

# **Capability Overview**



Today's economic environment demands tighter control of budgets and a greater understanding of project costs as early in the project development phase as possible. Bayphase, a leading international oil and gas consultancy, provides upstream field development solutions and decision support through rapid cost estimating.

## **Oil & Gas Cost Estimating Software**



Fourth Edition September 2017



#### **Cutting Edge Cost Estimation Analysis**

**NETCO\$TER**<sup>Onshore Production Module</sup> provides rapid and accurate analysis of global oil and gas projects from feasibility through to conceptual design. It is a cutting-edge simulation software tool developed and used by Bayphase to carry out technical definition and generate capital and operating costs for oil and gas projects.

The system is based on data gathered from a wide range of international projects executed by the company over the past 30 years. It is the result of an in-house programme to leverage the significant bank of knowledge and experience built up within Bayphase over numerous studies.

#### **Technical Capabilities**

**NETCOSTER** is used worldwide in feasibility and concept selection studies to provide engineering definition and cost estimates for field development.

It has been developed to meet the constantly changing needs and challenges of the upstream market, it keeps Bayphase ahead of the opposition through delivering estimates consistently and efficiently.

The program's engineering algorithms are based on sound engineering principles and experience derived from the development of actual onshore production facilities in many of the world's oil and gas provinces.

#### **Sophistication**

**NETCO\$TER** provides a consistent, global platform for concept screening and optimisation and cost-control. Apart from using it in-house, we

have a global network of field development experts who use our **NETCO\$TER** software platform to provide engineering definition and life-cycle cost estimates for field development concepts. This easy to use tool saves hundreds of hours of in-house research and analysis time.

#### **Speed and Accuracy**

**NETCO\$TER** also enables sound project cost modelling and evaluation. It allows our clients to make well-founded concept decisions for their development projects thereby increasing efficiency during execution and decreasing risk. It contributes greatly to successful project planning.

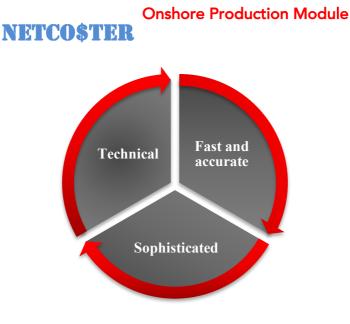
It has been benchmarked against many actual projects – contact us for more details on this.

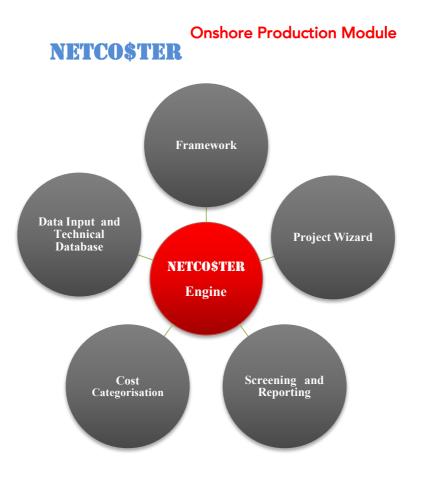
The **NETCO\$TER** cost estimation system is modular in form and is used to estimate costs for the full range of oil and gas projects:

- Small, large and giant fields
- Oil, condensate and non-associated gas
- Any international location
- Sweet and sour fields

It has been deployed as a corporate modelling solution for large and small companies, and has proven to be invaluable in:

- Equity research
- Portfolio analysis
- Business development
- Mergers and acquisition
- Benchmarking
- Competitor analysis





#### Framework

The **NETCOSTER** framework delivers a powerful and intuitive functionality that is core to all the estimation modules. Bayphase's framework approach delivers a powerful solution to cost modelling by utilising a number of key features:

- Transparent models developed entirely in Microsoft Excel. This delivers a consistent and familiar user interface and experience. It also takes advantage of Microsoft Excel's more advanced features therefore minimising systems requirements for running the software. Only Microsoft Office 2007 or above is required.
- There are no significant memory disk space requirements.
- Use of first principles algorithms to automate design, sizing and weight estimating for facilities takes the guess work out of cost estimation and delivers accurate results rapidly.
- The cost modules are updated twice per year through reference to market databases, supplier quotations and cost trends identified by Bayphase. In addition, key cost rates are monitored on a quarterly basis and users are given access to this data to enable them to develop fully up-to-date estimates.

#### **Cost Categorisation**

**NETCOSTER** provides a breakdown of the costs. The data base follows a categorisation that is applied to all modules. This categorisation is strictly maintained as all past projects have been analysed using this matrix to provide consistency. In addition, it broadly follows categorisations used by vendors and industrial cost data bases available in the market place.



#### **Data Input and Technical Database**

**NETCOSTER** uses primary input data such as reserves, reservoir depth, gas oil ratio etc. In addition, built in choices can be selected and customised to best fit user data. Once the field and configuration data is input or chosen, a cost estimate is run.

#### What it does:

- It allows the User to estimate cost for any level of reserves and virtually any type of production facilities configuration. The User inputs the field data the more specific the data is, the more accurate the estimate will be and follows a series of steps to define the onshore production facilities configuration.
- The program provides a number of cost data bases for the world's key oil and gas provinces but users can customise these to generate their own databases (up to three) based on their own experience.
- Once the easy to follow steps have been completed, **NETCOSTER** provides a breakdown of capital cost and operating costs.
- The cost database is weight driven and as such uses a series of algorithms to determine equipment weights. This data is then used to determine equipment costs.
- Once equipment configurations and weights are determined these are used to estimate the amount of bulks and land required to build the facility. This is then used to determine costs for materials, fabrication, transportation, construction, certification, engineering and project management.

