ASIA CLEAN ENERGY FORUM 2017

THE FUTURE IS HERE: ACHIEVING UNIVERSAL ACCESS AND CLIMATE TARGETS

Manila, Philippines • 5–8 June 2017

DEEP DIVE WORKSHOP

FROM START UP TO SCALE UP

ASIA CLEAN TECH

What it really takes to scale clean technology

5 June 2017, Monday, 13:30–17:30

Auditorium C, ADB Headquarters, Manila, Philippines

ASIA CLEAN ENERGY FORUM 2017
THE FUTURE IS HERE: ACHIEVING UNIVERSAL ACCESS AND CLIMATE TARGETS
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WELCOME REMARKS

YONGPING ZHAI
Technical Advisor (Energy)
Asian Development Bank

ASIA CLEAN TECH

ASIA CLEAN ENERGY FORUM 2017

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Manila, Philippines • 5–8 June 2017

INTRODUCTION

DANIEL HERSSON
Team Leader
ADB Climate Technology Finance Center

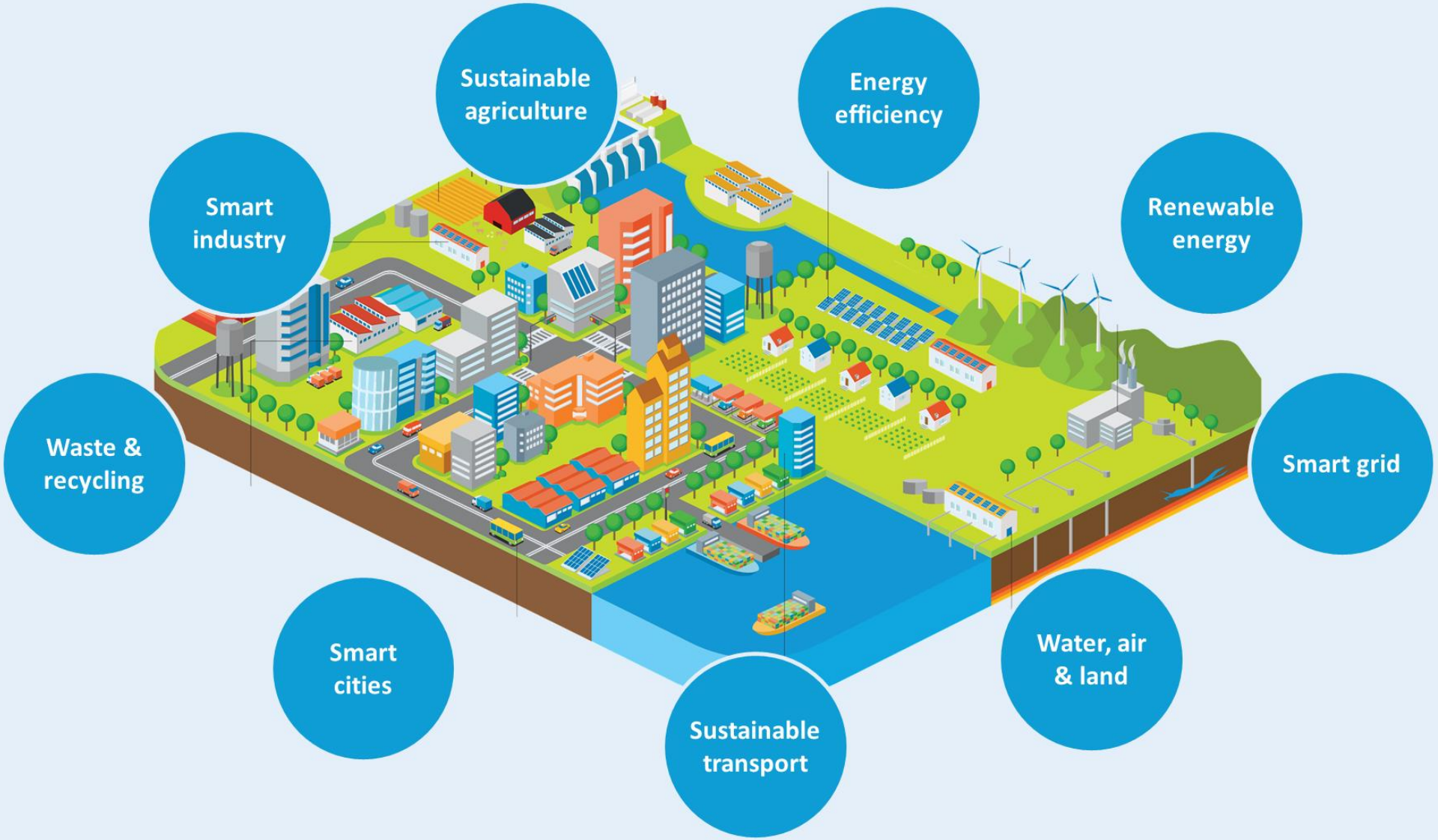
ASIA CLEAN TECH

FROM START-UP
TO SCALE-UP

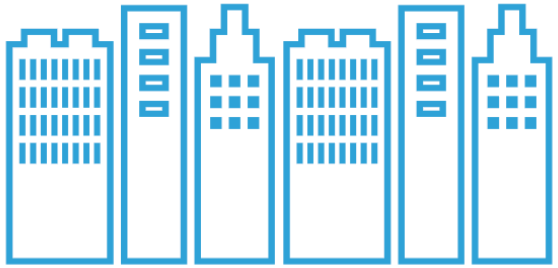
what it really takes to scale clean technology

ADB

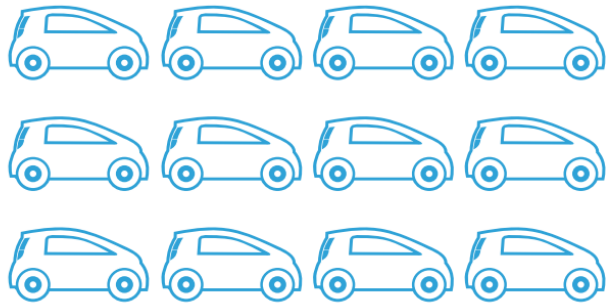
WHAT IS CLEANTECH?



