IHS QUE$TOR®

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Quick Start Guide

QUE$TOR

2016 Q1 Release

May 2016

Contents

Introduction

QUE$TOR has been designed to produce high level estimates of the capital and operating costs of green field oil and gas developments. It will assist with project modelling, evaluation and subsequent decision making in the oil and gas industry.

QUE$TOR provides a reliable, consistent methodology for producing cost estimates and creates efficiency when optimising field developments. It has benefits in many applications, including:

- Prospect evaluations
- Screening studies
- Feasibility studies
- Conceptual studies
- Optimisation studies

QUE$TOR uses a systematic approach to generate a field development basis, capital and operating costs, and project schedules from basic field data. QUE$TOR uses a bottom up methodology; the calculations are based around detailed sizing algorithms and engineering "rules of thumb" with regional variations where appropriate.

This approach allows engineers, estimators and economists to produce weight and cost estimates quickly, consistently, and accurately and to develop investment profiles.

This guide is designed to help you understand the operation of the QUE$TOR program, outlining the basic steps involved in developing a QUE$TOR project to produce a scheduled estimate for capital and operating costs. When you are running QUE$TOR, press the F1 key to access the QUE$TOR Help file for more detailed guidance.

Estimate Basis

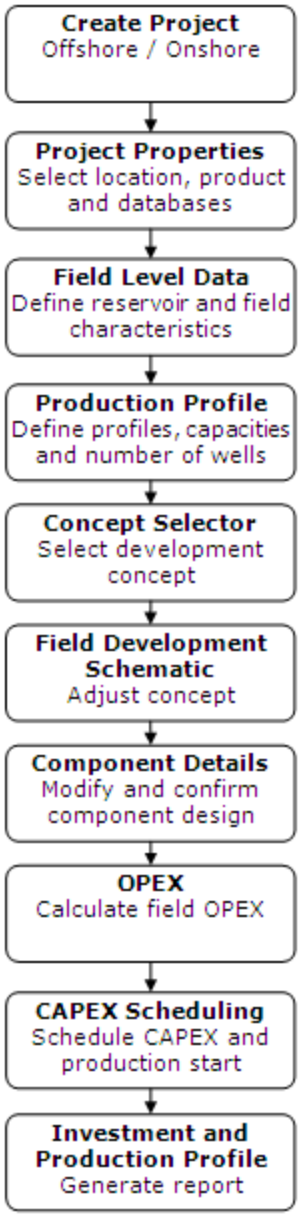
The following points should be considered when generating or reporting a cost estimate using QUE$TOR.

- QUE$TOR provides an estimate based on the costs within the markets today. We make no allowance for inflation or deflation of costs over the project life
- All of the costs within QUE$TOR are in real terms
- Pre-sanction project costs such as environmental studies, FEED and licensing costs can be optionally included
- Post-sanction costs such as owner's project management costs, legal costs and security costs can be optionally included
- Contingencies within QUE$TOR are calibrated to target the P50 development cost
- QUE$TOR is designed for use early in the project cycle. Therefore the estimate level that can be attained by using the program is typically within the range of +/- 25% to 40%
- The estimate produced is dependent on user entered values. Therefore, any estimate should take into account the confidence of these values.

About the Quick Start Guide

This guide is designed to help you understand the operation of the QUE$TOR program, outlining the basic steps involved in developing a QUE$TOR project to produce a scheduled estimate for capital and operating costs.

QUE$TOR is structured around a field development schematic (FDS) which allows you to create a visualisation of the development. The FDS is driven by a number of high level inputs which allow the development conditions to be specified. The basic program calculation sequence followed in QUE$TOR to generate a full life-cycle field or prospect development cost estimate is shown below.



To define the new project, QUE$TOR presents you with a series of forms that allow high level parameters of the development to be specified. The Field level data form is populated with default values for the basin selected in the Project properties form. Subsequent forms have values and selections based on earlier entries. Once you have reviewed and adjusted as necessary the default inputs in each form, click on **OK** to apply the inputs and move on to the next form. Click on **Cancel** to ignore changes made and go back to the previous form and make any necessary revisions.

Getting Started

QUE$TOR must be installed on a local PC. This must be done by a local administrator. See the release notes for installation instructions.

QUE$TOR will run on these following operating systems:

- Windows Vista
- Windows 7
- Windows 8
- Windows 10

A licence must be available; either a standalone dongle which plugs directly into your computer or a network licence which is accessible across your company's local area network. QUE$TOR Offshore, QUE$TOR Onshore and QUE$TOR LNG Regasification require separate licences. Contact your IT department for further details.

Depending on your installation options, you can launch QUE$TOR either from the taskbar Start button or from your PC desktop.

From the taskbar Start button

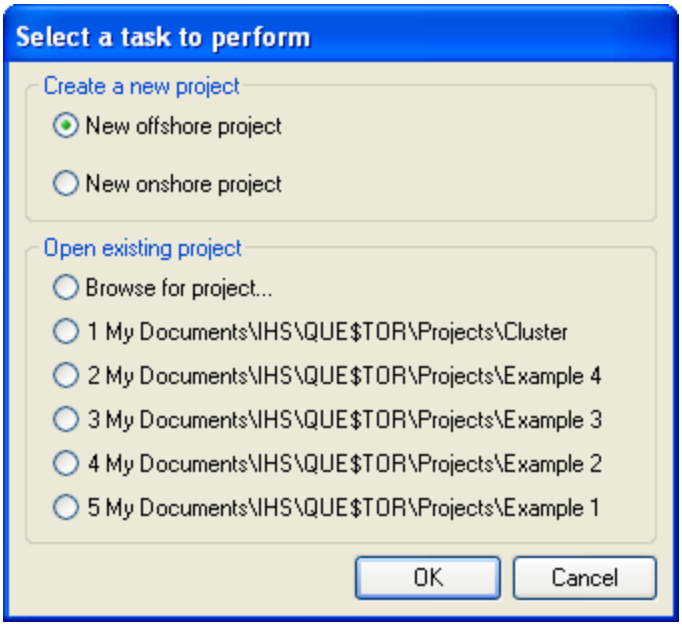
Click **Start** and follow **All Programs> IHS > QUE$TOR 2016 Q1 > QUE$TOR 2016 Q1**

From your PC desktop

Double-click the QUE$TOR 2016 Q1 application shortcut icon.

Creating a New Project

On opening QUE$TOR the task selection form will appear.



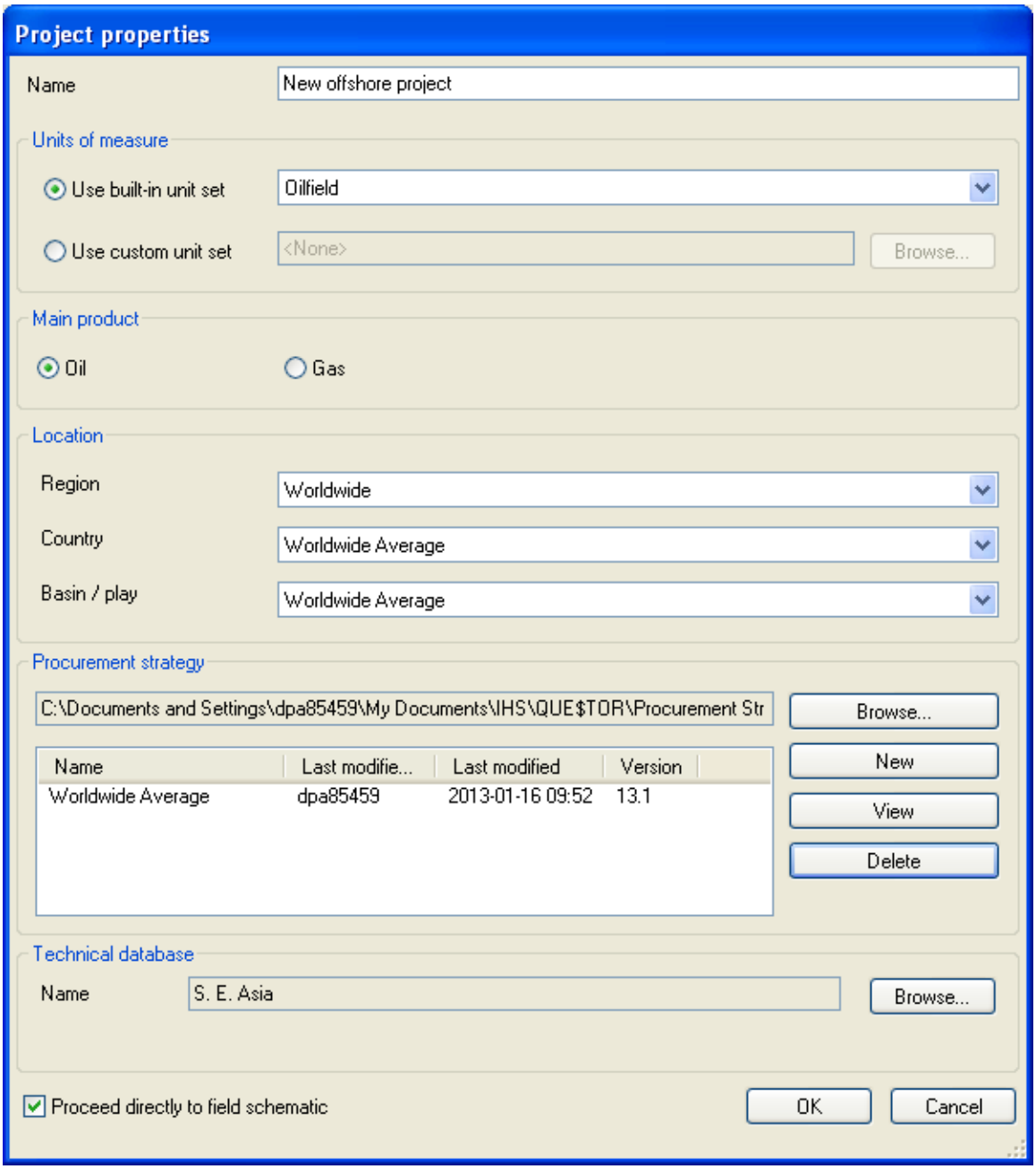
On this form you can choose to create a new project or open an existing project. For new projects you can either create a new offshore project or a new onshore project. For existing projects there are shortcuts to the last five projects saved.

