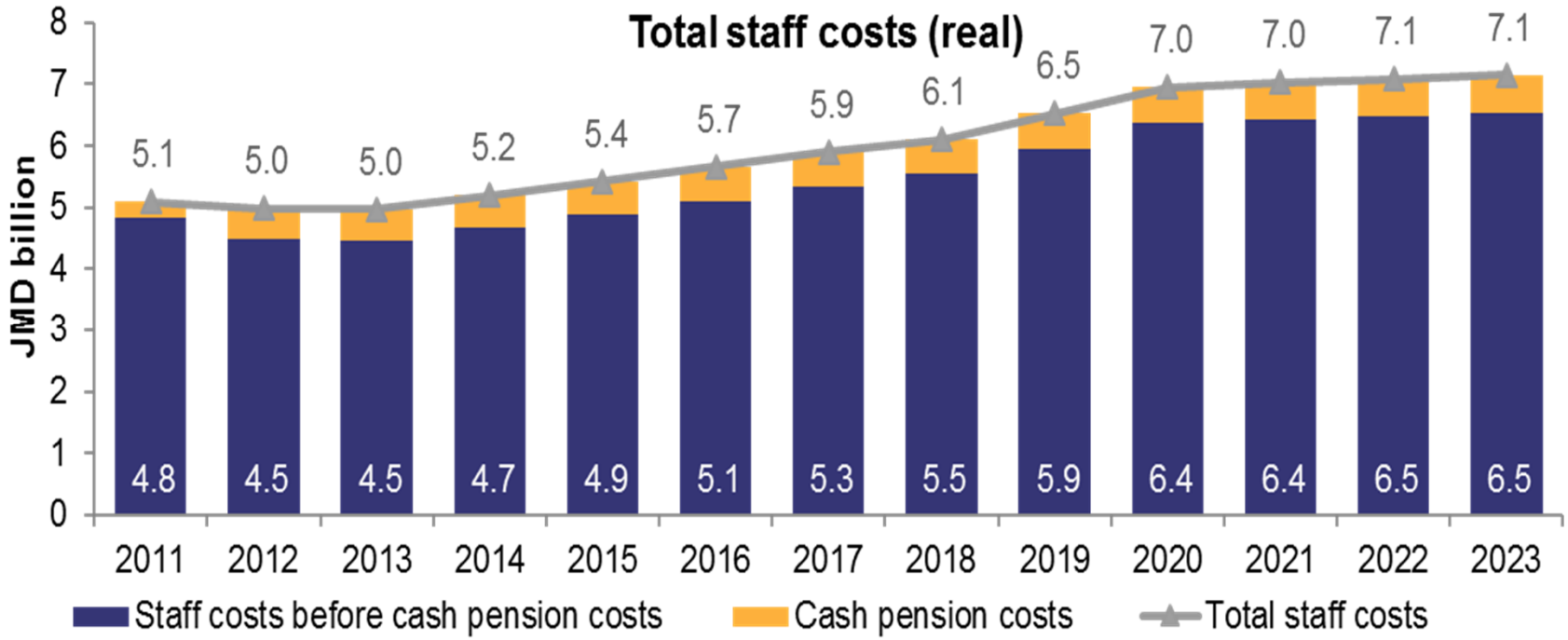
Step 2. OPEX Forecast: Staff Costs



What is the main cost driver? Water quantity or number of connections ?