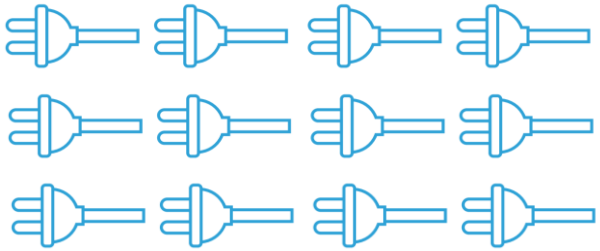
ASIA'S BIG ENERGY & CLIMATE **CHALLENGE**



44 million people
are added to Asia's urban population every year.



Asia will have more than
1 billion vehicles
by 2035



Asia will consume
54% more energy
by 2035

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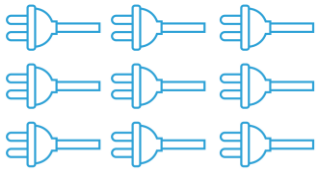
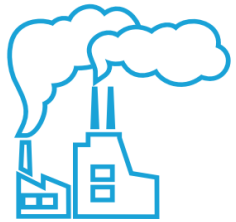
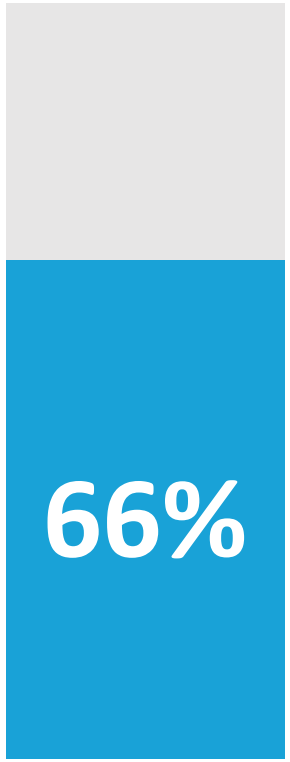
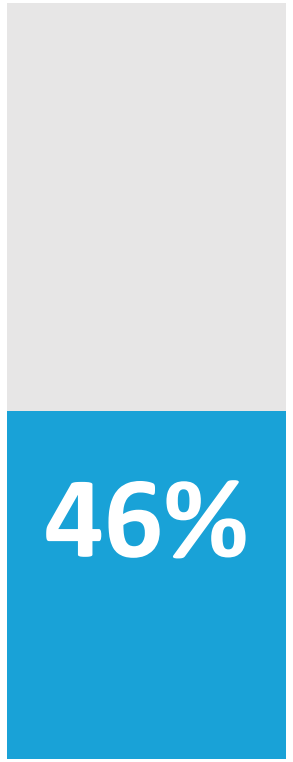
ASIA'S BIG ENERGY & CLIMATE **CHALLENGE**







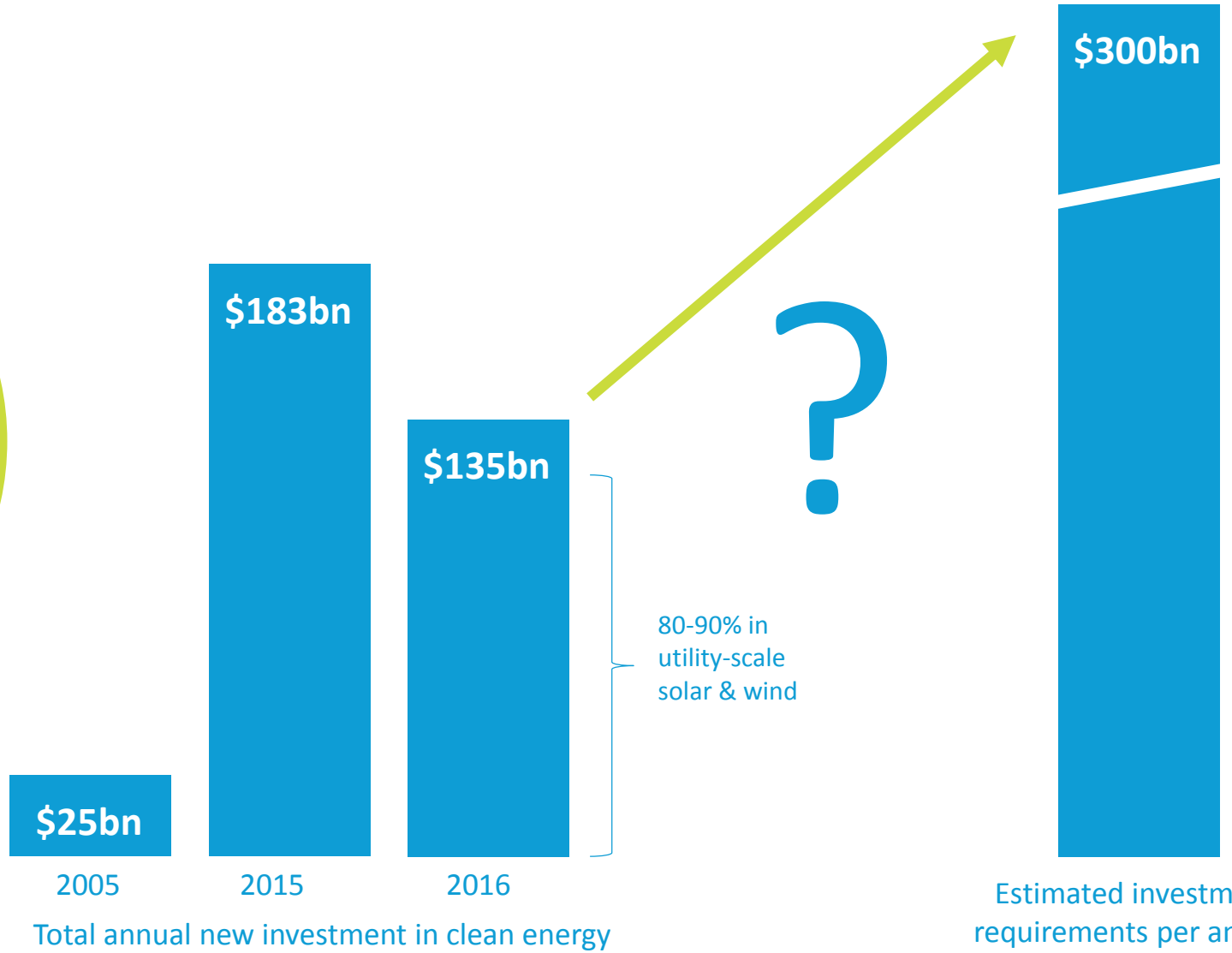
Asia's share of future growth in energy demand