The location of your wells should determine whether you pick offshore or onshore as the start point. If you are running a combined offshore and onshore project then the second location can be selected later in the project estimate.

Once you have selected your project location i.e. offshore or onshore, click **OK** to move onto the Project properties form. QUE$TOR will check that you have a valid licence to run the selected project type at this point.

Selecting the Project Properties

The project properties allow you to setup the basic information about your project including the procurement strategy, regional technical database and units set preference.

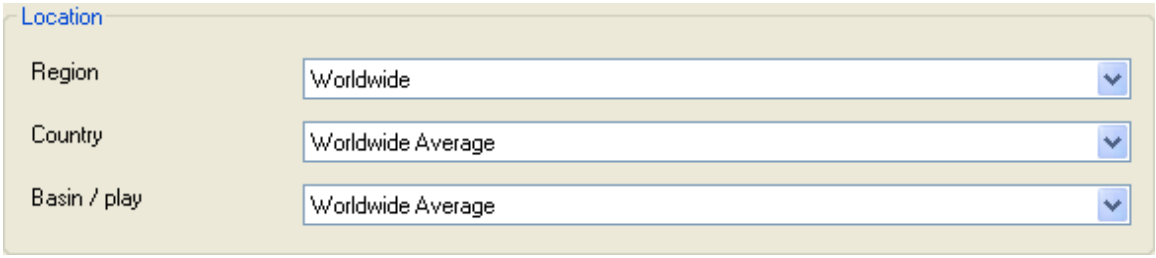


Work through the following steps to set up your project:

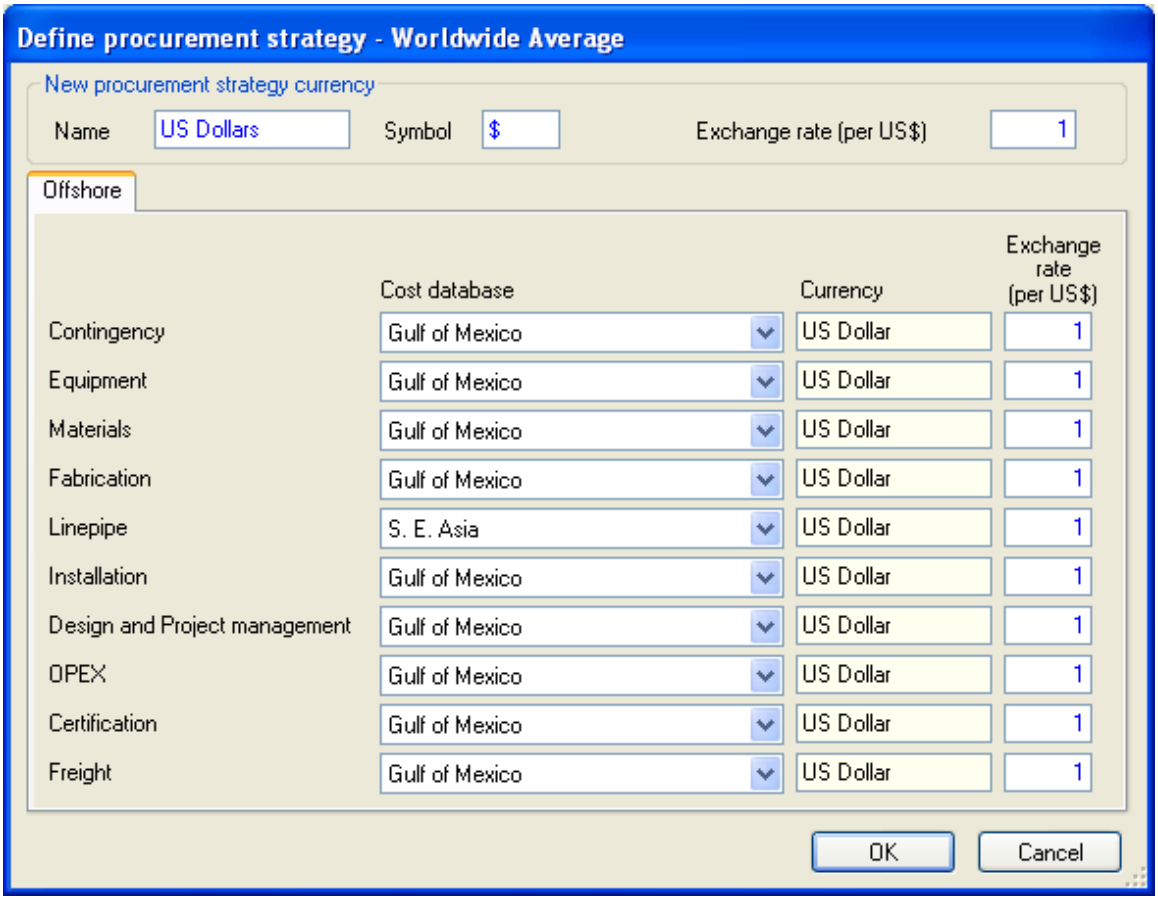
- Give your project a name.
- Select the units you want to work in. Pick from one of the standard unit sets provided or create your own using the Unit editor tool. For the majority of users one of the default unit sets should meet your needs as you can change each unit as needed throughout the program.

- Select the main product. For Oil projects you will have to define your recoverable oil reserves and a gas oil ratio, while for gas projects you will input your recoverable gas reserves and a condensate gas ratio.

- Select the geographical region, country, and basin to enable QUE$TOR to seed your project with typical basin specific data generated from the IHS IRIS21 E&P database. This selection will also drive the default location of a new procurement strategy and will set your regional technical database.



- Create your procurement strategy. This can be done by clicking the **New** button. This will display the Define procurement strategy form shown below. Procurement strategies allow you to choose different regional cost databases for each cost centre. By default all costs are reported in US Dollars but this can be edited by changing the currency name, symbol and exchange rate at the top of the form.

