The Earth Security Report 2017
Sustainable Development Goals for Business Diplomacy and Growth
<table>
<thead>
<tr>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forewords</td>
</tr>
<tr>
<td>Executive Summary</td>
</tr>
<tr>
<td>1 Key Messages</td>
</tr>
<tr>
<td>2 The Earth Security Index 2017</td>
</tr>
<tr>
<td>3 Business Diplomacy Blueprints</td>
</tr>
<tr>
<td>Industry Blueprints</td>
</tr>
<tr>
<td>1 Automotive Africa</td>
</tr>
<tr>
<td>2 Pharmaceuticals India</td>
</tr>
<tr>
<td>3 Energy Infrastructure China's Belt &amp; Road</td>
</tr>
<tr>
<td>4 Consumer Electronics Southeast Asia</td>
</tr>
<tr>
<td>5 Agri-business (coffee) Latin America</td>
</tr>
<tr>
<td>Appendices</td>
</tr>
<tr>
<td>1 Acknowledgments</td>
</tr>
<tr>
<td>2 Methodology</td>
</tr>
<tr>
<td>3 Endnotes</td>
</tr>
</tbody>
</table>

**Copyright**
© Earth Security Group 2017
The marks Earth Security Group and logotype, the Earth Security Index, the radial diagram and the presentation of the information in this document are the property of Earth Security Ltd. and cannot be reproduced without prior written consent.

**Disclaimer**
The views and opinions expressed in this report are solely the views and opinions of Earth Security Group, and do not reflect the opinion of sponsors and partners. Any errors or omissions are solely attributed to Earth Security Group.

**Earth Security Group**
earthsecuritygroup.com

**Sponsors**

- Schweizerische Eidgenossenschaft
  Confédération suisse
  Confederazione Svizzera
  Confederaziun svizra
- Swiss Agency for Development and Cooperation SDC
- HSBC
- Global Outreach Partners
- wbcasd
- ICC
  INTERNATIONAL CHAMBER OF COMMERCE
  The world business organization
The Sustainable Development Goals are the new political framework for development and for business. They signal the sustainable growth imperatives of the next decade.

This report provides the blueprints for global business to navigate the risks and the impact opportunities.
Forewords

This year’s report marks a new milestone in our mission to align private sector growth with the sustainable development priorities of countries.

The Earth Security Report 2017 puts forward a practical method for business and investors to define the issues, metrics and actions that matter to their sustainable growth.

Companies are being asked to use the power of innovation, investment, marketing and global value chains as a solution to entrenched social inequality and environmental degradation. Achieving this change will require business and governments to work together, translating global aspirations into practical actions.

The Sustainable Development Goals have provided a common framework for these aspirations. This report is applying our strategic analysis and approach to propose a step-change in business diplomacy for sustainable development.

Alejandro Litovsky
Founder & CEO,
Earth Security Group

SDC

I wish to build on my foreword to last year’s Earth Security Report, where I stressed that decisions based on fear are the main limiting factor when trying to move from a personal to a collective mode of action for sustainable development.

The Earth Security Report 2017 is cleverly helping us to address that challenge. For those wishing to seriously penetrate the deep and dense forest of the Sustainable Development Goals (SDG), the report is offering a practical approach for the private sector to be part of the solutions to fearsome dilemmas that are extremely difficult to solve.

In the realm of diplomacy it is in general relatively easy to agree on statements like “we need to fight social inequalities” or “to assure social stability it is key to create new jobs for the youth”. In reality, this will not happen easily.

By specifically focusing on industries and regions, the report manages to put forward areas of common interest and collective actions that allow business to focus seriously on sustainable growth.

The implication of all this is that a new group of inspired professionals must rise to help define new rules of the game, which will force the development of a new and sustainable economy that organically takes over from the current power centric and often patriarchal way of doing business.

These inspired professionals will be a new generation of business diplomats.

Pio Wennubst
Ambassador, Assistant Director General, Swiss Agency for Development and Cooperation (SDC), FDFA
<table>
<thead>
<tr>
<th>HSBC</th>
<th>WBCSD</th>
<th>ICC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each and every one of us has a stake in developing a sustainable economic system. The combined response of companies, investors, civil society and the public sector to global challenges such as climate change, resource scarcity and societal pressures are key to securing a prosperous future. Financial institutions are increasingly incorporating an assessment of Environmental, Social and Governance (ESG) issues into investment decision-making to help manage the impact of those challenges.</td>
<td>Forward-thinking businesses have long been engaged in efforts to integrate sustainability into the core of corporate strategy, decision-making and governance. As long-standing masters of innovation, business is ideally positioned to be the partner of choice when it comes to implementing the SDGs. Business solutions aligned with the SDGs enable companies to better manage their risks, as well as anticipate consumer demand, build positions in growth markets, secure access to needed resources, and strengthen their supply chains, all while moving the world towards the delivery of the Global Goals. We know that we live in a resource-constrained world, and that we’re pushing up against planetary boundaries. I commend the Earth Security Group for emphasizing the need for a systems-based approach to rethinking business models, with companies focusing on SDGs that are material to their growth and resilience. The work reinforces the fact that none of this can be accomplished by business alone. Good governance, economic incentives, appropriate and robust legal and institutional framework conditions and public-private partnerships are essential. Sustainable business lies at the heart of sustainable development. It is the only option for building a safe and resilient world where prosperity is shared and poverty is made history. WBCSD looks forward to supporting the amplification of this report’s key messages and helping them turn into action at scale, underpinned by science-based targets.</td>
<td>Since their inception in 2015, I have consistently said that the SDGs should be known within the global business community as the “BDGs”: The Business Development Goals. That’s because the SDGs represent a genuine economic imperative. Their achievement would mean greater productivity, increased employment, and stronger economic growth. By contrast, the costs of inaction are increasingly apparent: from the growing frequency of natural disasters triggered by climate change to the recent wave of public hostility to globalization. Leading companies – large and small – are already recognizing the benefits of placing sustainability at the heart of their operations. However, we are not yet seeing the scale and speed of change we need to achieve the SDGs. The Earth Security Report 2017 provides a clear analytical roadmap for business and investors to understand the commercial imperatives at the center of the SDGs. At the heart of this year’s findings are a simple truth: it is not possible to have a strong, functioning private sector in a world of increasing inequality, poverty and climate change. Public policy has a vital role to play in enabling businesses to drive implementation of the SDGs. The International Chamber of Commerce will actively utilize the findings of this year’s report to inform our dialogue with governments on the implementation of the SDGs – both in national capitals and at the United Nations itself in our unique role as the voice of the world business community in the UN General Assembly.</td>
</tr>
</tbody>
</table>

**Daniel Klier**  
Group Head of Strategy and  
Global Head of Sustainable Finance,  
HSBC

**Peter Bakker**  
Peter Bakker, President & CEO,  
World Business Council for Sustainable Development (WBCSD)

**Zoe Knight**  
Group Head, HSBC Centre of Sustainable Finance,  
HSBC

**John Danilovich**  
Secretary General,  
International Chamber of Commerce (ICC)
Executive Summary
Key Messages

Key Message 1
Planetary limits are forcing a rethink of business models. Companies must align commercial and sustainability imperatives.

Growth as usual is not possible in a world of limited resources. Every industry must now rethink the models that will allow long-term commercial growth while co-existing and co-evolving within social and ecological systems. All industry sectors reviewed show sustainability is critical to their future business resilience. Due to the scale of social and environmental pressures, business models that are being designed to regenerate communities and ecosystem services are already operating in a new paradigm of productivity and competitiveness.

Key Message 2
Regional pressures affecting competitiveness require companies to focus on SDGs that are material to their sustainable growth.

In different regions of the world, the Sustainable Development Goals (SDGs) highlight a specific set of issues that are material to the growth of industries. Business implementation of the SDGs remains a big challenge. The Business & Sustainable Development Commission has helped to raise business awareness on the SDGs. This report shows how companies can implement the SDGs strategically. This means aligning business strategies with the sustainable growth imperatives that are most critical to the societies in which companies operate.
Key Message 3
More interconnected social and environmental issues require companies to adopt systemic thinking when responding to societal trends.

Economic systems are out-of-sync with planetary limits and human wellbeing. The pressure on available resources, from clean available water and clean air to new job opportunities, mean that environmental, social and governance (ESG) risks are becoming more inter-connected. This new reality is challenging the prevailing linear, silo thinking on managing ESG impacts. Decision-makers in business and government must adopt systemic thinking to anticipate more complex ESG risks and build the resilience of their investments to priorities in their local contexts.

Key Message 4
Government policies are pivotal to industry transformations. Business diplomacy is needed to shape the conditions for inclusive growth.

Governments face the major task of advancing the policies to transform industry growth pathways, without losing the trust of their citizens. Progressive companies must invest time and resources to help governments to understand the policy incentives and the persisting barriers to scale sustainable and inclusive investment models. Creating such an enabling environment requires a more strategic and informed dialogue between companies and policy makers, as well as a clearer mutual understanding of perspectives and opportunities.
Executive Summary
The Earth Security Index 2017: Mapping SDGs that are material to sustainable growth

Earth Security Index Diagram

The Earth Security Index 2017 maps 39 dimensions of country risk that are material to the private sector, using globally comparable datasets produced by international institutions. The diagram scores a country’s pressures (higher scores mean higher pressures) in comparison to the rest of the world. The ESI 2017 is modelled on the targets of the Sustainable Development Goals (SDGs), and is a tool that helps the private sector to embed SDGs that matter to sustainable growth.

The World Aggregate diagram, below, calculates the average pressures for all the countries in the world. It identifies 19 issues that are material for the sustainable growth of both developed and developing countries.

For more information about the Earth Security Index 2017 please refer to the Appendix or visit our website: http://earthsecuritygroup.com

© Earth Security Group 2017
Earth Security Index Measurements

**SDG 1**
**No Poverty**
- Land Tenure Insecurity: The lack of security that a person’s land rights will be recognised and protected.
- Poverty: The country’s proportion of the population living in poverty.

**SDG 2**
**Zero Hunger**
- Fertilizer Overuse: The overuse of fertilizers, resulting in water pollution.
- Food Import Dependence: A country’s dependence on food imports.
- Food and Nutrition Security: The level of food insecurity, reflecting continuing or structural poverty and low income.

**SDG 3**
**Good Health and Well-being**
- Healthcare Access: The degree of access to basic healthcare.
- Healthy Diets: The levels of obesity and dietary related illnesses in a country.
- Infectious Diseases: The rate of infectious diseases, including TB and HIV, in the population.

**SDG 4**
**Quality Education**
- Education Access: The degree of youth literacy and years of schooling.

**SDG 5**
**Gender Equality**
- Gender Inequality: Women inequality in political systems, education and labour market.

**SDG 6**
**Clean Water and Sanitation**
- Freshwater Withdrawal: The sustainability of freshwater withdrawal in relation to total renewable freshwater resources.
- Sanitation Access: Share of the population that has access to improved sanitation.
- Water Access: Share of the population that has access to improved water source.
- Water Pollution: The degree of water pollution from households, industry and agriculture.

**SDG 7**
**Affordable and Clean Energy**
- Electricity Blackouts: The number of reported power outages per month.
- Energy Access: Share of the population that has access to electricity and non-solid fuels.
- Energy Efficiency: The CO2 intensity of the energy consumption of industry in a country.

**SDG 9**
**Industry, Innovation and Infrastructure**
- Logistics Performance: The quality of a country’s trade and transport related infrastructure.
- Industrial Innovation: The average of patent applications per 100,000 citizens.
- Internet Access: The proportion of the population using the internet.

**SDG 10**
**Reduced Inequalities**
- Income Inequality: The degree of income distribution across the population, as based on the GINI Index, to measure the level of income inequality.

**SDG 11**
**Sustainable Cities and Communities**
- Air Pollution: The mean annual degree of air pollution, weighted by population.
- Urban Basic Services: Urban population’s access to improved water sources and sanitation.
- Urban Population Growth: A country’s annual urban population growth rate.

**SDG 12**
**Responsible Consumption and Production**
- Waste Generation: The amount of waste generation per person per day.

**SDG 13**
**Climate Action**
- Carbon Emissions: Carbon emissions resulting from human economic activities.
- Weather Extremes: The level of annual exposure to extreme weather events, measured in human and economic losses.

**SDG 14**
**Life Below Water**
- Fisheries Decline: The proportion of a country’s total catch that comes from overexploited or collapsed fish stocks.
- Marine Pollution: The level of contamination of local waters by natural and human-made causes.

**SDG 15**
**Life on Land**
- Deforestation: The loss of forest cover from 2001 to 2014.
- Land Degradation: The cost of a reduction or loss of land ecosystem services.

**SDG 16**
**Peace and Justice Strong Institutions**
- Corruption: The perceived level of public corruption.
- Government Effectiveness: The quality and independence of the public service and the effectiveness of policy implementation.
- Insecurity: The level of political instability, terrorism, violence and crime.

**SDG 17**
**Partnerships for the Goals**
- Macroeconomic Risk: The exposure to macro-economic risks resulting from inflation, debt and probability of debt default.
- Tax Revenue: Tax revenue as a percentage of GDP.
Executive Summary

Business Diplomacy Blueprints: Transforming industries to achieve shared security and prosperity

Objectives

1. Translate the SDGs for business and investors with a focus on material risks and commercial imperatives for sustainable growth.

2. Support global and regional industry networks to advance opportunities for sustainable growth in regions pivotal to globalisation.

3. Guide governments in their engagement and collaboration with the private sector to focus on responding to inclusive growth priorities.

Blueprints

01

<table>
<thead>
<tr>
<th>Sector</th>
<th>Region</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive</td>
<td>Africa</td>
<td>Air pollution and traffic accidents in Africa’s growing mega-cities are the next challenge for global automakers.</td>
</tr>
</tbody>
</table>

Recommendations

1. Automakers should align their market growth strategies to SDGs that are critical to their sustainability.

2. The African Development Bank should finance electric mobility in partnership with companies and city governments.

3. African automotive associations and governments should collaborate to develop a roadmap for leapfrogging to electric vehicles.

02

<table>
<thead>
<tr>
<th>Sector</th>
<th>Region</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmaceuticals</td>
<td>India</td>
<td>The overuse of antibiotics and water pollution in India undermine the global pharma industry.</td>
</tr>
</tbody>
</table>

Recommendations

1. Indian pharma companies should adopt sustainable financing strategies to develop zero-wastewater facilities.

2. The national antibiotic campaign in India should deploy proven crowdsourcing technologies to enable citizens to control water pollution.

3. Indian industry associations — FICCI, CII and OPPI — should create a business action hub as a local partner of the global Antimicrobial Resistance (AMR) Industry Alliance.