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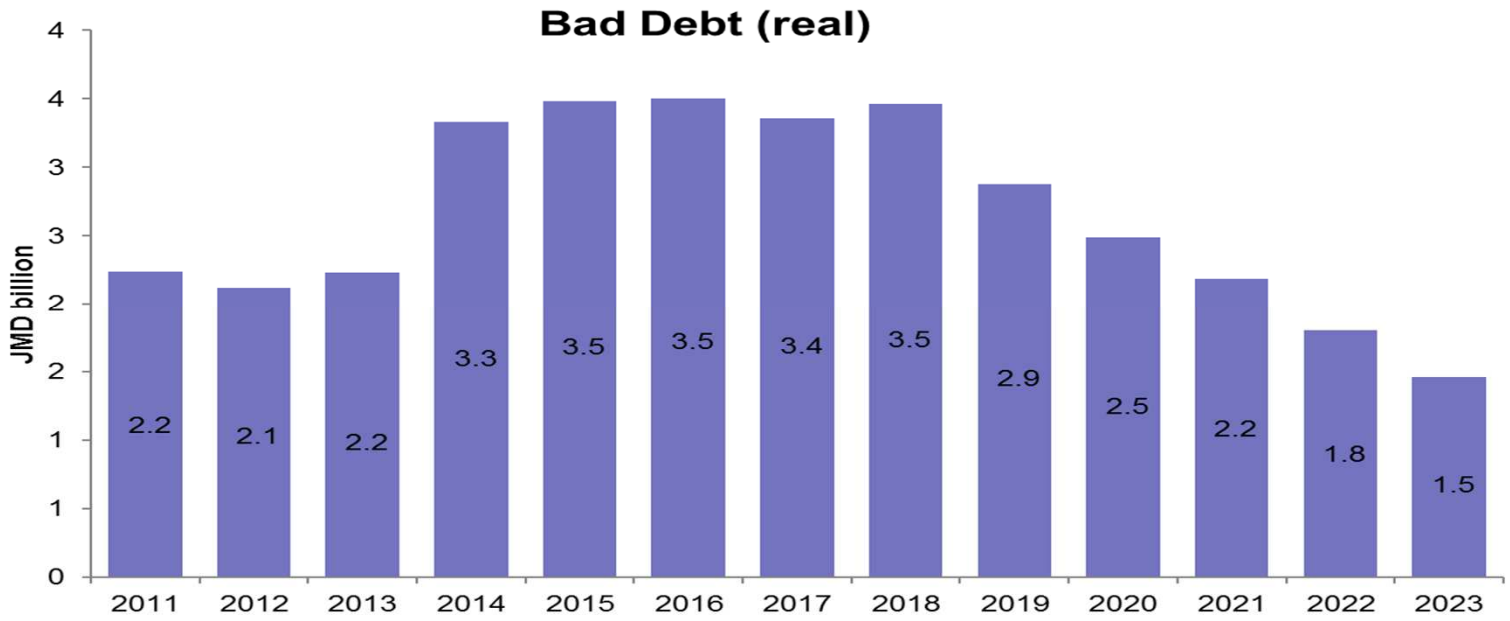
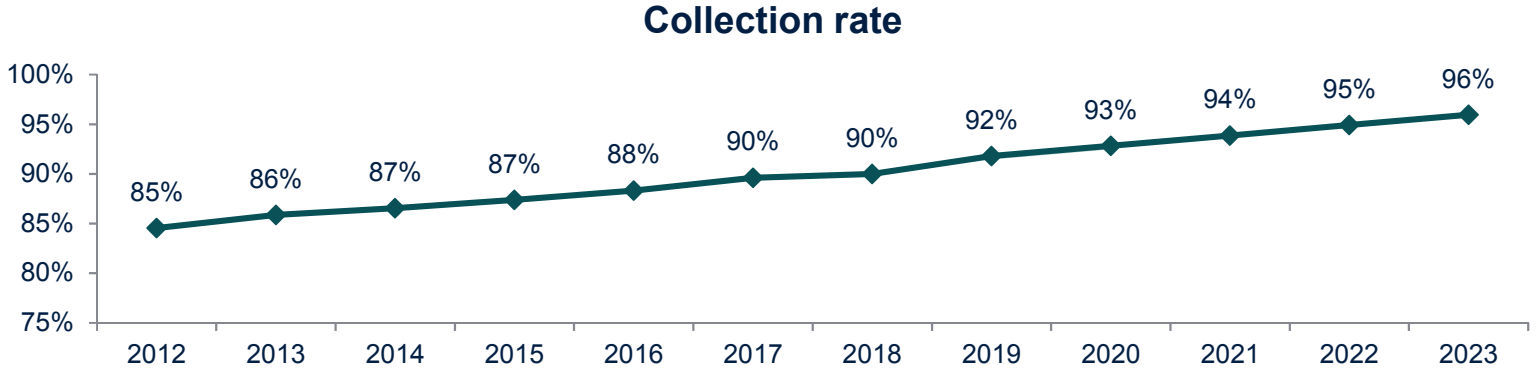
Step 2. OPEX Forecast: Provision for Bad Debts



- Provision to keep receivable days at 50.



