

## **PART 1**

### **Business Operations**

#### **1. Policy and Overview of Business Operations**

##### ***1.1 Vision, Mission, Objective and Strategy of the Company***

###### ***Vision***

To be a world-class chemical company making great products for society.

###### ***Mission***

We commit to be a responsible industry leader leveraging on the excellence of our people, processes, and technologies to create value for our stakeholders.

###### ***Value /Objective***

###### ***The customer is why we exist.***

We measure ourselves by our customers' success. Through unparalleled innovation and attention to quality we aim to exceed their expectations.

###### ***Our people make the difference.***

A company is its people and people provide the competitive advantage. We respect every voice and rely on one another to grow.

###### ***We see change as an opportunity.***

The business landscape is constantly evolving. We embrace the challenges of change to be world-class and maintain our differentiation.

###### ***Diversity is our strength.***

As a global company we value the variety of knowledge, perspectives and experiences in our organization, and draw strength from these to fuel our competitiveness.

###### ***We are responsible.***

In our pursuit of business growth and profitability we do things the right way – economically, socially, and environmentally.

###### ***Group Strategy***

Indorama Ventures is a major global intermediate petrochemicals producer and one of the largest vertically integrated polyester value chain producers in the world, serving world-class customers in diverse end-use markets including food, beverages, personal and home care, health care, automotive,

textile and industrial uses. With around 19,581 employees, and 93 sites<sup>1</sup> in 31 countries across five continents, we supply our products to customers in nearly every part of the world.

Our objective is to strengthen our position as a market leader in the polyester value chain segment of intermediate petrochemicals in terms of scale, integration and differentiation as well as profitability and return on investment; supported by a focus on delivering long-term, superior shareholder value.

It is estimated that in 2030, the world population will reach 8.4 billion people (according to third party sources). This surge in population growth will present global challenges, but we see this as an opportunity for increased demand across all our markets. With the fast-paced evolution of technologies, innovation will also play a key role in the chemical industry creating a market that is sufficiently sustainable in balancing the environment, resources, climate, food and nutrition, and quality of life. As the fastest growing polymer in the world at a rate of roughly 6% annually, polyester is the future.

### Strategic Levers

Our strategy has been designed to help us continue achieving our objectives as follows:

- Focused growth and investment
- Vertically integrated business model
- Geographic diversification
- Product diversification driven by innovation and R&D
- Sustainability
- Cost efficiency and operational excellence
- Financial prudence

### Focused Growth and Investment

Our growth and investment strategy is to build and enhance our existing market leadership position in each of the regions where we operate, as well as expand our geographic presence through organic growth and value-enhancing acquisitions.

We have an established a track record of implementing this strategy through greenfield investments, brownfield expansions as well as through attractive acquisitions. Acquisitions are a strategy for achieving our strategic targets. Indorama Ventures has strict strategic and financial acquisition criteria that are used to evaluate potential acquisition targets. We have a strong track record of acquiring businesses and successfully integrating them into our organization.

### Vertically Integrated Business Model

We expect vertical integration, either through asset ownership, co-located sites with owned assets or virtual integration through co-located sites with key raw material suppliers, to enhance our operational

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<sup>1</sup> As of December 2018.

and logistical efficiency, cost-competitiveness and raw material security. Integration through owned assets also enhances our ability to insulate ourselves from sector cyclicalities and improve the quality, visibility, and predictability of earnings. Continuing with our strategy, we have invested in ethylene production through our 440kt pa Louisiana-based gas cracker which is under refurbishment following our acquisition in 2015. We expect a commercial restart by the second quarter of 2018.

#### Geographic Diversification

Diversifying our customer mix, both geographically and through end-use applications (for some business segments), is an important aspect for our continued success in the polyester value chain. We plan to continue to enhance our marketing efforts and geographically diversify our customer base based on product lines. Today, the Group sells its products in more than 100 countries and, through its localized manufacturing facilities in various regions, is able to serve its customers from close and convenient locations.

#### Product Diversification driven by innovation and R&D

As a leading polyester value chain player, we intend to focus on the development of our research and development capabilities, either through our own facilities or through the establishment of relationships with other industry players.

We work carefully alongside our customers to provide them with innovative ideas, expertise and support solutions for their specific requirements. Through this effort to differentiate, we have significantly expanded our non-commodity or high value-added (HVA) portfolio.

As part of its product diversification strategy, the Group aims to focus its expansion into industries with HVA products. Such industries include the automotive, personal care, packing and specialties, and industrial sectors. In the automotive industry, the Group focuses on HVA products such as interior textiles, tires, airbags and seat belts. In the personal care industry, the Group supplies high quality materials for end products such as flame retardant home textiles, diapers, wet wipes and other medical care products. The Group believes that these HVA businesses have strong market potential and high barriers to entry and will continue to leverage its leading market positions in these HVA industries for further growth.

#### Sustainability

We believe that the increase in our ability to use recycled materials and integrate such recycled materials within our standard processes will allow us to cater to changing customer objectives and proactively address environmental issues. In addition to recycling, we continue to promote our sustainability initiatives through the seven pillars of sustainability namely, Waste Reduction, Reducing Resources, Renewable Energy, Recycling, Employee Development, Stakeholder Engagement, and Local Community Development.

#### Operational Excellence

Maintaining a low-cost philosophy through a continued focus on production cost efficiency, scale and technology efficiency, raw material efficiency and investment efficiency will help us maintain our industry

cost position in the future. In our volume-driven commodity businesses, such as our PET, PTA and some commodity polyester fiber businesses, cost competitiveness is a key driver which differentiates industry leaders from others.

We emphasize the importance of operational excellence to bring synergies and facilitate best practices and knowledge transfer across IVL's global footprint. Key focus areas include benchmarking conversion costs, optimizing the workforce, waste reduction and recovery, and environmental health and safety issues.

#### Financial Prudence

We are committed to maintaining a continued emphasis on financial discipline and prudent investment decisions. We evaluate each potential investment on the basis of stand-alone profitability and efficiency, in addition to its potential synergistic contributions within the overall organization. We strive to maintain an efficient capital structure as we grow to provide us with adequate flexibility in our operations and sufficient liquidity in our cash flow position to meet our covenants at all times.

### **1.2 Changes and Important Developments**

#### **Company Overview**

Formerly known as Beacon Global Limited, the company was established on February 21, 2003, and re-named Indorama Ventures Public Company Limited on March 19, 2009. Indorama Ventures Public Company Limited is a holding company with investments in companies operating in the intermediate petrochemicals industry in Thailand and globally. These companies are manufacturers and suppliers of three key business segments, namely PET, Fibers, and Feedstock comprising PTA, IPA, PX, NDC, MEG and various Ethylene Oxide (EO) derivatives.

#### **Company Background**

We commenced business operations in 1994 with the incorporation of Indorama Holdings Ltd., which was the first worsted wool yarn producer in Thailand.

#### *Entry into the PET Business*

The PET business segment comprises primarily the manufacture and sale of PET, a plastic polymer resin primarily used for beverage containers and food packaging, the packaging of pharmaceutical and household products as well as in industrial packaging applications. In addition, the Group also manufactures High Value-Added ("HVA") products such as packaging for oxygen-sensitive foods and beverages. In 1995, we entered the petrochemical industry focusing on the polyester value chain business with the establishment of a PET resin facility in Thailand. Since then, each successive growth and addition has been committed to the polyester value chain. We have grown significantly to become a major global polyester value chain producer.

We expanded our PET production footprint internationally into North America in 2003, with the acquisition of the StarPet facility, and into Europe in 2006, with the commencement of our Orion Global PET facility.

By the first half of 2011, IVL had completed major acquisitions of PET plants in China, Indonesia, Mexico, Poland and the US, which has resulted in the company becoming the world's largest PET producer and the largest player in Europe.

We also expanded our PET production footprint to Africa by implementing a new solid state polymerization SSP plant in Nigeria, which started commercial operations in 2012. In 2015, we entered the Middle East following the acquisition of a PET plant in Turkey. In 2018, we acquired a PET plant in Egypt, the largest in the Middle East and Africa.

In 2018, we acquired a PET plant in Brazil in order to further extend our market position, and expand our global footprint in key markets with high growth potential. This strategic position allows us to deliver products to key customers in Brazil and elsewhere in South America in a cost-effective and efficient manner.

Our growth in the PET business has been achieved through greenfield investments, strategic acquisitions, and brownfield expansions. The expansion made us the only PET resin producer with operations in the five largest consuming regions of Asia, Europe, North America, South America and Africa.

#### *Entry into the Packaging Business*

From 1996 onwards, we grew our packaging business by engaging in the downstream production of PET preforms, bottles and closures. IVL's first expansion globally was through the acquisition of Beverage Plastics in Northern Ireland (UK) in 2012. Then in 2013, we stepped into Africa with the acquisition of Aurus in Nigeria, in the belief that Nigeria has considerable potential for further growth. In 2018, IVL acquired Medco Plast for Packing and Packaging Systems S.A.E. This acquisition provides IVL with exposure to the East African PET packaging market, complementing our existing footprint in West Africa, where we have a presence in Nigeria and Ghana.

#### *Entry into the Fibers Business*

The Group's Fibers business segment comprises the manufacture and sale of a variety of polyester and other types of fibers and yarns (which are also used in the Group's HVA products, particularly in personal care, automotive and industrial applications). Polyester is one of the most widely used synthetic fibers in the world and is a versatile material with wide-ranging textile and industrial applications. Our development in the polyester business has been achieved through the acquisition of distressed assets and organic growth through debottlenecking and asset optimization. We entered the polyester business in 1997 through the acquisition of Indo Poly, a polyester fiber plant in Thailand. In 2008, we acquired Tuntex Thailand, the largest polyester fiber producer in Thailand. Both of our polyester facilities were acquired as distressed assets at a discount to their replacement cost and have been successfully turned around. In 2009, Indo Poly transferred all of its assets to, and all of its liabilities were assumed by Tuntex Thailand, which was subsequently re-named Indorama Polyester Industries. Further expansions subsequently took place at this site.

In the first half of 2011, we expanded our polyester production footprint internationally. We entered the US market with the acquisition of Invistra US. In November 2011, we acquired the polyester fibers recycling businesses of Wellman International in Europe, which is comprised of three production facilities in the Republic of Ireland, the Netherlands, and France.

#### *Backward Integration into Feedstock*

The Group's feedstock business segment comprises the manufacture, production and sale of PTA, IPA, PX, NDC, MEG, EO derivatives and by-products, which are raw materials used in the production of the Group's polyester products. The Group's feedstock business segment supports its PET and polyester business segments and forms part of its strategy to vertically integrate its operations.

We entered the PTA business in Europe with the acquisition of a PTA facility located in the Netherlands in 2008. In the same year, we also acquired two PTA facilities in Thailand – TPT Petrochemicals and Indorama Petrochem.

In 2012, we took another step upward to feedstock integration with the acquisition of Old World Industries I, Ltd. and Old World Transportation, Ltd., which is the largest single EO/EG production facility in the US. Mono Ethylene Glycol (MEG) is one of our key feedstocks together with Purified Terephthalic Acid (PTA) in the manufacture of Polyethylene Terephthalate (PET) and Polyester fibers and yarns, both downstream products for IVL. We also acquired 100% of Indorama Ventures Olefins Holding LLC, an old ethylene cracker in the US in September 2015 (under refurbishment). In March 2016, IVL bought BP's assets in Decatur, Alabama which produce PTA, PX and NDC. And in April 2016, IVL purchased CEPESA's PET, PTA and IPA assets in Spain.

#### Focus on Business Differentiation

##### *Advancing towards High Value-Added (HVA) Segments*

As we grew to become an industry leader, so did the importance of working more closely with our global customers in providing them with innovative and specialized solutions to meet their evolving needs. IVL has invested laterally into high value-added products in PET, Polyester fibers and yarns, polypropylene fibers and yarns, nylon fibers and yarns, PEO, IPA and NDC. We have made significant headway on the HVA front as a market leader and innovator of numerous products. Our specialty range has enhanced the brand value of IVL making the company a total global solutions provider. In 2018, our HVA portfolio represented 20% of production and 37% of consolidated core EBITDA. Core EBITDA is calculated as book EBITDA minus inventory gains or losses and extraordinary items, if any.

#### Recycling Business

We entered the recycling space in 2011 with the acquisition of Wellman International in Europe. At the beginning of 2014, we extended the know-how we obtained from the Wellman International purchase and commenced production of our recycled PET and fiber facility in Nakhon Pathom, Thailand. We expect to further leverage Wellman's bottle to flake technology on a global scale. We have also integrated three production sites in the US and Mexico with recycled PET and our objective is to continue to increase the use of recycled PET in our operations. In 2018, we acquired Sorepla, a

European non-integrated plastics recycler based in France which helped to enhance our recycling portfolio with food grade rPET.

### ***Success in Raising Capital***

#### ***Our Initial Public Offering***

Indorama Ventures became a public company on September 25, 2009. In January, 2010, IVL completed an initial public offering of 400,000,000 ordinary shares at an offering price of THB 10.20 per ordinary share. The total amount raised in cash from the initial public offering of shares totaled THB 4,080 million. Simultaneously, the minority shareholders of Indorama Polymers Public Company Limited, a subsidiary of IVL listed on the Stock Exchange of Thailand were offered under an exchange offer, 582,727,137 ordinary shares of Indorama Ventures Public Company Limited. The ordinary shares of Indorama Ventures Public Company Limited were listed and commenced trading on the Stock Exchange of Thailand (SET) on February 5, 2010 under the ticker symbol IVL. The company soon became a member of the major indices, the SET 50 Index, FTSE SET Large Cap Index, and MSCI.

#### ***Rights Offering***

In November, 2010, the Board of Directors passed a resolution to increase the authorized share capital from THB 4,334,271,047 to THB 4,815,856,719 and to reserve the increase in the authorized share capital of THB 481,585,672 for the exercise of Transferable Subscription Rights (TSRs). The Board approved a rights issue of TSRs to existing shareholders at the ratio of one TSR for every nine existing ordinary shares held of IVL. The conversion ratio was 1:1. One TSR to one ordinary share and the exercise price of the TSR to ordinary shares was THB 36 per ordinary share. On December 17, 2010, at the extraordinary general meeting of shareholders (EGM), the shareholders approved the issue, allocation and the terms and conditions of the TSRs. On February 24, 2011, the subscription of TSRs was completed with 99.67% of TSRs being exercised into shares. A total of 479,986,198 new shares started trading on the SET on March 3, 2011. The total amount raised in cash from this rights issue totaled THB 17,280 million.

#### ***Tender Offer***

Our PET business was listed on the SET as Indorama Polymers Public Company Limited (IRP) in 2005. On December 24, 2009, IVL offered to purchase up to 100% of IRP through a tender offer whereby IRP shareholders (other than IVL and its subsidiaries) were offered IVL shares in exchange for IRP shares. The said tender offer was completed on February 1, 2010 which resulted in IVL holding directly and indirectly (through its subsidiary Indorama Holdings [Thailand] Limited) around 99.08% of the issued and paid-up capital of IRP. IRP shares were delisted from the SET on February 5, 2010.

#### ***Warrants IVL-W1 Exercised***

Upon conversion IVL-W1 until the last exercise date which was on 24 August 2017, the paid-up capital of the Company increased to THB 5,244,965,472 representing 5,244,965,472 ordinary shares.

### Warrants IVL-W2 Exercised

Upon conversion IVL-W2 until the last exercise date which was on 24 August 2018, the paid-up capital of the Company increased to THB 5,614,551,908 representing 5,614,551,908 ordinary shares.

### Changes and Important Developments

Year	Event	Location	Business
1994	Incorporation of Indorama Holdings Ltd.	Thailand	Wool
1995	Establishment of Indorama Polymers PCL's PET resin plant in Lopburi, Thailand.	Thailand	PET
1996	Establishment of Petform (Thailand) Ltd., a joint venture with Serm Suk PCL.	Thailand	PET
2002	Completion of various expansion projects leading to increased capacity in Thailand.	Thailand	PET/ Polyester
2003	<ul style="list-style-type: none"> <li>Incorporation of Beacon Global Limited (subsequently re-named Indorama Ventures PCL in 2008).</li> <li>First major international expansion with the acquisition of StarPet PET plant in Asheboro, North Carolina.</li> </ul>	Thailand	PET
		US	PET
2006	<ul style="list-style-type: none"> <li>Acquisition of a 94.57% interest in Indorama Holdings Ltd. from an entity controlled by Mr. Alope Lohia.</li> </ul>	Thailand	Wool/ Holding Company
	<ul style="list-style-type: none"> <li>Expansion into Europe with the establishment of Orion Global PET plant in Klaipeda, Lithuania.</li> </ul>	Lithuania	PET
2007	Completion of various expansion projects leading to increased capacity.	US/ Thailand	PET/ Polyester



Year	Event	Location	Business
March 2008	<ul style="list-style-type: none"> <li>UAB Indorama Polymers Europe, IRP Rotterdam and IRP Workington acquired the net assets (property, plant and equipment, and working capital) and the operations of two PET production facilities located in the Netherlands and the United Kingdom, previously owned and operated by subsidiaries of Eastman Chemical Company.</li> </ul>	The Netherlands/UK	PET
	<ul style="list-style-type: none"> <li>UAB Indorama Holdings Ltd. Europe and IRH Rotterdam also acquired the net assets (property, plant and equipment, and working capital) and the operations of a PTA production facility located in the Netherlands, previously owned and operated by a subsidiary of Eastman Chemical Company.</li> </ul>	The Netherlands	PTA
June 2008	Indorama Holdings Ltd. sold its shares representing 89.71% of Indo-Rama Chemicals (Thailand) Ltd., to an entity controlled by Mr. Alope Lohia and his immediate family.	Thailand	Chemicals
August - October 2008	The Company acquired a 50.56% equity interest in TPT Petrochemicals PCL from various parties.	Thailand	PTA
September 2008	<ul style="list-style-type: none"> <li>The Company acquired a 65.81% equity interest in Tuntex (Thailand) pursuant to Tuntex (Thailand)'s bankruptcy rehabilitation plan.</li> </ul>	Thailand	Polyester
	<ul style="list-style-type: none"> <li>The Company acquired an additional 44.38% of the outstanding shares of Indo Poly (Thailand) Ltd. from Indorama International Finance PCL. As a result of the acquisition, the Company increased its direct and indirect shareholdings of Indo Poly (Thailand) Ltd. to 98.85%.</li> </ul>	Thailand	Polyester
September - October 2008	The Company acquired a 100% equity interest in Indorama Petrochem Ltd. from various parties.	Thailand	PTA

Year	Event	Location	Business
October 2008	The Company acquired an additional 3.94% of the outstanding shares of Indorama Polymers PCL from DEG, thereby increasing the direct and indirect holdings of Indorama Polymers PCL to 69.29%.	Thailand	PET
December 2008	The Company acquired an additional 31.20% of the outstanding shares of Tuntex (Thailand) PCL (re-named Indorama Polyester Industries PCL).	Thailand	Polyester
July 2009	<ul style="list-style-type: none"> <li>Indo Poly (Thailand) Ltd. transferred all of its assets and businesses to Indorama Polyester Industries PCL. (In August 2009, Indo Poly [Thailand] Ltd. commenced action to liquidate itself, a process which was completed in August 2011.)</li> </ul>	Thailand	Polyester
	<ul style="list-style-type: none"> <li>The Company acquired an additional 2.08% of the outstanding shares of TPT Petrochemicals PCL from International Finance PCL, thereby increasing the direct and indirect holdings of TPT Petrochemicals PCL to 52.64%.</li> </ul>	Thailand	PTA
August 2009	The Company and Indorama Holdings Ltd. jointly made a tender offer to purchase all outstanding shares of Indorama Polyester Industries PCL that we did not own. After the tender offer, the Company and Indorama Holdings Ltd. increased our shareholdings of Indorama Polyester Industries PCL to 99.55% and delisted Indorama Polyester Industries PCL from the SET effective on November 9, 2009.	Thailand	Polyester
October 2009	Startup of the AlphaPet PET plant in Decatur, Alabama.	US	PET
November 2009	TPT Utilities Co., Ltd. transferred all of its assets to TPT Petrochemicals PCL and subsequently completed the liquidation on October 29, 2011.	Thailand	Others

Year	Event	Location	Business
December 2009	<ul style="list-style-type: none"> <li>The Company acquired an additional 1.96% of the outstanding shares of TPT Petrochemicals PCL from International Finance PCL, thereby increasing the direct and indirect holdings of TPT Petrochemicals PCL to 54.60%.</li> </ul>	Thailand	PTA
	<ul style="list-style-type: none"> <li>On December 24, 2009 Indorama Ventures Public Company Limited (IVL) announced a tender offer to purchase up to 100% of the shares in Indorama Polymers Public Company Limited (IRP) with an intention to delist the shares of IRP from the Stock Exchange of Thailand. A total of 424,480,300 shares of IRP were purchased through an exchange offer whereby IRP shareholders received IVL shares.</li> </ul>	Thailand	PET
February 2010	IVL shares were listed and began trading on the Stock Exchange of Thailand after completion of an initial public offering of 400 million new shares at THB 10.20 and completion of an exchange offer to minority shareholders of Indorama Polymers Public Company Limited (IRP). Simultaneously delisted IRP shares from the SET on the first day of trading of IVL.	Thailand	Corporate
July 2010	Acquisition of a 50% equity stake in a joint venture company, UAB Ottana Polimeri Europe, for the purpose of acquiring an integrated PTA and PET plant in Ottana, Italy from Equipolymers. The joint venture partner, PCH Holdings, is in the power and utilities business and holds the remaining 50% stake.	Italy	PTA and PET
August 2010	<ul style="list-style-type: none"> <li>Announced the establishment of a greenfield project for PET polymers in Port Harcourt, Nigeria with an installed capacity of 75,000 tpa.</li> </ul>	Nigeria	PET

Year	Event	Location	Business
	<ul style="list-style-type: none"> <li>Announced capacity expansion by 190,000 tpa for PET through a new production line at an existing site in Rotterdam, the Netherlands. Europe is a net importer of PET resins and the expansion has helped to reduce imports and growth in demand. In addition, the PET expansion will result in full captive consumption of PTA produced onsite and cost benefits from economies of scale.</li> </ul>	Netherland	PET
October 2010	Acquisition of additional shares in TPT Petrochemicals PCL from Tuntex Taiwan and other shareholders to increase the Company's equity stake from 54.60% to 99.96%.	Thailand	PTA
November 2010	<ul style="list-style-type: none"> <li>Announced the approval of an acquisition to make PET resins and Polyester polymers for fibers and yarns in Kaiping City, Guangdong Province, China, from Guangdong Shinda UHMWPE Company Limited. The total installed capacity of the plant is 406,000 tpa. The acquisition allows the Company to expand its global footprint and to enter the high-growth market in China. The acquisition was completed in January, 2011.</li> </ul>	China	PET
	<ul style="list-style-type: none"> <li>Announced the signing of a definitive agreement with INVISTA S.a.r.l. to acquire their PET resins and Polyester staple business located in Spartanburg, South Carolina (US) and Queretaro, Mexico. The total installed capacity at the Spartanburg site is 470,000 tpa and 535,000 tpa at the Queretaro site. The acquisition will allow the Company to build on its expanding global platform making IVL the world's largest PET producer and provide access to new markets in Central and South America. The acquisitions were completed in March 2011.</li> </ul>	US / Mexico	PET / Polyester

Year	Event	Location	Business
	<ul style="list-style-type: none"> <li>Board of Directors Meeting No. 8/2010 on 10 November, 2010 approved the issuance of 481,585,672 free Transferable Subscription Rights (TSRs) to the company's existing shareholders and with an allocation ratio of 9 existing shares to 1 new TSR. The conversion ratio of 1 TSR entitled the TSR holder to purchase 1 newly issued share of the Company. The exercise price of the TSR into ordinary shares was determined prior to the extraordinary general meeting of shareholders to approve the rights issue.</li> </ul>	Thailand	Corporate
December 2010	<ul style="list-style-type: none"> <li>Announced the signing of a definitive agreement with SK Chemicals and SK Syntec to acquire their Polyester Filament yarns and PET resins business in Indonesia and PET resins business in Poland. The total installed capacity in Indonesia is 196,000 tpa and 140,000 tpa in Poland. The acquisition allowed the Company to expand its global platform and reinforce our focus on the polyester value chain. It provided important access to the growth markets of Indonesia and Poland. The acquisitions were completed in March 2011.</li> </ul>	Indonesia/ Poland	Polyester/ PET
	<ul style="list-style-type: none"> <li>Board of Directors Meeting No. 9/2010 on 16 December, 2010 approved an exercise price of THB 36 per share to subscribe to newly issued shares by each TSR holder.</li> </ul>	Thailand	Corporate
	<ul style="list-style-type: none"> <li>Extraordinary General Meeting of Shareholders No. 1/2011 approved the resolution of a rights issue and allocated an issue of TSRs at a ratio of 9 existing shares to 1 TSR to existing shareholders.</li> </ul>	Thailand	Corporate
March 2011	<ul style="list-style-type: none"> <li>A total of 479,986,198 new IVL shares were listed and began trading on the Stock Exchange of Thailand after completion of the TSR subscription at an exercise price of THB 36 per share.</li> </ul>	Thailand	Corporate

