Capital Efficiency - Pull All the Levers

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Headlines

"Speaking to investors today, new Shell CEO Ben van Beurden updated on the company's *priorities: improving Shell's financial results and achieving better capital efficiency, as well as continuing to strengthen operational performance and project delivery."….January 30, 2014*

(Vale capital spending) "in 2014 will show ***a decline for the third year in a row****. This reflects the greater focus on capital efficiency, which entails among other things pursuing shareholder value maximization through a smaller portfolio comprised of projects with a high risk-adjusted expected rate of return".*

(Rio Tinto) "to scale back capital spending to bolster economic returns…..Iron Ore growth pathway optimized at a lower capital intensity"

(Dow) "Our focus on operating and capital efficiency gives us flexibility to respond to changing economic conditions while also enhancing our productivity and profitability."

(Merrill Lynch on Exxon Mobile) "we view relative changes in capital efficiency and free cash flow as the key determinants of value".

1. What is Capital Efficiency?

In simplest terms capital efficiency (sometimes referred to as capital intensity) is about getting the biggest bang for the buck.

> *"Leaving the question of price aside, the best business to own is one that over an extended period can employ large amounts of incremental capital at very high rates of return. The worst business to own is one that must, or will, do the opposite - that is, consistently employ ever-greater amounts of capital at very low rates of return."*
> -Warren Buffett, 1992 Chairman's Letter

There are a myriad of definitions used when describing capital efficiency. The basic formula for calculating capital efficiency involves dividing the average value of output by the rate of expenditure for the same period of time. This may be considered over an

assets life cycle or for more discrete time periods in order to see if capital efficiency is improving or degrading over time.

A common definition used is "Return on Invested Capital" or ROIC defined as Net Operating Profit After Taxes (NOPAT) divided by Invested Capital.

2. What are the Components of Capital Efficiency and Who and How Can they be Influenced?

Capital efficiency as measured by Return on Invested Capital (ROIC) can be described as:

ROIC = Operating Margin X Invested Capital Turnover

Each of these terms offers opportunities for the owner and his principal capital facility provider (such as his engineer constructor or EPC) to add value, improving the capital efficiency of the asset.

Let's look at each in turn.

3. Improving Operating Margins

Operating margins are defined as:

Operating Margin = NOPAT/Sales

Where, NOPAT is:

Earnings Before Interest and Taxes (EBIT) = Revenue – Operating Expenses (OPEX), including feedstock and energy costs

Less

Non-operating income, losses

Less

Income tax provision

Less

Interest expense * tax rate

Plus

Non-operating income, losses * tax rate

And, the sales denominator is revenue from the sale of asset output which can be defined as:

Sales = Unit product sales price * Rated Plant Capacity * Capacity Factor (Function of plant performance and availability)

The asset owner's EPC has an ability to influence Operating Margin through:

- interest expense (through CAPEX schedule which may play through to asset interest charges associated with the selected asset capital structure),
- OPEX and availability driven Capacity Factor (through maintenance and turnaround strategies; quality design (potential to up-rate or further debottleneck a plant); required feed stock levels; and inherent energy efficiency and incorporation of renewable energy and storage solutions)

The asset owner can influence Operating Margin through:

- Premium pricing (relative to the market level set by supply and demand) for product as a result of marketing, packaging and distribution strategies
- Sales to absorb the maximum efficient capacity of the plant
- Operating practices focused on predictive and preventative maintenance (may be down in conjunction with his EPC)
- Control of other OPEX costs such as marketing and sales

EPC Focus to Enhance Client Capital Efficiency

Improved Operating Margins

Schedule

OPEX

Plant Availability

4. Invested Capital Turnover

Invested capital turnover is defined as:

Invested Capital Turnover = Sales/Invested Capital

Where Invested Capital =

Operating Working Capital (current assets (includes inventories) – current liabilities)

Plus

Net Property, Plant and Equipment (PPE) (book value of property, plant and equipment, net of cumulative depreciation)

The owner's influence over pricing and sales level is identical to that described with respect to Operating Margins in the previous section.

The owner's EPC has an opportunity to influence:

- plant availability (influencing sales levels),
- required inventories (through design and supply chain), and
- Net Property, Plant and equipment (PPE) through associated capital costs (CAPEX)

Fluor Quality Focus to Enhance Client Capital Efficiency

Invested Capital Turnover

Plant Availability

Inventories (Supply Chain Design)

CAPEX

5. Strategies to Improve Capital Efficiency

The balance of this paper will focus on the five areas identified as within the influence of the owner's EPC. The other levers associated with:

- Premium pricing
- Sales level
- Operating practices
- Control of other operating costs such as sales and marketing

are not addressed further in this paper.