Pages 10–19

Pages 20–29
<table>
<thead>
<tr>
<th>Region</th>
<th>Sector</th>
<th>Focus</th>
<th>Recommendations</th>
</tr>
</thead>
</table>
| Latin America   | Agri-business (coffee)        | Climate change and poverty in Latin America threaten coffee production and global coffee trade. | 1. Global retailers should create attractive coffee brands based on regenerative models and shape global consumer values.  
2. Global coffee companies should create “regenerative business incubators” to scale new coffee production models based on resilience principles.  
3. Sustainable coffee platforms, such as IDH, GCP and SCC, should collaborate on mainstreaming regenerative business models in coffee. |
| Southeast Asia  | Consumer Electronics          | Working conditions in factories in ASEAN are an endemic challenge for global electronics companies. | 1. Global electronics companies should reflect a commitment to workers’ rights in their global supply chain frameworks.  
2. Companies should embed decent work as a feature of their product brands, to help shape global consumer values.  
3. ASEAN Business Advisory Council and global electronics companies should collaborate on policies that ensure decent work conditions at a regional ASEAN level. |
| China’s Belt & Road | Energy Infrastructure      | Regional water cooperation in Central Asia and local jobs are vital to China’s Belt & Road Initiative (BRI). | 1. BRI energy investors should embed selected SDGs, such as water and local jobs, in their investment framework.  
2. The Chinese government and BRI investors should develop the blueprint for a United Renewable Energy System of Central Asia (URESCA).  
3. China’s development banks should support and facilitate a dialogue on Central Asia’s clean power corridors of the future. |
Air pollution and traffic accidents in Africa’s growing mega-cities are the next challenge for global automakers.

**Recommendations**

1. Automakers should align their market growth strategies to SDGs that are critical to their sustainability.

2. The African Development Bank should finance electric mobility in partnership with companies and city governments.

3. African automotive associations and governments should collaborate to develop a roadmap for leapfrogging to electric vehicles.
1.1 SDG Framework
Africa’s automotive industry

The Earth Security Index diagram aggregates the average pressures of 6 countries key to automotive manufacturing growth in Africa: Algeria, Egypt, Kenya, Morocco, Nigeria and South Africa. The diagram provides automakers, investors, and policy makers with a view of the SDG pressures that are material to the development of the industry in the region.
Automakers and automaker industry associations; financial institutions providing financing to the sector and development banks financing government plans; as well as government policy makers should consider the risks and opportunities they face in relation to the following SDGs, and the imperatives for action:

**SDG 3 Good Health and Well-being**

40 of the 50 countries with the highest road traffic death rates globally are in Africa. Traffic accidents now kill more people than malaria in Kenya and South Africa. Automakers must invest in new mass-market models that include basic collision avoidance features and make voluntary commitments to sell cars in African markets that meet vehicle safety standards adopted by the United Nations, such as the inclusion of airbags.

**SDG 7 Affordable and Clean Energy**

More than 30 countries in Africa experience chronic electricity shortages and regular interruptions to service. A growing electric vehicle (EV) fleet will place additional demand on the electricity grid as plugging in an EV is the equivalent of adding three houses to the grid. Joint investments with utilities in EV charging infrastructure will be pivotal to develop innovative solutions for EV infrastructure, such as solar powered charging bays and portable charging units.

**SDG 8 Decent Work and Economic Growth**

Youth unemployment is a critical challenge ripe for innovation. Only 1 out of 6 of the 420 million youth in Africa are in formal employment. Of the 12 million young people entering the workforce each year only a quarter will find a job. Auto manufacturers that are increasing their manufacturing and assembly capacity in the region should consider investing in skills building and vocational training, and also consider how new business models, like car-sharing, can help to create new job opportunities for the young.

**SDG 9 Industry, Innovation and Infrastructure**

The average commuter in Lagos, Nigeria, spends over 3 hours in traffic every day while gridlock costs Nairobi, Kenya, around USD 500,000 in lost productivity per day. Building partnerships as the preferred supplier to public transport and ride-sharing service platforms will be key to business growth as governments increasingly support mobility schemes that reduce the number of cars on the road.

**SDG 11 Sustainable Cities and Communities**

Africa is the fastest urbanising region in the world. Unsustainable urban sprawl, limited infrastructure and low-grade fuels led to a 26% increase in PM10 pollution levels from 2009 to 2012 in the region, the largest increase globally. Increasingly strict vehicle emissions regulations will require auto manufacturers to partner with city governments to invest in integrated sustainable mobility solutions for Africa’s growing cities.

**SDG 12 Responsible Consumption and Production**

Car ownership is rising across African cities with significant costs from congestion, traffic accidents and air pollution. In Cairo, congestion costs the city an estimated USD 8 billion annually. Auto companies must work with new ride-and car-sharing platforms, the media and city governments to direct this growth into technologies that are a win-win for carmakers and sustainable cities.

**SDG 13 Climate Action**

As a result of growing numbers of vehicles, Africa’s global share of car exhaust fumes are set to exceed that of the US, EU and China combined by 2030. The industry must work with national and regional governments to bring vehicle and fuel standards up to date, as part of their climate commitments.
1.2 Regional Focus
The sustainable growth of the automotive sector in Africa

Africa’s car market is the second fastest growing market for new vehicle sales behind China. In the next 10 years, the car market in Africa is expected to double. Yet Africa’s populous megacities are already beset by air pollution, and road traffic accidents today kill more people than malaria. This puts the continent, as well as global car manufacturers, at a crossroads: will Africa follow a petrol-based, polluted and grid-locked path of the past, or can it leapfrog directly to electric mobility systems as the next stage of urban transportation – as it has done in mobile telecommunications?

Over 80% of new vehicle sales on the continent occur in South Africa, Egypt, Algeria and Morocco, which also have sizeable assembly and manufacturing centres. However, second hand vehicles dominate demand in the region. In Nigeria, Kenya and Ethiopia second hand vehicles comprise an average of 85% of the total fleet and 80% of total car sales. While the African automotive market remains significantly less developed than other developing regions, a number of factors, including rapid urbanisation, a growing middle class, and growing infrastructure investments, are now set to grow the market. New vehicle sales are experiencing double digit growth in a number of African markets. As a result of this growth, Africa’s global share of car exhaust fumes is set to exceed that of the US, EU and China combined by 2030.

South Africa dominates auto manufacturing and assembly, with 75% of the continent’s vehicle output. The industry is now set to grow across the region, as governments look to boost manufacturing jobs and industrialise and diversify their economies. Several countries, including South Africa, Nigeria and Kenya, have developed national automotive industry development plans to boost local production of cars and increase tariffs on second-hand imports.

Carmakers, including BMW, Honda, General Motors, Ford, Nissan, Toyota, as well as Beijing Automotive, are now looking to increase local manufacturing and assembly in order to capture market share away from the region’s USD 48 billion import market.

Air pollution is one of the biggest issues facing Africa’s rapidly growing cities due to low fuel quality standards. At the same time, Africa has the highest road accident fatality rate globally. Road traffic accidents are one of the continent’s greatest urban challenges. 70% of Africa’s urban population has experienced worsening air pollution between 2009 and 2012, a higher share than any other region in the world. By 2050, 100,000 premature deaths per year could be prevented by transitioning to cleaner fuels. By then, however, the number of cars on roads in Africa will have increased by a factor of five.
### 1.3 Flashpoints for Business Diplomacy

**Strategic trends for collaboration on Africa’s sustainability mobility**

#### Flashpoint 1

**Regulation to curb air pollution will undermine business as usual**

Across the continent, the permitted level of sulphur in diesel petrol is roughly 300 times higher than in Europe. Vehicle emissions standards, which regulate the emissions of toxic fumes are at least a decade behind. Progress being made to adopt higher standards remains patchy across the different regions and still far lower than European norms.

In 2016, UNEP’s Partnership for Clean Cars and Vehicles supported 5 West African countries (Benin, Ghana, Côte d’Ivoire, Nigeria, and Togo) to raise their own fuel and vehicle emissions standards, ban high-sulphur fuel imports, and work with the Economic Community of West African States (ECOWAS) Commission to harmonise clean vehicle policies across the West African region by 2020.

However, the commitment on limited sulphur content in diesel is still 5 times higher than Europe’s limits.

In South Africa, higher fuel standards that meet European levels are expected by 2022, but have been hampered by delays. A lack of clear and uniform standards is a setback to automakers looking to boost manufacturing and assembly in regional production hubs such as South Africa, Nigeria and Kenya.

#### Flashpoint 2

**Improving road safety is an opportunity for the industry’s responsible growth**

Although Africa accounts for just 2% of the world’s registered vehicles, 16% of all road-related deaths occur on the continent. The region has the highest rate of road accident fatalities globally. In 2007, the World Health Organisation in cooperation with African governments, issued road safety recommendations covering awareness raising and legislation.

However, the international automotive safety watchdog, Global NCAP, revealed that millions of new cars sold in emerging markets in 2015, including Africa, still did not meet the UN’s basic safety standards for crash protection and avoidance. Together with the UN, the watchdog is calling for scrappage schemes to remove older unsafe vehicles from the road, as well as global implementation of basic safety features such as air bags and electronic stability control that will drive sales of newer and safer mass-market models.

#### Flashpoint 3

**The growth of EVs is being held back by a lack of investment and affordable models**

Optimistic projections suggest that EVs and hybrids could account for as much as 20% of the new car market in South Africa by 2030. However, South Africa’s battery electric fleet only reached 700 cars out of the 7 million light vehicles on its road in 2017, due to a lack of affordable models and consumer incentives to adopt EVs. In response, carmakers, such as Toyota, have developed their most basic and affordable EV models for the South African market.

However, governments are now looking to boost investment in home-grown production and innovation to grow EVs and hybrids across a number of African markets. For example, in Uganda, the government has invested USD 44 million to increase Kiira Motors Corporation’s capacity to produce 7,000 hybrids per year by 2018 as part of its national economic development plan.

However, the level of investment in EVs, hybrids and clean car production is eclipsed by the scale of investments into conventional auto production plants. In South Africa, Beijing Automotive International is investing USD 819 million in just one new plant for conventional production in Port Elizabeth. In Nigeria, almost 30 car brands have obtained licences to assemble cars, including Toyota, Honda and the Nigeria-China Manufacturing Company, yet none have signalled a commitment to investing in clean vehicles, electric or hybrid vehicles.

---

**Top 3 largest new car markets in North Africa**

**Egypt**

Chinese auto manufacturers JAC Motors and Hawtai are looking to invest up to USD 1 billion in Egypt’s auto manufacturing and components sector.

**Morocco**

Renault and its component suppliers have committed to investing USD 1.04 billion to build an industry ecosystem that will increase local sourcing of parts from 32% to 65%.

**Algeria**

PSA Group [Peugeot Citroën] invested USD 100 million in 2015 in a factory to produce up to 150,000 cars by 2020.
Flashpoint 4
Advocating for better infrastructure will support automakers’ future growth

Africa’s petroleum refinery capacity is unfit to support higher fuel standards. This is critical for automakers, as just a few tanks of high sulphur fuel have the potential to destroy the emission-reducing technologies in vehicles, such as sensors and filters. In South Africa, the Petroleum Industry Association has warned that the higher Clean Fuels 2 regulations could cost USD 4.9 billion in upgrading costs. Without the infrastructure to blend cleaner fuels, any benefits of cleaner cars will be lost.

At the same time, a lack of charging infrastructure limits the growth potential of electric vehicles (EVs) and hybrids. The Open Charge Map database of global charging equipment locations shows that South Africa is still the only country in Africa where EV charging stations have been identified. Carmakers are working to address these critical infrastructure challenges, but action is focussed on South Africa alone. For example, BMW South Africa has developed off-grid solar charging units and solar carports to address limited EV charging infrastructure. A more coordinated roll-out of charging infrastructure across the region will be critical to grow the market.

Flashpoint 5
Sustainable mobility infrastructures offer new pathways for investment and growth

The electrification of Africa’s public transport is a win-win for cities looking to implement sustainable mobility plans and car manufacturers looking to deepen their market penetration. Governments in Egypt, South Africa, Nigeria, Morocco, Ethiopia, DRC, Kenya and Tanzania are supporting investments in mobility infrastructure, such as mass public transit systems and ride-sharing schemes in order to take cars off the road, ease congestion, accidents and pollution. In Lagos, Nigeria, the government has invested over USD 1.5 billion into mass rapid transit systems that will take up to 80,000 cars off the road per day.

The proliferation of ride- and car-sharing platforms is expected to shape the vehicle ownership model in Africa, while presenting new partnering opportunities for carmakers. Over 56 ride-sharing services are on the market in Africa, with 14 in Lagos alone. In 2016, Nigeria’s Federal House of Representatives passed a resolution to integrate ride-sharing into their public transportation policy. Smaller pilot projects are beginning to sow the seeds of urban electric mobility.

Top 3 largest new car markets in Sub-Saharan Africa

<table>
<thead>
<tr>
<th>Country</th>
<th>Investment/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>BMW South Africa is planning to invest USD 382 million in its Pretoria plant to manufacture its X3 model.</td>
</tr>
<tr>
<td>Nigeria</td>
<td>Nissan was the first carmaker to invest in establishing production capacity in Nigeria, following the government’s new Automotive Policy in 2013.</td>
</tr>
<tr>
<td>Kenya</td>
<td>Toyota Kenya expanded its existing USD 5 million bus assembly plant in Mombasa to grow its presence in East and Central African regions.</td>
</tr>
</tbody>
</table>

1.4 Recommendations
For automakers, financial institutions and government policy makers shaping the future of the automotive sector in Africa

**Recommendation 1**
*Automakers should align their market growth strategies to SDGs that are critical to their sustainability*

Despite a challenging environment, automakers are expanding their operational and manufacturing capacity across the region, from Morocco to South Africa. Automakers looking to grow in the African market should adopt the SDG framework as a comprehensive view of the inter-connected issues that are material to the long-term growth of automotive manufacturing in Africa.

This would provide the strategic direction to address key issues relating to engaging in policy and investments in sustainable mobility and infrastructure, but would also factor in social and environmental priorities key to the long-term sustainable growth of the sector. These include addressing youth unemployment and the need to create skills and jobs as well as fully embedding health priorities such as road safety and air pollution into the design and manufacturing of cars in Africa.

**Recommendation 2**
The African Development Bank should finance electric mobility in partnership with companies and city governments

The Green Bond Programme of the African Development Bank (AfDB) has issued USD 1.4 billion worth of bonds since 2013 in its goal to support Africa’s transition to green growth. So far, transport projects have focussed on financing road and rail upgrades, as well as USD 97 million for the Dar es Salaam Bus Rapid Transit System. The bank also supported Nigeria’s issuance of Africa’s first sovereign green bond in 2017. Proceeds from the USD 63 million issuance will primarily finance renewable energy projects, but a portion is also being channeled into an EV commuter pilot in Abuja.

In order to scale up support for EV pilots, the bank’s green bond programme, as well its infrastructure, clean energy and climate finance programmes must focus on supporting the scaling of electric and sustainable mobility. Through its strategic financing AfDB, can play a role in pairing Africa’s growing megacities with leading players in the large vehicles e-mobility market, such as Toyota, Nissan, Volkswagen, and BYD, to help scale green bond issuances at city, national and regional levels for e-mobility.

