FEDERAL GOVERNMENT OF NIGERIA

FEDERAL MINISTRY OF AGRICULTURE & WATER RESOURCES

Manual for Financial Models For Water Utilities In Nigeria

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3 Useful Definitions

- Utility – Water Board, Water Corporation or other unit charged with the task of delivering water in an urban area
- Financial Model – A model of a utility to forecast the financial impact of given decisions, e.g. the impact of major investment programs
- World Bank – A bank channeling international aid to the developing world
- IDA – A special lending window for the World Bank to provide funds to some of the poorest nations. Funds are provided on very soft terms
- Design Capacity – Capacity of water production facilities at construction
- Capacity Utilization – The % of design capacity currently being used for water production
- Unaccounted for Water (UFW) – the amount of water not reaching customers because of leaks, illegal connections or others. This is normally referred to as Technical Losses
- Commercial Losses – the amount of water not billed or/and not collected. This is normally referred to as commercial losses
- Financial Losses – the combination of technical and commercial losses. A figure of 15 % tells you only 15% of extracted water is actually paid for by customers as 85 % of the production is lost either in technical or commercial processes

4 Introduction

The purpose of this manual is to provide the experienced excel user an overview and understanding of the Financial Model that will enable him to use the model as is and to understand how calculations are interconnected and accomplished.

For this reason we provide an overview of Model Features and how these features are utilized in each of the four states of Kaduna, Ogun, Lagos and Enugu in Nigeria.

The reader is advised to learn first the generic part of the model in Chapter 7 and then to refer to how the actual implementation for his utility has been done in chapter 8.

The actual implementation of a model is based on the current availability of trustworthy data as well as features of that utility's billing and commercial processes. So no two models will be the same after they have been tailored to the that utility.

5 Credits, Acknowledgements

Of course such a financial model has developed with the assistance of many different staff members in utilities spread over Africa and the Middle East and not least a number of World Bank staff. My thanks to everyone that brought ideas, improvements and shortcomings to my attention. The model is continuously evolving and hopefully has yet to achieve its full potential as a useful, user friendly and accurate forecasting tool for water utilities. Many thanks to all that participated in this process. We are truly grateful.

If you have ideas or want to comment on the model then please send us a mail to clarity@clarity.dk We will always respond – just be patient as we are constantly traveling.

6 How to use this document

Each user should be provided with four inputs:

1. The model itself is a standard excel workbook provided as a soft copy on a CD-rom. Make copies as you wish for training purposes but keep the original safe
2. A model write-up paper. This paper presents assumptions and conclusions from the model work.
3. A website called "Sana'a Help Model". This contains another example of a model implemented in Yemen. The model is the same but key inputs like the customer tariff model varies.
4. This document in a printed and soft copy. Please read this before attempting to use the model and when-ever you need to make a reference lookup.

The model is to be used by advanced excel users only. The following features of Excel are necessary to understand and be able to study the model:

- Naming cells and using names in calculations, as well as trace names back to their definition
- A few advanced formulas, specifically sumif, lookup, macro programming (very little), NPV (Net present value) and a few others.
- The use of dialog boxes in excel

If you do not understand these subjects then please open your excel, press F1 for help and perform a lookup in the help file. You can lookup any of the above issues and get help and examples this way.

7 Installing the Model

The model comes in one Excel workbook that contains all the sheets, a few macros etc.

Open your Excel Program.

Before loading the model you need to allow the macros to run. Go to Tools-> Options -> Security (Tab) -> Macro Security -> and select Medium security level. Otherwise macros won't run.

Also be sure to go to Tools -> Add-Ins and make sure you have checked the following additional packages to be installed: 1) Analysis Toolpak; 2) Conditional Sum Wizard; and 3) Lookup Wizard.

Now close Excel.

Now double click on the model, excel should open. If you want to work with the model be sure to select "Enable Macros" and "No" to the question "Open as read only". Now you have a fully operational model ready for changes. If the model contains links to other Excel workbooks it will ask if you want to update these links. Select the appropriate option, e.g. you could choose to have your data in other sheets and then link them to the model and update when necessary.

8 Model Design

Whenever a financial model is considered it is invariably a design question. Through our years of experience we have adopted the following design criteria:

8.1. Modeling Software

Whenever you are faced with a software design consideration it is necessary to choose between various solutions. It could be programmed in some programming language, which could then hide (and protect) calculations from changes. Or, it could be modeled in a spreadsheet format that allows frequent changes in calculations – also by the end user, but is flexible and well known by all office workers.

We have chosen to model in Excel although the model works equally well in Open Office Calc (OOO) (a free alternative to Microsoft Office). Just import the model into OOO and it should work.

The disadvantage is that it is easy to change calculations and therefore to inadvertently destroy its usefulness or render it completely useless. We trust the people in charge of updating the model can do so without changing the basic concept of the model – provided you follow the instructions given in this manual.

Always keep a safe copy of the last model so you can go back to this if applying changes suddenly reveals unexpected results. It is always useful to save different version with a version number or/and an approval date, i.e. Ogun Financial model version 4 Feb. 2008.xls.

8.2. Timeline

A general consideration is the timeline – should you use columns or rows to represent timelines? Considering Excel's ability to "refer" to data in the same column automatically it is evident one should use columns for the timeline – and keep the timeline the same on all sheets, e.g. column D as FY 2006 in all sheets. Otherwise, some calculations would not show the expected results!

You will be well advised to always adopt this principle whenever you develop a model in Excel.

8.3. Demand or Production Driven Model

In a utility where all customers have meters and all production is metered it would be a requirement to have a demand driven model. In this the order of calculation would be:

1) Calculate demand, including peak hour demands etc, for all your customers
2) Calculate the necessary production to service this demand, including the use of reservoirs etc.
3) Based on this calculate all production costs (electricity, chemicals, staff etc.)
4) Calculate all overheads and other items
5) Develop the reports (outputs)

However, this is far from the reality in most developing countries so the model used in Nigeria has the following, general features:

1) Calculate number of customers and bills separately as most customers are not metered and receive a fixed, monthly bill
2) Calculate production levels based on the design capacity and utilization of this design as normally the utility will produce the maximum possible in the existing situation with economic shortcomings etc.
3) Based on this calculate all production costs (electricity, chemicals, staff etc.)
4) Calculate all overheads and other items
5) Develop the reports (outputs)

The switch from a Production to a Demand driven model should be made when production capacity is more than enough to feed customer demand. As the current challenge in Nigeria is to trying to cope only with existing demand and to expand the networks to new customers it is evident that a Production Driven Model is the choice at this point in time.

The existing model can be utilized for both situations but will need some adaptation in the order of calculations of the water production to arrive at a Demand Driven solution.

8.4. Model Overview

When you develop a model then also give some consideration to how to break the financial data into useful input data. It is most common to break the data into two components: 1) the volume (e.g. number of staff, m3 water pumped), and 2) the pricing (e.g. average salary per month, water tariff, etc.). This way you can build your assumptions on activities (expected number of staff, retirements, new hiring, etc.) and not just refer to the method of “let me add 5 % for next year, which is probably right”!

Always try to break the number into its volume and price components so you can actually develop forecasts for each component separately. Continue to break down as needed until you have manageable components, but stop if you know it will not be possible to get timely and reliable data for model updating. Also be sure to adopt the guiding principle: This is a model only! If I can get 85 % of the revenues, costs and cash flow correct I will be satisfied. Develop your model so it addresses the most interesting parts of the economy and those where major changes are about to occur during the coming 5-10 years.

Keep assumptions, calculations and outputs completely separate! In the model this is done by keeping them in separate sheets. For a reader nothing is more irritating and irrational than to study all formulas to find the assumptions used in the model. Furthermore, to change assumptions one would need to change the formulas!

Assumptions/Inputs in the Financial Model are contained in three sheet and these are the main points of reference for updating the model.

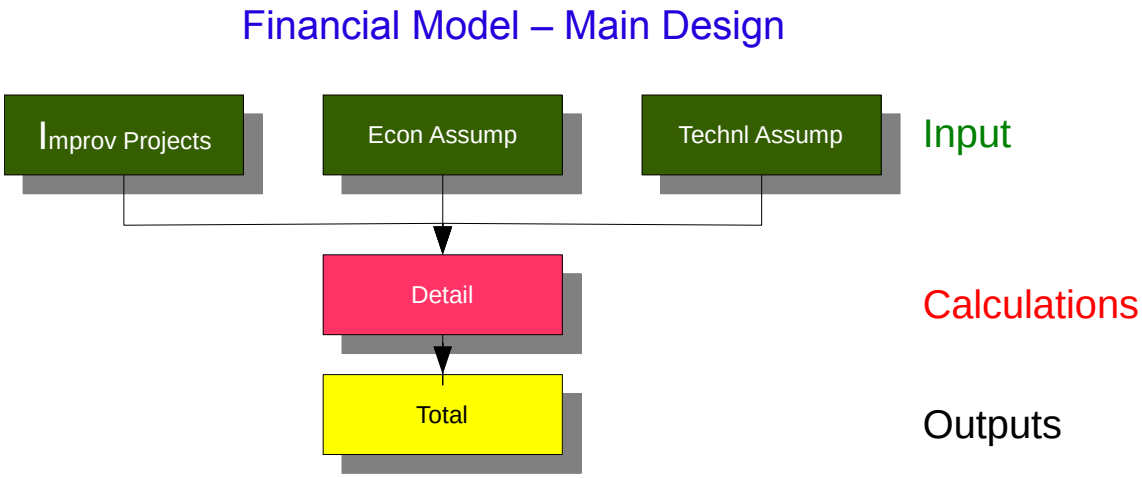

Figure 1: Main Design

Improv Project: All Assumptions/Inputs concerning investments in the Utility – funds from all sources. The inputs are a) the investment program, b) the financing (interest, repayments etc.), and c) the expected impact on your organization. Be sure to model all changes regarding new customer connections, reduction in UFW, new water sources, reduction in staff etc. in this sheet. Please refer to 8.5.1for further details.

Econ Assump: All inputs regarding economic assumptions. Change here all prices, e.g. cost electricity, chemicals, customer tariffs, etc. and inflation figures. Please refer to 8.5.2 for further details.

Technl Assump: All volumetric inputs, e.g. volumes of water pumped, lost, and delivered, number of customer connections, number of staff, etc. Please refer to 8.5.3 for further details.

Detail: This is approximately 450 lines of calculations based on the inputs given in the assumption sheets. Unless you are very sure how to change the model, then DO NOT CHANGE this sheet. Many details are calculated in this sheet – all customer bills, cash collections, water flows etc. and this is the sheet you could use to create your own outputs if you need further detailed reports not contained in the standard edition. Please refer to 8.5.5 for further details.

Total: The main output sheet contains Profit & Loss, Balance Sheet and Cash Flow reports. Do not change this report as it is ready made for printing and requires balancing of assets and liabilities in the Balance Sheet. If you need other reports then please make your own based on this one. You could make a copy of the whole Total sheet and then create your own report from there.

