

## 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

**NETCOSTER** **Onshore Production Module** 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

**NETCOSTER** 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 **NETCOSTER** 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

**NETCOSTER** 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.

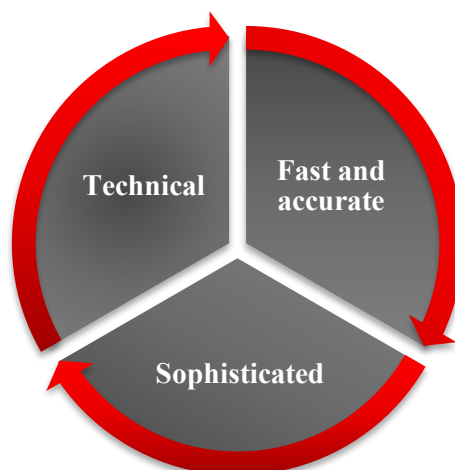
The **NETCOSTER** cost estimation system is modular in form and is used to estimate costs for the full range of oil and gas projects:

- 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:

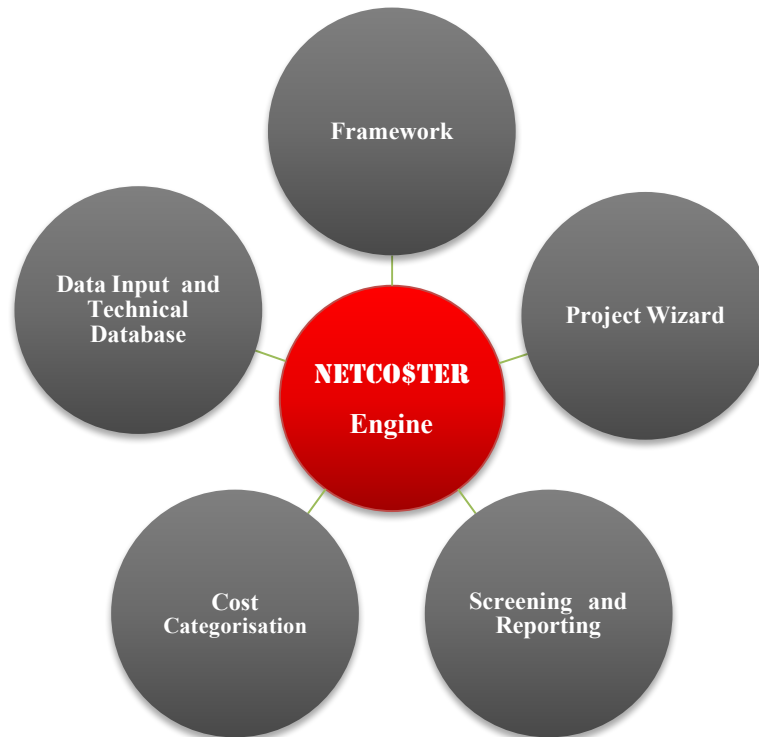
- Equity research
- Portfolio analysis
- Business development
- Mergers and acquisition
- Benchmarking
- Competitor analysis