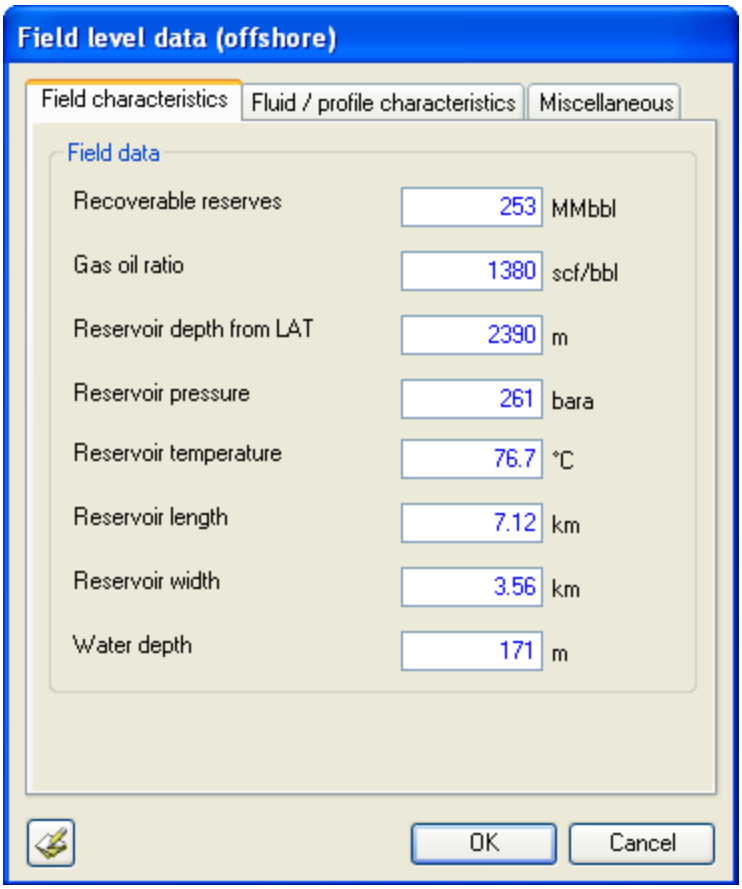


- Select the technical database to use for your project. By default this will be the region which you have selected for your project. Use **Browse** to select an alternative or user modified database if required.

Once you have completed the above steps, click **OK** to move onto the Field level data form.

Entering Your Field Level Data

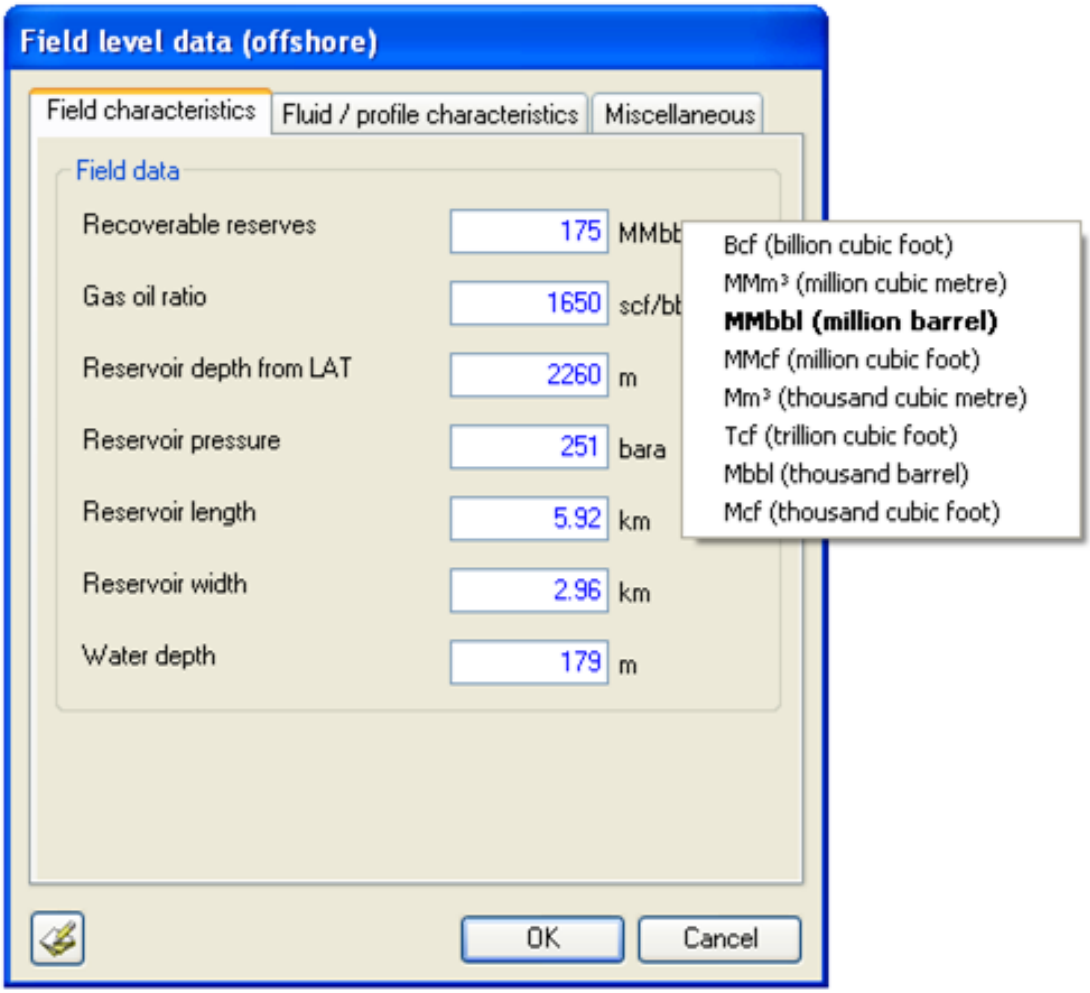
The Field level data form contains three tabs which list the values for the field characteristics, fluid characteristics and some miscellaneous data respectively.



The information entered varies slightly depending on whether you have selected an offshore or onshore project. Default values are populated from a database relevant to the basin you selected in the Project properties form.

On this form, modify the data to the specifics of the field that you want to produce an estimate for. The purpose of the default data is to provide a reasonable value where none is known and therefore you should use your values over these defaults. Any input value can be changed by simply over-typing it.

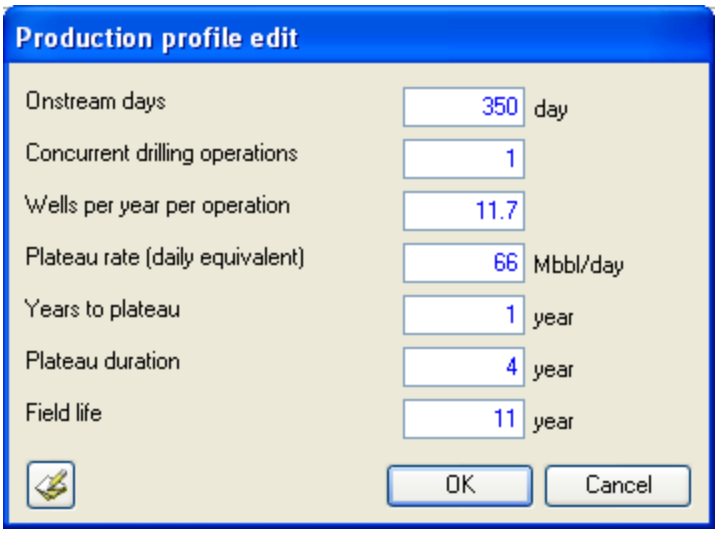
In this form, and any other form, the individual input units can be changed 'on the fly' by clicking on the unit to the right of the value and selecting the unit you wish to use from the options available, this is shown for the recoverable reserves input below.



Once you have entered / confirmed the data on all three tabs click **OK** to move onto the Production profile edit form.