8.4.1 User Interface

When you first open the application and click on the Total sheet you will see something like this:

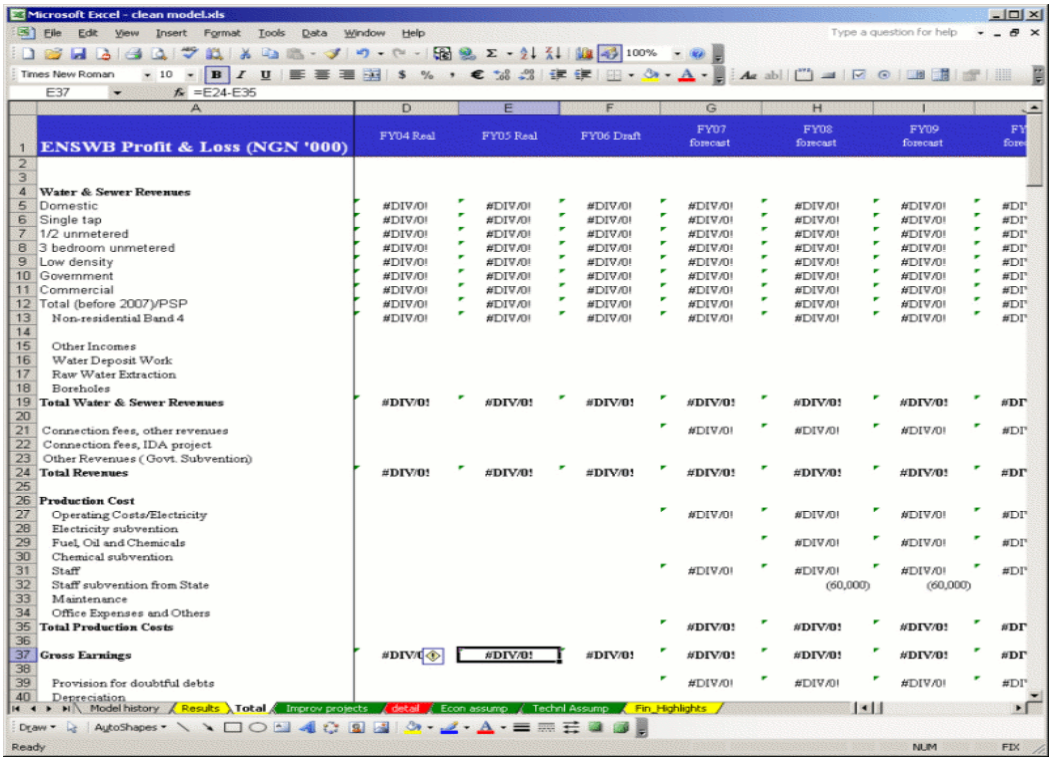

Figure 2: User Interface

The tabs marked in green are the tabs you use to input investments, economic and technical assumptions. The tab in red contains all the calculations necessary to produce the standard report sheets called Total, Fin Highlights and Results. The user interface is standard Excel. Yellow tabs are outputs / reports.

The following chapters detail the three input sheets on a generic model (without data) to explain their functionality. Please refer to chapter 8 for details on how each model is actually implemented in the four states in Nigeria as most have shortcomings based on the availability of data and therefore could have other types of calculations.

8.5. Model Design Details

8.5.1 Improvement Projects

The sheet has three major sections

- Investments
- Investment Financing
- Investment Impact

8.5.1.1 Investments

The bottom 10 lines in “Econ Assumptions” DEFINE up to 10 separate improvement projects that will impact the future of your organization. These 10 projects must include all the foreseen financial and non-financial improvements for the coming 5-10 years. An example is given below:

Figure 3: Definition of improvement projects

Improvement projects				
	ON/OFF	1.00	DEPREC	INVTYPE
1) Own connections	TRUE	ENSWB	2.20%	Water
2) IDA Project Phase 1	TRUE	WB/FGN	2.20%	Water
3) Ida Project Phase II	TRUE	WB/FGN	2.20%	Water
4) Federal / State Projects	TRUE	Federal/State	2.20%	Water
5) Federal Projects	TRUE	Federal 1	2.20%	Water
6) Project 6	TRUE		2.20%	Water
7) Planned, non-financed expansions	TRUE		2.20%	Water
8) Adjust Tariffs to Local Inflation rate from 2008	TRUE		2.20%	Water
9) Project 9	TRUE		2.20%	Water
10) Project 10	TRUE		2.20%	Water

The first column specifies a header/name for that improvement project. Use self-explanatory names, if possible. The next 3 columns specifies 1) whether this project currently is included in the calculations (TRUE=included, FALSE= not included), 2) the financing of this project, 3) the depreciation rate of the possible investments in this project, and 4) the type of asset to be invested in (water, sewer, buildings, etc.).

As can be seen above in this example we have the following projects.

1. Own connections: There are always a certain number of new connections per year when a utility already has an established base. This requires no investments as customers pay for the connections but it is important to model these additions to the customer base.
2. IDA Project phase 1: This is the first phase of the IDA supported project mainly aiming at refurbishments and urgent repairs to restore the capacity of existing systems to their design standard. This project in itself seldom produces more financial returns but it is an important phase to restore customer service levels, confidence and payments to previous levels. Restoring water production has an impact on increased electricity and chemical consumption as well as it should have an impact on customers' willingness to pay for services.
3. IDA Project Phase 2: This is the second phase of the IDA supported program. This phase normally expands the number of service connections and sometimes also increases water production. Thus this phase has an impact on the number of customer connections, electricity consumption, chemicals etc. and should increase the performance of the organization as well (reduction in staff, better billing systems, introduction of a regulator, legal requirements etc.)
4. Federal/State projects: State and federal government sometimes put in investment e.g. to expand coverage. You can model the impact of these activities under this heading.
5. Federal Projects: same as above except there can be different financing terms for item 4 and 5.
6. Project 6: Not defined but can be used in the model if required.
7. Planned, non-financed expansion: Can be used to model the impact of a new investment program not yet financed. This way you can put planned programs in the model and simulate what happens given the expected impact on the organization's financial status.
8. Adjust tariffs…: This is a component to adjust tariffs at some point to an automatic inflationary adjustment. You can use this to model the impact of such a change in tariffs, e.g. when/if a Regulator would allow this.
9. Project 9: Not yet defined but can be used in the model if required.
10. Project 10: Not yet defined but can be used in the model if required.

The idea behind this construction of the projects is that it is possible to include and exclude individual projects in the model. If you chose to include the IDA project they have to be

"TRUE" or "ON" in the model. If you make them "FALSE" or "OFF" they will not be included – neither with their investment program, loan costs, repayments or impacts. This gives you a chance to determine the financial impact of each project and to simulate for the management team situations like what-if analysis.

The way you put a project "ON" or "OFF" is easiest done in the "Results" sheet which is exactly included in the model to help you perform "what if" analysis. The following figure is a screenshot from that sheet:

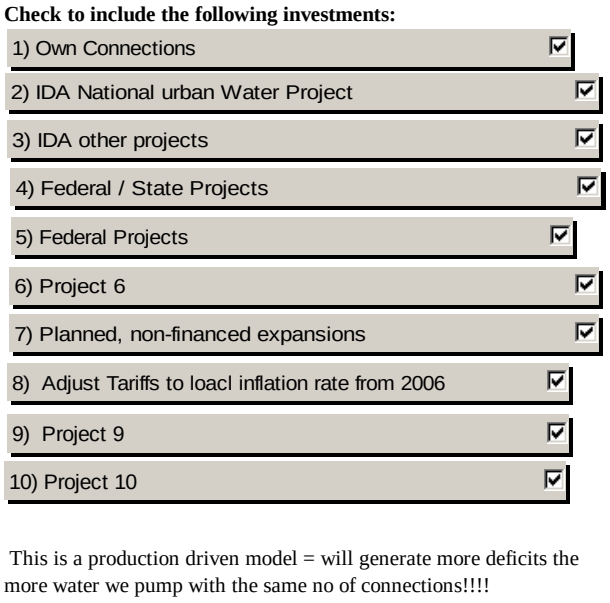

Figure 4: Turning project component on and off

The 10 buttons represent each of the 10 components. If you click on the button it will go ON/OFF automatically and that is all you have to do to simulate the impact of a given component. The above example illustrates all components are "TRUE" that is they are now included in the model.

The Result sheet gives you the yearly difference of the current models cash flow to the Base models cash flow and you can see and analyze the impact this way as well as have a NPV (Net Present Value) calculation for this component presented to you.

After you have defined the components in the improvement project, their financing, depreciation and type, you can now proceed to input the investment program, financing costs and impact in the "Improv Projects" sheet.

The first part of Improv Project sheet contains the investment program in N '000. The following image is a screenshot from that sheet:

ENSWB Investment Program (USD '000)		Unit	FY04 Real	FY05 Real	FY06 Draft	FY07 forecast
Investments						
1) Own connections	1	ENSWB	-	-	-	-
2) IDA Project Phase 1	2	WB/FGN	-	-	-	-
3) Ida Project Phase II	3	WB/FGN	-	-	-	-
4) Federal / State Projects	4	Federal/State	-	-	-	-
5) Federal Projects	5	Federal 1	-	-	-	-
6) Project 6	6	-	-	-	-	-
7) Planned, non-financed expansions	7	-	-	-	-	-
8) Adjust Tariffs to Local Inflation rate from 2008	8	-	-	-	-	-
9) Project 9	9	-	-	-	-	-
10) Project 10	10	-	-	-	-	-
Investment in NGN			-	-	-	-
Acc Investment NGN			-	-	-	-
Projects total USD			-	-	-	-
Acc. Total USD			-	-	-	-

Figure 5: Inputting Investments

You can now input the investments in the correct years for each of the 10 components. BE CAREFUL as you can not just type a number. The formula is something like this:

IF(proj_1,,)

which is a conditional formula. If this project (proj_1 which is the first component) is included then use the investment amount after the first comma or else use the investment amount after the second comma. An example would be:

IF(proj_1,1000000,0)

The above reads: If project one (= proj_1) is TRUE then use an investment amount of N 1,000,000, otherwise use 0. BE SURE to input the investment program for each year like this or it will no longer be possible to make the above mentioned "simulations".

All the investments will then be summarized based on whether the project needs to be included in the calculations or not, as explained above. A summary is also presented in USD based on the conversion ratio presented in the Economic Assumptions sheet..

8.5.1.2 Investment Financing

All investments have to be financed by some party. Be sure to check that the summary of the investment programs equals the summary of the financing for each year. Then you know all the investments are included in the financing schedules. All IDA investments are normally required paid back by the utility or by the State Government, depending on the decisions made in the on-lending agreement between the two parties. This agreement is approved by IDA.

In normal terms there will be 3 issues on IDA financing: 1) a commitment fee paid on the outstanding commitment (not-utilized loan); 2) an interest paid on the outstanding loan amount; and 3) a repayment schedule often after 5 years grace period and over 20 years or so. All this is modeled in the green section of the improvement project sheet.

We have included 4 potential different financing options: 1) Federal/state projects which could have an interest but normally are grants; 2) IDA funds; 3) Other Funds (could be other loan facilities); and 4) own funds from the utility itself. The summary is prepared based on the financing decisions in the economic sheet as explained above. As an example you will see the following formula in the IDA disbursement calculation:

$C$28*(SUMIF($C$4:$C$14,"WB/FGN",D4:D14)+SUMIF($C$4:$C$14,"WB",D4:D14))

This formula says: If a project component is financed by WB/FGN then let IDA pay for the percentage defined in C28 (in this case 85% of the disbursement). Add any projects fully paid by IDA, where the financing part is WB only (sometimes IDA will pay 100 % of a project component). NOTE that the formula looks for the definition "WB/FGN" so if you change it this formula will not recognize the change unless you change the formula yourself!

The two percentages defined under federal/State projects and IDA disbursements (in this case 15% and 85%) MUST sum up to 100%, otherwise the summary of investments and finance will not balance!

The formula for OWN investments in this case reads:

$C$35*(SUMIF($C$4:$C$14,"OGSWC",D4:D14))
+0.3*(SUMIF($C$4:$C$14,"OGSWC/FGN",D4:D14))

which says: If financing is defined as "OGSWC" then use the percentage in C35 (100%) to calculate the cash flow for the utility and add 30% of any project financed in combination by "OGSWC/FGN".

It is extremely important to know how these calculations work and how you change them. You need to FULLY understand this item as explained above before you can change the project subcomponent definitions.