## **NETCOSTER** Onshore Production Module



# NETCOSTER

## Onshore Production Module



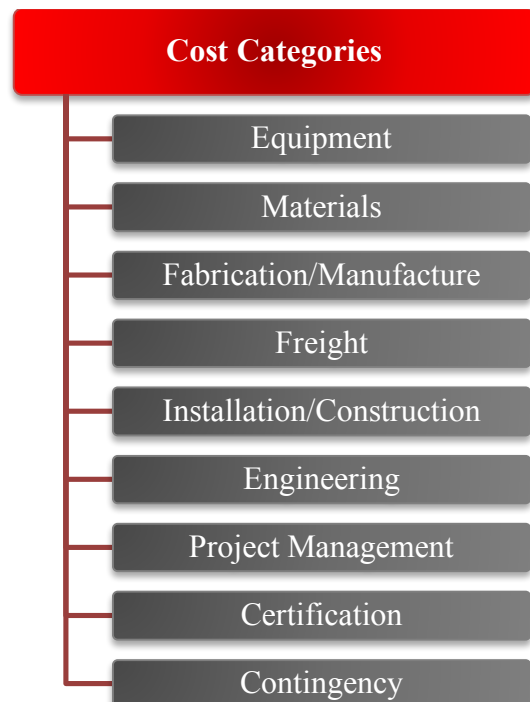
### Framework

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

**NETCOSTER** 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


Project Information						
Project Title	Elvira					
Case Identifier	Case 1 Gas Reinjection Turbine					
User	Bayphase Demonstrator					
Country/Region	West Africa					
Start Year for Cost Scheduling	2018					
Case Run Date	Thursday, 07 September 2017, 11:37:58					
Currency	USD					
						