Asia's share of global CO2 emissions by 2035

ADB

ASIA'S BIG ENERGY & CLIMATE **CHALLENGE**



SOURCE: Bloomberg New Energy Finance, ADB

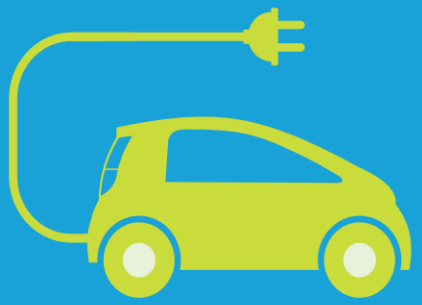
STARTUPS

develop the new technologies, business models, products and services required to deploy and finance clean energy solutions cost-effectively at scale

STARTUPS ARE DRIVING CLEAN ENERGY GROWTH

70%

of Chinese renewable energy companies were founded after 2010



4 of top 10

global electric car manufacturers are less than 15 years old

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STARTUPS ARE DRIVING CLEAN ENERGY GROWTH

8 of top 10

global solar PV manufactureres are less than 20 years old

75%

of India's solar PV capacity installed by young entrepreneurs

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CLEANTECH STARTUPS IN ASIA FACE MANY CHALLENGES

LACK OF ENTREPRENEURS

LESS THAN **2%**

of all start-ups in Asia are in the cleantech sector

LACK OF RISK CAPITAL

LESS THAN **7%**

global cleantech venture capital is invested in Asia

LACK OF SUPPORT

LESS THAN **10**

cleantech incubators and accelerators in Asia

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ADB IS BUILDING
A CLEANTECH ECOSYSTEM IN ASIA

1

support accelerators & incubators

2

support new cleantech investors

3

support cleantech marketplaces

4

support networking & collaboration

1 SUPPORTING ASIAN CLEANTECH ACCELERATORS

SEVEN
accelerators supported

1000+
startups evaluated

100+
startups accelerated

20+
startups seed-financed


IED GREEN STARTUPS (PRC)


EE BOOTCAMP (PHILIPPINES)

VCIC BOOTCAMP (VIETNAM)


POWERSTART (INDIA)

ADB-TUSSTAR (PRC)

2 SUPPORTING ASIAN CLEANTECH INVESTORS

ACP
ASIA CLIMATE PARTNERS

Low-carbon private equity fund ($400m) based in Hong Kong and co-managed by ADB, Orix and Robeco

EXAMPLE OF INVESTMENTS

ColdEX
Piping hot cold chain technology

India’s leading cold-chain logistics company

FLUIDICENERGY™

World-leading zinc-air energy storage technology

UNITED
联合光伏 UNITED PHOTOVOLTAICS

China's largest pure solar power plant investor and operator

ADB

2 SUPPORTING NEW CLEANTECH INVESTORS

INFUSE VENTURES

India's first and only early-stage cleantech venture capital fund ($25m) hosted by CIIE at IIM Ahmedabad