The following image gives an overview of the financing calculations:

Investment Program Financing				
Federal / State disbursed projects	15%	-	-	-
Federal / State Acc. Disbursed projects		-	-	-
Federal / State Commitment/Undisbursed		-	-	-
Federal / State Repayment(5 y grace, 15 y)	15			
Federal / State Outstanding Loan				
Federal / State Interest %	0.0%	-	-	-
			-	
IDA Disbursements	85.00%	-	-	-
IDA Acc disbursements		-	-	-
IDA Commitment / Undisbursed		-	-	-
IDA repayment 20 years (IDA 5 y grace, 5% p.a. 15 y)	15			-
IDA outstanding loan		-	-	-
IDA Interest 0.75 %	1.25%	-	-	-
OTHER FUND Disbursements	100.00%	-	-	-
OTHER FUND Acc disbursements		-	-	-
OTHER FUND Commitment / Undisbursed	-	-	-	-
OTHER FUND repayment 20 years	20			
OTHER FUND outstanding loan		-	-	-
OTHER FUND Interest 5 %	5%	-	-	-
			-	
KSWB Disbursements	100.00%	-	-	-
KSWB Acc disbursements		-	-	-
KSWB Commitment / Undisbursed	-	-	-	-
KSWB repayment 20 years	-			
KSWB outstanding loan		-	-	-
KSWB Interest 5 %	0%	-	-	-
				-
SUMMARY				
Disbursements, total		-	-	-
Outstanding loans, total		-	-	-
Loan disbursement, total			-	-
KS disbursements, total		-	-	-
KS Financing		-	-	-
Financing, total		-	-	-
Repayments		-	-	-
Repayments, accumulated		-	-	-
Interests, total		-	-	-

Figure 6: Inputting investment financing

8.5.1.3 Program Impact

Each improvement project should have an IMPACT. Unless there is an impact what would be the reason to carry out that project?

We have already explained two impacts:

1. The investment will result in an increased asset portfolio and this will be depreciated over time having an impact on the profit & loss account
2. The financing part will have an impact on interest costs and cash flow as repayments materialize

The third kinds of impacts are on the operation of the utility and one could think of any number of possible scenarios and sorts of impact.

We tend to think in processes and would like to draw attention to the water production process as it is seen from beginning to end. One way of describing this is through the following image:

The model reflects all these points in its design. It is therefore also possible to change all

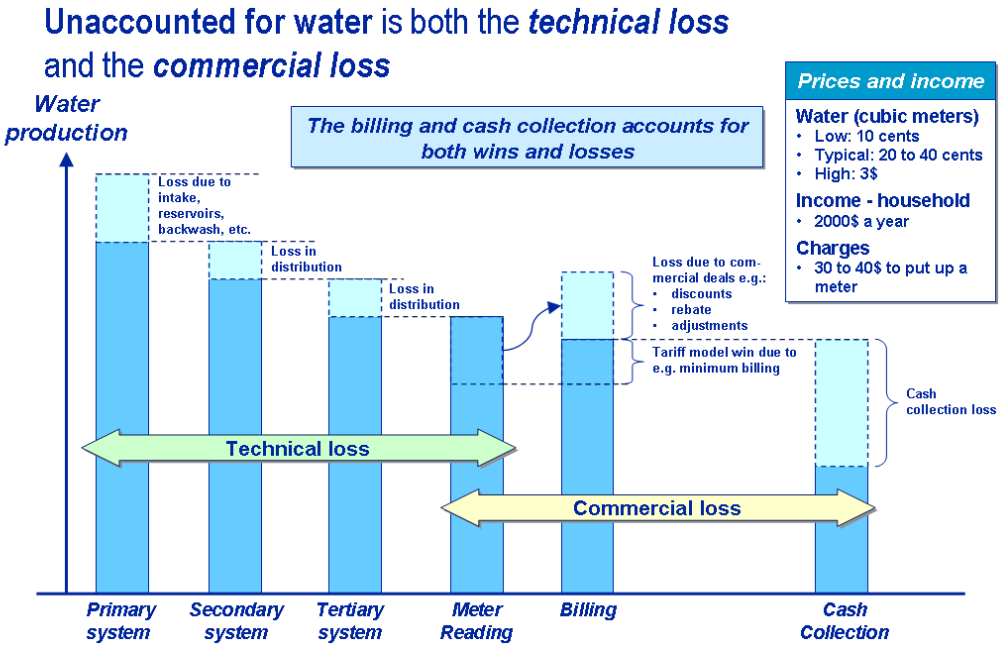

Figure 7: Production and losses overview

these parameters through the IMPACT inputs of the investment programs, e.g. water production, water losses, and commercial losses like billing and collection efficiency.

8.5.1.4 Impact Customer Connections

The most common impacts are ready modeled for you to use. The next sections will walk you through their use but it is important to understand how data should be input. We will start with customer connections as an example:

Investment program Impact					
Customer base					
Additional Water Connections					
1) Own connections	1	TRUE		#DIV/0!	#DIV/0!
2) IDA Project Phase 1	2	TRUE			
3) Ida Project Phase II	3	TRUE			
4) Federal / State Projects	4	TRUE	-	#DIV/0!	#DIV/0!
5) Federal Projects	5	TRUE			
6) Project 6	6	TRUE			
7) Planned, non-financed expansions	7	TRUE			
8) Adjust Tariffs to Local Inflation rate from 2008	8	TRUE			
9) Project 9	9	TRUE			
10) Project 10	10	TRUE			
Increase in water connections			-	**#DIV/0!**	**#DIV/0!**

Figure 8: Impact – customer connections

Again you see the 10 different projects on their own lines in the model. The idea is that you input, for each, the number of new connections in the correct year as this is estimated by the design engineers. For example, you could expect the IDA phase II project to contribute another 2,000 connections, when completed. Put this number in the correct column, which would be the first year this would have revenue impact. The additional connections will only be counted when that project is TRUE as defined in the Results sheet.

The same is true for all the other impacts defined.

8.5.1.5 Impact Sewer Connections

In this you would input the number of new sewer connections:

Additional Sewer Connections					
1) Own connections	1	TRUE			
2) IDA Project Phase 1	2	TRUE			
3) Ida Project Phase II	3	TRUE			
4) Federal / State Projects	4	TRUE			
5) Federal Projects	5	TRUE			
6) Project 6	6	TRUE			
7) Planned, non-financed expansions	7	TRUE			
8) Adjust Tariffs to Local Inflation rate from 2008	8	TRUE			
9) Project 9	9	TRUE			
10) Project 10	10	TRUE			
Increase in sewer connections			-	-	-

Figure 9: Impact – sewer connections

8.5.1.6 Impact Unaccounted for Water

Change in unaccounted for water percentage (UFW%) is given in this input. Use a % point to change the UFW%, e.g. to change from 45 % to 35% input -10% in the correct project/column.

8.5.1.7 Impact Increase/Reduction in Staff

Some funds could be available for retrenchment of staff etc. so a special project could address this. You would then use these lines to calculate the reduction in staff. If you input 2% the number of staff would reduce by 2 % with effect from the following year.

Increase / Reduction in no of Staff %					
1) Own connections	1	TRUE			
2) IDA Project Phase 1	2	TRUE			
3) Ida Project Phase II	3	TRUE		-	
4) Federal / State Projects	4	TRUE			
5) Federal Projects	5	TRUE			
6) Project 6	6	TRUE			
7) Planned, non-financed expansions	7	TRUE			
8) Adjust Tariffs to Local Inflation rate from 2008	8	TRUE			
9) Project 9	9	TRUE			
10) Project 10	10	TRUE			
Project reduction staff			**0%**	**0%**	**0%**

Figure 10: Impact - Increase/reduction in number of staff

8.5.1.8 Impact Water Consumption

Water Consumption: Input here the increase or decrease in water consumption by the customers:

Water Consumption					
1) Own connections	1	TRUE			
2) IDA Project Phase 1	2	TRUE			
3) Ida Project Phase II	3	TRUE			
4) Federal / State Projects	4	TRUE			
5) Federal Projects	5	TRUE			
6) Project 6	6	TRUE			
7) Planned, non-financed expansions	7	TRUE			
8) Adjust Tariffs to Local Inflation rate from 2008	8	TRUE			
9) Project 9	9	TRUE			
10) Project 10	10	TRUE			
Project effect on consumption			-	-	-

Figure 11: Impact - water consumption

8.5.1.9 Impact Increase in Water Production

Increase water resources / water production. Specify here the increase in water production in m3 per year:

Water Resource Increase l/s					
1) Own connections	1	TRUE			
2) IDA Project Phase 1	2	TRUE			
3) Ida Project Phase II	3	TRUE			
4) Federal / State Projects	4	TRUE			
5) Federal Projects	5	TRUE			
6) Project 6	6	TRUE			
7) Planned, non-financed expansions	7	TRUE			
8) Adjust Tariffs to Local Inflation rate from 2008	8	TRUE			
9) Project 9	9	TRUE			
10) Project 10	10	TRUE			
Project effect on water resources for pumping			-	-	-

Figure 12: Water resource increase

8.5.1.10 Impact Treatment Capacity Increase

Treatment Capacity Increase: Input here the % point increase/decrease in the overall treatment capacity. Be sure to calculate the effect of possible new water resources.

Treatment Capacity Increase					
1) Own connections	1	TRUE			
2) IDA Project Phase 1	2	TRUE			
3) Ida Project Phase II	3	TRUE			
4) Federal / State Projects	4	TRUE			
5) Federal Projects	5	TRUE			
6) Project 6	6	TRUE			
7) Planned, non-financed expansions	7	TRUE			
8) Adjust Tariffs to Local Inflation rate from 2008	8	TRUE			
9) Project 9	9	TRUE			
10) Project 10	10	TRUE			
Project effect on Treatment Capacity			**0.0%**	**0.0%**	**0.0%**

Figure 13: Impact - Treatment capacity increase

8.5.1.11 Impact Losses in Works

Project on losses at works: Use this to decrease/increase losses at works:

Project effect on losses at works					
1) Own connections	1	TRUE			
2) IDA Project Phase 1	2	TRUE			
3) Ida Project Phase II	3	TRUE			
4) Federal / State Projects	4	TRUE			
5) Federal Projects	5	TRUE			
6) Project 6	6	TRUE			
7) Planned, non-financed expansions	7	TRUE			
8) Adjust Tariffs to Local Inflation rate from 2008	8	TRUE			
9) Project 9	9	TRUE			
10) Project 10	10	TRUE			
Project effect on losses at works			**0.0%**	**0.0%**	**0.0%**

Figure 14: Impact - Water losses at works

You have now successfully modeled the impact of the investment program. Now we just need to model the economic and technical assumptions before you can enjoy the fruits of your work!

8.5.2 Economic Assumptions

Unaccounted For Water %					
1) Own connections	1	TRUE			
2) IDA Project Phase 1	2	TRUE			
3) Ida Project Phase II	3	TRUE			
4) Federal / State Projects	4	TRUE			
5) Federal Projects	5	TRUE			
6) Project 6	6	TRUE			
7) Planned, non-financed expansions	7	TRUE			
8) Adjust Tariffs to Local Inflation rate from 2008	8	TRUE			
9) Project 9	9	TRUE			
10) Project 10	10	TRUE			
Project effect UFW			**0%**	**0%**	**0%**

Figure 15: Unaccounted for water

The economic assumptions contain all changes to economic factors not directly related to water flow or staffing.

The following items are defined in the sheet Econ assump:

Electricity Tariff			
Price per kWh	NGN/kWh	6.60	6.60
Expected tariff increase	%		

Change electricity tariff in N / kWh or/and the expected increase rate in N

Chemical prices in N / kg (this is currently disabled)

Chemicals Costs			
Lime NGN per kg	NGN/kg		-
Chlorine gas NGN per kg	NGN/kg		-
Aluminium sulphate NGN per kg	NGN/kg	65.86	72.45
Chlorine powder NGN per kg	NGN/kg	-	-
HTH NGN per kg	NGN/kg	654.55	720.00

Electricity kWh per pumped m3 water and UFW water %. Use this to specify additional electricity costs beyond what is used in production) or, if you do not know the number of kWh then use an average kWh per m3 pumped water.