#### Key benefits:

- The User can input actual observed field data to model real case.
- The input data can be varied for sensitivity analysis and enable users to understand the key drivers of a project.

#### **Project Wizard**

A powerful component of the **NETCOSTER** interface, the wizard guides the User through all steps required to create and estimate project costs.

#### What it does:

- The wizard provides step-by-step guide for creation of an asset case cost estimate through simple user dialogue screens
- The wizard enables the User to enter all data, with the assistance of additional intuitive messages

#### Key benefits:

- Quick and easy to use.
- Ease of navigation through the model.
- Useful for both expert and novice users alike.

#### **Screening and Reporting**

**NETCO\$TER** is a powerful screening and reporting tool can be used to present the results of analysis, allowing users to easily compare findings from multiple projects calculated under different capacity scenarios.

#### What it does:

- The Program produces User defined reports such as Development Cost, Operating Costs, Cost Schedule, Cost Profiles and Charts, Technical Information, Investment and Cost Profiles.
- It is able to produce a detailed itemised cost breakdown for the production facility.
- A built-in scheduling tool allows the user to schedule costs to provide project cash flows.
- Reports can be printed or exported to spreadsheets.

#### Key benefits

• Enables users to use the output reports to interface with other cost estimating programs.

An integrated cost estimating solution that improves reliability, optimises performance and reduces cost and cycle time during the concept appraisal and selection phases for oil and gas companies worldwide.