Technical Information						
Fluid Type	Oil					
Approximate Fluid Production Rate (boepd)	60,200					
Oil Production (tpd)	60,000					
Condensate Production (tpd)	60					
Natural Gas Production (MMscfd)	6.20					
Sales Gas rate (MMscfd)	6.20					
Plant Power Generation (MW)	6.20					
Hydrogen Sulphide (mol %)	0.02					
Carbon Dioxide (mol %)	0.5					
Elemental Sulphur Production Rate (tonnes/day)	33					
Oil Gravity (API)	33					
Condensate Gravity (API)	19					
Associated Gas Molecular Weight (g/mol)	19					
Power Generation for Export	6.20					
Cost Drivers						
Equipment	Number of Trains	Sparing Within Trains	Number of Units	Unit Equipment Weight (tonnes)	Cost (USD/tonne)	Total Cost (USD)
<b>Production Separation Equipment</b>						
Production Manifold	1	1x100%	1	4.44		
Test Manifold	1	1x100%	1	0.62		
Production Separator	1	1x100%	1	24.69		
Test Separator	1	1x100%	1	2.57		
<b>Oil &amp; Condensate Production Separation Equipment</b>						
Deaerators	1	1x100%	1	24.69		
Sulphur Solvent Recover Unit & Storage						
Sulphur Solvent Unit Storage Shutters						
Liquid Sweetening						
Oil Storage Tanks	1	1x100%	1	1,244.90		
Oil Transfer pumps	1	2x100%	2	19.50		
<b>Gas &amp; Condensate Production Separation Equipment</b>						
Sour Catcher						
Condensate Stabilisation						
Condensate Storage Tanks						
Condensate Transfer pumps						
<b>Gas Processing Equipment</b>						
Amine Treatment Unit	1	1x100%	1	38.05		
Amine Treatment Unit - Selective	1	1x100%	1	187.88		
Gas Dehydration (8 - 4°C)	1	1x100%	1	99.34		
Refrigeration Unit (8 - 10°C)	1	2x50%	2	187.20		
Gas Injection Compressors	1	100%	1	4.85		
Gas Injection Manifold	1	1x100%	1	53.45		
Gas Export Compressors	1	3x50%	3	2.00		
Gas Lift Compressors	1	1x100%	1	25.39		
Gas Lift Manifold	1	1x100%	1			
<b>Gas Treatment Equipment</b>						
Incrustation	1	1x100%	1			
Sulphur Recovery Unit						
Sulphur Storage Shutters						
Sulphur Sulfurification Plant						
Sulphur Slurry Injection Manifold (Wells)						
<b>Acid Gas Treatment Equipment</b>						
Acid Gas Dehydration (8 - 4°C)						
Acid Gas Compressors						
Acid Gas Injection Manifold						
<b>H<sub>2</sub>S Gas Treatment</b>						
Acid Gas Dehydration (8 - 4°C) - H <sub>2</sub> S						
Acid Gas Compressors - H <sub>2</sub> S T						
H <sub>2</sub> S Injection Manifold						
<b>CO<sub>2</sub> Gas Treatment</b>						
Acid Gas Dehydration (8 - 4°C) - CO <sub>2</sub>						
Acid Gas Compressors - CO <sub>2</sub>						
CO <sub>2</sub> Injection Manifold						
<b>Other Water Disposal</b>						
Water Treatment						
Water Disposal Pump						
Water Disposal Manifold						
<b>Water Treatment/Injection</b>						
Water Treatment						
Water Injection Pump						
Water Injection Manifold						
<b>Major Utilities</b>						
Flare and Vents	1	1x100%	1	2.52		
Flaregas System	1	1x100%	1	4.67		
Plant Power Generation	1	1x100%	1	44.53		
Black Start Power Generation	1	1x100%	1	10.60		
Destination						
Steam Generation and Distribution						
Power Generation for Export						
Control Room	1	1x100%	1			
<b>Minor Utilities</b>						
Flare Gas	1	1x100%	1	3.00		
Drains - City Water	1	1x100%	1	4.50		
Drains - Sewerage	1	1x100%	1	2.10		
Instrument Air	1	1x100%	1	3.60		
Utility Air	1	1x100%	1	4.50		
Inert Gas	1	1x100%	1	4.50		
Chemical Injection - Corrosion Inhibitor	1	1x100%	1	4.50		
Chemical Injection - Sulfuric Acid	1	1x100%	1	4.50		
Chemical Injection - Anti-forming Agents	1	1x100%	1	4.50		
Chemical Injection - Methanol	1	1x100%	1	4.50		
Chemical Injection - Glycol	1	1x100%	1	4.50		
Chemical Injection - (Custom)	1	1x100%	1	4.50		
Chemical Injection - (Custom)	1	1x100%	1	4.50		
Diesel	1	1x100%	1	6.00		
Cracking Medium	1	1x100%	1	9.00		
Heating Medium	1	1x100%	1	12.00		
Raw/Service Water	1	1x100%	1	2.70		
Sewerage	1	1x100%	1	6.00		
Drinking Water	1	1x100%	1	6.00		
<b>Grounds</b>						
Site Grading				0.049km <sup>2</sup>		
Perimeter Fence				0.800km		
Roads Within Plant Boundary				0.443km		
				<b>Equipment Subtotal</b>	<b>1,848.10</b>	<b>116,939,000</b>
<b>Materials</b>						
Carbon Steel Piping				276.09		
Alloy Steel Piping				0.15		
Structural Steel				12.30		
Foundations				6,513m <sup>3</sup>		
Electrical				138.05		
Instrumentation				184.81		
Safety				97.41		
				<b>Materials Subtotal</b>	<b>77,920,000</b>	<b>25,628,000</b>
<b>Fabrication</b>						
Carbon Steel Piping				276.09		
Alloy Steel Piping				0.15		
Structural Steel				12.30		
Foundations				6,513m <sup>3</sup>		
Electrical				138.05		
Instrumentation				184.81		
Safety				97.41		
				<b>Fabrication Subtotal</b>	<b>39,600,000</b>	
<b>Freight</b>						
Freight					8.00%	14,589,000
				<b>Freight Subtotal</b>		<b>14,589,000</b>
<b>Installation/Construction</b>						
Construction Hours				1,948,000hrs		
				<b>Materials Subtotal</b>		<b>77,920,000</b>
<b>Engineering, Project Management, Certification and Contingency</b>						
Engineering Contractor				1,915,000hrs		
Oil Company Management				191,500hrs		
				<b>Engineering and project Management Cost Subtotal</b>		<b>186,647,000</b>
Certification					1.50%	
Contingency					12.00%	
				<b>Certification and Contingency Subtotal</b>		<b>59,032,520</b>
				<b>Engineering, Project Management, Certification and Contingency Subtotal</b>		<b>215,679,520</b>
				<b>Project Total Cost</b>		<b>490,558,520</b>

Total costs have been rounded to 1,000th

Unit rates have been redacted to protect our Intellectual Property

**Onshore Production Facilities Operating Cost**

Project Title		Elvira	
Case Identifier		Case 1 Gas Reinjection Turbine	
User		Bayphase Demonstrator	
Country/Region		West Africa	
Start Year for Cost Scheduling		2018	
Case Run Date		Thursday, 07 September 2017, 11:37:58	
Currency		USD	