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Step 3. Estimate Cost of Service and Revenue Requirement

Revenue Requirement/ Cost of Service

Step 3. Estimate Cost of Service and Revenue Requirement

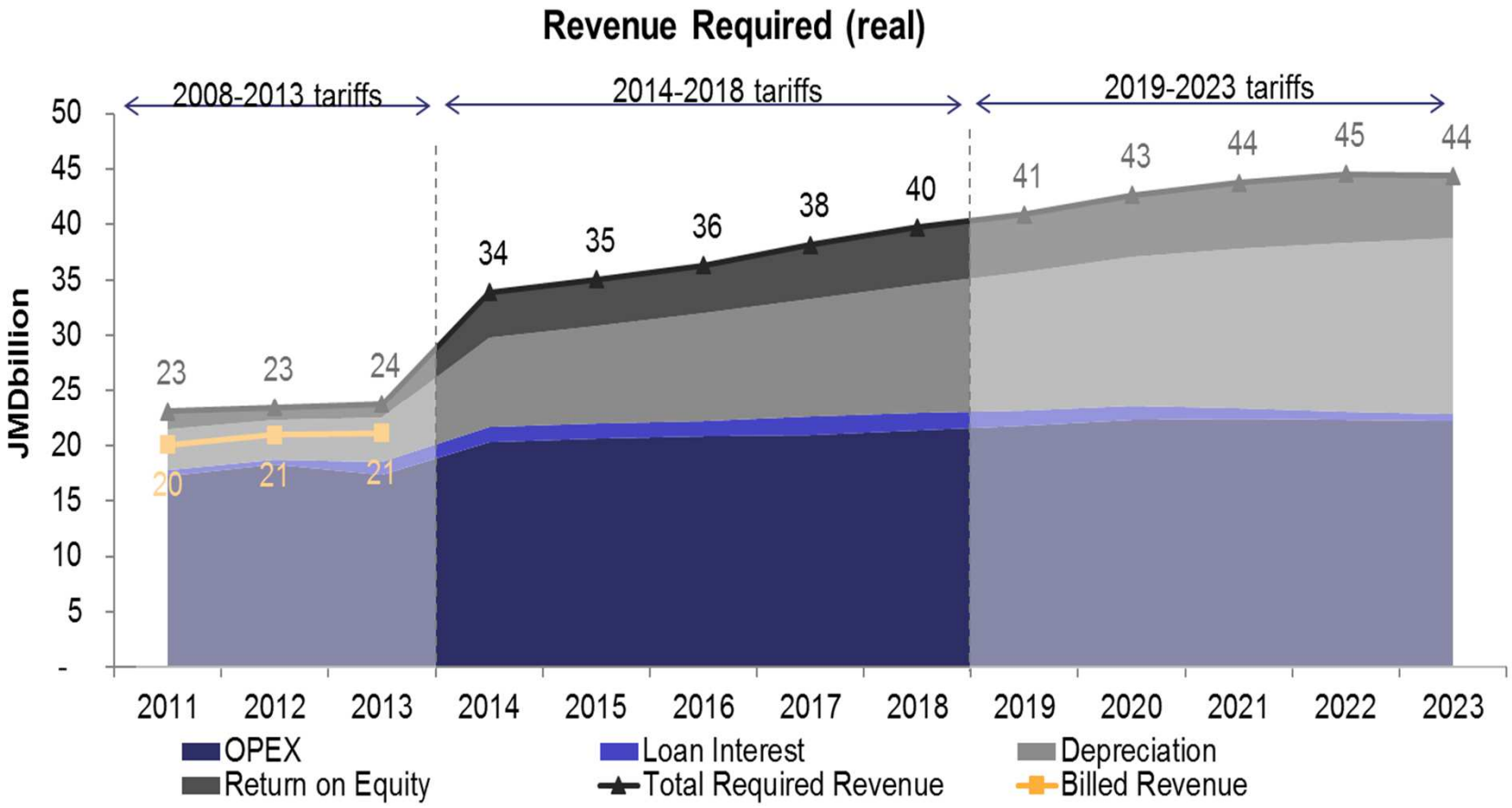
Inputs:

- CAPEX plan
- Financing plan
- OPEX forecast

How it works :

- Use building blocks approach to calculate Cost of Service
- Estimate revenue required to cover the Cost of Service
- Estimate Cash Requirements