Inspecific water costs			
Additional chemical usage	NGN/m3	-	-
Additional electricity usage	kWh/m3	-	-
UfW percentage of distribution	%		0%

8.5.2.1 Residential Tariffs

Tariffs and limits: In some utilities it is common practise to have various bands, e.g. 0-5 m3 and 5-10 m3 per month, and each band has different prices. This is not used in the Nigerian models.

Residential Users Water Tariffs (annual increase)			
Res. band 1 upper limit	m3/mth	-	-
Domestic 1 tariff	NGN/m3	-	-
Res. band 2 upper limit	m3/mth	-	-
Single tap 2 tariff	NGN/m3	-	-
Res. band 3 upper limit	m3/mth	-	-
1/2 tariff	NGN/m3	-	-
3 bedroom tariff	NGN/m3	-	-
Low density	NGN/m3	-	-
Res. basic water charges	NGN/m3	#DIV/0!	#DIV/0!
Res. minimum monthly water consumption	m3/mth	-	-
Res. minimum monthly water charge	NGN/mth	#DIV/0!	#DIV/0!

8.5.2.2 Sewerage Tariffs

In some utilities they have sewerage tariffs. This is not utilized in Nigeria.

Residential Users Sewarage Tariffs			
Res. sewarage tariff	NGN/m3	-	-
Res. sewer percentage of water consumption	%	0%	0%
Res. minimum monthly sewer consumption	m3/mth	-	-
Res. minimum monthly sewer charge	NGN/mth	-	-

8.5.2.3 Other user charges

In some utilities it is practice with fixed charges, e.g. meter reading charges or administrative fees. This is not used in Nigeria.

Residential Users Other Charges			
Res. new water connection fees	NGN	-	-
Res. new water connection deposit	NGN	-	-
Res. new sewer connection fees	NGN	-	-
Res. monthly meter charges	NGN/mth	-	-
Res. disconnection charges	NGN	-	-
Res. illegal connection charges	NGN	-	-
Res. other fees	NGN	-	-

8.5.2.4 Base Tariff calculation

Base tariff is a calculated area – do not touch this part.

Residental Users Base Tariffs			
Res. band 2 base tariff	NGN/mth	-	-
Res. band 3 base tariff	NGN/mth	-	-
Res. band 4 base tariff	NGN/mth	-	-

8.5.2.5 Non-Residential Users

The above was all definitions for residential users. The next few lines define the same for non-residential user, e.g. government, industries, etc. This is not used in Nigeria.

8.5.2.6 Borehole charges

In some utilities it is permitted to charge for the use of private boreholes. This is also so in some parts of Nigeria but these revenues are currently completely negligible and has therefore

not been used in the model:

Borehole Charges			
Borehole new permit, 0 - 400 m3 w/ infrastruct.	NGN	-	-
Borehole renew permit, 0 - 400 m3 w/ infrastruct.	NGN/yr	-	-
Borehole new permit, > 400 m3 w/ infrastruct.	NGN/yr	-	-
Borehole renew permit, > 400 m3 w/ infrastruct.	NGN/yr	-	-
Borehole new permit, 0 - 400 m3 w/o infrastruct.	NGN/yr	-	-
Borehole renew permit, 0 - 400 m3 w/o infrastruct.	NGN/yr	-	-
Borehole new permit, > 400 m3 w/o infrastruct.	NGN/yr	-	-
Borehole renew permit, > 400 m3 w/o infrastruct.	NGN/yr	-	-
Borehole sewer discharge, residential	NGN/m3	-	-
Borehole sewer discharge, non-residential	NGN/m3	-	-

8.5.2.7 Population Statistics

To be able to generate some population statistics you should input here the estimated number of people per connections type. This has no effect on billing – only on statistics:

Persons per household		
Persons per household, res. band 1	0.0	-
Persons per household, res. band 2	0.0	-
Persons per household, res. band 3	0.0	-
Persons per household, res. band 4	0.0	-
Persons per household, res. standpipes	0.0	-
Persons per household, non-res. band 1	0.0	-
Persons per household, non-res. band 2	0.0	-
Persons per household, non-res. band 3	0.0	-
Persons per household, non-res. band 4	0.0	-

8.5.2.8 Bills Issued

There are two factors in the commercial performance. The % of bills issued (the percentage of customers actually receiving a bill) is the first. Model here the impact of changes in the bills issued by changing the % in each group over the years:

Bills Issued			
Bills issued %, res. band 1	%	0%	0%
Bills issued %, res. band 2	%	0%	0%
Bills issued %, res. band 3	%	0%	0%
Bills issued %, res. band 4	%	0%	0%
Bills issued %, res. standpipes	%	0%	0%
Bills issued %, non-res. band 1	%	0%	0%
Bills issued %, non-res. band 2	%	0%	0%
Bills issued %, non-res. band 3	%	0%	0%
Bills issued %, non-res. band 4	%	0%	0%
Bills issued %, boreholes	%	0%	0%

8.5.2.9 Bills Collected

The next one is the % of bills actually collected. Model here the impact on the collection performance by changing the % in each customer group:

Bills Collected			
Bill collection rate %, res. band 1	%	0%	0%
Bill collection rate %, res. band 2	%	0%	0%
Bill collection rate %, res. band 3	%	0%	0%
Bill collection rate %, res. band 4	%	0%	0%
Bill collection rate %, res. standpipes	%	0%	0%
Bill collection rate %, non-res. band 1	%	0%	0%
Bill collection rate %, non-res. band 2	%	0%	0%
Bill collection rate %, non-res. band 3	%	0%	0%
Bill collection rate %, non-res. band 4	%	0%	0%
Bill collection rate %, boreholes	%	0%	0%

8.5.2.10 Depreciation charge of invested capital per type

Input here the depreciation charges for each type of investments

Depreciation charges		
STP depreciation rate	0%	0%
Water depreciation rate	2.2%	2.2%
Other depreciation rate	0%	0%

8.5.2.11 Doubtful debts write off

Input here provision for doubtful debts – the part of the debtors never expected to settle their bills

Provision for doubtful debts		
Provision for doubtful debts %	100%	100%

8.5.2.12 Local and USD price indexes

Local and USD price indexes can be modeled in this section. Play with the local and foreign inflation factors until you get right exchange rate or input the exchange rate manually. Only two items are used in the model: 1) the local inflation rate; and 2) the exchange rate NGN versus USD.

Price Indexes			
Foreign Inflation Rate	%	0.00	1.0%
Foreign Escalation Factor		0.97	0.98
Local Inflation Rate	%	5.00	7.0%
Local Escalation Factor			0.98
Relative Local Escalation Factor			
Exchange Rate NGN/USD		122.000	125.500
Relative USD Escalation Factor			
Local Escalation Factor	0.10		0.98
Relative Local Price Index			
Foreign Price Index	0.01	0.97	0.98
Relative Foreign Price Index			1.01
Exchange Rate NGN/USD	8,600.000	125.500	125.500
NGN / USD last year			122

8.5.2.13 Definition of Improvement Projects

Definition of improvement projects in max 10 types with project number, depreciation charges and investment type. The TRUE/FALSE is controlled in the Results Sheet - do not change it here! Please refer to 8.5.1 for further details on how to use this part.

8.5.3 Technical Assumptions

Use this sheet to change technical data for the number of customer connections, staffing, water flow, treatment flow in the operations

8.5.3.1 Customer Connections

Connection Info			
Water connections			
Number of connections, Domestic	no.	0	#DIV/0!
Number of connections, Single tap	no.	0	#DIV/0!
Number of connections, 1/2 unmetered	no.	0	#DIV/0!
Number of connections, 3 bedroom	no.	0	#DIV/0!
Number of connections, low density	no.	0	#DIV/0!
Number of connections, Government	no.	0	#DIV/0!
Number of connections, Commercial	no.	0	#DIV/0!
Number of connections, PSP	no.		#DIV/0!
Number of connections, non-res. band 4	no.	0	#DIV/0!
Number of boreholes, 0 - 400 m3, w/ infra.	no.	0	#DIV/0!
Number of boreholes, > 400 m3, w/ infra.	no.	0	#DIV/0!
Number of boreholes, 0 - 400 m3, w/o infra.	no.	0	#DIV/0!
Number of boreholes, > 400 m3, w/o infra.	no.	0	#DIV/0!
New water connections	no.		-
Total number of connections		0	#DIV/0!
Water Connection Growth %			#DIV/0!

All connection data for forecasted years are calculated based on current connection statistics and assumed new connections in the improvement projects. The distribution of connections between tariff bands and the water use per band is detailed here and used to calculate billings and water consumption overall in the detail sheet.

8.5.3.2 Connection Distribution

This area is calculated and give you a statistic about how your connections are spread between different customer types.

Connection Distribution			
Percent of connections, domestic	%	0%	0%
Percent of connections, single tap	%	0%	0%
Percent of connections, 1/2 unmetered	%	0%	0%
Percent of connections, 3 bedroom	%	0%	0%
Percent of connections, low density	%	0%	0%
Percent of connections, government	%	0%	0%
Percent of connections, commercial	%	0%	0%
Percent of connections, PSP	%	0%	0%
Percent of connections, non-res. band 4	%	0%	0%
Percent of connections, boreholes, 0 - 400 m3, w/ infra.	%	0%	0%
Percent of connections, boreholes, > 400 m3, w/ infra.	%	0%	0%
Percent of connections, boreholes, 0 - 400 m3, w/o infra.	%	0%	0%
Percent of connections, boreholes, > 400 m3, w/o infra.	%	0%	0%
Totals		*0%*	*0%*

8.5.3.3 Illegal Connections

This is used to implement a known level of illegal connections. This is not used in the Nigerian models!

Illegal Connections			
Percentage illegal, res. band 1	%	0%	0%
Percentage illegal, res. band 2	%	0%	0%
Percentage illegal, res. band 3	%	0%	0%
Percentage illegal, res. band 4	%	0%	0%
Percentage illegal, standpipes	%	0%	0%
Percentage illegal, non-res. band 1	%	0%	0%
Percentage illegal, non-res. band 2	%	0%	0%
Percentage illegal, non-res. band 3	%	0%	0%
Percentage illegal, non-res. band 4	%	0%	0%
Percentage illegal, boreholes, 0 - 400 m3, w/ infra.	%	0%	0%
Percentage illegal, boreholes, > 400 m3, w/ infra.	%	0%	0%
Percentage illegal, boreholes, 0 - 400 m3, w/o infra.	%	0%	0%
Percentage illegal, boreholes, > 400 m3, w/o infra.	%	0%	0%

8.5.3.4 Sewage Connections

Use this to model the number of connections and how their sewage bills relate to the water charges. This is not used in the Nigerian models!

Sewerage connections			
Number of connections		0	0
New sewer connections		-	-
Sewerage connection % of water connections		0%	0%

8.5.3.5 Consumption Distribution

This is a calculated area from the inputted consumption volumes – see below. This is not used in the Nigerian models.

Consumption Distribution			
Billing correction factor	%	0%	0%
Percent of consumption, domestic	%	0.00%	0.00%
Percent of consumption, single tap	%	0.00%	0.00%
Percent of consumption, 1/2 unmetered	%	0.00%	0.00%
Percent of consumption, 3 bedroom	%	0.00%	0.00%
Percent of consumption, low density	%	0.00%	0.00%
Percent of consumption, government	%	0.00%	0.00%
Percent of consumption, commercial	%	0.00%	0.00%
Percent of consumption, PSP	%	0.00%	0.00%
Percent of consumption, non-res. band 4	%	0.00%	0.00%
Totals		*0%*	*0%*

8.5.3.6 Consumption Volumes

Use this area to input known volumes of water distributed to the different types of customers. This is only useful in a demand driven model (where we produce to demand but not more) and not implemented in the Nigerian models!

