Abstract

Envision is a significant player primarily on the Chinese onshore market. Next milestone is to become a player on the Global scene. The onshore market is very challenging characterized by:

- Fierce competition in a saturated market, enhanced by E-Auctions
- Low margins combined with high risk due to challenging Project execution and Supply Chain environments

Customers are local or regional utilities exploring national subsidies. The renewable subsidies impose a strict regimen of Local Content Requirements on sourcing of labor, construction works, parts and auxiliaries. In order to penetrate the barriers and create a feasible business Envision has tested a Le-agile supply chain concept; Close-to-Market-Manufacturing Concept (CMMC)

Objectives

The objective for Envision is to increase global presence step-by-step. Underlying objectives are to penetrate market barriers and create a responsive supply chain capable of catering to specific wind domain-turbine combinations and in this way exploit competitive advantages.

Methods

In the process of entering new markets, Envision identifies; Order qualifiers and Order winners in each region.

Order Qualifiers:
Primary order qualifier is market presence in adherence to Local Content Requirements. Secondary order qualifier is a responsive supply chain, that can provide optimum turbine-to-wind-domain combinations. This can only be provided by a Le-agile and responsive supply chain that can identify and deliver this optimum within timeframe.

Order winners:
Primary order winner is a Competitive LCOE. Baseline for LCOE is an optimum match of turbine to the local wind and rigid project execution. Secondary order winners are Local/regional presence, track record; service agreements etc.

Execution

To deliver on the tough competition Envision has developed a mobile, flexible, production concept; Close-to-Market-Manufacturing Concept (CMMC) characterized by:

- Relatively small scale, asset-light, brown-field assemblies, located in optimal COG. and fitted with standard tools.
- Reduced up- and downstream stream cost and complexity of transportation.
- Attracting business from local/regional customers by sourcing parts, labor and auxiliaries in the area.

The reduced size and flexible output of 1-80 nacelles/year the CMMC compliments the centralized, manufacturing in a le-agile, responsive supply chain by providing capacity for; Prototyping, 0-Series and Variants, Module and system test assemblies.

Results

Envision made a proof-of-concept by establishing a CMMC-factory in a brownfield facility in the COG of Grenaa with the objective of supplying a regional site with 4 O-series 3MW turbines. The factory was located in a rented facility, fitted with standard tools and contract hired staff.

Nacelles #01 and #02 were subject to recording processes for Quality, Work-Instructions and hours, nacelles #03 and #04 were subject to process validation. Midway through the assembly all processes were subject to intensive value-stream mapping and process balancing.

All assembly sequences were planned and synchronized with logistics. The sequences were recorded into great detail on a daily basis with the intent of reducing cost and increase productivity. A direct result was a Learning Curve for the four turbines ranging: Nac.#01 1600 Hours; 1000 hours; 700 Hours and 600 Hours for Nac#04 – down range stabilized performance is assessed to 331 hours.

Conclusions

The CMMC can be applied and adopted to match local requirements focusing at local manufacturing hence providing a key order-qualifying feature and order winner, enabling a sale by being present in the community.

The CMMC is complementary to the large-scale factories in the responsive supply chain and can play the role a localized factory; overflow and proto-type and test-assembly factory.

The CMMC can be established within the longest lead-times ETA and the actualized sale is the signal that puts the start of the CMMC in motion. Whenever the assembly is over the factory can hibernate or be utilized as a service unit for the turbines.