#### **Onshore Production Facilities Development Cost**

| Use<br>CuthyRegion<br>Start Year for Cost Scheduling<br>Case Run Date<br>Currency   | Case 1 Gas Reinjection Turbi<br>Bayphase Demonstrator<br>West Africa<br>2018<br>Thursday, 07 September 201 |                                      |                   |  | Cieclogiste, Engine      | rs and Investment Analys |
|---|--|--------------------------------------|-------------------|--|--------------------------|--------------------------|
| clearial Information Fluid Tryoth Real Orgon<br>Approximate Fluid Production Real Orgon<br>Of Production (Real<br>Constraints Production)<br>Natural Gas Production, (MM-64)<br>Plant Power Generation, (MM-64) | 60,300<br>50,000<br>60   |                                      |                   | Hydrogen Sulphide (mol %) [0.0<br>Carbon Dioxide (mol %) [0.5<br>ohur Production Rate (tonnesiday)<br>Oli Gravity (API) 33<br>Condensate Gravity (API)<br>ated Gas Molecular Weight (gmol) 19<br>Power Generation for Export |                          |                          |
| Cost Drivers  | Number<br>of Trains  | Sparing Within Trains                | Number of Units   | Unit Equipment Weight<br>(tonnes)  | Cost<br>(USD/tonne)      | Total Cost<br>(USD)      |
| juipment<br>oduction Separation Equipment<br>oduction Manifold  | 1  | 1x100%                               | 1                 | 4.44   |                          |                          |
| st Manifold<br>oduction Separation  | 1  | 1x100%<br>1x100%                     | 1                 | 0.62<br>24.69<br>2.57  |                          |                          |
| I & Condensate Production Separation Equipment  | 1  | 1x100%                               | 1                 | 2.57   |                          |                          |
| saintri<br>Hann Salvent Recover Unit & Storage<br>Iphur Salvent Unit Storage Shutters<br>guid Sweetening  | 1  | 1x100%                               | 1                 | 24.69  |                          |                          |
| uid Sweetening<br>I Storage Tanks   | 1  | 1x100%<br>2x100%                     | 1                 | 1,244.50<br>19.90  |                          |                          |
| Storage Tarks<br>Transfer pumps<br>ss & Concensate Production Separation Equipment  | 1  | 2x100%                               | 2                 | 19.90  |                          |                          |
| ug Catcher<br>ordensate Stabilisation<br>ndensate Storage Tanks   |  |                                      |                   |  |                          |                          |
| Indensate Transfer pumps as Processing Equipment  |  |                                      |                   |  |                          |                          |
| nine Treatment Unit   | 1  | 1x100%                               | 1                 | 38.05  |                          |                          |
| Selection (@.4°C)<br>frigeration Unit (@.10°C)<br>is injection Compressors  | 1 1  | 2x50%<br>2x50%                       | 2                 | 99.34<br>87.23   |                          |                          |
| is Injection Compressors<br>is Injection Manifold<br>is Export Compressors  | 1  | 1x100%                               | 1                 | 4.89   |                          |                          |
| as Eport Compressors<br>se Life Compressors<br>se Life Manifold :<br>se Trastance Enriconant  | 1  | 3x50%<br>1x100%                      | 3                 | 53.45<br>2.00  |                          |                          |
| is Treatment Equipment<br>interation<br>Iphur Recovery Unit   | 1  | 1x100%                               | 1                 | 25.39  |                          |                          |
| Ipnur storaje snuters   |  |                                      |                   |  |                          |                          |
| Iphur Slurry Injection Manifold (Wells)<br>id Gas Treatment Equipment   |  |                                      |                   |  |                          | -                        |
| id Gas Dehydration (8, -4°C)<br>id Gas Compressors<br>id Gas Injection Manifold   |  |                                      |                   |  |                          |                          |
| B Gas Traditional<br>B Gas Teatment<br>id Gas Dehydration (@ - 4*C) - H <sub>2</sub> S  |  |                                      |                   |  |                          |                          |
| id Gas Compressors - H <sub>2</sub> S T<br>S Injection Manifold   |  |                                      |                   |  |                          |                          |
| 2, Gas Treatment<br>id Gas Dehydration (@ - 4°C) - CO <sub>2</sub>  |  |                                      |                   |  |                          |                          |
| id Gas Compressors - CO <sub>2</sub>  |  |                                      |                   |  |                          |                          |
| y Water Disposal<br>aler Treatment  |  |                                      |                   |  |                          |                          |
| ater Disposal Pump<br>ater Disposal Manifold  |  |                                      |                   |  |                          |                          |
| tater Treatment/Injection<br>atter Treatment<br>atter Injection Pump<br>atter Injection Numridid  |  |                                      |                   | -  |                          |                          |
| aior Utilities  |  |                                      |                   |  |                          |                          |
| are and Vent  | 1  | 1x100%<br>1x100%                     | 1                 | 2.52   |                          |                          |
| revalate System and Power Generation ack Start Power Generation ack Start Power Generation  | 1  | 1x100%<br>1x100%<br>1x100%           | 1                 | 0.81<br>44.63<br>10.60   |                          | -                        |
| salination<br>earn Generation and Distribution<br>wer Generation for Export   |  |                                      |                   |  |                          |                          |
| ntrol Room<br>nor Utilities   | 1  | 1x100%<br>1x100%                     | 1                 | 3.00   |                          |                          |
| el Gas<br>ains - Oily Water<br>ains - Sewage  | 1  | 1x100%<br>1x100%<br>1x100%<br>1x100% | 1                 | 4.50   |                          |                          |
| lity Air<br>lity Air  | 1  |                                      | 1                 | 3.60   |                          |                          |
| ert Gas<br>remical Injection - Corrosion Inhibitor  | 1  | 1x100%<br>1x100%                     | 1                 | 4.50<br>4.50<br>4.50   |                          |                          |
| remical Injection - Demulsifier<br>emical Injection - Anti-forming Agents<br>emical Injection - Methanol  | 1  | 1x100%<br>1x100%                     | 1                 | 4.50   |                          |                          |
| vernical Injection - Glycol<br>vernical Injection - (Custom)  |  |                                      |                   |  |                          |                          |
| emicial Injection - (Custom)<br>esel<br>odina Medium  | 1  | 1x100%<br>1x100%<br>1x100%           | 1                 | 9.00<br>9.00<br>12.00  |                          |                          |
| olina Medium<br>ading Medium<br>w/Service Water   | 1  | 1x100%<br>1x100%                     | 1                 | 9.00<br>12.00<br>2.70  |                          |                          |
| awater<br>inking Water  | 1  | 1x100%                               | 1                 | 6.00   |                          | -                        |
| rounds<br>Le Grading<br>rimeter Fence   |  |                                      |                   | 0.049km2<br>0.885km  |                          |                          |
| antee Feine<br>ads Within Plant Boundary  |  |                                      | Equipment Subtota | 0.443km  |                          | 116,939                  |
| aterials  |  | 1                                    | equipment oubtob  |  |                          | 116,939                  |
| riton Steel Pioloa<br>loy Steel Piping<br>uctural Steel   |  |                                      |                   | 276.09<br>0.15<br>14.32  |                          |                          |
|   |  |                                      |                   | 6.513m3<br>138.05  |                          | -                        |
| edrical<br>drumentation<br>fetv   |  |                                      |                   | 194.81<br>97.41  |                          |                          |
| brication   |  |                                      |                   |  | Materials Subtotal       | 25,628                   |
| irbon Steel Piping  |  |                                      |                   | 276.09<br>0.15   |                          |                          |
| ructural Steel  |  |                                      |                   | 14.32<br>6.513m3<br>138.05   |                          |                          |
| undations<br>echical<br>drumentation<br>fefy  |  |                                      |                   | 138.05<br>194.81<br>97.41  |                          |                          |
|   |  | •                                    |                   |  | Fabrication Subtotal     | 39,800                   |
| eight   |  |                                      |                   |  | 8.00%                    | 14,589                   |
| stallation/Construction   |  |                                      |                   |  | Freight Subtotal         | 14,589                   |
| Instruction Hours   |  |                                      |                   | 1.948.000hrs   | Materials Subtotal       | 77,920                   |
| ngineering, Project Management, Certification and Contingency   |  | 1                                    |                   | 1.015.0001   |                          | 77,920                   |
| aineering Contractor<br>I Company Management  |  |                                      |                   | 1.915.000hrs<br>191,500hrs<br>Engineering and project N  |                          |                          |
| vtification<br>nilngency  |  |                                      |                   | Engineering and project N  | 1.50%<br>12.00%          | 156,647                  |
| intingency  |  |                                      |                   | Certification  | and Contingency Subtotal | 59,032                   |
|   |  |                                      |                   | Project Management, Certification  |                          | 215,679                  |

