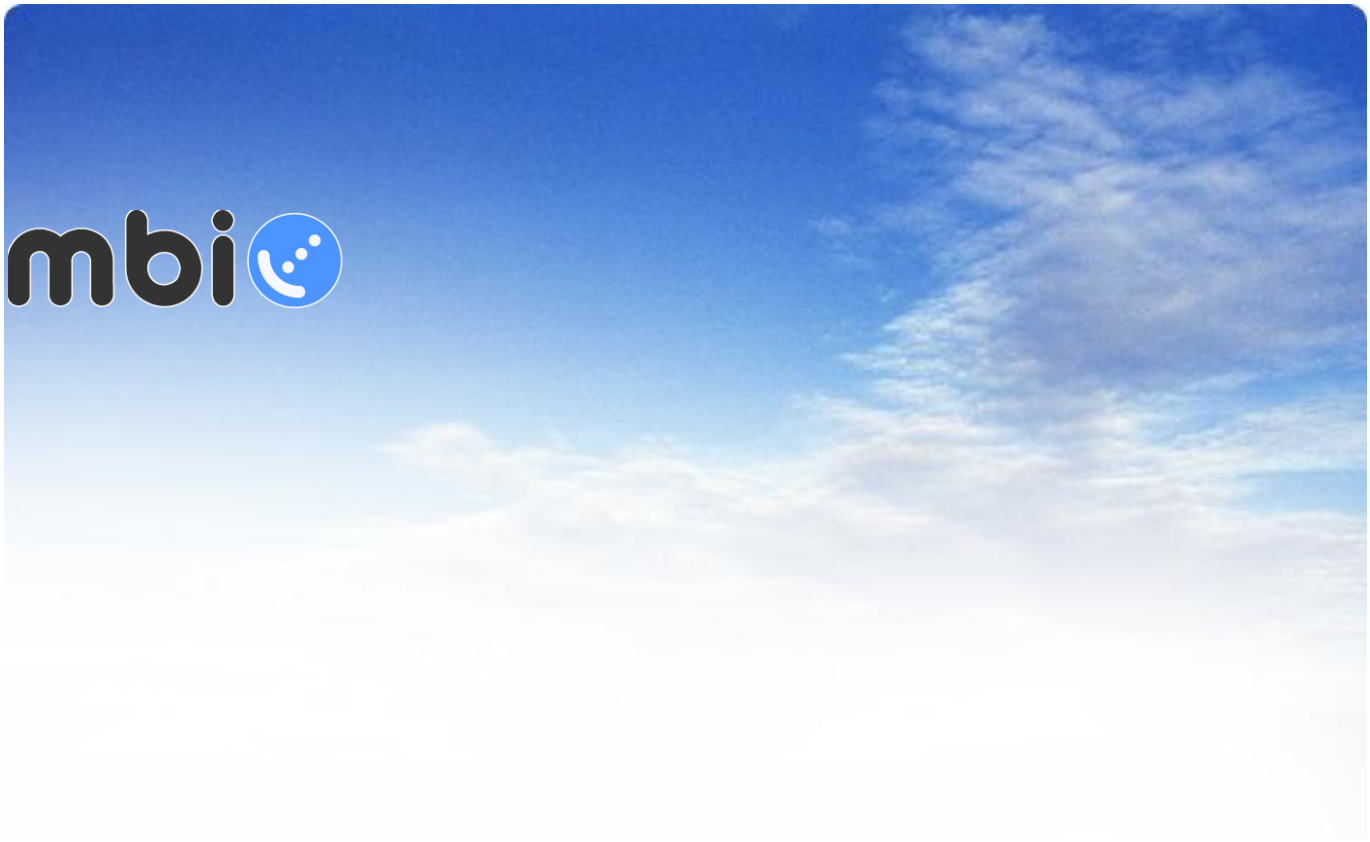


PowerSchedo

A support decision system in the Oil&Gas sector

Author: Luigi Poderico (lpoderico@mbigroup.it) Date: 29/03/2010

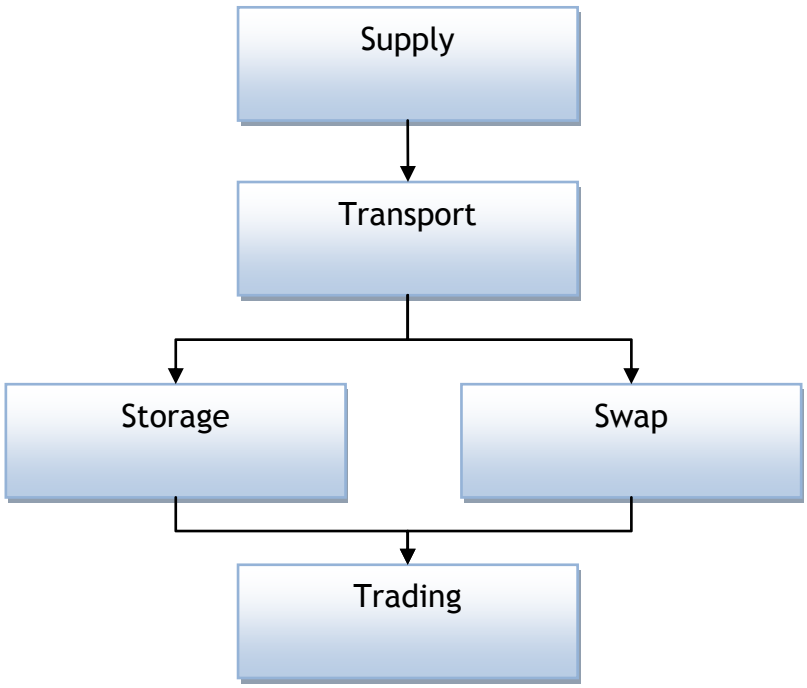
Introduction

PowerSchedO is a software tool to **support decision-making** for problems in the energy supply sector. It is used mainly in the **Electricity** and **Oil&Gas** sectors, which are the subject of this document.

