Background

The Kingdom of Saudi Arabia's 2030 Vision aims at reinforcing and diversifying the capabilities of the economy, turning key strengths into enabling tools that will help transition the Kingdom from a consumer-based economy to a knowledge-based one. The National Transformation Program (NTP 2020) was developed to help fulfill the Kingdom's Vision 2030 and to identify the challenges faced by government bodies in the economic and development sectors. The program establishes strategic objectives that are based on the Vision and addresses its challenges through 2020 in accordance with specific targets. The program identifies, each year, the initiatives necessary for achieving such goals and devises detailed plans on the basis of interim indicators that measure and monitor performance.

The Kingdom of Saudi Arabia will spend more than SR1 Trillion purchasing industrial equipment and spare parts by 2030 (excluding military), where 75% of large contract value is spent overseas with limited value-add to the local economy [1]. Most oil & gas, petrochemical, utility, desalination, mining, and cement plants in the Kingdom were built in the 1970s and 1980s, where approximately 30% of all spare parts have become out-of-warrantee, obsolete, discontinued, or no longer offered by Original Equipment Manufacturers (OEMs). If spare parts are not available from OEMs, companies in the Kingdom are forced to replace expensive systems instead of replacing faulty parts, which would ensure the longevity of their assets.
Noteworthy, 75% of large contracts are spent overseas with limited value-add to the local economy, and consequently; local investments in manufacturing will face difficulties due to limited ability to sell products locally let alone exporting them. It is worth noting that limited local sales are due in part to the absence of localized engineering enablement, where most if not all projects are engineered by foreign Engineering Procurement and Construction (EPC) companies, where they tend to favor overseas purchases to reap financial incentives. Developed countries made progress and stride in their localization initiatives by relying on the power of engineering design, procurement, and construction management companies (EPC). Industrial Equipment and Spare Part sectors have been selected by the National Investment Plan (NIP), where the NTP emphasizes that localization of industrial equipment ranks amongst the highest potential to achieve the vision 2030. It is estimated that the market for pumps, valves, and compressors across different industries in the Kingdom is forecasted to be around $65 Billion by 2030. The Saudi market is considered an emerging market, where the industrial equipment market size is about $15 Billion with an annual growth rate of about 7%. Current manufactured parts in the Kingdom represent less than 10% of overall annual spare part spending represented mainly by metal pipes manufacturing, where the remaining 90% are imported goods and services [1].

SAGIA suggests that lucrative industrial equipment to localize with promising ROIs include:

1. Pumps
2. Compressors
3. Valves

The above three components can contribute up to 30% of the local content in the short term for the next 5-years (based on sales price). Further, these three categories combined comprise 25% of the total industrial equipment sector and represent less than 4% of the local demand served by local suppliers [1].

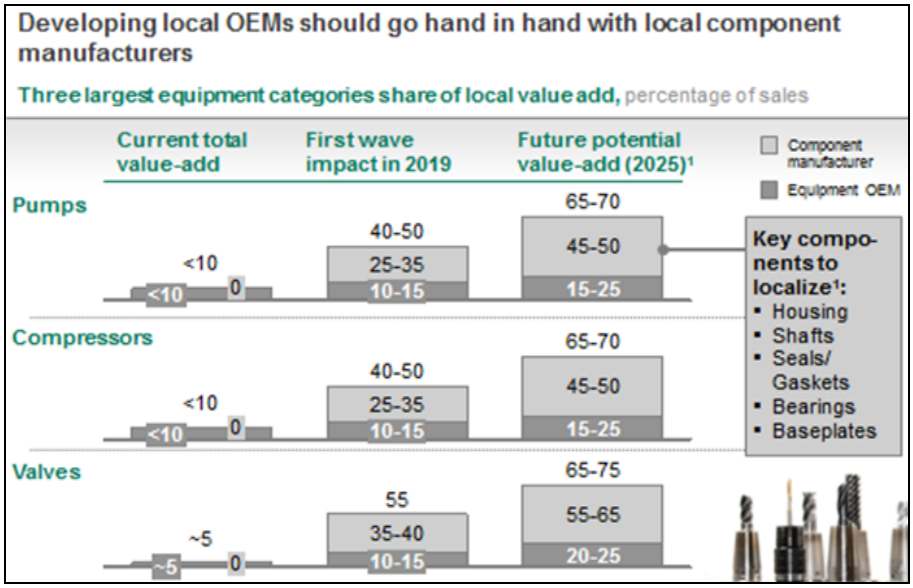

Figure1: The three largest categories for localization

When considering OEMs, there is another 15%-25% of spare parts that could be localized coming from assembly, testing/installation, and the share of profits that could be retained in the Kingdom. Over the next 5-years, OEMs believe that the following parts can be localized:

1. Turbines
2. Gas turbine accessories
3. Housings
4. Heat exchangers
5. Shafts
6. Boilers
7. Seals/Gaskets
8. Baseplates

By 2025, OEMs believe that bearings and partially prime movers can be localized and the total local value-add could reach 65%-75% for pumps, compressors, and valves. Increasing localization by 20 - 30% for the three nominated categories could add $500 Million to the GDP and create ~5,700 - 7,250 direct jobs over the next 5-years. Furthermore, extending localization to equipment categories (accounting for exports) could enhance local footprint up to $10-13 Billion to the GDP by 2025. Saudi Aramco, SABIC, SEC and SWCC represent more than 60% of the whole local market demand. OEMs indicate lack of visibility on demand across all stakeholders; especially segmented by component type, size, and specifications. The following metrics illustrate the Kingdom's ambitions to capitalize on localization, where spare parts play a major role in localization initiatives as an avenue to catalyze the development of a Thriving Economy:

- The Ministry of Defense will increase its localization from 2% in 2016 to 50% by 2030.
- Saudi Aramco will increase its localization initiatives from 40% in 2016 to 75% by 2030.
- Saudi Aramco's In-Kingdom Total Value Add program (IKTVA) aims to achieve 70% localization by 2021.
- SABIC's NUSANED program aims to increase O&G localization from 40% in 2015 to 75% by 2030.
- SABIC's NUSANED program aims to increase SME contribution to GDP from 20% in 2015 to 35% by 2030.
- Desalination local content increase (CAPX & OPEX) from 30% in 2016 to 40% by 2020.
- Ma'aden will increase GDP contribution from SR64 Bn in 2016 to SR97 Bn by 2020.
- Increase Privet Investors contribution from 40% in 2016 to 65% by 2030.
- Increase Foreign Investment from 3.8% in 2016 to 5.7% of GDP by 2030.
- Increase shares from non-oil exports from 16% in 2016 to 50% of annual GDP by 2030.
- Increase SEM funding from 5% in 2016 to 20% of required capital by 2030.