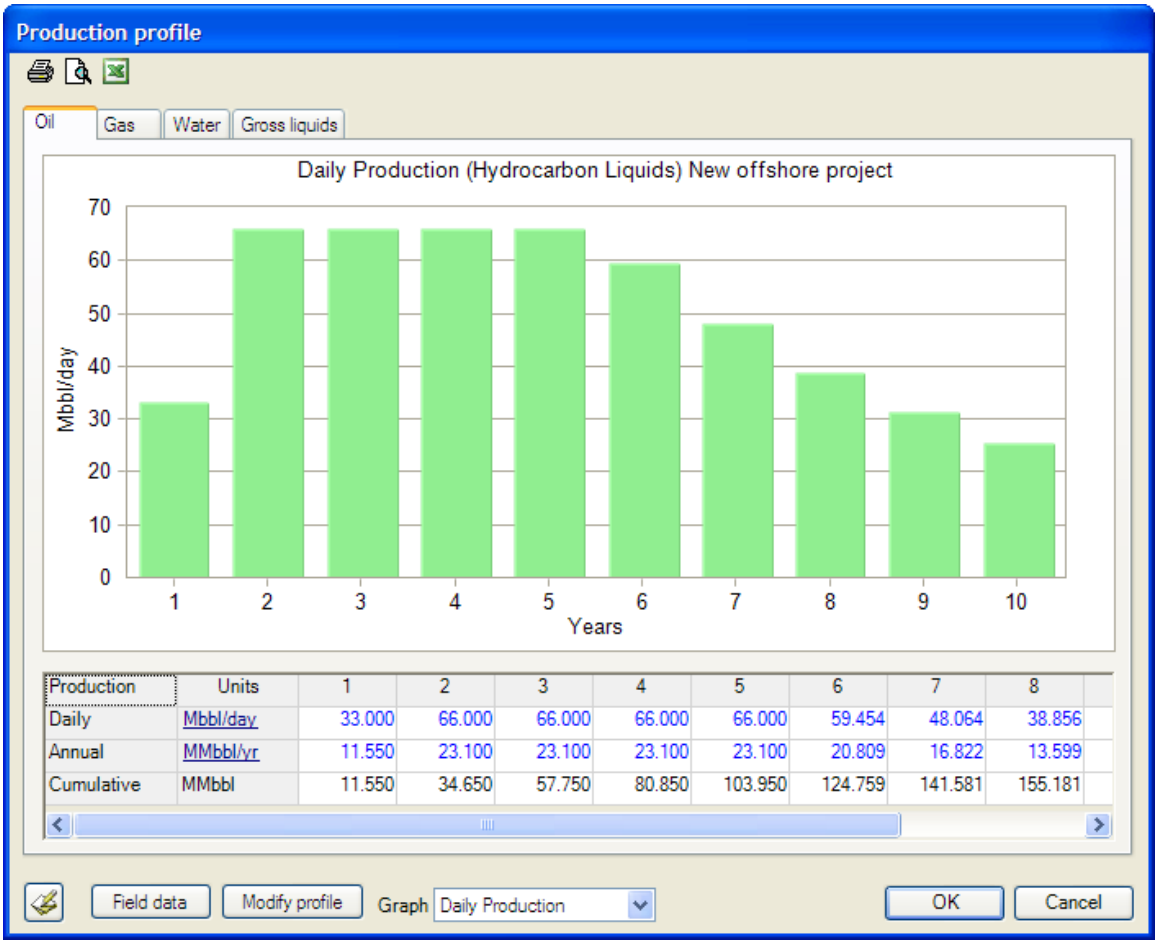
Creating a Production Profile

The production profile is created through two forms; the first form gives seven entries through which you can influence the basic parameters of your production profile.



Enter any of the values you know at this point and then click **OK** to move onto the Production profile form which gives you a visual representation of these values.

The production profile is displayed in a graphical and tabular format across four tabs; oil (or condensate), gas, water and gross liquids. Numbers in blue can be edited; numbers in black such as those in the gross liquids tab are derived numbers and therefore can't be edited. This colour convention applies throughout QUE$TOR.



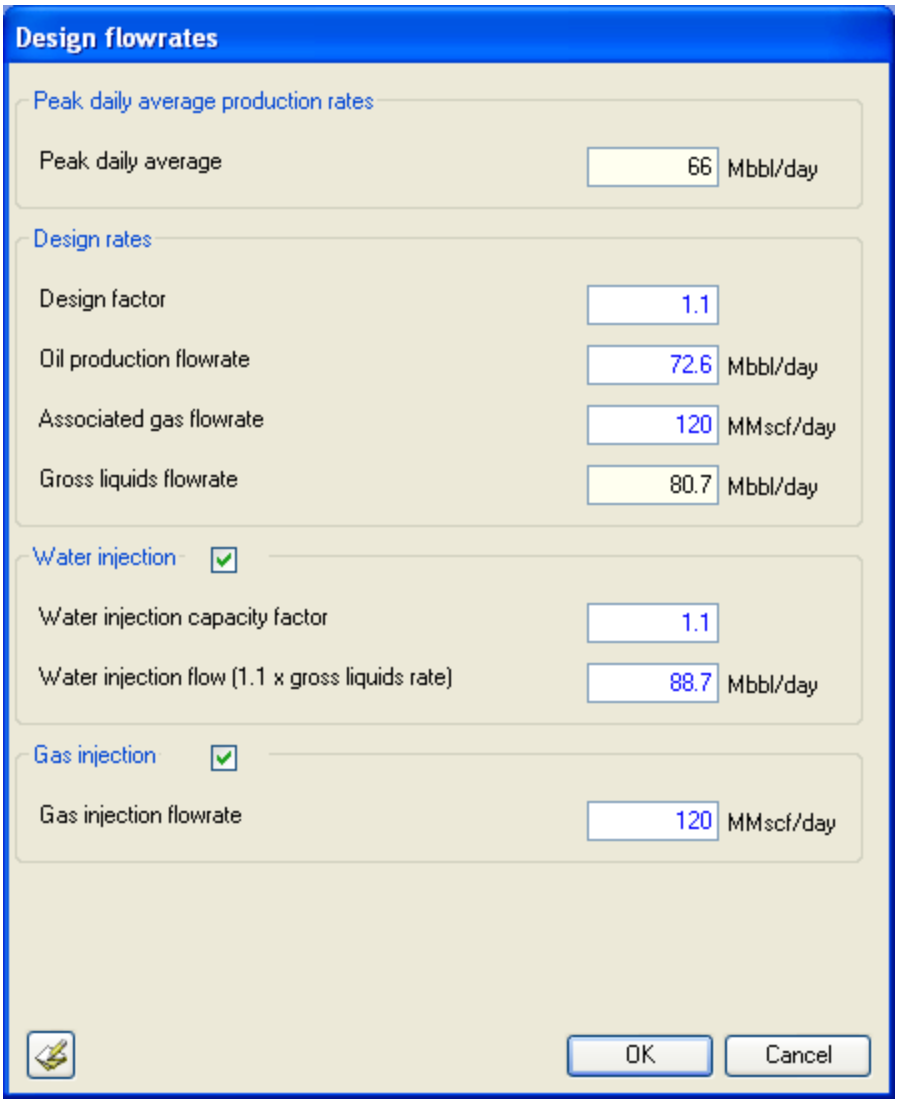
You can change the production for each year by entering the values in the table at the bottom of the form. This can either be typed in year by year or you can paste in a profile from an external spreadsheet through a right mouse click. You can overwrite either the daily or annual flowrates but not the cumulative row of the table. You can also copy the data in the production profile and paste it into an external spreadsheet.

Note: When pasting in a production profile from a spreadsheet ensure that the field life specified in the production profile edit form is the same as that of the profile you are pasting in.

Once you are happy with the production profile, click **OK** to move onto the Design flowrates form.

Setting the Design Flowrates

The Design flowrates form gives the flowrates that will be used to design the facilities within your project.



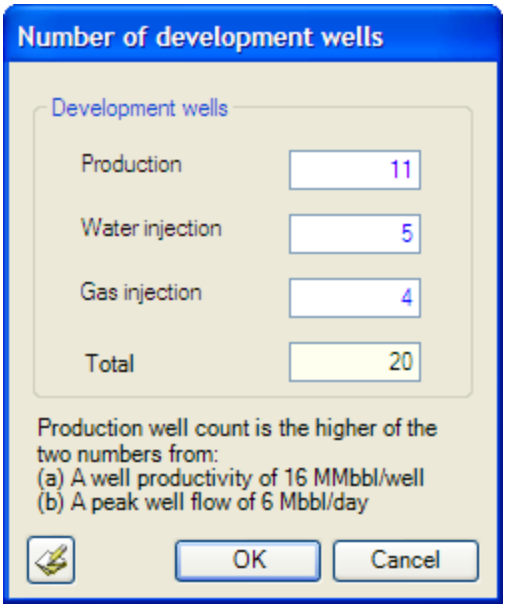
The production values are based on the peak production with a design factor for oil projects giving an allowance for day to day variation, and a swing factor in gas projects giving an allowance for seasonal demand variation.

The injection values should be adjusted based on your pressure maintenance and gas disposal assumptions. Water injection is assumed by default for all oil projects.

Once you are happy with the design flowrates, click **OK** to move onto the Number of wells form.

Setting the Number of Wells

The Number of wells form, shown below, sets the total number of wells required across the field.