Comsumption Volume			
Water consumption, domestic	l/c/d	-	#DIV/0!
Water consumption, single tap	l/c/d	-	#DIV/0!
Water consumption, 1/2 unmetered	l/c/d	-	#DIV/0!
Water consumption, 3 bedroom	l/c/d	-	#DIV/0!
Water consumption, low density	l/c/d	-	#DIV/0!
Water consumption, government	l/c/d	-	#DIV/0!
Water consumption, commercial	l/c/d	-	#DIV/0!
Water consumption, PSP	l/c/d	-	#DIV/0!
Water consumption, non-res. band 4	l/c/d	-	#DIV/0!
Total consumption	m3/yr	-	-

8.5.3.7 Technical System – Water Production

The following is used to input the whole production chain, including kWh and maintenance costs associated with production. Start from the design capacity, then calculate the utilization % and the UFW % (defined in Econ Assump sheet.

Technical system

(enter prices excl. VAT)

Installed Treatment Capacity			-
Utilized Treatment Capacity			0.0%
Losses at works			0.0%
O Feeder Lines Intakes			
Feeder 1 Intake Volume of water pumped	m3/y	-	-
Feeder Intakes Electricity Usage	kWh/y		#DIV/0!
Feeder Intakes Loss on Feeder Line	%	0.0%	0.0%
Feeder 1 Amount delivered to WTP	m3/y	-	-
Feeder Intakes Maintainance costs	NGN/y	-	-
O-o Water Treatment Plant			
WTP Amount received from sources	m3/y	-	-
WTP Electricity Usage	kWh/y		
WTP % used for backwash	%	0.0%	0.0%
WTP other losses	%		0.0%
WTP HTH useage	kg/m3		0.0000000000
WTP Aluminium Sulphate useage	kg/m3		0.0000000000
WTP Chlorine useage	kg/m3		0.0000
WTP Amount transferred to distribution	m3/y	-	-
WTP Maintainence costs	NGN/y	-	-
O-o-o Distribution System			
Distribution loss	%	-	0%
Distribution Amount received from WTP	m3/y	-	-
Unaccounted for Water	%	0%	0%
Distribution Electricity Usage	kWh/y	-	-
Distribution Amount distributed	m3/y	-	-
Distribution Maintainance costs	NGN/y		

8.5.3.8 Personnel and Personnel Costs

Use the following area to calculate staff costs. It is possible to input 3 groups of staff with different average salary levels per year per employee. Personnel redundancy is calculated based on your input in the Improv Projects sheet.

Personnel			
Direct Personnel			
Direct Personnel Number of Staff			0
Direct Personnel Redundancy	%	0.0%	2.0%
Direct Personnel Average Salary	NGN/mth	#DIV/0!	#DIV/0!
Direct Personnel Salary Increase	%		7.0%
Direct Personnel Other Payments	NGN/y /empl	-	-
Direct Personnel Bonuses and Incentives	NGN/y /empl	-	-
STP Personnel			
STP Number of staff		0	0
STP Redundancy	%	0.00%	0.0%
STP Personnel Average Salary	NGN/mth	0	0
STP Personnel Salary Increase	%	0.0%	0.0%
STP Personnel Other Payments	NGN/y/empl	-	-
STP Personnel Bonuses and Incentives	NGN/y/empl	-	-
Indirect Personnel			
Network and Administration		0	-
Indirect Personnel Redundancy	%	0%	0.0%
Monthly salary, avg.	NGN/mth	0	0
Indirect Personnel Salary Increase	%	0%	0.0%
Indirect Personnel Other Payments	NGN/y/empl	-	-
Indirect Personnel Bonuses and Incentives	NGN/y/empl	-	-

8.5.3.9 Other Overhead Costs (OHP)

Use this area to input other types of costs not directly linked to the production, e.g. consultancies, fuel, office expenses and management costs. Remember to input also stipulated increase in these costs.

Other OHP			
Consultancy Fees	NGN/y	-	-
Fuels	NGN/y		
Office Expenses	NGN/y		
Stationeries	NGN/y	-	-
Other Admin. Cost	NGN/y		
Management Group 1 No of Staff	no.	-	-
Management Group 1 Avg. Salary	NGN/y	-	-
Management Group 1 Salary Increase		0%	0.0%
Management Group 2 No of Staff	no.	-	-
Management Group 2 Avg. Salary	NGN/y	-	-
Management Group 2 Salary Increase		10%	10.0%

8.5.4 Calculations – the Detail Sheet

The Detail sheet contains a very long list of calculations based on the inputs given in the Improvement Project, Economic Assumptions and Technical Assumptions sheets. Only for specific purposes and only to implement changes in the models dynamic calculations should you change anything in the detail sheet.

8.5.4.1 Demand Calculations

The first 260 lines of the calculations are used to for all customer calculations. The following figure specifies the amount information on each customer group as specified in the Technical

Assump sheet. The following details the calculations on the Domestic type of connections:

	Demand Calculations				
1 Domestic					
	No of connections			0	#DIV/0!
	No of people/household			0.0	0.0
	Cons., res. band 1, m3/month/conn			**-**	**#DIV/0!**
	Total cons, res. band 1, m3/month			**-**	**#DIV/0!**
	Average water tariff / household	NGN/month		-	**#DIV/0!**
	Average sewerage tariff / household	NGN/month		-	#DIV/0!
	Total avg. tariff incl. service charge / household	NGN/month	#DIV/0!		#DIV/0!
	Percentage Bills Issued	%		0%	0%
	Percentage Bills Collected (% of issued)	%		0%	0%
	Billed Revenues, res. band 1	/ month	#DIV/0!		#DIV/0!
	Billed Revenues, res. band 1	/ year	#DIV/0!		#DIV/0!
	Cash Revenues, res. band 1	/ month	#DIV/0!		#DIV/0!
	Cash Revenues, res. band 1	/ year	#DIV/0!		#DIV/0!
	- hereof Revenue from sewerage	/ month	#DIV/0!		#DIV/0!
	- hereof Revenue from sewerage	/ year	#DIV/0!		#DIV/0!
	Estimated Total Billed Cons., res. band 1, m3	m3 / month		**-**	**#DIV/0!**
	Estimated Total Produced Cons., res. band 1, m3	m3 / month		**-**	**#DIV/0!**

All inputs are taken from the three input sheet – econ assump, techn assump. and improv projects sheets. There should be no need to change any of these calculations unless you change your tariff model, e.g. goes from flat rates to metered rates or introduces fixed fees on the bills.

Note that the calculations are on revenues, cash collection, m3 consumptions and split between water and sewerage revenues as this is a most common wish.

The last part contains a summary of all groups that is used for reporting and control purposes.

8.5.4.2 Production and Water Flow Calculations

The following part of the detail sheet contains all calculations regarding water production, losses, chemical, power consumption and maintenance costs.

The first part is purely on water production as the following figure illustrates:

ENSWC Water Flow

	Billed Consumption			0	#DIV/0!
	UfW			0%	0%
	Final Known Volume Produced			0	#DIV/0!
1.0	**INTAKES**				
	Feeder Lines Intakes				
	Volume of water pumped		m3 / year	-	-
	Electricity used		kWh/y	-	#DIV/0!
	Loss on Feeder Line		%	0%	0%
	Volume of water loss on Feeder Line		%	0	0
	Volume of water Delivered to WTP		m3 / year	-	-
2.0	**WATER TREATMENT**				
	Water Treatment Plant				
	Received Water m3		m3 / year	-	-
	Electricity used		kWh/y	-	-
		HTH	kg/m3	0.00000000	0.0000
		Aluminium sulphate	kg/m3	0.00000000	0.00000
		Chlorine gas	kg/m3	0.000000000	0.00000
	Own use / Backwash (% of received)		%	0%	0%
	Quantity used for processing		m3 / year	0	0
	Other losses in treatment process (% of received)		%	0%	0%
	Quantity loss in treatment process		m3 / year	0	0
	Quantity transferred to distribution systems		m3 / year	0	0
3.0	**DISTRIBUTION SYSTEM (Treated Water)**				
	Distribution system				
	Received water		m3	0	0
	Electricity used		kWh/y	-	-
	Loss in trans from Treatment		%	0%	0%
	Loss in trans from Treatment		m3 / year	0	0
	Produced water		m3 / year	0	0
	Produced water minus UfW		m3 / year	0	0
				#DIV/0!	#DIV/0!

8.5.4.3 Operational Costs

The following part contains all the calculations on cost of production excluding depreciations. It is summarized in 3 groups for Electricity, Fuel, Oil and Chemicals, and Maintenance.

The following details the information and calculations given:

OPERATIONAL COSTS				
Electricity				
	Feeder Lines Intakes	kWh/y	0	#DIV/0!
	Water Treatment Plant	kWh/y	0	0
	Distribution system	kWh/y	0	0
	Additional Electricity usage	kWh/y	0	0
	Rate	NGN/kWh	6.60	6.60
	Cost of Electricity	NGN/y	**0**	**#DIV/0!**
Fuel, oil and chemicals				
	HTH	kg/y	-	-
	Aluminium Sulphate	kg/y	0	0
	Chlorine Gas	kg/y	0	0
	Cost of Lime	NGN/kg	0.00	0.00
	Cost of Aluminium Sulphate	NGN/kg	65.86	72.45
	Cost of Chlorine Gas	NGN/kg	0.00	0.00
	Additional Chemical Usage	NGN/y		
	Cost of Oil, Fuel and Chemicals	**NGN/y**	**0**	**0**
Maintenance				
	Feeder Lines Intakes	NGN/y	0	0
	Water Treatment Plant	NGN/y	0	0
	Distribution system	NGN/y	0	0
	Other	NGN/y	0	0
	Cost of Maintenance	**NGN/y**	**0**	**0**

8.5.4.4 Personnel and Other Overhead Costs

The following calculations are for calculations the costs of the various salary groups as defined in the tech assump sheet.

After that, you have the calculation of other overhead costs also based on the information given in the techn assump sheet.

The following figure is a screenshot of this part of the detail sheet:

Personnel					
Direct personnel	no.		0		0
Direct Personnel Average Salary	NGN/y/empl	#DIV/0!		#DIV/0!	
Direct Personnel Other Payments	NGN/y		0		0
Direct Personnel Bonuses and Incentives	NGN/y		0		0
Sewage Plant Personnel	no.		0		0
Sewage Plant Personnel Average Salary	NGN/y/empl		0		0
Sewage Plant Personnel Other Payments	NGN/y		0		0
Sewage Plant Personnel Bonuses and Incentives	NGN/y		0		0
Direct Personnel Costs	**NGN/y**	**#DIV/0!**		**#DIV/0!**	
				#DIV/0!	
Indirect Personnel				#DIV/0!	
Network and Administration	no.		0		0
Average Salary	NGN/y		0		0
Management Group 1	no.		0		0
Management Group 1 avg. Salary	NGN/y		0		0
Management Group 2	no.		0		0
Management Group 2 avg. Salary	NGN/y		0		0
Indirect Personnel Costs	**NGN/y**		**0**		**0**
Personnel per 1000 connections		#DIV/0!		#DIV/0!	
Other OHP					
Consultancy Fees	NGN/y		0		0
Fuels	NGN/y		0		0
Office Expenses	NGN/y		0		0
Stationeries	NGN/y		0		0
Other Admin. Cost	NGN/y		0		0
Other OHP Costs	NGN/y		**0**		**0**

8.5.4.5 Investment and Depreciation Calculations

The following is the calculations regarding depreciation, both current and on the new assets acquired through the Improvement Projects. Assets will be grouped into Sewage (STP), Water and Other assets and calculations done on each group according to the depreciation percentages given in the Econ Assump sheet.

The following is a screenshot of the calculations:

Depreciation			
STP investments	STP	0	0
STP accumulated investment	STP		0
STP Depreciation			0
STP accumulated depreciation			0
Other investments	Other	0	0
Other accumulated investments		0	0
Other Depreciation			0
Other accumulated depreciation			0
Water investments	Water	0	0
Water accumulated investments		0	0
Water Depreciation			0
Water accumulated depreciaiton			0
Other depreciation			0
Total Depreciation		**0**	**0**

We have now reached the end of the inputs and calculations – next are the reports!