Step 3. Verifying viability of current and proposed tariffs



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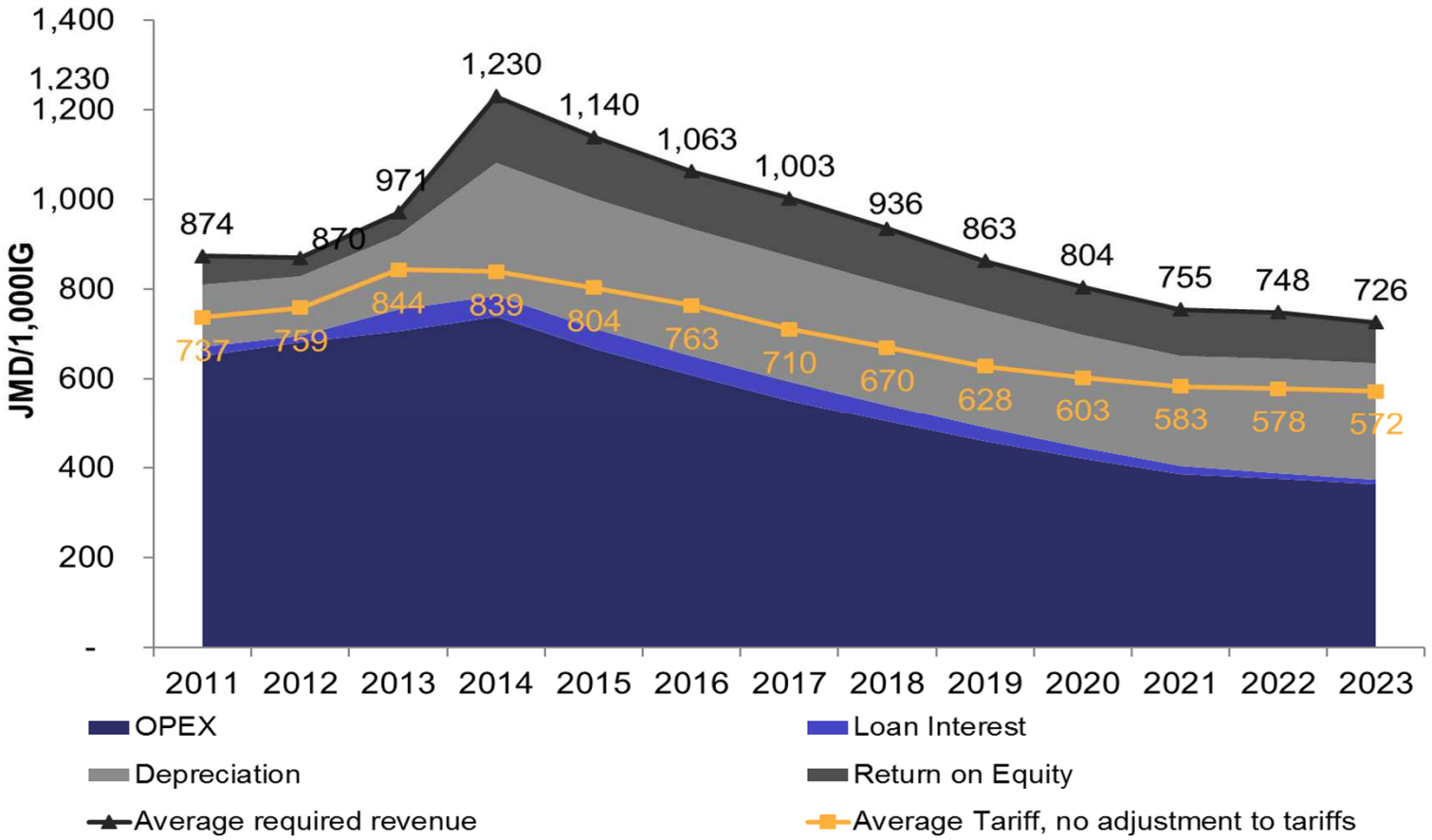
Step 3. Cost of Service – Building Blocks