In line with the Kingdom's 2030 Vision initiative for spare part localization, precision manufacturing becomes a rising domain of current interest. This interest came about to support existing local manufacturers and identify lucrative investment opportunities that will help reduce ever-growing annual cost spent on spare parts that are being procured from overseas as part of the localization initiative.

Current Localization Initiatives

Saudi Arabia is making significant progress in the manufacturing of spare parts and military industries in the Kingdom, which is projected to result in significant savings through domestically manufactured products versus imported ones.

The Saudi Armed forces launches a biannual event; Armed Forces Exhibition for Diversity (AFED), where major companies in the field of manufacturing equipment and spare parts participate in this event. In 2018, the AFED exhibition took place between February 25th until March 3rd, where a plethora of nominated spare parts have been displayed to showcase localization interest by multiple government entities [2]. For example, “the expected savings to be achieved by localizing 50% of the military spending could amount to SR33 billion, which would be reinvested into the Saudi economy," said the director of the local manufacturing support department at the Saudi Defense Ministry, Major General Attiyah Al-Maliki [3]. Incentives for investment and the development provide the opportunities for local manufacturers to contribute towards localizing the manufacturing of nominated spare parts. This exhibition is a valuable opportunity for the private manufacturing sector to meet the armed forces current and future demands. In 2018, the Ministry of Defense displayed more than 80,000 opportunities for the supply of military equipment, spare parts, and tools. The importance of the AFED exhibition is to converge both beneficiaries and suppliers to present their requirements, as well as for local and international companies to display their manufacturing capabilities in the Kingdom of Saudi Arabia.

The objective of the AFED exhibition is as follows:

1. Present manufacturing opportunities of materials and spare parts offered by exhibitors to open channels between the exhibitors and local factories to achieve the goal of self-reliance in this sector.
2. Enable Saudi factories, laboratories, and specialized research centers in the field of manufacturing the opportunity to contribute to the local manufacturing process.
3. Support and develop national industry, in line with the required global standards and quality specifications.
4. Contribute to the localization, transfer, and development of the supplementary materials by networking with international companies to achieve the goals of Vision 2030.
5. Create promising investment opportunities for the private sector and to benefit from the national capabilities and possibilities of attracting foreign investments.

Noteworthy that the AFED exhibition is not restricted to the Armed Forces nominated spare parts for localization; rather, it includes the demand for Saudi Aramco, SABIC, Ma'aden, SEC, SWCC, Saudi Airlines, and Saudi Arabian Railway [3]. The following list of categories represents the various types of spare parts that the AFED exhibitors have identified as lucrative for localization and investment opportunities [2]:

1. Batteries
2. Electrical materials
3. Filters
4. Gears
5. Mechanical and electrical cords
6. Washers and nuts
7. Hoses
8. Metal pipes
9. Safety materials
10. Tiers
11. Radiators
12. Plastic parts and materials
13. Bearings
14. Belts
15. Gauges
16. Oils and lubricants
17. Electronic chips
18. Medical supplies

It's worth mentioning that approximately 800 Saudi companies have applied for localizing the manufacturing of nominated spare parts [3], where only 120 companies out of the total 800 are registered with the Saudi Armed Forces. Additionally, the total number of line items that have been registered for localization by exhibitors is approximately 8,500 line-items, which represents 10.63% of the total amount that the Armed Forces and key local stakeholders are targeting to localize.

DarTec's Contribution (Value-Add): Develop engineering package that is required for manufacturing auxiliaries & accessories for Original Equipment Manufacturers – OEMs

(2D Engineering drawings per ASME 14.5 Standards that reflects operating conditions, 3D CAD files, Metallurgy Analysis Report) & provide inspection services after manufacturing.

Saudi Aramco hosts an annual event dedicated for SMEs to promote localization, where Aramco's top tier suppliers gather with each other to interact with local SMEs to explore potential localization opportunities. The iktva program is considered the stomping ground for Saudi Aramco's localization initiative to create value in every aspect of the company's business while maximizing long-term economic growth and diversification. Saudi Aramco aspires to capture value with their suppliers that produces long-term tangible benefits, such as, quality jobs for a growing Saudi population, innovation, diversification of industry, and increased global competitiveness.

In 2017 Aramco's In-Kingdom-Total-Value-Add (iktva) event took place between December 12th and 13th, where through iktva, Saudi Aramco is developing a world-class supply chain that's locally accessible, reliable, and innovative to meet its needs as the world's leading integrated energy and chemicals company. Aramco's iktva program is the company's response for the Kingdom's 2030 Vision localization initiative.

The forum that was attended by investors from 35 countries highlighted Saudi Aramco vision for the future and outline business opportunities by focusing on developing an accessible, reliable, and efficient supply-chain. The objective is to bridge gaps in the energy sector supply-chain that fosters the development of competitive industrial clusters. The forum provided a platform for all companies interested in establishing operations in the Kingdom to engage with the Kingdom's energy sector stakeholders and their key suppliers. The forum covered topics such as integration of supply-chains, knowledge-economy, human capital development, access to finance, market access, the legal and regulatory environment, SMEs, and infrastructure benefits.