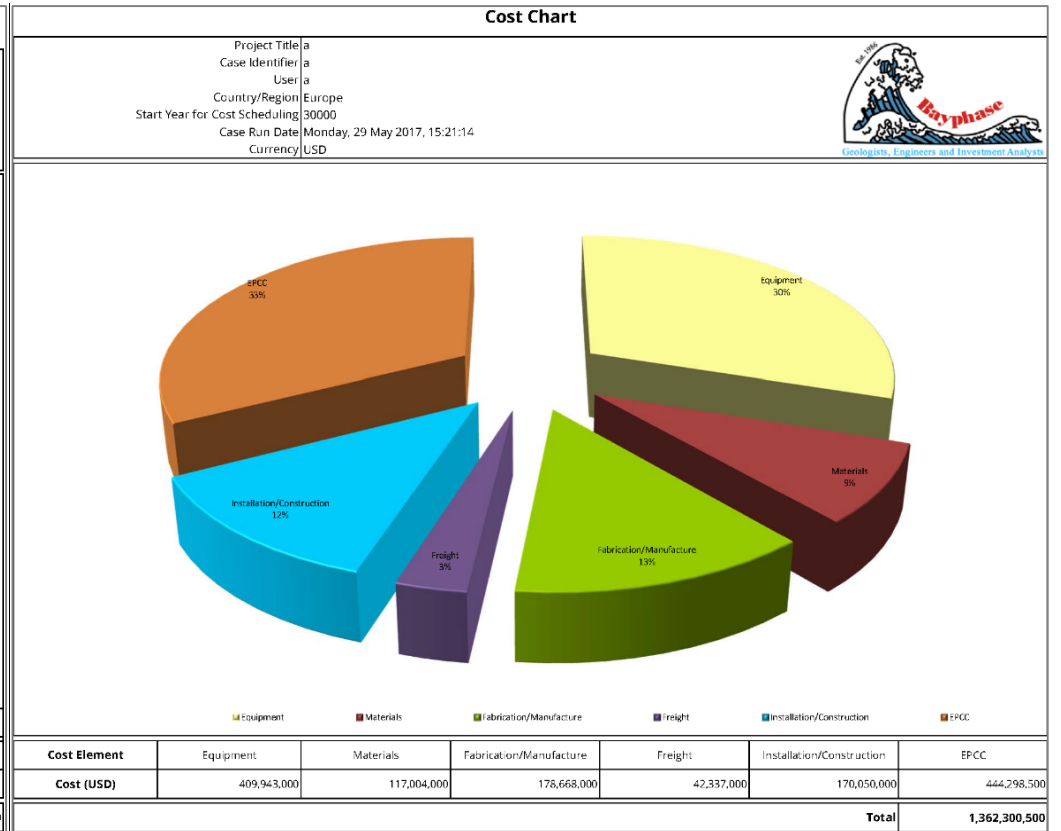
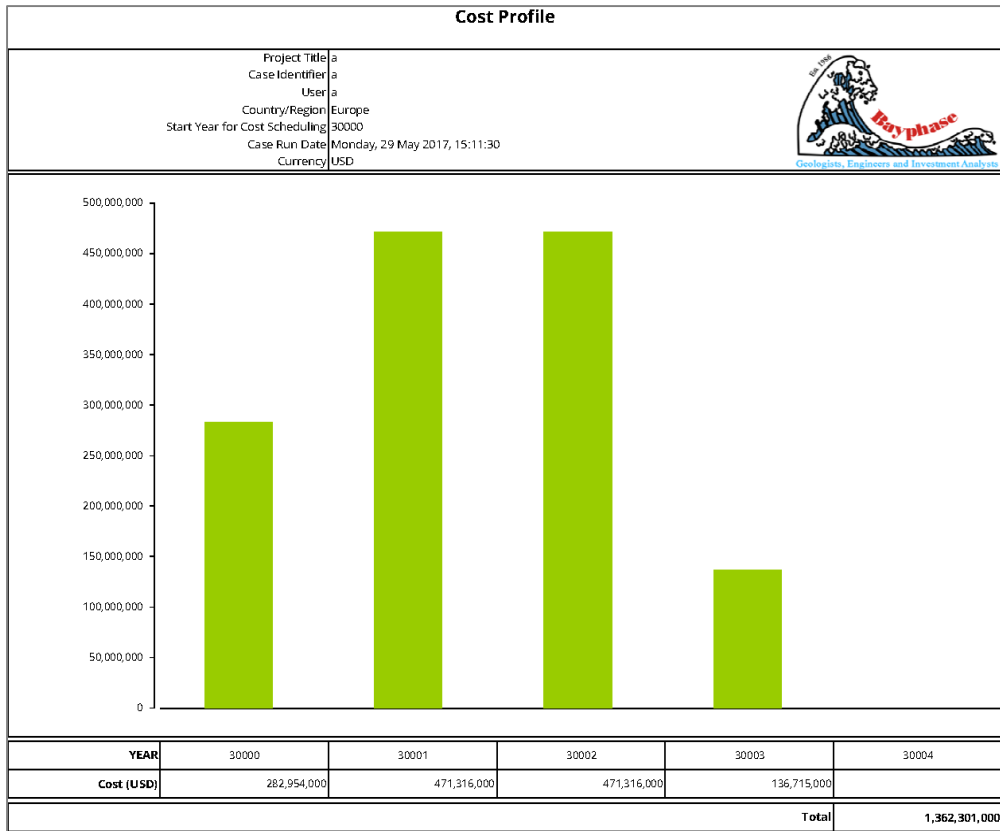
<b>Technical Information</b>			
Fluid Type	Oil		
Approximate Fluid Production Rate (boe)	60,300		
Oil Production (bpd)	50,000		
Condensate Production (bpd)	50,000		
Natural Gas Production (MMscfd)	60		
Sales Gas rate (MMscfd)			