Unit rates have been redacted to protect our Intellectual Property

#### **Onshore Production Facilities Operating Cost**

| Project Title   |                                       |                 |   |
|---|---------------------------------------|-----------------|---|
| Case Identifier<br>User   |                                       |                 |   |
| Country/Region  |                                       |                 |   |
| Start Year for Cost Scheduling  |                                       |                 | A NEW PLAN PLAN                               |
|   | Thursday, 07 September 2017, 11:3     | 7:58            | All and a second second                       |
| Currency  | USD                                   |                 | Geologists, Engineers and Investment Analysts |
| Technical Information<br>Fluid Type   | Oil                                   |                 |   |
| Approximate Fluid Production Rate (boe)   | 60.300                                |                 |   |
| Oil Production (bpd)  | 50,000                                |                 |   |
| Condensate Production (bpd)<br>Natural Gas Production (MMscfd)                                    | 50,000                                |                 |   |
| Sales Gas rate (MMscfd)   |                                       |                 |   |
| Cost Drivers  | Number Required                       | Cost (USD/Unit) | Total Cost                                    |
| Services  |                                       | ,               |   |
| Helicopter Services (AS 322 Super Puma)   |                                       |                 |   |
| Fixed Wing Services (Tupolev 134)   |                                       |                 | 1   |
| Plant Administration  | -                                     |                 |   |
| Personnel Expatriate  | 8                                     |                 |   |
| Qualified   | 16                                    |                 |   |
| Skilled<br>Labour   | 32 32                                 |                 |   |
| Vehicles  |                                       |                 |   |
| Saloons   | 8                                     |                 |   |
| Pick-ups<br>Vans  | 8<br>5                                |                 |   |
| Buses   | 3                                     |                 |   |
| Trucks  | 3                                     |                 | 1   |
| Plant Operators<br>Expatriate   | 4                                     |                 |   |
| Qualified   | 8                                     |                 |   |
| Skilled<br>Labour   | 8                                     |                 |   |
| Consumables   | , , , , , , , , , , , , , , , , , , , |                 |   |
| Chemical Injection  |                                       |                 |   |
| Corrosion Inhibitor Injection (bbl/year)  | 219<br>110                            |                 |   |
| Demulsifier (bbl/year)<br>Anti-Foaming Agent (bbl/year)   | 183                                   |                 |   |
| Methanol (bbl/year)   | 110                                   |                 |   |
| Triethylene Glycol (bbl/year)<br>Other 1  | 438                                   |                 | ₽   |
| Other 2   |                                       |                 |   |
| Production Losses Sulphur Solvent (bbl/year)  |                                       |                 |   |
| Triethylene Glycol Injection Rate (bbl/year)  | 22                                    |                 |   |
| Diethanolamine (DEA) Injection Rate (bbl/year)<br>Triethanolamine (TEA) Injection Rate (bbl/year) | 11<br>0                               |                 |   |
| Other 1   | ů                                     |                 |   |
| Other 2   |                                       |                 |   |
| Maintenance<br>Spares   | 0.20%                                 |                 |   |
| Equipment Replacement   | 0.10%                                 |                 |   |
| Vendor Specialists  | 0.15% 0.05%                           |                 |   |
| Equipment Monitoring Corrosion Monitoring   | 0.05%                                 |                 |   |
| Inspection  |                                       |                 |   |
| Inspection Specialists(% of CAPEX)  | 0.30%                                 |                 |   |
| Vessel Inspection Frequency (Annual)<br>Rotating Equipment Inspection Frequency (Annual)          | 2                                     |                 |   |
| Major Equipment Inspection Frequency (Annual)   | 2                                     |                 |   |
| Safety Systems Inspection Frequency (Annual)  | 1                                     |                 |   |
| Technical Support (Annual)<br>Manning   |                                       |                 |   |
| Expatriate  | 4                                     |                 |   |
| Qualified<br>Skilled  | 8                                     |                 |   |
| Labour  | 8                                     |                 |   |
| Budget<br>Social and Local Infrustructure   | 0.10%                                 |                 |   |
| Studies and Audits  | 0.05%                                 |                 |   |
| Insurance   | 0.50%                                 |                 | 1   |
| Equipment Inspection Specialists (% of CAPEX)   | 0.0001                                |                 |   |
|   |                                       |                 | Subtotal 19,189,00                            |
| Oil Company Management  |                                       |                 |   |
| Oil Company Management  | 19,189,000                            | 8.00%           | 1,535,00                                      |
|   |                                       |                 |   |
| On company wanagement   |                                       |                 | Subtotal 1,535,00                             |
|   |                                       |                 |   |