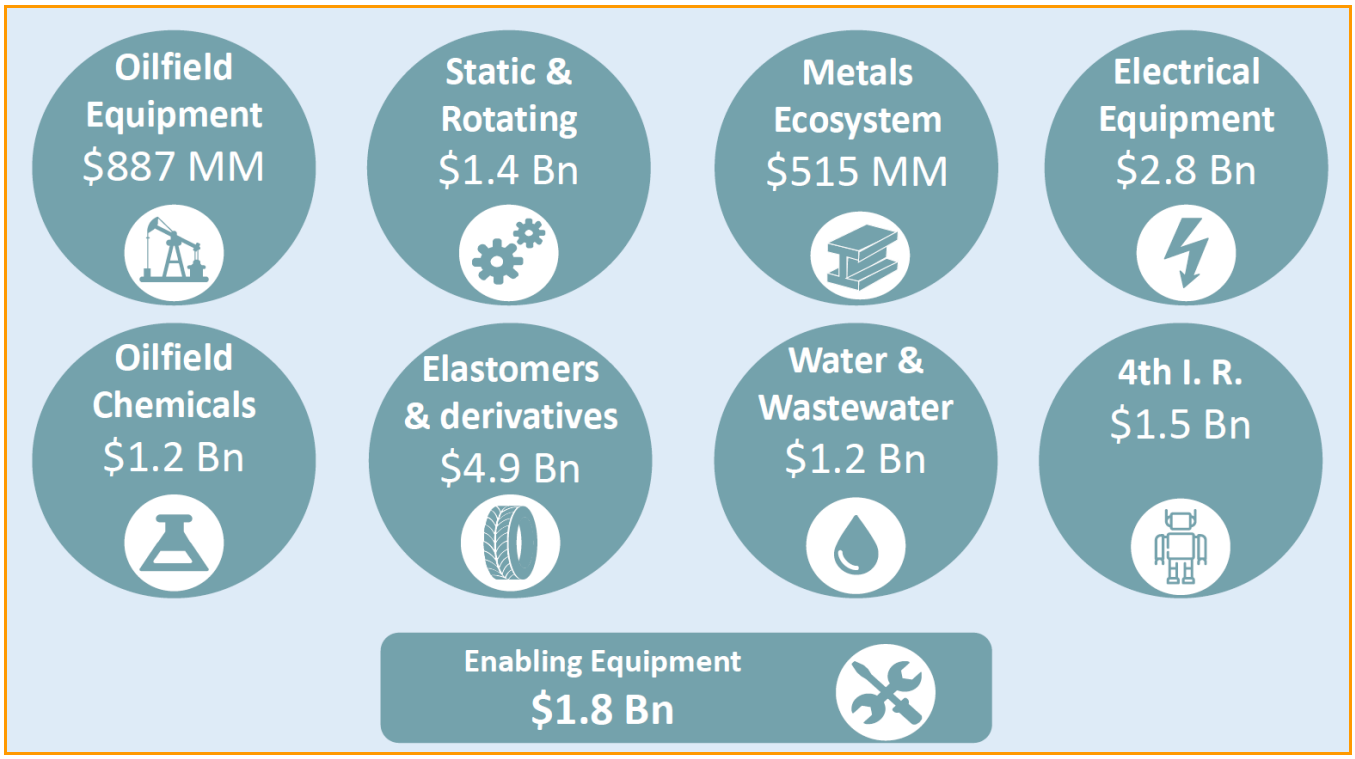

Figure 2: Saudi Aramco's current market gap of $16 Billion [4]

The iktva overarching objective is to achieve 70% of oil and gas supply-chain localization by 2021. During the 2017 iktva event; Saudi Aramco has identified 140 SME development opportunities, across 10 industrial segments, worth around SR60 Billion [5]. These opportunities include growth within the chemical's conversion parks at SADARA on the Arabian Gulf and Petro Rabigh on the Red Sea coast, where they are expected to help create over 40,000 new jobs, and potentially add around SR30 Billion to the Kingdom's annual GDP. Saudi Aramco is expected to spend more than SR1 Trillion over the next decade, where 70% of these funds would be spent locally [5]. Furthermore, Aramco prefers a large portion of these opportunities to be secured by locally based SMEs in the following areas:

1. Coiled tubing
2. Drill pipes
3. Drilling collars
4. DV tools
5. Liner hangers
6. Nipple manufacturing for downhole
7. Packers
8. Precision machining downhole tools
9. Upstream perforation explosive charges
10. Whipstock
11. Accumulators
12. Cement plugs
13. Cement retainers

14. Flow couplings
15. Hoisting and rigging components
16. Downhole cables
17. Multi-stage frac
18. Sheaves
19. Slips
20. Swivels
21. Cementing pumps
22. Cross coupling protectors
23. Upstream perforation system
24. Well service tools maintenance
25. Wellhead bonnets

Saudi Aramco has identified the above list of 25 oilfield equipment opportunities that are worth $887 Million [4]. For example, if one were to consider just the drilling equipment spending and opportunities; there are a lot of opportunities for localization as the below figures will illustrate.

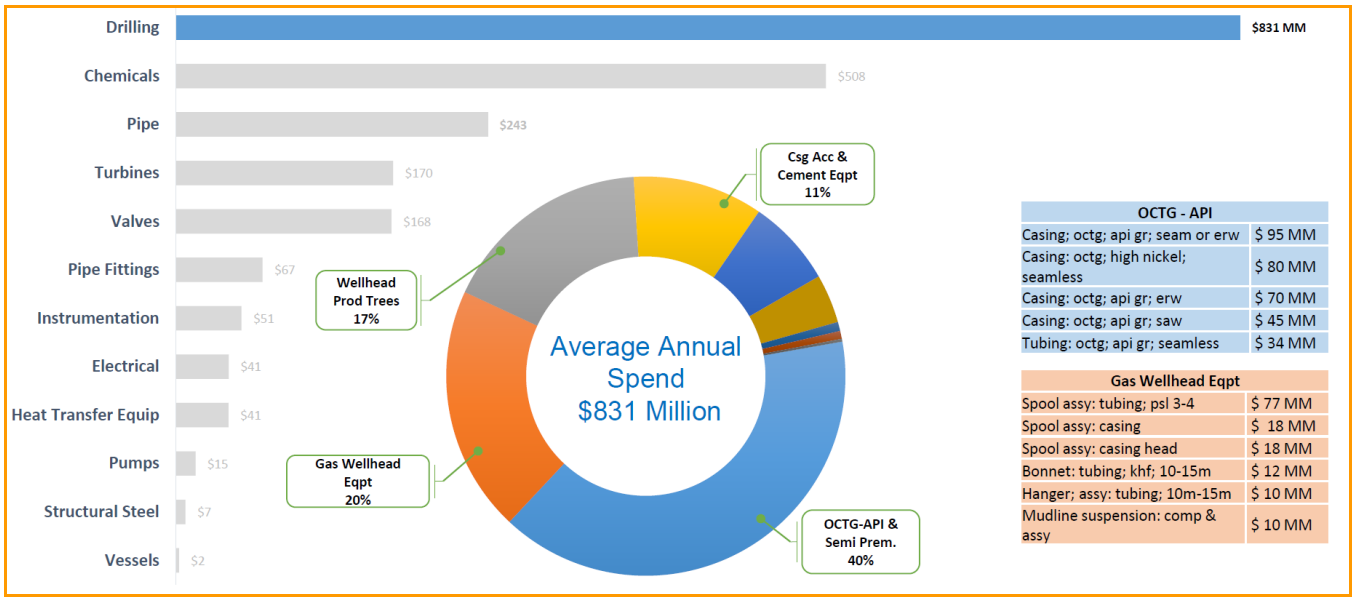

Figure 3: Aramco's Combined In-Kingdom & Out-of-Kingdom Drilling Equipment Spending [6]

Saudi Aramco estimates an average annual spending of $831 Million of drilling equipment, which are sourced from outside the Kingdom and very few in-Kingdom manufacturers [6].