Through such private-public partnerships, AfDB can play a pivotal role in electrifying sustainable urban mobility and improving the reliability of energy systems. Stronger market inter-connections, such as single network payment systems, would enable leveraging tighter connectivity between bus rapid transport systems, ultra-light rail, privatised minibus systems, taxis, and personal transport across two, three and four wheelers.
Recommendation 3

African automotive associations and governments should collaborate to develop a roadmap for leapfrogging to EVs

A closer cooperation of industry, finance and city governments is needed to remove the barriers and accelerate the transition to sustainable mobility. In 2015, BMW, Ford, General Motors, Nissan, Toyota and Volkswagen launched the **African Association of Automotive Manufacturers** (AAAM). The association will coordinate policies to develop the automotive sector in key markets in Africa, but has not yet prioritised the promotion of cleaner or electric vehicles in the region.57

On the other hand, in 2016, BMW, Nissan, and the South African National Energy Development Institute (SANEDI) launched the **Electric Vehicle Industry Association** (EVIA) for South Africa to support the development of public EV infrastructure.58 Eskom, South Africa’s public electricity utility, has also begun to take an active role in partnering with the government, EVIA and leading car companies in South Africa, such as BMW and Nissan, on the rollout of public and private charging stations and billing systems that conform to national standards.59

A closer cooperation of AAAM and EVIA is needed to develop a roadmap and identify scalable pilot solutions to leapfrog EVs in Africa, possibly starting with South Africa and then creating other city-level platforms in some of the countries highlighted here. Such a roadmap would include a comprehensive picture of the policies, infrastructure, skills and financing needs and opportunities, and provide a platform for stakeholders in industry, finance and government to collaborate.
Focus
The overuse of antibiotics and water pollution in India undermine the global pharma industry.

Recommendations
1. Indian pharma companies should adopt sustainable financing strategies to develop zero-wastewater facilities.
2. The national antibiotic campaign in India should deploy proven crowd-sourcing technologies to enable citizens to control water pollution.
3. Indian industry associations – FICCI, CII and OPPI – should create a business action hub as a local partner of the global Antimicrobial Resistance (AMR) Industry Alliance.
2.1 SDG Framework
India’s Pharmaceuticals Industry

Regional ESI Diagram

The Earth Security Index diagram for the pharmaceuticals industry in India provides pharmaceutical companies and policy makers with a view of the SDG pressures that are material to the long-term growth of the sector in the country.
Pharmaceutical companies, industry associations, investors in pharma and development finance institutions, and government policy makers, should consider the risks and opportunities they face in relation to the following SDGs, and the imperatives for action:

### SDG 3 Good Health and Well-being
India’s government spends only 4.7% of its GDP on healthcare, less than half of government spend in Brazil, China and Russia. Poor public health infrastructure, high levels of infectious disease, such as TB, and cheap unregulated over-the-counter sale of antibiotics have led to a rapid rise in resistant infections in India. 57,000 newborn babies are estimated to die annually from drug-resistant infections in India, the highest figure globally. At the same time, on average, only 36% of key generic medicines are available in public hospitals in comparison to 76% in the private sector facilities. The government and industry campaign on the safe use of antibiotics must integrate sustainable access to and usage of antibiotics, as well as other key generic drugs, particularly for poor rural populations that lack access to doctors.

### SDG 6 Clean Water and Sanitation
The number of polluted rivers in India doubled from 2010 to 2015, exacerbating the growing water supply crisis for 600 million Indians that are already at high risk of freshwater supply disruptions. The contamination of waterways and the potential impact of untreated wastewater from antibiotic factories on antibiotic resistance, will require the industry to work with state governments and other industries to strengthen stewardship practices, as well as address water pollution challenges with suppliers as a central component of industry’s response to the AMR crisis.

### SDG 8 Decent Work and Economic Growth
Only 1,500 drug inspectors are responsible for monitoring good manufacturing practices for drug quality across the entire pharmaceutical industry in India. The Pollution Control Boards that monitor water pollution are chronically understaffed and underfunded. New partnerships with state governments must support investments in building up the skills and capacities of the Pollution Control Boards in order to create a more level playing field.

### SDG 9 Industry, Innovation and Infrastructure
Research and development costs in India can be up to 20 to 30% lower than those in USA and Europe, driving many companies to outsource both production and clinical trials to India. As the government looks to boost competitiveness and respond to India’s water crisis with stricter environmental regulations, companies that have already invested in effectively managing their wastewater emissions and being compliant with government regulations will be better positioned to grow in a more tightly regulated market.

### SDG 12 Responsible Consumption and Production
Over 21% of diseases in India are water-related due to high levels of biological and chemical contamination, leading to a drastic rise in respiratory diseases in populations where industry is concentrated. Scientists are also concerned that chemical pollution containing extremely high levels of antibiotics is a driver of AMR. Sound management strategies of industrial chemicals and wastes in the pharma supply chain and other key industries must meet international standards.

### SDG 15 Life on Land
India is one of the most biodiverse countries on earth, hosting 8% of all documented species, including over 45,000 species of plants. High levels of land degradation and biodiversity loss in India will require pharma companies to consider integrating a pharmaceutical value of biodiversity into bio-prospecting agreements with the government and form new partnerships with NGOs and communities to better protect species and habitats while ensuring fair and equitable benefit sharing from the utilisation of genetic resources as per international standards.

### SDG 16 Peace and Justice Strong Institutions
A chronic lack of enforcement of industry regulations and lack of capacity of government inspectors has allowed a number of industry transgressions in the supply chain to persist, from water pollution to unethical marketing practices. As the government calls for stricter penal action against unethical practices and making the 'Uniform Code of Pharmaceutical Marketing Practices’ mandatory, pharma companies must ramp up their efforts to agree to providing pricing guidelines to third-party sales agents and monitoring and auditing sales agents.
2.2 Regional Focus
The sustainable growth of pharmaceuticals in India

India has become a major global player in the pharmaceutical industry as a low-cost manufacturing destination for the global pharma across all categories of pharmaceutical production: finished dosage, active pharmaceutical ingredients (APIs) and intermediates as well as research and development activities. Alongside China, India is now one of the world’s two largest suppliers of antibiotics. However, India is now also the largest user of antibiotics for human health globally. The industry faces multiple social and environmental challenges to its sustainable growth. Access to healthcare and affordable medicines remains a challenge at the bottom of the pyramid, as government investment in healthcare remains low in comparison to other large emerging markets.

Pharma is one of India’s fastest growing industries

The USD 17 billion pharmaceuticals industry in India is one of the fastest growing manufacturing segments of the Indian economy. It has been growing at 15% per year since 2010 and is a priority sector for Prime Minister Modi’s ‘Make in India’ programme. While the pharma production market has been strongly export-oriented, the growth of India’s middle class is creating a vibrant domestic market for medicines that address diseases such as diabetes, heart disease and other non-communicable diseases associated with a more affluent population.

By 2020, the Indian domestic pharmaceuticals market is expected to become the third largest globally, reaching at least USD 55 billion in revenues. However, access to medicines and to healthcare remains a challenge for the poorest households in India that are estimated to spend up to 40% of their overall income on medicines.

Water pollution is becoming a material risk for pharmaceutical supply chains

Untreated wastewater from pharmaceutical factories remains a complex challenge to the industry in India. Untreated effluent from factories is an added critical factor to broader trends of overuse of antibiotics. This means that chemical waste from the production of antibiotics is entering water sources and finding its way to humans.

As India becomes a focus of global attention for antibiotic resistance, the pressure on industry to address the wastewater challenges in the supply chain are likely to grow. The improved management of wastewater in pharma supply chains, in addition to improving the prescription and use of antibiotics, will be one of the crucial challenges to the industry, and potentially undermine the credibility of global industry commitments to tackle AMR.

India’s manufacturing landscape requires systemic business action

The Indian pharmaceutical sector is highly fragmented with more than 20,000 registered production units that produce 20% of global generic medicines. Roughly 250 large Indian and international pharmaceuticals companies dominate the production market for finished dosage formulations (i.e. the final consumable drug), with the top ten companies comprising more than a third of the production market. About 8,000 smaller production units control much of the bulk drugs production (i.e. basic APIs).

The industry is expected to grow faster as the Indian government seeks to boost domestic API production in order to reduce its dependence on Chinese imports. API production in India is concentrated in the industrial zones surrounding Hyderabad (in Telangana) and Visakhapatnam (in Andhra Pradesh) that together account for roughly 20% of India’s pharmaceutical exports.
Earth Security Report 2017
Pharmaceuticals
India
2.3 Flashpoints for Business Diplomacy
Strategic trends for collaboration on India’s sustainable pharma industry

<table>
<thead>
<tr>
<th>Flashpoint 1</th>
<th>Global pharma companies increasingly scrutinised on the environmental pollution of drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Over half of India’s waterways are now severely polluted, driven by the scale of untreated industrial waste and municipal sewage. As wastewater discharge doubled between 2010 and 2015, the sewage treatment capacity gap in India reached 38,000 million litres per day in 2015. As a result, unchecked pollution is expected to make India’s growing freshwater demand unmanageable and likely to render some cities uninhabitable by 2025. Pollution Control Boards at the national and state levels have declared the country’s primary pharmaceutical production hubs as some of the ‘most critically polluted areas’ in the country and have ordered multiple suspensions of pharmaceutical manufacturing facilities for violating pollution regulations since 2009. The Pollution Control Board in Hyderabad has also threatened plant closure and publicly revealed a list of non-compliant companies. India’s local pollution problems are having global implications in the capital markets for multinationals. Investors, including BNP Paribas and Nordea Asset Management, are increasingly pressuring international pharma companies to address water pollution in their supply chains.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flashpoint 2</th>
<th>India is a global hotspot for the rise of the AMR threat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When micro-organisms are exposed to untreated chemical waste antibiotics, antifungals, antivirals, antimalarials and anthelmintics they can mutate and develop a resistance to become superbugs. In addition to the overuse of antibiotics for humans and animal farming, untreated antibiotic production waste also releases antimicrobials into the environment. Yet, concentrations of medical compounds and antibiotic pollution are largely unregulated and not monitored by India’s central and state pollution boards. Independent studies have shown that high concentrations of antimicrobials in environmental samples taken close to pharmaceutical factories are creating a breeding ground for AMR in the lakes and rivers that surround the country’s pharma production hubs. AMR is already on the rise in India, where the infectious disease mortality rate is high and resistance to antibiotics is growing. Global travel, however, increases the speed at which superbugs spread, with 70–90% of all travellers to India returning home with drug-resistant bacteria in their gut. AMR is now present in every country, affecting the effectiveness, costs, and length of treatment of diseases from cancer and E.coli to malaria and tuberculosis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flashpoint 3</th>
<th>Financing solutions to achieve zero water pollution must be prioritised</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In 2015, India’s Central Pollution Control Board issued non-binding guidelines for the implementation of Zero Liquid Discharge (ZLD) for a number of industrial sectors, including pharmaceuticals. ZLD is a process which purifies and recycles almost 100% of wastewater produced. Major manufacturers, including Dr. Reddy’s, Hetero, Aurobindo, Matrix (Mylan), Divis, Natco, all report to having ZLD technology and waste processing facilities onsite. But common effluent treatment plants for the smaller production plants are over-burdened and under-equipped to process many chemical effluents. Yet, more expensive ZLD equipment is seen as prohibitively expensive for smaller manufacturing facilities. Shifting to zero wastewater emissions will be critical to the future growth of companies. For example, in Tamil Nadu, where ZLD was mandated for the textiles wet processing sector, over half of the textile factories in a key production zone were shut down between 2009 and 2011 for being non-compliant with the ZLD mandate. A clear roadmap must be developed by Indian pharma majors to map the opportunities to transition the whole production system in India to zero liquid discharge, identifying financing gaps and opportunities.</td>
</tr>
</tbody>
</table>
In 2016, Nordea, a USD 240 billion asset manager, revealed that hundreds of drug companies operating in Hyderabad and Visakhapatnam were still discharging wastewater from factories linked to the supply chains of the largest global pharma companies in its portfolio, including Sanofi, Novartis, and Roche. However, India’s bulk drug exporters recently warned the commerce ministry that stricter environmental requirements were creating delays in production and clearances. This means that a more coordinated response between companies and government will be necessary.

From the perspective of global manufacturers operating in India, or sourcing from India, it is vital to ensure that the environmental safeguards are clearly defined and effectively implemented by all Central and State Governments in India. For Indian companies, this must emerge as an essential prerequisite for sustained global competitiveness in the access to national and international markets. State governments in India must showcase examples of suppliers that are forced to discontinue production unless they adhere to stringent environmental norms.

A shortage of staff and funding for pollution boards that inspect production sites hampers the effective implementation of regulations across a highly-fragmented pharma manufacturing sector. Despite a Supreme Court ruling banning pollution from the pharmaceuticals sector in 1993, Nordea’s recent investigations revealed that many production plants continued to illegally dump untreated chemical waste into surrounding waterways.

Since 2016, Nordea has been working with the Pharmaceutical Supply Chain Initiative (PSCI) to jointly raise awareness of the expectations of major pharmaceutical companies and the investor community on the need to effectively manage pharmaceutical production waste and minimise the release of medicines and antibiotics to the environment.

To build on these efforts, more effective ‘sticks’ in the form of enforceable regulations must be deployed together with more attractive ‘carrots’ in the form of financing mechanisms to upgrade manufacturing facilities and purchase agreements based on environmental criteria, in order to advance system change.

### Flashpoint 4
**Quality and environmental safeguards must be considered as drivers of global competitiveness**

In 2016, Nordea, a USD 240 billion asset manager, revealed that hundreds of drug companies operating in Hyderabad and Visakhapatnam were still discharging wastewater from factories linked to the supply chains of the largest global pharma companies in its portfolio, including Sanofi, Novartis, and Roche. However, India’s bulk drug exporters recently warned the commerce ministry that stricter environmental requirements were creating delays in production and clearances. This means that a more coordinated response between companies and government will be necessary.

From the perspective of global manufacturers operating in India, or sourcing from India, it is vital to ensure that the environmental safeguards are clearly defined and effectively implemented by all Central and State Governments in India. For Indian companies, this must emerge as an essential prerequisite for sustained global competitiveness in the access to national and international markets. State governments in India must showcase examples of suppliers that are forced to discontinue production unless they adhere to stringent environmental norms.

### Flashpoint 5
**Pharmaceuticals must encourage government investment in pollution controls**

A shortage of staff and funding for pollution boards that inspect production sites hampers the effective implementation of regulations across a highly-fragmented pharma manufacturing sector. Despite a Supreme Court ruling banning pollution from the pharmaceuticals sector in 1993, Nordea’s recent investigations revealed that many production plants continued to illegally dump untreated chemical waste into surrounding waterways.

Since 2016, Nordea has been working with the Pharmaceutical Supply Chain Initiative (PSCI) to jointly raise awareness of the expectations of major pharmaceutical companies and the investor community on the need to effectively manage pharmaceutical production waste and minimise the release of medicines and antibiotics to the environment.

To build on these efforts, more effective ‘sticks’ in the form of enforceable regulations must be deployed together with more attractive ‘carrots’ in the form of financing mechanisms to upgrade manufacturing facilities and purchase agreements based on environmental criteria, in order to advance system change.