## Unit rates have been redacted to protect our Intellectual Property

#### **Onshore Production Facilities Technical Sheet**

| Project Title<br>Menific   | e: Elvira<br>17 Case 1 Gas Reinjection Turbine               |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  | ( Salar   |   |
|--|--|---|-----------------|--|--|---|--|--|---|------------------------------------|--------------------|-----------------------------------|---|--|--|---|---|
| Usa<br>Country/Regio   | r Bayphase Demonstrator<br>n West Africa                     |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
|  |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  | S BAS   | phase .                                       |
| Carner   | g 2018<br>e: Thursday, 07 September 2017, 12:11:35<br>y: USD |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  | Geologists, Engineers and                                   | d Investment Analysis                         |
| Technical Information Fluid Typ  | oi   |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Gas Ol Ratio (COR)<br>Ratio Transition (Core of the Core   | () 1200<br>() 2500   |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Water Disposed Injection Depth (u<br>Water Disposed Injection Depth (u   | a)   |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Component Description  | Number of  | Number Sparing  | Number of Units | Overall Design<br>H <sub>2</sub> S Presence Throughput Liquids<br>(bbbs/Day) | Overall Design<br>Throughput Gas<br>(mmscfd) | Unit Unit<br>Throughput Liquids Throughput Gao<br>(bbls/Day) (MMscId) | Plinkey Fl <sup>*</sup> da<br>(bara) (bara | P Efficiency Length<br>(km)  | ne Liquid Viscosity<br>h Density (cp)                         | Molecular Weight Export G<br>(g) ( | as Dewpoint        | eter Generated<br>basy Power (MW) | trical Power<br>Used<br>(MW) (MW)   | r Fael<br>Gas Used<br>(MMscfd)                                       | Fence/Shatters                         | Footprint<br>Area   | Unit Equipment<br>Weight<br>(tannes)          |
|  | Number of<br>(Wells/Days)                                    | Number Sparing<br>of Trains Trains  | Number of Units | H <sub>2</sub> S Presence Throughput Liquids<br>(bbls/Day)                   | Throughput Gas<br>(mmscfd)                   | Throughput Liquids Throughput Gao<br>(bbls/Day) (MMscld)              | (bara) (bara                               | Efficiency Length<br>(km)  | ne Liquid Viscosity<br>h Dousity (cp)<br>(kg/m <sup>2</sup> ) | (2) (2)                            | (°C) Diam<br>(inch | eter<br>Power (MW)                | trical Power Turbine Power<br>Used Used<br>(MW) (MW)                          | Gas Used<br>(MMscfd)   | Fence/Shatters<br>Length/Height<br>(m) | Area<br>(m <sup>2</sup> )                                   | (tonnes)                                      |
| Shared Production Separation Equipment Production Manifold (Wells)   | 11   | 1 1x1009  |                 | 1 50,000   | 60   | 50,000 60   | 1  | - I - I  | - I - I   | - I - I                            |                    | - I - I                           |   | 1  | 1                                      | 34.64   | 4.44  |
| Test Manifold (Wells)  | 11   | 1 1x1009  | i 1             | 1 5,910  |  | 5,910   |  |  |   |                                    |                    |                                   |   |  |  | 20.02   | 0.62  |
| Production Separation (Wells)<br>Test Separator (Wells)<br>Oil & Condensate Production Separation Equipment  | 11   | 1 1x1009  | 1               | 1 50,000<br>1 5,910  | 60   | 50,000 60   |  |  |   |                                    |                    |                                   |   |  |  | 116.88  | 24.69<br>2.57                                 |
| Test Separator (Wells)<br>Oil & Condensate Production Separation Equipment   | 11   | 1 1x1009  | 1               | 1 5,910  | 1 1  | 5,910   |  | -  |   |                                    |                    |                                   |   |  |  | 29.70   | 2.57  |
| Desalter   |  | 1 1x1009  | 1               | 50,000   |  | 50,000  |  |  |   |                                    |                    |                                   |   |  |  | 33.70   | 24.69   |
| Sulphur Solvent Recover Unit & Storage<br>Sulphur Solvent Unit Storage Shutters  |  |   |                 |  | -  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Liquid Sweetening  |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Oil Storage Tanks (Days)<br>Oil Transfer pumps   | 10   | 1 1x1009<br>1 2x1009  |                 | 50,000   |  | 50,000<br>50,000  | 50   | 100  |   |                                    |                    |                                   | 0.657   | 0.059  |  | 4,386.40<br>24.49   | 1,244.50<br>19.90                             |
| Gas & Condensate Production Separation Equipment   |  | . 20009   |                 | 50,000   |  |   |  | 100  |   |                                    |                    |                                   |   | 1 0.002  |  | *7.77   | 1 0.00  |
| Shua Catchar   |  | <u>├</u> ──   |                 |  |  |   | +  | + + -  |   |                                    |                    |                                   |   |  |  |   |   |
| Condensate Stabilisation<br>Condensate Storage Tanks (Days)  | 5  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Condensate Transfer pumps  |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   | 1  |  |   |   |
| Gas Processing Equipment Amine Treatment Unit  |  | 1 1x1009  | . 1             |  | 60   | 60  |  |  |   |                                    |                    |                                   | 0.019   | 0.006  |  | 212.79  | 38.05   |
| Amine Treatment Unit - Selective   |  |   |                 |  |  |   |  |  |   | 10                                 |                    |                                   |   |  |  | 17.28   | 187.88  |
| Gas Dehydration (@. 4°C)<br>Refrigeration Unit (@10°C)   |  | 1 1x1009<br>1 2x50%   | 2               |  |  |   |  |  |   |                                    | -4                 |                                   | -   |  |  | 17.28   | 187.88<br>99.34                               |
| Gas Injection Compressors  |  | 1 2x50%   | 2               |  | 59   | 29  | 208 20                                     | 0.6  |   |                                    |                    |                                   | 5.270   | 0.473  |  | 133.17  | 87.23   |
| Gas Injection Manifold<br>Gas Export Compressors   | 5  | 1 1x1009  | 5 1             | 1  | 59   | 59  |  |  |   |                                    |                    |                                   |   |  |  | 240.00  | 4.89  |
| Gas Lift Compressors   |  | 1 3x50%   |                 |  | 11   | 6   | 138 70                                     | 0.6  |   |                                    |                    |                                   | 0.319   | 0.029  |  | 99.26   | 53.45   |
| Gas Lift Manifold<br>Shared Gas Treatment Equipment  |  | 1 1x1009  | 1               | 1  | 11   | 11  |  |  |   |                                    |                    |                                   |   | 1  |  | 240.00  | 2.00  |
| Incineration   |  | 1 1x1009  | . 1             | 1  | 4  | 4   |  |  |   |                                    |                    |                                   | 1   | 0.142  |  | 200.00  | 25.39   |
| Sulphur Recovery Unit  |  |   |                 |  |  |   | _  | _  |   |                                    |                    |                                   |   |  |  |   |   |
| Sulphur Storage Shutters<br>Sulphur Slurrification Plant   |  |   |                 | 2  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Sulphur Slurry Injection Manifold  |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Acid Gas Treatment Equipment<br>Acid Gas Dehydration (@ - 4°C)   |  | 1   | 1               |  | 1 1  |   | 1 1  |  |   | 1                                  |                    | 1                                 |   |  |  |   | 1   |
| Acid Gas Compressors   |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Acid Gas Injection Manifold (Wells)<br>H2S Gas Treatment   |  | II  |                 |  | I  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Acid Gas Dehydration (@ - 4ºC) - H2S   |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Acid Gas Compressors - H2S<br>H2S Injection Manifold   |  |   |                 |  |  |   |  |  |   |                                    |                    | _                                 |   |  |  |   |   |
| CO2 Gas Treatment  |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Acid Gas Dehydration (@ - 4°C) - CO2<br>Acid Gas Compressors - CO2   |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| CO2 Injection Manifold   |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Olly Water Disposal<br>Water Treatment   |  | 1   | 1               |  |  |   | 1  | 1  |   | 1                                  |                    | 1                                 |   | 1  |  |   | 1   |
| Water Disposal Pump  |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Water Disposal Manifold<br>Water Treatement/Injection  |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Water Treatment  |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Water Injection Pump<br>Water Injection Manifold   | -  |   |                 |  |  |   |  |  |   |                                    |                    |                                   | _   | 1  |  | -   |   |