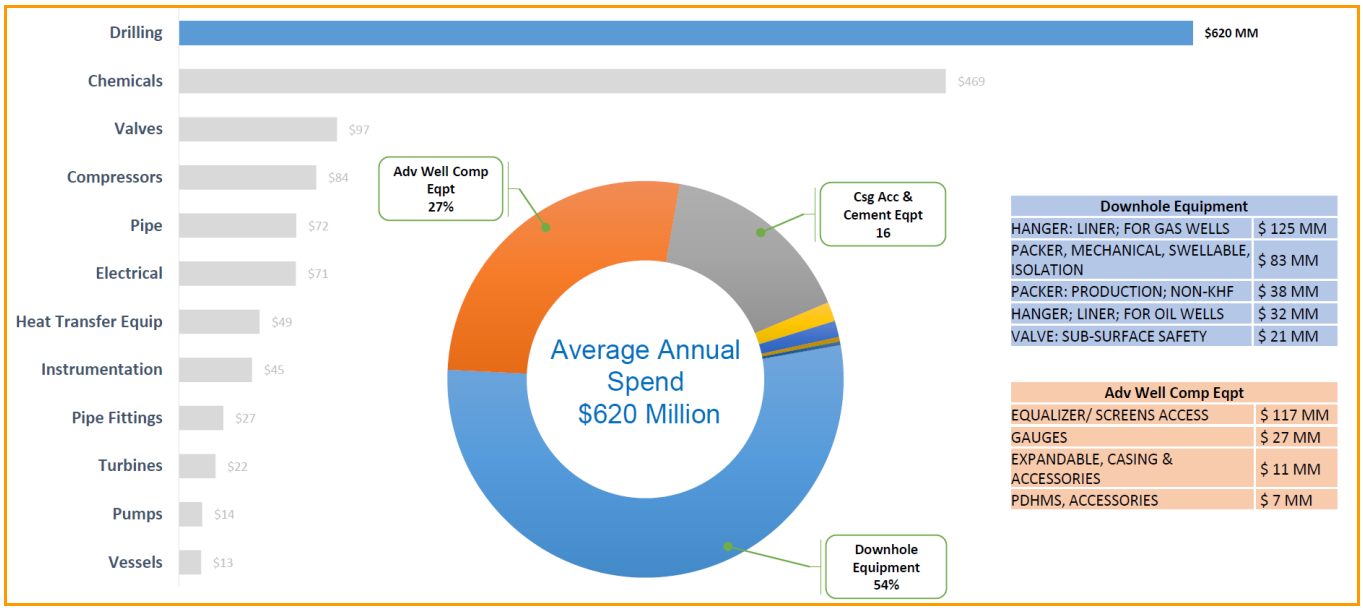

Figure 4: Aramco Drilling equipment currently sourced from outside the Kingdom [6]

Based on the figure above, Aramco spends $620 Million annually sourcing drilling equipment and spare parts from outside the Kingdom, where approximately 20% of these spare parts could be sourced locally [6]. Part of the reason why these parts have not been localized yet is because they are highly engineered equipment that require field-matter experts who could execute without any compromise to quality.

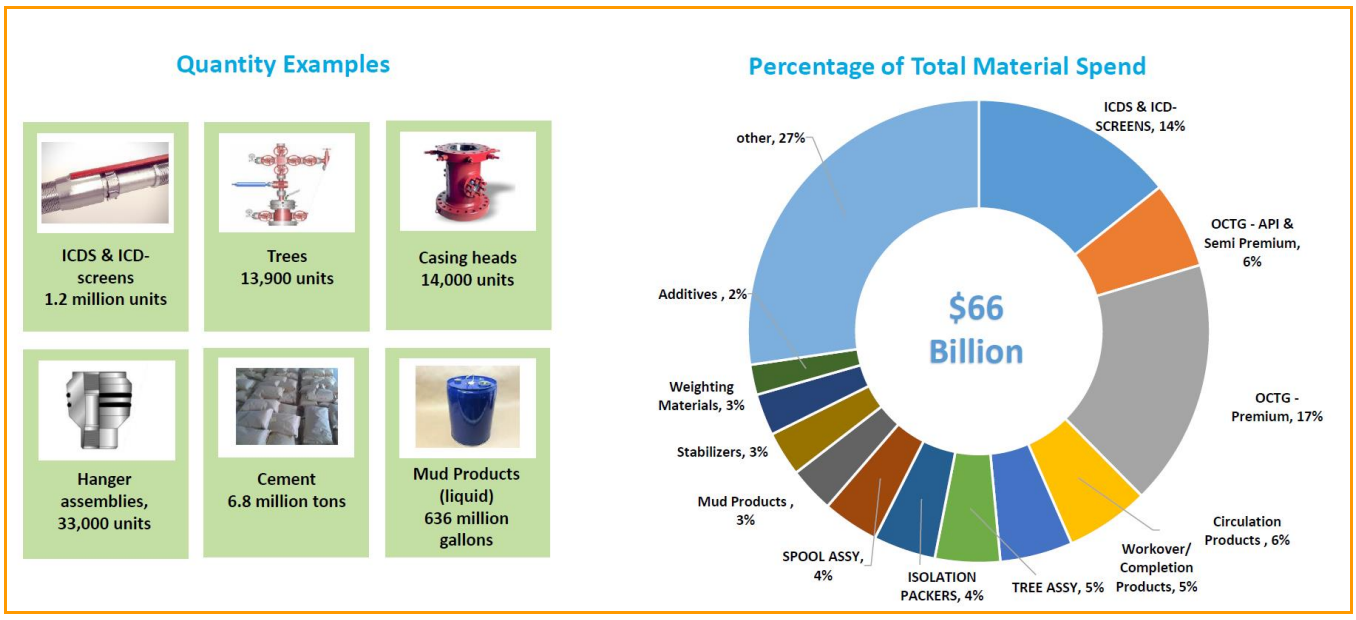

Figure 5: Frilling Material Forecast over the next 10-years [6]

Saudi Aramco predicts that it would spend approximately $66 Billion over the next ten-years (10), where a gradual localization plan would prove fruitful [6].

