SUSTAINABLE ENERGY, OPTIMAL SUPPLY CHAIN

How Drax is solving the complex biofuel puzzle with DELMIA Quintiq
Complex logistics puzzle — solved.
Operational cost-efficiency — delivered.
Profits — maximized.

Project delivery — on time and on budget.

Drax is one of the UK’s largest energy producers, supplying around 8% of the country’s electricity. Having upgraded the UK’s biggest power station, Drax is now a predominantly biofuel generator, producing 70% of its electricity from compressed wood pellets.

Along with a reduction in carbon emissions, decreased reliance on coal and a boost to the security of electricity supply, came a new and complex planning puzzle: How to optimize the purchase, transportation and storage of compressed wood pellets from source to burn.

<table>
<thead>
<tr>
<th>Business activities</th>
<th>Electricity generation, fuel sourcing and supply of power and compressed wood pellets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning puzzle</td>
<td>Sourcing, transportation and storage of biofuel and coal</td>
</tr>
<tr>
<td>Biofuel source</td>
<td>Mainly North America and Europe</td>
</tr>
<tr>
<td>countries</td>
<td></td>
</tr>
<tr>
<td>Annual volume</td>
<td>More than 7.5 million tonnes of compressed wood pellets</td>
</tr>
<tr>
<td>Logistics network</td>
<td>Marine, road and rail</td>
</tr>
</tbody>
</table>

SUSTAINABLE ENERGY, OPTIMAL SUPPLY CHAIN

DRAX POWER LIMITED
New fuel, new challenges

Biofuel is organic matter that decays, so each batch must be tracked accurately, stored in the right conditions and used within a certain timeframe. The right decisions have to be made as to when to purchase fuel at the best prices to maximize profit; and how to store and manage biofuel and coal.

The complexity extends to the efficient and cost-effective transportation of biofuel and coal. To extract the most value out of its supply chain, Drax has to:

- Send ships to optimal ports
- Minimize demurrage and port charges
- Secure the best prices for rail and storage
- Optimize take or pay contracts

Juggling all these considerations with biofuel constraints made planning an uphill task. While Drax was moving toward sustainable energy solutions, planning remained stuck in the past with Excel spreadsheets. The system could not cope well with the added complexity, nor did it allow room for future growth. Coming up with a feasible plan for transporting hundreds of thousands of tonnes of compressed wood pellets on a network of hundreds of ships and thousands of trains per year soon became overwhelming.

It was clear that the existing system had limited capabilities — it could not calculate variations of the plan, nor identify the best one. Drax needed a new solution to solve its planning puzzle: First, when to purchase fuel at the best cost and second, how to store and manage biofuel and coal efficiently and cost-effectively.
How DELMIA Quintiq stood out from the competition

After a selection process shortlisted three solution providers, DELMIA Quintiq’s one-day demo challenge impressed Drax, convincing the company to appoint DELMIA Quintiq as its technology partner.

Among the competition, DELMIA Quintiq distinguished itself by fully understanding the complexity of the puzzle and successfully modeling even the most difficult business rules.

DELMIA Quintiq’s flexible architecture ensures that all of Drax’ business rules, cost structures and constraints are modeled accurately.
"DELMIA Quintiq presented us with a 100%-fit solution that fulfills all our requirements. It is flexible and extremely configurable, allowing us to accurately model rules, cost structures and constraints."

- Owen Tucker, Planning Manager and project lead at Drax

The DELMIA Quintiq solution

The game changer for Drax is the optimizer, which allows the system to consider all constraints and generate the best solution in a matter of hours. With the old system, planners at Drax needed days to produce a workable (but not necessarily the best) plan. Now planners can meet the hard constraints and choose which, if any, of the soft constraints they can challenge or afford to break. Planners have a complete view of the supply chain and can easily spot and act upon problems and opportunities.

DELMIA Quintiq’s record-breaking optimization technology calculates hundreds and thousands of possibilities to find the best plan. By considering when to buy or sell fuel, through which port the fuel should arrive, the best way to schedule inland logistics, and where to store the fuel, planners can ensure they achieve the set KPIs.

The system plans the movement of biofuel and coal throughout the entire supply chain, taking into account:

- Complex port structures (e.g. take or pay)
- Haulier payment terms
- Inland logistics (road and rail)
- Target inventory levels

The DELMIA Quintiq solution provides full visibility of the financial implications of their planning decisions. Opportunities and problems are easy to spot and act upon. Planners at Drax can now balance risks with costs and compare the outcomes of different decisions to find the optimal solution to achieve the company’s business goals.
The full DELMIA Quintiq solution went live within nine months. Strict adherence to the DELMIA Quintiq Project Life Cycle ensured that the project was delivered on time and within budget. The proven methodology consists of six main phases designed to keep the focus on quality and efficiency:

1. **Initiation**
   - Project teams are assigned and briefed on the project.

2. **Analysis**
   - Project scope is defined to ensure solutions are aligned with the planning puzzle.

3. **Modeling**
   - DELMIA Quintiq is configured to meet Drax’ particular rules, regulations, unique assets and business processes.

4. **Iterative development**
   - The system is tested and improved to meet all of Drax’ requirements.

5. **Implementation**
   - The software is live, complete with optimized decision-support functions to help Drax planners improve on the plan.

6. **Post go-live**
   - The project is now being monitored to ensure that Drax achieves its business goals with the support of the DELMIA Quintiq software.
The way forward

Like many companies who have traditionally generated power using fossil fuels, Drax is moving to biofuel with the help of government subsidies. Since these subsidies are only temporary, to remain profitable in the mid- to long-term, Drax must ensure that its supply chain is as efficient as possible in order to ensure that it remains competitive with other fuel sources.

It is still too early to measure the full financial impact of the DELMIA Quintiq solution, but based on plans created using the optimizer, Drax is confident the software will pay for itself in a short period of time. Drax’ confidence in DELMIA Quintiq also serves as a catalyst to transform some of the company’s business processes.

DELMIA Quintiq has proven to Drax that it can go beyond solving the company’s complex biofuel puzzle to deliver efficiency and help them tap into cost-saving opportunities. Drax is now looking at the potential to apply DELMIA Quintiq to other areas of planning.
“DELMIA Quintiq’s deep understanding of our planning challenges resulted in a transparent and collaborative implementation process. We are now more cost-efficient and able to maximize our profits.”

- Graham Backhouse, Drax Head of Supply Chain & Logistics
Our 3DEXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the 3DEXPERIENCE® Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes’ collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 250,000 customers of all sizes in all industries in more than 140 countries. For more information, visit www.3ds.com.