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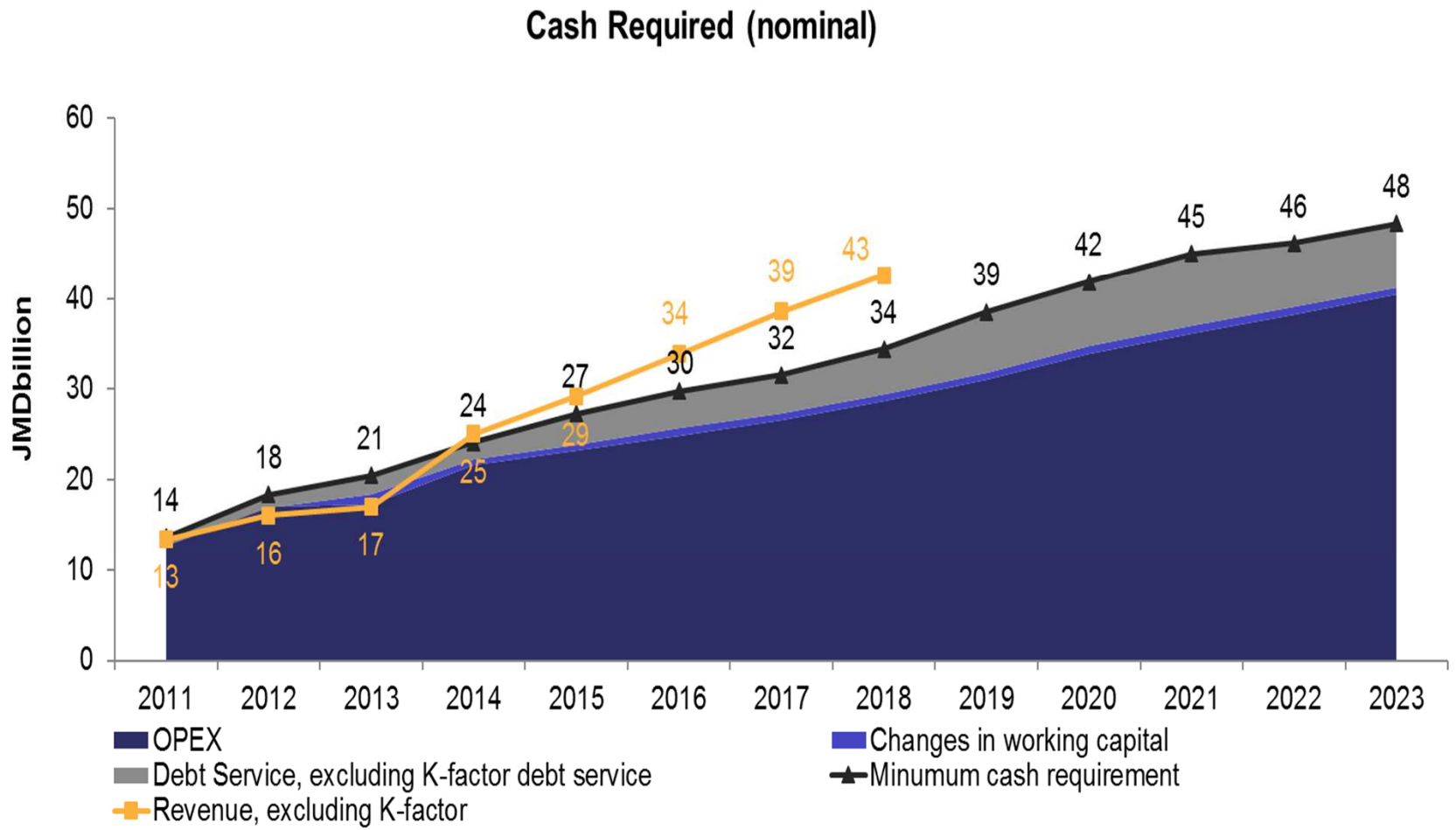
Step 3. Cash Revenue Requirement



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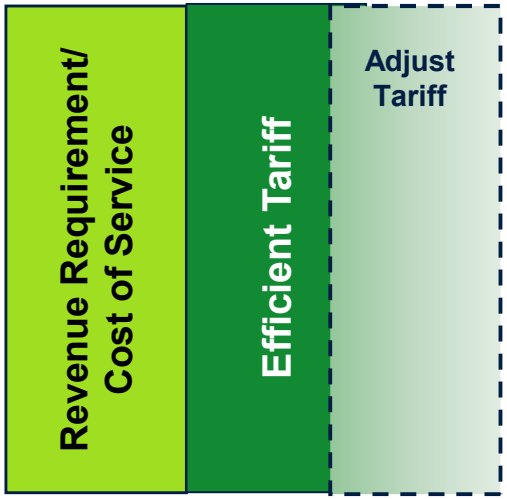
Step 4. Estimate Impact of Proposed Tariffs on Utility's Customers