From this data, Saudi Aramco calculates an iktva ratio that approximates the percent of Saudi Aramco's spend with you that remains in Kingdom or develops the Kingdom's supply chain and capabilities. The iktva ratio formula is illustrated below:

The objective is to drive key activities towards localization and job creation, which will be assessed against the following metrics:

A. Localized goods and services ($)
B. Salaries paid to Saudis ($)
C. Training & Development of Saudis ($)
D. Supplier Development Spend ($)
r. Local Research and Development ($)
X. Export Revenue Factor (%)

E. In relation to revenue

Supplier IKTVA Formula

$$\% \text{ IKTVA} = \left[\frac{A+B+C+D+r}{E}\right] + X$$

$$X = \left[\frac{Export\ Revenue\ as\ a\ \%\ of\ Total\ Revenue}{30\%\ Export\ Target}\right] * 10\%\ \text{points (max of 10\%)}$$

DarTec's Contribution (Value-Add): A: Localized Goods & Services in the IKTVA equation for localization

In order for SABIC to achieve its localization agenda and local industrial development, SABIC launched the “Nusaned” initiative, which is their 2030 Vision response to localization [7]. The objective of the program is to support investors in the following areas:

1. SABIC opportunities available to drive investment and create local demand through:
    a. Procurement spending
    b. Product conversion to develop downstream industry using SABIC raw material
    c. Commercialization of SABIC patents, technologies, or applications
2. SABIC support packages to help in commercializing opportunities, including providing raw materials, technical support, etc…
3. Advise and support on financing startup or existing companies
4. Local workforce development and training support through sponsorship programs
5. Strong alignment between Nusaned program and different local authorities to ease project development

Nusaned aimes at addressing some of the issues facing startups and investors alike; starting from idea generation all the way to execution. The program addresses the following key challenges by offering the corresponding solutions:

Figure 6: Nusaned's proposed solutions to key challenges facing startups & investors [8]

The Nusaned program addresses the issues and challenges through its four main pillar programs; which are as follows:

1. Entema: An opportunity gate to originate, receive, and analyze investment opportunities. Further, SABIC aims to provide investors a portal to explore investment opportunities and test their viability and attractiveness to receive SABIC support through Daem. For example, spare parts opportunities fall under the Entema program, where they are classified under procurement opportunities, where these investment opportunities have been showcased during the AFED 2018 exhibition.
2. Daem: SABIC's support package to enable investor opportunities, where SABIC executes the proposed support packages to investors that have been identified through the Entema program. SABIC's support is manifested in one or many of the following challenges:

    a) Supplying materials and services to SABIC through the procurement registration and technical qualification process at SABIC.
    b) Product offtake from SABIC at competitive pricing.

c) Technical Support and Products Application/Technology commercialization.
d) Capability Development through customized management and technical sponsorship and training programs to potential local workforce for opportunities qualified.
e) Provide access to SABIC's world-class practices in finance, supply chain, manufacturing etc… to understand best practices in execution.
f) Offer advice and support on Shared services and global supply chain; such as HR, procurement, supply chain leveraging SABIC cost advantaged position, etc…

3. Investment Fund: Access to funding for companies with feasible business cases.
4. Muahal: Develop workforce capabilities to enable investor opportunities into the Kingdom by aiming to develop the technical and leadership capabilities of the local workforce for the Nusaned supported opportunities. This is to ensure that investors have the right workforce to execute the opportunity in a competitive and sustainable way.

As part of the Kingdom's Vision 2030, the government has set ambitious targets to diversify the Saudi economy to keep it thriving into the future. Below is a list of some of the Vision 2030 parameters that SABIC aims to contribute towards:

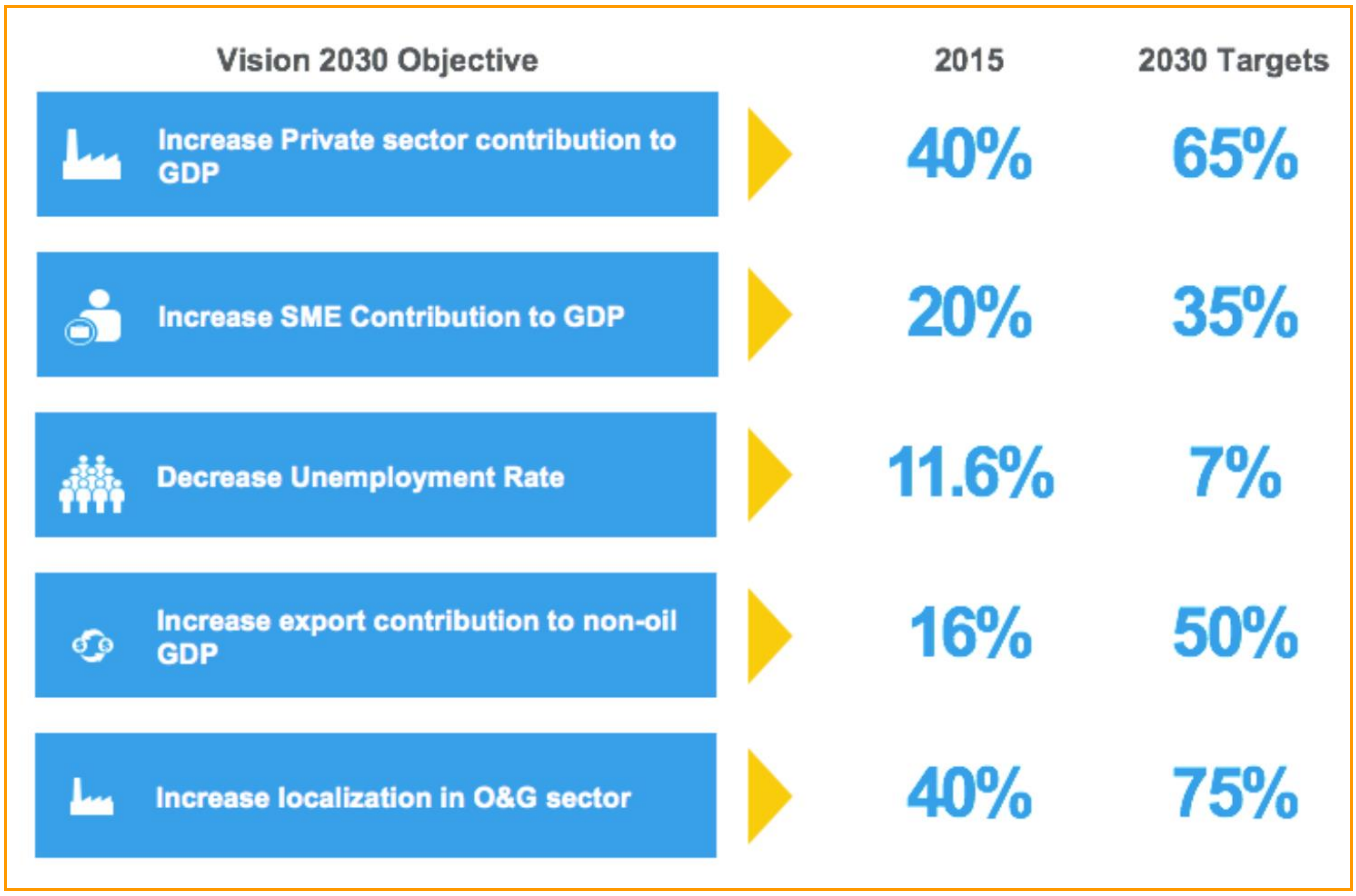

Figure 7: Kingdom 2030 Vision parameters relevant to SABIC [9]

SABIC has identified localization as one of the most significant levers to achieve the Vision 2030, where it would like to synchronize its efforts to localize the manufacturing of spare parts; especially those that use SABIC produced raw materials. Below is a list of SABIC enablers that facilitate localization efforts:

1. Product range and capabilities to support local manufacturing industries.
2. Large procurement to support local manufacturing.
3. World-class learning and development facilities to support workforce development.
4. Established technology platform to enable commercialization of products locally.
5. Global footprint to connect investors to Saudi Arabia.
6. World-class practices which can be shared to improve local companies.
7. Robust Shared-Services set-up which can be extended to other companies.
8. Integrated and Global supply-chain which can be leveraged for investors.