EXAMPLE OF INVESTMENTS

ecolibrium ENERGY

Provides energy intelligence to 400+ commercial, industrial and utility clients

Gold Farm

No 1. retail brand for solar pumps in India

GIBSS
Zero Energy Buildings Possible

Industry-leading zero-capex green building specialist

TESSOL
thermal energy solutions

Fastest growing innovative cold chain product company in India

ADB

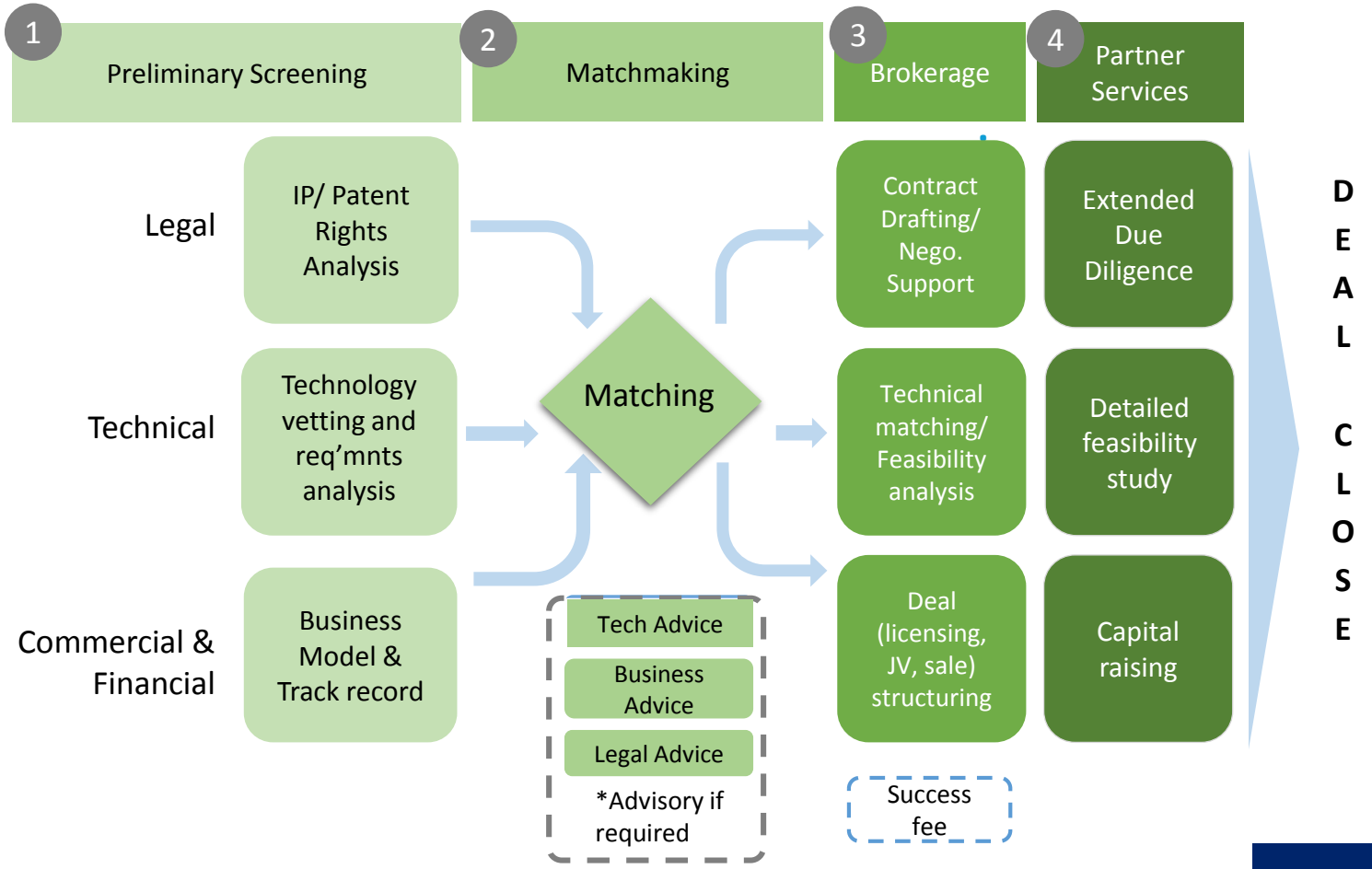
3 SUPPORTING CLEANTECH MARKETPLACES

IPEx Cleantech Asia
Technology Transfer Marketplace

- One-stop shop for clean technologies
- Facilitates deals between cleantech owners worldwide, and adopters project developers in Emerging Asia.
- Backed by ReEx Capital, DNV and Asian Development Bank

ReExCapitalAsia
connecting capital with clean energy

DNV·GL



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3

SUPPORTING CLEANTECH MARKETPLACES

BEC-TAD

Technology Assessment & Dissemination

- "Pop-idol" for next gen cleantech
- Selected cleantech companies assessed in public (around 100+ participants)
- Senior-level international jury from industry, academia, finance, government.
- Assessed according to technology attractiveness, market potential, regulatory & policy environment, and environmental& social impact
- Detailed recommendations to founder, policy-makers, industry, & investors

Beijing Energy Club
北京国际能源专家俱乐部

ASIA CLEAN TECH

50 YEARS

ADB

4

BUILDING A CLEANTECH COMMUNITY

NEW ENERGY NEXUS

- First global network of cleantech accelerators
- 30+ members that has supported 1000+ start-ups and helped raise $2+ bn
- Co-founded by California Clean Energy Fund and Asian Development Bank

NEW ENERGY NEXUS

California Clean Energy Fund

ADB

4

BUILDING A CLEANTECH COMMUNITY

TODAY

14:00-14:05	OPENING & WELCOME
14:05-14:15	INTRO: “Why Cleantech Start-Ups Matter”
14:15-14:45	PRESENTATION: “The State of Cleantech Innovation in Asia”
14.45-15.30	FROM START-UP TO SCALE-UP: “Building Cleantech Businesses”
15.30-16.00	COFFEE BREAK
16.00-16.50	PRESENTATIONS: “BRIDGING THE GAPS - Helping Cleantech Startups Scale” Up”
16.50-17.50	GROUP DISCUSSION: “FROM TALK TO ACTION - Making it Happen”
17.50	WRAP-UP

COCKTAIL RECEPTION

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INTERACTIVE QUESTIONS

THANK YOU

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PRESENTATION

RICHARD YOUNGMAN
CEO, The Cleantech Group

ASIA CLEAN TECH

DEEP DIVE WORKSHOP
FROM START UP TO SCALE UP

ASIA CLEAN TECH

The State of Cleantech Innovation in Asia

5 June 2017

Richard Youngman,
CEO, CTG (Cleantech Group)

@cleantechgroup

CTG (Cleantech Group) – At a Glance

Founded in 2002 to accelerate the next wave of innovation, San Francisco-headquartered CTG (Cleantech Group) today provides research services, online and in person, to "chart the future, connect the globe"

CTG Monitor powered i3

25,508 companies across 1,135 technologies

Keep your finger on the pulse of who and what is happening - the leading companies, the trends to pay attention to, and the key players to know worldwide.

Forums & Programs

Connect with 32,000+ members in 145 countries

Engage with industry leaders and innovators from across the cleantech and sustainability ecosystem. Find capital, advisors, partners and/or co-investors.

Subscription & Custom Research

Discover emerging opportunities, Scout for new companies & business models

Access in-depth coverage of key trends and continually uncover opportunity sets. Evaluate and connect with the specific companies that best fit your strategy and criteria.

The 2002 definition. Cleantech encompasses knowledge-based technology products/services that:

- Provide superior performance at lower costs
- Greatly reduce or eliminate negative ecological impact
- Improve the productive and responsible use of natural resources

} **Doing more with less**

CTG (Cleantech Group) – Example Industries Served and Covered

Our expertise and network span energy, industry, finance and more

	Utilities	Oil, Gas & Mining	Water & Waste	Transportation	Industrials
Relevant topics	• Decentralized energy resources; • Grid flexibility • Building energy management; • New energy business and service models; • Enabling technologies: IoT, drones, blockchain, big data and more	• Upstream technologies; • Digital Oilfield; • Industrial efficiency; • Big data capture and analysis; • Biofuels and biochemicals; • Enabling technologies: IoT, drones, big data	• Smart waste collection and sorting; • New water and waste business models; • Water data analysis; • Customer engagement tools; • Enabling technologies: Internet of things, drones, big data and more	• Electric vehicles and charging • Mobility as a Service; • Connected and autonomous vehicles; • Logistics and fleet tracking; • Enabling technologies: IoT, augmented reality, artificial intelligence	• 3D printing & additive manufacturing; • Industrial robotics; • Industrial energy efficiency; • Advanced materials; • Carbon capture and clean coal technologies • Augmented Reality & Virtual collaboration
Select Clients	EDISON INTERNATIONAL, Sempra Energy, PG&E, IBERDROLA, DUKE ENERGY, ENGIE, enel	bp, aramco, TOTAL, Shell, AngloAmerican, REPSOL	FATHOM, VEOLIA, suez environnement, KURITA, WM WASTE MANAGEMENT	GM, MAHLE Driven by performance, Westport, ECOMOBILITY VENTURES	SIEMENS, ABB, SOLVAY, GE, Johnson Controls, SAINT-GOBAIN, AIR LIQUIDE, Danfoss