8.5.5 Outputs

There are three main standard outputs in the model as it is defined today:

1. Total sheet: This sheet contains Profit and Loss, Balance Sheet and Cash Flow forecasts. These 3 items must balance with each other so please abstain from changing any calculations in here. If you want to make your own you can start by copying the whole sheet and then "practice" on the copy.
2. Fin Highlights sheet: This sheet is a "mini" report containing both financial and technical data. If a utility finds it do not want to use the financial mode then this is the sheet they should update on a regular basis. A good exercise would be to include it in the Management Information System on a monthly or tri-monthly basis.
3. Results Sheet: This sheet is special as it is a tool to control a) which project components should be included in the calculations (what if analysis), and b) it is a place where you can summarize differences between a scenario and a "base case" scenario. This enables the user to test various scenarios and advice his management team of the expected financial impacts of given plans or decisions.

9 Updating the model

9.1. Recommended Updating Process

Whenever the model is updated we recommend you follow the following procedure:

1) Collected available information on sales, customer connections and produced water
2) Collect information on costs (electricity, kWh, chemical use, maintenance, staff and subsidies)
3) Collect information on other costs
4) Analyze the data for consistency
5) Check the data against the model and determine if there is a need to change the model to calculate closer to the real data
6) Change the model in the places you need according to 5 above
7) Input the real data in the correct columns in the Total sheet as well as in the relevant input sheet for investments, economic and technical assumptions.
8) Check the results thoroughly
9) Write the updated management paper to explain the forecasts (draft included on the CD-Rom)
10) Discuss the results with management
11) Change assumptions if management believe they should be different
12) Correct the paper again

and you are done.

9.2. Data Needs

Some utilities are well organized with data and others are not. This financial model is designed to cope with even large utilities (like Lagos Water Corporation) and still be a useful tool.

When you look for data in the organization you should organize them as follows:

9.2.1 Needed Production Data

Although most utilities in the developing world do not have production meters installed the production department does have a feel for what is happening. Some raw water abstractions can be done by measuring pumping hours etc. When this is the only thing we have then we have to use that data, but be critical! If the Unaccounted for Water percentage is purely guesswork, then there is no reason to communicate is as if it was a fact! It is not a fact until we have measured what happens in the system!

Ideally, we would like to see the design capacity, plant utilization factor, current production levels and customer consumption – as accurate as we can do it. Try to get this type of data per financial year as we have to create a connection to the financial results for each year.

9.2.2 Needed Customer Data

You would like to know:

a) Total number of connections and how this has developed over the past 2-3 years. If there are many new customers then try to separate the additions into NATURAL add-ons and PROJECT add-ons.

b) Get the tariffs for the last 2-3 years. Make a note on customer groupings and how they are rated.

c) Get some billing statistics for these years, preferably for the same customer groups as you see in the gazetted tariff. Make a note of where the large revenue base and consumer groups are in this picture. Try to group the customers into the most important and a summary of all the others, e.g. tanker points etc. not so important in financial terms, that is!

9.2.3 Put the Revenue Data Together

Try to get create yourself a nice little table like the following:

District	(All)
Metered	(Multiple Items)
Tariff Category	(All)

		Data						
Year	Type	Sum m3	Sum Connections	% of Connections	Sum of Billing	% of Billing	Sum of Consumption m3	% of Consumption m3_2
2006	Domestic	1,168,217	4,185	4.58%	24,532,557	3.04%	1,168,217	1.55%
	Single Tap	10,346,880	43,112	47.15%	217,284,480	26.91%	10,346,880	13.71%
	1/2 Bedrooms	5,676,722	19,023	20.80%	100,652,874	12.47%	5,676,722	7.52%
	3 Bedrooms	7,618,388	10,824	11.84%	90,096,972	11.16%	7,618,388	10.10%
	Low Density	12,284,243	9,835	10.76%	257,969,103	31.95%	12,284,243	16.28%
	Government	1,156,475	1,976	2.16%	40,476,625	5.01%	1,156,475	1.53%
	Commercial	34,219,458	2,124	2.32%	55,362,090	6.86%	34,219,458	45.34%
	PSP	2,994,455	356	0.39%	20,972,345	2.60%	2,994,455	3.97%
2006 Total		75,464,838	91,435	100.00%	807,347,046	100.00%	75,464,838	100.00%
Grand Total		75,464,838	91,435	100.00%	807,347,046	100.00%	75,464,838	100.00%

Figure 16: Sample Revenue Statistics

Now, this is your reference point – try to keep this data updated on a regular basis, i.e. monthly or quarterly. If you have this you have 50 % of your inputs!

9.2.4 Staff Costs

Get the current staff strength from the personnel department. Make a difference (minimum) between contracted and casual labor and try to get the average salaries in these two group for the last 2-3 years. Reconcile this with the information in the official financial reports. Now create the input for the model based on this.

9.2.5 Electricity

Another large cost is electricity. You will need the number of kWh (kilowatt-hours) consumed the last 2-3 years. This is an important measurement as an increase in kWh means

we are using more and more power per m3 pumped water. This is a ratio to keep an eye on from the management team.

Now reconcile the kWh with the electricity costs in the last 2-3 year's financial reports. Calculate the price per kWh and see if it makes sense. Normally, the electricity costs are billed as a kWh charge and a fixed charge for the installed electrical capacity so a little variation is OK. Large variations needs to be explained as probably the statistics you have might be erroneous.

9.2.6 Maintenance

Usually the cost of maintenance is vary low compared to what is needed to keep all equipment working at design capacity. Analyze the maintenance costs inth financial reports and see how they are calculated. It is not unusual that maintenance only contains external costs (spare parts etc.) but not labor costs when the utility does the work themselves. It is important to consider how these costs should develop when new projects add to the invested capital so give some thought to the development of this costs in the future.

9.2.7 Other Costs and Revenues

These can vary as some utilities receive Government Subsidies, others have financing costs of old loans etc. If these costs are substantial you should develop separate calculations for these and try to fit them in other areas of the model, e.g. in the overhead costs. This way you only need to change the headings in the reports and input sheets but not the calculations.

10 Implementation of the Financial Model

The following sections present the actual financial models for four water utilities in Nigeria. In each case, the necessary adjustments were made in order to allow for local modalities and the availability of the necessary data.

10.1. Financial Model for Kaduna Water Board (KSWB)

The current model is version 11 which contains some update on errors in currency calculations on the investment program compared to version 10. Version 10 was the version delivered on mission in May 2007. Main conclusions are unchanged from version 10 to 11.

10.1.1 Timeline and Updating Audited data

The timeline for KSWB was updated with real numbers from FY04 and FY05 so the timeline is now changed to:

KSWB Profit & Loss (NGN '000)	FY03 Audited	FY04 audited	FY05 Audited	FY06 forecast

After checking for any inconsistencies the audited data were entered in the Total Sheet. Investments were behind expectations so the investment program was changed, too.

10.1.2 Revenues

A new set of customer data were given from the commercial department. The real customer data were updated in the technical assumption sheet as follows:

Connection Info					
Water connections					
Number of connections, Domestic	no.	0	0	0	0
Number of connections, Single tap	no.	0	0	0	0
Number of connections, 1/2 unmetered	no.	0	0	0	0
Number of connections, 3 bedroom	no.	0	0	0	0
Number of connections, low density	no.	0	0	0	0
Number of connections, Government	no.	0	0	0	0
Number of connections, Commercial	no.	0	0	0	0
Number of connections, PSP	no.	56,000	89,000	90,000	91,780
Number of connections, non-res. band 4	no.	0	0	0	0
Number of boreholes, 0 - 400 m3, w/ infra.	no.	0	0	0	0
Number of boreholes, > 400 m3, w/ infra.	no.	0	0	0	0
Number of boreholes, 0 - 400 m3, w/o infra.	no.	0	0	0	0
Number of boreholes, > 400 m3, w/o infra.	no.	0	0	0	0
New water connections	no.		1,000	1,780	1,800
Total number of connections		56,000	89,000	90,000	91,780
Water Connection Growth %			58.93%	1.12%	1.98%

As can be seen we have no customer statistics for FY03 – FY05 but we summarized current statistics in a separate workbook called "Customer connection 2004 to 2006" from where a pivot table produced the following result:

		Year	Metered								
		2004		2004 Total	2005		2005 Total	2006		2006 Total	Grand Total
Type	Data	No	Yes		No	Yes		No	Yes		
Commercial	Sum m3	585,888	171,373	757,261	455,745	109,521	565,266	623,016	133,402	756,418	2,078,945
	Sum Connections	1,436	460	1,896	1,484	463	1,947	1,527	469	1,996	5,839
	% of Connections	1.66%	19.61%	2.13%	1.69%	19.04%	2.16%	1.72%	17.85%	2.18%	2.16%
	Estimated Billing	41,012,160	11,996,110	53,008,270	31,902,150	7,666,470	39,568,620	43,611,120	9,338,140	52,949,260	145,526,150
	Sum of Billing	5.57%	8.63%	6.05%	4.30%	1.65%	3.28%	1.40%	23.76%	1.68%	2.78%
Domestic	Sum m3	31,466,055	366,558	31,832,613	35,709,230	1,427,237	37,136,467	36,474,473	619,977	37,094,450	106,063,530
	Sum Connections	82,924	1,637	84,561	83,989	1,679	85,668	85,163	1,816	86,979	257,208
	% of Connections	95.86%	69.78%	95.17%	95.90%	69.04%	95.17%	95.90%	69.13%	95.13%	95.16%
	Estimated Billing	642,808,467	7,697,718	650,506,185	662,732,070	29,971,977	692,704,047	677,516,469	13,019,517	690,535,986	2,033,746,218
	Sum of Billing	87.27%	5.54%	74.30%	89.40%	6.47%	57.50%	21.80%	33.13%	21.94%	38.90%
Industrial	Sum m3	0	1,502,049	1,502,049		5,323,866	5,323,866	33,428,571	34,469	33,463,040	40,288,955
	Sum Connections	79	10	89	39	50	89	39	89	128	306
	% of Connections	0.09%	0.43%	0.10%	0.04%	2.06%	0.10%	0.04%	3.39%	0.14%	0.11%
	Estimated Billing	0	105,143,430	105,143,430	0	372,670,620	372,670,620	2,340,000,000	2,412,830	2,342,412,830	2,820,226,880
	Sum of Billing	0.00%	75.67%	12.01%	0.00%	80.41%	30.93%	75.29%	6.14%	74.42%	53.95%
Institutions	Sum m3	738,888	403,272	1,142,160	740,112	1,510,415	2,250,527	742,560	413,915	1,156,475	4,549,162
	Sum Connections	1,811	142	1,953	1,814	156	1,970	1,820	156	1,976	5,899
	% of Connections	2.09%	6.05%	2.20%	2.07%	6.41%	2.19%	2.05%	5.94%	2.16%	2.18%
	Estimated Billing	25,861,080	14,114,520	39,975,600	25,903,920	52,864,525	78,768,445	25,989,600	14,487,025	40,476,625	159,220,670
	Sum of Billing	3.51%	10.16%	4.57%	3.49%	11.41%	6.54%	0.84%	36.86%	1.29%	3.05%
PSP	Sum m3	2,988,000	0	2,988,000	2,964,000	1,094	2,965,094	2,988,000	6,335	2,994,335	8,947,429
	Sum Connections	249	95	344	247	82	329	249	95	344	1,017
	% of Connections	0.29%	4.05%	0.39%	0.28%	3.37%	0.37%	0.28%	3.62%	0.38%	0.38%
	Estimated Billing	20,916,000	0	20,916,000	20,748,000	7,658	20,755,658	20,916,000	44,345	20,960,345	62,632,003
	Sum of Billing	2.84%	0.00%	2.39%	2.80%	0.00%	1.72%	0.67%	0.11%	0.67%	1.20%
Tanker	Sum m3	60,000		60,000		2,872	2,872	120		120	62,992
	Sum Connections	5	2	7	10	2	12	10	2	12	31
	% of Connections	0.01%	0.09%	0.01%	0.01%	0.08%	0.01%	0.01%	0.08%	0.01%	0.01%
	Estimated Billing	6,000,000	0	6,000,000	0	287,200	287,200	12,000	0	12,000	6,299,200
	Sum of Billing	0.81%	0.00%	0.69%	0.00%	0.06%	0.02%	0.00%	0.00%	0.00%	0.12%
Total Sum m3		35,838,831	2,443,252	38,282,083	39,869,087	8,375,005	48,244,092	74,256,740	1,208,098	75,464,838	161,991,013
Total Sum Connections		86,504	2,346	88,850	87,583	2,432	90,015	88,808	2,627	91,435	270,300
Total % of Connections		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Total Estimated Billing		736,597,707	138,951,778	875,549,485	741,286,140	463,468,450	1,204,754,590	3,108,045,189	39,301,857	3,147,347,046	5,227,651,121
Total Sum of Billing		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

KSWB should keep this data updated as it is essential to understand the nature of the customer base.