DarTec's Contribution (Value-Add):

- **Entema:**
  1. De-risking investment opportunities for investors who are interested in entering the Saudi market by linking supply and demand & identifying investment opportunities
  2. Develop the engineering package required for manufacturing SABIC nominated **Spare Parts & Downstream Opportunities**
- **Daem:** Develop engineering package that is required for manufacturing parts/equipment (2D Engineering drawings per ASME 14.5 Standards that reflects operating conditions, 3D CAD files, Metallurgy Analysis Report) & provide inspection services after manufacturing.

الشركة السعودية للكهرباء
Saudi Electricity Company

The Kingdom of Saudi Arabia is experiencing a tremendous expansion of industrial accompanied by a massive increase in the need for electric power energy due to the essential role that electric power has in the development and growth. Thusly, this huge demand of electric power requires large investments in the field of spare part manufacturing to enable localization.

Saudi Electricity Company – SEC has worked with manufacturers and investors to build a strategic relationship based on mutual interests and the principle of a Win - Win situation, which resulted in the construction of several factories and an increase in production lines reaching 65% of the purchases of power transmission materials from local factories. Further, SEC has been working to increase their local content value and support local manufacturers to enable healthy competition with foreign factories and suppliers alike. At the beginning of 2013, SEC formed a specialized team to study the localization potential at SEC to create strategic plane to improve local content development and attract more manufacturers and investors to build their factories in the Kingdom [10].

SEC has been playing a vital role in supporting the manufacturing of power related parts and equipment, where this role has been implemented by applying the following objectives [11]:

- Promote establishing local manufacturing with SEC's strategic partners.
- Improve the volume (value and number) of locally manufactured power spare parts.
- Attract more foreign investment to the power sector in the Kingdom.
- Transfer Knowledge/technology to the Kingdom.

SEC has put forth great efforts to support and encourage local manufacturing, where it has demonstrated their efforts as follows [12]:

- Provide local manufacturers with the necessary data for localization feasibility studies.
- Publish SEC's five-year plan for their spare part needs.
- Share the specifications of materials and equipment with local manufacturers.

- Hold regular meetings with local manufacturers to open channels of communication and reach to optimum solutions for the obstacles and problems.
- Signed a Memorandum of Understanding (MOU) with the Royal Commission in Yanbu and BAHRI Company to support the localization of spare parts.
- Signed MOU with MODEN to support the localization of manufacturing industries.
- Cooperate and coordinate with Saudi Aramco in their project of localization of electrical industries within the Energy City which they plan on building in the Eastern Province.
- Include local manufacturers with to implement mechanisms and procedures related to the development of new methods of work to enhance localization and increase local content development.

SEC has prepared a booklet for investment opportunities [13] to localize spare parts/equipment in the utility industry. This booklet contains 85 investment opportunities with a total estimated value about SR52 Billion [14].

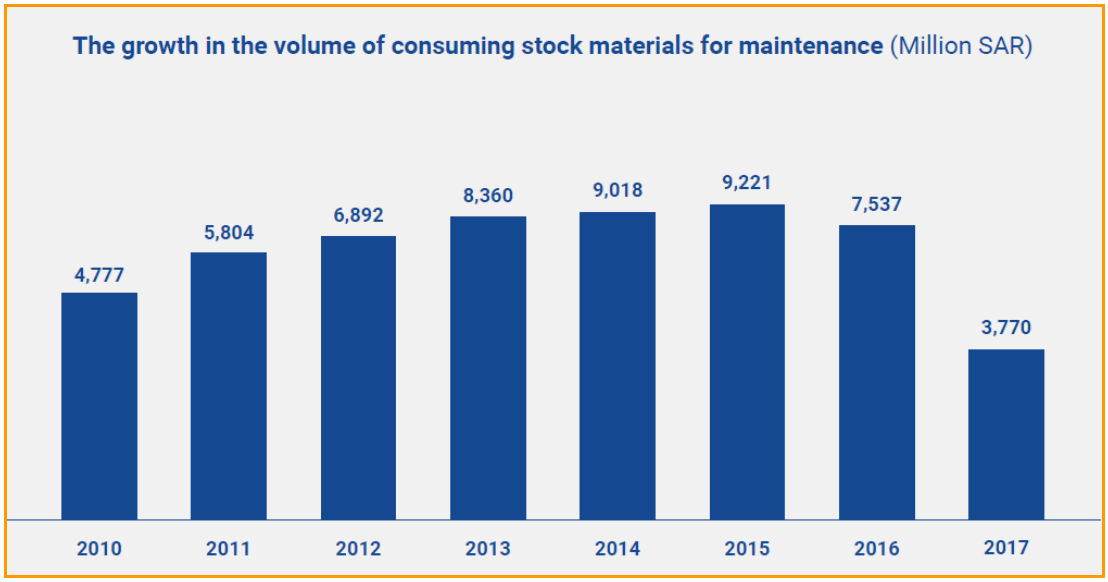

Figure 8: SEC's spare part consumption growth trend [13]

SEC's BANA Strategy to maximize local content consist of three major initiatives to support and motivate local industries [13]:

- Initiative 1: Develop policies and procedures to motivate contractors.
- Initiative 2: Develop policies and procedures to motivate local manufacturers.
- Initiative 3: Identify investment opportunities for localization.

SEC aspires to achieve the following noble objective as a result of their localization efforts by 2021 [13]:

- Deliver electricity to 2.3 million new customers.
- Enhance distribution network lengths by adding 162,000Km.
- Enhance transmission network length and increase reliability by adding 21,500Km.
- Increase the generation capacity to 91,000MW.