Measuring innovation in cleantech across countries

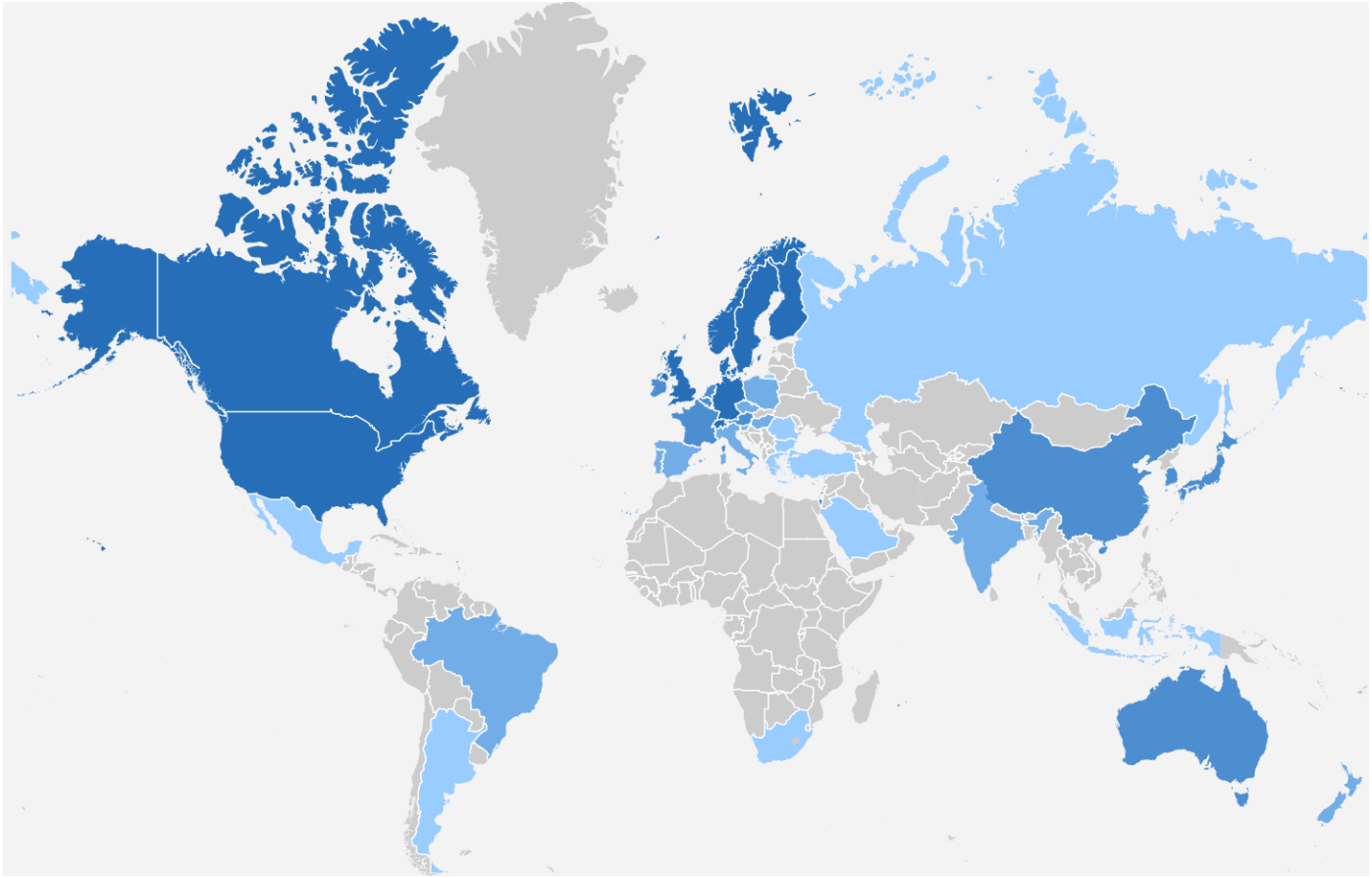
Which countries currently have the greatest potential to produce the entrepreneurial cleantech start-up companies which will commercialise clean technology innovations over the next 10 years?

ADB
Asian Development Bank

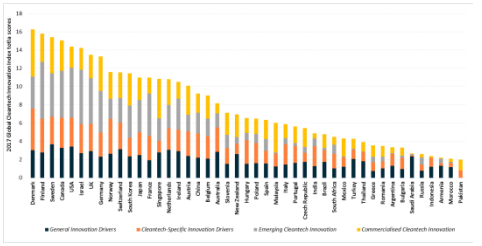
UNIDO

Measuring innovation in cleantech across countries

Which countries currently have the greatest potential to produce the entrepreneurial cleantech start-up companies which will commercialise clean technology innovations over the next 10 years?



Global Cleantech Innovation Index: Methodology



Global Cleantech Innovation Index

Inputs to Innovation

A: General Innovation Drivers

- General innovation inputs
- Entrepreneurial culture

B: Cleantech-Specific Innovation Drivers

- Government policies
- Public R&D spending
- Access to private finance
- Infrastructure for renewables
- Cleantech industry organisations

Outputs of Innovation

C: Evidence of Emerging Cleantech Innovation

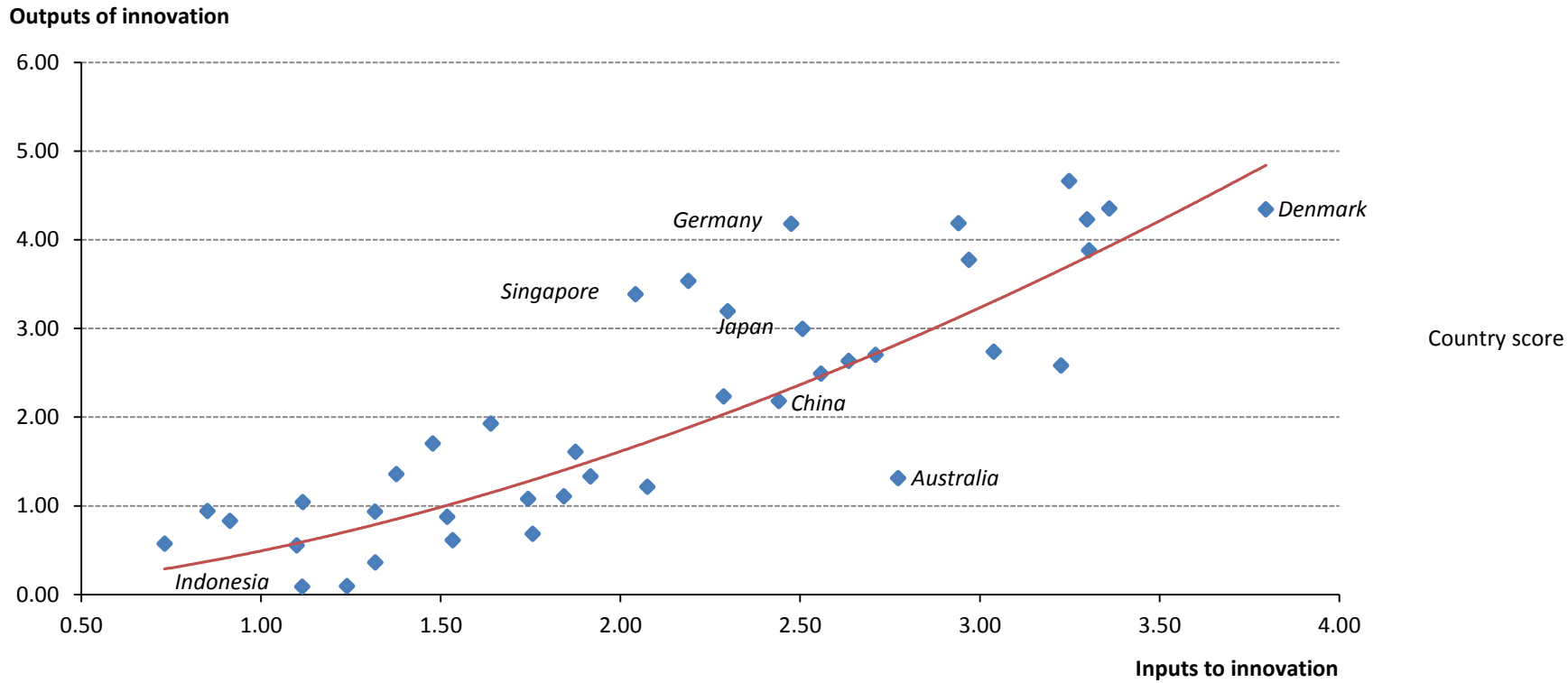
- Early-stage private investment
- High impact companies
- Environmental patents