### Largest Indian generic and international pharmaceutical companies

**Indian generic companies**
Sun Pharma  
Cadila Health  
Lupin  
Piramal Enterprises  
Dr Reddys Labs  
Cipla  
Aurobindo Pharm  
Alkem Lab  
Torrent Pharma  
Biocon

**International companies**
GlaxoSmithKline  
Sanofi India  
Pfizer India  
AstraZeneca  
Merck  
Novartis India  
Roche India  
Johnson & Johnson  
Bayer India  
Novo Nordisk India

Sources: National Stock Exchange of India and India Brand Equity Foundation
2.4 Recommendations

For companies, financial institutions and government decision-makers shaping the growth of pharmaceuticals in India

Recommendation 1

Indian pharma companies should adopt sustainable financing strategies to develop zero-wastewater facilities

New lines of credit are needed to upgrade facilities of smaller and medium-sized pharmaceutical factories. ZLD is three times more expensive than standard wastewater procedures in India. Many of the thousands of smaller producers claim these costs are a barrier to its implementation.99 Creating new financial vehicles, such as a financing facility or fund for ZLD technology should be a priority for India.

Leading pharma companies in India could leverage their legally mandated CSR financial commitments to establish and help capitalise such a facility. Development finance institutions, commercial banks, and large private foundations focused on health, such as the Gates Foundation, must develop models that enable support to the flow of finance – from providing risk guarantees and lower interest rates, to green bond financing. A similar model has been created by the Indian Ministry of Power and YES Bank, India’s fourth largest private bank, to scale-up energy efficiency investments as part of its National Mission for Enhanced Energy Efficiency. A Partial Risk Guarantee Fund for Energy Efficiency will provide the bank with a partial risk coverage in loans extended to micro, small and medium enterprises for energy efficiency projects.100

For the pharma industry, leading companies could engage the Department of Pharmaceuticals under the Ministry of Chemicals and Fertilizers to explore a similar partnership with the industry and leading Indian banks, to offer loans at preferential interest rates and provide partial guarantees to further lower the costs of finance. Co-financing structures like the ones that have been used by the Pollution Control Board in Uttar Pradesh could also be used, where smaller textile manufacturers in industrial parks are given 75% of the capital costs to upgrade their industrial Common Effluent Treatment Plant (CETP) to meet ZLD requirements, while the members of the industrial park invest the remaining 25%.101
Recommendation 2
The national antibiotic campaign in India should deploy proven crowd-sourcing technologies to enable citizens to control water pollution

The national campaign for the responsible use of antibiotics, the ‘Redline Campaign’, was launched in 2016 by the Organisation of Pharmaceutical Producers of India (OPPI) and the Indian Ministry of Health & Family Welfare but is not yet focusing on water pollution, which remains an endemic problem in India where inspections and controls are underfunded. This alliance has the opportunity to mobilise citizen advocacy on water pollution across the country as part of its approach to tackling AMR in India. To do this, it must involve the Pollution Control Boards at the state and national levels, and jointly define the most effective entry points to mobilise a grassroots monitoring capacity on wastewater emissions from pharmaceutical factories.

There is a role for mobile technology application developers to innovate with new interfaces that can activate citizens to play a role in monitoring pollution, partnering with and drawing on successful experiences of citizen engagement apps that have already been deployed to counter bribery and corruption in India, such as ipaidabribe.com and whistlenowkerala.com.

Recommendation 3
Indian industry associations – FICCI, CII and OPPI – should create a business action hub as a local partner of the global AMR Industry Alliance

Large multinational pharma companies in the US and European Union together purchase 45% of all generic drugs manufactured in India. Many of these companies work together through the Pharmaceutical Supply Chain Initiative (PSCI), an industry initiative seeking to improve the conditions of communities where drugs are manufactured. In 2017, a global AMR Industry Alliance was launched in collaboration with the International Federation of Pharmaceutical Manufacturers and Associations (IFPMA). Among other things, companies have committed to implement a common global framework to help manage antibiotic discharge by 2018. This can only be successful if simultaneous action is taken by local industry suppliers to overcome key gaps to its implementation, such as weak monitoring and enforcement, and financing requirements.

A local industry alliance could involve the Federation of Indian Chambers of Commerce and Industry (FICCI), the Confederation of Indian Industry (CII), and the Organisation of Pharmaceutical Producers of India (OPPI) to act as an institutional counterpart hub to the global AMR industry alliance. Its role should be to develop a clear Indian roadmap to address water pollution and manage antibiotic discharge, in collaboration with the Government of India.
Focus
Regional water cooperation in Central Asia and local jobs are vital to China’s Belt & Road Initiative (BRI).

Recommendations

1. BRI energy investors should embed selected SDGs, such as water and local jobs, in their investment framework.

2. The Chinese government and BRI investors should develop the blueprint for a United Renewable Energy System of Central Asia (URESCA).

3. China’s development banks should support and facilitate a dialogue on Central Asia’s clean power corridors of the future.
3.1 SDG Framework
China’s Belt and Road Initiative

Regional ESI Diagram

The Earth Security Index diagram for the BRI aggregates the average pressures of 7 countries: Kazakhstan, Tajikistan, Uzbekistan, Kyrgyz Republic, Turkmenistan, Afghanistan and Pakistan. The diagram provides BRI investors, planners, policy makers and infrastructure companies with a view of the SDG pressures that are material to the development of energy and infrastructure projects in the region.
Chinese energy companies and banks financing energy infrastructure along BRI, international banks and energy infrastructure companies participating in BRI projects, as well as the governments of China and BRI countries should consider the risks and opportunities they face in relation to the following SDGs, and the imperatives for action:

**SDG 6 Clean Water and Sanitation**

Central Asia has some of the lowest water efficiency levels and is among the highest per capita water users globally. Water shortages are already an operational risk for energy companies in the region. The use of water for agriculture by downstream countries – one of the region’s main drivers of potential conflict – is likely to be increasingly affected without effective water cooperation. BRI investors must integrate transboundary water risks into their energy growth plans and ensure their active support for transboundary water cooperation.

**SDG 7 Affordable and Clean Energy**

Energy inefficiency and an ageing electricity infrastructure are key causes of increasing power shortages across the region. Electricity losses in Tajikistan and Kyrgyzstan are estimated at 20% of total power output. In Uzbekistan, severe power supply shortages are expected by 2020. Energy efficiency investments and improving electricity generation, transmission and distribution infrastructure are an opportunity for BRI investors to align investment portfolios to regional priorities.

**SDG 8 Decent Work and Economic Growth**

According to the World Bank, the shortage of skilled labour is the second biggest constraint to growth reported by local firms in the region, after tax rates. So far, BRI investors have overcome these challenges by bringing in a skilled white-collar workforce from China. Balancing this approach with a commitment to local enterprise and skills development – whether as part of the broader value chains of its investments or in associated service sectors – is one way for BRI and China to build a positive long-term licence to operate in the region.

**SDG 9 Industry, Innovation and Infrastructure**

Asian Development Bank (ADB) estimates that USD 2 billion in infrastructure investments are needed annually in Central Asia to rehabilitate and upgrade the region’s ageing infrastructure. Investments in the region’s transport networks are central to BRI’s investments. Transboundary tension, including issues over water and energy, will hamper efforts toward greater connectivity, requiring BRI investors to foster regional policy harmonisation and cooperation where possible to build trust.

**SDG 11 Sustainable Cities and Communities**

Central Asia and the surrounding region has some of the highest air pollution levels globally, which are primarily driven by a heavy dependence on coal. China’s own experience of recognising the importance of clear air to the wellbeing and stability of cities will resonate with this challenge. An understanding of air pollution being a key local priority is important to BRI’s energy investments and the perceptions of local populations towards BRI in the future. Air pollution should be considered as a key impact indicator across all energy investments.

**SDG 12 Responsible Consumption and Production**

The region is characterised by high fossil fuel consumption. In Kazakhstan alone, fossil fuel consumption subsidies amounted to USD 6 billion in 2012. As governments come under pressure to rebalance fossil fuel subsidies with support for cleaner energy sources as part of their Paris commitments, BRI investors will need to increase the percentage of renewables in their energy investment portfolios.

**SDG 13 Climate Action**

The total volume of Central Asia’s glaciers has contracted by a third since 1900, and is expected to decline by up to 80% in a 4°C warmer world. Shrinking glaciers have already diminished water availability for the hydropower dams in the region. This has forced countries like Tajikistan, Kyrgyzstan, and Pakistan to increase their coal-powered generation, which also needs substantial water for cooling. It has also reduced water supplies to downstream countries in the summer. BRI investors need to factor climate change scenarios into their risk analysis and integrate climate resilient technologies into their energy investment portfolios.
3.2 Regional Focus

The sustainable growth of energy investments in China’s Belt and Road

The Belt and Road Initiative (BRI) is China’s ambitious outbound investment strategy, which links at least 65 countries along terrestrial and maritime trade corridors. BRI will open massive new opportunities for trade and investment in frontier markets. Energy infrastructure investments are a backbone of BRI.

The brief focuses on Central Asia, as BRI’s immediate sphere of influence across China’s western borders. It shows why the region’s security and stability require energy infrastructure investments to align more strategically with the Sustainable Development Goals.

Water security has emerged as a key geopolitical risk. This is further exacerbated by growing water demands from the energy and agriculture sectors. With the collapse of the Soviet Union, the regional system that managed energy inter-dependence gave way to newly independent republics concerned about their own energy supplies. Upstream countries deepened their reliance of hydropower by building dams, which affected the flow of water to downstream countries and their agriculture, while the latter rely on their oil and gas resources.

Without transboundary water cooperation, the future security of the region looks bleak. Receding glaciers upstream mean that there will be progressively less water to rely on. Decoupling energy production from water is the linchpin to making a new, more inter-dependent system work. Recent investments in grid interconnections across borders suggest that new regional-scale energy infrastructure based on cross-border, distributed renewable energy, could almost certainly lead to a future of peaceful cooperation and growth.

BRI’s infrastructure investments are changing the geographic definition of Central Asia, from the Soviet Union’s boundaries that included Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan and Kyrgyzstan; to include Pakistan and Afghanistan. BRI involves three distinct trade and investment corridors: The New Eurasia Land Bridge Economic Corridor (involving Kazakhstan, as well as Russia, Belarus and Poland); the China-Central Asia-West Asia Economic Corridor (involving Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan and Turkmenistan, as well as Iran and Turkey); and the China-Pakistan Economic Corridor (CPEC).

Chinese state-owned banks and companies dominate investments in oil, gas and hydropower along BRI. These include China’s Silk Road Fund, which was capitalised with USD 40 billion in 2014 and received a further USD 14.5 billion capitalisation at the recent BRI Summit in 2017. The China Development Bank, has already granted USD 160 billion in loans to countries involved in the BRI, and has identified a further USD 350 billion worth of projects.

The new player at the table, the Asian Infrastructure Investment Bank (AIIB), a China-led multilateral bank, has so far disbursed USD 1.7 billion for infrastructure projects. Following the recent Belt and Road Forum for International Cooperation, the Export-Import Bank of China (China EximBank) has signed 28 loan agreements valued at almost USD 6 billion with government authorities and companies of the countries along the Belt and Road.

Energy production in Central Asia must be decoupled from water consumption

Central Asia as a region is being redefined by BRI investments

China’s development banks are increasingly exposed to instability in the region
3.3 Flashpoints for Business Diplomacy
Strategic trends for collaboration on BRI’s sustainable energy

Flashpoint 1
Regional trust has been eroded due to the collapse of the Soviet Union’s energy system

The Unified Energy System of Central Asia was the Soviet Union’s regional approach to coordinating energy and water supplies across upstream countries (Kyrgyzstan and Tajikistan) and downstream countries (Uzbekistan, Kazakhstan and Turkmenistan). It ensured that downstream countries could access water to develop strong agriculture sectors. They provided oil- and gas-powered energy to upstream countries in return for the use of water. The system was dismantled in the 1990s with the collapse of the USSR. Since then, individual countries have sought to develop their national self-reliance on energy: upstream countries built hydropower dams, which affected the flow of water to downstream countries; while downstream countries diversified their markets for oil and gas exports.

As a result, trust and coordination across borders have been weakened. Since 2013, Uzbekistan has cut power and gas supplies to Tajikistan and Kyrgyzstan three times, exporting them to Afghanistan instead. Increased winter hydropower production in Tajikistan and Kyrgyzstan as a result of the cuts, led to reduced water exports for agriculture in Kazakhstan and Uzbekistan. Investment in the oil and gas sector of Uzbekistan, Turkmenistan and Kazakhstan with an export focus has also meant that their own citizens continue to experience energy shortages in winter.

Flashpoint 2
Climate change and water security are enhancing geopolitical risks for energy investments

Climate change will almost certainly reduce water availability in the region, with impacts on energy and agricultural systems. All seven countries in the region are highly vulnerable to climate change. As the region’s mountain glaciers recede, water scarcity is set to grow. 50% of glaciers in Central Asia could disappear by as soon as 2035, and entirely disappear in parts of Pakistan. High population growth and urban migration, combined with excessive and uncontrolled water withdrawal and pollution from irrigation, are set to deepen transboundary water crises across the region.

Contested water affects energy investments in the region. It blocks the developments of large power projects such as the Rogun Dam in Tajikistan. In the absence of better inter-sectoral collaboration, the risks of stranded energy investments are set to rise. Ironically, the effects of climate change on water availability may force Central Asian countries to increase their dependence on coal, further increasing their carbon emissions. In Tajikistan, energy shortages from low dam reservoir levels have already intermittently forced the use of coal-fired energy, which also is water-intensive and carries outage risks due to water scarcity.

Flashpoint 3
Local unemployment and access to skills are growing concerns for the infrastructure sector

Unemployment, and limited opportunities to develop skilled labour is one of the biggest constraints to growth in the region. The resulting informal sector is fertile ground for illicit economies such as drug trafficking from Afghanistan, Pakistan and Western China through Central Asia to Russia and Europe. Locals expect that BRI investments will create a spillover of opportunities for small and medium enterprises (SMEs). Countries imposing ‘local content’ laws on companies (the requirement to employ a majority of local people) where skills are unavailable, are a major challenge for infrastructure projects globally. In addition, Chinese loan conditions often require projects to be implemented by Chinese companies and labourers, despite local content laws in Pakistan, Turkmenistan and Uzbekistan.

Developing new opportunities and partnerships to bolster job-creating investments is a key sustainability challenge for BRI’s future in the region. China is now the world’s leading market and investor for renewable energy. It is planning to invest over USD 15 trillion in renewables over the next 15 years within and beyond China. It can complement large-scale project finance with opportunities for SME financing, which would create local markets for Chinese renewable energy products and jobs associated with these markets (such as technicians, repairs and services, retailing of solar home systems).
Large-scale grid connection projects are seen as vital to address significant transmission and distribution losses, reinvigorate regional energy trade, and deepen regional cooperation through growth. The USD 1 billion TUTAP project financed by the Asian Development Bank (ADB), seeks to link the power grids of Turkmenistan, Uzbekistan, Tajikistan, Afghanistan and Pakistan into a unified grid system from existing hydropower and coal- and gas- fired plants. The World Bank led USD 1 billion CASA-1000 project will enable Tajikistan and Kyrgyzstan to deliver excess hydropower in the summer season to Afghanistan and Pakistan. Both projects have been slow to progress given the political barriers to regional integration. However, the trend towards regional electricity integration is vital to future investment.