Sum of bidder points = Bid price points + LC points

Calculation of bid price points:

The lowest bid points = L1 = (80 or 90 or 95) Points

The second lowest bid points = L2 = L1 bid points X $(\frac{L1}{L2})$

The third lowest bid points = L3 = L1 bid points X $(\frac{L1}{L3})$

+

$$* 100 + XLC = \left(\frac{a1+a2+b+c+d+r}{E}\right)$$

a1: Localized Goods and Services
a2: Depreciation of productive assets
b:Compensation Paid to Saudis
c:Training & Development of Saudis
d: Supplier Development Spend
r: Research & Development
E: Operational expenses
Highest score for LC (5 – 10 – 20)
LC Points = LC Ratio X (5 or 10 or 20)%

DarTec's Contribution (Value-Add):

- a1: Localized Goods & Services

المؤسسة العامة لتحلية المياه المالحة
Saline Water Conversion Corporation

The spare part market size in the desalination industry is SR166M/year with exportability potential to GCC countries projected to be approximately SR348M/year [15]. Currently, only 1% of spare parts are being locally sourced. The Saline Water Conversion Corporation (SWCC) procurement department does not have enough information on spare part specifications to open competition to alternative suppliers. Furthermore, OEMs provide limited information to local stakeholders in order for them to capture market share. Generic spare parts can be provided by OEMs or alternative local manufacturers, where SWCC procurement department has enough information to define the specifications and open the competition through a bidding process [15].

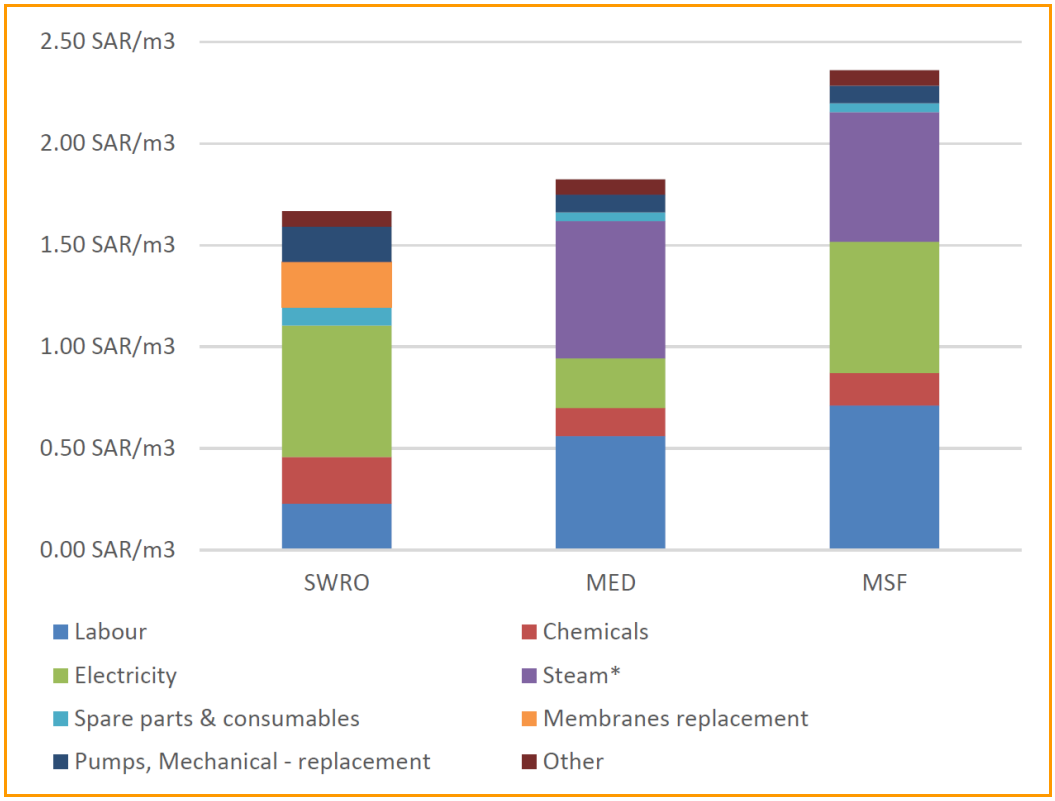

Figure 9: OPEX unit cost/m^3 produced (for low-pressure steam) [15]

Figure 9 above illustrates how spare parts and consumables become more lucrative for thermal desalination operation (MSF and MED) when compared to electrical desalination processes (RO).

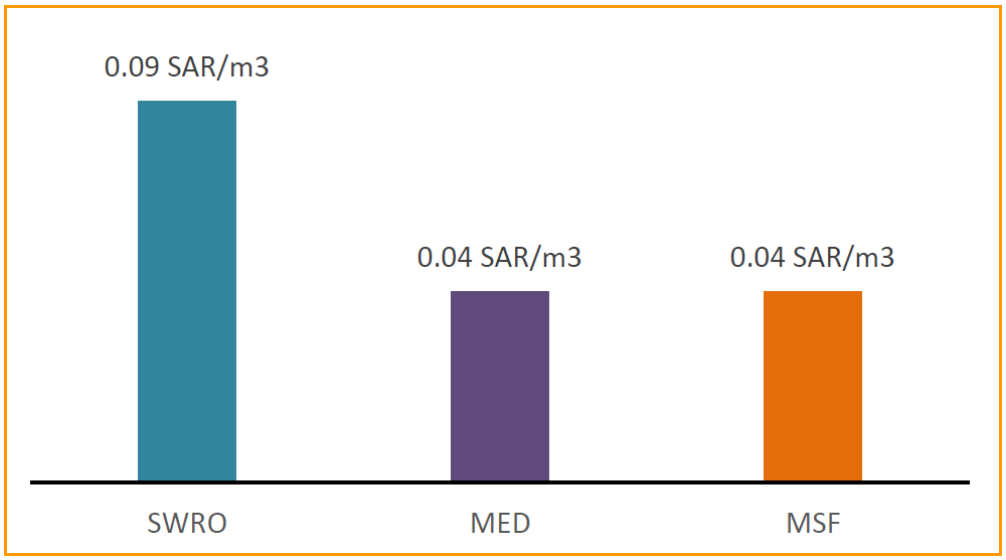

Figure 10: Spare parts & consumables unit cost per technology [15]

Spare parts unit cost is directly related to the equipment cost, where it represents 1/3 of 5% of the equipment cost excluding the membrane as illustrated in Figure 10.

