CHALLENGES THAT REMAIN: CAN SYNFUEL TECHNOLOGY MAKE IT ON THE OUTSIDE?

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Despite the current slack in development activity, there seems little doubt that a synthetic fuels industry using advanced, commercial-scale coal conversion technologies, will figure substantially in the energy picture before the millenium. The security of our country depends upon it, and the inevitability of increasing demand world-wide makes it an historical imperative.

This conviction makes it appropriate to conclude these proceedings with some ideas on the conditions required to deploy synfuel technologies successfully and take from each its contribution to our future well-being. The papers collected here deal in one or another way with three major success criteria--technology that works reliably at tolerable cost, economics that yield a profit, and environmental control systems, both hardware and regulatory, that are congruent with the actual risk of injury to the biosphere. To realize the full potential of coal in our lifetimes, we have much to do along each of those dimensions. But it is not work to be pursued in splendid isolation.

Pragmatically, since a synthetic fuel industry can be no more successful than its component facilities, it is critically important that we recognize and use those three types of success criteria as the key determinants of viability for each project individually. That is, each facility proposed, regardless of its size or process characteristics, must meet tests of technical feasibility, economic soundness, and environmental acceptability or it will be a failure--unable to satisfy the performance expectations of its owners and designers or, worse still, an expensive stillbirth.

Conversely, successful projects will be the offspring of scrupulous attention to the dynamics of process, to the flow of dollars invested and returned, and to the consistency and timeliness of compliance with legal requirements for the protection of the public's welfare. There is nothing new in this; all three legs of the triangle--hardware, economics, and environment--are accepted by every serious developer as necessary foundations for the project structure. Indeed, all of us are professionally active in one or another of those elements or we would not have met here. The engineers are building the track record of process testing and demonstration that underlies market acceptance of unconventional technology. In the area of economics, the analytic models are being refined and projection techniques are improving. Other professionals in the environmental field are working with regulatory forecasting, the intricacies of monitoring protocols, and research into both the incidence and effect of plant emissions. In each case, the task is absorbing and the results are occasionally gratifying.

But it would be an error to congratulate ourselves too quickly. The elegance of what we achieve in the laboratory, in the marketplace, or with the regulators is not, of itself, sufficient. The ultimate test of a project and our professional contributions to it comes in the field, in real space and time where projects are fully exposed to the assault of politics, weather, unionism, and public opinion. As any of us who has seen a project move from concept to ribbon cutting knows, what sounded so convincing in the briefing room, what seemed convincing on paper, too often fails in the doing. Our best disciplinary efforts notwithstanding, when it comes to melding our professional products into a viable whole, the results are flawed and apparently strong projects succumb. Why? The root of these failures appears to be in poor integration and underuse of expertise.

The greatest challenge to be met is not sufficiency or even excellence along any one dimension of a capital project, but rather achievement of an effective and canny synthesis of knowledge across dimensions in a manner that better accounts for the systems at work in a hostile world. I suggest that if synfuel facilities are going to "make it on the outside" they must first survive the most rigorous evaluation process that disciplinary specialists working in collaboration can devise. More simply, the projects which win will have to be made as tough as the world in which they compete. How? By means of a strategic approach.

To use the term "strategic" may smack of trendy jargonism: "strategic" is another estimable word corrupted by overuse and misapprehension. Therefore, to justify its application here, recall that the term describes a maneuvering of troops and materiel into their most advantageous position prior to a military engagement. In the context of project development—where the end-goal is to maximize benefits, while considering the greatest number, the shortest time, and the lowest cost—strategy implies the use of time, dollar, and intellectual resources to correctly anticipate system inefficiencies and to correct them before the full-scale encounter with the real world.

The conventional wisdom is that most project development tasks appropriately fall into the province of specialists who exchange only enough information to carry out their assignments and/or fix the blame for later difficulties, whichever occurs first. In the best circumstances, results developed largely in isolation are "integrated" in a table of contents and delivered to owners who hope fervently that by "buying the best" in each of several fields, they have spawned a money-maker. What has happened, through no individual fault, is suboptimization on a scale that can cost dearly when the bottom line is reckoned.

The strategic approach, while not a panacea, can help avoid such piecework and materially strengthen a project. Project strategy, after all, is not a plan devised by corporate counsel after the bench hands down a restraining order. Rather, it is the rationale which disciplines us to identify barriers in advance and set a course for negotiating them successfully.

The strategic approach is based not only on an interdisciplinary sharing of information but on an integration of knowledge which produces understanding—of constraints, of options, of trade-offs. It is open-minded, willing to confront whatever is real in gaining the ultimate objective. Strategy helps us expose inconsistencies in planning and builds greater objectivity into project decision making.