Year	Event	Location	Business
	<ul style="list-style-type: none"> <li>Announced capacity expansion by 300,000 tpa for PET at an existing site in Purwakarta, Indonesia.</li> </ul>	Indonesia	PET
April 2011	Announced a brownfield expansion of PET polymers production with a capacity of 220,000 tpa at the existing site in Poland.	Europe	PET
May 2011	Announced a brownfield expansion of PTA production at the Rotterdam plant, with a new production line with an annual PTA capacity of 250,000 tpa. This expansion enhanced the Company's business integration with a key raw material for production of PET polymers in Europe.	Europe	PTA
June 2011	The IVL Board approved the acquisition of a 50% stake in PT Polyprima Karyesreska (PT Polyprima), a PTA producer located in Cilegon, West Java, Indonesia which has an installed capacity of 465,000 tpa.	Indonesia	PTA
July 2011	Acquisition of a 75% equity stake in a joint venture company, Trevira Holdings GmbH, for the purpose of acquiring a polyester fiber plant in Germany and Poland with a capacity of 120,000 tpa. The acquisition of Trevira GmbH facilitated IVL's entry into the branded specialist filament business and provided access to an outstanding research and development facility with the accompanying intellectual property.	Germany/ Poland	Polyester
August 2011	The Board approved investments in a new recycling plant in Thailand (now complete) and a high technology business in Polyester fibers and yarns in Thailand and Indonesia. These projects have higher value addition and margins to leverage our existing assets.	Thailand/ Indonesia	Polyester

Year	Event	Location	Business
November 2011	The Board approved the acquisition of a 100% equity stake in the recycling business of Wellman International in Europe from WIT Beteiligungs GmbH and Wellman International Trading which is subsidiary of Aurelius AG. This business consists of three plants, a Polyester plant in Mullagh, Ireland with an installed capacity of over 80,000 tons, a recycling plant in Spijk, the Netherlands with an installed capacity of over 45,000 tons, and Verdun, France with an installed capacity of 28,000 tons.	Ireland/ France/ Netherlands	Polyester
January 2012	The Board approved the acquisition of 100% of FiberVisions Holdings LLC, a global manufacturer of specialty mono and bi-component fibers based in Duluth, Georgia (US), with a total global capacity of 221,000 tpa of specialties, with 117,000 tpa capacity in the United States, 90,000 tpa capacity in Europe and 14,000 tpa capacity in China.	US	Polyester
February 2012	<ul style="list-style-type: none"> <li>The Board of Directors approved the acquisition of a 100% partnership interest in Old World Industries I Ltd., and Old World Transportation Ltd., (collectively called Old World), located in Clear Lake, Texas (US). Old World is the largest single EO/EG production facility in the US with a Crude EO capacity of 435,000 tpa (which is the equivalent to 550,000 tpa of equivalent MEG capacity).</li> </ul>	US	EO/EG
	<ul style="list-style-type: none"> <li>Acquisition of a 51% stake in a packaging business. Beacon Trading (UK) Limited acquired a 51% stake in Beverage Plastics (Holdings) Limited (BPL) in Northern Ireland, United Kingdom.</li> </ul>	UK	Packaging
March 2012	Acquisition of 100% of the PET resin assets of PT Polypet Karyapersada. The PET facility is located in Cilegon, Indonesia with a production capacity of 100,800 tpa.	Indonesia	PET

Year	Event	Location	Business
April 2012	Acquisition of a 100% partnership interest in Old World Industries I, Ltd. and Old World Transportation, Ltd. in the US. Old World is in the business of production and sale of ethylene oxide (EO) and derivative products from ethylene oxide: purified ethylene oxide (PEO), mono ethylene glycol (MEG), diethylene glycol (DEG), and triethylene glycol (TEG).	US	EO/EG
July 2012	Start-up of a Solid State Polymerization (SSP) plant in Nigeria at a capacity of 84,000 tpa. This is IVL's first PET investment in Africa and establishes its foothold in the estimated 450,000 ton PET market for the African continent which currently has only one other PET producer.	Nigeria	PET
August 2012	Completion of the acquisition of the PET resin assets through its wholly-owned subsidiary, PT Indorama Polypet Indonesia, with a capacity of 100,800 tpa in Cilegon, Indonesia.	Indonesia	PET
November 2012	<ul style="list-style-type: none"> <li>An announcement of the greenfield expansion of PET production in North America with the establishment of a new plant with a capacity of 540,000 tpa.</li> </ul>	US	PET
	<ul style="list-style-type: none"> <li>With respect to the announced PET expansion at its Polish site, the Board decided to carry out a significant debottlenecking instead of setting up a new line as it would be more value accretive. This has now been completed.</li> </ul>	Poland	PET
February 2013	<ul style="list-style-type: none"> <li>Acquisition of a 100% stake in a packaging company, which produces PET preforms, in Nigeria. This acquisition will be a forward integration for the PET segment which set up a PET bottle resin manufacturing unit in Nigeria. All of the closing formalities were completed and the plant was taken charge of effective April 3, 2013.</li> </ul>	Nigeria	Packaging



Year	Event	Location	Business
May 2013	<ul style="list-style-type: none"> <li>The Board of Directors approved the formation of a 50:50 Joint Venture Company with a global producer of non-woven fibers to set up a 14,500 tpa Bicomponent Fiber Plant at IPI in Rayong, Thailand. The plant started operations in Q2 2015.</li> </ul>	Thailand	Polyester
	<ul style="list-style-type: none"> <li>The Board also approved expanding the current Bicomponent Fiber capacity by 10,800 tons at the Covington, Georgia (US) unit of wholly-owned FiberVisions Manufacturing Company.</li> </ul>	US	Polyester
October 2013	<ul style="list-style-type: none"> <li>Establishment of Indorama Ventures Packaging (Philippines) Corporation to start a new packaging business in the Philippines.</li> </ul>	Philippines	Packaging
	<ul style="list-style-type: none"> <li>The establishment of new subsidiaries: Indorama Ventures USA Holdings LP Indorama Ventures AlphaPet Holdings, Inc. Indorama Ventures Europe B.V. The three holding companies were formed as part of a restructuring exercise.</li> </ul>	US US Netherlands	Holding Company
November 2013	An announcement for the moth-balling of our PET plant at Indorama Polymers Workington Ltd., in the UK, as part of our business improvement plan and restructuring strategy of our European businesses.	UK	PET
December 2013	The establishment of a new subsidiary: <ul style="list-style-type: none"> <li>Indorama Ventures Global Services Limited.</li> </ul>	Thailand	Corporate
	<ul style="list-style-type: none"> <li>Signing of a joint venture agreement for Aromatics production in Abu Dhabi to develop the Tacaamol Aromatics Plant on Madeenat ChemaWEyaat Al Gharbia's (MCAG) site in the Western Region of Abu Dhabi. The plant is expected to have an annual capacity</li> </ul>	Abu Dhabi	PX

Year	Event	Location	Business
	of about 1.4 million tons of Paraxylene and 0.5 million tons of Benzene.		
February 2014	<ul style="list-style-type: none"> <li>Acquisition of PHP Fibers GmbH and its subsidiaries (PHP), where IVL holds 80% of PHP while the remaining 20% is held by Toyobo Co., Ltd., a leading Japanese manufacturer of high function products, including among others, automotive products. The acquisition was completed on 30 April, 2014.</li> </ul>	Germany/ US/ China	Air bags/ Tire cord yarns
	<ul style="list-style-type: none"> <li>The establishment of a new indirect subsidiary company in the Republic of Ghana.</li> </ul>	Ghana	Packaging
March 2014	The establishment of a new joint venture company in Thailand, 50% owned by Indorama Holdings Ltd., a subsidiary company of IVL, and 50% owned by JNC Fibers Corporation of Japan.	Thailand	Polyester
June 2014	Acquisition of 100% of Artenius TurkPET A.S. (Artenius) in Adana, Turkey. Artenius is a PET producer in Turkey with a capacity of 130,000 tpa. The acquisition was completed on 2 June, 2014.	Turkey	PET
October 2014	Reorganization of the Company's subsidiaries in the Netherlands and the US to improve operational and fiscal efficiencies, business workflows and to pool common resources, and some of the businesses of its subsidiaries.	Netherlands/ US	Corporate
November 2014	The establishment of two new joint venture companies: <ul style="list-style-type: none"> <li>Indorama Ventures EcoMex, S. de R. L de C.V.</li> <li>Indorama Ventures EcoMex Services, S. de R. L de C.V.</li> </ul>	Mexico	PET

Year	Event	Location	Business
December 2014	Announced the signing of a share purchase agreement to acquire a 100% equity stake in Performance Fibers Asia (PF Asia). PF Asia is a leading producer of premium polyester tire cord fabric in Asia. PF Asia's plants are located in Kaiping City, Guangdong, China, with an annual capacity of 41,000 tons of Polyester Tire Cord Fabric and 48,000 tons of Polyester Tire Cord Yarn.  All of the closing formalities were completed and the plants were taken charge of effective April 01, 2015.	China	Polyester
January 2015	The establishment of a new indirect subsidiary company in Myanmar, Indorama Ventures Packaging (Myanmar) Limited, with a 100% investment by a wholly-owned subsidiary, IVL Singapore Pte. Ltd.	Myanmar	Packaging
March 2015	<ul style="list-style-type: none"> <li>Completed the acquisition of a 100% stake in Polyplex Resins San. ve Tic. A.S, Turkey. Polyplex Turkey owns a newly set-up greenfield PET plant with a planned capacity of 252,000 tpa located in Corlu, close to Istanbul.</li> </ul>	Turkey	PET
	<ul style="list-style-type: none"> <li>Acquisition of a 100% stake in the PTA business of CEPESA Chimie Montréal s.e.c in Montreal, Canada. CPESA is the largest and the only PTA manufacturing facility in Canada with a capacity of 600,000 tpa and is one of the three merchant PTA producers in North America.</li> </ul>	Canada	PTA
May 2015	Completion of the acquisition of a 94.91% stake in a PET business in Thailand, Bangkok Polyester PCL (BPC). BPC is a producer of PET polymers in Rayong, Thailand, with a capacity of 105,000 tpa. Further shares were also acquired from the minority shareholders, thereby taking the Company's total shareholding in BPC to 98.97%.	Thailand	PET

Year	Event	Location	Business
June 2015	The acquisition of CEPSA Chimie Montréal s.e.c in Montreal, Canada was completed, including all of the closing formalities, and the plant was taken charge of effective June 1, 2015. IVL renamed the companies as Indorama Ventures Gestion, Inc., Indorama Ventures Northern Investments and Indorama Ventures PTA Montreal, respectively.	Canada	PTA
September 2015	The establishment of three new subsidiaries: <ul style="list-style-type: none"> <li>Indorama Ventures Dutch Investments B.V.</li> <li>Indorama Ventures Investments USA LLC</li> <li>Indorama Ventures Olefins LLC</li> </ul>	Netherlands US US	Holding Company Ethylene Cracker
November 2015	<ul style="list-style-type: none"> <li>Acquisition of 100% of CEPSA's business in Spain. CEPSA Spain is Europe's largest producer of IPA (isophthalic acid) and is the second largest producer in the world. With 220,000 tons of IPA capacity, 175,000 tons of PET, and 325,000 tons of PTA.</li> </ul>	Spain	PET/PTA/ IPA
	<ul style="list-style-type: none"> <li>The establishment of a new indirect subsidiary company in the US: Indorama Ventures Olefins Holding LLC</li> </ul>	US	Holding Company
December 2015	Completed the acquisition of a 100% stake in the Polyethylene Terephthalate (PET) business of MICRO POLYPET Private Limited (MicroPet) and its two subsidiaries, Sanchit Polymers Private Ltd., and Eternity Infrabuild Private Ltd. in India, effective 23 December, 2015. MicroPet has a PET capacity of 216,000 tpa and is situated in Panipat district in the northern Indian state of Haryana, and has a virtual integration with a major refinery for its PTA and MEG feedstocks.	India	PET

Year	Event	Location	Business
January 2016	Acquisition of a 100% stake in BP Amoco Chemical Company (BP)'s chemical complex in Decatur, Alabama (US). BP's integrated facility is located adjacent to IVL's PET manufacturing subsidiary, AlphaPet, Inc. and has a combined capacity of approximately 1.8 million tons of which PX capacity is 720,000 tons, PTA capacity is 1,020,000 tons, and NDC (Naphthalene Dicarboxylate). (The acquisition was completed and effective as of March 31, 2016.)	US	PTA/PX/ NDC
February 2016	Formation of an equal joint venture in India with Dhunseri Petrochem Limited. IVL will divest its 50% equity stake in its indirect, fully-owned PET manufacturing company - Micro Polypet Private Limited, India to Dhunseri Petrochem Limited. IVL will also acquire a 50% equity stake in a new carved-out entity from Dhunseri Petrochem Limited. The new entity will own the 480,000 ton PET manufacturing facility of Dhunseri Petrochem Limited located in the port city of Haldia in the eastern Indian state of West Bengal.	India	PET
March 2016	The establishment of a new indirect subsidiary in India, Indorama Ventures Packaging (India) Private Limited.	India	Packaging
April 2016	Completed the acquisition of a 100% of Compañía Española de Petróleos S.A.U. (CEPSA Spain)'s PIA, PET and PTA business in Guadarranque-San Roque, Cadiz, Spain. The operation was effective as of April 7, 2016. The company was renamed Indorama Ventures Química S.L.U.	Spain	PET/PTA/ IPA
July 2016	The establishment of a subsidiary company and a joint venture company in China.  The new indirect subsidiary:  Performance Fibers (Kaiping) No. 3 Company Limited  The new Joint Venture Company:  ES FiberVisions Shanghai Co., Ltd.	China       China	Polyester       Trading Business

Year	Event	Location	Business
August 2016	<ul style="list-style-type: none"> <li>Name change of a subsidiary company in the US. Polyamide High Performance, Inc., an 80% indirect subsidiary of IVL in the US changed its name to "PHP Fibers Inc."</li> </ul>	US	Air bags/ Tire cord yarns
	<ul style="list-style-type: none"> <li>The merger of two indirect subsidiaries in Germany. PHP Overseas Investments GmbH, a non-operating entity merged into PHP Fibers GmbH, an operating Fibers business entity. The new merged entity is known as "PHP Fibers GmbH."</li> </ul>	Germany	Air bags/ Tire cord yarns
September 2016	<ul style="list-style-type: none"> <li>Completed the formation of an equal joint venture in India with Dhunseri, effective September 12, 2016. The joint venture company in India was also renamed. Dhunseri Petglobal Limited was changed to "IVL Dhunseri Petrochem Industries Limited."</li> </ul>	India	PET
	<ul style="list-style-type: none"> <li>The establishment of a new indirect subsidiary company in China: Performance Fibers (Kaiping) Trading Company Limited</li> </ul>	China	Polyester
December 2016	The establishment of a new indirect subsidiary company in Mexico, Indorama Ventures Mexico Assets, S. de R.L. de C.V., which is 99.99% held by Grupo Indorama Ventures, S. de R.L. de C.V., a wholly-owned indirect subsidiary company of IVL.	Mexico	Service Company
May 2017	Acquisition of a 100% stake of Glanzstoff Group (Glanzstoff), a tire cord business in Luxembourg, Italy, the Czech Republic and China. The Glanzstoff acquisition provides a strategic fit to the automotive segment in the HVA portfolio with a capacity of 36,300 tpa.	Luxembourg/ Italy/ Czech Republic/ China	Tire cord
May 2017	Acquisition of the remaining 25% stake in Trevira Holdings GmbH (Trevira) in Germany. With this acquisition, IVL	Germany	Polyester

Year	Event	Location	Business
	holds 100% of Trevira, a leading brand of specialty polyester fibers globally.		
September 2017	Acquisition of a 100% stake of DuraFiber Technologies México Operations, S. A. DE C. V. (DuraFiber), a tire cord business with a capacity of 22,400 tpa.	Mexico	Tire cord
October 2017	Acquisition of a 100% stake of DuraFiber Longlaville, France, a tire cord business with a capacity of 35,000 tpa.	France	Tire cord
November 2017	Acquisition of the PTA assets of Artlant PTA S.A. and the adjacent utility assets of Artelia Ambiente, S.A. in Portugal.	Portugal	PTA
March 2018	Acquisition of a 100% stake of M&G Polimeros Brazil S.A. in Ipojuca, Brazil, the largest PET facility in the country with a capacity of 550,000 tpa. (Completed all closing formalities and took charge of the operations effective May 24, 2018).	Brazil	PET
March 2018	Formation of an equal joint venture company, namely Corpus Christi Polymers LLC (CC Polymers), with Alpek and Far Eastern and entered into an asset purchase agreement with M&G USA Corp. and its affiliated debtors (M&G) to acquire the integrated PTA-PET plant currently under construction in Corpus Christi, Texas (US). The plant is expected to be the largest single line vertically integrated PTA-PET production facility in the world and the largest PTA plant in the Americas with a capacity of 1.1 million tpa of PET and 1.3 million tpa of PTA .	US	Integrated PTA-PET
May 2018	Acquisition of a 65.72% equity stake in Avgol Industries 1953 Ltd., with a capacity of 203,000 tpa. Avgol Industries is a global manufacturer of non-woven fabric and hygiene products with six sites located in Israel, the US, Russia, China and India. (Completed all closing formalities of the transaction on 25 July 2018).	Israel/US/ Russia/ China/India	Non-woven fabric and hygiene

Year	Event	Location	Business
June 2018	Formation of a joint venture in Egypt with Dhunseri Petrochem Limited, namely Egyptian Indian Polyester Company S.A.E. (EIPET) with a capacity of 540,000 tpa. EIPET is one of the largest PET producers in the Middle East and Africa.	Egypt	PET
June 2018	Formation of a 50:50 joint venture limited liability company in the US with Huvis Global Corporation named Huvis Indorama Advanced Materials, LLC. (HIAM) with a capacity of 60,000 tpa. HIAM is a manufacturer of Low Melting Fiber (LMF) used as a binder fiber in core-sheath constructions to produce HVA applications for automotive and industrial composites.	US	Low Melting Fiber
June 2018	Acquisition of an equity stake of 100% of KORDÁRNA Plus a.s. (Kordarna) in the Czech Republic with a capacity of 57,000 tpa. Kordarna is the largest producer of tire cord fabrics in Europe, having one production site in the Czech Republic and another in Slovakia. (Completed all closing formalities and took charge of the operations effective October 30, 2018).	Czech Republic/ Slovakia	Tire cord
July 2018	Acquisition of 74% of the share capital of Medco Plast for Packing and Packaging Systems S.A.E., Egypt (MEDCO) with a production capacity of 70,000 tpa of PET preforms. MEDCO is the largest PET convertor in Egypt with market share of approximately 25%. (Completed all closing formalities of the transaction on November 13, 2018).	Egypt	Packaging
July 2018	Acquisition of 100% of the share capital of Sorepla Technologie S.A. and its subsidiary, namely Société de Recyclage de Matières Plastiques (Sorepla Industrie) S.A., in France (Sorepla). Sorepla is one of the largest plastics recyclers in Europe with a capacity of 52,000 tpa.	France	PET Recycling
September 2018	Agreed to form a 50:50 joint venture limited liability company in the US with Loop Innovations, LLC named Indorama Loop Technologies, LLC. (ILT).	US	Sustainable Polyester Resin



Year	Event	Location	Business
October 2018	Acquisition of a 100% equity stake in Schoeller Group in Europe, with operating plants in Austria, the Czech Republic and Germany. Schoeller Group is a leading European producer of pure wool and wool blend worsted yarns, with one dyeing facility in Austria and one spinning facility in the Czech Republic, with a total production capacity of 3,600 tpa. (Completed all closing formalities of the transaction on November 23, 2018).	Austria/ Czech Republic/ Germany	Wool and Wool Blend Worsted Yarn
October 2018	Established a new indirect subsidiary company and merged indirect subsidiaries in Mexico.  The setting up of a new indirect subsidiary:  Glanzstoff Industries Mexico, S. de R.L. de C.V.  The merger of indirect subsidiaries:  Indorama Ventures Mexico Assets, S. de R.L. de C.V. (IVMA)	Mexico  Mexico	Chemical Fibers  Service Business
November 2018	Acquisition of a 100% equity stake in M&G Fibras Brasil S.A. in Brazil. The site produces Polyester Staple Fiber, with a capacity of 75,000 tpa.	Brazil	Polyester Staple Fiber
December 2018	Acquisition of a 100% equity stake in UTT Beteiligungsgesellschaft mbH (UTT), Germany, one of the leading suppliers of airbag fabrics and other highly specialized solutions in the field of technical textiles, with two manufacturing sites located in Germany and Mexico and with capacity of approximately 12,000 tpa .	Germany/ Mexico	Airbag Fabrics and Others
December 2018	Acquisition of a 100% equity stake in the PET business of INVISTA Resins & Fibers GmbH, Germany (IRFG); and certain intellectual property rights of INVISTA Textiles (UK) Limited with regards to its barrier technology. PolyShield® PET and OxyClear® Barrier PET are well-known brands in oxygen barrier packaging. The IRFG plant is located in	Germany	PET

Year	Event	Location	Business
	Gersthofen, Germany and manufactures high value-added PET with a combined capacity of 282,000 tpa.		
December 2018	Signed a definitive Asset Purchase Agreement of with Custom Polymers PET, LLC, to acquire their PET recycling facility in Alabama (US). The facility consists of two production lines: rPET flakes and food-grade rPET pellets, with a combined capacity of 31,000 tpa.	US	rPET and food-grade rPET Pellets
December 2018	An integrated PTA-PET asset at the Corpus Christi joint venture received all regulatory clearances required from the United States Federal Trade Commission for the proposed acquisition on December 21, 2018.	US	Integrated PTA-PET
December 2018	Commercial production start-up at Indorama Ventures Xylenes & PTA, LLC's PIA plant in Decatur, Alabama (US) on December 23, 2018. This plant complements IVL's existing PIA plant at IVL Quimica in Spain. The two PIA plants have a combined name plate capacity of 440,000 tpa.	US	PIA

In August, 2014, IVL's Board of Directors passed a resolution to increase the Company's share capital and issue warrants through a rights issue to existing shareholders. Furthermore, the Extraordinary General Meeting of Shareholders No. 1/2014 held on August 6, 2014 considered and approved the rights issue of warrants to existing shareholders, terms of the warrants, and the increase in registered share capital and allocation of share capital for the exercise of the warrants. The key terms of the issued warrants are:

Warrant	IVL W1	IVL W2
Term	3 Years	4 Years
Exercise Ratio	1 unit of warrant for 1 share	1 unit of warrant for 1 share
Exercise Price	THB 36 per share	THB 43 per share
Issue Date	25 August 2014	25 August 2014

Expiry Date	24 August 2017 3 years from the issue date	24 August 2018 4 years from the issue date
Warrant Issue Price	THB 0 (at no cost)	THB 0 (at no cost)
Allocation	To existing shareholders at the ratio of 10 IVL existing shares to 1 IVL-W1	To existing shareholders at the ratio of 13 IVL existing shares to 1 IVL-W2
Exercise Period	Last business day of each month for every 3 months starting from 31 October 2014. The last exercise date is the third anniversary from the issue date.	Last business day of each month for every 3 months starting from 31 October 2017. The last exercise date is the fourth anniversary from the issue date.

As of August 31, 2014, the Company increased its registered share capital from THB 4,815,856,719 to THB 5,666,010,449 in ordinary shares with a par value of THB 1 per share. The increase in registered share capital by THB 850,153,730 is reserved for the exercise of IVL-W1 and IVL-W2 warrants into ordinary IVL shares. As per the terms of the issue, if all warrants are exercised by the warrant holders into ordinary shares, IVL will raise, with the exercise of all IVL-W2, up to THB 15.9 billion by September 2018.