Distributed renewable energy investments are a crucial component in addressing electricity shortages in Central Asia, Afghanistan and Pakistan, where the potential for renewable energy generation is very high. Kazakhstan aims to add 53 renewable energy projects with a total capacity of 1,966 MW by the end of 2020. Private investment is crucial for meeting the capital requirements to finance the renewable plans in the region, but securing private sector investments has been an uphill struggle in state-owned, centrally controlled systems with minimal distributed energy policies and high levels of fossil fuel and electricity subsidies. In Afghanistan, USAID efforts to kick-start the renewables sector have been limited by a lack of viable power purchase agreements from the government. In Kyrgyzstan, a USD 20 million UNDP and GEF private sector grant facility for micro-hydro had no takers due to concerns about low tariffs and the high costs of local bank finance. On the other hand, clear policy commitments on renewables and a feed-in tariff regime in Pakistan helped the government secure USD 3 billion in renewable energy investment in 2015. By securing better government policies on renewables, BRI can create a step-change in renewable energy investment.

<table>
<thead>
<tr>
<th>Country</th>
<th>Pakistan</th>
<th>Kazakhstan</th>
<th>Tajikistan</th>
<th>Uzbekistan</th>
<th>Turkmenistan</th>
<th>Kyrgyz Rep.</th>
<th>Afghanistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spend</td>
<td>45 billion</td>
<td>14 billion</td>
<td>6 billion</td>
<td>6 billion</td>
<td>4 billion</td>
<td>1 billion</td>
<td>0.1 billion</td>
</tr>
</tbody>
</table>

**Key energy investments**

- State Grid Corporation of China (SSGCV) is implementing the USD 2.1 billion Port Qasim-Faisalabad Electricity Transmission Project as part of the CPEC.  China Natural Petroleum Corporation (CNPC) has formed a 50:50 joint venture with Kazmunaiagaz to develop the Urikhtau gas field.  
- Tebian Electric Apparatus (TBEA) has built a USD 350 million coal-fired power plant in Dushanbe and a USD 400 million electrical transmission line across the country.  
- CNPC has formed a 50:50 joint venture with Uzbekneftegaz to develop the Mingublak Oilfield and the Karakul, Baysun and Surhan gas blocks.  
- USD 8 billion gas export-backed loans to Turkmenistan from China Development Bank to develop the Galkynysh gas field.  
- TBEA invested USD 386 million into the reconstruction of the Bishkek Power Station.  
- CNPC signed a contract with Afghan’s Ministry of Mines for exploration and extraction of the Amu Darya Oil River Basin in northern Afghanistan.

Source: International Monetary Fund, 2015.
3.4 Recommendations
For energy companies, investors and government policymakers shaping the future of BRI in Central Asia

Recommendation 1
BRI energy investors should embed selected SDGs, such as water and local jobs, in their investment framework.

Recommendation 2
The Chinese government and BRI investors should develop the blueprint for a United Renewable Energy System of Central Asia (URESCA).

There is growing interest from China and international projects seeking to ‘green’ the BRI. This includes a framework agreement between China’s Ministry of Environmental Protection and UN Environment.157 Large-scale renewable energy projects are already being financed by BRI investors, such as the Silk Road Fund, China Development Bank, China Exim Bank, and Asian Infrastructure Investment Bank (AIIB). This trend is likely to continue given the opportunity for China to export leading renewable energy technology.

However, our analysis suggests that the environmental issues that are material to BRI’s development interact with social priorities in BRI countries, in particular, related to pressures over job creation and skills building. BRI investors can adopt the SDG framework to move from ‘green’ issues to a more interconnected view of inclusive growth priorities. This would still provide the basis to address key environmental issues, such as embedding water scarcity, water pollution and carbon emissions into investments, but would consider the linkages of these issues with social priorities. To create the long-term goodwill of BRI countries towards China, development banks will have to play a proactive role in creating local jobs, skills and enterprises, drawing on institutions that are already focused on SME development in the region such as the Central Asia Regional Economic Cooperation (CAREC) Program.

China’s bold vision is to create a global renewable energy grid that connects renewable energy generation across hemispheres. This would create a continuous source of clean power across national borders and time zones.158 The Beijing-based Global Energy Interconnection Development and Cooperation Organization (GEIDCO) and China’s State Grid Corporation have proposed a layout for such a system in Asia. This would develop six ‘Ultra High Voltage’ grids across China, Northeast Asia, Southeast Asia, South Asia, Central Asia and West Asia to cement a clean power system in the region.159 President Xi Jinping recently underlined the strategic role that the BRI should play in this system.160 The wind and power resources of Central Asia are a vital resource for one component of this grid.

Just like during the Soviet Union’s time, a United Energy System of Central Asia helped to organise cooperation in the region, in the 21st Century BRI should be the driver of a vision of prosperity between these countries based on renewable energy. In Central Asia, a grid interconnection across national borders, which decouples energy production from intensive water consumption, has the potential to address the geopolitical tensions that hamper prosperity and security. China’s development banks and BRI investors should embrace the vision of making BRI a critical corridor for the development of a green super grid.
**Recommendation 3**

**China’s development banks should support and facilitate a dialogue on Central Asia’s clean power corridors of the future**

Bringing countries together to work out how to advance the interoperability of electricity networks, common fiscal incentives for renewables and other cross-border alignments offers in itself a new vector of dialogue and cooperation that can help build trust. A dialogue process encouraged by development banks in the region can set the initial basis to bring private and public actors together. It would be aligned with, and linked to, multilateral platforms such as the **Shanghai Cooperation Organisation’s (SCO) Energy Club**, which includes Central Asia as well as Afghanistan and Pakistan. This is the primary forum for countries in the region to coordinate energy strategies, investment plans and implement measures of collective energy security.

Such a dialogue could combine representatives from country governments, global private sector energy companies and investors that see the potential to participate in BRI investments. For multilateral lenders, such as the **Asian Infrastructure Investment Bank (AIIB)**, the identification of priorities emerging from such a dialogue would help to inform lending strategies and conditional lending requirements, such as feed-in tariffs, renewable auctions, reduced fossil subsidies as well as the application of water-risk screening processes for energy investments.
Focus
Working conditions in factories in ASEAN are an endemic challenge for global electronics companies.

Recommendations

1. Global electronics companies should reflect a commitment to workers’ rights in their global supply chain frameworks.

2. Companies should embed decent work as a feature of their product brands, to help shape global consumer values.

3. ASEAN Business Advisory Council and global electronics companies should collaborate on policies that ensure decent work conditions at a regional ASEAN level.
4.1 SDG Framework
Consumer electronics in ASEAN

Regional ESI Diagram

The Earth Security Index diagram aggregates the average pressures of 5 countries key to electronics manufacturing in ASEAN: Indonesia, Malaysia, Philippines, Thailand and Vietnam. The diagram provides electronics companies, investors, and policy makers with a view of the SDG pressures that are material to the development of the industry in the region.
Global consumer electronics companies sourcing from Southeast Asia, global investors in these companies, and government policy makers in the region should consider the risks and opportunities they face in relation to the following SDGs, and the imperatives for action:

**SDG 6 Clean Water and Sanitation**
Water pollution in the region is at critical levels and getting worse. Almost half of the rivers in Thailand are considered heavily polluted. Industrial pollutants from E&E manufacturing are not yet regulated, but a growing water pollution crisis in key production countries will require the sector to take a more leading position on sustainable production processes, water-use efficiency and technologies to address the challenge.

**SDG 8 Decent Work and Economic Growth**
While unemployment levels in the region are low, more than 2.6 million people in ASEAN are estimated to live in modern slavery conditions. Companies will need to balance increasing automation of manufacturing processes with growing public pressure to meet international standards, such as the Modern Slavery Act, to address the scale of bonded and forced labour in manufacturing supply chains.

**SDG 9 Industry, Innovation and Infrastructure**
ASEAN’s internet population doubled to 162 million from 2009 to 2013. However, there remains a strong digital divide between and within countries. Efforts to further digital inclusion should be supported as it will be an important enabler of growth for electronics companies in the region.

**SDG 11 Sustainable Cities and Communities**
As ASEAN’s middle class more than doubles by 2020, annual consumer spending is set to rise 80% to USD 2.3 trillion generating new consumer opportunities to service an increasingly affluent urban population. For example, the market for the Internet of Things (IoT) is growing at 35% annually, reaching USD 7.53 billion in 2020. At the same time, growing demographic disparities between countries will fuel intra-regional migration to fast growing cities in the region, requiring companies to double down on efforts to address migrant forced labour.

**SDG 12 Responsible Consumption and Production**
E-waste, discarded electrical and electronic devices, grew 63% between 2010 and 2015 in Southeast Asia. The growing challenge of improper and illegal e-waste dumping is increasing occupational health exposure to toxic chemicals and substances. At the same time, highly toxic chemicals in electronics production are now leading to increased cancer rates amongst electronics workers. The resulting environmental and human harm from local and international dumping of e-waste and electronics manufacturing is driving ‘extended producer responsibility’ for consumer electronics brands, and will require companies to form stronger partnerships on circular economy models with suppliers.

**SDG 16 Peace and Justice Strong Institutions**
The region is amongst the lower performers on Transparency International’s Corruption Perception Index. In the electronics sector, every country in ASEAN has seen a decrease in the number and frequency of inspections per worksite. The combination of poor controls, under-resourced labour auditing and political acceptance of illicit labour practices, underlines the need for stronger industry action to enforce international norms, and for leadership on business integrity.
4.2 Regional Focus
The sustainable growth of consumer electronics in ASEAN

The Association of Southeast Asian Nations (ASEAN) is set to become on aggregate the 4th largest economy by 2030. One of the pillars of this growth and global competitiveness is seeking to overtake China as the global manufacturing hub for electrical and electronics equipment (E&E). Global consumer electronics companies are increasingly considering this region, looking to benefit from low labour costs and a growing domestic consumer base for electronics.

ASEAN’s international trade of electrical and electronics equipment (E&E) products, including computers, mobile phones, TVs and household appliances, has tripled over the past decade, reaching USD 382.1 billion in 2016. Singapore, Malaysia, Thailand, Vietnam, Philippines, and Indonesia account for over 90% of ASEAN industry exports. Nearly 1,700 E&E manufacturing companies operate in Malaysia producing one of the country’s largest exports. Thailand is the second largest hard disk drive manufacturer after China, but is now competing with lower-cost neighbours such as Vietnam. Between 2010 and 2014, Vietnam’s E&E exports grew 60% to become the 12th largest global exporter in the sector. The Philippines produces 10% of the world’s semiconductors, with electronics exports accounting for 50% of its total exports.

The ASEAN region is itself evolving into a mass consumer market for electronics. Its predominantly young population of 625 million is increasingly affluent and globally connected. The region is the world’s fastest growing internet region, with e-commerce projected to grow to more than USD 200 billion by 2025.

To capitalise on the region’s growing market and low manufacturing costs, investments in electronic manufacturing capacity throughout ASEAN are set to grow. For example, Bosch, with a presence in 6 ASEAN countries, is increasing its investments in the region by USD 1.2 billion. 50% of the manufacturing investments of US companies in the region are in computers and electronics. Vietnam has been Apple’s fastest growing market in 2014, leading the company to open a subsidiary there in 2015.

By contrast, the ASEAN’s domestic consumer base is growing, further attracting global manufacturing. The growth of the electronics manufacturing industry has provided opportunities to higher-skilled employment in its high-tech research, design and innovation segments, particularly in production markets such as Singapore. However, the lion’s share of employment created in the region is for low-skilled assembly and packaging.

Human rights issues have been a chronic issue among these low-skilled, often migrant and foreign contract labour workers, who face compulsory overtime, hazardous working conditions, unequal pay and a lack of compensation for workplace accidents. As pressure mounts on global consumer electronics companies to effectively acknowledge and tackle social, environmental and governance issues in their supply chain, a more strategic approach must be taken to transform the industry’s business model to create decent work, in alignment with the SDGs.

To capitalise on the region’s growing market and low manufacturing costs, investments in electronic manufacturing capacity throughout ASEAN are set to grow. For example, Bosch, with a presence in 6 ASEAN countries, is increasing its investments in the region by USD 1.2 billion. 50% of the manufacturing investments of US companies in the region are in computers and electronics. Vietnam has been Apple’s fastest growing market in 2014, leading the company to open a subsidiary there in 2015.

By contrast, the ASEAN’s domestic consumer base is growing, further attracting global manufacturing. The growth of the electronics manufacturing industry has provided opportunities to higher-skilled employment in its high-tech research, design and innovation segments, particularly in production markets such as Singapore. However, the lion’s share of employment created in the region is for low-skilled assembly and packaging.

Human rights issues have been a chronic issue among these low-skilled, often migrant and foreign contract labour workers, who face compulsory overtime, hazardous working conditions, unequal pay and a lack of compensation for workplace accidents. As pressure mounts on global consumer electronics companies to effectively acknowledge and tackle social, environmental and governance issues in their supply chain, a more strategic approach must be taken to transform the industry’s business model to create decent work, in alignment with the SDGs.
4.3 Flashpoints for Business Diplomacy
Strategic trends for collaboration on ASEAN’s working conditions

Flashpoint 1
Labour exploitation in lower-tier suppliers undermines the success of electronics production in ASEAN

Fluctuating and high-volume workload in the electronics supply chain drives extreme overtime and exploitation of temporary workers in manufacturing facilities. Factories rely on recruitment agencies and brokers to adjust temporary workforces to fit volatile production cycles, exacerbating precarious working conditions.\(^{187}\)

In Thailand, over half of the sector’s workers are temporary agency workers in precarious employment, where they lack the rights of permanent employees or union representation, face lower wages and increased job instability.\(^{188}\) In 2016, a survey by the global NGO Verité revealed evidence of forced labour in over 200 electronics factories in Malaysia.\(^{189}\) While global brands have improved policies and monitoring of permanent and fixed-contract employees in first and second tier suppliers, temporary workers and lower tier production processes, such as components manufacturing, are predominantly below the radar.\(^{190}\)

Flashpoint 2
Protecting migrant and foreign contract labourers is vital to electronics production in ASEAN

A constant stream of low-skilled migrant labour is viewed by local factories as a prime source of low-cost, flexible labour. The number of Southeast Asian migrant workers in ASEAN rose from 1.5 million in 1980 to 6.5 million by 2013. Over 90% are either unskilled or low-skilled and travelling illegally across a handful of routes to find work.\(^{191}\) In the E&E sector, Singapore, Malaysia and Thailand are primary destinations for labour migrants from Indonesia, Myanmar, Cambodia and Laos.\(^{192}\)

Migrant workers have little or no ability to bargain collectively on terms and conditions of their employment and therefore are highly susceptible to the extortionate conditions and hiring fees of recruitment agents, making them vulnerable to debt bondage, contract violations, wage fraud, and document seizure.\(^{193}\) In Singapore, migrants represent nearly 30% of the total electronics industry workforce, yet are not subject to Singaporean law and receive only 14% of the wage of their Singaporean counterparts.\(^{194}\)

Flashpoint 3
Denial of the right to organise is at the heart of exploitative conditions

Preventing the formation of trade unions and employee organisations in local factories undermines the efforts of global electronics companies to address forced labour in their supply chains. In the Philippines, NXP Semiconductors, a supplier to global electronics brands, is an example of a company responding to union concerns by increasing wages and regularising precarious working conditions at one of their factories in a special economic zone.\(^{195}\)

Industry and trade union groups across the ASEAN region have been supporting employees organise to improve labour rights.\(^{196}\) IndustriALL, a global union representative with 50 million workers, and the GoodElectronics network, have trained over 600 trade unionists from IndustriALL affiliates in the region as part of a 5-year project.\(^{197}\) The Electronics Industry Citizenship Coalition (EICC), an industry coalition of leading consumer electronics companies working on supply chain issues, has also launched migrant worker protection projects in the region.\(^{198}\)

### Largest global consumer electronics companies and their presence in the ASEAN region

<table>
<thead>
<tr>
<th>Company</th>
<th>Samsung</th>
<th>Apple</th>
<th>Microsoft</th>
<th>Hitachi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example investments in the ASEAN region</td>
<td>Samsung has invested close to USD 1.2 billion in Malaysia in television, monitors and battery manufacturing, one of its largest investments outside South Korea.(^{209})</td>
<td>Apple has committed to build a USD 44 million research and development facility in Indonesia, with plans to build three innovation centres in Indonesia over the next three years.(^{210})</td>
<td>Microsoft invested USD 220 million in new production lines in Nokia Vietnam (that has recently been acquired by Foxconn) in 2014 with expected output of 76.4 million products per year.(^{211})</td>
<td>Hitachi has so far invested about USD 108 million in Malaysia operating 22 manufacturing facilities including the production of electronics components such as switches and disk drives.(^{212})</td>
</tr>
</tbody>
</table>
While all ASEAN countries are members of the International Labour Organisation (ILO), most have not ratified key conventions relating to collective bargaining, freedom of association, and legal protection for migrant workers. The ten year-old ASEAN Declaration on the Protection and Promotion of the Rights of Migrant Workers has yet to be implemented due to objections by Malaysia and Singapore to include undocumented migrants.

