

MA'ADEN

Supply Chain Local Content Opportunities

LC Vision

“Our vision is to maximise the contribution of the mining industry to the Kingdom of Saudi Arabia through spend on Saudi components within labour, goods, services, assets and technology.”

About MA'ADEN

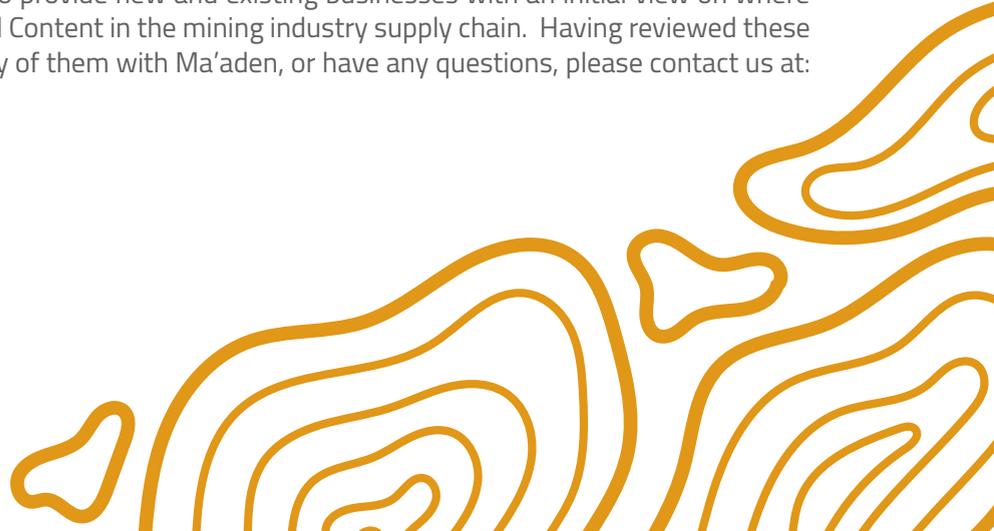
The Saudi Arabian Mining Company (MA'ADEN) has been identified as the national champion for the mining industry in KSA. Inspired by Vision 2030, and with the Kingdom's geological potential, Ma'aden is set to grow and champion the development of the mining sector. A critical element of this role is the development of Local Content in KSA - to create opportunities for new and existing businesses, and individuals, in the mining industry supply chain.

MA'ADEN Local Content Supply Chain Opportunities

To support the development of Local Content in the mining industry supply chain Ma'aden has produced the following document that highlights 82 category opportunities to improve Local Content, based on Ma'aden's own consumption. Some of these categories are currently sourced from outside KSA, and some are available from companies based in KSA, but all offer opportunities to improve the level of supply chain Local Content, and the contribution the mining industry makes to the Saudi economy.

These opportunities have been separated into three groups – Raw Materials, Equipment, and Services. For each opportunity high level information is provided on the category, the opportunity, the specifications currently used by Ma'aden, how this supports Ma'aden's business, and an indication of Ma'aden's consumption historically, and estimated in the future. It is intended to provide new and existing businesses with an initial view on where potential opportunity exists to improve Local Content in the mining industry supply chain. Having reviewed these opportunities should you wish to discuss any of them with Ma'aden, or have any questions, please contact us at:

LocalContent@Maaden.com.sa





Raw Materials

24 Billion SAR

Cumulative spend to 2030

Raw Materials

Index

Petroleum Coke	Flocculants	Sodium Cyanide	Aluminum Coating
Aluminium Scrap	Fatty Acid	Alloys	Manganese Based Alloys
Caustic Soda	Coating Oil	Magnesium	Metal Products
Pitch	Limestone & Hydrated Lime	Antiscalants	Colouring Agents for DAP
Potash	Defoamer	Aluminium Fluoride	
Explosives	Catalysts	Refractory Bricks	

Petroleum Coke

Description

- Calcined Petroleum Coke (CP Coke) is a solidified carbon block by-product of processing and calcining Petroleum at high temperatures, and in its raw form it is known as Green Petroleum Coke (GPC)
- It is used for carbon anode manufacturing in aluminium smelters; the anode acts as a conductor of electricity for the aluminium electrolysis process of smelting

Opportunity

- Global: Petroleum Coke (Pet Coke) Market To Reach ~ SAR 75 Bn by 2022
- Total Global Green Coke market stands at 140 Mn tons, out of which ~28 Mn tons of anode grade CPC is produced with China and the US contributing to the largest share of production
- Localise calciner development by utilising the GPC from KSA to meet Ma'aden requirements and specifications

Specification

- Low sulphur (<3%) content and low silver content required in the green coke used
- Bulk density greater than 0.85gm/cc

Where in the Process

The calcined petroleum coke is used for processing in an anode baking oven in order to produce anode coke of the desired shape and physical properties

Demand

Forecasted Spend, SAR:

2021	2025	2030
562m	633m	734m

Current levels of localisation:

On-Shore Spend



Aluminium Scrap

Description

- Scrap aluminium can be reused in aluminium production
- The process involves simply re-melting the metal, which is far less expensive and energy intensive than creating new Aluminium from Bauxite Ore

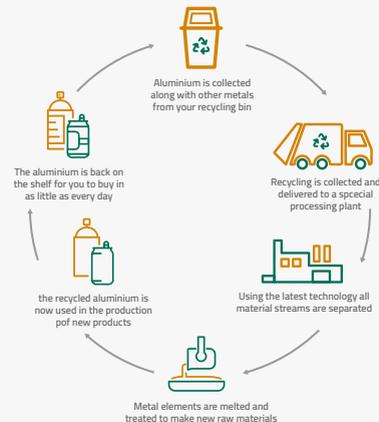
Opportunity

- Opportunity to push for increased local purchases of aluminium scrap
- Currently aluminium scrap is purchased from a variety of suppliers of which the majority are located outside of the kingdom

Specification

ALUMINIUM 7602 SCRAP – MIXED, EXT, COATED (UBC), 1ST QUALITY

Where in the Process



Demand

Forecasted Spend, SAR:

2021	2025	2030
396m	446m	517m

Current levels of localisation:

On-Shore Spend



Caustic Soda

Description

The largest end use of Caustic soda (sodium hydroxide) is in alumina production (14%), followed by pulp and paper industry (12%), organic chemicals production (16%), inorganic chemicals production (12%), and other uses like textiles, soaps and detergents, water treatment

Opportunity

- Caustic Soda requirements 100% localised but with opportunity to increase Local Content in supply chain, and through Saudi job creation

Specification

Largely delivered in bulk quantity in liquid form

Where in the Process

Caustic soda is used to remove silica from red bauxite ore

Demand

Forecasted Spend, SAR:

2021	2025	2030
263m	296m	343m

Current levels of localisation:

On-Shore Spend



Pitch

Description

- Coal Tar Pitch (CT Pitch) is a by-product of the Coal cokefication process carried out in Steel plants and is obtained as fractional distillation residue
- The Coal Tar residue is treated further in manufacturing plants to adhere with required properties, and used as binders to hold CP Coke and recycled materials during the Carbon anode manufacturing process

Opportunity

- Localise coal tar pitch manufacturing through development of a processing unit and importing coal tar residue to meet Ma'aden requirements and specifications, and reduce the working capital inventory
- Hybrid petroleum pitch usage for anode manufacturing in KSA

Specification

High Softening point (108 to 113 °C) – The higher the softening point, the better the specification
Coking value > 64

Where in the Process

Pitch is used for production of cathodes and anodes used in the electrolytic process of aluminium production

Demand

Forecasted Spend, SAR:

2021	2025	2030
163m	183m	212m

Current levels of localisation:

On-Shore Spend



Potash

Description

- Potash are Potassium containing salts and is used as a source of Potassium in the production of fertilisers
- More than %90 of potash produced in the world is used for fertilizers
- It requires simple separation from other minerals and physical grading into a form suitable for fertilizer manufacture or farm spreading.

Opportunity

To source locally produced Potash to fulfil Ma'aden's demand, which is currently sourced from overseas

Specification

Suitable for fertilizer manufacture or farm spreading

Where in the Process

Potash is used in the fertiliser production process

Demand

Forecasted Spend, SAR:

2021	2025	2030
111m	124m	144m

Current levels of localisation:

On-Shore Spend



Explosives

Description

- Explosives are used mainly for drilling and blasting operations in mining, construction, and other sectors

Opportunity

- Ammonium Nitrate is imported into the Kingdom
- Middle East & Africa accounted for the majority share of the mining explosives market in 2015 and it is expected to remain dominant over the forecast period (2016 - 2024)
- Opportunity to invest in Ammonium Nitrate plant in KSA

Typical Components

- Bulk ANFO-Prillex
- Bulk ANFO bulk emulsion-Kemulex
- Detonating cord
- Ignitor cord
- Starters
- Electronic detonator

Where in the Process

Explosives are used in mining operations.

Demand

Forecasted Spend, SAR:

2021	2025	2030
110m	124m	143m

Current levels of localisation:

On-Shore Spend



Flocculants

Description

A flocculant is a substance which increases the settling rate of solids in slurry

Opportunity

- To supply flocculants to Ma'aden to fulfil its demand.
- To customize flocculants for better performance.

Specification

Flocculants are broadly categorized into the following two categories:

- Anionic Flocculants
- Non Anionic Flocculants

Ma'aden uses both of them.