In October 2014, the Company successfully completed the offering of Subordinated Perpetual Debentures No. 1/2557 for THB 15 billion. The Perpetual Debentures carry a fixed rate coupon of 7.0% per annum for the first five years, after which the coupon will be adjusted every five years as per the stated terms and conditions. The issuance has strengthened IVL's capital structure, and improved the liquidity and flexibility of the Company.

In October 2015, the Company successfully issued its first overseas Senior Unsecured Bond in the amount of SGD 195 million to institutional investors in Singapore through its wholly-owned subsidiary, IVL Singapore PTE Ltd. The Bond was rated AA (Stable) by Standard and Poor's with a tenure of 10-years at an interest rate of 3.73 percent per annum. It is guaranteed by the Credit Guarantee & Investment Facility (CGIF), a trust fund of the Asian Development Bank and listed on the SGX-ST.

In 2017, the total number of IVL-W1 exercised from October 2014 until the last exercise on 24 August 2017 was 430,708,227 warrants, representing 89.47% of the total warrants issued. The unexercised (IVL-W1) warrants have expired and were delisted on August 25, 2017. The Company will use this inflow of funds to reduce its debt and pursue future growth opportunities.

In 2018, the total number of IVL-W2 exercised from October 2017 until the last exercise on August 24, 2018 was 369,586,436 warrants, representing 99.80% of the total warrants issued. The unexercised (IVL-W2) warrants expired and were delisted on August 25, 2018. The Company will use this inflow of funds to reduce its debt and pursue future growth opportunities.

In October 2018, TRIS Ratings (a strategic partner of S&P Global) ascribed the Company's rating at "AA-". They also upgraded the outlook of IVL to "AA-" from "A+" reflecting the Company's successful strategy and future potential.

## 2. Nature of the Business

### Revenue Structure

The details of our sales revenue structure, according to our consolidated financial statements for the year ended December 31, 2016 to 2018, are as follows:

Details	Year Ended December 31,					
	2016		2017		2018	
	(Bt million)	%	(Bt million)	%	(Bt million)	%
<b>Revenue breakdown by</b>						
PET	134,990	53	145,760	51	182,415	53
Fibers	73,291	29	81,065	28	99,207	29
Feedstock	93,771	37	115,161	40	147,296	42
Elimination	(47,432)	(19)	(55,655)	(19)	(81,747)	(24)
<b>Consolidated revenue from sale of goods</b>	<b>254,620</b>	<b>100</b>	<b>286,332</b>	<b>100</b>	<b>347,171</b>	<b>100</b>

Details	Year Ended December 31,					
	2016		2017		2018	
	(Bt million)	%	(Bt million)	%	(Bt million)	%
<b>Revenue breakdown by 5 Segments</b>						
Integrated PET	153,343	60	170,374	60	209,231	60
Olefins	10,988	4	14,332	5	14,595	4
Fibers	64,202	25	71,590	25	89,137	26
Packaging	5,446	2	6,168	2	8,053	2
Specialty Chemicals	24,069	9	28,615	10	31,595	9
Elimination	(3,428)	(1)	(4,746)	(2)	(5,441)	(2)
<b>Consolidated revenue from sale of goods</b>	<b>254,620</b>	<b>100</b>	<b>286,332</b>	<b>100</b>	<b>347,171</b>	<b>100</b>

Source: The Company's consolidated financial statements and MD&A.

The Company's operations in major regional markets allows for diversified sales, which are serviced from manufacturing units within the region and through a declining quantity of exports. Our sales by geographic segment for the year ended December 31, 2016 to 2018 are as follows:

Details	Year Ended December 31,					
	2016		2017		2018	
	(Bt million)	%	(Bt million)	%	(Bt million)	%
<b>Revenue breakdown by Geographic Segments*</b>						
Thailand	14,789	6	17,823	6	20,782	6
North America	94,552	37	105,568	37	124,819	36
Europe	77,443	30	92,075	32	100,809	29
Rest of the World	67,836	27	70,866	25	100,761	29
<b>Consolidated revenue from sale of goods</b>	<b>254,620</b>	<b>100</b>	<b>286,332</b>	<b>100</b>	<b>347,171</b>	<b>100</b>

\*Geographic revenue breakdown based on customers' locations.

Source: The Company's consolidated financial statements.

## Business Overview

Indorama Ventures (SET: IVL) is a major global intermediate and downstream petrochemicals producer with 93 sites in 31 countries across five continents (as of December 31, 2018) providing value-added and differentiated products and services several diversified consumer goods industries. Our management team has in-depth experience in the global chemicals and high value-added products chain.

High value-added products are premium products and normally have higher margins over pure staple commodity products.

IVL has integrated businesses which are aligned to create a sustainable value proposition. IVL's customer orientation, global reach and scale allow us to benchmark ourselves globally to enhance operational excellence.

The additional factors that provide a broader portfolio of products for customers are in innovation, high value-added products and recycling, which will enhancing earnings growth and enhanced sustainability of the business. Ongoing investment in research and development provide customers with new products and services that improve our offerings and complete IVL's positioning as a one-stop center for global requirements.

## Business Description

The term Polyester can be broken into poly, meaning many, and ester, a basic organic chemical compound. The principle ingredients used in the manufacture of polyester are purified terephthalate acid, derived from Paraxylene, a part of the aromatics chain leading backwards to crude oil, and monoethylene glycol, part of the olefins chain that leads backward to crude oil or natural gas. The chemical process that produces the finished polyester is polymerization. IVL is one of the world's foremost-integrated producers in the Polyester industry.

IVL is a bridge connecting the oil and gas industry with consumer goods producers. There is constant demand growth from downstream customers, as they are mostly consumption oriented FMCG companies, which grows in volume at the rate of around 5-6 percent globally.

The industry norm is to have long-term volume contracts with customers, normally of one to three years; however, the pricing is adjusted monthly as per benchmark prices in the industry and according to an agreed mechanism. The system indicates IVL's ability to pass through price movements to end customers (not always contractually).

This mechanism implies that crude oil and its derivative raw materials used to produce PET and Polyester fibers have a low-impact on the business except in the event there is a sharp rise or fall in the price of such materials within a short period, entailing an adjustment in the cost of inventory to reflect market prices. This mark-to-market effect is termed "inventory gains" or "inventory losses."

However, there could be volatilities in the spread when there is oversupply or tight supplies in the industry in the short-term.

### **Portfolio Development**

IVL continues to consolidate its existing businesses. Fundamental shifts in the portfolio, both in its existing shape and form, and, as it evolves over the medium-term, necessitate the need to review the way we analyze and report our segments.

To this extent, we have completed a comprehensive assessment of our portfolio, identified areas of synergies and natural alignment, and recalibrated our future capital deployment strategies. All of this is in-line with our imperatives towards becoming a world-class, well-diversified, growth-oriented global chemicals company.

Going forward, each of our segments necessitates differentiated investment and growth strategies depending on the role they play in our existing portfolio. Each segment is either already delivering or is capable of delivering double-digit EBITDA margins through its business cycles. These segments are also poised for healthy growth momentum and thereby support IVL's overall growth strategy.

These new segments are as follows:

#### **1. Integrated PET**

This segment will include businesses in the aromatics and PET value chain, including PX, PTA and PET. Given PET's unique properties of 100% recyclability, reporting under this segment will also include IVL's recycling initiatives across the polyester value chain.

#### **PX Business Overview**

Paraxylene (PX) is used in the polyester chain, mainly in the production of fiber, film and polyethylene terephthalate (PET) bottle resins, via one of two intermediates – purified terephthalic acid (PTA) or dimethyl terephthalate (DMT). A small amount of PX is used as a solvent and to produce di-paraxylene and herbicides. The PX market has seen strong growth driven by increasing PTA consumption in the manufacturing of polyester.

#### **PTA Business Overview**

Terephthalic acid is an organic compound and a colorless solid. It is a commodity chemical, used principally as a precursor to polyester PET, used to make clothing and plastic bottles.

IVL entered the PTA business in 2008 with a strategy of developing raw material integration to ensure an uninterrupted supply of raw materials and ensure better integration in the polyester value chain. This provides IVL with a cost competitive edge to the PET and Fiber businesses. The Company's PTA assets are strategically co-located with downstream facilities in many countries including Thailand, Indonesia, Spain, the United States and the Netherlands. As of December 31, 2018, we were a globally integrated PET producer with a total PTA capacity of 4.9 million tons per annum.

#### **PET Business Overview**

Our PET business is part of our core polyester value chain business and comprised 41% of production volumes in 2018. Beginning with one manufacturing plant, we have grown with operations now across the five major consuming continents of North America, South America, Europe, Africa, and Asia. Our PET business includes the production and sale of PET resin. As of December 31, 2018, we were the

largest PET resin producer in the world with an aggregate installed production capacity of 5.7 million tons per annum (including our India joint ventures where IVL owns a 50% equity interest).

### **Recycling Business Overview**

In responding to the needs of customers and tackling global challenges on resource scarcity and waste, IVL started to explore the recycling business as part of our corporate sustainability programs. Our decision to execute the recycling project is based on the growth of PET use in a number of industries, the opportunities available in recycling PET and the increased attention being paid to developing a circular materials economy. We started producing PET flakes from discarded PET bottles in 2011 following our acquisition of Wellman Group, with flake processing facilities in Spijk, the Netherlands and Verdun, France. These two bottle recovery plants process discarded PET bottles to produce recycled PET flakes to serve the facility in Ireland. Recycled PET flakes are then converted into both food-grade and fiber-grade materials.

This PET recycling project complements IVL's existing capabilities and serves as a way to gain access to new markets and product lines. Over the past several years, we continued to expand PET recycling facilities in Thailand, the United States, Mexico and France. These expansions are a further milestone in strengthening our business and reflect our desire to continue to build a more sustainable business.

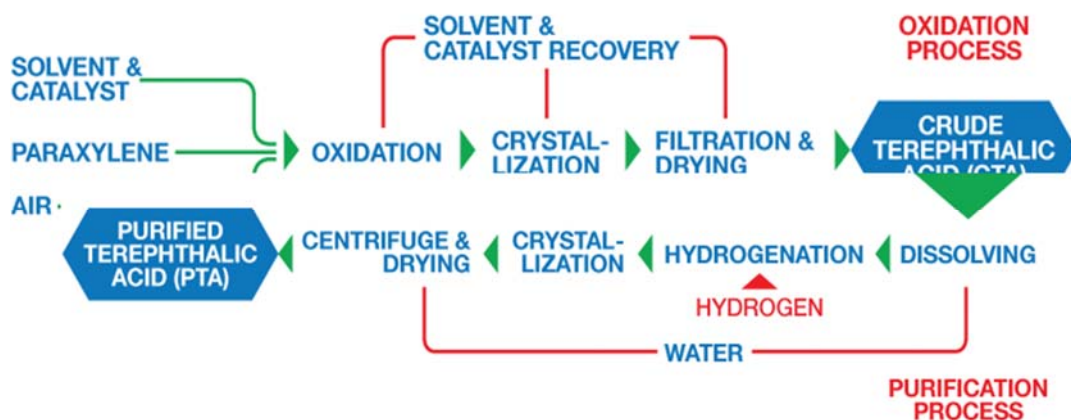
### **Integrated PET Production Process**

#### **PTA production process**

Terephthalic acid (TA) is the result of the oxidation of Paraxylene (PX). The commercial process utilizes acetic acid as a solvent together with a catalyst composed of cobalt and manganese salts, with a bromide promoter.

A radical chain reaction occurs in a series of intermediates, starting with the oxidation of paraxylene and finally to terephthalic acid. It is then further purified to make PTA.

The chart below summarizes the PTA production process.

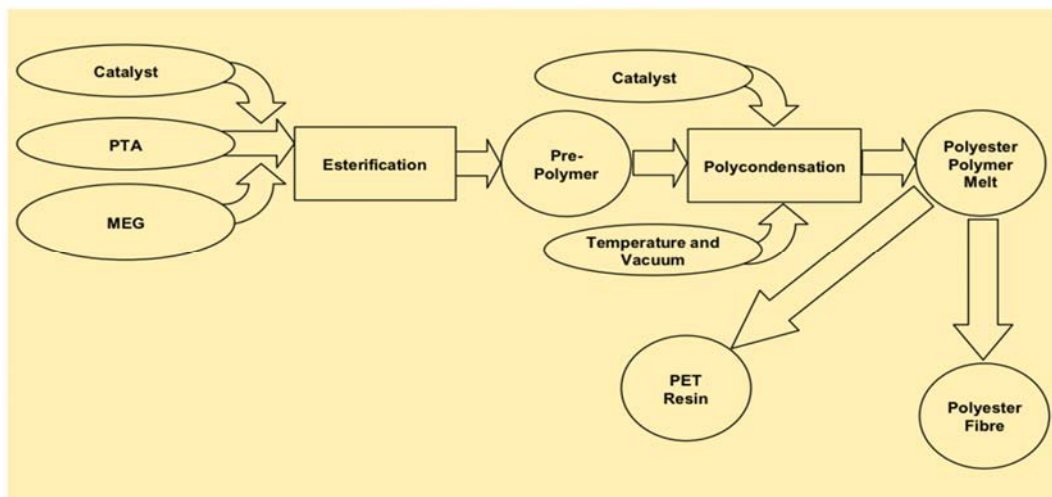




### **PET production process**

PET resin comes from polyester polymer melt. The melt is converted into PET resin, either through a conventional solid-state process or through a newer technology melt-to-resin process. Under the conventional solid-state polycondensation process, the melt is extruded into strands, which are quickly cooled down by water. After solidification, the strands are cut into small pellets, dried and further crystallized by being heated in a reactor under a specific temperature and pressure conditions under a nitrogen flow. Under the melt-to-resin process, the polycondensation process is completed during the melt phase, resulting in the formation of pellets without going through the solidification process. We have plants that use both of these technologies.

The chart below summarizes the PET production process.



### **Integrated PET Products and Markets**

We have sales and marketing teams in each of the regions where we operate, which are overseen strategically by our sales and marketing head office in Thailand. Our marketing activities include regular meetings with our customers to understand their requirements and maintain good relationships as well as providing first-rate customer service.

Most of our PX production is used for internal consumption to produce PTA in our plant in Alabama, in the United States. Our main customers for PTA are PET resin and polyester producers. Our downstream PET and polyester production facilities use a significant proportion of our PTA production. We sell the remaining PTA that we do not use within the group to third party customers. In 2016, 2017, and 2018, 55.9%, 53.1%, and 61.9% respectively, of our PTA was sold to the group and 44.1%, 46.9%, and 38.1% respectively, of our PTA was sold to third party customers.

We classify our PET customers into four main groups:

- Well-known brand name beverage companies with their own conversion plants to produce PET bottles;

- Well-known brand name beverage companies who sub-contract the production of PET bottles to converters using PET resin purchased by such beverage companies;
- PET resin traders; and
- PET converters who use PET resin to manufacture preforms, bottles, sheets and other PET packaging to service the needs of end users.

We sell our PET resin primarily through direct sales to end-use customers. A small proportion of our sales take place through agents and traders.

We are the world's largest PET resin producer and the only PET resin producer with production facilities in five continents, Asia, North America, South America, Europe, and Africa, which allows us to market our PET resin products globally to customers for their worldwide PET requirements.

### ***Integrated PET Competition***

IVL is the world's largest PET producer with a number 1 or number 2 position in 95% of our manufacturing locations. We have a strong presence in the Americas and EMEA and a high level of feedstock integration (PTA to PET in key markets and PX integration in North America), all of which position us as the global leader in this 100% recyclable business.

We are an integrated PET producer, where we manufacture and use PX and PTA for our own captive consumption partially or fully. Currently in China, there are many new plants, especially PTA plants, using the latest technology and having lower conversion costs than previously. However, there are other competitors in Europe and North America. For PET competitors, Equipolymers and Neo Group are the main competitors in the European market; Alpek (DAK Americas LLC) and the Far Eastern Group are the principal competitors in the US market; and Thai Shinkong Industry Corp. and Thai PET Resin Co., Ltd are the main competitors in the Thai market. Although PET technology is available through commercial licenses, we believe the capital investment required to achieve profitability through economies of scale may inhibit new entrants to the market.

### ***Integrated PET Production Facilities***

The following table sets out the key figures for our integrated PET production facilities as of December 31, 2018

<b>Production Facilities/Location</b>	<b>Nameplate Capacity<sup>(1)</sup> ('000 tons per annum)</b>
<b>PTA</b>	
Europe	1,735
Indonesia <sup>(2)</sup>	500
United States	1,303
Thailand	1,373

Production Facilities/Location	Nameplate Capacity <sup>(1)</sup> (‘000 tons per annum)
<b>PET</b>	
China	488
Europe	1,363
Indonesia	201
MENA	369
United States	1,570
India <sup>(3)</sup>	699
Thailand	414
<b>Recycling facilities</b>	<b>404</b>
<b>Total</b>	<b>10,418</b>

(1) The capacity of plants has been re-rated to reflect the de-bottlenecking projects taken-up by the various plants from time-to-time. However, the capacity does not include a non-operating site: Ottana Polimeri S.R.L., IRP Workington, Ottana Polimeri S.R.L. and Adana Turkpet.

(2) From October 1, 2018, Polyprima was fully consolidated due to a revision in terms with the JV partner.

(3) A 50/50 Joint Venture partnership with Dhunseri Petrochem Limited in India.

## 2. Olefins

IVL commenced its presence in this segment by acquiring the MEG and PEO facility in the United States in Texas, in 2012. We are in the process of further enhancing our presence by shortly commencing production at our ethylene cracker in Louisiana. This cracker will mainly support the captive EO-EG facility providing a unique integration advantage and the ability to capture the entire value chain margin.

### ***Monoethylene Glycol (MEG) Business Overview***

The other major feedstock produced by Indorama Ventures is MEG, which is an organic compound. In its pure form, it is an odorless, colorless, syrupy, sweet-tasting liquid.

Monoethylene glycol comes from ethylene via intermediate ethylene oxide. Ethylene oxide reacts with water to produce ethylene glycol.

The major end uses of ethylene glycol are in the polyester industry and in anti-freeze for automobile radiators. Besides automobiles, MEG is a medium in liquid-cooled computers, chilled water air-conditioning systems and geothermal heating/cooling systems.

### ***Purified Ethylene Oxide (PEO) Business Overview***

Purified Ethylene Oxide comes from the direct oxidation of ethylene in the presence of a silver catalyst.

Purified Ethylene Oxide is used in the production of detergents, thickeners, solvents, plastics and various organic chemicals such as ethylene glycol, ethanolamines, simple and complex glycols, polyglycol ethers and other compounds. Pure ethylene oxide is a disinfectant that is widely used in hospitals and the medical equipment industry to replace steam in the sterilization of heat-sensitive tools and equipment, such as disposable plastic syringes.

PEO derivatives are used to manufacture various products such as soaps, detergents, brake fluids, weed killer and urethane foam.

Ethylene oxide is one of the most important raw materials used in large-scale chemical production. Most ethylene oxide is used for the synthesis of ethylene glycols, including diethylene glycol and triethylene glycol that accounts for up to 75% of global consumption. Other important products include ethylene glycol ethers, ethanolamines and ethoxylates. Among glycols, ethylene glycol is used as antifreeze, in the production of polyester and PET, liquid coolants and solvents. Polyethylene glycols are used in perfumes, cosmetics, pharmaceuticals, lubricants, paint thinners and plasticizers. Ethylene glycol ethers are used in brake fluids, detergents, solvents, lacquers and paints. Other products of ethylene oxide include ethanolamines, which are used in the manufacture of soaps and detergents and for the purification of natural gas. Ethoxylates are reaction products of ethylene oxide with higher alcohols, acids or amines. They are used in the manufacture of detergents, surfactants, emulsifiers and dispersants.

### ***Diethylene Glycol (DEG) and Triethylene Glycol (TEG) Business Overview***

Diethylene Glycol (DEG) is a by-product made together with MEG through the processing of EO. DEG has broad applications and is used to manufacture polyester polyols, unsaturated polyester resins, buffet heaters, morpholine production, paints and coatings, plasticizers, liquid laundry detergents, cement grinding and as an intermediate for polyethylene glycol.

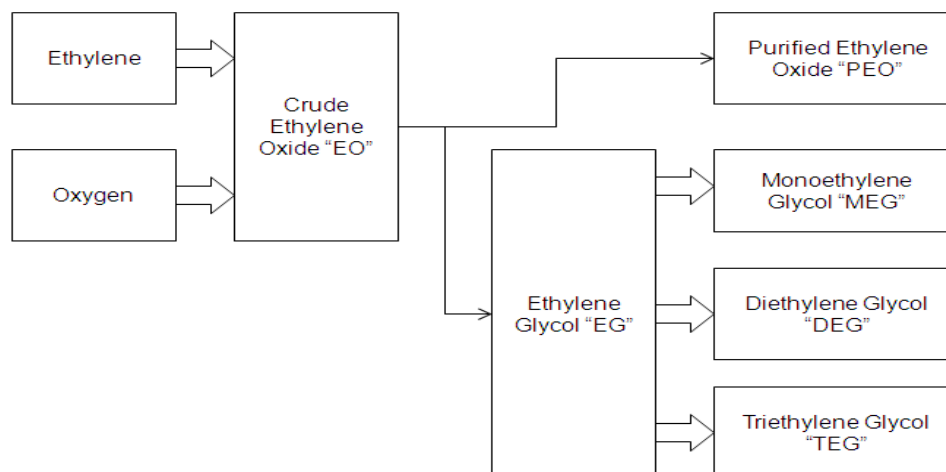
Triethylene Glycol (TEG) is a by-product made by processing EO and is mainly used for natural gas dehydration. The other applications are air sterilizers, resin for windshield plate glass and as an intermediate for polyethylene glycol. It is used as a plasticizer for vinyl as well as in air sanitizer products. When aerosolized, it acts as a disinfectant. It is an additive for hydraulic fluids and brake fluids and is used as a base for “smoke machine” fluid in the entertainment industry.

### ***US Olefin Cracker Business Overview***

IVL acquired an old and mothballed ethylene cracker located in the United States in Lake Charles, Louisiana, through its subsidiary, Indorama Ventures Olefins LLC. The refurbishment and restart process is ongoing. The plant has an expected commercial start-up in the first half of 2019. On completion, our integration will expand in North America, as we are currently a buyer of ethylene, which will be the end product of our US cracker once the refurbishment is completed.

### **Oxide and Glycol Production Process**

The chart below summarizes the EO/EG production process.



### **Oxide and Glycol Products and Markets**

IVL acquired its first EO/EG plant in April 2012, which has 100% of its sales in North America. Sales and Marketing for Indorama Ventures (Oxide & Glycols), or IVOG, is overseen by the sales and marketing head office in Thailand and implemented by the US sales team. Sales of our products are broken into two main categories:

Purified Ethylene Oxide (PEO) is sold exclusively in the US merchant market. PEO is used as a chemical intermediate in the manufacturing of PEO derivatives such as ethanolamines, polyols, ethers and surfactants which are in turn, used in the manufacture of agricultural chemicals, rigid and flexible foams, cleaning solvents and the personal care and beauty care industries, respectively.

There are currently many pure merchant consumers of PEO in the United States and IVOG supplies many of these companies, a testimonial to our reliability and service excellence. IVOG has an approximate 30% of the US merchant market share of PEO sales.

In addition to PEO, the plant manufactures the glycol products Monoethylene Glycol (MEG), Diethylene Glycol (DEG) and Triethylene Glycol (TEG) through a distillation process. The majority of the yield is MEG.

- IVL's acquisition of the Clear Lake, Texas plant accompanied an MEG supply agreement with the former owner who consumes MEG for the engine coolant market principally in the US.
- IVL's US Polyester and PET plants consume MEG as a raw material for their products. IVL's US plants have consumptive MEG capacity in excess of the Clear Lake, Texas plant's production capabilities, giving IVL the option to merchant MEG in the US and global markets or consume the MEG on a captive basis.

In 2016, 2017, and 2018, 31.2%, 33.1%, and 37.3% respectively of our EO/EG was sold to the group and 68.8%, 66.9%, and 62.7% respectively of our EO/EG was sold to third-party customers.