However, the growing awareness of forced labour conditions in global value chains is nudging the regional approach. The ILO’s Task Force on ASEAN Migrant Workers, including trade unions and migrant worker associations, has been lobbying for the adoption of this rights-based framework and have established a platform for ongoing dialogue on the issue. The governments in Malaysia and the Philippines are set to implement minimum wages for migrant workers and more stringent standards for recruitment agencies, despite low industry acceptance.

Special Economic Zones (SEZs) and Export Processing Zones (EPZs) are the backbone of most ASEAN export-led development strategies for the sector. More than 1,000 SEZs exist in ASEAN. These zones cater to export-oriented companies, providing duty-free imports of materials and equipment, but have a higher prevalence of labour rights violations due to even weaker enforcement of labour laws within their bounds. Today, the most pronounced cases of union busting are found in these gated and secured enclaves, where electronics factories are increasingly located.

In 2016, ASEAN Economic Ministers adopted the ASEAN Guidelines for Special Economic Zone Development and Collaboration, a non-binding reference of best practices in the development and operation of SEZs. However, there is no information or even reference in the guidelines to improving and monitoring labour conditions, wages and union activities.

### Flashpoint 4
Regional coordination can help to level the playing field for business

While all ASEAN countries are members of the International Labour Organisation (ILO), most have not ratified key conventions relating to collective bargaining, freedom of association, and legal protection for migrant workers. The ten year-old ASEAN Declaration on the Protection and Promotion of the Rights of Migrant Workers has yet to be implemented due to objections by Malaysia and Singapore to include undocumented migrants.

However, the growing awareness of forced labour conditions in global value chains is nudging the regional approach. The ILO’s Task Force on ASEAN Migrant Workers, including trade unions and migrant worker associations, has been lobbying for the adoption of this rights-based framework and have established a platform for ongoing dialogue on the issue. The governments in Malaysia and the Philippines are set to implement minimum wages for migrant workers and more stringent standards for recruitment agencies, despite low industry acceptance.

### Flashpoint 5
Special economic zones must become a critical arena for improving labour rights

Special Economic Zones (SEZs) and Export Processing Zones (EPZs) are the backbone of most ASEAN export-led development strategies for the sector. More than 1,000 SEZs exist in ASEAN. These zones cater to export-oriented companies, providing duty-free imports of materials and equipment, but have a higher prevalence of labour rights violations due to even weaker enforcement of labour laws within their bounds. Today, the most pronounced cases of union busting are found in these gated and secured enclaves, where electronics factories are increasingly located.

In 2016, ASEAN Economic Ministers adopted the ASEAN Guidelines for Special Economic Zone Development and Collaboration, a non-binding reference of best practices in the development and operation of SEZs. However, there is no information or even reference in the guidelines to improving and monitoring labour conditions, wages and union activities.

<table>
<thead>
<tr>
<th>Company</th>
<th>Investment Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sony</td>
<td>USD 20 million in developing its plant in Thailand to produce premium smartphone models in 2016.</td>
</tr>
<tr>
<td>Panasonic</td>
<td>Panasonic is investing USD 44.6 million in air conditioner manufacturing in Thailand and expanding production capacity in Malaysia by 60%.</td>
</tr>
<tr>
<td>Toshiba</td>
<td>Toshiba is investing USD 4 billion to scale up its production of next-generation memory chips in the Philippines.</td>
</tr>
<tr>
<td>Intel</td>
<td>Intel has invested more than USD 1 billion since 2006 in its Vietnam-based factory to assemble and test its Intel® Core™ processor.</td>
</tr>
<tr>
<td>Hewlett-Packard</td>
<td>HP has invested USD 230 million in a hi-tech inkjet printer manufacturing facility in Penang, Malaysia.</td>
</tr>
<tr>
<td>LG Electronics</td>
<td>LG Electronics invested USD 1.5 billion to establish a screen factory in Vietnam in 2016.</td>
</tr>
</tbody>
</table>
4.4 Recommendations

For global electronics companies, financial institutions and government policy makers shaping the future of ASEAN’s manufacturing

**Recommendation 1**
Global electronics companies should reflect a commitment to workers’ rights in their global supply chain frameworks

Companies such as Samsung, HP and Motorola have developed new applications and online tools to share information with their suppliers and improve training and reporting on worker issues from suppliers. On an industry level, challenges in effectively monitoring and improving labour standards across various manufacturing sites remains a big challenge. Reaching further down the supply chain where many of the lower skilled and migrant workers are most vulnerable to precarious working practices and poor factory conditions will require the industry to consider new approaches.

Consumer electronics brands can follow the example of more than 50 multinationals, including H&M, BMW and Bosch, that have already signed ‘Global Framework Agreements’ (GFAs) with the IndustriALL Global Union. GFAs are jointly negotiated between companies and worker representatives to put in place standards on workers’ rights, health, safety and environment that meet international best-practices. Joint agreement ensures a shared responsibility for implementation and a more strategic alignment with local priorities for inclusive growth, quality of work, and safer production. As yet, IndustriALL is still looking to sign their first GFA with a company from the electronics sector and doing so is a unique opportunity for brand leadership.

**Recommendation 2**
Companies should embed decent work as a feature of their product brands, to help shape global consumer values

Innovative electronics companies, such as Fairphone, are building their brand appeal on the basis of fair working conditions. This provides an innovation model for larger and more established global brands, especially for millennial consumers in an increasingly crowded market. In the midst of production delays for Fairphone 1, the company refrained from requiring excessive overtime from its primary supplier, and instead explained to customers the reasons for delay. For the production of Fairphone 2, the company’s ‘Supplier Partnership Agreements’ outline shared commitments to co-invest in advancing social and environmental performance in top and sub-tier supplier factories.

GSN, a component manufacturer, partnered with Fairphone on its ‘Fair-Trade Pilot Center’ in Shenzhen in China, where it provides full social insurance coverage and additional paid leave for visiting family in other regions. GSN devotes two thirds of its annual dividend to social activities within and outside of the company. Companies should enhance their current response by developing ‘supplier partnership funds’ that help sub-tier suppliers to cover the costs of training, health and safety upgrades, fair living wages and social insurance coverage. These funds can be supplemented with dividend sharing incentives for enhanced compliance, and engage with emerging technology platforms, such as LaborVoices and Laborlink, which have developed mobile applications to provide anonymous worker feedback and real-time metrics to benchmark suppliers as a means to assess the impact of social financing schemes.
Recommendation 3

ASEAN Business Advisory Council and global electronics companies should collaborate on policies that ensure decent work conditions at a regional ASEAN level

Global electronics brands have a role to play in engaging with ASEAN to advocate policy improvements. In particular, this should focus on SEZs, where manufacturing activities are concentrated, and where union busting and poor working conditions are most prevalent. A first meeting is needed between companies and ASEAN to explore mutual interests, key objectives and potential areas of impact. Further to that, a business-led industry association should play a convening role to develop an industry platform going forward. This could build on the example of the Alliance for Bangladesh Worker Safety, where more than 200 global companies came together with textiles and garment manufacturers in Bangladesh to put an end to poor factory conditions. Companies in the alliance committed up to USD 500,000 per year to upgrade factories to improve safety for workers, as well as implement multi-party bargaining and ensure regular audits that were shared with workers and stakeholders.226

Such a platform in ASEAN would build on the existing pan-ASEAN programmes, including the ILO’s ASEAN TRIANGLE Project that is working with the ASEAN Trade Union Council and ASEAN Confederation of Employers on a framework for decent work in labour migration.227 It should advocate the adoption of ILO conventions on migrant workers and the right to organise.

Finally, the platform should provide an opportunity for consumer electronics companies to improve their collaboration with the ASEAN Business Advisory Council, as the primary private sector mechanism of ASEAN. As a first step, the implementation of the ASEAN Declaration on the Protection and Promotion of the Rights of Migrant Workers should be a priority and should be integrated into the ASEAN Guidelines for Special Economic Zone Development and Collaboration.
Earth Security Report 2017
Agri-business (coffee)
Latin America
Climate change and poverty in Latin America threaten coffee production and global coffee trade.

1. Global retailers should create attractive coffee brands based on regenerative models and shape global consumer values.

2. Global coffee companies should create ‘regenerative business incubators’ to scale new coffee production models based on resilience principles.

3. Sustainable coffee platforms, such as IDH, GCP and SCC, should collaborate on mainstreaming regenerative business models in coffee.
5.1 SDG Framework
Coffee in Latin America

Regional ESI Diagram

The Earth Security Index diagram for coffee production in Latin America aggregates the average pressures of 5 of the largest producer countries: Brazil, Colombia, Honduras, Mexico and Peru. While these regions have their unique challenges, the visual identifies some of the common pressures that are most material for the sector and will drive risk scenarios in the region.

The diagram and analysis provide coffee companies, including farmers, roasters, retailers – from coffee brands and coffee shop chains to supermarket retailers; as well as policy makers with a view of key SDG priorities and the opportunities to improve business models and partnerships to ensure long-term resilience and growth.
Coffee producers and traders, global coffee retailers and government policy makers should consider the risks and opportunities they face in relation to the following SDGs, and the imperatives for action:

**SDG 1 No Poverty**
The average land holding of smallholder coffee farmers in the region is between just 1 and 3 hectares. Weak land titling makes it difficult for poor farmers to access credit, and deters them from making longer-term productivity investments. Companies must strengthen their commitment to address weak land tenure and viable living wages. Raising the issue of poverty in the sustainability agenda for coffee production is vital. Even coffee farms certified with sustainability seals were found in 2013 to be paying farm workers below the minimum wage.

**SDG 2 Zero Hunger**
The outbreak of the coffee leaf rust disease in 2012 undermined the livelihoods and nutrition security of nearly half a million farmers in Central America. In addition to food security, from a sustainable agriculture perspective, a prevailing mono-crop production system has in part led to the excessive use of inputs and fertilisers. In sum, coffee farmers will continue to switch to higher value and edible crops in the absence of adequate support on pricing, advanced farming techniques and extension services.

**SDG 5 Gender Equality**
Although gender equality is higher in Latin America than other regions, gender gaps still persist in the agricultural sector, undermining its performance. Just 30% of women that live in rural areas own agricultural land, and only 5% have access to technical assistance. Companies must screen their supply chain initiatives and investments with a gender-sensitive lens.

**SDG 6 Clean Water and Sanitation**
Water shortages in coffee growing regions are a direct threat to its production. In Brazil, the 2014 droughts reduced coffee production by nearly 40%. As climate change leads to more extreme weather conditions, global coffee companies will need to increase their engagement and support for water stewardship programmes in their supply chains and invest in watershed and ecosystem funds to enhance climate resilience at the watershed level.

**SDG 8 Decent Work and Economic Growth**
An estimated 40% loss of coffee production from crop disease could lead up to 500,000 job losses in Central America alone. An ageing farming population is set to retire in the next ten years, creating a labour shortage gap as young people move to larger cities. Combined with growing input costs, this trend is set to increase coffee prices for roasters. Coffee companies will need to invest in enticing a younger generation of coffee farmers to stay in the business, through higher farmer incomes and greater value generation in coffee growing countries.

**SDG 10 Reduced Inequalities**
Latin America has the highest levels of income inequality globally. Just 10% of the region’s richest people have 71% of the wealth. This stymies growth and erodes social cohesion. Industry supply chain initiatives seeking to improve the conditions for smallholders, must also focus on addressing barriers to income growth, such as land insecurity, land holding size and aggregation of outputs, and market access.

**SDG 12 Responsible Consumption and Production**
Wastewater from the processing of coffee can be up to 40 times more contaminated than the average urban sewer wastage. The opportunity for companies in the coffee value chain is to develop new business models to convert toxic pulp from coffee mills into a valuable source of compost or bioenergy and in doing so reduce their energy costs and environmental impact.

**SDG 13 Climate Action**
Climate change will reduce the suitable land area for Arabica coffee production in Brazil and Central America by 80% by 2050. The coffee industry must work together with regional institutions such as the Inter-American Development Bank (IDB) to halt the decline and lack of funding for coffee research institutions, such as the Agronomic Institute in Brazil, and their programmes on planting materials, disease and climate resistant crop varieties, and farmer training.

**SDG 15 Life on Land**
20% of all forested and agricultural land in Latin America is already degraded, increasing the challenge of soil depletion in coffee plantations. The Peruvian Agricultural Census of 2012 identified coffee production as one of the major drivers of deforestation in the Peruvian Amazon, making up 25% of agricultural land in this region. Climate change will shift coffee production to forested areas at higher altitudes, leading to increased deforestation across the region. This is set to undermine the corporate commitments of coffee companies to deforestation-free supply chains unless companies can proactively support funding for land restoration activities, regenerative and climate resilient farming practices, such as shade-grown coffee.
5.2 Regional Focus
The sustainable growth of coffee in Latin America

Despite decades of corporate responsibility initiatives and investments, coffee, one of the world’s most valuable traded agricultural commodities, is not sustainable. By 2050, global production must double to match global demand, but low productivity and crop disease due to climate change are already affecting production in large swaths of coffee producing lands. Latin America accounts for 60% of global coffee production and is, therefore, a strategic region for global companies. Coffee farming in the region must integrate ecosystem services at the heart of their model, as well as provide a larger share of economic value to farmers, for whom coffee farming is uneconomical.