Step 4. Estimate impact of proposed tariffs on utility's customers

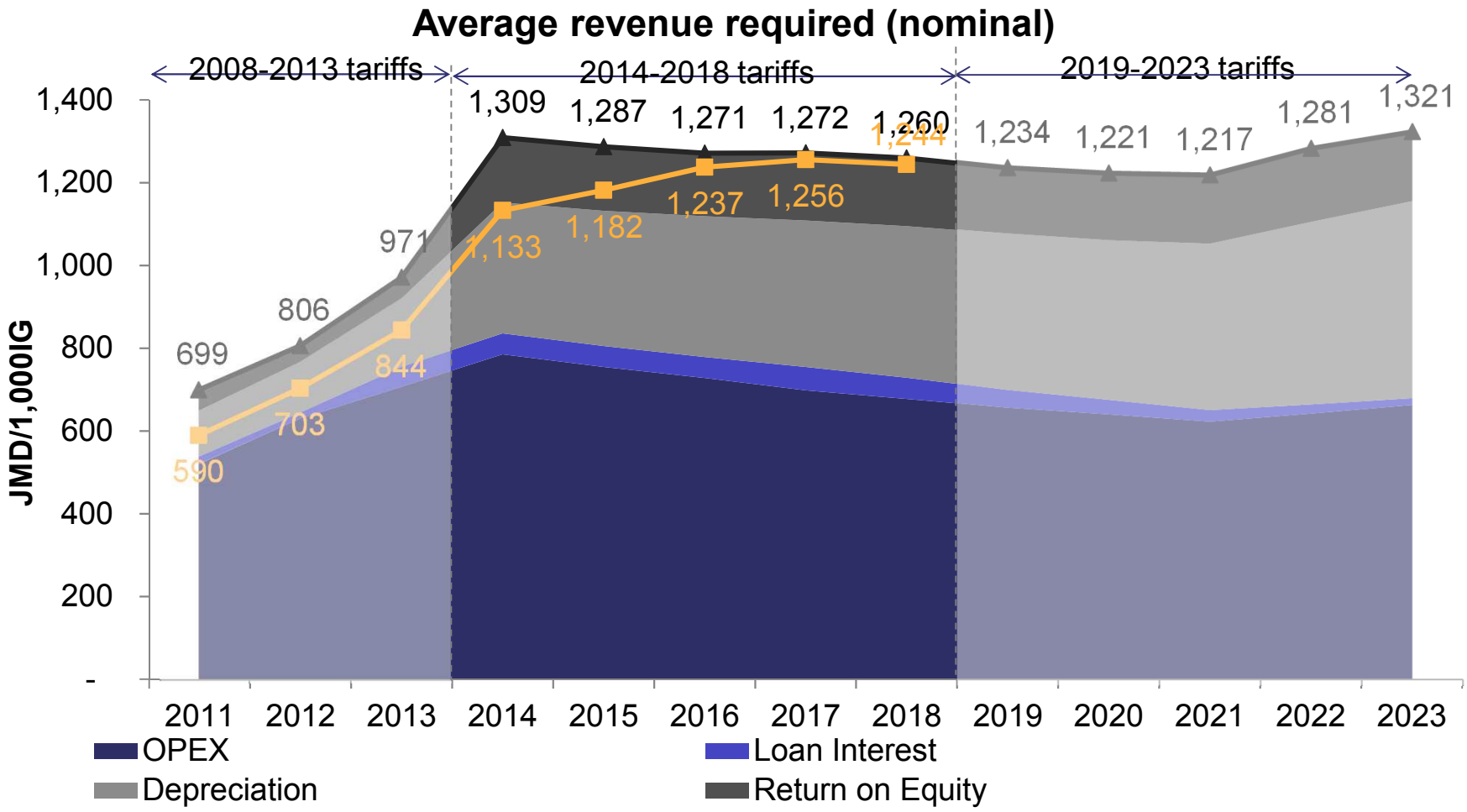
Inputs:

- Revenue Requirement
- Current Tariffs
- Relevant regulation

How :