### ***Oxide and Glycol Competition***

PEO Competition – Due to the hazardous nature of PEO, there are no imports or exports of PEO as a product. PEO derivatives, however, are open to import-export. IVOG competes in the US PEO market with global competitors, all of whom primarily produce PEO to support internal production of PEO derivatives and sell the balance of their capacity to the merchant market. Unlike all of our competitors, IVOG does not produce any PEO derivatives, which competes with our merchant customers businesses.

Glycols Competition – The global market for MEG is highly competitive, involving a large number of producers located throughout the world. MEG is easy to transport and store. The shale gas revolution in the US has given its producers advantaged ethylene as a feedstock material ensuring the US is a low-cost region for MEG production. IVL's integration into MEG adds value to the US PET and Polyester margin chain. The largest competitors in North America include Shell Chemical, MEGlobal, Equistar and Sabic, along with Pemex in Mexico. The US is a largely mature consumer of MEG with demand growth driven by new PET capacity and an opportunistic export arbitrage platform based on the advantaged North American ethylene costs associated with shale gas.

### ***Olefins Production Facilities***

The following table sets out the key figures for our olefins production facilities as of December 31, 2018 (excluding the US Gas Cracker as it is under a restart process):

<b>Production Facility/Location</b>	<b>Nameplate Capacity (‘000 tons per annum)</b>
EO/EG Facility - United States	550

### ***3. Fibers Business***

This segment includes all our offerings in the mobility domain (automotive and tires), the personal hygiene domain and lifestyle domain. Each of these domains continues to grow at a rate of 6-7% annually, and offers the potential for multi-billion dollar businesses individually. Growth in the fiber business comes as a result of trends towards light-weighting, use of sustainable materials, increasing levels of consciousness for personal hygiene and change in choice of personal wear, specifically by the younger generation.

#### ***Polyester Fibers and Yarns Business Overview***

Polyester was discovered in the 1940s and has been manufactured on an industrial scale since 1947. Polyester fibers are the first choice for apparel and are used in trousers, skirts, dresses, suits, jackets, blouses and outdoor clothing.

Blends with cotton and virgin wool are very popular. They are often referred to as the “classical blend.”

Polyester fibers are produced by the melt spinning process. Raw materials are heated to a spinning mass, which is then pressed through spinnerets (similar to a sieve). Manufacturing techniques have

developed to the point where they can produce round, oval or angular profiles, making them firm to the touch.

Polyester fibers are particularly resistant to light and weather, can withstand climatic effects, being as light or as fine as the weather demands, and have good moisture transport and dry quickly.

### ***Polyester Fibers and Yarns Products***

Polyester fibers are most commonly used for apparel, from sportswear to high fashion; home textiles, such as bedding and carpets; non-woven materials including surgical gowns; technical textiles such as filters, and automotive uses including carpets and insulation.

With the acquisition of Performance Fibers in China in 2015, IVL can now produce Polyester yarns and Polyester fabrics that are used in tires and supplied to various world-class tire companies. With the growth in demand, IVL is in the process of expanding product capacity by around 40% in China.

- The acquisition of Glanzstoff in 2017 enhanced the offering of fibers in the automotive space with Rayon fiber. Glanzstoff also makes composite fibers for the automotive sector. This acquisition enhances our strategic position in automotive fibers as we can now offer a suite of products to the same or similar group of customers.
- DuraFibers in France and Mexico expanded the footprint of Performance Fibers in China as they produce similar products in the automotive fibers space.

### ***Polyolefin Fibers Business Overview***

The fiber forming substance is any long-chain synthetic polymer composed of a weight of at least 85% of ethylene, propylene, or other olefin unit in these manufactured fibers. Italy began production of olefin fibers in 1957. Production of olefin fibers in the United States began in 1960. The first commercial producer of olefin fibers in the United States was Hercules, Inc., now known as FiberVisions and wholly-owned by IVL.

Polymer granules are usually fed into an extruder that melts the polymer that is then pumped through a spinneret. The filaments are cooled in an air stream before being wound on a package or collected in cans. Because the fibers are difficult to dye, colored pigments are often added to the polymer stream before extrusion to produce colored fibers.

Propylene, when polymerized, creates a crystalline polypropylene polymer. The fibers made with these polymers can be used in furnishings, apparel and industrial products. Olefin fibers provide warmth without much weight. Olefin is resistant to abrasions, stains, sunlight, fire and chemicals. It does not dye well, but has the advantage of being colorfast since pigments are added in the fibers. Since Olefin fibers have a low melting point, they can be thermally bonded. One of the most important properties of Olefin fibers is its strength, which can be tailored for different applications. It keeps its strength in wet or dry conditions. Olefin fibers can be multi- or monofilament and staple, tow, or film yarns. The cross section is usually round, but can be modified for different end uses.

### ***Polyolefin Fibers Products***

Uses include nonwoven fabrics for diapers, feminine care and adult incontinence products (as top sheets, back sheets, leg cuffs, elastic waistbands, and transfer layers); in spun laced nonwoven products such as medical disposable textiles, filtration products or in air-laid nonwoven structures as absorbent cores, and wet wipes.

In terms of apparel, olefin fibers are used in sports and active wear, socks, thermal underwear and as lining fabrics, while in the home they are often used independently or in blends for indoor and outdoor carpets, carpet tiles and carpet backing. The fiber can also be used in upholstery, draperies, wall coverings, slipcovers, and floor coverings as well as heat-sealable paper for use in cases such as tea and coffee-bags.

In heavier applications, the fibers are often used for interior fabrics, sun visors, arm rests, door and side panels, and trunk and parcel shelves, while olefins can be created into carpets, ropes, and geo-textiles that are in contact with the soil, filter fabrics, bagging and concrete reinforcements.

### ***Bicomponent Fibers Business Overview***

Bicomponent fibers may be defined as “extruding two polymers from the same spinneret with both polymers contained within the same filament.” A close relative is “co-spun fiber,” which is a group of filaments of different polymers, but with a single component per filament spun from the same spinneret. The term “conjugate fibers” is often used, particularly in Asia, as synonymous with bicomponent fibers. The main objective of producing bicomponent fibers is to exploit capabilities not existing in either polymer alone. Bicomponent fibers are commonly classified by their fiber cross-section structures as side-by-side, sheath-core, islands-in-the-sea and citrus fibers or segmented-pie cross-section types. Bicomponent fibers made of polyethylene sheath and polypropylene core are important fibers for the nonwoven fabric market.

### ***Worsted Wool Yarns Business Overview***

The term worsted is derived from Worsted, a village in the English county of Norfolk. Worsted wool fabric is typically used in the making of tailored garments such as suits, as opposed to woolen wool, which is used for knitted items such as sweaters. The essential feature of worsted yarn is its straight, parallel fibers. Worsteds differ from woolens, in that the natural crimp of the wool fiber is removed in the process of spinning the yarn. IVL produces wool from Merino sheep. These sheep are sought after for their coats, which are said to produce the finest, softest wool available.

While many forms of wool require that the fiber undergo a spinning process, the production of worsted wool follows a slightly different path. Rather than going directly into a spinning process, the wool is first combed in a carding process. This is where the fibers are separated and prepared for spinning to remove any short and brittle fibers from the wool, leaving only the longer strands of fiber to undergo the spinning process, producing a smooth yarn that possesses a higher durability.

Owing to the strength of worsted wool, the fibers can be woven into a finer material that is more crease resistant than many other fabric choices making it an ideal choice for garments that need to hold their



shape. Worsted wool has been a popular choice for men's trousers, pleated skirts for women, and both men's suits and sports jackets. Because worsted wool is so durable, it wears very well and drapes easily, making it an ideal fabric for all sorts of garments.

### ***Worsted Wool Yarns Products***

Worsted wool produced by Indorama Ventures is used in high-end suiting for both men and women.

### ***Nylon 6.6 Tire Cord Yarns Business Overview***

With the acquisition of PHP Fibers GmbH and its subsidiaries ("PHP"), IVL holds 80% of PHP while the remaining 20% is held by Toyobo Co., Ltd., a leading Japanese manufacturer of high function products, including among others, automotive products.

PHP is a globally recognized manufacturer of branded high-tenacity polyamide nylon 6.6 yarns and is one of the leading suppliers in Europe for the automotive safety supply chain. PHP Group's production facilities are located in the United States, Europe and China.

The acquisition of PHP significantly enhances our High Value-Added (HVA) product portfolio with the addition of high performance automotive and industrial products.

### ***Nylon 6.6 Tire Cord Yarns Products***

These yarns are extensively used in air bags and tire cords in the automotive sector.

### ***Fibers Products and Markets***

Our main customers for fibers and yarns products are companies producing textiles for apparel, fast moving consumer goods companies in hygiene, companies producing home textiles and industrial companies such as automotive companies and packaging film producers.

### ***Fibers Competition***

Competition in the global fibers and yarns industry is characterized by the presence of large diversified industrial companies, as well as a large number of relatively small niche players with a capacity of sometimes less than 10,000 tons per annum. Larger fiber producers usually focus on high-volume standard fibers for sale in domestic markets where the level of competition is high and predominantly based on price and, to a lesser degree, on consistency of product quality. The larger polyester producers of commodity polyester products continue to focus on increasing their production of non-commodity products. They comprise approximately half of our total output. China dominates polyester production and has many companies involved in this business. There are a few companies in Korea, China, Turkey, and in western markets where they make specialized fibers and yarns, which compete with our specialized fibers and yarns.

### Fibers Production Facilities

The following table describes our fibers and yarns production facilities as of December 31, 2018.

Production Facilities/Location	Nameplate Capacity <sup>(1)</sup> (‘000 tons per annum)
China	139
Europe	412
Indonesia	404
MENA	35
United States	260
India	10
Thailand	266
<b>Total</b>	<b>1,526</b>

(1) The capacity of plants has been re-rated to reflect the de-bottlenecking projects taken-up by various plants from time-to-time. However, the capacity does not include a non-operating site: IVL Karawang.

## 4. Specialty Chemicals

### Specialty Chemicals Business Overview

IVL entered this segment in 2011 with the acquisition of Auriga Polymers in the United States in South Carolina, which owns the technology for the Crystal Clear Oxygen Barrier Resin, OxyClear® and Polyshield®. We supplemented our presence in this segment in 2016 by acquiring the world’s only NDC facility in the state of Alabama, and an IPA facility in Cadiz, Spain.

In 2018, we grew this portfolio by expanding our IPA production in Spain and additionally converted a PTA line to IPA in Alabama, thereby becoming the world’s second largest producer. Also in 2018, IVL announced the acquisition of Invista’s assets in Germany resulting in IVL possessing the IP for Polyshield® and Oxyclear® resins, together with Invista’s barrier technology in all markets globally.

### Specialty Chemicals Products and Markets

Our main customers for specialty PET resins are manufacturers of medical applications, premium bottles, and film and textile specialties. IVL continues to innovate our products in order to maximize differentiation, increase customer loyalty and enter new markets. We are moving closer to customers, offering both customer-tailored products and customer-specific service arrangements. Increasing consumer preference for eco-friendly substitutes also benefits us as we are the leading global solutions provider of barrier resins, which come from renewable feedstocks and offer a minimal carbon footprint. For IPA, we manufacture and (mostly) captively use within our group. In 2018, we sold 17% of IPA production to outside customers who manufacture PET resin as well as paints and coatings.

We sell NDC to outside customers who manufacture new-generation polyesters and resins to make items such as LCD flat panel displays and ultra-thin data storage tapes. We have sales and marketing teams in each of the regions where we operate, which are overseen strategically by our sales and marketing head office in Thailand.

### **Specialty Chemicals Competition**

IVL is the only commercial producer of NDC in the world. Since there are no other commercial producers, there is no direct competition, however, products made from NDC monomers do have competition from products such as modified PET, PI, and PC. NDC is used in markets such as films for optical displays, insulation for motors, flexible circuits for harnesses, industrial and pharmaceutical packaging containers, industrial fibers, and tire cords, among others.

Close to 40% of IPA demand is concentrated in domestic markets in Europe (where we are the only producer) and North America. Global IPA demand is close to 1.1 million tons with China being the largest consumer as PET is the main application for IPA. Apart from PET, the main applications are coatings and Unsaturated Polyester Resins (UPRs). We are the second largest producer of IPA worldwide and our main competitors are Lotte, FCFC, Ineos and Eastman. In 2018, we were the only producer that increased its market share in every region.

### **Specialty Chemical Production Facilities**

The following table describes our specialty chemical production facilities as of December 31, 2018.

<b>Production Facilities/Location</b>	<b>Nameplate Capacity<sup>(1)</sup> ('000 tons per annum)</b>
Specialty PET - various sites	513
IPA – Spain and the US	440
<b>Total</b>	<b>953</b>

(1) The capacity of plants has been re-rated to reflect the de-bottlenecking projects taken-up by various plants from time-to-time.

## **5. Packaging**

### **Packaging Business Overview**

IVL has been involved in this business for the past two decades, first through a Joint Venture with SermSuk PCL in Thailand and thereafter expanding our facilities to PET under penetrated but high growth countries in Southeast Asian and African markets including the Philippines, Nigeria, Myanmar and Ghana. The current portfolio consists of plastic polymer resins primarily used for beverage and food packaging, and packaging of pharmaceutical and household products. Currently, our main products are preforms, bottles and closures at 14 production facilities in seven countries. An aggregate production quantity of 0.3 MMt makes this IVL's smallest business segment.

Our focus is on developing a sustainable packaging business, and not competing with PET, by broadening the production footprint around the world through M&A and a greenfield expansion led growth strategy.

In the fourth quarter of 2018, IVL acquired MEDCO, a facility in Egypt, to expand our global footprint.

The overall global packaging industry is valued at around USD 1 trillion and is growing at 5% per annum. This is a high growth segment, especially in olefins-based sustainable packaging materials, that serves the key needs of the FMCG and pharmaceutical industries.

This downstream business provides tremendous scope for reducing earnings volatility, margin enhancements through segment integration into the olefins chain, and increased diversification.

### **Packaging Products and Markets**

Our main customers are reputable global beverage and FMCG companies such as L'Oréal, Pepsi and Coca Cola. We can produce clear and colored preforms, bottles, and closures. We have been regularly working on lightweighting as per the requirements of our customers. Through superior engineering, technology, plus reliable customer service and delivery, we provide our customers with packaging solutions that help them build the value and volume of their brands. Similar to other segments, we have sales and marketing teams in each of the regions where we operate, which are overseen strategically by our sales and marketing head office in Thailand.

### **Packaging Competition**

The global beverage packaging market is extremely competitive due to the presence of many vendors involved in the packaging of soft drinks. Though many new vendors are regularly emerging in the market, it is difficult for them to compete with international vendors, including IVL, in terms of features, functions, and services. The key players in the global market are Alpla, Ball Corporation, Crown Holdings, and Amcor.

In response to the increasing needs of our customers, we have also invested in high speed bottling lines. In the near future, we plan to expand our product portfolio to pharmaceutical healthcare, personal care and home care packaging products with enhanced functionality and sustainable materials.

### **Packaging Production Facilities**

The following table describes our packaging production facilities as of December 31, 2018.

Production Facilities/Location	Nameplate Capacity (‘000 tons per annum)
Packaging – various sites	320

### 3. Indorama Ventures Potential Risk Factors

#### **Risk monitoring and control mechanism at IVL:**

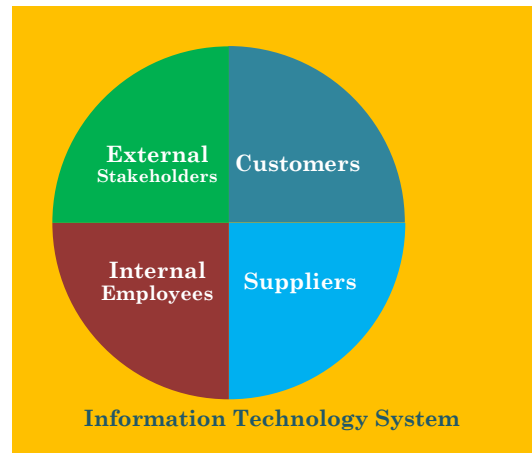
The Enterprise Risk Management framework uses top-down and bottom-up approaches to identify and manage business risks at corporate and subsidiary levels around the world to identify and mitigate business risks at every level. This is led by the Board, the Committee and senior management. This covers the assessment and review of internal and external risks, including global risks and factors that may affect the Company's operations. Business heads in the Sustainability and Risk Management Committee, as well as the Business Risk Management Committees, monitor key risks and ensure adequate preventive measures and mitigation controls. All significant risks identified are analyzed, recorded and reported. The risk management report and mitigation plan are reviewed quarterly by the committees at business segment and plant level. In addition, the Sustainability and Risk Management Committee reviews a sensitivity analysis of the business plan, Greenfield and M&A projects, to ensure sustainability especially with regards to the environmental and social impacts to business operations.

#### **3.1 Emerging Business Risks**

##### ***3.1.1 A cyber-security incident, data breach or a failure of a key information technology system could adversely impact our business or reputation***

We rely extensively on information technology systems ("IT Systems"), including some which are managed, hosted, provided and/or used by third parties and their vendors, in order to conduct our business. Our uses of these systems include, but are not limited to:

- communicating within our company and with other parties, including our customers;
- ordering and managing materials from suppliers;
- converting materials to finished products;
- receiving and processing orders from and shipping products to our customers;
- marketing products to customers;
- collecting and storing customer, employee, investor and other stakeholder information and personal data;
- processing transactions, including but not limited to employee payroll, employee benefits and payments to customers and vendors;
- hosting, processing and sharing confidential and proprietary research, business plans and financial information;
- complying with legal, regulatory and tax requirements;
- providing data security;
- handling other processes involved in managing our business.



Although we have a broad array of information security measures in place, our IT Systems, including those of third-party service providers with whom we have contracted, have been, and will likely continue to be, subject to computer viruses or other malicious codes, unauthorized access attempts, phishing and other cyber-attacks.

In general, cyber-attacks and other cyber incidents are occurring more frequently; are constantly evolving in nature; are becoming more sophisticated, and are being made by groups and individuals with a wide range of expertise and motives.

Such cyber-attacks and cyber incidents can take many forms, including cyber extortion, password theft or introduction of viruses or malware, such as ransomware through phishing emails. We cannot guarantee that our security efforts will prevent breaches or breakdowns of our, or our third-party service providers', IT Systems since the techniques used in these attacks change frequently and may be difficult to detect for periods of time. In addition, although we have policies and procedures in place to ensure that all personal information collected by us or our third-party service providers is securely maintained, data breaches due to human error or intentional or unintentional conduct have occurred and will likely continue to occur.

Although we have seen no material impact on our business operations from the cyber-security attacks and data breaches we have experienced to date, we may suffer a loss or disclosure of confidential business or stakeholder information as a result of a breach of our IT Systems, including those of third-party service providers with whom we have contracted. Moreover, we may suffer reputational, competitive and/or business harm; incur significant costs, and be subject to government investigations, litigation, fines and/or damages, which may adversely impact our business, results of operations, cash flows and financial condition.

Furthermore, while we have disaster recovery and business continuity plans in place, if our IT Systems are damaged, breached or cease to function properly for any reason, including the poor performance of, failure of or cyber-attack on third-party service providers, catastrophic events, power outages, cyber-security breaches, network outages, failed upgrades or other similar events, and if the disaster recovery

and business continuity plans do not effectively resolve such issues on a timely basis, we may suffer interruptions in our ability to manage or conduct business.

**Risk Mitigation Action:**

- Our systems are protected with advanced Firewalls, Antivirus, Antimalware, latest system patch application, and Advance Threat protection to strengthen our system's security.
- We do have a guideline of user awareness, to educate our users on risks of cyber security and train them for safe system usage.
- We do have a backup policy to protect our system and data, such that incase of cyberattack, systems can be recovered from backup.
- We have the capability to reduce the impact and proliferation of an event; to identify and classify applications, databases, systems, and information. We can minimize insider risks by keeping a closer watch on user activities, analyzing user behavior, and regularly assessing risks to proactively spot weaknesses and improve their security position.
- By enhancing security and privacy capabilities across the company, we establish stricter control over user IT activities in order to keep sensitive information secure and prevent insider breaches.
- The ongoing assessment of security threats, balanced against the existence and adequacy of security controls, is to ensure that security controls and countermeasures in place are commensurate with potential risks.

**3.1.2 Disruptive innovation/technology potentially leading to vulnerabilities such as Alternatives for PET**

It is difficult to anticipate the nature of disruptive innovations or new technologies, which might outpace the company's ability to remain competitive. Resistance to change may restrict the company from making necessary adjustment to the business model and core operations.

In particular, the trend of eco-friendly substitutes for disposable plastic water bottles is increasing. While good for raising environmental awareness, this might be misunderstood to include recyclable PET, thus affecting the future use of PET. Advanced technology to invent alternatives for PET as such biodegradable plastic might make vulnerable our business position as one of the leading companies in the market.

Customers increasingly expect more personalized products and services. Sudden development might alter customer expectations and change the core business model. Innovation can be restrained by the organization's core business assumptions or structural limitations. The needs of customers may have evolved; new technologies and solutions may have become available, and/or regulation has changed. Together these can create discontinuities, potentially changing the structure of an industry.

### Risk Mitigation Actions:

- IVL revisits its approach to corporate strategy development toward introducing more agility, adaptability, and responsiveness to emerging threats. We must continuously monitor changes in the environment to determine which, if any, could be truly disruptive.
- We see the strategic importance of Research & Development, choosing the appropriate level of investment while also effectively measuring return on those investments, which has meaningful impacts on our future positioning.
- We work closely with brand owners to promote campaigns on recycling and provide education to differentiate PET from other plastics. We observe the trend and thus strategically increase investment in recycling plants; arrange more recycling factory visits and encourage recycling and end-use of rPET.

### ***Embracing possible reward under disruptive trend is also opportunity***

With business expertise, disruptive innovation can present opportunity for a company's growth. Disruptive drift may become business-as-usual, to which a firm needs to be flexible in embracing the trend and using it to its competitive advantage.

Combining artificial intelligence (AI) and sustainability matters can aid society and environmental issues. AI provides additional tools alongside physical models, economic models, and decision makers operating in complex constrained frameworks, deploying data science as a means to address climate change information or leverage machine-learning techniques to support management of sustainable clean water and energy production.

IVL invests in research and development, fostering innovation and encouraging our people to be proactive and develop capability to adapt and transform threats into opportunities. This aids the company in disrupting the market by producing innovative, game-changing products and ideas that fundamentally change the way people live and work.

We work closely with our customers globally, providing them with innovative and specialized solutions to meet their evolving needs. Our business is exceptional in producing innovative and High-Value Added (HVA) products.

Leveraging IVL's strong foundation in the PET market and geographic reach, we see vast opportunities to grow the POLYSHIELD® PET and OXYCLEAR® Barrier PET brands to their full potential by reaching out to both existing and new customers around the world.

We are already capitalizing on the opportunities in the U.S. market, one of the largest barrier resin markets in the world - through our existing OXYCLEAR® Barrier PET license in the Americas. The strategic acquisition in Germany will evolve IVL to the next level of success by taking advantage of opportunities worldwide. With this acquisition, IVL reinforces its commitment to deliver the highest value to our customers and create sustainable long-term value for our shareholders.



### 3.1.3 Water crises might result in disruption of business operations and economic activity

Water crises as significant decline in the available quality and quantity of fresh water has emerged consistently in many areas globally which is interconnected environment-related risks with extreme weather events and climate change. Those risks lie in the higher-impact and the higher-likelihood across past several years. Continuing availability of water underpins action on food security, energy security, poverty reduction, economic growth, conflict reduction, climate change adaptation and biodiversity loss, while increasing global mistreatment of water resources across the world has led to significant degradation of ecosystems and the goods the industry provides.

As businesses, seek to secure long-term prosperity, to maintain competitive advantage and differentiation, and to secure stability and optimal in supply chains, increasing water scarcity can be challenge and uncertainty as physical, financial, regulatory and reputational risks. More severe climate change also lead to drought and flood which might impact the company in several entities as we operate in geographical locations. The company will come under greater pressure to reduce water use and increase efficiency.