Cost Drivers	Number Required	Cost (USD/Unit)	Total Cost
<b>Services</b>			
Helicopter Services (AS 322 Super Puma)			
Fixed Wing Services (Tupolev 134)			
<b>Plant Administration</b>			
<b>Personnel</b>			
Expatriate	8		
Qualified	16		
Skilled	32		
Labour	32		
<b>Vehicles</b>			
Salvans	8		
Pick-ups	8		
Vans	5		
Busess	3		
Trucks	3		
<b>Plant Operators</b>			
Expatriate	4		
Qualified	8		
Skilled	8		
Labour	8		
<b>Consumables</b>			
<b>Chemical Injection</b>			
Corrosion Inhibitor Injection (bblyear)	219		
Demulsifier (bblyear)	110		
Anti-Foaming Agent (bblyear)	183		
Methanol (bblyear)	110		
Triethylene Glycol (bblyear)	438		
Other 1			
Other 2			
<b>Production Losses</b>			
Sulphur Solvent (bblyear)			
Triethylene Glycol Injection Rate (bblyear)	22		
Diethanolamine (DEA) Injection Rate (bblyear)	11		
Triethanolamine (TEA) Injection Rate (bblyear)	0		
Other 1			
Other 2			
<b>Maintenance</b>			
Spares	0.20%		
Equipment Replacement	0.10%		
Vendor Specialists	0.15%		
Equipment Monitoring	0.05%		
Corrosion Monitoring	0.15%		
<b>Inspection</b>			
Inspection Specialists(% of CAPEX)	0.30%		
Vessel Inspection Frequency (Annual)	2		
Rotating Equipment Inspection Frequency (Annual)	1		
Major Equipment Inspection Frequency (Annual)	2		
Safety Systems Inspection Frequency (Annual)	1		
<b>Technical Support (Annual)</b>			
<b>Manning</b>			
Expatriate	4		
Qualified	8		
Skilled	8		
Labour	8		
<b>Budget</b>			
Social and Local Infrastructure	0.10%		
Studies and Audits	0.05%		
Insurance	0.50%		
<b>Equipment</b>			
Inspection Specialists (% of CAPEX)	0.0001		
<b>Subtotal</b>			<b>19,189,000</b>
<b>Oil Company Management</b>			
Oil Company Management	19,189,000	8.00%	1,535,000
<b>Subtotal</b>			<b>1,535,000</b>
<b>Total Operating Cost</b>			<b>20,724,000</b>