Like most concepts, this one is vulnerable to the charge that is is vague and impractical. In fact, it is neither. To give the idea of a strategic approach substance, I offer some illustrations of techniques which draw together and exploit the potential of two types of project development activity generally regarded as being only distantly related—design engineering and environmental management. The point, naturally, is that so-called "soft-side" analyses are among the essential determinants of the technological and financial configuration of a successful capital project.

Consider, first, impact analysis. Contrary to public opinion, impact analysis need not be a necessary evil endured to get one's project ticket punched. On the contrary, it is the best arena for exploiting interdisciplinary synergies fully because it is essentially a predictive exercise. Impact analysis relates project activities and attributes (as generators of impact) to the several categories of physical, bio-chemical, and cultural reality (impact receivers) which collectively describe the project's host environment. It produces results which are forecasts of change; change which (a) may or may not be of concern to those affected, and (b) may or may not be consistent with the overall rationale for the project. Such forecasts are powerful tools in the right hands, since by modifying the causative features of the project, impact outcomes can be improved. That is, benefits can be increased by feeding the results back into siting and design decisions. Repeated at intervals in the project planning process, impact analysis provides developers with progressively more detailed information for skirting avoidable obstacles and thereby improving their project's competitive edge.

Impacts, _per se_, as expressions of a future condition, are neutral; i.e., it does not matter to a river whether _n_ cubic feet per second are withdrawn or diverted. Various parties with interest in a circumstance or resource, however, can attach strongly positive or negative values to change. Indeed, some types of change are so negatively charged that they are limited or banned outright as a matter of public policy. These are regulated changes, the conditions that environmental, health and safety regulations are designed to control.

A logical outgrowth of impact analysism, then, is regulatory analysis to determine which changes induced by a project are controlled and which are not. Once regulated changes have been identified, compliance planning which includes the engineering of hardware systems, can begin. What is required, and by when, to make a technically sufficient and administratively correct response to the requirements imposed? Again, the analysis yields important information to designers who must either meet performance specifications or modify process to produce less than the threshold quantity of the offending substance. After systematic examination of the current and probable requirements of law applicable to his project, the project developer has not only a clear picture of what may be required to comply, but also the information needed to devise a plan for negotiation with regulators which eliminates redundancies and reduces costs over project life. Obviously, the earlier a developer knows what may be required of him, the more easy it becomes to work in compliance.

The analysis of non-regulated change, too, can make a significant contribution to project viability. In some cases, the changes identified through impact analysis are welcome ones; an expanded tax base, more job opportunities, and so on. In others, interested parties at the regional or local level perceive the same changes negatively and mark them as issues for controversy; e.g., stresses on infrastructure systems, housing stock, and public security. Even more so than with regulated impacts, the analysis of constituents' concerns and preferences related to unregulated change provides project developers with critical information which can make or break the venture. Who are the key people? Which concerns are the most crucial and what possibilities for horsetrading exist?

Hence, the analog of regulatory analysis is a two-way public communication program which collects intelligence—not "PR" conducted by operatives far removed from basic technical decisions, but by technically literate professionals who have short lines of communication to developers and designers and can arm them with the information required to mitigate or retire expectable controversy. In this, the venture manager plays a critical role: he must understand the larger objective of public interactions and make it happen. More importantly, the developer must share this understanding and give his manager room to work at the grass roots level. When either one fails, the project is compromised.

If the previous steps have been carried out iteratively and in a mode of continuing exchange among the disciplinary units of the project team, the final step of integration into an internally consistent plan for development will proceed more smoothly. Not only will changes in initial assumptions or design changes be accommodated more rapidly, but the emerging master plan will move steadily toward the project configuration—technical, financial, and environmental—that has the strongest potential for successful implementation.

To summarize, the sense of my thesis is this:

1. The real world is a tough place to do business.

2. Synfuel projects will have to be implemented in the real world.

3. Successful synfuel projects must be tough.

4. Tough projects are made and not born.

5. Making projects tough requires a strategic approach to integrate knowledge.

6. The integration of knowledge requires interdisciplinary collaboration, not merely coordination.

7. Interdisciplinary collaboration requires exceptional technical skills, imagination, risk-taking and commitment.

8. The real world is a tough place to do business.

What then is the greatest barrier to efficient deployment of synfuel technology? Not the technologies themselves, not capital, not solutions to contaminant control, I suggest, because these will come to hand in the end. From a management perspective, it is a human one, because most of us must change our behaviors as professional practitioners. To lower the project mortality rate, we will have to overcome our fear of the territory beyond the immediate boundaries of our training. We will have to risk asking "why" and "why not" more often; try to make the connections between our own work and other fellows' explicit; share results before they are "right" because "good enough" may be all that is required to make a sound decision on concept.

In sum, we need a recognition of strategy as a valid approach to integrating our efforts and building better projects. Beyond recognition, we need leadership, management in the best sense, to see that it happens. This combination is rare enough to make the payoff rewarding for a few perceptive developers. With project success will come broader recognition that can make synfuels development pay off for the nation.