#### Risk Mitigation Actions:

- The risk management committees of plants and business segments regularly monitors regulatory and potentials change and evaluate water risks and opportunities by conducting the Scenario analysis with those changes.
- We communicate on an ongoing basis and also work with local authorities to check ground water levels and levels in reservoirs in order to ensure the water supply and avoid the conflict with stakeholders nearby. The business continuity plans of our entities include water as one of the elements in their plans.
- We conduct a water sensitivity analysis using the AQUEDUCT Water Risk tool developed by World Resources Institute (WRI) to identify water stress locations. The tool helps us to evaluate change in water demand, water supply, risk from stakeholder and change in regulation based upon current and future condition. Given the tool enable us to foresee the changes to water risk forecasting on 2020, 2030 and 2040, these results had been analyzed and discussed during meeting of risk assessment committee to identify necessary mitigation measures or any initiatives on quarterly basis, where the plants locating in high risk water stress or locating under significant risks to water usage.
- We evaluate the possibilities and options to reduce water consumption, increase the recycle and reuse of wastewater, make water harvesting, to achieve our goal of zero liquid discharge as many as sites, and establish targets at the entity and group level.
- IVL commits to sustainable water management (including water withdrawal and discharge) by complying with all applicable environmental laws, international standards, and regulations in the countries where we have operations, and will be proactive in demonstrating leadership and responsibility in-line with our values.

## 3.2 Business Risks

### ***3.2.1 Increasing Business and International Operations naturally exposes us to various challenges such as macro-economic, geopolitical, environmental, and regulatory risks***

IVL's business operations have been rapidly increasing globally year on year, presenting new challenges and risks. These include: political instability; the safety and security of employees; tangible and intangible property due to increased terrorist attacks in new countries; anti-national or communal activities; unanticipated economic developments, and rapid changes in legislation, regulations, standards, or pandemic diseases.

We may also have to comply with inconsistent or unexpected changes in foreign laws; currency controls, tax regulations, and changes in international tax treaties; the imposition of duties on imports; anti-dumping duties; environmental and regulatory requirements, or import and export controls.

Many of these could be beyond our control and could have an adverse impact on the Company.

#### **Risk Mitigation Actions:**

IVL has considered the likelihood and potential business impact of each risk and has undertaken the following mitigation actions:

- Long-term and short-term sensitivity analyses of the Company's business plans, and correlation of various risks to the business.
- Stringent due diligence process to benefit from opportunities and mitigate business risks including, but not limited to, an environmental and geopolitical risk analysis of every business opportunity before a decision is taken by the management and the Board.
- Close and continuous monitoring of political, economic and legislative conditions of each country, including threats from anti-national and terrorist activities; safety and security of employees, and the assets of the Company.

### ***3.2.2 Climate Change Risk***

Climate change is inevitable and is going to have potentially serious implications for businesses. Post-COP21, IVL anticipates more environmental, social, political, and economic repercussions. The Company has carried out Climate Change Risk and Opportunity analyses.

The following are some of the Climate Change related Risks:

- **Regulatory:** Increased operational costs due to direct climate change legislation (e.g. cost of carbon) and indirect legislation (renewable energy targets, efficiency upgrades, etc.) may affect the Company's operations.

As of December 31st 2018, IVL has 93 operating sites in 31 countries. Depending on the scope of any carbon levy, IVL could be directly and/or indirectly affected either through increased production costs and/or through impacts from the supply chain and downstream customers.

There would be financial implications as the Company would be required to produce more energy efficient, less carbon intensive products for climate protection in the long-term.

- **Physical:** Extreme weather events, increasing frequency and severity of floods, droughts, cyclones, etc., may impact the Company's operations and supply chain.
- **Changing Consumer Preferences:** Changing consumption patterns towards increasing demand for environmentally-friendly products and technologies will most probably result in a declining demand for established or GHG-intensive products, particularly in Europe. A company that is lagging in this area could face the risk of being outmaneuvered by companies that have positioned themselves more favorably with eco-friendly or green products/services.
- **Reputational:** This is another important risk as laggards on climate action risk may face damage to their reputation and brand image.

The management has nominated a one senior executive at the corporate level to closely monitor both climate change risks and opportunities, who will report to all concerned, including the Sustainability and Risk management Committee (SRMC) that in turn, reports to the Board.

#### **Risk Mitigation Actions:**

IVL has increased its focus on efficiency improvements; adherence to GHG reduction goals and targets as defined and disclosed in its [Sustainability Reports](#) and on our [website](#).

The Company has also participated in the assessment of Dow Jones Sustainability Indices, CDP's Climate Change and Supply Chain, FTSE and other external sustainability assessments in 2018. These assessments are helping the company to:

- Identify financial savings
- Prepare for changes in regulations
- Improve risk awareness and long-term resilience
- Enhance reputation and shareholder confidence
- Continue our focus on accelerating innovation, recycling and developing a circular economy
- Increase focus on renewable energy
- Reduce our Carbon footprint in all our operations through life cycle assessment and management, greenhouse gasses accounting, energy and environment management
- Produce low carbon products, improve operational eco-efficiency within IVL operations and in value chain, lowering product toxicity
- Carry out water risk assessment globally in all our operations and initiate water management
- Light weighting of our products
- Strategically move to be in closer proximity to our customers and suppliers to avoid supply chain risks
- Explore opportunities for more post-consumer recycling of our products and increase usage of bio-based raw materials

### ***Climate Change is an opportunity***

At the same time, climate change is perceived as an opportunity as changes in regulations will drive the Company towards using more renewable energy. Increasing innovation and production of low-carbon products will lead the Company to become one of the customers' and consumers' preferred companies, which also brings financial gain through lowering overall cost of production. Possible climate change opportunities include:

- Tax incentives for increased use of renewable energy
- Tax incentives for increased recycling of PET waste; carbon credits for lowering emissions through recycling and reusing as compared to virgin PET
- Savings from global carbon and emission trading schemes due to reductions in carbon emissions
- An enhanced reputation for being an environmentally-friendly company by recycling more and more
- Becoming the preferred company to our consumers

### ***3.2.3 We operate in highly competitive industries and the actions of our competitors could impact on our profitability and market share***

- The industries in which we operate are characterized by price and other competition.
- The majority of our products are commodities – necessities – with a growing number of high value-added (HVA) products, and it may be difficult to have product differentiation and pass on increased costs to customers.
- Other competitive factors include product quality, specifications or product performance; continuity and reliability of supplies to customers, and sustainable long-term customer relationships.
- We often compete with large multinational companies as well as regional and/or specialized producers in the markets for our polyester fiber products. Margin pressure could arise from, for instance, limited demand growth and overcapacity in a market.

**Risk Mitigation Actions:** Greater integration and diversification of our manufacturing facilities across geographies, product innovation, product diversification, cost reductions and other operational excellence measures.

### ***3.2.4 How continuous demand growth in PTA, Oxide and Glycols, PET resins, Polyester and Non-Polyester fiber and yarn industries could result in overcapacity***

- Our operating results reflect the historically cyclical pattern of the PTA, MEG, PET resin, Polyester and Non-Polyester fiber and yarn industries, with periodic overcapacity and the resulting pressure on pricing.
- This cyclical nature arises, in part, from investments made at the top of the cycle (when margins are high and funds are available), thereby creating a demand-supply imbalance.

- The industry has experienced periods of overcapacity, when new plants become operational, and there can be no assurance that this will not recur in the future.
- In the absence of sufficient economic growth to generate increased demand, or the closure of facilities to mitigate the effect, new capacity causes a period of regional or global overcapacity might leading to downward pressure on profit margins.

**Risk Mitigation Actions:** Diversification of customer portfolio, adding high value added product portfolio, recycled products etc. to create customer loyalty and differentiation

***3.2.5 Crude oil and commodity price volatility affect the valuation of inventories and the capital employed, distorting the reported performance to an extent***

- Volatility of crude oil prices brings the risk of markdowns or mark-ups of inventories that we carry at any point in time and can impact our performance adversely or positively.
- Our reported capital employed might also be affected as working capital requirements change with movements in our products or raw materials prices.
- Natural gas price volatility affects cash conversion costs in countries where we operate. As we consume natural gas at certain locations the volatility of natural gas prices can benefit or hinder our performance

**Risk Mitigation Actions:** The losses or gains due to marking-to-market fluctuation in our inventories are largely mitigated by respective cash inflows, in our net working capital. The natural gas hedging tool is used to keep a check on price volatility by a partial fixed price contract of natural gas.

***3.2.6 With the external factor our cost might be impacted from market conditions or uncontrollable factors***

- Cost of our products may increase due to various external factors such as an increase in labor costs due to inflation, changes in minimum wage regulations; unplanned or prolonged shutdowns; raw material shortages; natural disasters; strikes; technical failures and regulatory rulings for environmental non-compliance.
- In such events we may not be able to fulfil our product delivery obligations and could therefore be exposed to claims for damages, suffering loss of reputation.

**Risk Mitigation Actions:** Insurance coverage including, but not limited to, loss from business interruption caused by accidents, natural disasters, damage to property, plant and machinery breakdowns, etc. Geographical diversification of business operations to minimize the risk of disruption from natural disasters or unexpected events.

***3.2.7 We may not be able to protect our intellectual property rights and we could be adversely impacted should we infringe on the intellectual property rights of others***

- Fibers and Yarns (both Polyester and non-Polyester) and PET resins operate in industries where our competitors have substantial intellectual property portfolios. The continued success of this business depends on our ability not only to protect our own technologies and trade

secrets, but also to develop and sell new products that do not infringe on existing patents or threaten existing customer relationships.

- Intellectual property litigation can be very costly and could result in substantial expense and diversions of resources, both of which could adversely affect our businesses, financial conditions and results.
- There may be no effective legal recourse against infringement of our intellectual property by third parties, whether due to limitations on enforcement of rights in foreign jurisdictions or as a result of other factors.
- An unfavorable outcome in any intellectual property litigation could have a materially adverse effect on financial conditions; results of operations in the fibers and yarns business, and to a lesser extent in PET resins

**Risk Mitigation Actions:** We take measures like patent and trademark registrations to protect our intellectual property (IP) rights. Moreover, we conduct FTO studies wherever appropriate to ensure that we do not infringe on the intellectual property (IP) rights of others.

### 3.3 Operational Risks

#### 3.3.1 Our operations are dependent on the availability and costs of raw materials

- Our operations are fundamentally dependent on the availability and costs of our primary raw materials. We procure PTA and MEG for our PET and fibers businesses; also PX for our PTA business; Ethylene for our Oxide and Glycols business; other types of raw materials for our Non-Polyester fibers business and recyclable bottles and flakes for our recycling business.
- Our financial conditions and operational results are thereby influenced by the market prices of these items, which are then subject to supply and demand, as well as other factors beyond our control.
- The markets and prices for petroleum products may be influenced by aggregate demand for such products (which can fluctuate with changes in economic conditions and cycles, seasons and weather patterns), the level of domestic and regional production, the prices and availability of imports, the prices and availability of substitute fuels and the extent and nature of government regulations and taxation.
- Any increase in raw material costs without a corresponding increase in the sale price would reduce our operating results. Our ability to pass on raw material price increases is dependent upon market conditions and our relative cost position compared to competitors.
- There may be periods of time in which we may not be able to fully recover increases in the cost of raw materials due to contractual arrangements or weaknesses in demand for, or oversupply of, our products.

**Risk Mitigation Actions:** Entering into long-term purchase agreements with suppliers where possible, and hedge prices when it makes economic sense.

### **3.3.2 Our production facilities are subject to operational risks that may adversely affect our operations**

- We are dependent on the continued operation of our production facilities, which are subject to hazards associated with the manufacturing, handling, storage and transportation of chemical materials and products. These include pipeline leaks and ruptures; explosions, fires, inclement weather and natural disasters; mechanical failure, unscheduled downtime, labor difficulties, transportation interruptions, remediation complications, chemical spills, discharges or releases of toxic or hazardous substances or gases, storage tank leaks and other environmental risks.
- These hazards can cause personal injury and loss of life, severe damage to, or destruction of, property and equipment, environmental damage, fines and liabilities.
- Indorama Ventures Europe BV; Indorama Polyester Industries' Map Ta Phut polyester; TPT Petrochemicals PTA, Indorama PET Nigeria Limited, Guangdong IVL PET Polymer Company Limited, Indorama Ventures Poland Sp. Z.o.o., and some others are co-located at sites where our neighbors face the same operational risks and, in some cases, they provide critical supplies and/or services, and any disruption in those supplies and/or services could also affect our operations.

#### **Risk Mitigation Actions:**

- We ensure readiness by having emergency evacuation procedures and mock drills for catastrophes internally and Emergency Response Teams.
- Regular reviews of safety equipment on site and annual training programs on safe work practices are carried out for the awareness of all concerned.
- All new employees, contractors and visitors are given mandatory safety training before they are allowed to enter the factory premises.
- At the production facilities, we do regular inspections, preventive maintenance and replacement of obsolete parts or equipment to avoid breakdown incidences.
- We closely monitor plant stocks as per inventory norms thus planning to ensure continuous availability of required materials.

### **3.3.3 Our business could be affected by an information technology system failure.**

- We rely on information technology (IT) systems to handle our businesses. Any systemic failure for whatever reason could disrupt our operations and prevent us from being able to process transactions with our customers, operate our manufacturing facilities, prepare internal MIS reports and properly report those transactions in a timely manner.
- A significant, protracted IT system failure may result in a materially adverse effect on our financial condition, operational results, or cash flow.

#### **Risk Mitigation Actions:**

- Adopting IT policies, processes and procedures to manage and protect IT risks. These policies and procedures are implemented as guidelines for the IT team and users. All policies and processes are reviewed and revised, as and when appropriate.



- IT Infrastructure and IT Applications are provided to ensure adequate resource allocation and optimal system function that supports the strategies and goals of the company.
- IT assessment by external as well as internal auditors. Moreover, we conduct internal IT assessment of all sites in accordance with IT general controls (ITGC) and report to senior management and SRMC.

### 3.4 Management Risks

#### ***3.4.1 The costs and difficulties of integrating future acquired businesses and technologies could impede our future growth and adversely affect our competitiveness***

- As part of our strategy, we may seek further growth through acquisitions of manufacturing facilities producing PTA, PET, Fibers, Oxides and Glycols or other products in our product chain in order to maintain a competitive position within the industries in which we operate and to enhance our position in our core areas of operation.
- Unidentified or unanticipated liabilities or risks in the operations of the companies which we may acquire;
- Potential failure to achieve the economies of scale, synergies or other benefits sought;
- Greater than expected costs, time and effort spent by management in completing and integrating the acquisitions;
- Inability to successfully integrate the services, products and personnel of the acquisitions into our operations or the inability to realize any expected cost savings or other synergies from the acquisitions;
- Inability to retain employees, customer or supplier relationships;
- Lack of return on our investment.

We may not be able to identify attractive acquisition opportunities or make acquisitions on attractive terms, or obtain the financing necessary to complete and achieve such acquisitions. Regulations on mergers and acquisitions by the European Union, the United States, Thailand or other national regulators may also limit our ability to make future acquisitions or mergers.

**Risk Mitigation Actions:** We do detailed due diligence for acquisitions, and seek appropriate production in the acquisition agreement.

#### ***3.4.2 The Indorama name is used by other companies that we do not control.***

The 'Indorama' trade-name belongs to Lohia Global Holdings Limited. IVL has a non-exclusive license for its use pursuant to a License Agreement with Lohia Global Holdings Limited and pays a royalty fee to Lohia Global Holdings Limited for the use of the 'Indorama' trade-name.

The business groups of other Lohia family members use the 'Indorama' wordmark. We do not control the usage of the trade-name by such business groups nor any adverse impact due to their actions on our reputation associated with the Indorama trade-name

**Risk Mitigation Actions:** IVL differentiates itself by presenting the Company as Indorama Ventures Pcl; listed and headquartered in Thailand.



### **3.4.3 The risk of a shareholder group that holds the majority of outstanding shares**

The Lohia family holds around 64.75% of outstanding shares and may affect voting results on significant agenda items.

**Risk Mitigation Actions:** All agenda items put to the Shareholder's meetings are always discussed and approved at the board meeting, having an equal representation of independent and non-Independent directors including representation from the major shareholders. Notice of the shareholder's meeting together with the Board opinion is well circulated to the shareholders prior to the meeting.

## **3.5 Financial Risks**

### **3.5.1 Significant capital investments including the future development of new facilities have been, and may in the future continue to be, necessary to achieve our growth plans, which carry project risks and other risks**

Our growth plans have required, and may continue to require, significant capital investments to expand, renovate, convert or upgrade existing facilities, develop new facilities or make major acquisitions or investments

- Failure to complete a project within the outlined project timetable and/or within budget
- Failure of the project to perform according to prescribed operating specifications following its completion
- Any significant increase in costs that were unforeseen in the project plan, and any inability to sell the products produced at volumes and/or price levels envisaged in the project plan could affect the success of our projects
- Due to the significant amount of capital required and the long time period between the planning and completion of such projects, project delays could have an effect on our business and future prospects
- Acquired businesses may not achieve the required level of revenue, profit, cash flow or other financial benchmarks.
- Acquisitions may involve risks associated with potential assumption of unanticipated liabilities and contingencies; difficulties in integrating acquired businesses, and achieving planned operational synergies.
- While our strategy is to acquire businesses that will improve our competitiveness and profitability, acquisitions may not be successful or accretive to earnings.

**Risk Mitigation Actions:** Project Cell works on each project with experienced individuals having technical, commercial, legal and requisite skills. They may use the resources of external consultants for strengthening the planning and execution of each project.

### **3.5.2 Exchange rate and/or interest rate fluctuations may have a significant adverse impact on our business, financial condition, prospects and operational results**

- As a result of the global nature of our business, changes in foreign currency rates could have an adverse impact on our business; financial condition, prospects and operational

results. Currency fluctuations affect us because of mismatches between the currencies in which operating costs are incurred and those in which revenues are received. We sell products that are typically priced by reference to prices in US dollars or euros, while a portion of operating costs are incurred in local currencies.

- The floating interest rates are impacted by macro-economic conditions and the monetary policy of each region. Interest rate risk is the risk that future movements in market interest rates will affect the results of the Company's operations and its cash flows.
- Credit risk is the potential financial loss resulting from the failure of a customer or counterparty to settle its financial and contractual obligations to the Company as and when they fall due.
- Our reported earnings may also be affected by fluctuations between the baht, which is our reporting currency, and the non-baht currencies in which some of our overseas subsidiaries report their results.

#### **Risk Mitigation Actions:**

##### **Currency risk:**

- IVL primarily utilizes forward exchange contracts with maturities of less than one year to hedge certain financial assets and liabilities determined by foreign currencies.
- Our operating subsidiaries instigate loans in their principle currencies. Generally, long-term loans are borrowed on floating interest rates and are linked to the benchmark interest rates for each currency.

##### **Interest rate risk**

- IVL has mitigated the interest rate risk by using derivative financial instruments. Principally, interest rate swaps, contracting a fixed interest rate, and the issuance of debentures including Perpetual Debentures in the Thai Bond market, are used to manage exposure to fluctuations in interest rates on borrowings.
- There is a natural hedge to a large extent where foreign currency liabilities are supported by same currency assets wherever possible.

##### **Credit risk**

- IVL has a credit policy in place and the exposure to credit risk is monitored on an ongoing basis.
- Credit evaluations are performed on all customers requiring credit over a certain amount.
- The Company does take credit insurance in specific regions to cover credit risk. Our exposure to credit risk is represented by the carrying amount of the receivables in the Statement of Financial Position.

##### **Liquidity risk**

- The Company monitors and maintains a level of cash, and cash equivalents, deemed adequate by management to finance the Group's/Company's operations, and to mitigate the effects of fluctuations in cash flows.

### **3.5.3 The Company is a holding company and is dependent on the receipt of dividends to make dividend payments on our shares**

- As a holding company, the Company is dependent on the receipt of dividends from its subsidiaries and associated companies, for which payment will depend on their future financial performance. This, in turn, depends on successfully implementing their strategies as well as on financial, competitive, regulatory, technical and other factors; general economic conditions, demand and selling prices for their products, and other factors specific to their respective industries or specific projects, many of which are beyond our control.
- The subsidiaries have dividend policies to not pay over 80% of net profit after tax and legal reserves. However, the board of those subsidiaries will approve dividends paid from time to time by considering some factors i.e.; cash reserved for loan repayment; expansion investment, or to support the cash flow of the Company in case of impact by changes in market conditions.
- The ability of our direct and indirect subsidiaries to pay dividends to their shareholders, including the Company, is subject to applicable laws.
- Although we intend to pay dividends with respect to shares, our ability to pay dividends in the future will depend on a decision of the Board of Directors and/or the approval of the shareholders at a general meeting; results of operations; as well as cash flows; financial conditions; contractual restrictions and restrictions imposed by applicable laws and other factors which the Board of Directors deems relevant.

#### **Risk Mitigation Actions:**

- IVL received dividend income of 10.79 billion THB in the year 2018 from its direct and indirect subsidiaries while it paid dividends of 8.92 billion THB to its shareholders. The dividend received is 1.21 times the dividend paid. At the end of the year 2018, the retained earnings have increased to 14.72 billion THB from 12.78 billion THB.
- Annual planning is done for receipt of interim and final dividends from direct and indirect subsidiaries. The respective CFO/ Financial Controllers plan for required corporate approvals and take their cashflow plan into consideration for payment of dividends.

### **3.5.4 Risk that the Company cannot comply with debt covenants**

IVL and its subsidiaries has total outstanding debts of THB 135.80 billion at the end of 2018. The total outstanding debt includes short term loans, long term loans, debentures/bonds and financial leases. The net debt-equity ratio at the end of 2018 is around 0.86 times, compared to what is required under financial covenants of equal to or less than 2.00 times.

The financial position has strengthened over the years with a larger equity base and increase in cashflow from operations. The total shareholders' equity at the end of 2018 is 151.62 billion THB (including perpetual debentures of 14.87 billion THB). In addition, syndicated bank loans at regional level and subsidiaries have standalone financing which are required to meet financial obligations and comply with financial covenants.

In October 2018, the domestic credit rating of IVL has been upgraded from A+ to AA- by TRIS. IVL would like to maintain a business profile and financial profile which maintains or enhances its rating profile.

### **Risk Mitigation Actions:**

Financial policy is to maintain a long term net debt-equity ratio of around 1.00 and Board guidance, is not to exceed 1.50 times.

- Diversified sources of financing through long term loans, debentures, short term loans, working capital financing solutions and others in multiple currencies such as Thai Baht, US Dollars, Euros and others.
- Surplus unutilized credit lines from the banks/institutions to have surplus liquidity.
- Monitoring of financial position, cashflows and covenants on a monthly/quarterly basis.

## **3.6 Compliance & Legal Risks**

### ***3.6.1 The lawsuits against Indorama Petrochem PTA facility may have an adverse effect on our business***

#### ***Lawsuit regarding the project to increase production efficiency and improve the air pollution treatment system***

- On June 19<sup>th</sup>, 2009, a lawsuit was filed in the Thai Central Administrative Court (the CAC) against various Thai governmental entities and Ministers (the Respondents) by various Claimants requesting that the CAC render a judgment ordering the Respondents to revoke an environmental impact assessment report (the EIA Report) and to revoke their approvals of projects or activities, required to prepare the EIA Report, located in Map Ta Phut, Ban Chang and the surrounding area in Rayong Province, Thailand. The lawsuit alleges that 76 projects in such areas may have a serious impact on the community with regard to the quality of the environment, natural resources and health. One of the projects named in the lawsuit is a project to increase the production efficiency and improve the air pollution treatment system of Indorama Petrochem PTA facility, which was approved by the Minister of Industry.
- On September 2<sup>nd</sup>, 2010, the CAC issued a judgment revoking the permission granted that had not completely complied with the provision of Paragraph 2 of Section 67 of the then Constitution. According to the judgment, the Indorama Petrochem project was not classified as a project for which permission to operate was revoked.
- However, on October 1<sup>st</sup>, 2010, the Claimants filed an appeal to the Supreme Administrative Court (the SAC) requesting the SAC reverse the judgment of the CAC and not rely on the Notification of the Ministry of Natural Resources and Environment, and rule that the Respondents be required to revoke the environmental impact assessment reports and grant permission to the projects or activities which were approved or obtained from August 24<sup>th</sup>, 2007 onwards until the study and assessment of the impact on the quality of the environment and health is completed as required by the then Constitution. On December 7<sup>th</sup>, 2010, the Respondents submitted the statement of defense

against the appeal of the Claimants. As of December 2018, the SAC has not yet issued a judgment on this case.

- While Indorama Petrochem was not considered a project for which permission was revoked by the CAC; it therefore can operate its PTA facility. However, the Company cannot ensure that the judgment to be rendered by the SAC will not have an impact on the project of Indorama Petrochem to the extent that the permission will be revoked or the construction of buildings or the business operation of Indorama Petrochem will be suspended.
- Indorama Petrochem's plant has never been affected by this lawsuit and the operation of the plant is continuing normally.