The owner's EPC can drive process improvement along the five principle opportunity areas identified to improve capital efficiency to the extent that he is enabled by the owner's organization and contract form.

This is key, since best of class capital efficiency may require change contracting and project execution practices from what the owner has traditionally utilized. Examples may include life cycle contracting, increased use of fabrication and modularization, and utilization of the EPC's supply chain which is tuned to the delivery of capital assets versus the owner's product profile.

These five areas (reordered), capital efficiency levers if you will, include:

- CAPEX
- Schedule
- OPEX
- Plant Availability
- Inventories (Supply Chain Design)

6. Lever #1 - CAPEX

CAPEX or capital cost improvements begin by realizing that approximately 10% of CAPEX is related to engineering and 90% related to procurement and construction. The owner's EPC can significantly impact CAPEX costs in five principle ways:

- Ensure that the developed design basis meets owner's project requirements (OPR), without undue contingencies, redundancies or factors of safety. This entails ensuring that our design basis documents (baseline centric documents) have been sufficiently challenged from this "scope control" perspective and that subsequent reviews are not unduly conservative. Said another way, the design is *fit for purpose*.
- Ensure that the appropriate level of design is undertaken to reflect the delivery form selected for the project (design build may require less detailed design for off-sites, infrastructure and utilities). Further, challenge and eliminate non value adding engineering process steps and simplify others where possible. This mind set of fit for purpose execution processes and continuous process improvement is essential to driving the CAPEX dimension of capital efficiency.
- Drive down construction costs by ensuring that construction is an integral part of the basis of design. This is accomplished through development of a construction basis of design (CBOD) coincident with addressing the owner's project requirements (OPR). This is much more than constructability. Project execution

processes must be reconfigured to reflect this element of an expanded basis of design. A framework for a construction basis of design was laid out in *"Addressing Project Capital Efficiency through a Business Basis of Design" (PM World Journal; Vol. III, Issue IV, April 2014)* and is included as Table 1 for completeness.

- Ensure supply chain strategies that drive lower CAPEX costs are fully supported by modified work processes and the client contracting and project organizations
- Enhance confidence levels associated with early stage estimates to improve capital certainty (one of three primary concerns expressed by owners together with schedule certainty and capital efficiency). This supports cost certain or cost incentivized contracts

7. Lever #2 - Schedule

Schedule improvements improve capital efficiency by lowering the interest costs associated with the construction phase while generating revenue at an earlier point in time. Additionally, schedule certainty is important to owners and is one of their three primary concerns (together with capital certainty and capital efficiency). The owner's EPC can significantly impact schedule in three significant ways.

- Optimizing his work process to simplify and where possible eliminate steps in the project execution process while incorporating added considerations related to an expanded basis of design (BOD^X), innovation and continuous improvement.
- Modify work processes to reflect construction driven execution needs including work process changes needed to support increased fabrication efforts to better control quality, cost and schedule. Fabrication strategies can drive plant layout for example while shifting labor from a field setting to a more manufacturing like environment.
- Improving his measurement and understanding of the root causes of rework during the engineering and construction phases to reduce the time and cost, including disruption, associated with rework. This is facilitated to the extent that owner work process requirements are not driving bespoke project execution processes which are not as easily benchmarked. Included in this effort is an improved understanding of RFI drivers and implementation of a continuous improvement process to reduce RFIs.

8. Lever #3 - OPEX

OPEX improvements begin by recognizing that at least 50% of life cycle cost is associated with operating and maintenance phase expenditures. When feedstock and fuel costs are considered these numbers may be significantly higher. The owner's EPC can impact this element of capital efficiency by including in an expanded basis of design the O&M factors which should drive plant life cycle design. Like the CBOD described in section 6, the O&MBOD will complement and complete the owner's project requirements (OPR). Depending on the strength of the owner's O&M organization and the timely, sustained participation of senior operating and maintenance managers and experts, this basis of design may be by the owner.

Taken together the CBOD and O&MBOD are referred to as an expanded basis of design (BOD^X) or a business basis of design. Our initial thinking on an O&MBOD framework was also laid out in *"Addressing Project Capital Efficiency through a Business Basis of Design" (PM World Journal; Vol. III, Issue IV, April 2014)* and is include in Table 2 for completeness.