Total costs have been rounded to 1,000th


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





## Onshore Production Cost Scheduling Tool

Project Title: a  
Case Identifier: a  
User: a  
Country/Region: Europe  
Start Year for Cost Scheduling: 30000  
Case Run Date: Monday, 29 May 2017, 15:11:30  
Currency: USD



Geologists, Engineers and Investment Analysts

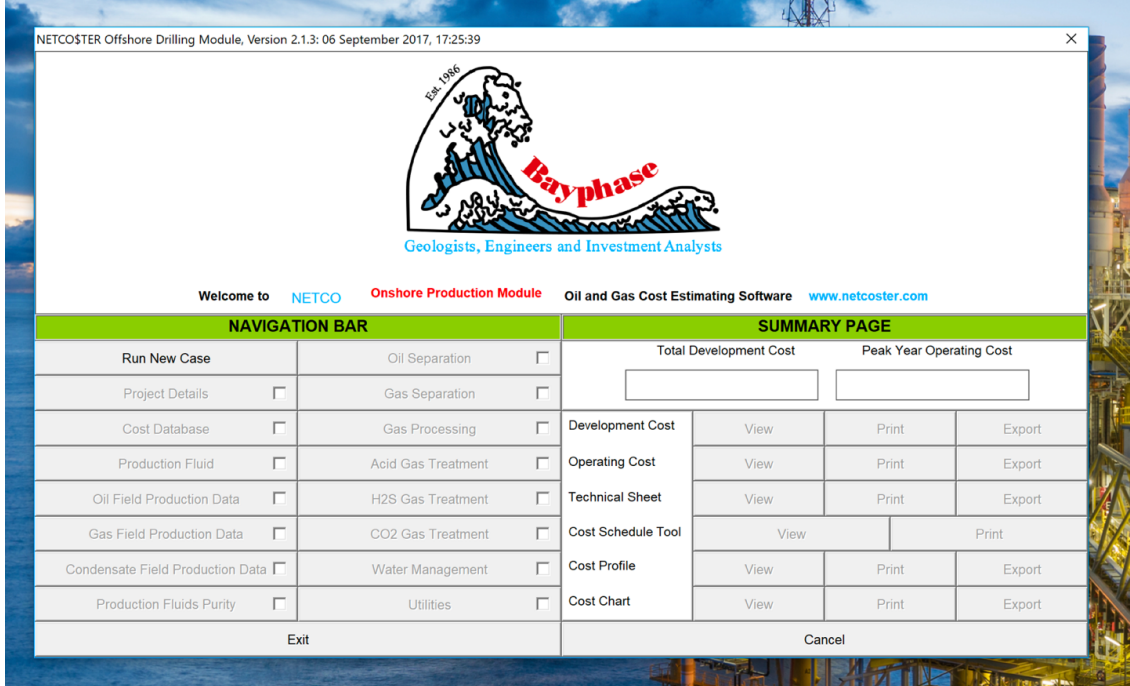
Year		30000				30001				30002				30003				30004			
Cost (USD)	Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
409,943,000	Equipment	40,994,300				40,994,300				40,994,300				40,994,300				40,994,300			
117,004,000	Materials	9,750,333				9,750,333				9,750,333				9,750,333				9,750,333			
176,668,000	Fabrication/Manufacture	14,889,000				14,889,000				14,889,000				14,889,000				14,889,000			
42,337,000	Freight	3,024,071				3,024,071				3,024,071				3,024,071				3,024,071			
170,050,000	Installation/Construction	12,146,429				12,146,429				12,146,429				12,146,429				12,146,429			
444,298,500	EPCC	37,024,875				37,024,875				37,024,875				37,024,875				37,024,875			
<b>1,362,300,500</b>	<b>Total</b>	37,025,000				40,049,000				102,940,000				262,954,000				471,316,000			
<b>Investment Schedule</b>		30000				30001				30002				30003				30004			
		282,954,000				471,316,000				471,316,000				136,715,000							