#### ***Lawsuit regarding the project to improve the reverse osmosis (RO) system***

- On March 10<sup>th</sup>, 2010, Claimants filed a lawsuit in the CAC against the Respondents (above). This requested the CAC to order the Respondents to revoke the EIA Report and to revoke their approvals of projects or activities, required to prepare the EIA Report, located in Map Ta Phut, Ban Chang and the surrounding area in Rayong Province, Thailand. The lawsuit alleges that nine projects in those areas may have a serious impact on the community with regard to the quality of the environment, natural resources and health
- The Claimants requested that the CAC suspend such projects, activities or operations of applicants or owners because they may have breached relevant procedures specified under the then Constitution and other relevant laws, including the commissioning of a HIA Report, the holding of a public hearing and the hearing of opinions from independent environmental organizations, prior to operating such projects or activities.
- One of the projects named in the lawsuit is the project to improve the reverse osmosis (RO) system of Indorama Petrochem's PTA facility, which was approved by the Minister of Industry.
- On February 28<sup>th</sup>, 2011, the CAC issued an order dismissing the petition for an injunction on the grounds that the facts made by the Claimants were insufficient to issue a court injunction and that there was no evidence to prove that the Claimants would be damaged by the operation of the projects. At present, the CAC has not yet issued a final judgment on this case. The operation of the plant is continuing normally.
- As of December 31<sup>st</sup> 2018, there is no material litigation against the Company or its subsidiaries which could have a negative effect on our assets exceeding 5% of shareholders equity.
- Apart from this, there is no lawsuit, which could have a significant effect on our business. However, the above litigation could have an adverse effect on a subsidiary of the Company, the impact of which cannot be estimated.

#### ***3.6.2 Changes in laws and regulations relating to beverage containers and packaging could reduce demand for such end use products***

- Legal requirements have been enacted in the United States and elsewhere requiring that deposits or certain eco-taxes or fees be charged for the sale, marketing and use of certain non-refillable beverage containers.

- Other proposals relating to additional beverage container deposits, recycling, and eco-tax and/or product stewardship have been or may be introduced in various jurisdictions in the United States and elsewhere.
- Increased consumer concerns and changing attitudes about solid waste, environmental responsibility and related publicity could result in the adoption of such legislation or regulations. This has encouraged some of our PET customers to reduce the amount of PET resin they use in their bottle production process, known as light weighting, which has achieved this goal and has impacted the demand for PX, PTA and PET resin.
- However, PET can be recycled and IVL has made investments in PET recycling projects in Mexico, the US, Europe and Thailand

#### **Risk Mitigation Actions:**

- We are closely monitoring New Product development and R&D departments' performance. Continuous improvement in Operational efficiency to maintain quality standards.
- Increase recycling PET (rPET) capacity in Asia and looking at acquisition/expansion of the existing NPT facility and Green field Projects in the Philippines and Indonesia.
- We also do market studies for suitable rPET acquisitions and/or joint ventures with existing recyclers and follow through to close the deals.

#### **3.6.3 Environmental regulations may cause us to incur costs and liabilities**

- Our operations are subject to environmental laws and regulations by central and local authorities in the countries in which we operate. These requirements are complex, subject to frequent changes and have tended to become more stringent over time.
- We have incurred, and will continue to incur, costs and capital expenditures in complying with these laws and regulations and in obtaining and maintaining all necessary permits.

**Risk Mitigation Actions:** We have procedures in place to enable us to comply with environmental laws and regulations; however, there can be no assurance that we will at all times be in compliance with all of our obligations in the future or that we will be able to obtain or renew all licenses, consents or other permits necessary to allow us to continue to operate our businesses. Any failure by us to comply with such laws and regulations could subject us to fines, penalties and other liabilities.

#### 4. Business Assets

##### Property, Plant and Equipment

Indorama Ventures PCL had fixed assets as stated in consolidated financial statement are property, plant and equipment of subsidiaries. As of December 31, 2017 and December 31, 2018, we had net book value of plant and equipment of subsidiaries used in our operation after deducting of accumulated depreciation and other impairment as stated in our consolidated financial statement equal to Baht 151,202 million and Baht 205,182 million or 53.5% and 54.1% of total assets. Details are as follows:

Unit: Baht million

Type	Net Book Value after Accumulated Depreciation	
	December 31, 2017	December 31, 2018
Land and land improvements	7,839	9,651
Buildings and building improvements	14,548	19,958
Machinery and equipment	106,111	133,359
Office furniture, fixtures, and equipment	567	713
Transportation equipment	155	261
Spare parts	554	1,001
Construction in progress	21,427	40,240
<b>Total Net Book Value</b>	<b>151,202</b>	<b>205,182</b>

**Remark:** As of December 31, 2018, mortgaged with financial institutions for Baht 38,620 millions

##### On-going Investment Projects

Major announcement & ongoing projects as on 31<sup>st</sup> December 2018 are as follows:

- a. Refurbishing of US Gas Cracker at Lake Charles, Louisiana
- b. Acquisition of Fibers Business in Brazil (M&G Fibras)
- c. Expansion of portfolio in airbag sector in Europe (UTT)
- d. Acquisition of Specialty PET Business in Germany (INVISTA)
- e. Acquisition of PET Recycling Facility in USA (Custom Polymers)
- f. Acquisition of joint venture integrated PTA-PET plant in USA (Corpus Christi)
- g. Other minor expansions and debottlenecks at various locations

### Intangible Assets

Indorama Ventures PCL had net book value of intangible assets as of December 31, 2017 and December 31, 2018 equal to Baht 18,027 million and Baht 25,139 million or 6.4 % and 6.6 % of total assets, respectively. Details are as follows:

Unit: Baht million

Type	Net Book Value	
	December 31, 2017	December 31, 2018
Right Acquired	91	142
Supplier Contract and relationships	5,626	5,632
Software Licenses	132	239
Technology License and Knowhow	7,075	8,340
Customer Contracts and Relationships	3,040	7,114
Trade Name and Trademarks	1,185	2,737
Chemical Exchange Contract	228	209
Capitalised development expenditure	649	727
<b>Total Book Value of Intangible Assets</b>	<b>18,027</b>	<b>25,139</b>

### Investments

Indorama Ventures PCL operates as a holding company; therefore our main assets are the investments. As of December 31, 2017 and December 31, 2018, we had net book value of our investments in subsidiaries as stated in our separate financial statement under the cost method equal to Baht 65,567 million and Baht 66,582 million or 50.7% and 42.7% of total assets in our separate financial statement, respectively. Details are as follows:

Unit: Baht million

Subsidiaries <sup>1</sup>	Ownership Interest <sup>2</sup> (Direct) (%)	Net Book Value of Investment as of	
		December 31, 2017	December 31, 2018
Indorama Petrochem Ltd.	99.99	7,944	7,944
Indorama Holdings Ltd.	99.81	2,001	2,001
Indorama Polymers PCL	72.60	7,220	7,220
Indorama Polyesters Industries PCL	64.94	1,474	1,474
TPT Petrochemicals PCL	99.97	5,182	5,182
IVL Belgium N.V.	99.99	122	-
Indo Polymers Mauritius Limited	100.00	2	2
Indorama Ventures Global Services Limited	99.99	41,621	42,758
<b>Total Book Value</b>		<b>65,567</b>	<b>66,582</b>

**Remarks:** <sup>1</sup> Only companies which are held directly by Indorama Ventures PCL

<sup>2</sup> As at December 31, 2018







### Trademarks in connection with our business

The Company, subsidiaries and affiliates use a number of trademarks, trade names and service marks in connection with the business. We market our products under various brand names, which are registered in various countries.

The Indorama wordmark does not belong to us. We are a part of an informal Indorama Group, which consists of three independently managed associate groups, namely ourselves, the Sri Praksh Lohia Group in Indonesia and the Om Prakash Lohia Group in India. The Indorama Group was founded by late Mr. Mohan Lal Lohia in 1976 in Indonesia, and each of the groups is currently managed by one of Mr. MohanLal Lohia's sons. We have a non-exclusive license for its use pursuant to a License Agreement with Lohia Global Holdings Limited, a company owned by Ms. Shruti Lohia, a daughter of Mr. Sri Praksh Lohia. The Sri Praksh Lohia Group and the Om Prakash Lohia Group also use the Indorama wordmark.

As of 31<sup>st</sup> December 2018, the Company, subsidiaries and affiliates have approximately 114 trademarks registered with the national/regional trademark office in the counties where IVL invested and/or have businesses. Out of the 114 trademarks, 20 marks, i.e. "INDORAMA VENTURES", "RAMAPET", etc., are managed by the head office of the Company in Thailand. Some of the key trademarks of the Company are as below:

	RAMAPET	TREVIRA
DIOLEN		
FiberVisions		Glanzstoff
BIO RAMAPET	PLYTEC	INOV

### Patent

As of 31<sup>st</sup> December 2018, the Company, subsidiaries and affiliates have approximately 533 patents registered with the national/regional patent office worldwide. Below is the information of Patents as of 31<sup>st</sup> December 2018.

Businesses	Number of Patents
Feedstock and PET Business	78
Fibers Business	454
Wool Business	1
<b>Total</b>	<b>533</b>

### Long Term Lease Agreements

As at 31 December 2018, the Company has entered into certain lease agreements for a period over 3 years for business purposes. The following summarizes the long-term lease agreements:

#### PET Business

Lessee	Details of Lease Assets	Purpose of Lease	Lessor	Expiration
<b>Petform (Thailand) Ltd.</b>	3,850 square meters	Packaging Facility	Industrial Estate Authority of Thailand	8 October 2042
<b>Indorama Ventures Packaging (Myanmar) Limited</b>	15,124 square meters	Packaging Facility	Myanmar Japan Thilawa development Ltd.	4 June 2064
<b>AlphaPet, Inc.</b>	161,874.26 square meters	PET Facility	BP Amoco Chemical Company	31 August 2027
<b>Indorama Ventures Polymers Mexico S.de R.L de C.V</b>	361,683.09 square meters	PET Facility	Indorama Ventures Polycom S.de R.L de C.V	Upon the termination of agreement
<b>Indorama Ventures EcoMEX, S. de R.L. De C.V.</b>	46,538 square meters	PET Facility	IVL Holding, S.de R.L. de C.V.	3 February 2022
<b>UAB Orion Global Pet</b>	47,651 square meters	PET Facility	Klaipeda Free Economic Zone Management Company UAB	8 June 2098
<b>Indorama Ventures Europe B.V.</b>	478,640 square meters	PET & PTA Facility	Port of Rotterdam	28 February 2093

Lessee	Details of Lease Assets	Purpose of Lease	Lessor	Expiration
<b>Indorama Ventures Poland Sp.z.o.o.</b>	79,093 square meters	PET Facility	Ministry of Treasury, the Government of Poland	4 December 2089
<b>Guangdong IVL PET Polymer Co., Ltd.</b>	136,782.60 square meters 12,529.10 square meters 4,828.38 square meters	PET Facility	Government of the People's Republic of China	6 February 2057 28 November 2052 18 September 2061
<b>Indorama PET (Nigeria) Ltd.</b>	15,000 square meters	PET Facility	Eleme Petrochemicals Co., Ltd.	31 December 2025
<b>Indorama Ventures Packaging (Nigeria) Ltd.</b>	10,000 square meters	Packaging Facility	Eleme Petrochemicals Co., Ltd.	31 December 2025
<b>Indorama Ventures Packaging (Ghana) Ltd.</b>	2,388 square meters 1,190 square meters	Packaging Facility	Davenport Developers Ltd.	31 March 2024 31 July 2026
<b>Indorama Ventures Packaging (Philippines) Corporation</b>	4,335 square meters 4,099 square meters	Packaging Facility	Southern Luzon Int'l Business Park Corp.	31 August 2023 31 March 2023
<b>PT.Indorama Polypet Indonesia</b>	47,580 square meters 5,690 square meters 10,100 square meters 165 square meters 10,440 square meters 1,720 square meters 1,630 square meters 910 square meters	PET Facility	Government of the Republic of Indonesia	13 June 2034 21 September 2034 13 June 2034 31 January 2034 24 September 2026 24 September 2026 24 September 2026 24 September 2026
<b>Indorama Ventures Adana PET Sanayi Anonim Sirketi</b>	33,255 square meters	PET Facility	Advansa Sasa Polyester Sanayi A.S.	30 September 2055
<b>IVL Dhunseri Petrochem Industries Private Ltd.</b>	140,911.54 square meters 170,939.21 square meters 1,092.65 square meters 10,845.57 square meters 10,845.57 square meters	PET Facility	Haldia Development Authority  Haldia Riverside Estates Limited	13 May 2088 18 August 2101 11 February 2099 9 February 2098 27 August 2045
<b>Indorama Ventures Polimeros S.A.</b>	853,389 square meters	PET Facility	Suape-Complexo Industrial	5 March 2055

**Polyester Fiber and Yarn Business**

<b>Lessee</b>	<b>Details of Lease Assets</b>	<b>Purpose of Lease</b>	<b>Lessor</b>	<b>Expiration</b>
<b>Indorama Polyester Industries Pcl.</b>	283,794 square meters	Polyester & Yarn Facility	<b>Industrial Estate Authority of Thailand</b>	12 May 2038
<b>ES FiberVision (Thailand) Co.,Ltd.</b>	32,356 square meters	Polyester & Yarn Facility	<b>Industrial Estate Authority of Thailand</b>	14 December 2044
<b>PT.Indorama Polychem Indonesia</b>	83,164 square meters	Polyester & Yarn Facility	<b>Government of the Republic of Indonesia</b>	18 December 2043
	20,160 square meters			18 December 2043
	3,394 square meters			2 October 2043
	4,480 square meters			2 October 2043
	98,380 square meters			2 October 2043
	14,816 square meters			2 October 2043
	39,000 square meters		<b>PT Indorama Synthetics TBK (PT IRS)</b>	December 2026
<b>PT.Indorama Ventures Indonesia</b>	8,206 square meters	Polyester & Yarn Facility	<b>Government of the Republic of Indonesia</b>	7 April 2028
	240,051 square meters			4 October 2033
	26,575 square meters			7 April 2028
	1,913 square meters			13 November 2042
<b>PT.Indorama Polyester Industries Indonesia</b>	40,840 square meters	Polyester & Yarn Facility	<b>Government of the Republic of Indonesia</b>	25 May 2025
<b>FiberVisions Manufacturing Company</b>	598.11 square meters	Polyester & Yarn Facility	<b>GCC Partners, LLC</b>	30 November 2020
<b>FiberVisions (China) Textile Products Ltd.</b>	44,946.86 square meters	Polyester & Yarn Facility	<b>Government of the People's Republic of China</b>	17 January 2045
<b>FiberVisions Products, Inc.</b>	69,589.74 square meters	Polyester & Yarn Facility	<b>Athen-Clarke County Industrial Development Authority</b>	1 December 2020
<b>ES FiberVisions (Suzhou) Co.,Ltd.</b>	16,000 square meters	Polyester & Yarn Facility	<b>FiberVisions (China) Textile Products Ltd.</b>	30 April 2033
<b>Wellman International Ltd.</b>	46,545 square meters	Polyester & Yarn Facility	<b>MJR Recycling B.V.</b>	31 December 2020
	2,197 square meters		<b>Swanenberg Beheer B.V.</b>	30 October 2020

Lessee	Details of Lease Assets	Purpose of Lease	Lessor	Expiration
<b>Wellman France Recyclage S.A.S</b>	32,670 square meters	Bottle Recycling Plant	<i>Societe Albertus</i>	31 December 2022
<b>PHP Fibers GmbH</b>	192 square meters 118,570 square meters	Polyester & Yarn Facility	<i>Mainsite GmbH &amp; Co.KG</i>	Upon the termination of agreement
<b>Safe Tweave Inc.</b>	646 square meters 13,935.46 square meters	Polyester & Yarn Facility	<i>Glanzstoffhaus PHP Fibers Inc.</i>	31 December 2017 Upon the termination of agreement
<b>Performance Fibers (Kaiping) Co., Ltd.</b>	98,157 square meters	Polyester & Yarn Facility	<i>Government of the People's Republic of China</i>	30 October 2046
<b>Performance Fibers (Kaiping) No.2 Co., Ltd.</b>	44,422 square meters	Polyester & Yarn Facility	<i>Government of the People's Republic of China</i>	11 November 2060
<b>Performance Fibers (Kaiping) No.3 Co., Ltd.</b>	35,482.40 square meters	Polyester & Yarn Facility	<i>Government of the People's Republic of China</i>	11 June 2066
<b>Shenma-PHP (Pingdingshan) Air BagYarn Manufacturing Co.,</b>	53,328 square meters	Polyester & Yarn Facility	<i>Government of the People's Republic of China</i>	26 January 2061
<b>Glanzstoff Industries (Qingdao) Co.,Ltd</b>	7,668 square meters	Polyester & Yarn Facility	<i>Qingdao Ruishengyuan Machinery Co.,Ltd</i>	29 November 2026
<b>Società Industriale Cremonese SICREM s.p.a.</b>	72,000 square meters	Polyester & Yarn Facility	<i>Hypo Vorarlberg Leasing SPA</i>	6 December 2029
<b>Glanzstoff-Bohemia s.r.o.</b>	26,410 square meters 1,123 square meters	Polyester & Yarn Facility	<i>ZEVYP - pozemky s.r.o. Konečný Zdeněk,</i>	Upon the termination of agreement
<b>Textilcord Steinfurt S.A.</b>	1,428.30 square meters	Polyester & Yarn Facility	<i>City of Steinfurt</i>	30 September 2096
<b>Glanzstoff Longlaville S.A.S</b>	301,814.55 square meters	Polyester & Yarn Facility	<i>Glanzstoff Services S.A.S</i>	Upon the termination of agreement
<b>Hubei Gold Dragon Nonwoven Fabrics Co.,Ltd</b>	33,229.99 square meters 2,300 square meters	Polyester & Yarn Facility	<i>Government of the People's Republic of China Jingmen High-Tech Industrial Development Co.,Ltd.</i>	14 July 2024 31 December 2024

Lessee	Details of Lease Assets	Purpose of Lease	Lessor	Expiration
<b>Avgol India Private Limited</b>	21,329 square meters	Polyester & Yarn Facility	P & G	14 February 2027
<b>Avgol Ltd.</b>	180 square meters	Office	Avraham Rubinstein & Co. Contracting Company Ltd	14 February 2020

### Feed Stock Business (PTA & EG/EO)

Lessee	Details of Lease Assets	Purpose of Lease	Lessor	Expiration
<b>TPT Petrochemicals</b>	240,000 square meters	PTA Facility	Industrial Estate Authority of Thailand	6 February 2022
<b>PCL</b>	59,566 square meters			10 November 2039
<b>Indorama Petrochem Limited</b>		Piping System	Eastern Fluid Transport Co., Ltd.	8 January 2021
		PX and acetic acid Storage	Thai Tank Terminal Limited	7 December 2018
<b>PT.Indorama Petrochemicals</b>	76,090 square meters	PTA Facility	Government of Indonesia	13 June 2034
	19,850 square meters			18 August 2034
	15,710 square meters			21 September 2034
	47,090 square meters			13 June 2034
	1,720 square meters			24 September 2026
	75,000 square meters		PT.Pelindo	18 October 2038
<b>Indorama Ventures (Oxide &amp; Glycols) LLC U.S.(D.E.)</b>	3,900,562.56 square meters	EG/EO Facility	Celanese Ltd.	5 December 2098
<b>Indorama Ventures Xylenes &amp; PTA LLC</b>	8,305.53 square meters	Warehouse	Trinity Warehousing and Distribution	Upon the termination of agreement
	1,046.83 square meters	Warehouse	Johnson Bates & Legg, Inc.	
<b>Indorama Ventures Portugal PTA-Unipessoal LDA.</b>	146,849 square meters	PTA Facility	IAPMEI	6 August 2027

**Others (Holding Business, Trading & Service Business)**

<b>Lessee</b>	<b>Details of Lease Assets</b>	<b>Purpose of Lease</b>	<b>Lessor</b>	<b>Expiration</b>
<b>Beverage Plastic (Holding) Limited</b>	18,967 square meters	Warehouse & Office	Silverwood Business Park Limited	20 March 2031
<b>TTI GmbH</b>	1,568 square meters	Technical Center	Immomeile	Upon the termination of agreement
	1,193 square meters	Laboratory	Immomeile	
	860 square meters	Storage	Immomeile	
	110 square meters	Storage	Immomeile	
	600 square meters	Storage	Buenger	
<b>Indorama Ventures Portugal Utility, Unipessoal Lda.</b>	21,500 square meters	thermoelectric plant	IAPMEI	6 August 2027
<b>Tereftailicos Industries Quimicas Ltda.</b>	99,007.40 square meters	Factory	M&G Fibras e Resinas Ltda.	Upon the termination of agreement
<b>Schoeller Sussen GmbH</b>	1,282.85 square meters	Office	Schoeller Verwaltungs GmbH (Albers & Co AG)	Upon the termination of agreement

**Thai Board of Investment Tax Incentives**

Under the Industrial Investment Promotion Act B.E. 2520, the Company and certain subsidiaries incorporated in Thailand have been Granted privileges by the Board of Investment at various times relating to manufacturing of worsted wool yarn, wool top, polyester fiber, PTA, PET resin, PET preforms and closures, amorphous resin and the operation of the TPT Petrochemicals cogeneration plant (the “promoted operations”). The privileges Granted, subject to compliance with the terms and conditions prescribed in the relevant promotional certificates, include:

- (a) exemption from payment of import duty on machinery approved by the Board of Investment;
- (b) exemption from payment of income tax on net profit from promoted operations for a period of eight years from the date on which income is deemed to be first derived from such operations;
- (c) a 50% reduction in the normal income tax rate on the net profit derived from promoted operations for a period of five years, commencing from the expiry date in (b) above;
- (d) a five-year carry forward period for losses for tax purposes from promoted operations during the period in (b) above;

- (e) income exclusions and additional deductions in computing the taxable income for promoted operations during the period in (b) above;
- (f) exemption from income tax on dividend paid to the shareholders from the profit of the promoted operations during the corporate income tax exemption period; and
- (g) double deduction of the cost of transportation, electricity and water supply for corporate income tax purposes for a period of ten years, from the date on which income is deemed to be first derived from the promoted operations.

Moreover, other non Thai subsidiaries of the Company operating in various jurisdictions may have their own incentives from the local Government.

The table below summarizes the expiry dates of our BOI tax incentives got by the subsidiary as of 31<sup>st</sup> December 2018.