D: Evidence of Commercialised Cleantech Innovation

- Cleantech Exports & Imports
- Renewable energy consumption
- Late-stage investment and exits
- Listed cleantech companies
- Employees

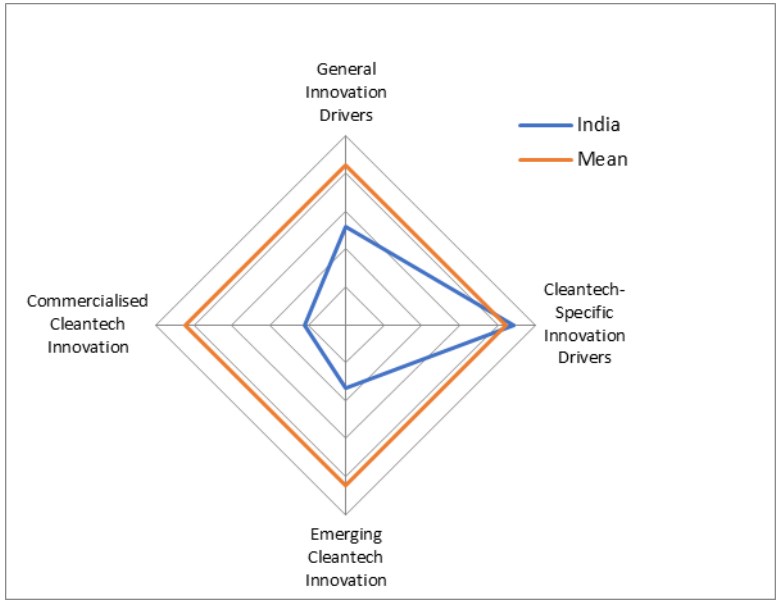
Measuring innovation in cleantech across countries

Which countries seem to most effectively convert their inputs to outputs?



An Example of a Country's Global Cleantech Innovation Index Profile: India

Strengths	Weaknesses
Strong government entrepreneur support schemes	High barriers to entry plus lack of coordination between government-backed entrepreneur schemes at both state and federal level
Strong entrepreneurial culture Several innovation clusters and accelerators provide small loans and grants for start-ups	Lack of structured access to seed (and pre-seed) entrepreneurship support beyond friends and family network
Cleantech-friendly government policy agenda, with ambitious GHG emission targets and energy efficiency standards Focus on clean energy and software	Not as strong support for innovation in other clean technology sectors - ie materials, asset heavy, longer term development cycle innovation
Potentially enormous internal market Attractive destination for renewable energy Investments	Risk averse growth capital investment market, lack of access to expansion finance GDP related cleantech exports (and Imports),