- Estimate tariff increase necessary to reach cost recovery tariffs

Step 4. Proposed Tariff



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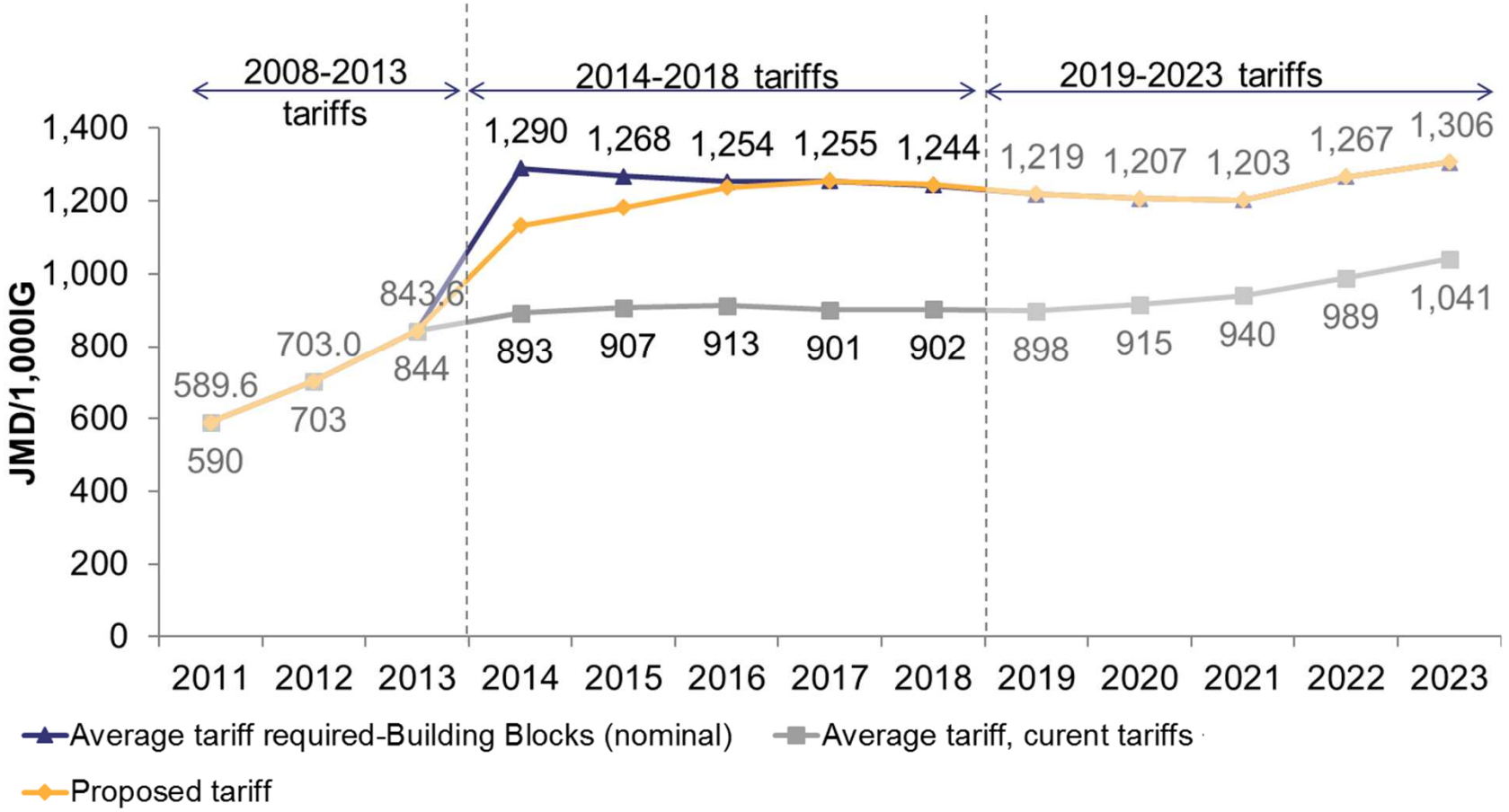
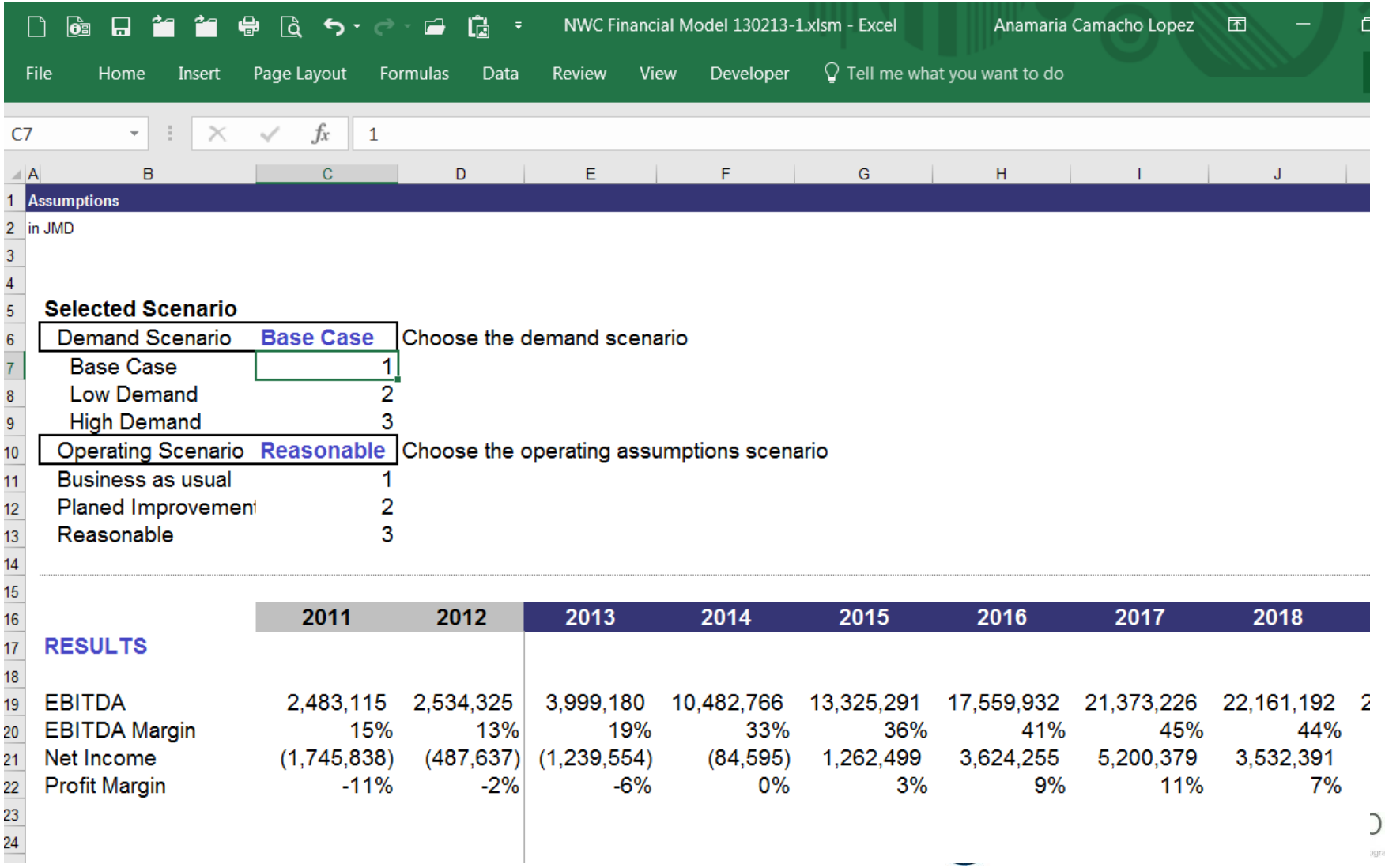
Step 4. Proposed Tariff



Checking How Changes in Assumptions Affect Results!



Assumptions

in JMD

Selected Scenario

Demand Scenario	Base Case	Choose the demand scenario
Base Case	1	
Low Demand	2	
High Demand	3	
Operating Scenario	Reasonable	Choose the operating assumptions scenario
Business as usual	1	
Planed Improvement	2	
Reasonable	3	

	2011	2012	2013	2014	2015	2016	2017	2018
RESULTS								
EBITDA	2,483,115	2,534,325	3,999,180	10,482,766	13,325,291	17,559,932	21,373,226	22,161,192
EBITDA Margin	15%	13%	19%	33%	36%	41%	45%	44%
Net Income	(1,745,838)	(487,637)	(1,239,554)	(84,595)	1,262,499	3,624,255	5,200,379	3,532,391
Profit Margin	-11%	-2%	-6%	0%	3%	9%	11%	7%

Thank You

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