| Major Utilities  |  | I I   |                 |  |  |   |  |  |   |                                    |                    |                                   |   | <u> </u>   | 1                                      |   | <u> </u>                                      |
| Flare and Vent   |  | 1 1x1009  | 1               |  | 60   | 60  |  |  |   |                                    |                    |                                   | 0.200   | 0.018  |  | 3,304.31  | 2.52  |
| Firewater System<br>Plant Power Generation   |  | 1 1x1009<br>1 1x1009  |                 |  |  |   |  |  |   |                                    |                    | 6.196                             | 0.101   | 0.009  |  | 150.00<br>74.17   | 0.81<br>44.63                                 |
| Black Start Power Generation   |  | 1 1x1009  |                 |  |  |   |  | _  |   |                                    |                    | 0.100                             |   |  |  | 6.24  | 10.60   |
| Desalination<br>Steam Generation and Distribution  |  |   |                 |  |  |   | + +  | + +  |   |                                    |                    |                                   |   |  |  |   |   |
| Power Generation for Export  |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  |   |   |
| Control Room<br>Minor Utilities  |  | 1 1x1009  | 1               |  |  |   |  |  |   |                                    |                    |                                   | 0.300   | 0.027  |  | 130.00  | 1   |
| Fuel Gas   |  | 1 1x1009  | i 1             |  |  |   |  |  |   |                                    |                    |                                   | 0.100   | 0.009  |  | 15.00   | 3.00  |
| Drains - Oily Water<br>Drains - Sewage   |  | 1 1x1009<br>1 1x1009  | 1               |  |  |   |  | + +  |   |                                    |                    |                                   | 0.200   | 0.018  |  | 22.50<br>10.50  | 4.50  |
| Instrument Air   |  | 1 1x1009  | i 1             |  |  |   |  |  |   |                                    |                    |                                   | 0.300   | 0.027  |  | 10.50   | 3.60  |
| Utility Air  |  | 1 1x100%  |                 |  |  |   |  |  |   |                                    |                    |                                   |   |  |  | 33.50   |   |
| Inert Gas  |  |   |                 |  |  |   |  |  |   |                                    |                    |                                   |   | 0.014  |  |   | 4.50  |
| Chemical Injection - Corrosion Inhibitor   |  | 1 1x1009<br>1 1x1009  | i 1             |  |  |   |  |  |   |                                    |                    |                                   | 0.500   | 0.045  |  | 22.50<br>22.50  | 4.50<br>4.50                                  |
| Chemical Injection - Demulsifier   |  | 1 1x1009  | i 1             |  |  |   |  |  |   |                                    |                    |                                   | 0.500 0.500 0.500   | 0.045<br>0.045<br>0.045  |  | 22,50<br>22,50<br>22,50                                     | 4.50<br>4.50                                  |
| Chemical Injection - Demulsifier<br>Chemical Injection - Anti-forming Agents<br>Chemical Injection - Methanol  |  | 1 1x1009<br>1 1x1009<br>1 1x1009  | 1               |  |  |   |  |  |   |                                    |                    |                                   | 0.500   | 0.045  |  | 22.50   | 4.50  |
| Chemical Injection - Demulsifier<br>Chemical Injection - Atti-forming Agents<br>Chemical Injection - Methanol<br>Chemical Injection - Glycol   |  | 1 1x1009<br>1 1x1009  | 1               |  |  |   |  |  |   |                                    |                    |                                   | 0.500   | 0.045  |  | 22.50<br>22.50<br>22.50<br>22.50                            | 4.50<br>4.50<br>4.50                          |
| Chemical Injection - Demundifier<br>Chemical Injection - Anti-forming Agents<br>Chemical Injection - Alvedand<br>Chemical Injection - Glycol<br>Chemical Injection - (Custom)  |  | 1 1x1009<br>1 1x1009<br>1 1x1009  | 1               |  |  |   |  |  |   |                                    |                    |                                   | 0.500   | 0.045  |  | 22.50   | 4.50  |
| Censial Injection - Donuloffer<br>Censical Injection - Auto-forming Agents<br>Demical Injection - Methanol<br>Censical Injection - Octool<br>Censical Injection - Coutoon<br>Censical Injection - Coutoon<br>Desel   |  | 1 1x1009<br>1 1x1009<br>1 1x1009<br>1 1x1009<br>1 1x1009<br>1 1x1009  |                 |  |  |   |  | Image: Constraint of the sector of |   |                                    |                    |                                   | 0.500 0.500 0.500 0.500 0.500   | 0.045 0.045 0.045 0.045  |  | 22.50<br>22.50<br>45.00                                     | 4.50 4.50 9.00                                |
| Cencial Injecton - Demulafor<br>Cencial Injecton - Andorman Agron<br>Cencial Injecton - Machanal<br>Cencial Injecton - Coycol<br>Cencial Injecton - Coycol<br>Cencial Injecton - Custom<br>Decel<br>Cooling Medium   |  | 1 Isloo<br>1 Isloo<br>1 Isloo<br>1 Isloo<br>1 Isloo<br>1 Isloo<br>1 Isloo<br>1 Isloo<br>1 Isloo   |                 |  |  |   |  |  |   |                                    |                    |                                   | 0.500 0.500 0.500 0.500 0.500 0.500 0.500 0.200                               | 0.045 0.045 0.045 0.045 0.045 0.018                                  |  | 22.50<br>22.50<br>45.00<br>45.00                            | 4.50<br>4.50<br>9.00<br>9.00                  |
| Censial Injection - Demulafor<br>Censial Injection - Andrésmiph Agren<br>Censial Injection - Machemiph<br>Demical Injection - Chyold<br>Censial Injection - Clustom)<br>Demical Injection - Clustom)<br>Desel<br>Comisal Injection - Clustom)<br>Desel<br>Assessariase Water   |  | 1 Isloo<br>1 Isloo<br>1 Isloo<br>1 Isloo<br>1 Isloo<br>1 Isloo<br>1 Isloo<br>1 Isloo<br>1 Isloo   |                 |  |  |   |  |  |   |                                    |                    |                                   | 0.500 0.500 0.500 0.500 0.500   | 0.045 0.045 0.045 0.045  |  | 22.50<br>22.50<br>45.00                                     | 4.50 4.50 9.00                                |
| Cennical Injection - Demutafier<br>Cennical Injection - And-Kenniga Agents<br>Cennical Injection - Marchaned<br>Cennical Injection - Grycol<br>Cennical - Grycol<br>Cennical Injection -  |  | 1         h1000           1         h1000 |                 |  |  |   |  |  |   |                                    |                    |                                   | 0.500<br>0.500<br>0.500<br>0.500<br>0.500<br>0.500<br>0.200<br>0.400<br>0.400 | 0.045<br>0.045<br>0.045<br>0.045<br>0.045<br>0.018<br>0.038<br>0.036 |  | 22.50<br>22.50<br>45.00<br>45.00<br>60.00<br>13.50          | 4.50<br>4.50<br>9.00<br>9.00<br>12.00<br>2.70 |
| Cennical Injection - Demandafar<br>Cennical Injection - Andrésming Agreen<br>Cennical Injection - Andrésming Agreen<br>Cennical Injection - Grycel<br>Cennical Injection - Grycel<br>Cennical Injection - Grycel<br>Cennical Injection - Grycel<br>Demandary - Constantion<br>Demandary - Constantion<br>Resources Water<br>Seaware<br>Dankang Water<br>Canadary   |  | 1 1x109<br>1 1x109<br>1 1x109<br>1 1x109<br>1 1x109<br>1 1x109<br>1 1x109<br>1 1x109  |                 |  |  |   |  |  |   |                                    |                    |                                   | 0.500 0.500 0.500 0.500 0.500 0.200 0.400                                     | 0.045 0.045 0.045 0.045 0.018 0.038                                  |  | 22.50<br>22.50<br>45.00<br>45.00<br>60.00                   | 4.50<br>4.50<br>9.00<br>9.00<br>12.00         |
| Consul Tapicon. Semantifier<br>Consul Tapicon. And Sering Agents<br>Chemical Tapicon. Methods<br>Chemical Tapicon. Good<br>Chemical Tapicon. Good<br>Chemical Tapicon. Good<br>Chemical Tapicon. Colord<br>Descel.<br>Cosing Medium<br>Randorrice Water<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casuatar<br>Casua | 000  | 1         h1000           1         h1000 |                 |  |  |   |  |  |   |                                    |                    |                                   | 0.500<br>0.500<br>0.500<br>0.500<br>0.500<br>0.500<br>0.200<br>0.400<br>0.400 | 0.045<br>0.045<br>0.045<br>0.045<br>0.045<br>0.018<br>0.038<br>0.036 |  | 22.50<br>22.50<br>45.00<br>45.00<br>60.00<br>13.50          | 4.50<br>4.50<br>9.00<br>9.00<br>12.00<br>2.70 |
| Cremeal Tajeston - Domadafer<br>Cremeal Tajeston - And-Semija Agaren<br>Cremeal Tajeston - And-Semija Agaren<br>Cremeal Tajeston - Gyord<br>Cremeal Tajeston - Gyord<br>Cremeal Tajeston - Gyord<br>Cremeal Tajeston - Gyord<br>David<br>Canding Markin<br>Tase-Service Water<br>Sesurator<br>Drukung Water<br>Cremeal   | 009<br>035<br>043  | 1         h1000           1         h1000 |                 |  |  |   |  |  |   |                                    |                    |                                   | 0.500<br>0.500<br>0.500<br>0.500<br>0.200<br>0.200<br>0.200<br>0.400<br>0.400 | 0.045<br>0.045<br>0.045<br>0.045<br>0.045<br>0.018<br>0.038<br>0.036 |  | 22.50<br>22.50<br>45.00<br>45.00<br>60.00<br>13.50<br>30.00 | 4.50<br>4.50<br>9.00<br>9.00<br>12.00<br>2.70 |