Where in the Process

Ma'aden use flocculants in various processes mainly, but mainly in the following:

- Beneficiation process
- Process Water treatment process
- Aluminium refining process

Demand

Forecasted Spend, SAR:

2021	2025	2030
71m	80m	93m

Current levels of localisation:

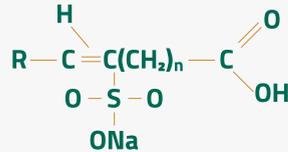
On-Shore Spend



Fatty Acid

Description

Carbonate Collector is a strategic chemical directly impacting the recovery of P2O5 from ore



Opportunity

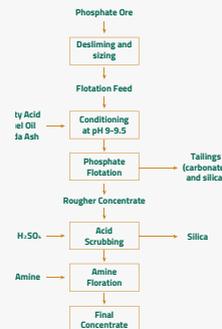
- The majority of fatty acid is produced in China and South East Asia, using palm oil or similar as a base material
- There is some production in the Middle East but capacity is small, and similarly the market size is small
- Ma'aden's supply is currently blended in country but the opportunity exists to move the manufacture of fatty acid to Ma'aden specification to KSA and increase the level of Local Content

Specification

Fatty Acid
Fatty Acid Ester
Vegetable Oil Ester
Alcohol

Where in the Process

Fatty acid is used to concentrate ore during a reverse 'Crago' floatation process



Demand

Forecasted Spend, SAR:

2021	2025	2030
63m	71m	83m

Current levels of localisation:

On-Shore Spend



Coating Oil

Description

- Coating oil or agents are applied to fertilisers to preserve the quality of manufactured fertilizer through shipping, storage and handling
- The function of coating oil is to control dust emission, minimize caking, enhance flowability or to minimize moisture pickup amongst others

Opportunity

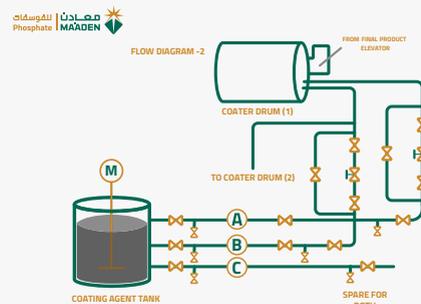
To provide a locally produced product to fulfil Ma'aden's demand – currently %100 of the supply of coating oil comes from overseas

Specification

Typically Coating / Anticaking agents are produced using vegetable oil and mineral oils along with some proprietary additives.

Where in the Process

After Granulation of the product.



Demand

Forecasted Spend, SAR:

2021	2025	2030
57m	64m	74m

Current levels of localisation:

On-Shore Spend



Limestone & Hydrated Lime

Description

- A major use for lime is in metallurgy, including steel production, which accounts for nearly half of total lime consumption
- Calcium oxide finds various applications in the building and construction sector, such as in the production of concrete and AAC

Opportunity

- Increased construction and infrastructure development is expected to boost the consumption of polymers and concretes, driving the demand for calcium oxide. A rise in the population in EMEA, especially in Africa and the Middle East, has driven demand for infrastructure expansion
- Calcium Oxide market is forecasted to grow at CAGR of ~5% between 2017 and 2021
- Oman and UAE have the largest reserves of limestone within the Middle East region

Specification

Ma'aden is purchasing limestone and 2 types of lime (i.e. Quicklime & hydrated lime)
Typical Ca (OH)₂ content desired is 92-95%

Where in the Process

- Lime is used in precipitating impurities / regenerating caustic within the aluminium processing
- Lime is also used as a clinker agent combined with Silica contained in the mineral, forming Calcium Silicate, avoiding formation of Iron Silicate
- Hydrated lime is used to neutralize FSA produced in PA Plant

Demand

Forecasted Spend, SAR:

2021	2025	2030
48m	54m	63m

Current levels of localisation:

On-Shore Spend



Defoamer

Description

- Defoamers are highly efficient, hydrocarbon oil-based antifoaming agents.
- Defoamers are used in construction and building products for foam control purposes

Opportunity

- MENA market accounted for ~%5 of the global defoaming coating additives market in 2013 and expected to be fastest-growing regional defoaming coating additives market
- Saudi Arabia and Qatar are main customers in the MENA market. Defoaming coating additives were mainly consumed by the construction segment, accounting for a %35 market share in 2013 Defoamers which use Oleic Acid as a base typically come from China and South East Asia

Specification

- DAP requires water based Defoamer
- PAP requires oil based defoamer
- Aluminium requires water based Defoamer

Where in the Process

- Defoamers are used in the PAP plant reactors where entrapped gases are removed to reduce foaming effect
- Defoamer is added into the granulation scrubbing system to reduce surface bubbles in the granulation process
- Defoamer is added at the precipitation process to control the foam in the Alumina output caused by the Caustic reaction process

Demand

Forecasted Spend, SAR:

2021	2025	2030
42m	47m	54m

Current levels of localisation:

On-Shore Spend



Catalysts

Description

- A catalyst is an agent or compound that is added to a process to make a chemical reaction happen more quickly
- They are used widely in Maaden as well as other petrochemical industries.

Opportunity

- Local Catalyst production to meet Ma'aden's requirements
- There is very significant broader demand for catalysts in the petrochemical and other KSA industries, which increase the attractiveness of this investment opportunity

Specification

- Cobalt/Molybdenum oxides
- ZNO
- Nickel
- Iron oxide
- Copper oxide

Where in the Process

- Ammonia Process for Gas separation
- Sulfuric Acid Production

Demand

Forecasted Spend, SAR:

2021	2025	2030
39m	43m	55m

Current levels of localisation:

On-Shore Spend



Sodium Cyanide

Description

- Sodium cyanide (NaCN), also referred to as white cyanide, is a white, cubic crystalline solid produced from hydrogen cyanide and sodium hydroxide used to extract gold and other precious metals
- Sodium cyanide production requires high purity (>95%)

Opportunity

- Current global consumption for Sodium Cyanide is around 1 Mn tons and expected to reach ~2.9 Mn tons by 2035 and current MGBM consumption is in the region of 350g/ton
- Sodium Cyanide demand is mainly driven by gold recovery and organic chemical production
- The consumption of Sodium cyanide is expected to grow at ~6% p.a starting 2019
- Whilst all Ma'aden demand is currently sourced in Kingdom, opportunities exist to boost Local Content

Specification

Ma'aden procures one type of Sodium Cyanide (Assay solid with 98% purity in cubic form)

Where in the Process

Experts estimate on average that ~80% of NaCN is consumed by gold leaching

Demand

Forecasted Spend, SAR:

2021	2025	2030
31m	35m	41m

Current levels of localisation:

On-Shore Spend



Alloys

Description

- Addition of alloying elements to aluminium can be made in various formats
- Master alloys ease a quick dissolution of alloying elements in liquid aluminium with a high efficiency

Opportunity

Supply of locally produced alloys to fulfil Ma'aden's demand for its aluminium production – currently 100% of Ma'aden's requirement is supplied from overseas

Specification

- Pure Magnesium Ingot / Sows
- 98.5% Silicon metal
- Manganese Briquette – 85% Min
- Copper tablet – 80%
- Chromium tablet – 80%
- 10% Calcium waffles
- 3.0% Titanium, 1% Boron coils
- 3.0% Titanium, 0.15% Carbon

Where in the Process

Master alloys are used in the aluminium production process

Demand

Forecasted Spend, SAR:

2021	2025	2030
30m	34m	40m

Current levels of localisation:

On-Shore Spend



Magnesium

Description

- Magnesium oxide (MgO) is produced by the calcination of magnesium carbonate
- MgO is prized as a refractory material. It has two useful attributes: high thermal conductivity and low electrical conductivity

Opportunity

To supply Ma'aden with Pure Magnesium in the form of Ingots and Sows – current supply comes entirely from overseas

Specification

- Pure Magnesium Ingot/ Sows
- Purity 99.8% Magnesium min
- Zn- 0.05% Max
- Be- 0.0001% Max
- Ca- 0.05% Max
- Na- 0.003% Max
- Ni – 0.001% Max
- Sn- 0.01% Max
- Pb+Cd - < 0.01
- OE- 0.05
- 6-12 Kg Ingot, 1000 Kg per pallet (Wooden), Polythene wrap, Pet strap
- 113 Kg Sow +/- 5%, 4 pcs Sow with Pet Strap

Where in the Process

Pure Magnesium is used as an alloy for Slabs and Billet Production. Around 500 to 600 tons of Pure Magnesium is consumed monthly in the process in the form of Ingots and Sows.

Demand

Forecasted Spend, SAR:

2021	2025	2030
26m	29m	34m

Current levels of localisation:

On-Shore Spend



Antiscalants

Description

- An antiscalant is a chemical that is injected into process fluid to prevent scale formation
- Ma'aden uses Sodium Hexameta phosphate (SHMP) as an antiscalant in Phosphoric Acid production

Opportunity

- To provide antiscalants for Ma'aden consumption
- There is significant broader demand, beyond Ma'aden's requirements, across the KSA economy, for antiscalants

Specification

- Water Treatment antiscalants are proprietary chemicals produced by various companies
- Sodium Hexameta Phosphate (SHMP) is a commodity chemical which is used in production of 40% Phosphoric acid

Where in the Process

Antiscalants are used in various processes in production plants at Maaden. Mainly in water treatment units, boiler feed water and Phosphoric Acid Production.