9. Lever #4 - Plant Availability

This is addressed primarily through the O&MBOD described in the previous section but may also include potential "life cycle" (PPP type) offerings. Other influencers may include:

- decisions on the number of equipment or process trains,
- operating practices with respect to "in-service" maintenance activities, and
- influence of multi-plant economic dispatch business models

with these last two more squarely within the owner's domain.

10. Lever #5 - Inventories

Inventory requirements can impact overall capital efficiency and are influenced by design and supply chain decisions that address inventory requirements for efficient operations.

More significant will be the potential benefits leveraged from alternative supply chain relationships and contracting strategies.

Inventory levels are also significantly influenced by the degree of standardization incorporated in the capital asset.

11. Why Capital Efficiency is Key to Project Execution

Focusing on capital efficiency and the value it can bring drives alignment across all participants in a capital assets life cycle. This includes the owner's project development organization, his EPC, contracts and legal, operations and finance. Within the EPC organization it drives a fundamental shift in what is designed, how it is designed and the sequence and packaging of design. Through frameworks such as the expanded basis of design, BOD^X, we inculcate not only capital efficiency considerations but support a culture of innovation and continuous improvement.

Table 1

CBOD Framework

General

- ✓ Comprehensive identification of required or preferred construction strategies, tactics, techniques and tools
- ✓ Construction labor, skills, equipment, materials of construction, logistical constraints to be reflected in basis of design
- ✓ Unique requirements that reflects owner or contractor preferences such as:
    - Prior experience of the owner
    - Unique risks, opportunities or constraints associated with the project
    - Contractor capabilities and experience
    - Special tools uniquely available to the project
    - Broader programmatic objectives required of the owner or independently committed to by the owner that influences construction execution.
    - Applicable safety program to be used on project

Specific

CBOD considerations may be broadly grouped as basis of design requirements related to:

- Labor
- Equipment
- Materials
- Means & methods
- Management processes and practices

- ✓ Labor
    - Sourcing
    - Safety – hazard elimination and mitigation
    - Knowledge
    - Welfare
    - Productivity
- ✓ Equipment
    - Procurement
    - Logistics
    - Installation
- ✓ Materials

- Preferred material sources
- Material tracking
- Preferred logistical approach
- On-site material activities

✓ Means & methods
- Focus on design impacting elements of construction
- Strategies
  - Reduce indirects
  - Reduce need for enabling works
  - Modularization/fabrication with appropriate metrics
  - Requirements for off-site construction
- Tactics
  - Reduce temporary works
  - Minimize excavations
- Techniques
- Tools - Unique equipment to be employed

✓ Management processes and practices
- Owner's policies, guidelines or other directives affecting construction
- Regulatory limitations on construction practices, means & methods
- Desired sequence of construction
- RFI reduction
- Sustainability
  - Construction energy, water, waste requirements
- Commissioning - Provisions to be reflected in design
- Workface planning

Table 2

O&MBOD Framework

General

- ✓ Operations and maintenance (O&M) process that influence design
- ✓ O&M labor, skills, equipment, materials (including consumables), temporary provisions for maintenance to be reflected in basis of design
- ✓ Unique requirements such as:
    - Contracting community capabilities and experience
    - Special tools required for major maintenance
    - Broader programmatic objectives required of the owner or independently committed to by the owner that influences maintenance execution.
    - Applicable safety program to be used during facility operation

Specific

O&MBOD considerations may be broadly grouped as basis of design requirements related to:

- Labor
- Equipment
- Materials
- O&M practices and techniques
- Management processes and practices

- ✓ Labor
    - Sourcing
    - Safety
    - Knowledge
    - Productivity
- ✓ Equipment
    - Maintenance – provisions; combinations; accessibility, minimization
    - Repair – minimization of spare types
    - Replacement
- ✓ Materials – minimize maintenance
- ✓ O&M practices and techniques that are unique
- ✓ Management processes and practices
    - Documentation
    - Asset management
    - Contractual provisions to support long term O&M

References:

1. Addressing Project Capital Efficiency through a Business Basis of Design; PM World Journal; Vol. III, Issue IV, April 2014

2. Application of Life Cycle Analysis in the Capital Assets Industry; Construction Management Association of America (CMAA); June 2013; ISBN 978-1-938014-06-2 (eBook); ISBN 978-1-938014-07-9 (Print)

3. Life Cycle Analysis – a 7DSM Future; National Institute of Building Sciences; January 9, 2014

4. Application of Life Cycle Analysis in the Capital Assets Industry; PM World Today; March 2012

5. How Radically will Project Execution Change: A 7D^{SM} Future; CMAA Future Focus; Washington DC; March 4 -5, 2012

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