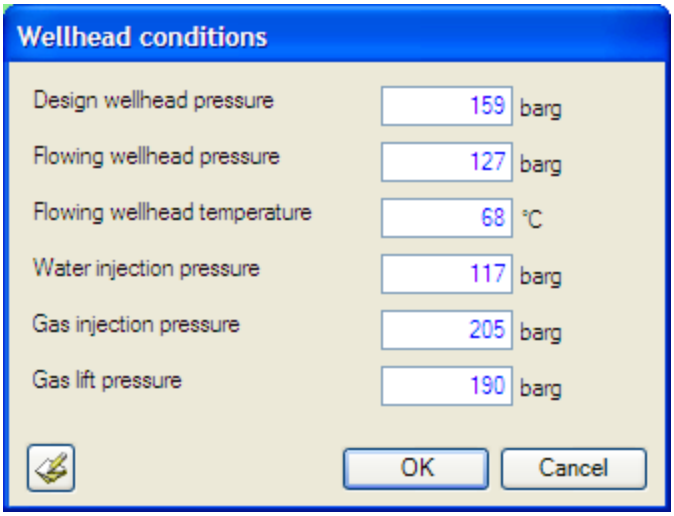


The default number of production wells is based on the recoverable reserves, well productivity, plateau production and peak well flow. The default number of water injection wells assumes an average of two injectors for every five oil production wells. Gas injectors are based on an average flowrate of 30 MMscf/day per well.

Modify the well count to match your design assumptions and click **OK** to move onto the Wellhead conditions form for onshore projects or the Concept selector form for offshore projects.

Setting the Wellhead Conditions

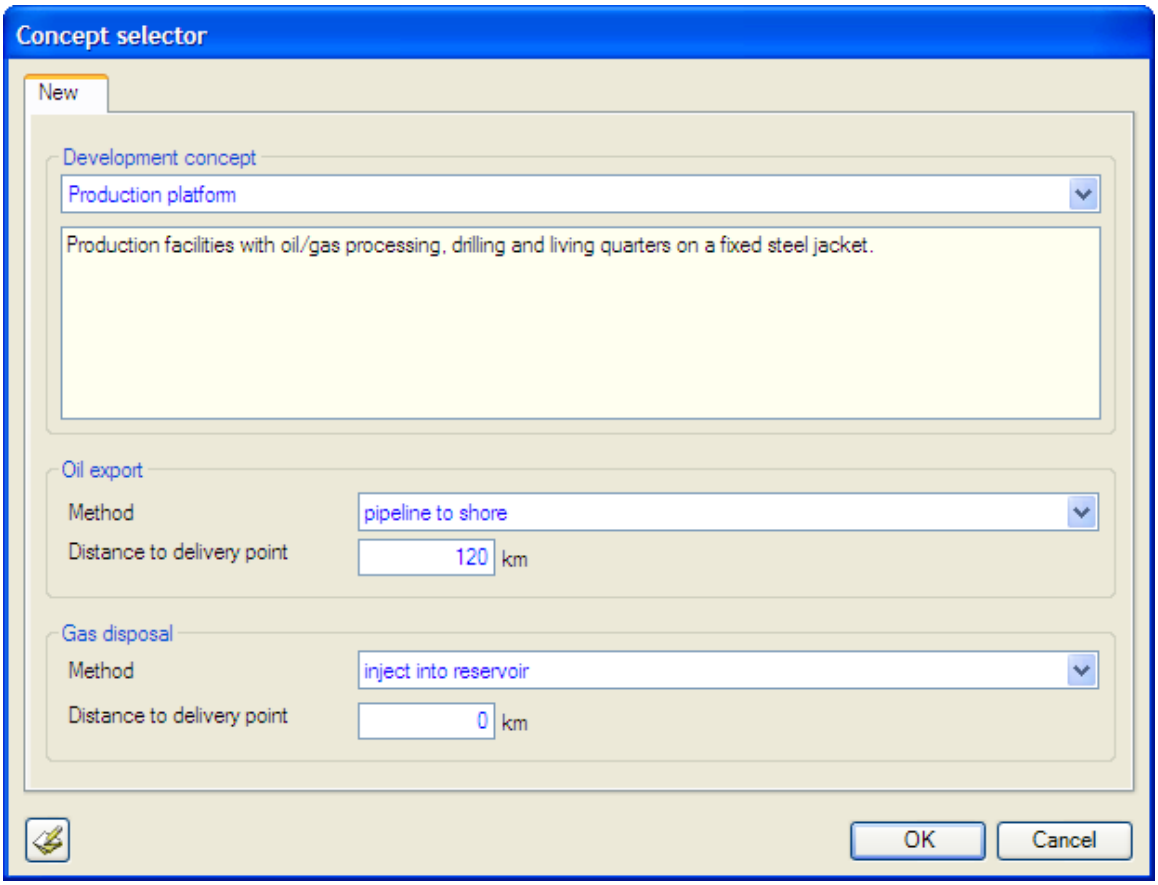
The Wellhead conditions form is only available for onshore projects and provides the wellhead conditions of the primary streams.



Water injection, gas injection and gas lift pressure are only relevant if these services are selected. Adjust the conditions as necessary and then click **OK** to move onto the Concept selector form.

Selecting a Concept - Offshore

The Concept selector form allows you to choose the basic concept of your field development.



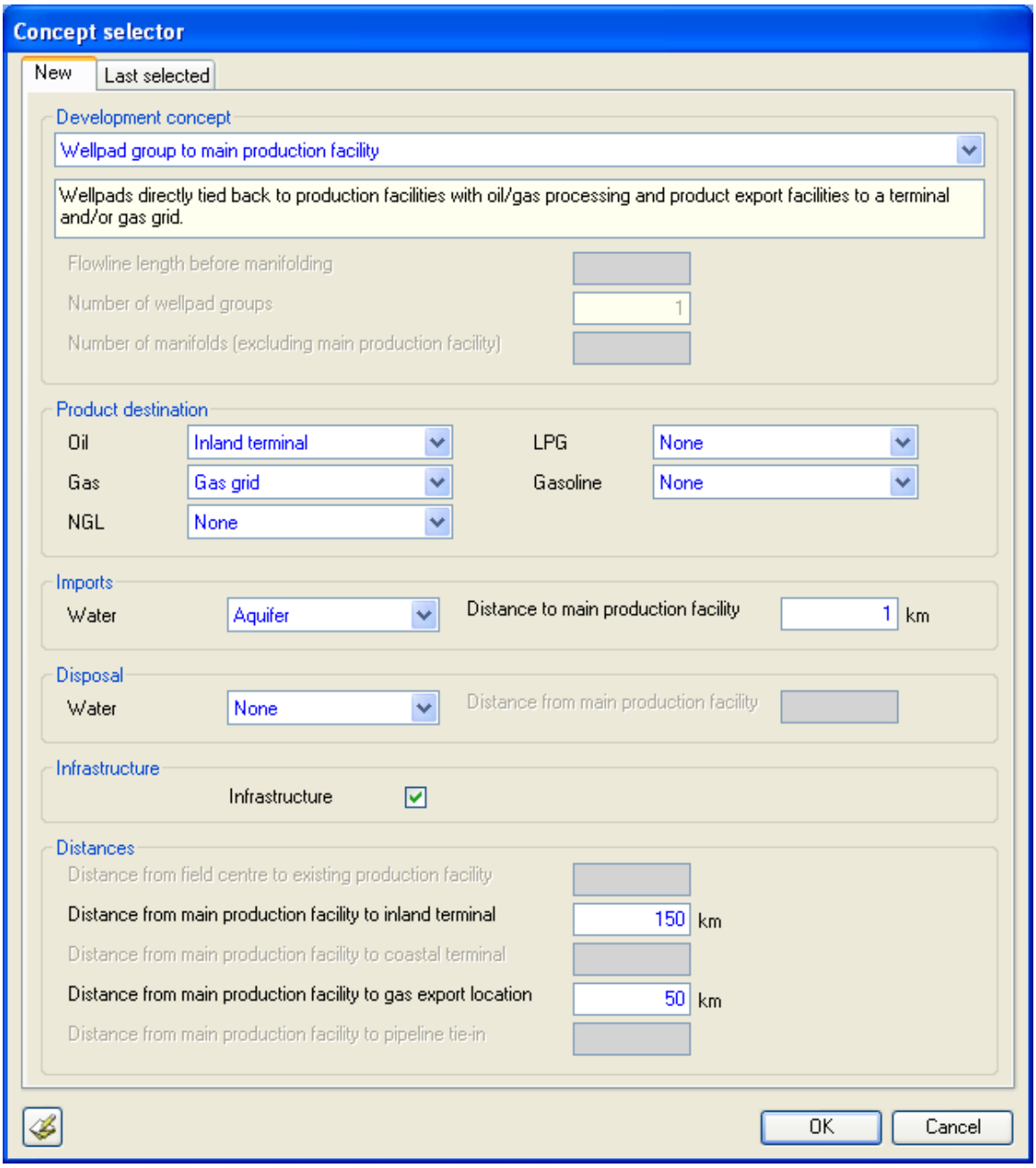
QUE$TOR selects a field development concept based on the field level data and production profile. You can change this to another of the 14 default concepts using the list box. If you want to configure your concept from scratch, select 'Blank concept'.