The Industrial Cluster (IC) conducted a study by analyzing four SWCC desalination plants (Ras Al-Khair, Jubail plants, Jeddah plants, and Shoaiba plants) based on the stock inventory and movement for 3-years, and below were the findings [15]:

- Present stock inventory value was estimated at SR1.5Bn.
- All stock movements from 2012 – 2016 represent 150,000 items, 3,000 categories, and over 3,000 OEMs.
- Stock value build over the past 4-years has a value of SR494M and 95% of moving stock is sourced internationally.
- Local spare part manufacturers represent a value of SR7M and 1%.
- The remaining unidentified 4% are most likely manufactured by international companies at a value of SR20M.

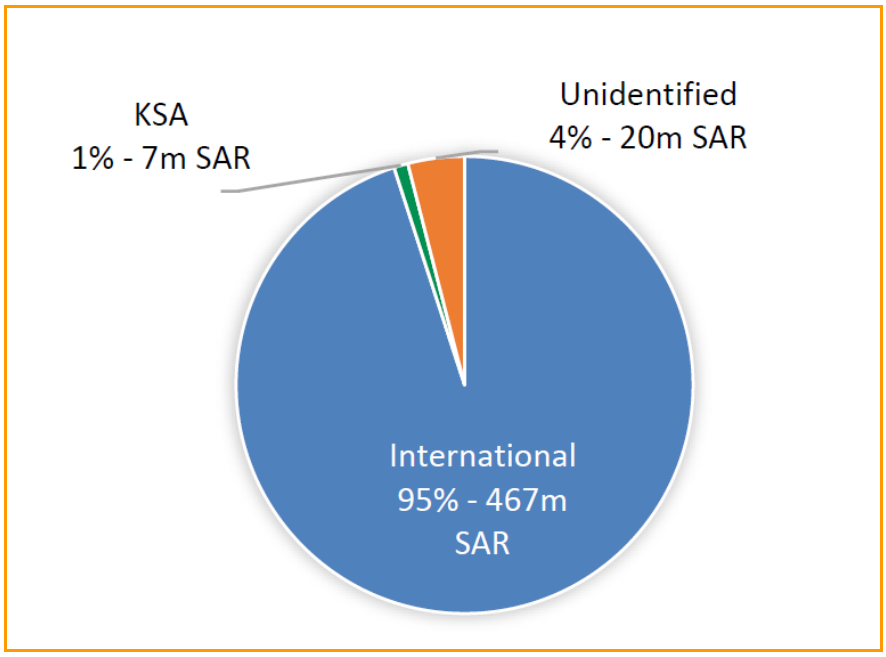

Figure 11: SWCC spare part sourcing distribution [15]

Figure 11 clearly illustrates the overwhelmingly high stock value of spare part items that are currently sourced internationally in both categories (Spare parts & Generic items). Furthermore, the study identified 165 local OEMs that covers 490 categories across spare parts and generics items, where the below figures illustrates the differences between both categories:

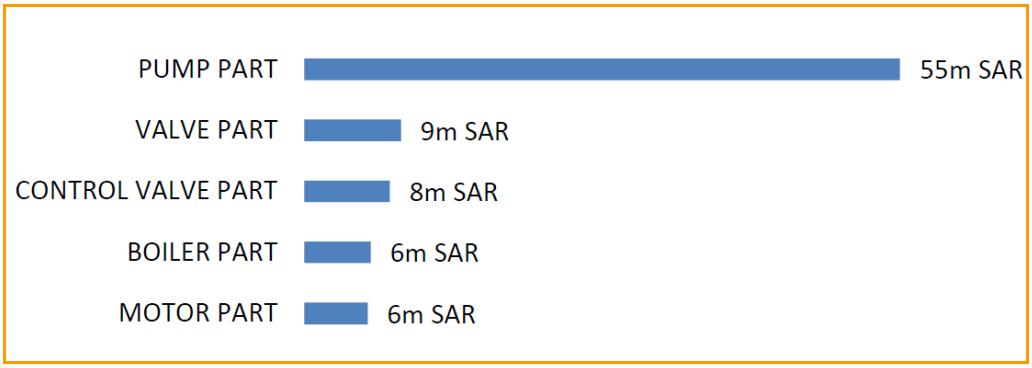

Figure 12: High value desal plant items related to Spare Parts [15]

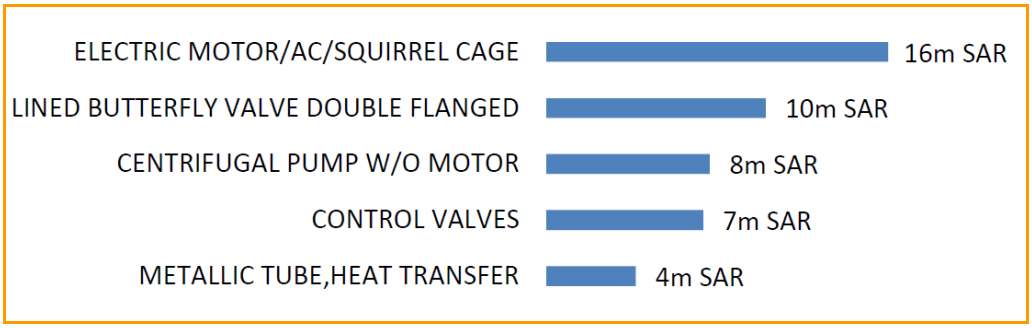

Figure 13: High-value desal plant items related to Generic Items [15]

#	Category	Type	Stock Value (Moving)	Number of items in Category	Number of OEM - International	Number of OEM - KSA
1	Pump Parts	Spare Parts	55m SAR	3,087	130	7
2	Valve Part	Spare Parts	9m SAR	714	103	1
3	Control Valve Part	Spare Parts	8m SAR	571	36	1
4	Boiler Part	Spare Parts	6m SAR	119	12	-
5	Motor Part	Spare Parts	6m SAR	329	41	-
6	Electric Motor/Squirrel Cage/AC	Generic	16m SAR	183	74	-
7	Butterfly Valve/D Flanged	Generic	10m SAR	62	17	-
8	Centrifugal Pump W/O Motor	Generic	8m SAR	35	18	1
9	Control Valves	Generic	7m SAR	81	37	1

Table 1: Stock inventory for the 4 surveyed plants [15]

Table 1 above demonstrates the categories with lucrative spare part localization potentiation in the desalination industry.

Local OEMs represent only 1% of total inventory value from four (4) SWCC plants combined (Ras AlKhair - RAK, Jeddah, Jubail, and Shoaiba), where spare part manufacturing is a captive market dominated by main international OEMs, which did not allow the development of new local spare parts manufacturers.

DarTec's Contribution (Value-Add): Develop engineering package that is required for manufacturing parts/equipment (2D Engineering drawings per ASME 14.5 Standards that reflects operating conditions, 3D CAD files, Metallurgy Analysis Report) & provide inspection services after manufacturing.