Imidro’s aluminium adventures;
From tackling raw materials challenges to creating value added through downstream industries

Panthea Geramishoar, IMIDRO
Aluminium Wonder Series: recession after story. Fundamentals dismissed!

• 2008 -2014 Premiums rose from nothing to the only viable reason to keep on producing!  
  Market in Contango, still to be?
• 2009-2014 Physical shortage + Highest ingot volume in warehouses than ever!
  Commodity financing with Aluminium, a Fun Profitable Practice
• 2009-2011 Rising inventories + Rising Prices!
• 2014-2015 Falling inventories + Falling prices!
• First shortage in almost a decade in 2014, continued to 2015, yearly shortage 356 kt, y-o-y demand growth global 7-9%, China 9-14%  (WBMS 2016)
The Privileged - The Protected - The Pioneers
Power is Key, What about Bauxite and Alumina?

Aluminium VIP Club

- Cheap abundant energy is a natural privilege - Middle East, Russia.
- Receiving subsidies is a protection - China.
- Innovation for cost control is what pioneers do - Top producer companies, Alcoa, Rusal, Hydro.
Alumina market

- 42% fall in prices in 2015
- Surplus in the market
- Lower OPEX, lower Al, weak sentiment

Grammery Explosion -1.2 mt capacity lost for nearly 2 years

Chinese demand continues

Chinese demand growth

Global recession

Increased supply - 50% growth in China’s production

Alumina price improvement

Alumina Market Balance & Prices, MB, IAI
Alumina market determinants: China; **double-digit capacity installment rate** for more than a decade

China’s Alumina Refineries’ Capacity Creation Rate, USGS, IAI
Market in balance for long when Indonesian ban on bauxite brought it into shortage.

Low operation rate of projects, 7 of 81 projects have become operational (CRU 2014)

First inter-basin bauxite shipment from Guinea to China in 2012
The importance of being bauxite,
First inter-basin bauxite shipment from Guinea to China in 2012

China bauxite import, CM group, Bauxite Index, AMC
IMIDRO has brought an evolution in Iranian primary aluminium industry: Four times increase 2002-2019

<table>
<thead>
<tr>
<th>Smelters by IMIDRO</th>
<th>Capacity 000 tonnes</th>
<th>Year of start-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iralco’s Phase I *</td>
<td>70</td>
<td>1967</td>
</tr>
<tr>
<td>Iralco’s Phase II</td>
<td>110</td>
<td>2006</td>
</tr>
<tr>
<td>Hormozal</td>
<td>143</td>
<td>2009</td>
</tr>
<tr>
<td>Almahdi I</td>
<td>110</td>
<td>1997</td>
</tr>
<tr>
<td>Salco</td>
<td>300</td>
<td>2018</td>
</tr>
<tr>
<td>Jajarm</td>
<td>36.6</td>
<td>2016</td>
</tr>
<tr>
<td><strong>Total Guaranteed</strong></td>
<td>~ 770</td>
<td>-</td>
</tr>
<tr>
<td>New Smelter</td>
<td>350</td>
<td>Under study</td>
</tr>
<tr>
<td>New Smelter</td>
<td>350</td>
<td>Under study</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1470</td>
<td>-</td>
</tr>
</tbody>
</table>

Current primary aluminium cap is 430 KT:
- Abundant cheap Energy
- 1 to 2 MT of local Demand

Prospects in 2025:
- 10% CAGR of demand in the last decade

Total Primary Aluminium Production 000 tonnes

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2015</th>
<th>2019</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>175</td>
<td>355</td>
<td>800</td>
<td>1500</td>
</tr>
</tbody>
</table>
IMIDRO’s Supply Chain; Upstream Strategies
Supply chain strategies for Iran aluminium industry

- To produce 1.5 mtonnes of aluminium Iran needs 3 mtonnes of alumina...Has only one alumina refinery (Jajarm) .......... 2750 ktonnes deficit

<table>
<thead>
<tr>
<th>Project</th>
<th>Capacity 000 Tonnes</th>
<th>Capex million US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persian Gulf Alumina</td>
<td>1600 (to 3000) Alumina</td>
<td></td>
</tr>
<tr>
<td>SBDT Mine Guinea + Negotiations with bauxite mine owners with bauxite available from 2020</td>
<td>4000 bauxite</td>
<td>around 4 000</td>
</tr>
<tr>
<td>Nepheline Syenite</td>
<td>200 alumina</td>
<td></td>
</tr>
<tr>
<td>Petroleum Coke</td>
<td>200 GPC/CPC + light petro products</td>
<td></td>
</tr>
</tbody>
</table>