INTOOSTER Onshore Production Module



**NETCOSTER**<sup>Onshore Production Module</sup> uses a Graphic User Interface that allows Users to input case data to arrive at their cost estimate. For illustrative purposes a number of screen shots from the program are provided below.

#### Opening User Form

This is the first form seen by the User when running a case allowing them to view the process units that can be handled by the program, it also provides the ability to access the results on completion of the cost estimating run.

| Welcome to                       |                    |   | Oil and Gas Cost Estin | -               | ww.netcoster.com |              |
|----------------------------------|--------------------|---|------------------------|-----------------|------------------|--------------|
| NAVIGATIO                        | NBAR               |   |                        | SUMMA           | RY PAGE          |              |
| Run New Case                     | Oil Separation     | Γ | Total D                | evelopment Cost | Peak Year Ope    | erating Cost |
| Project Details                  | Gas Separation     |   |                        |                 |                  |              |
| Cost Database                    | Gas Processing     |   | Development Cost       | View            | Print            | Export       |
| Production Fluid                 | Acid Gas Treatment |   | Operating Cost         | View            | Print            | Export       |
| Oil Field Production Data        | H2S Gas Treatment  |   | Technical Sheet        | View            | Print            | Export       |
| Gas Field Production Data        | CO2 Gas Treatment  | Γ | Cost Schedule Tool     | View            |                  | Print        |
| Condensate Field Production Data | Water Management   | Γ | Cost Profile           | View            | Print            | Export       |
|                                  | Utilities          | Г | Cost Chart             | View            | Print            | Export       |
| Production Fluids Purity         | oundoo             |   |                        |                 |                  |              |