PowerSchedO is different from other similar software products on the market in that it uses instruments and resolving techniques with a strong scientific connotation, including the branch of applied mathematics known as *operational research*. Using commercial optimization tools and dedicated algorithms, its high performance level makes it excellent value for money when compared with similar software, and it offers first class results in terms of quality and flexibility as well.

Supply and trading

Supply and trading are typical activities of companies which deal with the buying and selling of hydrocarbons. The optimization and balancing of the supply and trading portfolio can be very difficult because of the complex nature of supply contracts and market rules, and in general with the high cohesion of the elements which make up the supply chain.



1 The supply-chain of Oil&Gas

M.B.I. S.r.l.
Via F. Squartini, n°7 - 56121 Loc. Ospedaletto - Pisa - Italia
Tel/Phone +39 0503870888 Fax +39 0503870809
www.mbigroup.it

Supply optimisation

At the head of the supply chain are the energy **supply contracts**. *The way these are made regulates the complex supply cost*. The supply contracts are very complex and the presence of many different constraints makes optimal selection and activation difficult based on the **sales** predictions given.

Examples of these constraints include:

- **minimum and maximum** daily and annual supply limits;
- **take-or-pay** clauses, where you have to pay a penalty if the minimum supply is not made;
- **make-up** clauses, where you can recoup a quantity of hydrocarbon which is the object of a take-or-pay clause, at a given cost;
- **quantity discounts** of various types based on the amount of gas delivered;
- **transport network** constraints based on the delivery points and quantity supplied.

The variety and complexity that emerge from this and other constraints results in two fundamental aspects, based on this automatic decision support system.

- These constraints are difficult to *resolve* to the necessary degree of precision *using generic commercial optimisation software*
- The specific and flexible description of the constraints to the various supply contracts is an important prerequisite in order to achieve a reduced **time-to-market** and guarantee adequate flexibility to deal with market changes.

Trading optimisation

The description of the optimisation of the supply portfolio just given, is based on the hypothesis of having an estimate of the quantity of hydrocarbons to be sold in the various markets. The natural extension to this issue is *to identify at the same time the way sales are going*.

In this case there are a variety of hypotheses that can be made about the market.

For example:

- Markets can be considered elastic or unelastic relating to the fact that the quantity offered and the relative price can influence the price and quantity equilibrium.
- Compiling **bilateral contracts** can be as complex as compiling supply contracts.
- The existence of **different markets** is important because these are parts of the supply chain and allow for **speculation** and **arbitrage.**

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Not only is there the difficulty of optimising a trading portfolio but also a supply portfolio. *Only by optimizing the trading and supply portfolios at the same time is it possible to compute a point of maximum competitive profit:* any separation of the two elements leads to the loss of flexibility and consequently a decrease in the quality of the solution proposed.

Problems resolved

The main problems resolved by PowerSchedO are the following:

- resource allocation
- sensitivity analysis
- what-if analysis

Resource allocation

Based on the different functions of the links in the supply chain, different examples of resource allocation can be provided:

Minimum cost	Maximum profit	Robust resource allocation
The main problem is to determine the best form of supply, transport and storage to cover a given sale, which could be the result of a prediction process.	The main problem is to determine the best form of supply, transport, storage and sales. In this case even the sales are a result of optimization: when maximum profit is your goal.	The main problem is to determine the best form of supply, transport and storage to cover a sale given in the knowledge that this is affected by uncertainty.

Sensitivity analysis

Sensitivity analysis is one of the main tools in the decision support system. *It shows the result of a variation in one of the parameters of the problem being studied.*

With reference to the Allocation of Resources at Minimum Cost, a typical sensitivity analysis studies the impact on supply costs of a variation in predicted energy demand.

In the same way, the what-if analysis supports the user in the decision-making process. In particular *it determines the impact on the supply chain of a potential structural variation*.

For example it can show the consequences of renegotiating a supply contract or the introduction of a new storage contract.

The added value of PowerSchedO

PowerSchedO is based on scientific as well as technological knowledge, which means that it cannot be compared to any other advanced management support tools.

The excellent results in terms of quality, stability and flexibility are the real added value of PowerSchedO.

Quality	Stability	Time to market
Our experience has shown that the improvement obtained by adopting advanced instruments, like PowerSchedO, is around **10% in terms of recouping the costs** of supply.	The quality of the results obtained is much more stable and much less dependent on human factors. The **decision maker** has found its role: taking decisions based on calculations made by the decision support system	The flexibility of PowerSchedO in resolving problems guarantees a **low time to market** following structural changes which can happen within the supply chain.

PowerSchedO technology

PowerSchedO is proposed as a **Service-Oriented Architecture** in order to *simplify its integration into an existing context*.

The architecture has been carefully designed to better adapt to the needs of the user. It has two principle modes:

Integrated modality – a **class enterprise system** supported by a dedicated computing cluster

Stand-alone modality– supported by a **desktop system.**

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Conclusions

In these few pages we have outlined the main characteristics of PowerSchedO, a sophisticated non-management decision support system, capable of excellent results in terms of quality, stability and time-to-market.

PowerSchedO is currently used by ENI, the major Italian player in the Oil&Gas sector, where it has shown itself to be a valid tool on this field.

This is just a brief introduction to this product. If you would like to know more about it, please contact us for further information.

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