Based on your concept, QUE$TOR will select typical oil and gas export options. Adjust these to match your desired product export routes.

When you click **OK** QUE$TOR runs the complete cost estimate using program defaults throughout and displays the field development schematic along with the cost summary tree.

Selecting a Concept - Onshore

The Concept selector form allows you to choose the basic concept of your field development.



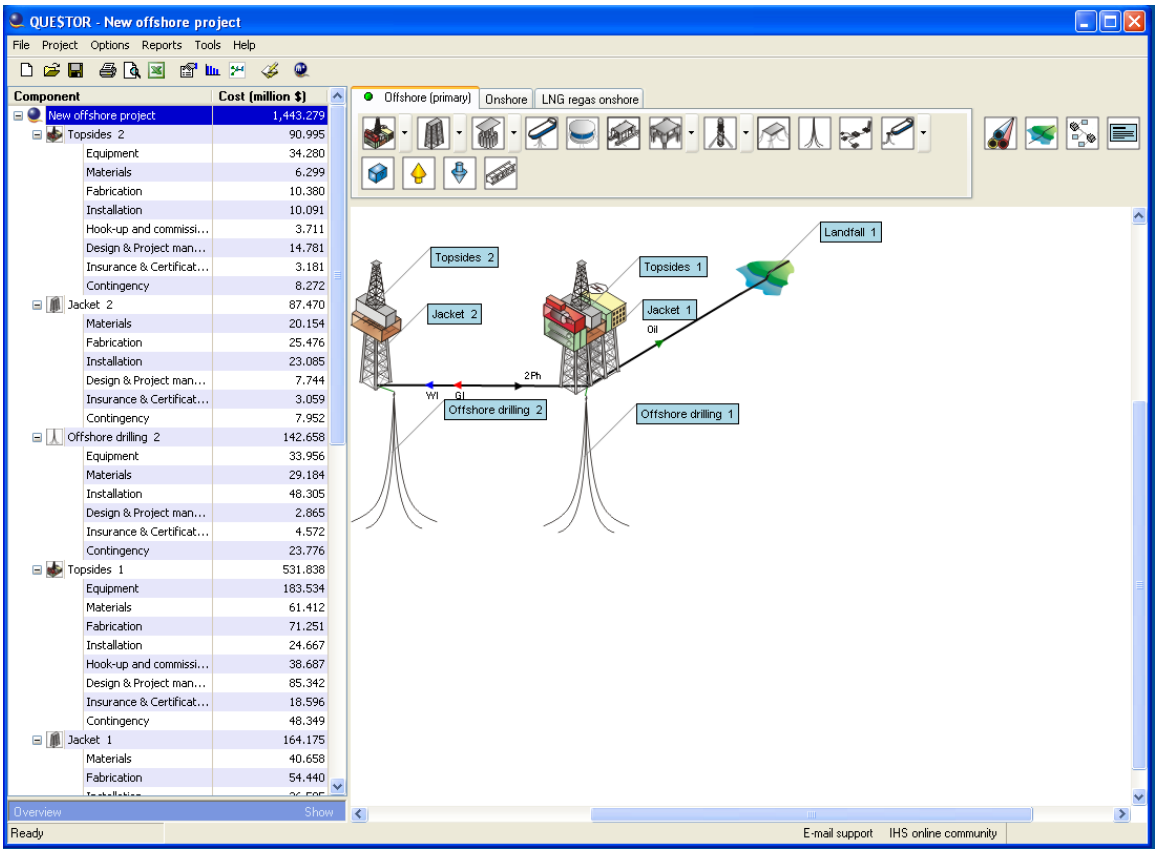
QUE$TOR selects a field development concept based on the field level data and production profile. You can change this to another of the 6 default concepts using the list box. If you want to configure your concept from scratch, select 'Blank concept'.

Based on your concept, QUE$TOR will select typical oil and gas export options. Adjust these to match your desired product export routes.

When you click **OK** QUE$TOR runs the complete cost estimate using program defaults throughout and displays the field development schematic along with the cost summary tree.

Using the Field Development Schematic

On selecting your concept and clicking **OK** QUE$TOR will move through to the main field development schematic.



The field development schematic shows the components within your chosen concept on the right hand side of the screen, with the associated high level CAPEX summary on the left hand side of the screen.

The schematic can be changed by adding and removing components. You can select components to add from the component toolbar at the top of the screen and click on the schematic to place the component. To delete a component hit delete when the component is selected or right click on the component and select **Delete**. You will be asked to confirm any deletions to prevent any components being inadvertently deleted.

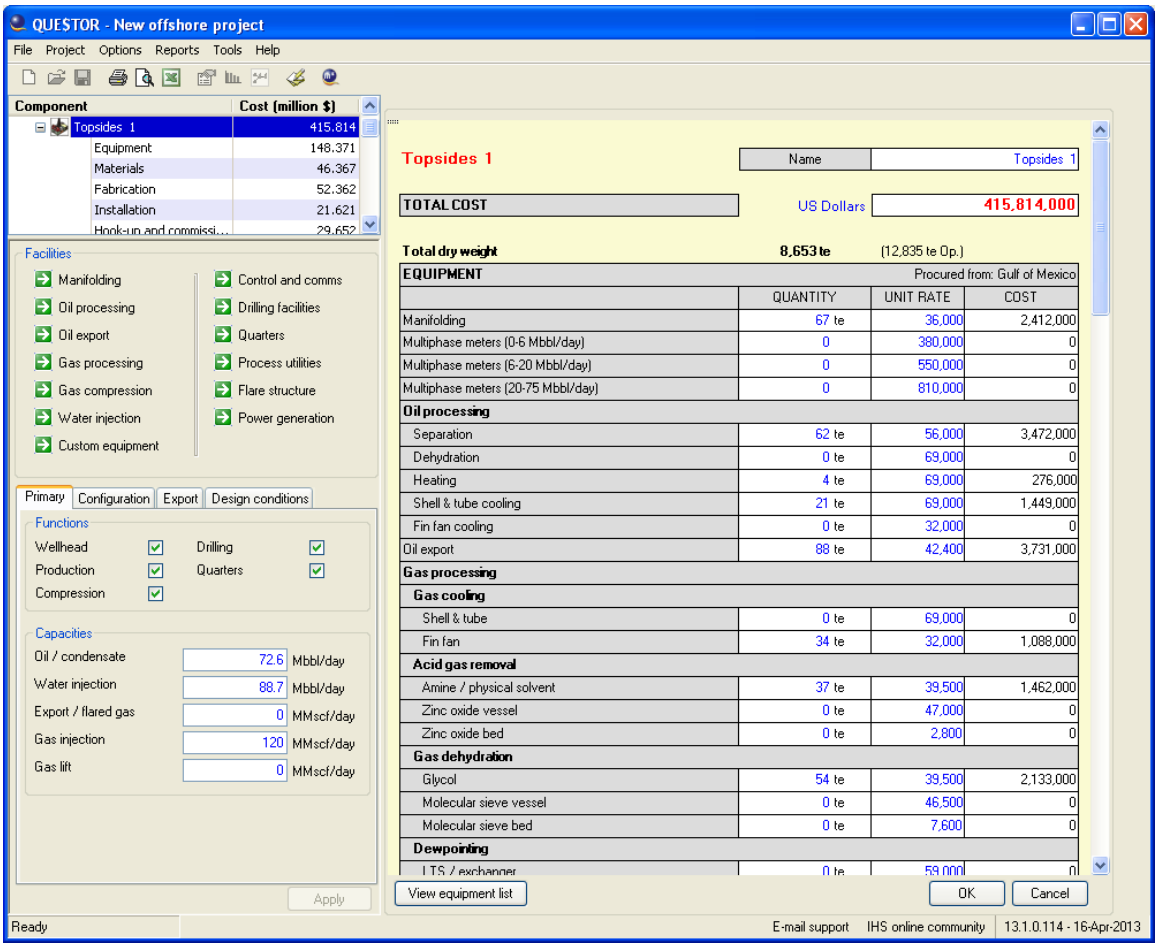
Components often require links so that the correct data can flow between them. Components are linked using the link icon in the toolbar  . Once you have linked two components you may need to add a pipeline by double clicking on the link.