- Necessity to secure bauxite and alumina.
IMIDRO’s Strategies to Create Value Added
In our Aluminium Strategy, IMIDRO has **TRANSFORMED** from being a pure Upstream body to make Downstream High-Tech products.
## Creating Value Added through downstream

### Aluminium Flat Rolled Products (FRP)
- **Project:** Hot Roll + Cold Roll + Finishing Lines
- **Capacity:** 000 Tonnes
- **Phase 1:**
  - 160 KT of products:
    - 100 KT CBS and CES (Beverage Can)
    - 40 KT Foil (Packaging)
    - 20 KT Plate (Marine)
- **Phase 2:**
  - 800 KT Auto Body Sheet
- **Capex:** 800 million US$*

### Aluminium Billets
- **Project:**
- **Capacity:** 50 KT
- **Capex:** 500 million US$*

### Aluminium Wire and Rod
- **Project:**
- **Capacity:** 50 KT

* The figures might be modified after the studies are complete.
Global aluminium downstream market is flourishing. Local market perspectives are great too.

**Billets**
- Billets are the raw material for Extrusions.
- Local 80-100 KT of aluminium extrusions consumption
- The Main market for Al billets/extrusions is ABC (architectural, building and construction).
- Another big market for extrusions is Transportation (30% of global total).
- Annual growth rate of 6.7% in 2015-2020 for Al extruded products.
- In the last decade, Al’s share in ABC rose from 15% to 23%.
- In the last decade, the Iranian market for billets is around 80 KT and is predicted to reach 150 KT in 2025.

**Regions**

<table>
<thead>
<tr>
<th>Region</th>
<th>2010</th>
<th>2015</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>11.2</td>
<td>14.9</td>
<td>19</td>
</tr>
<tr>
<td>N. America</td>
<td>10.8</td>
<td>13.5</td>
<td>18.2</td>
</tr>
<tr>
<td>Japan</td>
<td>8.1</td>
<td>9.4</td>
<td>13.4</td>
</tr>
</tbody>
</table>

MBR, Research and markets, Alcircle, IMIDRO
Wire and Rod

- 6 million tonnes per year global aluminium wire and rod consumption in 2015
- Global growth of 35% during the last 10 years and 30% in next decade to 2025
- Every 100 km of high voltage power transmission line = 2400 tonnes of Al conductors
- Iran’s outdated under-developed grid: an opportunity for new power lines ...
- 2000 km new high voltage line installment in Iran means 50000/y tonnes of aluminium wire and rod

CRU, Danieli, Imidro, Tavanir
FRP

- Global demand for flat rolled aluminium products is expected to rise by 4-5% CAGR between 2016 and 2020 ... TRANSPORTATION
- Demand for automotive sheet alone will be the highest in North America (up to 25-30% CAGR), Europe, and East Asia (10-12% CAGR), increasing from around 1.2 million tonnes in 2015 to around 2.4 million tonnes in 2020, marking an average global growth of ~20% CAGR.
- Iran imports 100% of BEVERAGE CAN SHEET.

Aluminiuminsider.com, Amag, Imidro

Consumption of FRP in 2015 by region:
23.8 mtonnes (CRU 2016)

FRP annual growth rate to 2020 (CRU 2016)
Ford’s **F150** Pickup Truck

- Best selling passenger car in the US for 32 years: 760,000 sold cars per year
- 2016... 850,000 of F150 to be sold... **350,000 tonnes**

**Al sheet**

- 317 kg lighter ... **NO Compromises**
- Ford’s 1.4 billion-dollar investment for F150 Aluminium transformation in its auto lines

- **First commercial All-Aluminium-Bodied car**, high-strength military grade ... **26615 $** vs Luxury aluminium cars like Range Rover ... **84225 $**
Body-in-White; 28% of car’s weight to be all aluminium.
We have never stopped trying to **create a sustainable growth platform** for Iranian aluminium industry.

For this purpose, a journey started 14 years ago resulted in a **200% increase** in local primary aluminium capacity. Till 2019 with **SALCO completion**, our achievements would be **more than 350% growth**.

Our **tough yet joyous adventures** will continue by overcoming raw materials challenges and adding value through **downstream** production.

We are looking forward to having **investing partners** in our alumina, aluminium and downstream projects.
Thank You for Your Attention