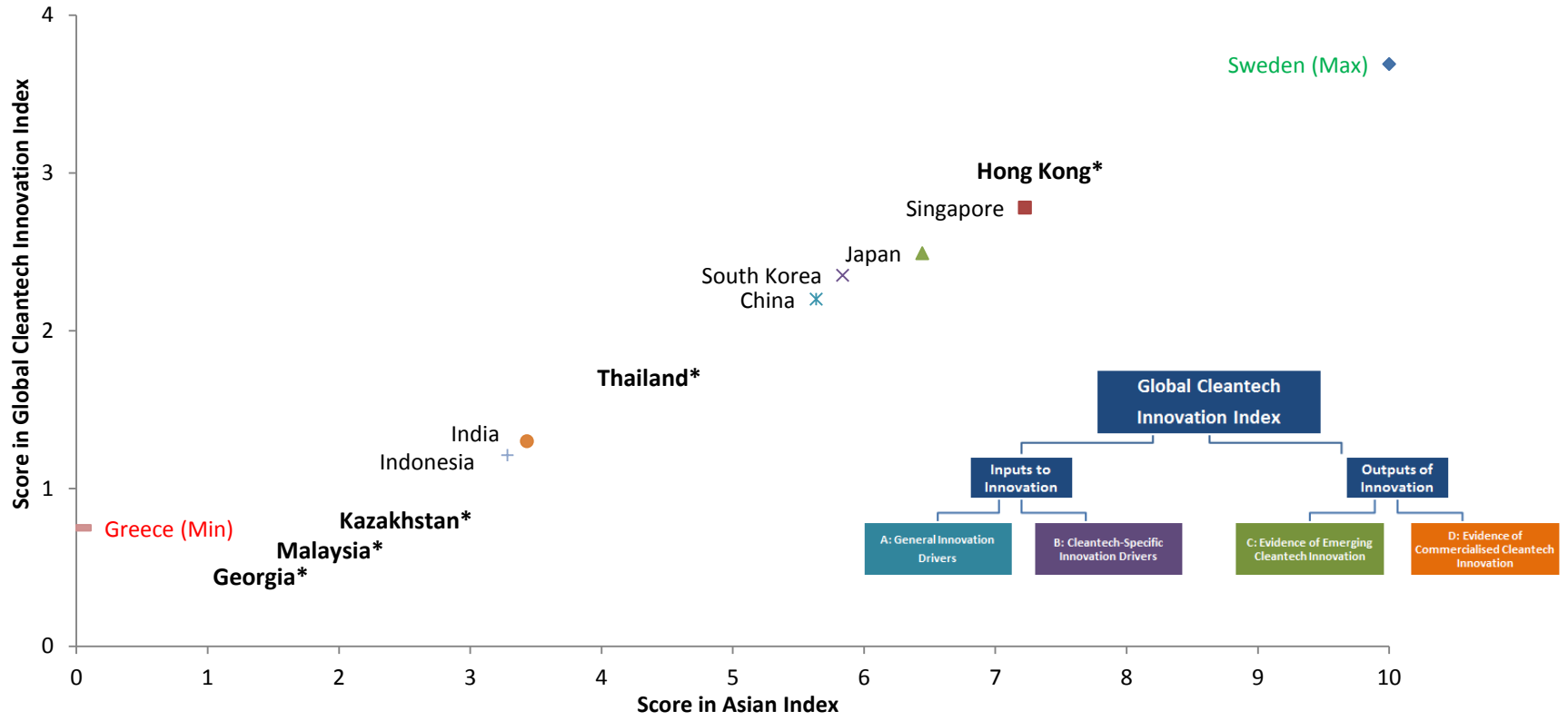


Current efforts that may impact future scores

- Startup India
- Centre for Innovation, Incubation, and Entrepreneurship (CIIE)
- UNIDO's GCIP

Measuring innovation in cleantech across Asia: using a "shadow index"

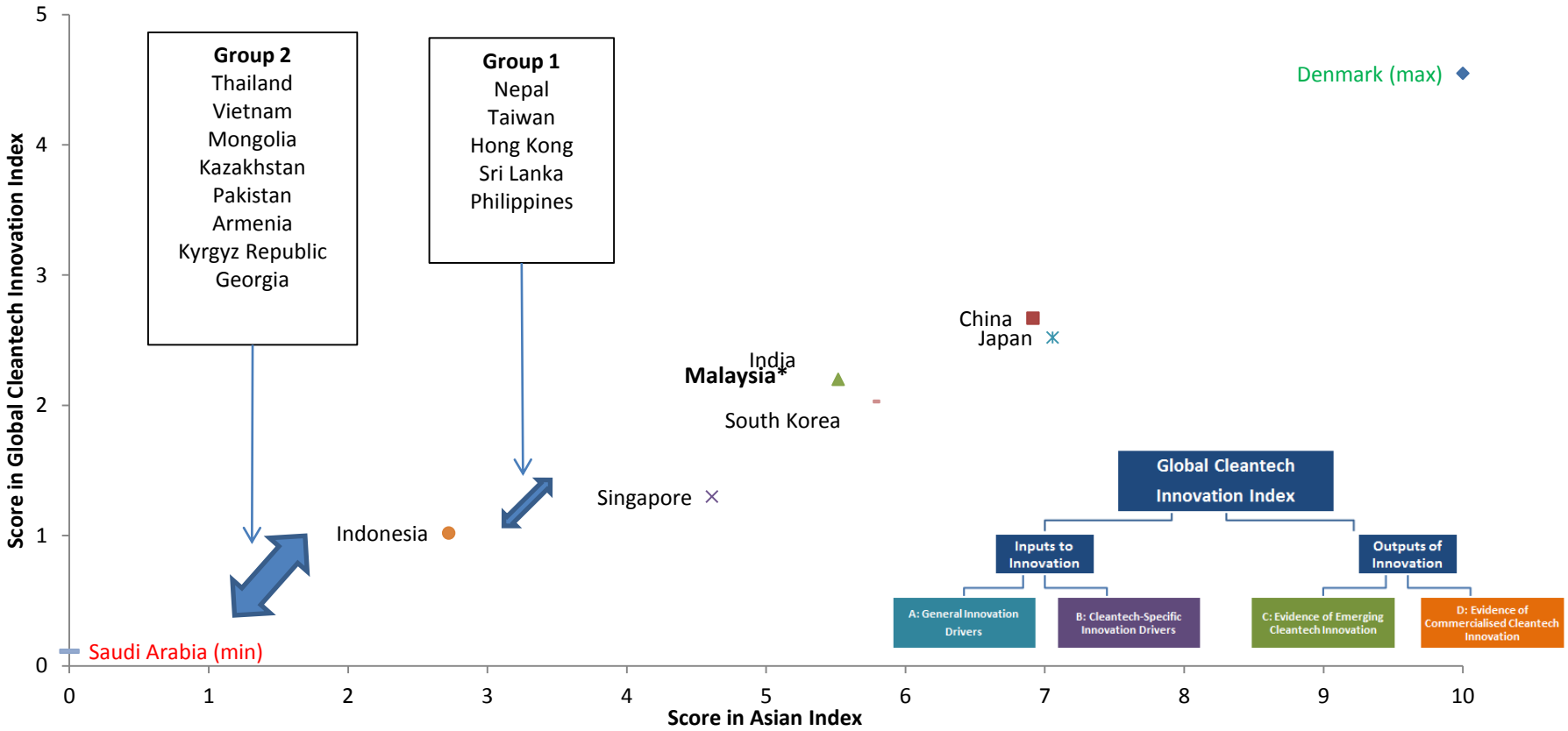
Which countries seem to have the strongest "general innovation drivers"?