**NETCOSTER Onshore Production Module** 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.

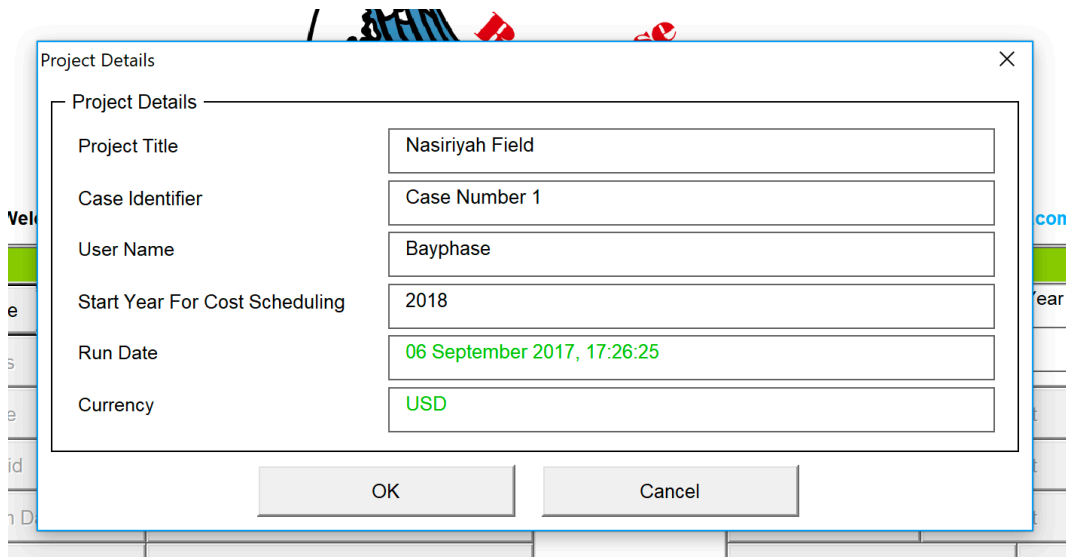
### Opening User Form

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.



### 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.



## Data Base Selection User Form

This is the third form seen by the User when running a case and allows them to select the regional 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.

**Cost Database**

**Region**

- Europe
- Norway
- North Africa
- West Africa
- East Africa
- Central Asia
- Middle East
- Asia
- North America
- South America
- Eastern Siberia
- Western Siberia

**Custom Cost Database**

**Load/Clear Customized Cost Database**

Load CCD1	Clear CCD1	Iraq Cost Database
Load CCD2	Clear CCD2	
Load CCD3	Clear CCD3	

**OR Create and Customize New Cost Database**

- Custom Cost Database 1 (CCD1)
- Custom Cost Database 2 (CCD2)
- Custom Cost Database 3 (CCD3)

**Customize Rates**      **Finish Customizing**

**Cost Database - Other Cost Factors**

<i>Freight Cost (Percentage)</i>	
Freight Cost	8
<i>Certification and Contingency (Percentages)</i>	
Certification	1.5
Contingency	15

**OK**      **Cancel**

## 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

Fluid Type

- Oil
- Gas
- Condensate

Flow Rate Units

- Field Units (bbl/scf)
- Metric (tonne/scm)

Reservoir Conditions

Reservoir Depth (m)

OK Cancel

Onsh ng S  
Oil opm  
Ga  
Ga  
Acid  
H2S  
CO2  
Water Management  Cost Profile

That’s all the space available to us to provide an introduction to **NETCOSTER** Onshore Production Module .

*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](http://www.bayphase.com)