Latin America is a global coffee production hub

Brazil and Colombia are among the top five coffee producers in the world accounting for 35% and 9% of global coffee production respectively, whilst Honduras, Peru and Mexico are amongst the top producers in Latin America. 75% of Brazil’s coffee production comes from smallholder farmers with an average of 7.5 hectares. However, in Colombia, Honduras and Mexico farm sizes average between only 1 and 3 hectares.

Coffee has been integral to building economic resilience of communities and providing employment opportunities for many of these countries. For example, in Honduras, coffee production employs a third of the population and accounts for 25% of its export earnings. In Peru, over 1 million people are employed in the coffee production supply chain, producing an estimated 5 million bags of coffee with a total export value of USD 700 million in 2015.

Coffee farming is not economically viable for smallholder farmers

Over a third of global coffee production meets one or more voluntary sustainability standards. Despite this, coffee production today is economically unsustainable. Smallholder farmers in Latin America are struggling to make a viable income from coffee due to interconnected challenges of ageing trees, insufficient access to finance and inputs, all compounded by the sudden and swift impact of crop disease and accelerating climate change. Of the USD 200 billion in revenues that are generated annually in the coffee retail market, only USD 15 billion reaches coffee farmers.

Future coffee supplies are at risk unless it can become a more viable and resilient business to smallholder farmers that grow 70–80% of the world’s coffee crop. Industry players must consider moving beyond voluntary standards to more radical changes to coffee production. This will require new business models that capture a greater share of the value chain for farmers and co-investments to improve the resilience of coffee farmers to climatic and economic shocks.

Global companies have a stake in Latin America’s social and ecological resilience

The Latin American coffee industry is dominated by a handful of multinationals in the roasting and retail segment of the value chain who, therefore, have a stake in the region’s production resilience. For example, Latin America is a significant region for Starbucks, supplying over half of the total 400 million pounds of Arabica beans that the retailer sources per year.

Jacobs Douwe Egberts generated over USD 900 million in sales in 2016 in Latin America largely driven by Brazil. Nestlé purchases a quarter of Mexico’s total coffee output, more than any other buyer. On the retail side, home-grown Latin American brands are capturing a greater share of the market. Four of the top six coffee brands by retail sales in Latin America are Brazilian.
5.3 Flashpoints for Business Diplomacy
Strategic trends for collaboration on Latin America’s coffee resilience

Flashpoint 1
Current coffee economics will result in an exodus of farmers

Coffee production must triple in the next 30 years to meet growing demand.\textsuperscript{259} While coffee roasters and buyers (table below) registered gross operation margins of up to 54% in 2014, stagnating coffee prices have reduced earnings for coffee farmers to the point where its price no longer covers production costs, let alone investments in re-planting and yield enhancements.\textsuperscript{260/261} Despite the opportunity for productivity improvements, low prices for green coffee still fail to make it economically attractive. In Brazil, where the most productive and efficient coffee farms are, farmers in the state of Espírito Santo are switching to more lucrative black pepper.\textsuperscript{262}

Certified coffee production does not ensure much higher earnings, since premiums are still tied to the market price and profits are maximised in the value-add roasting segment.\textsuperscript{263} As a result, coffee farmers, whose average age is 58, are not able to invest in their land and are switching to more lucrative crops, or leaving farming and migrating to urban areas, threatening future supply.\textsuperscript{264}

Flashpoint 2
Creating and retaining more value for farmers is a priority for coffee value chains

Coffee companies must be proactive in helping farmers to create more value beyond the farm. Vega and Twin Engine are two independent coffee start-up companies that are reconfiguring the coffee value chain to enable farmers to earn more income from their coffee crop. Vega aims to become the ‘Etsy of coffee’, buying directly from local co-ops and individual farmers and supporting farmers to roast their own beans. This enables farmers to make up to four times the revenue of growers make in a traditional supply chain.\textsuperscript{265}

Twin Engine buys premium roasted coffee directly from farmers in Nicaragua, but also employs Nicaraguans to manage its marketing, sales, and supply chain operations thereby creating more jobs and stimulating local economies. These models are promising, but are currently outside of the large-scale systems that drive mainstream industry. Identifying how innovative and sustainable business models can become the defacto approach to coffee production is key to ensuring its long-term quality and supply.

Flashpoint 3
Climate change and crop disease are major threats to coffee production

Climate change is set to decommission large swathes of coffee land in the region. In parts of Mexico, coffee production could be economically unviable by 2020 due to rising temperatures.\textsuperscript{266} The scenarios are already being played out: in Colombia, USD 100 million worth of coffee in 2016 were lost due to El Niño and La Niña.\textsuperscript{267} In Brazil, severe drought and unusually high temperatures cut yields in 2014 by 30% in the largest coffee regions.\textsuperscript{268} In Peru, the coffee rust disease outbreak in 2013 and 2014 impacted 40% of coffee plantations and reduced productivity by half in major coffee growing regions.\textsuperscript{269}

For coffee companies, this means raising prices to consumers. Folgers, the largest coffee brand in the US, reported a decrease in its revenues in 2014 after it raised prices because of supply shortages.\textsuperscript{270} USAID estimates that coffee production could fall by 40% in the next few years as climate change increases the prevalence of crop disease.\textsuperscript{271} In Honduras, the government recently announced plans to help farmers convert 20% of the country’s total coffee-growing land into cocoa production, given its ability to thrive in warmer weather.\textsuperscript{272}

### Top coffee buyers by market share and their sourcing footprint in the five largest coffee growing markets in Latin America

<table>
<thead>
<tr>
<th>Coffee buyers</th>
<th>Nestlé</th>
<th>Jacobs Douwe Egberts</th>
<th>Keurig Green Mountain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of global market by value</td>
<td>22.7%</td>
<td>16.3%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sources</th>
<th>Brazil</th>
<th>Brazil</th>
<th>Brazil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colombia</td>
<td>Colombia</td>
<td>Colombia</td>
<td></td>
</tr>
<tr>
<td>Honduras</td>
<td>Honduras</td>
<td>Honduras</td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>N/A</td>
<td>Mexico</td>
<td></td>
</tr>
<tr>
<td>Peru</td>
<td>Peru</td>
<td>Peru</td>
<td></td>
</tr>
</tbody>
</table>

Source: Coffee Barometer 2014 and Euromonitor 2014
A recent study that mapped the suitability of Arabica coffee to adapt to climate change concluded that in order to thrive, coffee plantations would need to be protected by shade trees to keep them cool and enhance the biodiversity of plantations. Shade-grown coffee was the predominant production method before an input-intensive, mono-crop model took over in the 1970s and allowed global production to scale. Shade-grown biodynamic coffee is cultivated below a canopy of trees and amidst a variety of coffee-species and crops, increasing the biodiversity of the landscape, reducing the costs of fertilisers and pesticides, and enhancing resilience to higher temperatures, lower rainfall, and pests. Soil moisture in full-sun conditions can be 42% lower compared to shade-grown production. In north-east Brazil, the Asociación Biodinámica D’Ibicoara, is a collective of six farms taking a biodynamic approach to producing a new single-origin coffee called Floresta. Farmers in the collective are earning 43% more income by producing, roasting and distributing lower-cost high quality beans themselves.

Despite the benefits of shade-grown production, the proportion of land under the approach has shrunk by 20% since 1996. Part of the decline has been driven by smallholder farmers looking to intensify production by planting more coffee bushes per unit of land. Today, just 25% of coffee production globally is managed under diverse shade, with 35% under partial shade. Reintroducing shade and alternative crops can then be a challenge on small-scale land holdings that comprise up to 80% of coffee production in Latin America.

While the industry spends over USD 350 million on coffee sustainability initiatives per year, an estimated USD 1.5 billion is required to replant farms devastated by the coffee leaf rust epidemic. A partnership between Starbucks and Conservation International has supported tree refurbishment as well as revitalising shade management systems in Mexico. Industry investments into coffee sustainability and tree refurbishment must prioritise sun-to-shade transitions and diversification of farming practices that can be implemented in both plantations and small-scale systems.
5.4 Recommendations
For coffee companies, financial institutions and government policy makers shaping the future of coffee in Latin America

Recommendation 1
Global retailers should create attractive coffee brands based on regenerative models and shape global consumer values

Building specialty brands based on regenerative models, such as shade-grown and biodiverse coffee production, will require global demand. The coffee branding and retail business has the know-how to largely influence global demand. For example, marketing campaigns about the premium experience of ‘cold brew’ coffee by Starbucks, Whole Foods, Dunkin’ and Peet’s Coffee have helped grow this new market 339% from 2010 to 2015 in the US. The trends for cold brew, as well as the success of the Nespresso phenomenon, show the power of marketing supported by quality product brand development.

While a Starbucks partnership with Conservation International supports shade-grown projects in Mexico, it has limited the sale of organic shade-grown Mexican coffee only to its Mexican stores. In the UK, Percol’s Organic Rainforest Arabica coffee used to be sold in Tesco and Waitrose supermarkets, but has been unavailable for at least two years. While there is a chance that certified coffee sold in coffee stores and supermarkets may come from shade-grown production, only the Smithsonian Institute’s ‘Bird Friendly’ label can guarantee that the coffee beans have been raised under tree canopy.

Starbucks, Nestlé, and other major coffee brands and retailers have an opportunity to focus on shade-grown coffee, supported by local communities, as the next big specialty coffee. The branding attributes would be built on the original forms of coffee production before the 1970s as well as biodynamic ‘earth-powered’ production. Marketing efforts for shade-grown coffee are likely to appeal to millennials, now the largest living generation and the major driver of coffee trends, which values brand commitments to sustainability, experience over price and sustainable options.
Recommendation 2

**Global coffee companies should create ‘regenerative business incubators’ to scale new coffee production models based on resilience principles**

Business entrepreneurs must challenge conventional thinking. New entrepreneurial models in South America, such as those mentioned earlier, as well as Fazenda Ambiental Fortaleza’s Isso é Café brand, are producing high-quality organic shade-grown coffee while regenerating the landscape. The model is working: it shows that it is possible to create a viable business model and consumer-facing brand built around the attributes of an ecosystem regeneration business model. Coffee majors must explore how to apply these models to coffee.

**PepsiCo** adopted a similar model of supporting disruptive enterprises through its Nutrition Greenhouse programme. The programme is designed to nurture emerging nutrition and wellness brands and help PepsiCo to collaborate on innovation to diversify its product portfolio to deliver better nutritional outcomes. In their model, each of the chosen companies receives a start-up grant and is paired with senior executives whose industry expertise can help them address their immediate market challenges and accelerate commercial growth.285

Such a business incubator programme could also provide capital for farmers to purchase coffee processing equipment, develop market linkages and develop local business skills and SMES, drawing on the investment expertise and portfolios of impact investors such as Root Capital, Acumen, TechnoServe, and Moringa Partnership.

Recommendation 3

**Sustainable coffee platforms, such as IDH, GCP and SCC, should collaborate on mainstreaming regenerative business models in coffee**

The next frontier for business model innovation in coffee production is on those models that enhance social regeneration – by involving communities as owners of larger parts of the value creation process – and ecological regeneration – by adopting planting methods that consider biodiversity as a factor of productivity. Examples of companies setting such business models exist but are too far from the mainstream industry as to catch the attention of industry majors.

The industry needs to develop a way of understanding the signals and models that can effectively address sustainability pressures – and consider how they could be integrated into larger-scale systems. At the pre-competitive level, coffee companies should fund innovation research that identifies new production models, and involve governments and public finance institutions to define new financing options to support them.

Multi-stakeholder platforms that have emerged in response to the crisis in coffee production would be good partners to disseminate and further convene such a process. These include the sustainable trade initiative **IDH** which seeks to prototype and scale sustainable business models; the **Sustainable Coffee Challenge (SCC)**, led by **Starbucks** and Conservation International; and the **Global Coffee Platform (GCP)**, that convenes over 200 private- and public-sector stakeholders in the coffee industry.286
Appendix 1
Acknowledgements

Partners and Sponsors
We would like to thank the Swiss Agency for Development and Cooperation for their support and active partnership as well as HSBC for their sponsorship of the report.

We are also grateful to the World Business Council for Sustainable Development and the International Chamber of Commerce for their collaboration as Global Outreach Partners of the Earth Security Report 2017.

ESG Team
The team at Earth Security Group that has developed this report included Alejandro Litovsky, Margot Hill Clarvis, Rida Bilgrami, Pablo Orvananos, Caroline Hambloch, Philipp Cyrus, Rupert Bassett, Angela Quiroga Manrique and Aleksandra Klassen.

We would also like to thank our Senior Advisors, Richard Burrett and Ravi Chaudhry, as well as Senior Associates, Anna Swaithes and Giulia Guidi for their valuable insights and guidance on the report.

Photography
Executive Summary © jaboo2foto/Shutterstock.com
Automotive © Anton_Ivanov/Shutterstock.com
Pharmaceuticals © Neo Studio/Shutterstock.com
Energy Infrastructure © humphery/Shutterstock.com
Consumer Electronics © Dmitry Kalinovsky/Shutterstock.com
Agri-business [coffee] © Darrin Henry/Shutterstock.com

Interviews
Abigail Jones, Acumen Public Affairs; Anders Langworth, Nordea Asset Management; Andreas Klugescheid, BMW Group; Andreas Spiegel, Swiss Re; Annette Pensel, Global Coffee Platform; Anni Santhiago, International Labour Organisation; Astrid Skala-Kuhmann, GIZ; Bambi Semroc, Sustainable Coffee Challenge and Conservation International; Benjamin Schmerler, Root Capital; Björn Claeson, Electronics Watch; Bob Mitchell, Electronics Industry Citizenship Coalition; Bongani Mshibe, BMW Group South Africa; Camilo Sanchez, Olam International; Carel Snyman; South African National Energy Development Institute; Christina Lebb, World Bank; Diana Rojas, Swiss Agency for Development and Cooperation; Diego Rodriguez, World Bank; Djoomart Ortorbaev, former Prime Minister of The Kyrgyz Republic; Emmanuelle Aubertel, BNP Paribas; Frannie Léautier, African Development Bank and Fezembat Group; Fulai Sheng, UN Environment; Hanna Capeder, Swiss Agency for Development and Cooperation; Hassatou N’Sele, African Development Bank; Husam Mohamed Beide, World Bank; Iskandar Abdullaev, Regional Environmental Centre for Central Asia; Jae-Hee Chang, International Labour Organisation; Jarrett Bens, Electronics Industry Citizenship Coalition; Jennifer Blanke, African Development Bank; Jenniver Sehring, Organization for Security and Co-operation in Europe; Joel Brounen, Solidaridad; Juan Antonio Rivas, Olam International; Kadri Kevin Nassief, South African National Energy Development Institute; Kan Matsuzaki, IndustriALL Global Union; Magdalena Kettis, Nordea Asset Management; Mike Whitfield, African Association of Automotive Manufacturers and Nissan South Africa; Kamal Singh, UN Global Compact India; Rob de Jong, UN Environment; Natalia Alexeeva, UN Environment Central Asia; Nilim Baruah, International Labour Organisation; Peter Baum, European Bank for Reconstruction and Development; Pierre Guislan, African Development Bank; Remco Kouwenhoven, Fairphone; Rowan Palmer, UN Environment; Sasja Beslik, Nordea Asset Management; Sean Ansett, AtStake; Shakhboz Akhmedov, Regional Environmental Centre for Central Asia; Shobha Mishra Ghosh, Federation of Indian Chambers of Commerce and Industry; Srinath Komarina, YES Bank; Stefan Canz, Nestlé; Steve Brooks, Pfizer; Thierry Umbehr, Swiss Agency for Development and Cooperation, Veronika Krakovich, European Bank for Reconstruction and Development.
Appendix 2
Methodology

Index Construction
The 2017 Earth Security Index Report, developed by the Earth Security Group, introduces and applies a country framework that captures the magnitude and scope of a series of country pressures along the dimensions of the Sustainable Development Goals (SDG), using publicly available information. The risk visual portrays dimensions, where higher values represent worse relative performance.