This information was then utilized to structure new tariff calculations in the model so it now is implemented as follows:

1) Customers are grouped according to the above table
2) For each group an average bill per household was generated and reconciled to audited accounts / draft accounts
3) The formula for revenue generation was then changed to only being no of connections in a group x average billing in that group
4) The revenue was not reduced by a factor for non-billing as the statistic only includes customers that actually received bills
5) A collection ration of 65 % was applied as it is expected to be currently

Because of the current dire situation in water delivery and the time it will take make the necessary improvements we do not expect major changes in the collection ratio before the end of the project.

10.1.3 Costs

The installed treatment capacity is at m3 138 million per year. There is expected to be a increase of approximately 13 % but we choose to model this through increasing the utilization factor currently at 56.8 % to 113% in 2009.

UFW is expected to fall from the current level of 40% to 25% when refurbishments are completed.

Cost of electricity is expected to grow in line with the increase in water pumping and electricity prices to increase by 10 % annually from 2008.

The same assumptions were made with regard to chemical costs.

The number of staff has been falling slightly in recent years and we presume this will continue with a 2% annual decline in the coming 2 years. From 2009 we assume staff strength can remain at a level of 1,882. Average salaries are expected to grow by 10 % annually (inflation level). A staff subvention of N5 million per moth is expected to continue while no other subsidies are included in the model.

Maintenance costs are expected to grow extraordinarily in 2006 by 25% both because the investment program is taking on and because of immediately needed repairs to the current installations. After 2006 we expect maintenance costs to grow with inflation of 10 % annually.

Other overhead costs are mainly expected to grow by inflation.

10.1.4 Investments and Investment Impact

The investment program for the IDA supported project is specified in the following table:

Project Funds available for Kaduna	IDA SDR	IDA USD	FGN USD	Project Total
Works	13,480,000	19,799,266	4,727,540	24,526,806
Goods	4,250,000	6,242,350	241,946	6,484,296
Consultancies	5,091,000	7,477,601	1,026,010	8,503,611
Training	550,000	807,834		807,834
Incremental Op Costs	382,000	561,077	76,377	637,454
Total	23,753,000	34,888,128	6,071,873	40,960,001

Investments are expected to be implemented in the following sequence:

KSWB Investment Program (USD '000)		Unit	FY03 Real and adjusted	FY04 forecast	FY05 forecast	FY06 forecast	FY07 forecast	FY08 forecast	FY09 forecast
Investments									
1) Own connections	1	KSWB	-	-	-	-	-	-	-
2) IDA Project Phase 1	2	WB/FGN	-	-	-	-	1,351,624	2,623,741	2,043,546
3) Ida Project Phase II	3	WB/FGN	-	-	-	-	15,000,000	-	-
4) Federal / State Projects	4	Federal/State	-	-	-	-	-	-	-
5) Federal Projects	5	Federal 1	-	-	-	-	-	-	-
6) Project 6	6	-	-	-	-	-	-	-	-
7) Planned, non-financed expansions	7	-	-	-	-	-	-	-	-
8) Adjust Tariffs to Local Inflation rate from 2006	8	-	-	-	-	-	-	-	-
9) Project 9	9	-	-	-	-	-	-	-	-
10) Project 10	10	-	-	-	-	-	-	-	-
Investment in NGN			-	-	-	-	**16,351,624**	**2,623,741**	**2,043,546**
Acc Investment NGN			-	-	-	-	**16,351,624**	**18,975,366**	**21,018,912**
Projects total USD			-	-	-	-	**120,978**	**18,000**	**13,000**
Acc. Total USD			-	-	-	-	**120,978**	**138,978**	**151,978**

The impact of this program is:

13) An expected refurbishment to design level of most installations in Kaduna State
14) An expected further 13% increase in water production
15) 25,000 new customer connections (or equivalent sales through kiosks and other delivery points) by 2009
16) A reduction of 10 % points in the UFW %
17) An increase of 51 % total on produced water
18) An increase of 8% points on losses at works (because of increased production in some older systems and to bring the losses closer to design standards)

An on-going renumeration exercise is expected to add another 5,000 new customer connections by 2008.

KSWB is expected to pay all costs associated with the IDA loan. Commitment fees, interest and repayments are included in the model (1.25 % interest and repayment over 15 years fro 2013). This point needs updating once the on-lending agreement between Kaduna State and KSWB is provided.

10.2. Financial Model for Ogun Water Corporation (OGSWC)

The current model is version 7 which contains some update on errors in currency calculations on the investment program compared to version 6. Version 6 was the version delivered on mission in May 2007. Main conclusions are unchanged from version 6 to 7.

10.2.1 Timeline and Updating Audited data

The timeline for KSWB was updated with real numbers from FY04 and FY05 so the timeline is now changed to:

	Unit	FY01 Real	FY02 Real	FY03 Real	FY04 Real	FY05 Real	FY06 forecast

After checking for any inconsistencies the audited data were entered in the Total Sheet. Investments were behind expectations so the investment program was changed, too.

10.2.2 Revenues

A new set of customer data were given from the commercial department. The real customer data were updated in the technical assumption sheet as follows:

Water connections						
Number of connections, res. band 1	no.	0	0	0	0	0
Number of connections, res. band 2	no.	0	0	0	0	0
Number of connections, res. band 3	no.	0	0	0	0	0
Number of connections, res. band 4	no.	0	0	0	0	0
Number of connections, res. standpipes	no.	0	0	0	0	0
Number of connections, non-res. band 1	no.	0	0	0	0	0
Number of connections, non-res. band 2	no.	0	0	0	0	0
Number of connections, non-res. band 3	no.	33,739	33,939	34,139	34,339	35,800
Number of connections, non-res. band 4	no.	0	0	0	0	0
Number of boreholes, 0 - 400 m3, w/ infra.	no.	0	0	0	0	0
Number of boreholes, > 400 m3, w/ infra.	no.	0	0	0	0	0
Number of boreholes, 0 - 400 m3, w/o infra.	no.	0	0	0	0	0
Number of boreholes, > 400 m3, w/o infra.	no.	0	0	0	0	0
New water connections	no.	200	200	200	341	10,343
Total number of connections		33,739	33,939	34,139	34,339	35,800
Water Connection Growth %		-3.68%	0.59%	0.59%	0.59%	4.25%

It was not possible to generate statistics for OGSWC on different customer categories.

Revenues are modeled only as an average billing per month per connection. This type of modeling is highly insufficient to detail any substantial informaion on the customer base. Hopefully, a new billing system and customer enumeration will enable much improved customer information in the future.

This information was then utilized to structure new tariff calculations in the model so it now is implemented as follows:

6) Customers are grouped in one group only
7) For this group an average bill per household was generated and reconciled to audited accounts / draft accounts
8) The formula for revenue generation was then changed to only being no of connections in the group x average billing in that group
9) The revenue was reduced by a factor of 29% for non-billing, gradually improving over time to 10% of all connections
10) A collection ration of at the time 60% gradually improving to 90% was applied

Because of the current dire situation in water delivery and the time it will take make the necessary improvements we do not expect major changes in the collection ration before the end of the project.

10.2.3 Costs

Ogun State subsidizes operations heavily by procuring chemicals and paying elctricity bills directly (100%) and N6 million a month for salaries. The model calculates the situation without subventions.

The present production capacity is m3 38 million per year. This is expected to increase to approximately m3 56 million toward the end of the project.

UFW is expected to remain at 50% (unmetered) because of the expected increased pressure in the systems. It is likely this will be addressed through other investment programs but financing is yet to identified.

Cost of electricity is expected to grow in line with the increase in water pumping and electricity prices to increase by 5 % annually from 2007.

The same assumptions were made with regard to chemical costs.

The number of staff has been falling slightly in recent years and now stands at 1075. From 2006 we assume staff strength can remain at this level. Average salaries are expected to grow by 5 % annually (inflation level).

Maintenance costs are expected to grow extraordinarily in 2006 by 25% both because the investment program is taking on and because of immediately needed repairs to the current installations. After 2006 we expect maintenance costs to grow with inflation of 5 % annually.

Other overhead costs are mainly expected to grow by inflation.

10.2.4 Investments and Investment Impact

The investment program for the IDA supported project is some USD 43 million. In addition, the Federal and State Governments have engaged in considerable investment programs, rather unknown in costs and actual size as well as impact in OGSWC's financial situation. The impact of these programs should be investigated and modeled.

Investments are expected to be implemented in the following sequence although timing is still difficult because of constant delayes in program implementation:

SWSC Investment Program (N '000)		Unit	FY04 Real	FY05 Real	FY06 forecast	FY07 forecast	FY08 forecast	FY09 forecast	FY10 forecast
Investments									
1) Own connections	1	OGSWC	-	-	-	-	-	-	-
2) IDA Project Phase 1	2	WB/FGN	-	-	2,813,983	-	-	-	-
3) Ida Project Phase II	3	WB/FGN	-	-	-	-	-	3,011,671	-
4) Federal / State Projects	4	Federal/State	-	-	2,439,664	-	4,544,165	-	-
5) Federal Projects	5	Federal 1	-	-	-	-	575,643	-	655,688
6) Project 6	6	-	-	-	-	-	-	-	-
7) Automatic Tariff Adjustments	7	-	-	-	-	-	-	-	-
8) Project 8	8	-	-	-	-	-	-	-	-
9) Project 9	9	-	-	-	-	-	-	-	-
10) Project 10	10	-	-	-	-	-	-	-	-
Investment in USD			-	-	**5,253,647**	-	**5,119,808**	**3,011,671**	**655,688**
Acc Investment USD			-	-	**5,253,647**	**5,253,647**	**10,373,455**	**13,385,127**	**14,040,815**
Projects total USD			-	-	**40,267**	-	**38,120**	**21,783**	**4,607**
Acc. Total USD			-	-	**40,267**	**40,267**	**78,387**	**100,170**	**104,777**

The impact of this program is:

19) An expected refurbishment to design level of most installations in Kaduna State and investment in new facilities

20) An expected 47% increase in water production

21) 27,000 new customer connections (or equivalent sales through kiosks and other delivery points) by 2009

22) An increase of 51 % total on produced water

An on-going renumeration exercise is not modeled yet but should normally provide between 20-30 % increase on the existing customer base, corresponding to another 10,000 customers.

OGSWB is expected to pay all costs associated with the IDA loan. Commitment fees, interest and repayments are included in the model (1.25 % interest and repayment over 15 years fro 2013). This point needs updating once the on-lending agreement between Kaduna State and OGSWB is provided

10.3. Financial Model for Lagos (LSWC)

The current model is version 9. Version 8 was the version delivered on mission in May 2007. A exchange rate calculation was corrected but has no major impact on the conclusions drawn on mission.