 **Note**: Connections from drilling components, subsea, and wellpad groups do not require pipelines to be specified.

Each component will be estimated using default assumptions based on the data you have entered so far. To view a component in detail you can double click on it or right click on it and select **Edit / view cost estimate**.

Adjusting a Component

You can view the details of each component by either double clicking on the component icon in the field development schematic or by right clicking on teh icon and selecting **Edit / view cost estimate**.

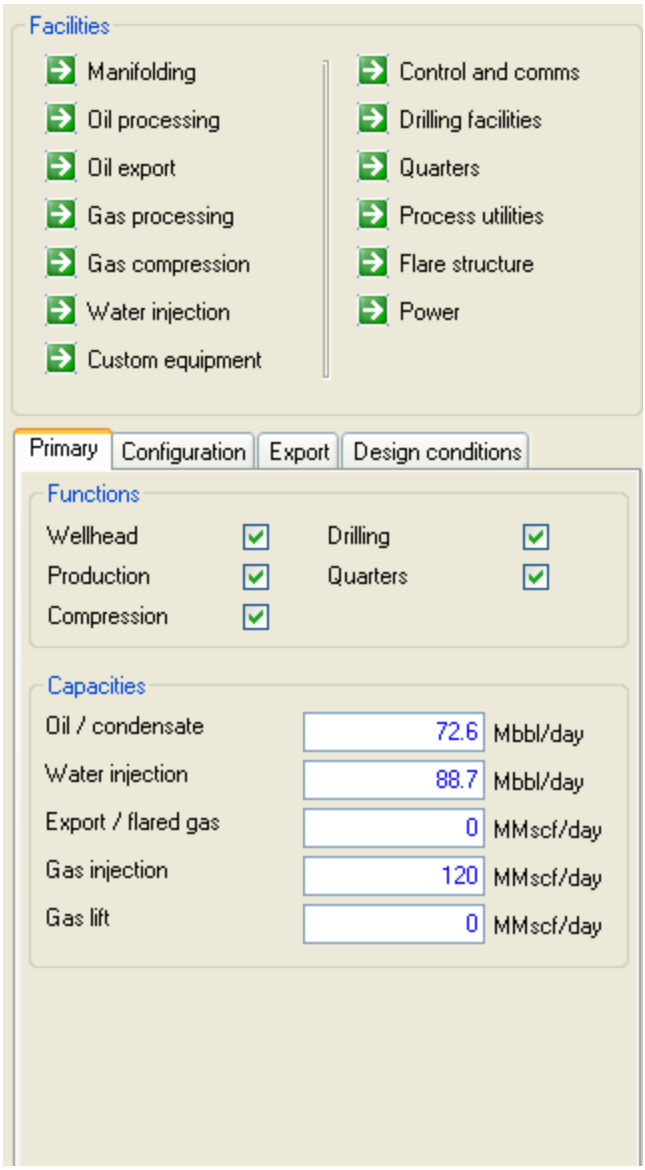


Each component has two main parts to it: the inputs, where you can adjust the design parameters, and the cost sheet, where you can see the detailed breakdown of the cost.

You can make changes within each of these areas and when you click **Apply** or **OK** these changes will be applied to the component and the CAPEX estimate adjusted accordingly. Clicking on **OK** will also exit the component. Clicking **Cancel** also exits the component; however you will lose all changes made since you entered the component.

Inputs

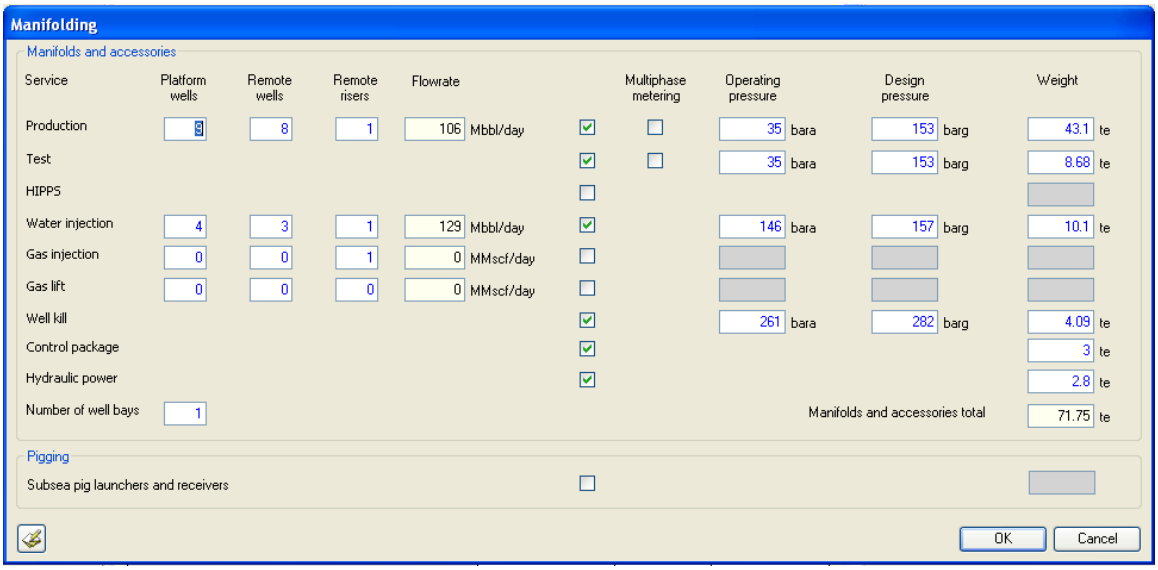
The left hand side of the screen contains the main input data for that component. The input form for the topsides component is shown below.



The input form shows the main design parameters for a given component, such as the design flowrates. You can make changes to these values to match your design assumptions. When you click **Apply** these changes will be applied to the component and the CAPEX estimate adjusted accordingly.

Sub-components

There are arrow buttons within many components that can be clicked on to open up one of the sub-components; the details of that system are then shown. The topsides Manifolding sub-component form is shown below.



You can make changes within each sub-component and when you click **OK** these changes will be applied to the component and the CAPEX estimate adjusted accordingly.

Cost sheet

The right hand side of the screen has the cost sheet. This shows a detailed breakdown of the CAPEX estimate for the component. Each line item is made up of a quantity and a unit rate.

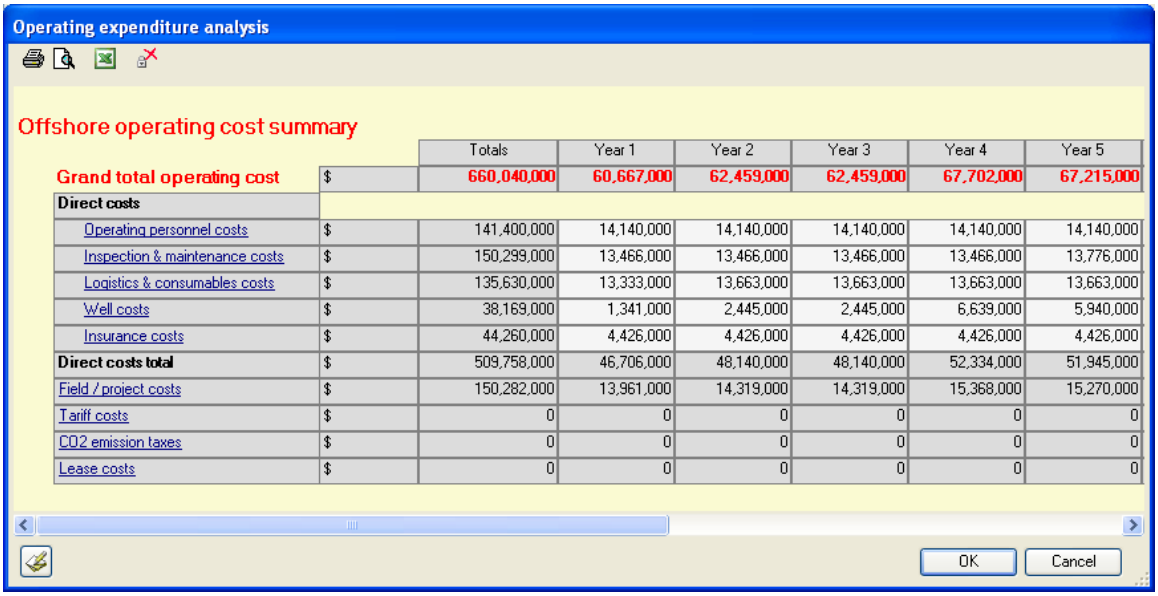
QUANTITY	UNIT RATE	COST
150 te	29,500	4,425,000

The quantity is calculated from the design parameters and technical algorithms for that item and the unit rate is taken from the selected procurement strategy. You can overwrite any of the blue values within the cost sheet, as shown for the quantity entry above. Numbers in black are derived by multiplying the quantity by the unit rate so can't be overwritten.