Demand

Forecasted Spend, SAR:

2021	2025	2030
39m	43m	55m

Current levels of localisation:

On-Shore Spend



Aluminium Fluoride

Description

Aluminium fluoride (AlF₃) is an inorganic compound used primarily in the production of aluminium. This colourless solid can be prepared synthetically but can also be naturally found within the rosenbergite and oskarssonite minerals.

Opportunity

- Global aluminium fluoride demand is pegged at 1.5 Mn metric tons with China leading global production (~%67) and export followed by North America and Western Europe
- China exports are expected to be drastically reduced (up to 80%) and an important idle capacity across Europe and North America (i.e. Mexico) can be explored

Specification

Aluminium Fluoride (Anhydrous powder) with >%98 purity; packaged in palletized big bags (~1.5 Tons)

Where in the Process

Aluminium Fluoride is used in Aluminium smelting process contributing to:

- Lower alumina feed melting point
- Increase solution's electrolyte's conductivity and reduce power consumption
- Enable aluminium producers to cut energy use, streamline production, reduce production costs, and ensure a pure end product

Demand

Forecasted Spend, SAR:

2021	2025	2030
22m	25m	28m

Current levels of localisation:

On-Shore Spend



Refractory Bricks

Description

- Supply of Flue wall building materials
- Flue wall Brick Type K1, K2, K3, L1, L2, flue wall replacement
- Flue wall brick type M & E
- Middle Top Blocks 30-8 (internal Flue Wall FW2-9)
- End Top blocks 30-8 (internal Flue walls FW 2 to 9)
- Wedge brick Type-1(1-2) , 2A, 2B, type 3

Opportunity

Establish localised manufacturing capability to supply Ma'aden requirements either through local investment in new capability, through foreign direct investment, or through partnership with foreign companies that can provide the technical support and knowledge to support the development of capability in Kingdom

Specification

Middle Top blocks 30-8 (External walls-Flue walls 1, 10)
End Top Blocks 30-8 (External Flue walls Fw-1,10)
Wedge brick Type-1(1-2)
Wedge brick Type-2A(1-2)
Wedge brick Type-2B (1-2)
Wedge brick Type-3 (1-2)
Pit Slab -F(1-2)
Flue wall Brick Type K1 (order 1-1) for flue wall replacement
Flue wall Brick Type K2 (order 1-1) for flue wall replacement
Flue wall Brick Type K3 (order 1-1) for flue wall replacement
Flue wall Brick Type L1 (order 1-1) for flue wall replacement
Flue wall Brick Type L2 (order 1-1) for flue wall replacement
Flue wall Brick Type L3 (order 1-1) for flue wall replacement
Flue wall Brick Type M (order 1-1) for flue wall replacement
Flue wall Brick Type E (order 1-3) for flue wall replacement
Middle Top Blocks 30-8 (internal Flue Wall FW2-9)
End Top blocks 30-8 (internal Flue walls FW 2 to 9)

Where in the Process

Used in the lining of furnaces of furnaces during the production of aluminium

Demand

Forecasted Spend, SAR:

2021	2025	2030
17m	19m	23m

Current levels of localisation:

On-Shore Spend



Aluminum Coating

Description

This is the end and tab stock product coating used by Ma'aden in its rolling mill. The specification and type of coating are driven by customer requirements and approved by the rolling mill customer.

Opportunity

Establish localised manufacturing capability to supply Ma'aden requirements either through local investment in new capability, through foreign direct investment, or through partnership with foreign companies that can provide the technical support and knowledge to support the development of capability in Kingdom

Specification

The product is formulation based.

Where in the Process

Used in rolling mill finishing.

Demand

Forecasted Spend, SAR:

2021	2025	2030
13m	14m	17m

Current levels of localisation:

On-Shore Spend



Manganese Based Alloys

Description

- Manganese is added to aluminium to create 3000 series alloys
- The addition of manganese to aluminium increases strength through solution strengthening and improves strain hardening while not appreciably reducing ductility or corrosion resistance

Opportunity

- Although 80 percent of manganese resources are found in South Africa, manganese is also mined in Australia, China, India, Ukraine, Brazil and Gabon
- There is no known Manganese deposit within the Kingdom of Saudi Arabia, but the opportunity exists to use a locally based distributor or agent

Specification

Manganese Hardener (Mini tablets/ Briquettes, Zero Flux)

- Mn 84-86%
- Fe- 0.20% Max
- Si- 0.10% Max
- Cr- 0.10% Max
- Se- 0.05% Max
- Be- 0.001% Max
- Pb+Cd - < 0.01
- OE- 0.05
- 10 Kg bags (paper) of mini tablets/ briquettes, Pet wrap, Pet strap

Where in the Process

Manganese is used in the aluminium production process for specific alloys

Demand

Forecasted Spend, SAR:

2021	2025	2030
12m	14m	16m

Current levels of localisation:

On-Shore Spend



Metal Products

Description

- An alloy stretched out to become a sheet is called a metal sheet
- Metal sheets are categorized based on the alloy used, thickness, hardness, method of manufacturing, tensile strength and quality

Opportunity

- Saudi Arabia has the highest consumption of steel in GCC with two thirds of its requirements coming from finished steel products (e.g. coils, plates)
- Opportunity exists to switch to a locally manufactured product, as 100% of Ma'aden's current demand is met from overseas

Specification

Sheet Metal

Where in the Process

Sheets are fabricated into various simple products for internal use by Ma'aden and its affiliates to replace worn components e.g. machine guards

Demand

Forecasted Spend, SAR:

2021	2025	2030
12m	13m	15m

Current levels of localisation:

On-Shore Spend



Colouring Agents for DAP

Description

- Colorants are applied to DAP fertilizers, whereas coating is applied to all products to prevent caking in transport / storage
- Colorant usage is driven by market requirements for a dark coloured product, full body colouring is used to ensure that light colour is not exposed due to breakage during transport

Opportunity

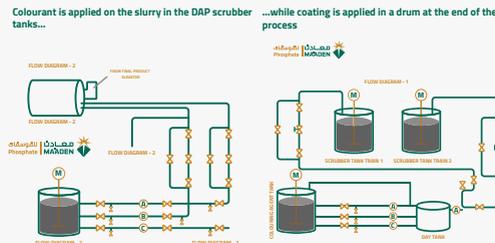
- Coating agents are applied on 100% of production volume to prevent caking while ~78% of production volume is coloured
- The Middle East region has witnessed a growth in the colorants market driven by various industries such as textiles, packaging, pharmaceutical, personal care, building & construction, foods & beverages, automotive and paper & printing

Specification

- Full Body Colouring
- Pepsi Brown Colour

Where in the Process

- Colorants are applied in the DAP plant scrubber tanks, and coating is applied to all product at the end of the process
- DAP is coloured by the addition of liquid colorant



Demand

Forecasted Spend, SAR:

2021	2025	2030
4m	5m	6m

Current levels of localisation:

On-Shore Spend





Equipment

10 Billion SAR

Cumulative spend to 2030



Equipment

Index

Pipes and Fittings	Lubricants	Filtration	Computer Equipment & Accessories	Paints and Primers
Gaskets	Safety Supplies – PPE	Electrical and Instrumentation	Compressor rental and maintenance	Power Transmission
Pumps	Hardware & Fasteners	Hose	Cathode Sealing Bar	Fabricated Structural Assemblies
Valves	Building and Construction Machinery	Motor	Tires and tire tubes	Flange
Conveyors	Bearing	Tube	Heavy Equipment Spares	Hydraulics
Seals	Washers	Nozzles	Straps	
Crushers, Breakers and Grinders	Generators Rental	Switches	Dewatering Equipment	

Pipes and Fittings DAP

Description

- Pipes and fittings are components that are used to change the direction of fluid flow, size of the pipe, connect different components and stop the flow of fluids
- They can be manufactured from different materials but are largely made of PVC

Opportunity

- PVC/HDPE pipe demand in KSA: SAR 1.6 Bn in 2016, Expected to reach SAR 2 Bn by 2022
- Global PVC pipe market size to grow at a ~7% CAGR to reach SAR ~320 Bn by 2022
- Victaulic pipe system manufacturing facility to be established
- Specialised engineering service providers on piping, e.g. X rays, infrared scanning, specialised thickness and pressure testing to be readily available

Typical Components

- Pipes and tubes
- Fittings, phalanges and elbows
- Expansion joints

Where in the Process

Pipes are used in numerous processes including:

- **Manufacturing of DAP** occurs by reacting phosphoric acid and ammonia inside a pipe reactor
- **Creating water line** by connecting a gypsum pond with spray crossflow packed bed scrubbers
- Piping, valves and fittings of mild steel are used as **transfer equipment** in the production of ammonium polyphosphate

Demand

Forecasted Spend, SAR:

2021	2025	2030
220m	248m	287m

Current levels of localisation:

On-Shore Spend



Gaskets

Description

- A gasket fills the space between two or more mating surfaces to prevent leakage from the joined objects while under compression
- Category scope includes gaskets, bushing and their sub types

Opportunity

- Middle East gasket market is forecasted to grow steadily at a CAGR of ~%5 by 2021
- Ma'aden's existing gasket demand is currently split between in country and foreign suppliers, opportunity exists to more fully meet Ma'aden's demand through domestically manufactured products

Typical Components

- Gaskets
- Bushings
- O-Rings

Where in the Process

- Gaskets can mainly be found in:
- Inside process equipment like pumps and compressors
 - Outside process equipment like flanges

Demand

Forecasted Spend, SAR:

2021	2025	2030
4m	5m	6m

Current levels of localisation:

On-Shore Spend



Pumps

Description

Industrial pumps are used to move fluid in an industrial application

Opportunity

- Pumps services market in ME is expected to grow at a CAGR of ~%9 between 2017 and 2021
- KSA Industrial Pumps market is projected to grow at a rate of ~%2.4 between 2017 and 2023 driven by an expected recovery of oil prices, rebound of construction industry, exponential growth across industrial sector and establishment of petrochemical industries
- Specialised repair and servicing facility

Typical Components

- Casing
- Impellers
- Pump Parts

Where in the Process

Pump and pump parts are used from raw material processing to finished product

Demand

Forecasted Spend, SAR:

2021	2025	2030
82m	92m	107m

Current levels of localisation:

On-Shore Spend



Valves

Description

- Valves are used in various diameter size, flow rate, material, class, connection type etc.
- Control valves control conditions such as flow, pressure, temperature, and liquid level by fully or partially opening or closing in response to signals received from controllers and/or sensors

Opportunity

- MENA valves market is estimated to be ~ \$10.2 Bn in 2019, with a projected CAGR of ~%6
- Local valve manufacturers are present in kingdom with the capability to manufacture different valve types, however the majority of Ma'aden's demand is still fulfilled by overseas suppliers
- Automated control valves for new industries (actuators, positioners, etc.) manufacture and repair services

Typical Components

- Gate
- Globe
- Butterfly
- Diaphragm
- Relief
- Ball

Where in the Process

Used at multiple points in operations to regulate, direct or control the flow of a liquid by opening, closing, or partially obstructing flow through pipes or passageways

Demand

Forecasted Spend, SAR:

2021	2025	2030
59m	66m	77m

Current levels of localisation:

On-Shore Spend



Conveyors

Description

Conveyor system is used to move raw material, in-process and finished product from one location to another

Opportunity

- Global conveyor belt market is forecasted to reach SAR 29 Bn by 2021 with the EMEA Conveyor belt market size attaining ~SAR 8.6 Bn
- Middle East conveyor belts market is projected to register CAGR of %4.3 between 2016 & 2026
- Metal-reinforced rubber conveyor belt segment has been estimated to account for ~%27 value share of the market in 2015 and is expected to register a CAGR of %4.6 over the forecast period
- Investigate producing secondary equipment, used on conveyor belt systems, locally

Typical Components

- Belts
- Rollers
- Idlers
- Accessories

Where in the Process

- Raw material transportation
- In-process and finished product movement and storage

Demand

Forecasted Spend, SAR:

2021	2025	2030
43m	48m	56m

Current levels of localisation:

On-Shore Spend



Seals

Description

- A mechanical seal is a device that helps join systems or mechanisms together by preventing leakage, containing pressure, or excluding contamination
- Category scope includes seals, bushing and their sub types

Opportunity

- Middle East mechanical seals market is forecasted to grow steadily at a CAGR of ~5% by 2021
- Partnering with world class seal manufacturing company to produce seals locally

Typical Components

- Bushings
- Seals
- O-Rings

Where in the Process

- Seals can mainly be found in:
- Inside process equipment like pumps and compressors
 - Outside process equipment like flanges

Demand

Forecasted Spend, SAR:

2021	2025	2030
37m	42m	49m

Current levels of localisation:

On-Shore Spend



Crushers, Breakers and Grinders

Description

Crushers, breakers and grinders are used to physically break down and reduce particle size of extracted material

Opportunity

- To supply Ma'aden with crushers, breakers and grinders across its mining operations
- Partner with local manufacturing of wear parts using available scrap steel within the kingdom
- Provide maintenance, repair and servicing services for crushers, breakers and grinders

Typical Components

- Crushers
- Feeder Breakers
- Grinding Mills
- Grinding Balls

Where in the Process

Crushers, breakers and grinders are used after the raw material has been extracted and is used to reduce the particle size before processing

Demand

Forecasted Spend, SAR:

2021	2025	2030
34m	38m	44m

Current levels of localisation:

On-Shore Spend



Lubricants

Description

- Lubricant is a substance introduced to reduce friction between surfaces in mutual contact, which reduces the heat generated when the surface moves.

Opportunity

- Lubricant market in KSA is expected to grow at ~5% p.a. between 2016 and 2021
- KSA commercial lubricants market is driven by construction and infrastructure industries
- Middle East & Africa lubricants market is estimated to register a CAGR of ~3% between 2014 and 2019 to reach SAR 69 Bn and a volume of ~ 4.9 KT
- Investigate the possibility of using old oil as an alternative energy source

Typical Components

- Lubricant oil
- Grease
- Coolant

Where in the Process

Lubricants are mainly used in rotating equipment

Demand

Forecasted Spend, SAR:

2021	2025	2030
28m	32m	39m

Current levels of localisation:

On-Shore Spend



Safety Supplies – PPE

Description

- Personal protective equipment (PPE) is equipment worn to minimize exposure to hazards that cause serious injuries and illnesses in the workplace
- PPE includes gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits

Opportunity

- Middle East market will continue growing at a steady average of ~%8 from 2015-2022 driven by more stringent industry regulations, growing awareness of occupational health
- Saudi Arabia market is projected to grow to SAR ~1.7 Bn by 2021 with oil and gas sector accounting for more than 50% of the market
- Conduct feasibility for local manufacturing with local available raw materials

Typical Components

- **Safety clothes** (i.e. Uniforms, jackets, coverall, shirts...)
- **Safety supplies** (i.e. face shield, mask, helmet...)

Where in the Process

- All major mining and plant operations require safety supplies to mainly personnel protection
- Skin: Gloves to prevent skin contact, irritation and absorption
- Eye/Face: Eye protection / face shields to safeguard against potential eye contact, irritation
- Respiratory: NIOSH approved air purifying respirator
- Other body parts (i.e. coveralls, boots...)

Demand

Forecasted Spend, SAR:

2021	2025	2030
26m	30m	34m

Current levels of localisation:

On-Shore Spend



Hardware and Fasteners

Description

- A fastener is a component that is used to create a non-permanent joint
- Most commonly used fasteners are rivets, pins, bolts, screws, nuts, washers, and braces

Opportunity

- Middle East in 2015 accounted for ~5% of the world's imported fasteners
- Global industrial fasteners market is expected to reach SAR 390 Bn by 2020, SAR 439 Bn by 2022 and SAR 503 Bn by 2025, with a ~5% CAGR between 2017-2022.
- Demand for industrial fasteners is going to rise by ~4% to SAR 331 Bn by 2020
- Partnering with fastener manufacturing company or local smelters and foundries for recycling of scrap steel generated within the kingdom to produce fasteners

Typical Components

- Rivets
- Pins
- Bolts
- Screws
- Nuts
- Washers
- Braces

Where in the Process

Various applications and processes in Ma'aden operations across multiple affiliates

Demand

Forecasted Spend, SAR:

2021	2025	2030
25m	29m	33m

Current levels of localisation:

On-Shore Spend



Building and Construction Machinery

Description

Provision of a diverse set of general and specialized building and construction machinery to perform lifting, loading, transporting and general infrastructure activities

Opportunity

- To provide machinery and manpower required for their safe operation to support Ma'aden's construction projects
- Manufacture and provide specialised services (assessments) of cranes (Mobile, tower and overhead) within KSA

Typical Components

Examples of mobile equipment include:

- Cranes
- Excavators
- Cement Mixers

Where in the Process

Primarily during construction of new infrastructure facilities

Demand

Forecasted Spend, SAR:

2021	2025	2030
24m	27m	32m

Current levels of localisation:

On-Shore Spend



Bearing

Description

A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts.

Opportunity

- To supply locally produced bearings to Ma'aden
- Market is dominated by several large global firms, with the local market covered by resellers
- Technological advancements in seal and lubrication technologies, the use of lightweight materials in high-performance products, and integration of electro-mechanical features directly into the bearings are driving performance and decreasing product costs

Typical Components

Increasing demand for specialized bearing solutions that meet different industry specific requirements and reduce lubricant utilization

- Bearing sleeve
- Bearing roller
- Other bearings

Where in the Process

Used in machinery throughout the production process

Demand

Forecasted Spend, SAR:

2021	2025	2030
24m	27m	32m

Current levels of localisation:

On-Shore Spend



Washers

Description

A washer is a thin plate (typically disk-shaped) with a hole (typically in the middle) that is normally used to distribute the load of a threaded fastener

Opportunity

To supply Ma'aden with locally manufactured Washers

Typical Components

Types of Washers used at Ma'aden:

- Flat Washer
- Lock Washer
- Split Washer
- Thrust Washer
- Bevel Washer
- Sealing Washer
- Tab Washer

Where in the Process

All washers are general items used in pump and other equipment in the maintenance of plants

Demand

Forecasted Spend, SAR:

2021	2025	2030
24m	27m	31m

Current levels of localisation:

On-Shore Spend



Generators Rental

Description

Rental services mobile generators to provide power to remote locations

Opportunity

- To provide rental services of power generation equipment to Ma'aden for its mining activities
- Cost effective power generation measures to be established and incorporated into generator rental contracts (Diesel consumption, power factor and grid stability)

Typical Components

Examples of generators include:
- Diesel

Where in the Process

Primarily used in mining operations

Demand

Forecasted Spend, SAR:

2021	2025	2030
21m	24m	28m

Current levels of localisation:

On-Shore Spend



Filtration

Description

- Filtration is a process by which insoluble solids can be removed from a liquid
- Different types of filters are used depending on the solid being filtered out and the liquid it is suspended in

Opportunity

- Global industrial filtration market is expected to grow at a CAGR of ~%7 to reach SAR 158 Bn by 2025 driven by the growth in global petrochemicals and specialty chemicals industry
- Specialised world class filter manufacturers to be attracted to KSA in order to establish a local manufacturing facility

Typical Components

- Filters
- Filter media and components (e.g. cloth, collectors)

Where in the Process

Filtration is used in:

- **Alumina production** where ~500–1000m² of filtration area per million tonnes of production is required, along with hundreds of square metres of gravity thickener/clarifier area
- **DAP production** where filtration enables the removal of calcium sulphate, silica, fluoride, and other suspended solids from the initial phosphoric acid

Demand

Forecasted Spend, SAR:

2021	2025	2030
16m	18m	21m

Current levels of localisation:

On-Shore Spend



Electrical and Instrumentation

Description

- Electrification and automation solutions are used to improve operating procedures and integrate existing equipment in aluminium plants
- Wire/and cable growth are mainly used in in Construction and Industrial industry

Opportunity

- Middle East cable market size was ~ SAR 24 Bn in 2015, and is projected to exceed SAR 43 Bn by 2023, growing at CAGR of ~8,4%
- Construction and industrial activities, rising modernization needs of the outdated power distribution lines and the growing popularity of smart grids and related applications will be driving demand increase

Typical Components

- Controller
- Transmitter
- Wire / Cable
- Circuit Breakers
- Switches, contactors and fuses
- Coils

Where in the Process

Various applications and processes in Ma'aden operations across multiple affiliates

Demand

Forecasted Spend, SAR:

2021	2025	2030
13m	15m	17m

Current levels of localisation:

On-Shore Spend



Hose

Description

- A hose is a flexible hollow tube designed to carry fluids, water, air, etc from one location to another
- Supplied, in roll form, based on length, diameter, and material

Opportunity

To move a greater proportion of Ma'aden's total spend on hoses to local manufacture

Typical Components

Hoses vary based on the area/application

- Hydraulic hoses
- SS Braided hoses
- PTFE Lined hoses
- Chemical hoses
- Air/water/Liquid hoses

Associated materials (clamps, nozzles, rolls etc.)

Where in the Process

- Air handling and generations units
- Chemical units
- Lubrication and Power packs
- Cylinders and Accumulators

Demand

Forecasted Spend, SAR:

2021	2025	2030
7m	8m	9m

Current levels of localisation:

On-Shore Spend



Motor

Description

A motor is designed to convert one form of energy (i.e. electrical or chemical) into mechanical energy

Opportunity

- Electrical Motors have potential to be supplied by local manufacturers
- Electrical Motors supplied by Original Equipment Manufacturer (OEM) with potential to partner with local suppliers
- Utilise local repair service providers for repair and refurbishment and set agreements with local foundry to recycle all old materials from motors

Typical Components

Electrical Motor types includes the following but not limited to:

- DC / AC
- Self Braking
- High Speed
- High Voltage

Where in the Process

Used throughout the mining and production process.

Demand

Forecasted Spend, SAR:

2021	2025	2030
6m	6m	7m

Current levels of localisation:

On-Shore Spend



Tube

Description

Hollow metal (steel) tubes are used in construction and fabrication processes

Opportunity

To supply Ma'aden with locally manufactured steel tubes

Specification

Types of Tube used at Ma'aden:

- Reformer Tube
- Seamless Tube
- Boiler Tube
- Hollow Tube
- Welded Tube

Where in the Process

- Reformer used in Ammonia plant.
- Seamless, Hollow and Weld tube all are generally used in maintenance of plants
- Boilers tubes are used in SAP Economiser, MWP Fire tube boiler etc

Demand

Forecasted Spend, SAR:

2021	2025	2030
5m	6m	7m

Current levels of localisation:

On-Shore Spend



Nozzles

Description

A projecting sprout at the end of a hose where fluid is discharged and designed for regulating and directing a flow of fluid.

Opportunity

To supply Ma'aden with locally manufactured nozzles – currently the majority of demand is met by overseas suppliers

Typical Components

Types of Nozzles used at Ma'aden:

- Nozzle Valve
- Nozzle Torch
- Nozzle Spray

Where in the Process

Nozzle valve used for the maintenance of FUKUI valve in Ammonia and other plants.

Other nozzle are general spares used across all plants

Demand

Forecasted Spend, SAR:

2021	2025	2030
4m	4m	5m

Current levels of localisation:

On-Shore Spend



Switches

Description

Electrical switches and accessories

Opportunity

Manufacture, distribution, servicing and spare parts for electrical switches and accessories to meet Ma'aden's demand from sources within KSA. The majority of demand is currently met by suppliers from outside KSA

Typical Components

Types of Electrical switches used at Ma'aden:

- Pull Switch
- Pushbutton Switch
- Disconnect Switch
- Rotary Switch
- Selector Switch
- Toggle Switch
- Safety Switch

Where in the Process

Pull cord switch used in conveyors
Most of the electrical switch used in Switch gears, control panel and other control system devices

Demand

Forecasted Spend, SAR:

2021	2025	2030
4m	4m	5m

Current levels of localisation:

On-Shore Spend



Computer Equipment & Accessories

Description

- Computer equipment include laptops and associated accessories such as docking stations, external keyboard, mice, and monitors
- Office based employees each have their assigned computer equipment to carry out their duties

Opportunity

- To supply Ma'aden with computer equipment and accessories across all locations and affiliates
- Ma'aden's computer equipment and accessory demand is largely met by in country suppliers, but most of the equipment is imported. There is significant commonality in demand across all sectors of the economy, and the opportunity exists to examine local manufacturing for some items

Typical Components

Equipment include:

- Laptops
- Monitors
- Docking Stations
- External Keyboards
- External Mice

Where in the Process

Computer equipment is required for all office based employees across all Ma'aden affiliates and locations

Demand

Forecasted Spend, SAR:

2021	2025	2030
4m	4m	5m

Current levels of localisation:

On-Shore Spend



Compressor rental and maintenance

Description

In the mining industry, industrial air compressors are used as a source of electricity for powering drilling and piling machinery, pneumatic tools, material conveyors, and ventilation systems.

Opportunity

- To provide rental and maintenance services, as well as the manpower required for the safe operation of air compressors to Ma'aden for its mining activities
- Legislation to be established for minimum requirements for safe operation and maintenance of pressure vessels
- Specialised service provider to be established for the implementation of legislation requirements

Typical Components

- Portable Compressors
- Vehicle Mounted

Where in the Process

Air compressor services are required across Ma'aden's mining and key operating sites

Demand

Forecasted Spend, SAR:

2021	2025	2030
3m	4m	4m

Current levels of localisation:

On-Shore Spend



Cathode Sealing Bar

Description

Copper Inserted Cathode Bars (CICB) «Hot Rolled» that are IP Sensitive and used in Pot Relining

Opportunity

Establish localised manufacturing capability to supply Ma'aden requirements either through local investment in new capability, through foreign direct investment, or through partnership with foreign companies that can provide the technical support and knowledge to support the development of capability in Kingdom

Specification

It AP37/ALCOA 410KA (IP Sensitive)

Where in the Process

Used in reduction for pot electrolysis.

Demand

Forecasted Spend, SAR:

2021	2025	2030
2m	3m	3m

Current levels of localisation:

On-Shore Spend



Tires and tire tubes

Description

- A tire is a ring-shaped component that surrounds a wheel's rim to transfer a vehicle's load from the axle through the wheel to the ground and to provide traction on the surface travelled over
- It is typically made from rubber or synthetic compound

Opportunity

- To supply Ma'aden with tires across its mining operations
- To provide associated services to fit and maintain vehicles
- Investigate the possibility of extending tire life by making use of alternative technology available in the market (Foam fill)
- Investigate the use of old shredded tires and tubes to improve the VOD of open pit mine blasting

Typical Components

Tires and tire tubes for operational vehicles at Ma'aden mines and processing sites

Where in the Process

- Tires are used across all wheeled vehicles for:
- Incoming logistics
 - Outgoing logistics
 - Staff transport services
 - Operational site vehicles

Demand

Forecasted Spend, SAR:

2021	2025	2030
2m	3m	3m

Current levels of localisation:

On-Shore Spend



Heavy Equipment Spares

Description

- These are spare parts to replace worn and torn parts in heavy equipment
- Heavy equipment is a motorized unit (heavy machinery or vehicle) or non-motorized unit (attachment, trailer, container) serving one or more industrial uses

Opportunity

- KSA heavy equipment requirements are mainly driven by:-
- Construction industry expected to continue growing at a ~3% CAGR (2015-2022)
 - Earthmoving equipment market projected to grow at a ~12% CAGR (2014-2019) GCC has a high demand for heavy machinery with an estimated USD 128 Bn worth of projects to be completed annually between 2016 and 2019
 - Partnering with local smelters and foundries for recycling of scrap steel generated within KSA to produce heavy equipment spares

Typical Components

- Plant and mobile equipment spares
- Borers and draining equipment spares
- Trucks and heavy vehicle tyres

Where in the Process

Across the value chain for aluminium, gold and phosphate industries' Fixed and mobile equipment **needs to be regularly maintained and upgraded** in order to keep pace with changing needs of the industry, market and environment