Subsidiary	Year of Expiry for Full Exemption from Tax	Year of Expiry for 50% Reduction in Tax
Asia Pet (Thailand) Ltd. (BOI Certificate No. 5089(2)/2556)	2021	-
Indorama Polymers PCL (BOI Certificate No. 5090(2)/2556)	2021	-
Indorama Petrochem Ltd. (BOI Certificate No. 1123(2)/2547)	2014	2019
Indorama Petrochem Ltd. (BOI Certificate No. 60-0436-0-00-0-2)	-	-
Indorama Petrochem Ltd. (BOI Certificate No. 61-0867-1-00-1-2)	-	-
TPT Petrochemical PCL (BOI Certificate No. 1121(2)/2549)	2014	2019
TPT Petrochemical PCL (BOI Certificate No. 1965/Or.Or./2552)	-	-
Indorama Polyester Industries PCL (BOI Certificate No. 1271(2)/2552)	2017	2022
Indorama Polyester Industries PCL (BOI Certificate No. 1969(2)/2554)	2021	2026
Petform Thailand Ltd (BOI Certificate No. 1764 (2)/2546)	2012	-
Petform Thailand Ltd (BOI Certificate No. 1766 (2)/2548)	2014	-
Petform Thailand Ltd (BOI Certificate No. 1971 (2)/2548)	2014	-



Subsidiary	Year of Expiry for Full Exemption from Tax	Year of Expiry for 50% Reduction in Tax
Petform Thailand Ltd (BOI Certificate No. 2170 (2)/2548)	2014	-
Petform Thailand Ltd (BOI Certificate No. 1853 (2)/2550)	2016	-
Petform Thailand Ltd (BOI Certificate No. 1334 (2)/2550)	2015	-
Petform Thailand Ltd (BOI Certificate No. 1095 (2)/2554)	2020	-
Petform Thailand Ltd (BOI Certificate No. 1057 (2)/2553)	2018	-
Petform Thailand Ltd (BOI Certificate No. 1812 (2)/2552)	2017	-
Petform Thailand Ltd (BOI Certificate No. 1414 (2)/2553)	2018	-
Petform Thailand Ltd (BOI Certificate No. 1811 (2)/2552)	2018	-
Petform Thailand Ltd (BOI Certificate No. 2556 (2)/2554)	2020	-
Petform Thailand Ltd (BOI Certificate No. 1213 (2)/2555)	2020	2025
Petform Thailand Ltd (BOI Certificate No. 2142 (2)/2555)	2020	2025
Petform Thailand Ltd (BOI Certificate No. 5137(2)/2556)	2021	-
Petform Thailand Ltd (BOI Certificate No. 5138(2)/2556)	2021	-
Petform Thailand Ltd (BOI Certificate No. 5139(2)/2556)	2021	-
Petform Thailand Ltd (BOI Certificate No. 2094(2)/2556)	2021	2026
Petform Thailand Ltd (BOI Certificate No. 1199(2)/2557)	2022	-
Petform Thailand Ltd (BOI Certificate No. 2453(2)/2557)	2023	-
Petform Thailand Ltd (BOI Certificate No. 2435(2)/2557)	2023	-
Petform Thailand Ltd (BOI Certificate No. 2587(2)/2557)	2025	-

Subsidiary	Year of Expiry for Full Exemption from Tax	Year of Expiry for 50% Reduction in Tax
Indorama Ventures Global Services Ltd (BOI Certificate No. 1236/2557)	-	-
Indorama Ventures Global Services Ltd (BOI Certificate No. 59-0783-1-00-0-0)	-	-
ES FiberVisions (Thailand) Ltd (BOI Certificate No. 2412(2)/2557)	2025	2030
Indorama Holdings Ltd (BOI Certificate No. 2111 (1)/2553)	2019	2024
Indorama Holdings Ltd (BOI Certificate No. 1289 (2)/2555)	2020	-

***Policy on Investment in Subsidiaries and Associated Companies and Policy on Management of Subsidiaries and Associated Companies***

The Company will have investments in subsidiaries and associated companies aggregating not less than 75 percent of the Company's total investment in securities. In case, if the Company wishes to make any material change to the policy or scope of investments, such as lowering the proportion of investment in subsidiaries and associated companies in relation to the Company's total investments in securities to less than 75 percent, the Company will obtain prior approval from the shareholders meeting.

The Company has a policy on investment in subsidiaries and associated companies of the Company that the Company will invest in business with a high potential of growth and long-term profitability. Moreover, the Company will send at least one of its representative to be a director of such subsidiaries and associated companies; such representative might be the Chairman of the Board of Directors, Chief Executive Officer, Managing Director, directors, the high level managers of the Company or any third person who has the qualifications and experience suitable for such business with no conflict of interest directly with the business of those subsidiaries. Such representative shall manage and administer the business of such subsidiaries according to the regulations and procedures provided in the Articles of Association of the Company and of such subsidiaries and relevant laws and recommendation of the IVL parent company.

## **5. Legal Disputes**

As of 31<sup>st</sup> December 2018, there is no material litigation against the Company or its subsidiaries which could have a negative effect on our assets exceeding 5% of shareholder's equity. In addition, there is no lawsuit, which could have a significant effect on our business.

## 6. General Information and Other Information

### General Information

Name : Indorama Ventures Public Company Limited  
 Symbol : IVL  
 Head Office : 75/102 Ocean Tower 2, 37<sup>th</sup> Floor, Soi Sukhumvit 19 (Wattana)  
 Asoke Road, Klongtoey Nua, Wattana, Bangkok 10110, Thailand  
 Tel: 0-2-661-6661 Fax: 0-2-661-6664-5  
[www.indoramaventures.com](http://www.indoramaventures.com)  
 Type of Business : Holding Company  
 Company Registration No. : 0107552000201  
 Registered Capital : Baht 5,666,010,449 divided into 5,666,010,449 common shares  
 of par value at Baht 1  
 Paid-Up Capital : Baht 5,614,551,908 divided into 5,614,551,908 common shares  
 of par value at Baht 1

### References

Share Registrar : Thailand Securities Depository Company Limited  
 93 Ratchadapisek Road, Dindaeng, Dindaeng, Bangkok 10400,  
 Thailand  
 Tel: 0-2-009-9999 Fax: 0-2-009-9991  
 Debenture Registrar : Bangkok Bank Public Company Limited  
 333 Silom Road, Silom, Bangrak, Bangkok 10500, Thailand  
 Tel: 0-2-230-1136 Fax: 0-2-626-4545-6  
 Debenture Registrar : Siam Commercial Bank Public Company Limited  
 (For IVL Debenture No. 1/2015 Tranche 1 & 2) 1060 SCB Chidlom Tower 2, 3<sup>rd</sup> Floor,  
 New Petchburi Road, Makkasan, Ratchathewi,  
 Bangkok 10400, Thailand  
 Tel: 0-2-256-2339 Fax: 0-2-256-2406  
 Debenture Registrar : Krungthai Bank Public Company Limited  
 (For IVL Debenture No. 2/2015) 35 Sukhumvit Road, Klongtoey Nua, Wattana,  
 Bangkok 10110, Thailand  
 Tel: 0-2-298-0830 Fax: 0-2-298-0835

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Debenture Holders' Representative	:	Bank of Ayudhya Public Company Limited 1222 Rama III Road, Bang Phongphang, Yannawa, Bangkok 10120, Thailand Tel: 0-2-296-3582      Fax: 0-2-296-2202
Auditor	:	KPMG Phoomchai Audit Limited 195 Empire Tower, 50 <sup>th</sup> – 51 <sup>st</sup> Floor, South Sathorn Road, Yannawa, Sathorn, Bangkok 10120, Thailand Tel: 0-2-677-2000      Fax: 0-2-677-2222
Legal Advisor	:	The Capital Law Office Limited 44 Smooth Life Tower, 18 <sup>th</sup> Floor, North Sathorn Road, Silom, Bangrak, Bangkok, 10500, Thailand Tel: 0-2-633-9088      Fax: 0-2-633-9089

## Investments of the Company

As of 31 December 2018

<b>EG&amp;EO Business</b>					
<b>No.</b>	<b>Company Name/Address</b>	<b>Country</b>	<b>Type of Shares</b>	<b>Shares Issued</b>	<b>Shareholding</b>
1	<b>Indorama Ventures (Oxide &amp; Glycols) LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1 847 943 3100 Fax: +1 847 943 3196	USA	(Membership Interest)	-	99.99%
<b>Ethylene Cracker Business</b>					
<b>No.</b>	<b>Company Name/Address</b>	<b>Country</b>	<b>Type of Shares</b>	<b>Shares Issued</b>	<b>Shareholding</b>
1	<b>Indorama Ventures Olefins LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1 337 502 4678 Fax: N/A	USA	(Membership Interest)	-	90.40%
<b>PTA Business</b>					
<b>No.</b>	<b>Company Name/Address</b>	<b>Country</b>	<b>Type of Shares</b>	<b>Shares Issued</b>	<b>Shareholding</b>
1	<b>TPT Petrochemicals Public Company Limited</b> 75/116-117, Ocean Tower 2, 41 <sup>st</sup> Floor, Soi Sukhumvit 19 (Wattana), Sukhumvit Road, Klongtoey Nuer, Wattana, Bangkok 10110, Thailand Tel: +66 2 661 6661 Fax: +66 2 661 6664 – 5	Thailand	Common Share	492,500,000	99.97%
2	<b>PT. Indorama Petrochemicals</b> Graha Irama, 16th Floor, Jalan H R Rasuna Said, Blok X-1, Kav. 1-2, Kuningan Timur, Setiabudi, Jakarta Selatan 12950, Indonesia Tel: +62 21 526 1555 Fax: +62 21 526 4436	Indonesia	Common Share Class A Class B Class C Class D Class E Class F	2,514,400 1,833,743 166,257 50,000 200,000 250,000 14,400	73.99%
3	<b>Indorama Ventures PTA Montreal LP.</b> 10200 rue Sherbrooke E., Montreal-Est, Quebec H1B 1B4, Canada Tel: +1 514 645 7887(229) Fax: +1 514 645 9115	Canada	(Partnership Interest)	290,000,000	99.99%
4	<b>Indorama Ventures Portugal PTA - Unipessoal, LDA.</b> ZILS Zona 2, Lote 2E1, Monte Feio, 7520-064 Sines, Portugal Tel: +351 269 189 000 Fax: +351 269 189 099	Portugal	Quota	1	99.99%
<b>PTA &amp; PET Business</b>					
<b>No.</b>	<b>Company Name/Address</b>	<b>Country</b>	<b>Type of Shares</b>	<b>Shares Issued</b>	<b>Shareholding</b>
1	<b>Indorama Ventures Europe B.V.</b> Markweg 201, 3198NB Europoort Rotterdam, Netherlands Tel: +31 181 285 400 Fax: +31 181 285 405	Netherlands	Common Share	100	99.99%

2	<b>Indorama Petrochem Limited</b> 75/93, Ocean Tower 2, 35 <sup>th</sup> Floor, Soi Sukhumvit 19 (Wattana), Sukhumvit Road, Klongtoey Nuer, Wattana, Bangkok 10110, Thailand Tel: +66 2 661 6661 Fax: +66 2 661 6664 – 5	Thailand	Common Share	1,014,616,651	99.99%
3	<b>Corpus Christi Polymers LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: N/A Fax: N/A	USA	(Membership Interest)	-	33.33%

**PTA & PET & Purified Isophthalic Acid Business**

No.	Company Name/Address	Country	Type of Shares	Shares Issued	Shareholding
1	<b>Indorama Ventures Quimica S.L.U.</b> Poligono Industrial Guadarranque, 0 S/N, 11360 San Roque, Cadiz, Spain Tel: +34 956 671 000 Fax: +34 956 671 127	Spain	Common Share	6,000	99.99%

**PTA & Paraxylene & NDC Business**

No.	Company Name/Address	Country	Type of Shares	Shares Issued	Shareholding
1	<b>Indorama Ventures Xylenes &amp; PTA LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1 302 636-5401 Fax: +1 302 636-5454	USA	(Membership Interest)	-	99.99%

**PET Business**

No.	Company Name/Address	Country	Type of Shares	Shares Issued	Shareholding
1	<b>Indorama Polymers Public Company Limited</b> 75/102, 103 Ocean Tower 2, 37 <sup>th</sup> Floor, Soi Sukhumvit 19 (Wattana), Asoke Road, Klongtoey Nuer, Wattana, Bangkok 10110, Thailand Tel: +66 2 661 6661 Fax: +66 2 661 6664 – 5	Thailand	Common Share	1,382,197,870	99.91%
2	<b>Asia Pet (Thailand) Limited</b> 75/102 Ocean Tower 2, 37 <sup>th</sup> Floor, Soi Sukhumvit 19 (Wattana), Asoke Road, Klongtoey Nuer, Wattana, Bangkok 10110, Thailand Tel: +66 2 661 6661 Fax: +66 2 661 6664 – 5	Thailand	Common Share	45,000,000	99.90%
3	<b>Guangdong IVL PET Polymer Company Limited</b> No.1 Meihua Road, Shuikou Town, Kaiping City, Guangdong, People's Republic of China Tel: +86 750 220 9680 Fax: N/A	China	(Capital Contribution)	-	99.91%
4	<b>UAB Orion Global pet</b> Metal G.16, Klaipeda, Republic of Lithuania, LT-94102 Tel: +370 46 300749 Fax: +370 46 314323	Lithuania	Common Share	776,880	99.91%

5	<b>Indorama PET (Nigeria) Limited</b> East West Expressway, Eleme, Port Harcourt, Rivers State, Nigeria Tel: +234 (1) 2793841 Fax: +234 (1) 2793842	Nigeria	Common Share	450,000,000	89.92%
6	<b>PT. Indorama Polypet Indonesia</b> JL. Raya Anyar Km.121, Kel. Kepuh, Kec. Ciwandan, Cilegon 42445 (Banten), Indonesia Tel: +62 254 602300 Fax: +62 254 602940	Indonesia	Common Share	3,500	99.99%
7	<b>Indorama Ventures Corlu PET Sanayi Anonim Sirketi</b> Karamahmet Mahallesi, Avrupa Serbest Bölgesi, 3. Sokak No: 2 Ergene/Tekirdag - 59860, Turkey Tel: +90 282 691 1100 / 207 Fax: +90 282 691 1008	Turkey	Common Share	16,217,649	99.99%
8	<b>Indorama Ventures Poland Sp. z o.o.</b> ul. Krzywa Gora 19, 87-805 Wloclawek, Poland Tel: +4854 416 6442 Fax: +4854 416 6449	Poland	Common Share	993,988	99.99%
9	<b>Indorama Ventures Ecomex, S. de R.L. de C.V.</b> Carretera Libre a Colotlan 6800. Colonia Extramuros. Zapopan, Jalisco, Mexico Tel: +5233 1561 3732 Fax: N/A	Mexico	Equity Quota Class I	2	51.00%
10	<b>Indorama Ventures Polymers Mexico, S. de R.L. de C.V.</b> Avenida Prolongación Paseo de la Reforma 1015, Torre A piso 2, Colonia Santa Fe Cuajimalpa, CP 05348, Delegación Cuajimalpa de Morelos, Ciudad de México, México Tel: +52 55 9177 5700 Fax: +52 55 5292 4919	Mexico	Equity Quota Class I	2	99.99%
11	<b>Alphapet, Inc.</b> 1301 Finley Island Road, Decatur, Alabama, AL35601, USA Tel: +1 256 308 1180 Fax: +1 256 341 5926	USA	Common Share	4,400	99.99%
12	<b>Auriga Polymers Inc.</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808 USA Tel: +1-877-738-7527 Fax: +1-980-233-6602	USA	Common Share	5,000	99.99%
13	<b>Starpet Inc.</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808 USA Tel: +1-336-672-0101 Fax: +1-336-672-0904	USA	Common Share	5,000	99.99%



14	<b>IVL Dhunseri Petrochem Industries Private Limited</b> Dhunseri House, 4A, Woodburn Park, Kolkata- 700020, P.S. Bhawanipur, India Tel: +91 33 2283 6128 – 33 Fax: +91 33 2283 6056	India	Common Share	40,000,000 42,500,000	50.00%
15	<b>Indorama Ventures Polimeros S.A.</b> 'Rod. PE-60, Km 10, s/nº - Engenho Massangana, TDR - Sul. Complexo Industrial Portuário Suape. 'CEP: 55590-000 - Ipojuca – PE, Brazil Tel: +91 33 2283 6128 – 33 Fax: +91 33 2283 6056	Brazil	Common Share	1,555,165,727	99.99%
16	<b>Egyptian Indian Polyester Company</b> 10 Nehru St., 5th Floor, Flat no.18 Behind Merryland Park, Heliopolis Cairo - 11341, Egypt. Tel: +202 225 88 991 Fax +202 22588945	Egypt	Common Share	570,000	49.99%
17	<b>Wellman Neufchateau Recyclage S.A.</b> Chemin de Grety 88300 Rebeuville, France Tel: N/A Fax N/A	France	Common Share	320,866	99.99%
18	<b>Indorama Loop Technologies, LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808 USA. Tel: N/A Fax: N/A	USA	(Membership Interest)	-	50.00%

**Packaging Business**

No.	Company Name/Address	Country	Type of Shares	Shares Issued	Shareholding
1	<b>Petform (Thailand) Limited</b> 85 Moo 11, Bangnga-Thaklong Road, Khao Samorkorn Sub-district, Thawung District, Lopburi Province, 15180 Thailand Tel: +66 36 489 116 Fax: +66 36 489 115,117	Thailand	Common Share	7,500,000	59.94 %
2	<b>Beverage Plastics Limited</b> Silverwood Business Park, 70 Silverwood Road, Lurgan, Craigavon, County Armagh, BT66 6LN, Northern Ireland Tel: +44 283 831 1800 Fax: +44 283 831 1888	Northern Ireland	Common Share	600,000	75.36%
3	<b>Indorama Ventures Packaging (Nigeria) Limited</b> Eleme Petrochemicals Complex, East-West Expressway, Eleme, Rivers State, Nigeria Tel : +234 (1) 2793841 Fax: +234 (1) 2793842	Nigeria	Common Share	150,000,000	99.99%

4	<b>Indorama Ventures Packaging (Ghana) Limited</b> Plot 234 Meridian Rd. COMM.2 Accra, Greater Accra, BOX CO PMB 350 TEMA GA/R, Ghana Tel: +233 266082249 Fax: N/A	Republic of Ghana	Common Share	4,649,215	99.99%
5	<b>Indorama Ventures Packaging (Philippines) Corporation</b> Building 1, Southern Luzon Complex, Barangay Batino, Calamba City, Laguna, Philippines Tel: +63 495 303 592 / +63 495 340 036 Fax: N/A	Philippines	Common Share	1,075,005	99.99%
6	<b>Indorama Ventures Packaging (Myanmar) Limited</b> Lot No. A11-1, Thilawa Special Economic Zone A, Yangon Region, Myanmar Tel: +95-12309022 Fax: N/A	Myanmar	Common Share	3,516,322	99.91%
7.	<b>Indorama Ventures Packaging (India) Private Limited</b> C 524, Defence Colony, New Delhi - 110024, Delhi, India Tel: +91 11 4163 0033 Fax: +91 11 2433 9075	India	Common Share	140,000	99.98%
8	<b>Medco Plast Co. for Packing &amp; Packaging systems (S.A.E.)</b> 3 Kambes st. - El Dokki, El Giza, Egypt Tel: +202 37481730 Fax: +202 37499685	Egypt	Common Share	4,950,000	73.99%

**Fibers Business**

No.	Company Name/Address	Country	Type of Shares	Shares Issued	Shareholding
1	<b>Indorama Polyester Industries Public Company Limited</b> 75/92, Ocean Tower 2, 35 <sup>th</sup> Floor, Soi Sukhumvit 19 (Wattana), Asoke Road, Klongtoey Nuer, Wattana, Bangkok 10110, Thailand Tel : +66 2 661 6661 Fax : +66 2 661 6664 – 5	Thailand	Common Share	2,202,850,000	99.49%
2	<b>ES Fibervisions (Thailand) Company Limited</b> 75/64, 65 Ocean Tower 2, 28 <sup>th</sup> Floor, Soi Sukhumvit 19 (Wattana), Asoke Road, Klongtoey Nuer, Wattana, Bangkok 10110, Thailand Tel : +66 2 661 6661 Fax : +66 2 661 6664 – 5	Thailand	Common Share	41,000,000	50.00%
3	<b>PT. Indorama Polychem Indonesia</b> JL. Desa Kembang Kuning, Kecamatan Jatiluhur, Purwakarta (Jawa Barat), Indonesia Tel : +62 264 207727 Fax : +62 264 211260	Indonesia	Common Share	70,000	99.99%

4	<b>PT. Indorama Ventures Indonesia</b> Desa Cihuni, RT/RW 002/004, Cihuni, Pagedangan, Tangerang, Banten, 15820 Indonesia Tel : +62 215 371111 Fax : +62 215 378811	Indonesia	Series A Shares Series B Shares	80,000 2,812,500	99.99%
5	<b>PT. Indorama Polyester Industries Indonesia</b> JL. Surya Lestari Kav. 1-16A, Kawasan Industry Surya Cipta, Desa Kutamekar, Kec Ciampel, Karawang, 41361, Jawa Barat, Indonesia Tel : +0267-440501 Fax: +0267-440764	Indonesia	Common Share	20,000	99.98%
6	<b>Trevira GmbH</b> Max-Fischer-Strasse 11, 86399 Bobingen, Federal Republic of Germany Tel : +49 8234 9688 2100 Fax: +49 8234 9688 5355	Germany	Common Share	25,300	99.99%
7	<b>PHP Fibers GmbH</b> Industrie Center Obernburg, 63784 Obernburg, Germany Tel: +49 6022 81 2552 Fax: +49 6022 81 31 2552	Germany	Common Share	25,001	80.00%
8	<b>Shenma-PHP (Pingdingshan) Air Bag Yarn Manufacturing Co., Ltd.</b> Pingdingshan City, Henan Province, People's Republic of China Tel: +49 6022 81 2552 Fax: +49 6022 81 31 2552	China	(Capital Contribution)	-	39.20%
9	<b>PHP Fibers Inc.</b> 300 Serrano Way, Scottsboro, AL 35768 , USA Tel: +1-256-218-4000 Fax: +1-256-218-4062	USA	Common Share	1,000	80.00%
10	<b>SafeTweave, Inc.</b> 302 Serrano Way, Scottsboro, AL 35769, USA Tel: +1-256-218-4000 Fax: +1-256-218-4062	USA	Common Share	1,000	80.00%
11	<b>FiberVisions A/S</b> Engdraget 22, Varde Denmark, DK-6800, Denmark Tel: +45 7994 2200 Fax: +45 7994 2201	Denmark	Class A Class B	122,949,441 29,117,600	99.99%
12	<b>FiberVisions (China) Textile Products Limited</b> No. 29 Heng Shan Rd., New District, Suzhou, People's Republic of China Tel: +86 512 6823 1099 Fax: +86 512 6823 0021	China	(Capital Contribution)	-	99.99%

13	<b>ES FiberVisions (Suzhou) Co., Ltd.</b> No. 29 Hengshan Rd. Suzhou New District 215011, China Tel: +86 512 6823 1099 Fax: +86 512 6823 0021	China	(Capital Contribution)	-	50.00%
14	<b>FiberVisions Manufacturing Company</b> The Corporation Trust Company, 1209 Orange St., Wilmington, Delaware 19801, USA Tel: +1 302 658-7581 Fax: +1 302 655-2480	USA	Common Share	100	99.99%
15	<b>FiberVisions Products, Inc.</b> CT Corporation System, 289 S. Culver Street, Lawrenceville, Georgia 30046 USA Tel: +1 800 241 8922 Fax: +1 404 888 7795	USA	Common Share	25,000	99.99%
16	<b>Wellman France Recyclage S.A.S.</b> Zone Industrielle de Regret 55100 Verdun, France Tel: +33 (0) 971 002 005 Fax: +33 (0) 329 843 104	France	Common Share	500	99.99%
17	<b>Wellman International Limited</b> Mullagh, Kells, Co.Meath, A82 NN93, Ireland Tel: +353 46 9280200 Fax: +353 46 9280300	Ireland	Common Share	1,100,850	99.99%
18	<b>Performance Fibers (Kaiping) Company Limited</b> 3 Hongqiao Road, Changsha, Kaiping, Guangdong Province, People's Republic of China Tel: +86 750 2278000 Fax: +86 750 2218093	China	(Capital Contribution)	-	99.99%
19	<b>Performance Fibers (Kaiping) No.2 Company Limited</b> 1 Huan Cui Road West, Cuishan Lake New Region, Kaiping, Guangdong Province, People's Republic of China Tel: +86 750 2278000 Fax: +86 750 2218093	China	(Capital Contribution)	-	99.99%
20	<b>Performance Fibers (Kaiping) No.3 Company Limited</b> Land Lot JCR2016-57(Kaiping 14)B, west of Die Cui Da Road , north of Huan Cui West Road, Cuishanhu New District, Kaiping, Guangdong, People's Republic of China Tel: + (86) 750-2201707 Fax: + (86) 750-2218093	China	(Capital Contribution)	-	99.99%
21	<b>Glanzstoff Industries (Qingdao) Co., Ltd.</b> <ul style="list-style-type: none"> <li>No.1735 Maoshan Road, Sino-German Ecopark, Huangdao District, Qingdao, Shandong Province, People's Republic of China</li> </ul>	China	(Capital Contribution)	-	99.99%