10.3.1 Timeline and Updating Audited data

The timeline for LSWC was updated with real numbers from FY04 and FY05 and a draft report for FY06 so the timeline is now changed to:

LSWCWU Profit & Loss (NGN '000)	FY04 Real	FY05 Real	FY06 Draft	FY07 forecast

After checking for any inconsistencies the audited data were entered in the Total Sheet. Investments were behind expectations so the investment program was changed, too.

LSWC is not one company but several after an "unbundling" exercise carried out in 2005. LSWC is also engaged in attracting private operators on both the production and commercial sides. To model all these issues would require more than one financial model. The Consultant has therefore modeled the entire economics of LSWC Holding as a consolidated statement of all the corporations under its umbrella. This does not presently distort the modeling results as only a few of the daughter corporations generate external value. For the time being it is actually a potential legal problem that many of these new companies are born with significant accounting deficits.

The model is teherefore a consolidated model for the whole group of companies. It should be updated whenever the unbundling or private operators becomes of significant proportions to its financial situation, which is expected to happen within the coming 1-2 years.

10.3.2 Revenues

The model lacks information on actual number of connections in customers groups. Moreover, recent customer surveys show huge discrepancies between the number of customers in the billing database and the enumerated data, in some case reportedly more than half of all customers were not registered. The model therefore uses actual cash flows and models expectations for increased cash flows from customers without actually knowing the actual improvement possibilities from cash collection to theoretical billing. Currently, after phase I of the enumeration there should be around 190,000 active customers, however only around 120,000 bills are printed and many not delivered to customers. Current collections are only at approximately 20 % of billings (FY2006).

The model contains only the expected billings – not the whole customer base. Based on the preliminary results of the on-going customer enumeration and expectations for incresed production leading to better service levels we assume the number of billable customers will soon increase dramatically. This also includes new federal and atate projects that will enable new connections to be implemented.

The expected billing data were updated in the technical assumption sheet as follows:

Water connections					
Number of connections, res. band 1	no.	0	0	0	0
Number of connections, res. band 2	no.	0	0	0	0
Number of connections, res. band 3	no.	0	0	0	0
Number of connections, res. band 4	no.	0	0	0	0
Number of connections, res. standpipes	no.	0	0	0	0
Number of connections, non-res. band 1	no.	0	0	0	0
Number of connections, non-res. band 2	no.	0	0	0	0
Number of connections, non-res. band 3	no.	56,000	56,000	56,560	120,000
Number of connections, non-res. band 4	no.	0	0	0	0
Number of boreholes, 0 - 400 m3, w/ infra.	no.	0	0	0	0
Number of boreholes, > 400 m3, w/ infra.	no.	0	0	0	0
Number of boreholes, 0 - 400 m3, w/o infra.	no.	0	0	0	0
Number of boreholes, > 400 m3, w/o infra.	no.	0	0	0	0
New water connections	no.		-	566	25,200
Total number of connections		56,000	56,000	56,560	120,000
Water Connection Growth %			0.00%	1.00%	112.16%

This information was then utilized to structure tariff calculations in the model so it now is implemented as follows:

11) Billable customers are not grouped but just estimated in one large “chunk”
12) An average bill per conenction was generated then and reconciled to audited accounts / draft accounts
13) The formula for revenue generation was then changed to only being no of connections x average billing
14) The revenue was not reduced by a factor for non-billing as the statistic only includes customers that actually received bills
15) A collection ration of 80 % was applied as it is to grow to 90% as water becomes increasingly available and tre effect of commercial PPP arrangements takes shape

10.3.3 Costs

The installed treatment capacity is at m3 197 million per year. Utilization is currently around 33%, expected to grow to 69% by the end of the project in 2010.

UFW is expected to fall from the current level of 50% to 30% when refurbishments are completed.

Cost of electricity is expected to grow in line with the increase in water pumping and electricity prices to increase by 10 % annually from 2008.

The same assumptions were made with regard to chemical costs.

The number of staff has been falling slightly in recent years and we presume this will continue until staff strength reaches 2000 at the end of 2007. Average salaries are expected to grow by 5 % annually. A staff subvention of N 152 million per year is not expected to continue and N 614 million is included in the budget as IDA support for critical operational costs. No other subsidies are included in the model.

Maintenance and other overhead costs are expected to grow with inflation of 10 % annually.

10.3.4 Investments and Investment Impact

The investment program for the IDA supported project is specified in the following table:

Investments							
1) Own connections	1	LSWCWU	-	-	-	-	-
2) IDA Project Phase 1 (Rehab)	2	WB/FGN	-	-	30,000	50,000	-
3) Ida Project Phase II (expansion)	3	WB/FGN	-	-	-	15,000	30,000
4) Federal / State Projects	4	Federal/State	-	-	-	-	-
5) Federal Projects	5	Federal 1	-	-	-	-	-
6) PPP Improvements	6	LSWC	-	-	-	-	-
7) DFID Rehabilitation	7	Federal/State	-	-	-	-	-
8) Effect of IPP Arrangement (+20 % power cost)	8	LSWC	-	-	-	-	-
9) Group External Revenues	9	LSWC	-	-	-	-	-
10) Customer Enumeration in 2005/2007	10	LSWC	-	-	-	-	-
Investment in NGN			-	-	**4,215,462**	**9,849,854**	**4,902,643**
Acc Investment NGN			-	-	**4,215,462**	**14,065,317**	**18,967,959**
Projects total USD			-	-	**30,000**	**65,000**	**30,000**
Acc. Total USD			-	-	**30,000**	**95,000**	**125,000**

We have no information about the investments in the federal/state supported projects.

The impact of this program is:

23) An expected refurbishment to approximately 70% of design level Lagos State
24) 20,000 new customer connections (or equivalent sales through kiosks and other delivery points) by 2010
25) A reduction of 20 % points in the UFW %
26) An increase of 51 % total on produced water

An on-going renumeration exercise is expected to add 55,000 new customer connections by 2008.

LSWC is expected to pay all costs associated with the IDA loan. Commitment fees, interest and repayments are included in the model (1.25 % interest and repayment over 15 years fro 2013). This point needs updating once the on-lending agreement between Lagos State and LSWC is provided.

10.4. Financial Model for Enugu (ENSWC)

The current model is version 2 and is the first model for ENSWC as the utility was very late in being included in the IDA supported project..

10.4.1 Timeline and Updating Audited data

The timeline for KSWB was updated with real numbers from FY04 and FY05 so the timeline is now changed to:

ENSWC Investment Program (USD '000)	Unit	FY04 Real	FY05 Real	FY06 Draft	FY07 forecast

After checking for any inconsistencies the audited data were entered in the Total Sheet. Investments were behind expectations so the investment program was changed, too.

10.4.2 Revenues

A new set of customer data were given from the commercial department. The real customer data were updated in the technical assumption sheet as follows:

We were able to provide reasonable good customer statistics which we summarized into the following information in a pivottable:

Year	Type	No of connections	No of bills	Billing N1000	Collection	Collection %	Billing/conn
2004	Domestic High Density	12,410		43,453	25,055	58%	3.501
	Domestic Low Density	950		3,924	3,532	90%	4.131
	Commercial	146		207	388	187%	1.418
	Industrials	1		4,197	8,771	209%	4,197.000
	Institutional/Government	30		5,358	11,197	209%	178.600
	Tanker	7		10,709	5,684	53%	1,529.857
	All					#DIV/0!	#DIV/0!
2004 Total		**13,544**		**67,848**	**54,627**	**81%**	**5.009**
2005	Domestic High Density	14,033		128,174	37,556	29%	9.134
	Domestic Low Density	1,073		9,807	2,873	29%	9.140
	Commercial	165		126	37	29%	0.764
	Industrials	1		38,205	11,194	29%	38,205.000
	Institutional/Government	34		5,670	1,661	29%	166.765
	Tanker	7		13,709	4,358	32%	1,958.429
	All					#DIV/0!	#DIV/0!
2005 Total		**15,313**		**195,691**	**57,679**	**29%**	**12.779**
2006	Domestic High Density	14,161		121,362	33,982	28%	8.570
	Domestic Low Density	1,112		9,530	2,669	28%	8.570
	Commercial	181		240	67	28%	1.326
	Industrials	1		40,102	11,229	28%	40,102.000
	Institutional/Government	36		5,682	1,591	28%	157.833
	Tanker	7		11,806	3,214	27%	1,686.571
	All		8,651			#DIV/0!	#DIV/0!
2006 Total		**15,498**	**8,651**	**188,722**	**52,752**	**28%**	**12.177**
Grand Total		**44,355**	**8,651**	**452,261**	**165,058**	**36%**	**10.196**

ENSWC should keep this data updated as it is essential to understand the nature of the customer base.

This information was then utilized to structure new tariff calculations in the model so it now is implemented as follows:

16) Customers are grouped according to the above table

17) For each group an average bill per household was generated and reconciled to audited accounts / draft accounts

18) The formula for revenue generation was then changed to only being no of connections in a group x average billing in that group

19) The revenue was reduced by a factor of 80% for non-billing because of the dire situation in many of the facilities in Enugo State (only some 5 % of

schemes are producing water). This factor is expected to decrease to 30% by 2010.

20) A collection ration of 20 % was applied and is expected to increase to 70% by 2009.

10.4.3 Costs

The installed treatment capacity is at m3 119 million per year. There is no expectation about improving this substantially. However, water outputs are expected to increase as a result of an increased utilization factor from currently 5-6 % to 11-12 % as a result of the IDA supported program.

UFW is expected to fall from the current level of 40% to 25% when refurbishments are completed.

Cost of electricity is expected to grow in line with the increase in water pumping and electricity prices to increase by 5 % annually from 2009. Electricity is subsideized 100%.

The same assumptions were made with regard to chemical costs.

The number of staff has been falling slightly in recent years and we presume this will continue with a 2% annual decline in the coming 2 years. From 2009 we assume staff strength can remain at a level of 565. Average salaries are expected to grow by 5 % annually (inflation level). A staff subvention of 90% is expected to continue.

Maintenance costs are expected to grow by 5% annually.

Other overhead costs are mainly expected to grow by inflation although fuels are expected to jump by 25% in 2008 as a result of installing more generators.

Subsidies are expected to continue for chemical and electricity costs (100%) and for staff costs a minimum of 90% until the current situation improves.

10.4.4 Investments and Investment Impact

The only on-goinginvestment program is the IDA supported program as specified in the following table:

Investments							
1) Own connections	1	ENSWC	-	-	-	-	-
2) IDA Project Phase 1 Rehab	2	WB/FGN	-	-	-	645,658,425	-
3) Ida Project Phase II Other	3	WB/FGN	-	-	-	-	717,053,347
4) Federal / State Projects	4	Federal/State	-	-	-	-	-
5) Federal Projects	5	Federal 1	-	-	-	-	-
6) PPP	6	ENSWC	-	-	-	-	-
7) Planned, non-financed expansions	7	-	-	-	-	-	-
8) Adjust Tariffs to Local Inflation rate from 2008	8	-	-	-	-	-	-
9) Enumeration	9	-	-	-	-	-	-
10) Remove Subsidies from 2010	10	-	-	-	-	-	-
Investment in NGN			-	-	-	**645,658,425**	**717,053,347**
Acc Investment NGN			-	-	-	**645,658,425**	**1,362,711,772**
Projects total USD			-	-	-	**5,000,000**	**5,500,000**
Acc. Total USD			-	-	-	**5,000,000**	**10,500,000**

The impact of this program is:

27) An expected refurbishment to design level of some installations (the most populous ones) in Kaduna State

28) An expected 6%-points increase in water production

29) 4,500 new customer connections (or equivalent sales through kiosks and other delivery points) by 2009, 4,800 from a customer enumeration exercis and approximately 5,000 from yet unidentified sources.

ENSWC is not expected to service the IDA loan although an on-lending agreement to that effect has still to be presented. The proceeds are therefore considered a Government grant in the model.

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