The dashboard allows the Earth Security Group to conduct a multi-dimensional risk assessment of countries, markets and global inter-dependencies, and provide leading decision-makers in business, government and civil society with strategic intelligence on global sustainability risks and opportunities.

The ESI 2017’s indicator framework has been substantially revised and improved from the previous year, with inputs from our Global Expert Group and other thematic experts (see acknowledgements). In this year’s report, the index is applied to a series of cases that cover a total of 24 countries from the ESI database. In total, the ESI database includes 217 countries. The ESI 2017 framework assesses and visualises the 17 SDGs through 39 dimensions that are deemed critical for a country’s sustainability and development agenda.

The structural changes to the 2017 Index include the consolidation of the previously 4 themes into 17 SDG based topics. These 17 SDG based topics are further divided into a total of 39 dimensions. These dimensions, which are mapped on the visual, are underpinned by a total of 59 data points.

Data
The selection and processing of the data for the ESI 2017 has followed five criteria:

1 **Coverage** Data that allows for the assessment of country-level trends and for a comparison between countries.

2 **Relevance** Data that is relevant to assess resource-related risks in an unambiguous way. Note that it is acknowledged that the indicator ‘Nutrient Pollution’ (Fertiliser Overuse dimension) does not only measure agricultural sources of water pollution, but also includes urban, industrial and fossil fuel sources.

3 **Accessibility** Data that is publicly available, either through peer-reviewed scientific studies or data compiled by international organisations. The only exception is the indicator ‘CO$_2$ grammes/kWh from electricity generation’ (Carbon Intensity), whose latest update is not publicly available anymore compared to previous years.

4 **Quality** Data whose quality can be controlled and represents the best measure of the issue currently available globally.

5 **Recency** The most up-to-date datasets available for all data points up to May 2017.

The transformation of raw data into the index scores involves several steps. The following sections discuss how the data in the ESI 2017 has been transformed and normalised.

Transformation
Due to the existence of outliers in the data, three methods were employed for the transformation of the data. If the skewness of the data was greater than 2 or the kurtosis was greater than 3.5, the outliers of the data have been treated. If the variable exhibited one to five outliers, the data has been winsorised. In the case of six or more outliers, the data has been either transformed with the natural log or, in extreme cases, with a natural log formula.

Normalisation
To allow for aggregating and comparing different data on a common scale, the data points were normalised on a 0–100 scale, where 0 is the lowest pressure and 100 the highest pressure. The normalisation was calculated based on the min–max method, whereby the minimum and maximum values of the indicator serve as the lower and upper bound of the normalised data, respectively. In a few cases, the k-th percentiles of values in a particular range were chosen to create new minima and/or maxima.

Weighting and Aggregation
After the transformation and normalisation of the data, the data points were aggregated and weighted into dimensions (the visual wedges on the graph). The following section describes this aggregation and weighting process. The aggregation of data points has taken place on the level of dimensions. The dimension score is calculated from the weighted average of all its underlying data points.

The ESI Diagram
Using the values from the weighting and aggregation processes, the relative country risk visuals were created. The following sections describe the methodology behind the country risk visuals:

1 **Scale** The visuals provide a relative risk profile that highlights the most critical dimensions for each of the countries covered by the index. In each case, the visual represents dimension scores on a 0–100 scale, following the methodology described above.

2 **Visualisation** The wedges should be read in the same way as the scores: the bigger the bar, the higher the pressure in that dimension. To aid the use of the visuals, a visual benchmark has been added that draws a highlight to those wedges that have a higher score than 50. This is a purely visual aid and does not imply a value judgement or statistical calculation, meaning that dimensions scoring 50 or less will also be relevant to the risk profile of the country. However, this visual device allows the observer to focus on the smaller number of dimensions that surpass the 50 mark.
Sources


— Carbon Dioxide Information Analysis Center, 2013, Oak Ridge National Laboratory.

— Credit Rating, 2017, Trading Economics.


— Environment Indicators Database, 2011–2014, OECD.

— Environmental Performance Index, 2017, Yale University.


— Global Climate Risk Index 2017, 2016, Germanwatch.

— Global Competitiveness Index, 2016, World Economic Forum.


— INSEAD Global Talent Competitiveness Index, 2017, INSEAD.


— Ocean Health Index, 2015, Ocean Health Index Science.

— PARLINE Database on National Parliaments, 2016, Inter-Parliamentary Union.


— UNAIDS HIV Data, 2015, UNAIDS.


Appendix 3

Endnotes

1. ‘Worse than Malaria’, The Economist, 24 October 2015.
2. ‘Pressure grows on car makers to meet minimum UN, and moral, safety standards’, FIA Foundation, 19 June 2017.
4. ‘Has load shedding killed off the electric car in Africa?’, IT News Africa, 17 February 2015.
7. ‘Solutions for a Changing Climate’.
11. ‘Daring Cities Make Bold Air Quality Commitment To Remove All Diesel Vehicles By 2025’, C40 Blog, 1 December 2016.
20. ‘Africa has the world’s deadliest roads’, Aceda, D., Mail & Guardian Africa, 5 March 2016.
27. ‘In 35 years, Nigeria could be the automotive capital of Africa’, Kazeem, Y., Quartz Africa, 3 November 2015.
33. ‘Millennials are shifting car ownership model; ask Toyota’, Shirozu, N., Reuters, 9 February 2016.
34. ‘Tshwane unveiled electric vehicle charging stations’, City of Tshwane, 11 October 2016.
35. ‘China’s JAC Motors, Hawtai planning to increase investments in Egypt’, Ahram Gate, 16 May 2017.
36. ‘Renault and partners to invest $1 bn in Morocco’, Yaakoubi, A.E., Reuters, 8 April 2016.
37. ‘Algeria attracts automotive manufacturers and becomes a key market in the development of GEFCO’, GEFCO, 22 February 2016.
38. ‘BMW to invest $417 million to make X3 model in South Africa plant’, Reuters, 16 November 2015.
71 'Global antibiotic consumption 2000
70 'India drug industry lobby hits back at
69 'Pharmaceutical Industry in India'
67 'India', IUCN,
66 'Effluent from drug manufactures
65 'Water in crisis – India',
64 'From vision to decision Pharma 2020',
62 'River Stretches for Restoration of
60 'Health expenditure, total (% of GDP)
59 'BMW SA bets big on electric cars',
58 'Lobby group for electric cars launched
56 'Nigeria to Sell $63 Million of
55 'Green Bond Program: Portfolio
54 'Antibiotic Resistance in India:
51 'Impacts of pharmaceutical pollution on
50 'Impacts of pharmaceutical pollution on
49 'City of burning lakes: experts fear
48 'Andhra Pradesh Pollution Control
47 'With 59 firms, Telangana tops
46 'India's drug inspectors hard-pressed
to scrutinize factories', Reuters, April 2014.
45 'From vision to decision Pharma 2020', PWC, 2012.
42 'India', IUCN,
41 'Antibiotic Resistance in India:
40 'Impacts of pharmaceutical pollution on
39 'Impacts of pharmaceutical pollution on
38 'City of burning lakes: experts fear
37 'Andhra Pradesh Pollution Control
36 'With 59 firms, Telangana tops
34 'Impacts of pharmaceutical pollution on
33 'Impacts of pharmaceutical pollution on
32 'City of burning lakes: experts fear
31 'Andhra Pradesh Pollution Control
30 'With 59 firms, Telangana tops
28 'Impacts of pharmaceutical pollution on
27 'Impacts of pharmaceutical pollution on
26 'City of burning lakes: experts fear
25 'Andhra Pradesh Pollution Control
24 'With 59 firms, Telangana tops
22 'Impacts of pharmaceutical pollution on
21 'Impacts of pharmaceutical pollution on
20 'City of burning lakes: experts fear
19 'Andhra Pradesh Pollution Control
18 'With 59 firms, Telangana tops
16 'Impacts of pharmaceutical pollution on
15 'Impacts of pharmaceutical pollution on
14 'City of burning lakes: experts fear
13 'Andhra Pradesh Pollution Control
12 'With 59 firms, Telangana tops
10 'Impacts of pharmaceutical pollution on
9 'City of burning lakes: experts fear
8 'Andhra Pradesh Pollution Control
7 'With 59 firms, Telangana tops
5 'Impacts of pharmaceutical pollution on
4 'City of burning lakes: experts fear
3 'Andhra Pradesh Pollution Control
2 'With 59 firms, Telangana tops
0 'Impacts of pharmaceutical pollution on
108 'China’s Silk Road in Central Asia: transformative or exploitative?', Lain, S., The Financial Times, 27 April 2017.
110 'Chinese Firms Wary of Political Risks on Xi’s Belt and Road', Shi, T., Bloomberg, 22 May 2017.
111 'Pollution Cloud Over South Asia Threatens Economies', National Geographic, 12 August 2002.
114 'Analysing energy subsidies in the countries of Eastern Europe, Caucasus and Central Asia', OECD, 2013.
116 'Tajikistan increases coal production', Chorshanbiyev, P., Tajikistan Media Group, 6 October 2015.
120 'China’s ‘Belt and Road’ vision struggles to leave port', Bland, B., The Financial Times, 8 May 2017.
121 'China’s Silk Road in Central Asia: transformative or exploitative?', Lain, S., The Financial Times, 27 April 2017.
123 'Tajikistan's winter energy crisis: electricity supply and demand alternatives', Fields et al, World Bank, 1 January 2013.
126 'Tajikistan’s winter energy crisis: electricity supply and demand alternatives', Fields et al, World Bank, 1 January 2013.
127 'Pakistan’s glaciers will melt by 2035’, Dawn, 6 November 2013.
128 'Pakistan Attracts USD 3 Billion Foreign Investment In Renewable Energy', Mittal, S., Clean Technica, 1 December 2015.
129 'Pakistan’s glaciers will melt by 2035’, Dawn, 6 November 2013.
129 'Pakistan’s glaciers will melt by 2035’, Dawn, 6 November 2013.
130 'How climate change in Central Asia is threatening to spark regional conflict', Chen, S., South China Morning Post, 6 January 2017.
131 'Kyrgyzstan cuts electricity supply to Kazakhstan', TENGRI, 4 April 2014.
133 'How climate change in Central Asia is threatening to spark regional conflict', Chen, S., South China Morning Post, 6 January 2017.
134 'Kazakhstan - Openness to and Engagement with the World Energy Market', Eurasianet, 6 April 2016.
136 'Pakistan’s glaciers will melt by 2035’, Dawn, 6 November 2013.
137 'Kazakhstan’s winter energy crisis: electricity supply and demand alternatives', Fields et al, World Bank, 1 January 2013.
138 'Tajikistan’s winter energy crisis: electricity supply and demand alternatives', Fields et al, World Bank, 1 January 2013.
140 'Tajikistan’s winter energy crisis: electricity supply and demand alternatives', Fields et al, World Bank, 1 January 2013.
143 'China Wants to Power the World', Minter, A., Bloomberg, 3 April 2016.
201 ‘How many people are in modern slavery in Asia Pacific?’, Global Slavery Index, 2017.
204 ‘IoT developments in ASEAN highlight economic potential in the region’, Control Engineering Asia, 14 February 2017.
208 ‘Electronics industry challenged to clean up their act’, Human Rights in ASEAN, 17 March 2015.
220 ‘Asia Pacific remains a growth region: Bosch invests 1.2 billion euros’, Bosch, 3 November 2016.
204 ‘Export processing zones or exploiting people zones? We give the low-down’, Ethical Consumer, June 2007.


214 ‘80% of world’s computer chips will be made by Intel Vietnam by 2015’, Tuoi Tre News, 30 July 2014.

215 ‘HP to invest R1M in Penang, expected to sign land deal with state govt’, The Star, 9 October 2014.


222 ‘Partnership beyond the first tier: social impact with sub-supplier GSN’, Fairphone, 15 October 2015.


230 ‘Nitrogen emissions in Latin America should be monitored, experts insist’, Phys Org, 6 September 2016.

231 ‘On the ground support for Farming Communities’, Starbucks Website (last accessed 2 July 2017).

232 ‘Gender equality, the unresolved challenge in Latin America and the Caribbean’, Inter-American Institute for Cooperation on Agriculture, 2 November 2016.


235 ‘Labor shortage to limit Colombian coffee crops as beans go unpicked’, Murphy, P., Reuters, 3 June 2015.


242 ‘Arabica coffee genome sequence is in the public domain, in an effort to address climate change’, IDB News Release, 11 September 2014.


244 ‘Arabica coffee genome sequence is in the public domain, in an effort to address climate change’, IDB News Release, 11 September 2014.


246 ‘Understanding commodities and risks, Nordea, 2016.


256 ‘PepsiCo Partners with Starbucks to Seek Growth in Latin America’, Bailey, S., Market Realist, 21 September 2015.
258 'America loves K-cups, but instant coffee rules the world', Nisen, M. Quartz, 9 May 2014.
261 'How Individual Investors Are Fuelling Sustainable Farming Improvements in Colombia: Turning a $40B supply chain on its head', Cummisskey, J., Next Billion, 11 November 2013.
262 'Struggling Brazilian coffee farmers turn to pepper', Terazono, E., Financial Times, 16 March 2017.
264 'Rabobank brings coffee industry players together', Rabobank, 2016.
265 'This start-up is trying to revolutionize your morning coffee', Gordts, E., HuffPost, 29 December 2015.
266 Potential impacts of climate change on agriculture: a case of study of coffee production in Veracruz, Mexico,' Schroth et al., Climatic Change 79 (2006).
268 'A Brewing Storm: The climate change risks to coffee', Watts, C., The Climate Institute, August 2016.
273 'Projected Shifts in Coffea arabica Suitability among Major Global Producing Regions Due to Climate Change', Ovalle-Rivera et al, PLOS One, 14 April 2015.
274 'Shade Coffee: Update on a Disappearing Refuge for Biodiversity', Jha et al, BioScience [64], May 2014.
276 'Shade Coffee: Update on a Disappearing Refuge for Biodiversity', Jha et al, BioScience [64], May 2014.
277 'Downturn in shade-grown coffee putting forests, wildlife, people at risk', Levkov, D., Mongabay, 11 July 2014.
278 'Shade Coffee: Update on a Disappearing Refuge for Biodiversity', Jha et al, BioScience [64], May 2014.
281 'Follow Starbucks’ 15 Year Journey to 100% Ethically Sourced Coffee', Conservation International, 2015.