#### Project Definition User Form

This form is used by the User to define the key parameters of the case for file accessing and cost scheduling purposes.

| P    | roject Details                 |                             | ×    |  |  |  |  |
|------|--------------------------------|-----------------------------|------|--|--|--|--|
|      | Project Details                |                             |      |  |  |  |  |
|      | Project Title                  | Nasiriyah Field             |      |  |  |  |  |
| Vel  | Case Identifier                | Case Number 1               |      |  |  |  |  |
|      | User Name                      | Bayphase                    |      |  |  |  |  |
| e    | Start Year For Cost Scheduling | 2018                        | - íe |  |  |  |  |
| 5    | Run Date                       | 06 September 2017, 17:26:25 |      |  |  |  |  |
| e    | Currency                       | USD                         |      |  |  |  |  |
| id   | c                              | DK Cancel                   | t    |  |  |  |  |
| n Di |                                |                             |      |  |  |  |  |

Data Base Selection User Form

This is the third form seen by the User when running a case and allows them to select the reginal cost database that will be used as the case basis and to customise the selected basis if desired. We have developed 12 regional cost databases and the User is able to develop three separate customised databases if desired.

| _     | 1 1 1 1 1         |   |                    |  |  |  |  |  |  |
|-------|-------------------|---|--------------------|--|--|--|--|--|--|
| Co    | ost Database      |   | ×                  |  |  |  |  |  |  |
| ROf   | - Region          | Custom Cost Database                        |                    |  |  |  |  |  |  |
| K OI  | C Europe          | Load/Clear Customized Cost Database         |                    |  |  |  |  |  |  |
|       | Norway            | Load CCD1 Clear CCD1                        | Iraq Cost Database |  |  |  |  |  |  |
|       | North Africa      | Load CCD2 Clear CCD2                        |                    |  |  |  |  |  |  |
|       | O West Africa     | Load CCD3 Clear CCD3                        |                    |  |  |  |  |  |  |
|       | C East Africa     | OR Create and Customize New Cost Database   |                    |  |  |  |  |  |  |
|       | Central Asia      | Custom Cost Database 1 (CCD1)               |                    |  |  |  |  |  |  |
|       | Middle East       | Custom Cost Database 2 (CCD2)               |                    |  |  |  |  |  |  |
|       | C Asia            | Custom Cost Database 3 (CCD3)               |                    |  |  |  |  |  |  |
|       | O North America   | Customize Rates                             | Finish Customizing |  |  |  |  |  |  |
|       | C South America   | Cost Database<br>Utner Cost Factors         | <b>_</b> .         |  |  |  |  |  |  |
| Oil F | C Eastern Siberia | Freight Cost (Percentage)                   | o                  |  |  |  |  |  |  |
| Gas   | O Western Siberia | Freight Cost                                | 8                  |  |  |  |  |  |  |
| dens  |                   | Certification and Contingency (Percentages) | p                  |  |  |  |  |  |  |
| Pro   |                   | Certification                               | 1.5                |  |  |  |  |  |  |
|       | OK                | Contingency                                 | 15                 |  |  |  |  |  |  |
|       |                   |   |                    |  |  |  |  |  |  |

#### Production Fluid Definition User Form

This is the fourth form seen by the User when running a case and allows them to select the fluid type – effectively the type of upstream hydrocarbon development they wish to consider – and the units the case is to be run in. When have two set of units "field units" based on the widely used US based oil field units system and "metric" based on Former Soviet Union practice. On this form the User also enters the reservoir depth being accessed by the development a key parameter in separator, gas injection, gas lift and water injection design – and ultimately the cost of these systems.

|          |                           | _    |  |  |  |  |  |  |  |
|----------|---------------------------|------|--|--|--|--|--|--|--|
|          | Production Fluid X        |      |  |  |  |  |  |  |  |
|          | Fluid Type                |      |  |  |  |  |  |  |  |
|          | Oil                       |      |  |  |  |  |  |  |  |
|          | C Gas                     |      |  |  |  |  |  |  |  |
|          | C Condensate              |      |  |  |  |  |  |  |  |
| )<br>nsh |                           | ng S |  |  |  |  |  |  |  |
|          | Flow Rate Units           |      |  |  |  |  |  |  |  |
| Oi       | Field Units (bbl/scf)     | opm  |  |  |  |  |  |  |  |
| Ga       | C Metric (tonne/scm)      |      |  |  |  |  |  |  |  |
| Ga       | Reservoir Conditions ———  |      |  |  |  |  |  |  |  |
| \cid (   | Reservoir Depth (m) 2400  |      |  |  |  |  |  |  |  |
| -12S (   |                           |      |  |  |  |  |  |  |  |
| 002      | OK Cancel                 |      |  |  |  |  |  |  |  |
| Nate     | r Management Cost Profile |      |  |  |  |  |  |  |  |

That's all the space available to us to provide an introduction to **NETCO\$TER**<sup>Onshore Production Module</sup>

# For further details or to receive a trail of the software contact us via the website or through using the contact details given overleaf.§

### Address:

St Georges House Knoll Road Camberley Surrey GU15 3SY United Kingdom

| Telephone: | +44 (0) 1276 682828 |
|------------|---------------------|
| Fax:       | +44 (0) 1276 63334  |
| Web:       | www.bayphase.com    |