Demand

Forecasted Spend, SAR:

2021	2025	2030
4m	5m	6m

Current levels of localisation:

On-Shore Spend



Straps

Description

- PET STRAP (Polyethylene terephthalate) is a new environment friendly strapping material to substitute Steel Strap and Polypropylene (PP) Strap.
- For the advantages it offers, it is being increasingly used in packaging for strapping the billets, ingots, and coils in Aluminium Industry

Opportunity

- To provide a locally produced product to fulfil Ma'aden's demand
- melter procurement has identified a local manufacturer, trial orders have been placed, and the material is under technical evaluation

Typical Components

- Mainly two types of Strap used in common:
- PET strap (Polyethylene terephthalate) strap
 - Steel strap
 - Ma'aden Aluminium mostly uses the PET strap

Where in the Process

- Colorants are applied in the DAP plant scrubber tanks, and coating is applied to all product at the end of the process
- DAP is coloured by the addition of liquid colorant

Demand

Forecasted Spend, SAR:

2021	2025	2030
4m	5m	6m

Current levels of localisation:

On-Shore Spend



Dewatering Equipment

Description

- Dewatering is the removal of water from solid material – dewatering equipment is deployed to remove water content from extracted minerals
- Dewatering is a key process in mining operations. Removal of the moisture content enables easier and more cost effective handling and transportation of minerals

Opportunity

To develop the manufacturing, distribution, maintenance and servicing of dewatering equipment, including process chemicals, in KSA. Almost all of Ma'aden's current demand is met by suppliers outside of KSA

Typical Components

- Dewatering equipment:
 - Spiral dewaterers
 - Tube presses
 - Vertical plate pressure filters (VPA)
 - Inclined plate settlers
- Process chemicals
- Spare parts
- Field and maintenance services

Where in the Process

Processing of bauxite ore to remove water content

Demand

Forecasted Spend, SAR:

2021	2025	2030
2m	2m	3m

Current levels of localisation:

On-Shore Spend



Paints and Primers

Description

Paint is most commonly used to protect, colour, or provide texture to objects. Primer is an undercoat or a preparatory coating put on materials before painting. Priming ensures better adhesion of paint to the surface, increases paint durability, and provides additional protection for the material being painted.

Opportunity

To supply locally produced paint and primer products to support Ma'aden's ongoing maintenance requirements as well as capital projects – almost all paint and primer demand is currently met by suppliers outside of KSA.

Typical Components

Types of Paints used at Ma'aden:

- Spray Paint
- Touch up Paint

Primers

- Interzinc 22 Primer
- Inorganic zinc Primer
- Enamel Primer

Where in the Process

General Items used in All maintenance

Demand

Forecasted Spend, SAR:

2021	2025	2030
2m	2m	3m

Current levels of localisation:

On-Shore Spend



Power Transmission

Description

- With the widespread establishment of electrical grids, power transmission is usually associated most with electric power transmission.
- Motor and compressors are used in HVAC, power generation, industrial use and others

Opportunity

- Electric motors are extensively used in the power generation and expanding applications of pumps and compressors in the desalination, water and wastewater sectors will be driving demand increase
- Solar and wind power needs to be tapped into as Saudi Arabia is blessed with abundance of these alternate sources of energy

Typical Components

- Motors and compressors
- Gears and gearboxes
- Couplings
- Link, chain and trans Belts
- Shafts and Excels

Where in the Process

Various applications and processes in Ma'aden operations across multiple affiliates

Demand

Forecasted Spend, SAR:

2021	2025	2030
1m	1m	1m

Current levels of localisation:

On-Shore Spend



Fabricated Structural Assemblies

Description

- Steel structures are required for Ma'aden's capital projects and smaller scale improvement and development activities at existing sites
- Prefabricated structures reduce cost and time required on site

Opportunity

- To supply locally sourced and produced structures to fulfil Ma'aden's demand
- Establish a local facility to manufacture specialised structural steel assemblies

Typical Components

Products required include: Warehouse steel buildings, hangars, platforms, gratings, floor plates, ladders, stairs, railings, small storage tanks, industrial sheds

Where in the Process

Primarily required for Ma'aden's capital projects, but may also be required for smaller scale improvements to existing sites

Demand

Forecasted Spend, SAR:

2021	2025	2030
<1m	<1m	<1m

Current levels of localisation:

On-Shore Spend



Flange

Description

A flange joint is a connection of pipes, where the connecting pieces have flanges through which the parts are bolted together

Opportunity

- To supply Ma'aden with locally manufactured Flanges
- Recycle specialised high pressure flanges

Typical Components

A number of types of flanges are used at Ma'aden:

- Threaded Flanges
- Socket-Weld Flanges
- Slip-On Flanges
- Blind Flanges

Where in the Process

All flanges are general Items used in maintenance of plants

Demand

Forecasted Spend, SAR:

2021	2025	2030
<1m	<1m	<1m

Current levels of localisation:

On-Shore Spend



Hydraulics

Description

- Actuators are devices that move or control mechanisms powered by hydraulic, pneumatic, electric, thermal or mechanical means
- Gauges are instruments that capture a series of measurements where each measurement represents the value under observation during a point in time

Opportunity

- Opportunity to establish specialised operations within Ma'aden existing and future plants across Saudi Arabia
- Establishing advanced training facility within the kingdom to cater for the specialised mining industry requirements

Typical Components

- Actuator
- Gauge
- Hydraulic components
- Instruments, Hoses and tubing

Where in the Process

Various applications and processes in Ma'aden operations across multiple affiliates

Forecasted Spend, SAR:

Demand

Forecasted Spend, SAR:

2021	2025	2030
<1m	<1m	<1m

Current levels of localisation:

On-Shore Spend







Services

43 Billion SAR

Cumulative spend to 2030

Services

Index

Mining Operation	Professional Engineering Services	Scaffold Services	Education and Training Services
Manpower Supply	Tanker Truck Transport	Mobile Equipment	Security Management & Fire Safety
Ocean Freight	Management Consultancy	Gypsum Stacking	Event Management Service
Freight Forwarding	General Maintenance	Conveyor Maintenance Services	Refractory Services
Facilities Management	IT Consulting	Waste Management	Hydro Jetting Services
Transport from Mines	Catering Services	Laboratory Services	Catalyst Loading
Manufacturing Services	Drilling Services	Chartered Bus Service	

Mining Operation

Description

- Scope of outsourced mining services includes all operational pre-crusher extraction activities including drilling, charging and blasting, loading and transporting of mined ore and overburden
- Other activities include mine planning, stockpile, roads and infrastructure management

Opportunity

- The Saudi mining sector is growing at ~9% p.a. with a goal of increasing its contribution to the Saudi economy by 50% to reach SAR 98 Bn by 2020
- Opportunity to establish operations within Ma'aden existing and future mines across Saudi Arabia

Service Requirement

End-to-end outsourced mining services or specific extraction activities depending on the mine strategy

Where in the Process

- All pre-crusher extraction activities:**
- Drilling
 - Charging and Blasting
 - Loading
 - Hauling

Demand

Forecasted Spend, SAR:

2021	2025	2030
937m	1,005m	1,222m

Current levels of localisation:

On-Shore Spend



Manpower Supply

Description

Manpower hire covers contract hires for plant and admin roles

Opportunity

- Opportunity to source appropriately skilled manpower to serve local KSA market with a prioritisation of Saudi nationals across all sectors and industries in line with Saudization objectives
- Establish a local practical technical training facility (Fitting, Electrical, Boiler making, Rigging etc.)

Service Requirement

- Technical manpower e.g. technicians, operators, engineers
- General admin

Where in the Process

Across all business units and job descriptions

Demand

Forecasted Spend, SAR:

2021	2025	2030
478m	538m	624m

Current levels of localisation:

On-Shore Spend



Ocean Freight

Description

Transport of **liquid cargo** using large volume ships – primarily focusing on **liquid pitch transportation, and other high volume raw materials**

Opportunity

High volumes of imported raw materials offer opportunities to provide in ocean freight logistics services to Ma'aden and others in KSA and the GCC

Service Requirement

Liquid pitch and other high volume raw material ocean freight services through specialized vessels

Where in the Process

In bound delivery of liquid pitch and other high volume raw materials

Demand

Forecasted Spend, SAR:

2021	2025	2030
449m	506m	586m

Current levels of localisation:

On-Shore Spend



Freight Forwarding

Description

- A freight forwarding company organises shipments for corporations to get goods from the manufacturer or producer to a market, customer or final point of distribution
- Freight forwarding does not typically include the actual transportation

Opportunity

Provide locally based service managing the freight forwarding of parts, tools, and material inputs to Ma'aden's mining and processing sites, and focus on maintaining high levels of Saudisation in the provision of that service

Service Requirement

- Provision of an integrated freight forwarding service to organise international and national shipments using ocean, air, rail and road services
- Freight forwarding does not include the operation of the transportation

Where in the Process

Freight forwarding services are typically used in the provision of services to transport spare parts, tools, machinery, and material inputs from the manufacturer to Ma'aden's operational sites

Demand

Forecasted Spend, SAR:

2021	2025	2030
285m	321m	372m

Current levels of localisation:

On-Shore Spend



Facilities Management

Description

Facility management services cover building maintenance and operations services and are required to maintain the upkeep of plant and property