Calculating the Operating Costs

The operating cost calculations should be run once you have finished the design of your development as the costs are based on the technical definition of the development.

The OPEX algorithms are run by selecting **OPEX** from the **Project** menu. This will open a separate window where a summary of the operating costs for each year of production is displayed.



		Totals	Year 1	Year 2	Year 3	Year 4	Year 5
Grand total operating cost	$	660,040,000	60,667,000	62,459,000	62,459,000	67,702,000	67,215,000
Direct costs							
Operating personnel costs	$	141,400,000	14,140,000	14,140,000	14,140,000	14,140,000	14,140,000
Inspection & maintenance costs	$	150,299,000	13,466,000	13,466,000	13,466,000	13,466,000	13,776,000
Logistics & consumables costs	$	135,630,000	13,333,000	13,663,000	13,663,000	13,663,000	13,663,000
Well costs	$	38,169,000	1,341,000	2,445,000	2,445,000	6,639,000	5,940,000
Insurance costs	$	44,260,000	4,426,000	4,426,000	4,426,000	4,426,000	4,426,000
Direct costs total	$	509,758,000	46,706,000	48,140,000	48,140,000	52,334,000	51,945,000
Field / project costs	$	150,282,000	13,961,000	14,319,000	14,319,000	15,368,000	15,270,000
Tariff costs	$	0	0	0	0	0	0
CO2 emission taxes	$	0	0	0	0	0	0
Lease costs	$	0	0	0	0	0	0

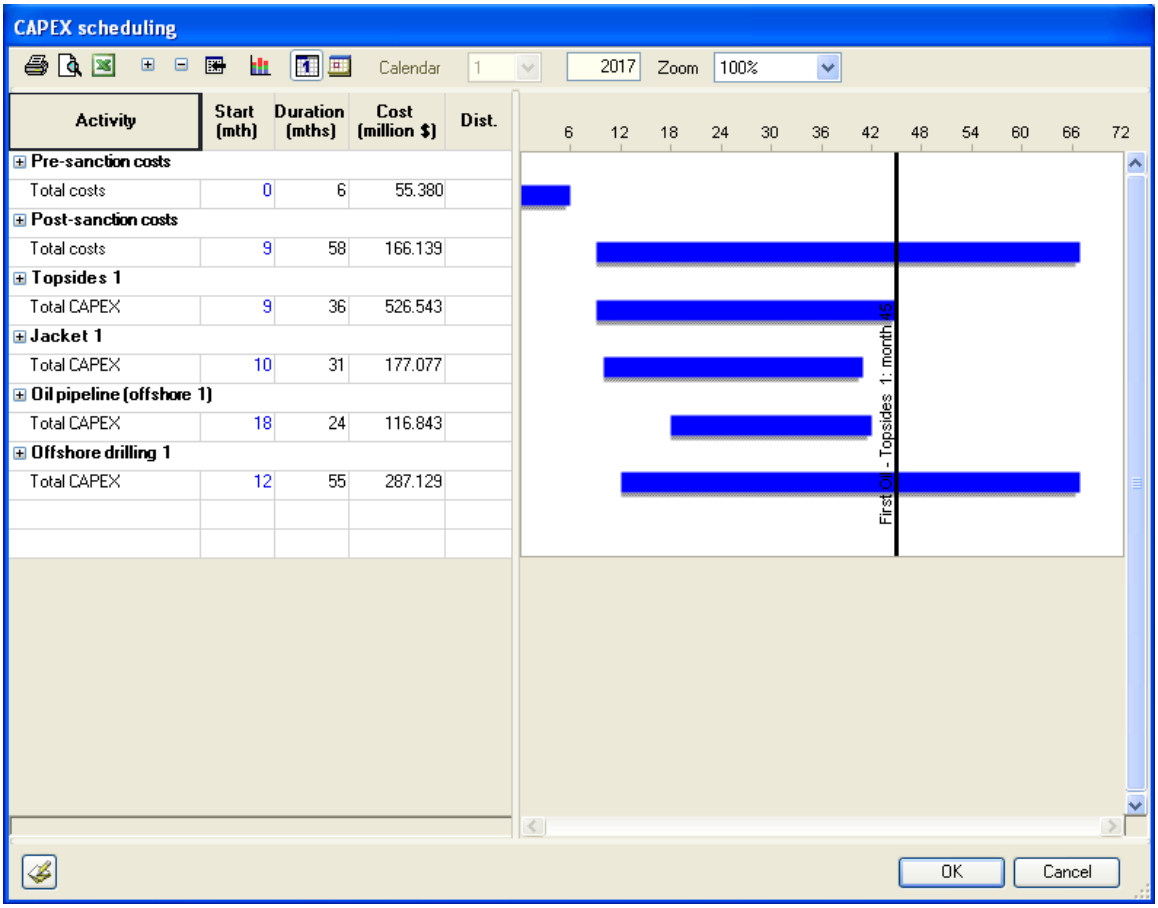
The costs are broken down into various categories, which can be seen on the left side of the screen. The detailed breakdown of these cost categories can be seen by clicking on these items, they are formatted as blue hypertext. This will open up further definition sheets for you to review or adjust the default values.

Once you are happy with the operating costs, click **OK** to go back to field development schematic so that you can generate the project schedule.

Scheduling the Capital Costs

The CAPEX scheduling calculations should be run once you have finished the design of your development as the schedule and costs are based on the details of the development.

The CAPEX scheduling module can be accessed by selecting **Scheduling** from the **Project** menu. The schedule will be shown as a Gantt chart along with the underlying data for each component.



For each component, a detailed schedule can be viewed by expanding the component using the  icon. You can adjust the start date and activity duration either by dragging the bars within the Gantt chart or by adjusting the corresponding values in the table. Adjusting these values will change when the calculated CAPEX values are to be spent.

Once you are happy with the project schedule, click **OK** to go back to field development schematic so that you can generate the Investment and production profile.

Generating the Investment and Production Profile

The investment and production profile is run by selecting **Investment and production profiles** from the **Project** menu.

The investment and production profile gives a report of all of the values that could be required to run an economic analysis, with the production, CAPEX and OPEX given for each year of the project. The values in this report are in real terms, i.e. they are costs specific to a particular point in time (depending on the version) and have not been inflated or discounted over the life of the project.

This report can be printed or exported to Excel using the toolbar buttons.

Saving Your Project

Projects are not automatically saved in QUE$TOR. We recommend you save your project when you reach the field development schematic and at regular intervals after this.

To save a project select **Save** or **Save As** from the **File** menu or click on the **Save** project button  . This will enable you to save the project in the usual Windows fashion. The default location for saved projects is '**My Documents\IHS\QUE$TOR\Projects**'.

Saved project files have a ".qpr" file extension and include the selected procurement strategy, technical database and unit set. Once saved, projects are completely standalone and have no further interaction with QUE$TOR's databases. This means that saved projects can easily be sent to others who may not have the same databases.

Saved projects can be moved, copied and renamed using Microsoft Windows Explorer in the same way as any Windows file. Projects can be opened either directly from Windows Explorer or from within QUE$TOR. To open a saved project in QUE$TOR either select **Open existing project** from the form that appears when QUE$TOR starts or select **Open** from the **File** menu.

 **Note**: When you create a new project you won't be able to save the project until you reach the field development schematic.

Opening a Saved Project

To open a saved project select, using the option buttons, **Browse for project** and click **OK** to proceed or click on the Open project button  . This will enable you to open a project in the usual windows fashion. The Open existing project box has shortcuts to the last five projects opened in QUE$TOR. Saved projects have a ".qpr" file extension.

Contacting customer support

As part of the continuing licensing agreement for QUE$TOR, IHS offers a full technical support service via its regional offices. Both computing and engineering support relating to the operation and understanding of the program are available.

The QUE$TOR support group has a dedicated support email address: support_questor@ihs.com

Note: There is an 's', not a '$' in questor in the email address.

The IHS software support team key contacts are as follows:

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