



## Expert's Corner Paper 2024-01

### Enabling energy transition projects by Hervé Baron

*Project abandoned... Continuous capital expenditure (CAPEX) inflation throughout the early project stages... New technologies prevented to go to the industrial scale or projects to be launched because of high costs... Sounds familiar? The lesson learnt? In the field of energy transition (carbon capture, circular, e-fuel, biofuel, hydrogen, energy transition, etc.), whose profitability is very far from that of traditional Oil & Gas, petrochemical or chemical projects, a brand new approach is needed. While focusing on CAPEX minimisation was not the focus on oil & gas projects, it is of utmost importance to enable energy transition projects to come to life. In this Expert Paper, we explain why and how to overcome this specific issue through a transformation of project development and management.*

#### The new mindset

Making new technology projects profitable requires a drastic change of mindset and practices across the entire project development phase up to Final Investment Decision (FID) and from all parties: Owner, Engineer, Licensor, suppliers and sub-contractors. The new approach is to focus on cost and strive to find the most competitive solutions. It requires a joint effort from all parties.

The conventional approach to cost consciousness, or "Value Engineering" as it is called, is to carry out a punctual exercise, a workshop, with numerous people attending. From my experience, the "Value Engineering" workshops rarely achieve much. Many proposals were in fact just normal practice, or should have been normal practice. Others were brushed away quickly without proper consideration. A few ideas would have gained being properly evaluated but time was rarely allocated to do this and there was poor follow-up. Cost savings ideas do not, in any case, come at once during a workshop. They pop up anytime and throughout the project development. The trick is to capture them and process them properly. Trying to evaluate a cost saving idea right away is often not possible. Ideas should be logged for evaluation as a dedicated task, and developed early enough to be enabled in the design. Projects must maintain and follow-up a "potential cost savings register" showing the progress/result of the evaluation and the status of implementation, if decided, of each idea.

#### The obstacles to CAPEX minimisation

##### Onerous specifications

CAPEX optimization starts by obtaining the best price for the main, i.e., the Process, Equipment and packages. This means to specify as little as possible and let the suppliers, who know better where the costs lie, propose. How often do we do this, i.e., stick to the functional (Process) specification and leave the technical definition of the rest to suppliers? Very rarely I am afraid. This is unfortunate as it prevents suppliers from joining forces to the cost effectiveness effort and propose their most economical solutions.

Plant design, such as Plant layout, piping, Civil, etc., is routinely offshored to low cost countries. Do we exercise control from the home office? Do we still have the in-house capability to challenge the offshored design?

Awareness of the overall Engineering sequence and interactions between disciplines, as described in my publication "[The Oil & Gas Engineering Guide](#)" (editions Technip), is not always there. However much optimisation is to be found at the interfaces between disciplines. Understanding the impact of one discipline's

input to another is key to being able to control and optimise those inputs, avoiding unnecessary overdesign for instance.

Identifying and studying potential cost savings take time and resources. Studying alternatives usually hinders progress before the decision is made. There is a money vs time conflict.

Engineering contractors employed in developing new technologies projects come, in my experience, from Oil & Gas, petrochemical, traditional nuclear or chemical sector. They are used to onerous industry standards, Owner specifications and suppliers. Oil & Gas plants are designed to be highly reliable, as the throughput is so valuable: production should not be interrupted at any cost. Super reliable equipment (to the API standards), with spare ones on top, are used.

Applying these standards to new technologies projects is a death sentence. These plants do not need uninterrupted operation for 3 or 5 years as do Oil & Gas facilities. The Plant design must be rethought in a different light, taking into account that the facility could be shut down more frequently. Oil & Gas standards are not appropriate, sparing of equipment is usually not required and the same goes for isolations to take items off-line.

##### Aligning all contributors

As indicated in the introduction, minimising CAPEX requires joint work from all parties, particularly the Owner, the Engineering contractor and the Process licensor. However their respective goals are not usually aligned. My experience is that the Owner's involvement is key to reconcile conflicts of interest. The Owner's leadership can foster a new mind set from all parties: the thrill to select the most economical solutions.

The Engineering contractor is usually employed to carry out the Front End Loading (FEL) under a lump sum Contract. Its objectives include making a profit, i.e., spend the number of budgeted hours or, better still, less. Does the contractor profit from spending time identifying and studying alternatives that could reduce CAPEX? I am afraid not. On top of that, the time spent to study alternatives that will prove dead ends will be lost. It might also cause delays.

Any new idea is a risk of delay and rework. It will indeed inevitably take time to assess and, if adopted, would almost inevitably require rework. Why would a contractor under a lump sum contract, the usual form of FEL contract, do this? Aligning the objectives of the Owner and that of the Engineering contractor by setting an incentive to minimise CAPEX is not easy. Indeed, how to set the target as the CAPEX estimate is indeed the result of the Front End Loading? Making an incentive on the effort put up by the Contractor to find solutions that minimise CAPEX is not easy either. It can indeed be quite subjective.

The objective of the Process licensor is neither that of CAPEX minimisation. Its objective is that the performances it has guaranteed are met. It is the Process licensor that sizes the

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Equipment. The Process licensor will always seek to have some overdesign. How do we ensure it does not exaggerate?

*Note that the traditional approach to minimise CAPEX at FEED stage, by resorting to a FEED competition won't find its place here as new technology projects aren't usually profitable enough to pay for 2 FEEDs. In addition, for new technologies, close interaction between the Engineering contractor, the Process licensor and key suppliers is often required, e.g., to address issues such as scale-up, perform some testing, etc. It would be uneasy to have such interactions with 2 Engineering contractors.*

### **The ways to go**

I believe that enabling new technology projects reach a positive FID requires a brand new mindset, specially from Engineering contractors. Applying onerous standards and methods from Oil & Gas just won't do.

First of all we should reduce the price of supplies. Inquiries must be made lean. What does this mean? The usual inquiry for Oil & Gas equipment includes numerous documents with technical requirements as well as fabrication, inspection, painting, documentation, "you name it" requirements. We must change this practice and stick to the functional (Process) requirements. Anything else must be questioned if not downright eliminated. This is a drastic change of the way Engineering contractors work, from the usual top down approach, where the Engineering contractor specifies everything, to a bottom up approach that lets suppliers propose their standards.



Then we should also make a lean plant design. It starts by reviewing the design specifications in each discipline. We should challenge default choices, chase the unnecessary and hidden overdesign. Design reviews (PFD and P&IDs review, Plot plan and Equipment layout reviews, 3D model review) must be held with cost savings as a focus. Equipment overdesign, if any, must be set individually. Process conditions must be precisely defined to ensure the selection of the least onerous materials of construction and rating. New suppliers, not the ones usually found in Oil & Gas and chemical plants, but rather those in agro-industry or other more cost-sensitive industries, shall be identified. Local suppliers/sub-contractors shall be leveraged in the cost effectiveness efforts., etc.

**To fill these dots and share experienced cost savings, I invite you to join a one day workshop. The workshop will be held, remotely via Teams, on March 28, 2025. Please drop a mail at [baron.engtraining@gmail.com](mailto:baron.engtraining@gmail.com) if interested. I will send you the details once available.**



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