Opportunity

- The Saudi Arabian facility management market is estimated to have reached ~SAR 83 Bn in 2017 and projected to grow at %11 CAGR during 2018-2023 period
- The forecasted growth is attributed to the growing infrastructure sector supported by SAR 4 trillion worth of infrastructure planned projects or under construction
- Boost consumable production for local manufacturing units

Service Requirement

- Hard services e.g. plumbers, painters, electricians (building maintenance)
- Soft services e.g. Laundry, waste management, house keeping, pest control (operational services)

Where in the Process

- Facility management services are required across all Ma'aden facilities including:
- Administrative buildings
 - Plant operations
 - Employee living accommodations

Demand

Forecasted Spend, SAR:

2021	2025	2030
256m	288m	334m

Current levels of localisation:

On-Shore Spend



Transport from Mines

Description

Trucks and trains are used to transport mined ore from mines to the plant

Opportunity

Opportunity to establish operations within Ma'aden existing and future mines across Saudi Arabia

Service Requirement

Dump Trucks

Where in the Process

Transport multiple types of mined ore from mines to processing plants

Demand

Forecasted Spend, SAR:

2021	2025	2030
152m	171m	198m

Current levels of localisation:

On-Shore Spend



Manufacturing Services

Description

- Link side trimmer conveyor
- Rubber Sleeves
- HVAC air filters, element filter
- Casting materials
- Thermo couples

Opportunity

Establish localised manufacturing capability to supply Ma'aden requirements either through local investment in new capability, through foreign direct investment, or through partnership with foreign companies that can provide the technical support and knowledge to support the development of capability in Kingdom

Service Requirement

- Link application side trimmer scrap conveyor 1000471486
- Rubber sleeves 1000028332 – 28335 & other sleeve
- Air filters 1000008126 and many others HVAC filters
- Castable material for furnaces
- Furnace thermocouple 1000017955, 1000017956 and others

Where in the Process

- Link mainly used in Ma'aden rolling mill for scrap conveyor
- Sleeves for reduction areas
- Filters used widely across all plants
- Castable commonly used for all furnaces and crucible relining
- Thermocouple in all plants

Demand

Forecasted Spend, SAR:

2021	2025	2030
121m	136m	158m

Current levels of localisation:

On-Shore Spend



Professional Engineering Services

Description

- Professional engineering services are required across Ma'aden's operations and capital projects programmes
- Skilled labour is required to carry out technical work including design of new facilities

Opportunity

Opportunity to source appropriately skilled manpower to serve local KSA market with a prioritisation of Saudi nationals across all sectors and industries in line with Saudization objectives

Service Requirement

- Technical manpower e.g. discipline engineers (e.g. mechanical, electrical, civil, piping, process, etc.), quality control, project engineers and study or project managers.
- Ad hoc technical consultancy services

Where in the Process

Across Ma'aden's operational sites and capital project programmes including:

- 1- Prefeasibility Projects (under each SBU).
- 2- BFS / FEED studies under PME.
- 3- Mega Projects Execution.
- 4- Affiliates Sustaining Capex Projects.

Demand

Forecasted Spend, SAR:

2021	2025	2030
107m	120m	139m

Current levels of localisation:

On-Shore Spend



Tanker Truck Transport

Description

- Tanker trucks are primarily used for inbound shipments of in-process chemicals and fuels to mines and production facilities
- Molten sulphur, caustic soda and phosphoric acid require customized tanks while other non-hazardous commodities require generic tanks

Opportunity

Opportunity to serve Ma'aden mines and plants sites across Saudi Arabia for a diversity of fuels and in-process chemicals

Service Requirement

- Oil tanker truck
- Sulphuric acid tanker truck

Where in the Process

Transporting of the following non-exhaustive list of materials:

- Molten Sulphur
- Diesel and crude oil
- Caustic soda
- Phosphoric acid
- Sulphuric acid
- Copper
- Zinc concentrate

Demand

Forecasted Spend, SAR:

2021	2025	2030
99m	112m	129m

Current levels of localisation:

On-Shore Spend



Management Consultancy

Description

- Provision of management advisory services, market insight, benchmarking and strategy
- Functional scope includes corporate strategy, individual affiliate strategy, cost control, and individual functional management advisory services (including finance, sales, marketing, HR etc.)

Opportunity

Management consultancy market in KSA is very large, circa \$1.5bn, representing around half of the total market for the GCC. Typically the market is serviced by large international companies and use of KSA nationals is low, limiting the levels of Local Content. Market covers a broad range of services, offering niche potential for local providers.

Service Requirement

- Strategy Consulting
- Business process improvement
- Organisation and human performance development
- Specialist functional advisory services

Where in the Process

- Management consulting used across full scope of management activities:
- Setting and driving corporate and affiliate strategy
- Managing implementation and delivery of business change
- Identifying and delivering business process improvement
- Organisation design and human resource development
- Cost control and performance improvement

Demand

Forecasted Spend, SAR:

2021	2025	2030
99m	111m	129m

Current levels of localisation:

On-Shore Spend



General Maintenance

Description

- General maintenance involves the technical maintenance and upkeep of equipment required for safe operation of the mines and plants
- Executing periodic maintenance of process and non-process assets

Opportunity

- The forecasted growth is attributed to the growing infrastructure sector supported by USD 1 trillion worth of infrastructure planned projects or under construction
- Establish a local practical technical training facility (Fitting, Electrical, Boiler making, Rigging etc.)
- Establish qualified labour hiring service provider
- Increase Saudisation levels in the provision of general maintenance services

Service Requirement

- Industrial labour for cleaning
- Multiple technical roles (i.e. Electrician, pipe fitter, fabrication, welder...)

Where in the Process

- Across all Ma'aden facilities and plants including:
- Administrative buildings
 - Plant operations
 - Utilities operations
 - Employee living accommodations

Demand

Forecasted Spend, SAR:

2021	2025	2030
95m	107m	124m

Current levels of localisation:

On-Shore Spend



IT Consulting

Description

IT consulting services used across business units for administrative and functional functions

Opportunity

Saudi Arabia IT market has been growing at a rate of ~%6 over 2014-2019 period driven by:

- Investments worth of \$7.5Bn in transformative technologies such as cloud, big data, social and mobility – part of the country transformational 2030 vision
- Government initiatives to implement e-governance across major departments and offices including government offices, schools and colleges

Service Requirement

- IT consultancy
- Telecommunication services
- Computers and associated accessories

Where in the Process

Across all Ma'aden affiliates, business units and divisions

Demand

Forecasted Spend, SAR:

2021	2025	2030
94m	106m	123m

Current levels of localisation:

On-Shore Spend



Catering Services

Description

- Provision of integrated catering services to site and office locations
- Functional scope includes sourcing of food and beverages, food preparation, food service, and management of catering facilities (cleaning, basic maintenance etc.)

Opportunity

- Whilst market growth has been limited in recent years, the catering services marketing in KSA is forecast for steady growth with a projected size of circle \$7bn by 2023
- Diversification of the economy, driven by Vision 2030, is likely to create new and expanding opportunities in sectors like construction, manufacturing, healthcare, education and hospitality
- Significant opportunities exist to boost levels of Saudi employment to boost Local Content

Service Requirement

- Food and beverage procurement
- Food preparation
- Food service
- Management of catering facilities

Where in the Process

- Catering services are offered across all major facilities, both offices and sites
- Office catering services focus predominantly on lunch service, but may also include breakfast and other services during the working day
- Site based services are typically full time operations, providing catering services throughout the day, including evening meals

Demand

Forecasted Spend, SAR:

2021	2025	2030
88m	99m	110m

Current levels of localisation:

On-Shore Spend



Drilling Services

Description

- Mining drilling rigs are used for two main purposes: Exploration drilling which aims to identify the location and quality of a mineral, and production drilling, used in the production-cycle for mining
- Experienced manpower is required for the safe operation of such heavy machinery

Opportunity

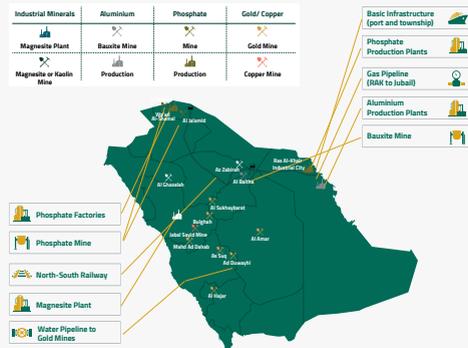
Opportunity to source appropriately skilled manpower to serve local KSA market with a **prioritisation of Saudi nationals** across all sectors and industries in line with Saudization objectives

Service Requirement

Technical manpower e.g. technicians, operators, engineers

Where in the Process

Drilling services are required across Ma'aden's mining sites



Demand

Forecasted Spend, SAR:

2021	2025	2030
80m	91m	105m

Current levels of localisation:

On-Shore Spend



Scaffold Services

Description

Scaffolding services are used to access equipment for maintenance in a safe manner, i.e. repairing, cleaning, construction

Opportunity

- Opportunity to establish **operations within Ma'aden** existing and future mines across Saudi Arabia
- Saudi Arabia scaffolding market growth fuelled by the operations, construction and infrastructure industries
- Scaffolding suppliers and manufacturers to comply to industry best practices

Service Requirement

- Open Space
- Confined Space
- Scaffolds without boards

Where in the Process

Scaffolding services are used across all Ma'aden plants and sites

Demand

Forecasted Spend, SAR:

2021	2025	2030
75m	85m	98m

Current levels of localisation:

On-Shore Spend



Mobile Equipment

Description

Rental services of a diverse set of general and specialized mobile equipment to perform lifting, loading, transporting and general infrastructure activities

Opportunity

Saudi Arabia earthmoving equipment market is expected to grow at a CAGR rate of ~%11 by 2020 fuelled by the construction and mining industries
Partnering with world class mobile equipment manufacturer for establishing local manufacturing, repair and servicing facility

Service Requirement

Examples of mobile equipment include:

- Excavator
- Dump Truck
- Dozer
- Process / Non-Process Equipment

Where in the Process

Primarily used in mining operations, plant operations, projects, maintenance

Demand

Forecasted Spend, SAR:

2021	2025	2030
57m	64m	75m

Current levels of localisation:

On-Shore Spend



Gypsum Stacking

Description

- Gypsum is a soft Sulfate mineral composed of Calcium Sulfate Dihydrate.
- Gypsum is a by-product generated from Phosphoric acid and FSA production at Ma'aden
- Stacking is required to store and manage this by-product

Opportunity

- Scope of service includes the safe conveying and stacking of gypsum
- Gypsum demand has been driven by construction sector growth in recent years

Service Requirement

- Provision of manpower for operation of:
- Fixed or static conveyors
 - Mobile conveyors
 - Radial stackers
 - Stacking operation

Where in the Process

Gypsum stacking is required at Ras Al Khair where gypsum is a by-product generated from Phosphoric Acid and FSA production at Ma'aden

Demand

Forecasted Spend, SAR:

2021	2025	2030
56m	63m	73m

Current levels of localisation:

On-Shore Spend



Conveyor Maintenance Services

Description

- A conveyor system is a common piece of mechanical handling equipment that moves materials from one location to another
- Ma'aden has ~700 different specifications covering belts, rollers, idlers and accessories with ~70 specifications contributing to %80 of the spend

Opportunity

- Scope of service includes conveyor servicing, parts and accessories
- No production capacity currently exists within KSA for conveyors
- Limited use of KSA Nationals in servicing activity offers significant Local Content opportunity
- Significant opportunity exists across major players in KSA

Service Requirement

- Maintenance Services
- Belts
- Rollers
- Idlers
- Accessories

Where in the Process

- Crushed ore is transported to the beneficiation plant via conveyor systems
- Waste is transported to assigned disposal location through customized conveyors
- Servicing and replacement of accessories occurs throughout the lifecycle of the conveyor

Demand

Forecasted Spend, SAR:

2021	2025	2030
50m	56m	65m

Current levels of localisation:

On-Shore Spend



Waste Management

Description

- Waste is any material no longer required by the company (equipment that is no longer used or by-products created during the production cycle) and can be classified as hazardous and non-hazardous (solid, liquid or gas)
- Waste management involves the collection, transportation and disposal of waste in line with company, city and country codes and regulations

Opportunity

- Saudi Arabia generates more than 15 million tons of municipal waste each year with vast majority diverted to landfills and dumpsites
- Vision 2030, puts forward a strong regulatory and investment framework to develop Saudi waste-to-energy sector with a focus on developing an environmentally friendly waste disposal solution

Service Requirement

- Disposal services (equipment and manpower)
- Licensed disposal site

Where in the Process

- Multiple products along the production chain (not exhaustive):
- Hazardous: e.g. solid scales, Kaolin dust, silica dust, ammonium phosphate sulphate, defoamer
 - Non-hazardous: e.g. aluminium slag, oil absorbents

Demand

Forecasted Spend, SAR:

2021	2025	2030
43m	48m	56m

Current levels of localisation:

On-Shore Spend



Laboratory Services

Description

Laboratory services are required across Ma'aden's operations
Samples that require testing are sent off to laboratories
Skilled labour is required to carry out technical work

Opportunity

Opportunity to source appropriately skilled manpower to serve local KSA market with a prioritisation of Saudi nationals across all sectors and industries in line with Saudization objectives

Service Requirement

- Samples testing
- Technical manpower e.g: technicians, lab assistants, project managers

Where in the Process

Across Ma'aden's operational sites

Demand

Forecasted Spend, SAR:

2021	2025	2030
41m	46m	54m

Current levels of localisation:

On-Shore Spend



Chartered Bus Service

Description

Chartered bus services are used to transport Ma'aden employees to and from Ma'aden's operational sites

Opportunity

To provide chartered bus service with high levels of Local Content to support Ma'aden's growing number of operational sites

Service Requirement

- Coaches
- Minibuses
- VIP Buses

Where in the Process

Chartered transportation is required across all of Ma'aden's mining and operational sites

Demand

Forecasted Spend, SAR:

2021	2025	2030
29m	33m	38m

Current levels of localisation:

On-Shore Spend



Education and Training Services

Description

Vocational training and leadership development are used to enhance and develop Ma'aden's industrial and professional employees' capabilities and competencies.

Opportunity

- Opportunity to source appropriately skilled manpower to serve local market with a prioritisation of Saudi nationals across all sectors and industries in line with Saudization objectives
- In line with its strategy, Ma'aden continues to offer opportunities to partner with reputable service providers to develop employee capabilities
- Leadership development is also a key focus in ensuring the sustained future of Ma'aden
- Establish a local practical technical training and assessing facility (Fitting, Electrical, Boiler making, Rigging etc.)

Service Requirement

Classroom training, on the job training, and eLearning are typically provided

Where in the Process

Education and training is required across Ma'aden's managerial, technical and operational employees

Demand

2021	2025	2030
23m	26m	30m

Current levels of localisation:

On-Shore Spend



Security Management & Fire Safety

Description

- Security management involves conducting preventative and corrective maintenance on security equipment
- Fire safety involves inspecting, testing and maintaining fire protection, detection systems and equipment

Opportunity

- The Saudi Arabian market size for the security industry is expected to reach **SAR 450 Mn by 2022 (CAGR ~%34)**
- Opportunity to develop manpower skillset in-Kingdom and boost levels of Saudisation in locally based suppliers

Service Requirement

Security equipment e.g. barriers, CCTV, intercom systems, x-ray machines
Fire equipment e.g. extinguishers, fire hoses

Where in the Process

Across all Ma'aden facilities including:
- Administrative buildings
- Plant operations
- Mining sites

Demand

Forecasted Spend, SAR:

2021	2025	2030
14m	15m	18m

Current levels of localisation:

On-Shore Spend



Event Management Service

Description

Ma'aden requires external support for large scale corporate events

Opportunity

To support with planning, organisation and execution of Ma'aden's corporate events and to develop the skills and Saudisation levels in the provision of event management services

Service Requirement

To provide specialist event management support to help Ma'aden to stage internal and external communication and engagement events

- Typically covering areas such as:
- Event planning and content development
- Liaison with the event venue
- IT and audio visual support
- Event catering

Where in the Process

Events relate to all elements of Ma'aden's business and may include areas such as:

- External communication and reporting
- New project, product and commercial relationship announcements
- Internal communication, education and engagement events with staff

Demand

Forecasted Spend, SAR:

2021	2025	2030
13m	14m	17m

Current levels of localisation:

On-Shore Spend



Refractory Services

Description

Refractory services involve the maintenance of furnaces, cathode relining used during the production of aluminium and can be classified as generic or cast-house depending on furnace type

Opportunity

Opportunity to source appropriately skilled manpower to serve local KSA market with a prioritisation of Saudi nationals across all sectors and industries in line with Saudization objectives providing manufacturing, installation and maintenance services
Local manufacture of insulation bricks

Service Requirement

- Alumina silicate
- Castables
- Insulation bricks
- Ceramics

Where in the Process

- Anode baking
- Pot lines
- Cathode sealing
- Calcliner

Demand

Forecasted Spend, SAR:

2021	2025	2030
12m	13m	16m

Current levels of localisation:

On-Shore Spend



Hydro Jetting Services

Description

Hydro jetting services are regularly required for **vessels and pipes cleaning, sludge removal and waste disposal**

Opportunity

Saudi Arabia hydro jetting services market is largely consolidated with limited number of players which offers an opportunity for additional firms to enter marketplace, and also to boost the level of Saudisation in the provision of these services

Service Requirement

- Vessel cleaning using a robotic attachment
- Pipe cleaning using a guided nozzle

Where in the Process

- Phosphoric acid plant**
 - Storage area
 - Cooling tower drift eliminator
 - Gypsum conveyor rollers
- Sulphuric acid plant**
 - Sea water filters
- Refinery**
 - Flash tank
 - Digester
 - Calciner

Demand

Forecasted Spend, SAR:

2021	2025	2030
3m	4m	4m

Current levels of localisation:

On-Shore Spend



Catalyst Loading

Description

- Catalyst unloading, screening and loading services are required across Ma'aden's operations
- Catalysts require replenishment periodically
- Skilled labour is required to carry out technical work utilising specialised equipment and tools.

Opportunity

Opportunity to source appropriately skilled manpower to serve local KSA market with a prioritisation of Saudi nationals across all sectors and industries in line with Saudization objectives

Service Requirement

- Technical manpower
- Unidense method for primary reformer tubes catalyst replacement
- Single step method for unloading, screening and loading facilities

Where in the Process

- Catalyst loading and removal services are required across Ma'aden's mining and operational sites
- Ammonia (HTS, LTS, Reformer, Converter)
- SAP- Convertor

Demand

Forecasted Spend, SAR:

2021	2025	2030
2m	2m	3m

Current levels of localisation:

On-Shore Spend



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