	<ul style="list-style-type: none"> <li>Room 299, No.2877 Tuanjie Road, Huangdao District, Qingdao City, Shandong Province, People's Republic of China</li> </ul> Tel: +86 532 80987237 Fax: +86 532 80983559				
22	<b>Glanzstoff Longlaville S.A.S.</b> Pôle Europeen de Développement, 54810 Longlaville, France Tel: +33 3 82 44 80 00 Fax: +33 3 82 44 56 82	France	Common Share	3,037,323	99.99%
23	<b>Società Industriale Cremonese SICREM s.p.a.</b> Pizzighettone, Via G.B. Pirelli, 56, Italy Tel: +39 0372 738011 Fax: +39 0372 730001	Italy	Common Share	9,180,000	99.99%
24	<b>Textilcord Steinfurt S.A.</b> Rue Schwarzenhof, 34 L-8452 Steinfurt – GD, Luxembourg Tel: +352 399 8811 Fax: +352 399 881 213	Luxembourg	Common Share	1,000	99.99%
25	<b>Glanzstoff - Bohemia s.r.o.</b> Tereziňská 60, 41002 Lovosice, Czech Republic Tel: +420 416 575 111 Fax: +420 416 575 107	Czech Republic	Common Share	750	99.99%
26	<b>Winnsboro Fibres LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: + (256) 218-4006 Fax: +(256) 218-4017	USA	(Membership Interest)	-	99.99%
27	<b>Performance Fibers Operations Mexico, S. de R.L. de C.V</b> Av. de la Luz 77 Zona Industrial Benito Juárez, CP 76120, Querétaro, Qro., México Tel: +52 442 211 3000 Fax: N/A	Mexico	Equity Quota Class I	50,000	99.99%
28	<b>Huvis Indorama Advanced Materials, LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, U Tel: N/A Fax: N/A	USA	(Membership Interest)	-	50.00%
29	<b>Hubei Gold Dragon Nonwoven Fabrics Co., Ltd.</b> 236 Xinlong Road, High-Tech Industrial Development Zone, Jingmen, Hubei, 448000, China Tel: 86 724 650 3034 Fax: N/A	China	(Capital Contribution)	-	65.28%
30	<b>Avgol India Private Limited</b> Plot No. 184, Part of Plot No. 183 & 185, Sector - A, Mandideep Industrial Area, Mandideep, Dist. - Raisen – 462046, Madhya Pradesh, India Tel: 91 748 066 6602 Fax: N/A	India	Common Share	2,746,449	65.94%

31	<b>Avgol Rus LLC</b> Building 1 Druzhby Street, town of Uzlovaya, Tula Region, 301605, Russian Federation Tel: 74 872 710 653 Fax: N/A	Russia	(Membership Interest)	-	65.66%
32	<b>Avgol America Inc.</b> 178 Avgol Drive Mocksville, NC, 27028-2558, USA Tel: +1 336 936 2503 Fax: N/A	USA	Common Share	150,000	65.94%
33	<b>Avgol Distribution Company Inc.</b> 178 Avgol Drive Mocksville, NC, 27028-2558, USA Tel: +1 336 936 2503 Fax: N/A	USA	Common Share	3,000	65.94%
34	<b>Avgol Ltd.</b> 20 Lincoln st., Rubinstien House, Tel Aviv, 67134-12, Israel Tel: 972-3-906-1555 Fax: 972-3-9364376	Israel	Common Share	82,941,411	65.94%
35	<b>Kordarna Plus a.s.</b> No. 890, 696 74 Velká nad Velickou, Czech Republic Tel: N/A Fax: N/A	Czech Republic	Common Share	248,409,200	99.99%
36	<b>Glanzstoff Industries Mexico, S. de R.L. de C.V.</b> Av. de la Luz 77 Zona Industrial Benito Juárez, CP 76120, Querétaro, Qro. Mexico Tel: +52 442 211 3000 Fax: N/A	Mexico	Equity Quota Class I	50,000	99.99%

**Wool Business**

No.	Company Name/Address	Country	Type of Shares	Shares Issued	Shareholding
1	<b>Indorama Holdings Limited</b> 75/64, 65 Ocean Tower 2, 28 <sup>th</sup> Floor, Soi Sukhumvit 19 (Wattana), Asoke Road, Klongtoey Nuer, Wattana, Bangkok 10110, Thailand Tel: +66 2 661 6661 Fax: +66 2 661 6664 - 5	Thailand	Common Share	77,446,800	99.81%
2	<b>Schoeller GmbH &amp; Co KG</b> Politischer Gemeinde Hard, Austria Tel: 0043 5574 609 0 Fax: N/A	Austria	(Capital Contribution)	-	99.99%

3	<b>Schoeller Kresice s.r.o.</b> Prazska 98, 41148 Kresice, Czech Republic Tel: N/A Fax: N/A	Czech Republic	(Capital Contribution)	-	99.99%
<b>Holding Company Business</b>					
No.	Company Name/Address	Country	Type of Shares	Shares Issued	Shareholding
1	<b>Indorama Netherlands Cooperatief U.A.</b> Markweg 201, 3198NB Europoort, Rotterdam, Netherlands Tel: +31 181 285 400 Fax: +31 181 285 405	Netherlands	(Ownership Interest)	-	99.99%
2	<b>Indorama Netherlands B.V.</b> Markweg 201, 3198NB Europoort, Rotterdam, Netherlands Tel: +31 181 285 400 Fax: +31 181 285 405	Netherlands	Common Share	18,000	99.99%
3	<b>Beacon Trading (UK) Limited</b> 23 Northiam, Woodside Park, N 12 7ET, London, United Kingdom Tel: N/A Fax: N/A	United Kingdom	Common Share	320,000	99.81%
4	<b>Beverage Plastics (Holdings) Limited</b> Silverwood Business Park, 70 Silverwood Road, Lurgan Craigavon, Country Armagh, BT 66 6 LN, Northern Ireland Tel: +44 2838311800 Fax: +44 2838311888	Northern Ireland	Common Share Class A Class C	10,000 7,550 2,450	75.36%
5	<b>KP Equity Partners Inc.</b> Lot 2&3, Level 3, Wisma Lazenda, Jalan, Kemajuan, 87000 F.T. Labuan, Malaysia Tel: +087 414 073 Fax: +087 413 281	Malaysia	Common Share	10,000	99.99%
6	<b>Trevira Holdings GmbH</b> Max-Fischer-Strasse 11, 86399 Bobingen, Federal Republic of Germany Tel: N/A Fax: N/A	Germany	Common Share	25,000	99.99%
7	<b>Indorama Ventures Recycling Netherlands B.V.</b> Markweg 201, 3198 NB Europoort, Rotterdam, Netherlands Tel: +31 181 285 400 Fax: N/A	Netherlands	Common Share	18,000	99.99%
8	<b>Indorama Ventures Holdings LP</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1-847-943-3100 Fax: +1-847-943-3196	USA	(Partnership Interest)	-	99.99%

9	<b>Indorama Ventures USA Holdings LP</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1-847-943-3100 Fax: +1-847-943-3196	USA	(Partnership Interest)	-	99.99%
10	<b>Indorama Ventures Performance Fibers Holdings USA LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1 302 636-5401 Fax: +1 302 636-5454	USA	(Membership Interest)	-	99.99%
11	<b>FiberVisions Corporation</b> The Corporation Trust Company, 1209 Orange St., Wilmington, DE 19801, USA Tel: +1 678 578 7240 Fax: +1 678 578 7276	USA	Common Share	1,000	99.99%
12	<b>FiberVisions (China) A/S</b> Engdraget 22, Varde Denmark, DK-6800, Denmark Tel: +45 7994 2200 Fax: +45 7994 2201	Denmark	Common Share	100,000	99.99%
13	<b>ES FiberVisions Holdings ApS</b> Engdraget 22, Varde Denmark, DK- 6800, Denmark Tel: +45 7994 2200 Fax: +45 7994 2201	Denmark	Common Share	48,500	50.00%
14	<b>Indorama Ventures OGL Holdings LP</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1-847-943-3100 Fax: +1-847-943-3196	USA	(Partnership Interest)	-	99.99%
15	<b>FiberVisions, L.P.</b> 3700 Crestwood Parkway, Suite 900, Duluth, Georgia 30096, USA Tel: +1 302 658-7581 Fax: +1 302 655-2480	USA	(Partnership Interest)	-	99.99%
16	<b>ES FiberVisions, Inc.</b> 3700 Crestwood Parkway, Suite 900, Duluth, Georgia 30096, USA Tel: +1 302 636 5401 Fax: +1 302 636 5454	USA	Common Share	100	50.00%
17	<b>IVL Holding, S. de R.L. de C.V.</b> Avenida Prolongación Paseo de la Reforma 1015, Torre A piso 2, Colonia Santa Fe Cuajimalpa CP 05348, Delegación Cuajimalpa de Morelos, Ciudad de México, México Tel: +52 55 91775700 Fax: +52 55 52924919	Mexico	Equity Quota Series A	2	99.99%



18	<b>Grupo Indorama Ventures, S.de R.L. de C.V.</b> Avenida Prolongación Paseo de la Reforma 1015, Torre A piso 2, Colonia Santa Fe Cuajimalpa CP 05348, Delegación Cuajimalpa de Morelos, Ciudad de México, México Tel: +52 55 91775700 Fax: +52 55 52924919	Mexico	Equity Quota Class I	2	99.99%
19	<b>Indorama Ventures Polyholding LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1 256 308 1180 Fax: +1 256 341 5926	USA	(Membership Interest)	-	99.99%
20	<b>Indorama Polymers (USA) LLC</b> 1301 Finley Island Road, Decatur, Alabama, AL 35601, USA Tel: +1 256 308 1180 Fax: +1 256 341 5926	USA	(Membership Interest)	-	99.99%
21	<b>Indorama Ventures USA LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1 256 308 1180 Fax: +1 256 341 5926	USA	(Membership Interest)	-	99.99%
22	<b>IVL Belgium N.V.</b> Jules Bordetlaan 160, 1140 Evere, Belgium Tel: N/A Fax: N/A	Belgium	Common Share	30,615	99.99%
23	<b>Performance Fibers Holdings Finance, Inc.</b> The Corporation Trust Company, 1209 Orange St., Wilmington, DE 19801, USA Tel: +1 678 578 7240 Fax: +1 678 578 7276	USA	Common Share	1,000	99.99%
24	<b>Performance Fibers Asia Holdings, LLC</b> Corporation Trust Center, 1209 Orange St., Wilmington, Delaware 19801, USA Tel: +1 678 578 7240 Fax: +1 678 578 7276	USA	(Membership Interest)	-	99.99%
25	<b>Performance Fibers Asia, LLC</b> Corporation Trust Center, 1209 Orange St., Wilmington, Delaware 19801, USA Tel: +1 678 578 7240 Fax: +1 678 578 7276	USA	(Membership Interest)	-	99.99%
26	<b>Indorama Ventures Northern Investments Inc.</b> 10200 rue Sherbrooke E., Montreal-Est, Quebec H1B 1B4, Canada Tel: +1 514 645 7887 Fax: +1 514 645 9115	Canada	Class A Class B Class C	10,401 149,889,750 256,766,500	99.99%
27	<b>Indorama Ventures Gestion Inc.</b> 10200 rue Sherbrooke E., Montreal-Est, Quebec H1B 1B4, Canada Tel: +1 514 645 7887 Fax: +1 514 645 9115	Canada	Common Share	100	99.99%

28	<b>Indorama Ventures Dutch Investments B.V.</b> Markweg 201, 3198NB Europoort, Rotterdam, Netherlands Tel: +31 181 285 400 Fax: +31 181 285 405	Netherlands	Common Share	8,914,320	51.00%
29	<b>Indorama Ventures Investments USA LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1 302 636 5401 Fax: +1 302 636 5454	USA	(Membership Interest)	-	51.00%
30	<b>Indorama Ventures Olefins Holding LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1 302 636 5401 Fax: +1 302 636 5454	USA	(Membership Interest)	-	99.99%
31	<b>Glanzstoff Holding (Hong Kong) Limited</b> Unit 1301, 13/F. Chung Nam Building, 1 Lockhart Road, Wanchai, Hong Kong Tel: + 852 2153 9718 Fax: + 852 2117 1879	Hong Kong	Common Share	100	99.99%
32	<b>Glanzstoff Industries S.r.l.</b> Pizzighettone, Via G.B. Pirelli, 56, Italy Tel: +39 0372 738011 Fax: +39 0372 730001	Italy	Quota	10,000	99.99%
33	<b>Indorama Ventures Spain S.L.</b> Poligono Industrial Guadarranque, S/N, 11360 San Roque, Cadiz, Spain Tel: N/A Fax: N/A	Spain	Common Share	10,000	99.99%
34	<b>Indorama Ventures Corpus Christi Holding LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: N/A Fax: N/A	USA	(Membership Interest)	-	99.99%
35	<b>Indorama Ventures Brazil Participações S.A.</b> Av. das Nações Unidas, nº 12.551, 8º andar, Parte, Brooklin Novo. CEP: 04578-903, São Paulo -SP - Brasil. Tel: +55 11 2111-1388 Fax: +55 11 2111-1470	Brazil	Common Share	560,324,724	99.99%
36	<b>Avgol Industries 1953 Ltd.</b> 20 Lincoln st., Rubinstien House, Tel Aviv, 67134- 12, Israel Tel: 972-3-9061555 Fax: 972-3-9364376	Israel	Common Share	302,373,632	65.94%
37	<b>AE BG AlphaPhi Holding GmbH</b> Politischer Gemeinde Wien, Austria Tel: N/A Fax: N/A	Austria	(Capital Contribution)	-	99.99%

38	<b>AE BG AlphaOmega Holding GmbH</b> Politischer Gemeinde Wien, Austria Tel: N/A Fax: N/A	Austria	(Capital Contribution)	-	99.99%
39	<b>Scorpius Capital a.s.</b> No. 890, 696 74 Velká nad Velickou, Czech Republic Tel: N/A Fax: N/A	Czech Republic	Common Share	2,146,843	99.99%

**International Headquarter Business**

No.	Company Name/Address	Country	Type of Shares	Shares Issued	Shareholding
1	<b>Indorama Ventures Global Services Limited</b> 75/80-81 Ocean Tower 2, 32 <sup>nd</sup> Floor, Soi Sukhumvit 19 (Wattana), Asoke Road, Klongtoey Nuer, Wattana, Bangkok 10110, Thailand Tel: + 66 2 661 6661 Fax: + 66 2 661 6664 – 5	Thailand	Common Share	4,275,791,662	99.99%

**Trading & Services Business**

No.	Company Name/Address	Country	Type of Shares	Shares Issued	Shareholding
1	<b>IVL Singapore Pte. Ltd.</b> 9 Raffles Place, #27-00 Republic Plaza, Singapore 048619 Tel: N/A Fax: N/A	Singapore	Common Share	19,000,000	99.91%
2	<b>UAB Indorama Polymers Europe</b> Metalo G.16, LT-94102 Klaipeda, Republic of Lithuania Tel: + 370 46 300 749 Fax: + 31 181 285 405	Lithuania	Common Share	725,088	99.91%
3	<b>UAB Indorama Holdings Europe</b> Metalo G.16, LT-94102 Klaipeda, Republic of Lithuania Tel: + 370 46 300749 Fax: +370 46 314323	Lithuania	Common Share	1,173,952	99.81%
4	<b>Indorama Trading (UK) Limited</b> 23 Northiam, Woodside Park, N12 7ET, London, United Kingdom Tel: N/A Fax: N/A	United Kingdom	Common Share	10,000	99.81%
5	<b>Indorama Trading AG</b> c/o RA Mauro Locarnini, Anwaltsbüro Locarnini, Talstrasse 39, CH-8001 Zürich, Switzerland Tel: N/A Fax: N/A	Switzerland	Common Share	100	99.81%
6	<b>PHP-Shenma Air Bag Yarn Marketing (Shanghai) Co., Ltd.</b> China Merchants Plaza, East Building, Room 1107, No. 333 Cheng Du Road (North), Shanghai 200041, People's Republic Of China Tel: +49 6022 81 2552 Fax: +49 6022 81 31 2552	China	(Capital Contribution)	-	40.80%

7	<b>ES FiberVisions Shanghai Co., Ltd.</b> Room 2401-B, Manpo Plaza, 500 Yan An West Road, Shanghai, People's Republic Of China Tel: +86-(0)21-6212-5877 Fax: +86-(0)21-6226-8829	China	(Capital Contribution)	-	50.00%
8	<b>Performance Fibers (Kaiping) Trading Company Limited</b> No.3 Hongqiao Road Kaiping, Guangdong Province, People's Republic of China Tel: +86 750 2201707 Fax : +86 750 2218093	China	(Capital Contribution)	-	99.99%
9	<b>TTI GmbH</b> Kasinostr. 19 – 21, 42103 Wuppertal, Germany Tel: +49 6022 81 2552 Fax: +49 6022 81 31 2552	Germany	Common Share	25,100	40.00%
10	<b>Trevira North America, LLC</b> 5206 Leonardslee CT, Charlotte, Mecklenburg County, North Carolina, 28226, USA Tel: +1-704-910-0970 Fax: +1-704-496-2157	USA	(Membership Interest)	-	99.99%
11	<b>ES FiberVisions Company Limited</b> 3-3-23 Nakanoshima, Kita-Ku, Osaka 530-0005, Japan Tel: +81 6 6441 3307 Fax: +81 6 6441 3347	Japan	Common Share	200	50.00%
12	<b>ES Fiber Visions Limited Partnership</b> Entity Services (Nevada) LLC, 2215- B Renaissance Dr., Suite 10, Las Vegas, NV 89119, USA Tel: +706 357 5100 Fax: +706 966 4247	USA	(Partnership Interest)	-	50.00%
13	<b>Indorama Ventures Alphapet Holdings, Inc.</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808 USA Tel: +1 256 308 1180 Fax: +1 256 341 5926	USA	Common Share	100	99.99%
14	<b>ES FiberVisions ApS</b> Engdræget 22, Varde Denmark, DK- 6800 Tel: +45 7994 2200 Fax: +45 7994 2201	Denmark	Common Share	10,000	50.00%
15	<b>Indorama Ventures Ecomex Services, S. de R.L. de C.V.</b> Carretera Libre a Colotlan 6800. Colonia Extramuros, C.P. 45200, Zapopan, Jalisco, Mexico Tel: +52 33 1561-3732 Fax: N/A	Mexico	Equity Quota Class I	2	51.00%

16	<b>Indorama Ventures Polycor, S. de R.L. de C.V.</b> Avenida Prolongación Paseo De La Reforma 1015 , Torre A piso 2, Colonia Santa Fe Cuajimalpa CP 05348, Delegación Cuajimalpa de Morelos, Ciudad de México, México Tel: +52 55 91775700 Fax: +52 55 52924919	Mexico	Equity Quota Class I	2	99.99%
17	<b>Indorama Ventures Servicios Corporativos, S. de R.L. de C.V.</b> Avenida Prolongación Paseo de la Reforma 1015, Torre A piso 2, Colonia Santa Fe Cuajimalpa CP 05348, Delegación Cuajimalpa de Morelos, Ciudad de México, México Tel: +52 55 91775700 Fax: +52 55 52924919	Mexico	Equity Quota Class I	2	99.99%
18	<b>Performance Fibers (Hongkong) Limited</b> Room 3B, 22nd Floor, 148 Electric Road, North Point, Hong Kong Tel: + 852 2110 8242 Fax: + 852 2110 0033	Hong Kong	Common Share	1,000	99.99%
19	<b>ES FiberVisions Hong Kong Limited</b> Unit No. 2810. 28/F, The Metropolis Tower, 10 Metropolis Drive, Hunghom, Kowloon, Hong Kong Tel: +852 2970 5555 Fax: +852 2970 5678	Hong Kong	Common Share	616,010	50.00%
20	<b>4200144 Canada Inc.</b> 3400 First Canadian Centre, 350 - 7th Avenue SW, Calgary, Alberta T2P 3N9, Canada Tel: +1 (514) 645 7887 (229) Fax: +1 (514) 645 9115	Canada	Class A	100	99.99%
21	<b>Indorama Ventures Exporter Inc.</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1-980-233-8191 Fax: +1-980-233-6220	USA	Common Share	2,500	99.99%
22	<b>Glanzstoff Services S.A.S.</b> Pôle Europeen de Développement, 54810 Longlaville, France Tel: +33 3 82 44 80 00 Fax: +33 3 82 44 56 82	France	Common Share	82,195	99.99%
23	<b>Glanzstoff Industries A.G.</b> Rue Schwarzenhof, 34 L-8452 Steinfort - GD Luxembourg Tel: +352 399 881 1 Fax: +352 399 881 213	Luxembourg	Common Share	960,000	99.99%

24	<b>Glanzstoff Management GmbH</b> Technologiezentrum, Haus C, Technopark 1, 3430 Tulln, Austria Tel: N/A Fax: N/A	Austria	Common Share	500	99.99%
25	<b>Indorama Ventures Portugal Utility - Unipessoal, LDA.</b> ZILS Zona 2, Lote 2E1, Monte Feio, 7520-064 Sines, Portugal Tel: +351 269 189 000 Fax: +351 269 189 099	Portugal	Quota	1	99.99%
26	<b>Performance Fibers Services, S. de R.L. de C.V.</b> Av. de la Luz 77 Zona Industrial Benito Juárez, CP 76120, Querétaro, Qro., México Tel: +52 442 211 3000 Fax: N/A	Mexico	Equity Quota Class 1	50,000	99.99%
27	<b>Schoeller Süssen GmbH</b> Bühlstrasse 14, 73079 Süssen, Germany Tel: 0049 7162 930 5015 Fax: N/A	Germany	(Capital Contribution)	-	99.99%
28	<b>Kordplast s.r.o.</b> No. 897, 696 74 Velká nad Velickou Tel: N/A Fax: N/A	Czech Republic	Common Share	200,000	99.99%

**Logistic Business**

No.	Company Name/Address	Country	Type of Shares	Shares Issued	Shareholding
1	<b>Indorama Ventures Logistics LLC</b> Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808, USA Tel: +1-847-943-3100 Fax: +1-847-943-3196	USA	(Membership Interest)	-	99.99%

**Non-Operating Business**

No.	Company Name/Address	Country	Type of Shares	Shares Issued	Shareholding
1	<b>Indorama Polymers Rotterdam B.V.</b> Markweg 201, 3198 NB, Europoort, Harbour No.6347, Rotterdam, Netherlands Tel: +31 181 285 400 Fax: +31 181 285 405	Netherlands	Common Share	18,002	99.91%
2	<b>Indorama Holdings Rotterdam B.V.</b> Markweg 201, 3198 NB, Europoort, Rotterdam, Netherlands Tel: +31 181 285 400 Fax: +31 181 285 405	Netherlands	Common Share	18,002	99.81%
3	<b>MJR Recycling B.V.</b> Tengnagelwaard 5, NL-6917 AE Spijk(Gld), Netherlands Tel: +31 656 6250 Fax: +31 656 6251	Netherlands	Common Share	18,100	99.99%

4	<b>FiberVisions</b> <b>Vermögensverwaltungsgesellschaft mbH</b> Local Court of Dusseldorf, Werdener Straße 1, 40227 Düsseldorf Germany Tel: +49211 8306-0 Fax: +49 211 87565 116-0	Germany	Common Share	3,000,000	99.99%
5	<b>Indorama Ventures Adana PET Sanayi Anonim</b> <b>Sirketi</b> Karamahmet Mahallesi, Avrupa Serbest Bolgesi, 3. Sokak No:2 Ergene/Tekirdag – 59860, Turkey Tel: +322 441 0253-226 Fax: +322 441 0110	Turkey	Common Share	5,489,505,865	99.99%
6	<b>Indo Polymers Mauritius Limited</b> Les Cascades, Edith Cavell Street, Port Louis, Republic of Mauritius Tel: N/A Fax: N/A	Mauritius	Common Share	58,827	100.00%
7	<b>Indorama Polymers Workington Limited</b> Siddick, Workington, Cumbria, CA14 1LG, United Kingdom Tel: +31 181 285 440 Fax: +31 181 285 400	United Kingdom	Common Share	1	99.91%
8	<b>Tereftálicos Indústrias Químicas Ltda.</b> 'Fazenda São Francisco, s/nº, CEP: 13140-971 - Paulínia - São Paulo - SP/ Brazil Tel: +31 181 285 440 Fax: +31 181 285 400	Brazil	Common Share	37,573,293	51.00%
9	<b>Avgol Cyprus Ltd.</b> Arch. Makariou III, 284 FORTUNA COURT, BLOCK B, 2nd floor P.C. 3105, Limassol, Cyprus Tel: N/A Fax: N/A	Cyprus	(Membership Interest)	-	65.94%
10	<b>PT. Indorama Glycol Indonesia</b> Gedung Graha Irama Building, 7th Floor, JL. HR. Rasuna Said Blok X-1, Kav 1-2, Kuningan Timur, Setiabudi, Jakarta Selatan, Indonesia Tel: (62) 21 526 1155 Fax: (62) 21 526 1577	Indonesia	Common Share	500	99.99%