* Does not appear in the GCII, y axis value is an estimation based on Asian GCII countries

Measuring innovation in cleantech across Asia: using a "shadow index"

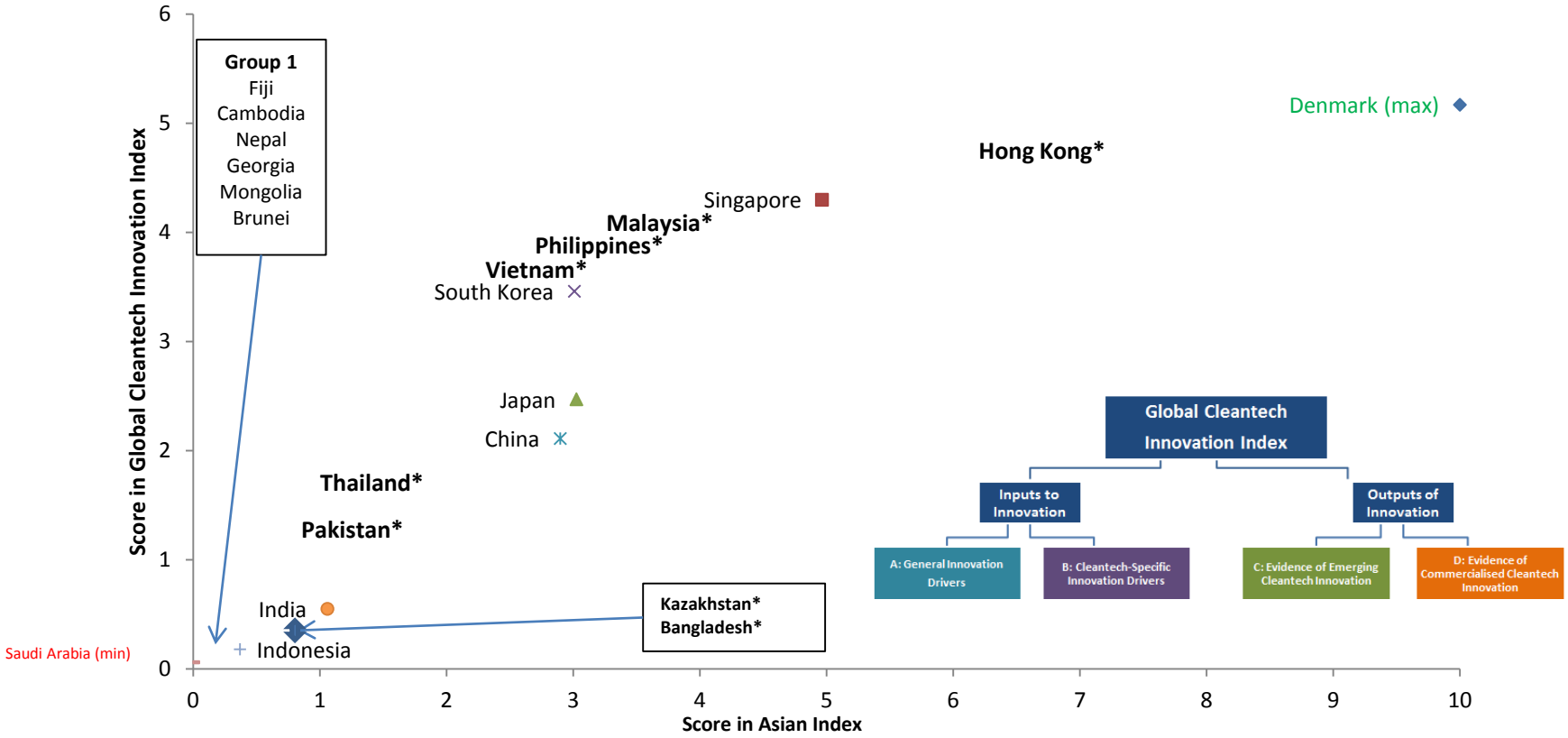
Which countries seem to have the strongest "cleantech-specific drivers"?



* Does not appear in the GCII, y axis value is an estimation based on Asian GCII countries

Measuring innovation in cleantech across Asia: using a "shadow index"

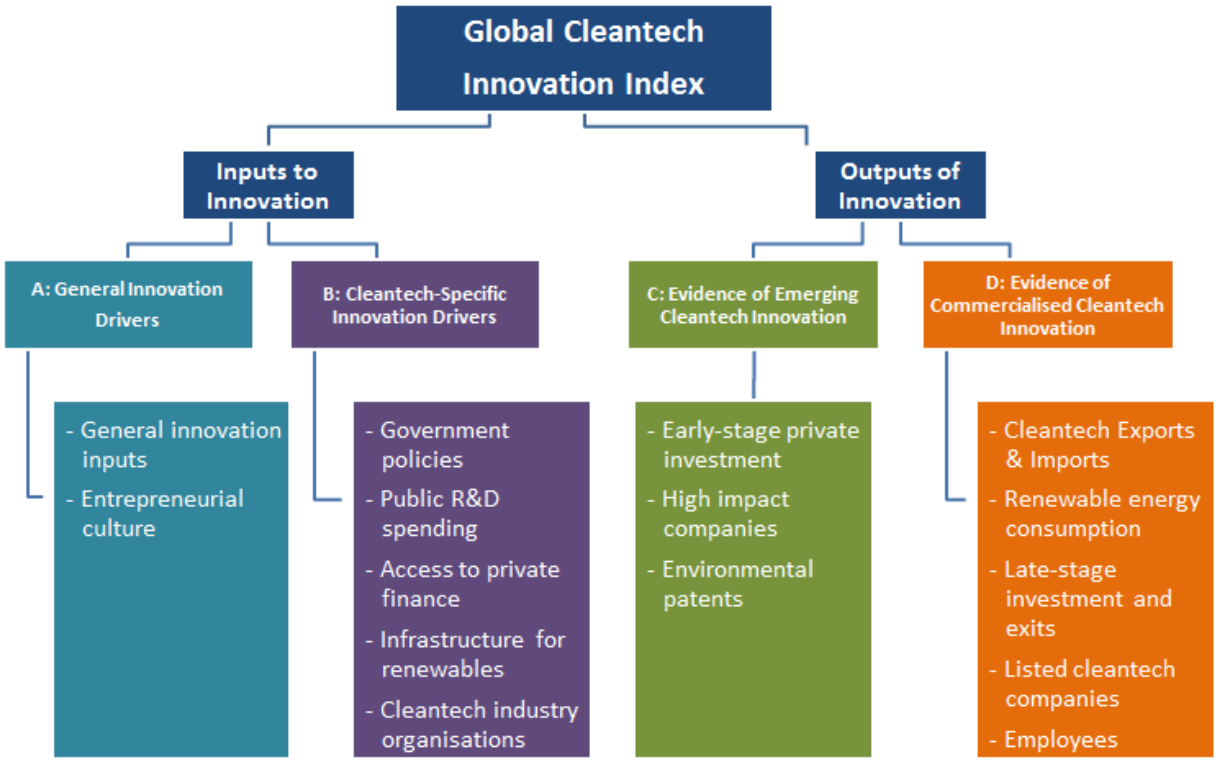
Which countries seem to have the strongest "evidence of commercialised cleantech innovation"?

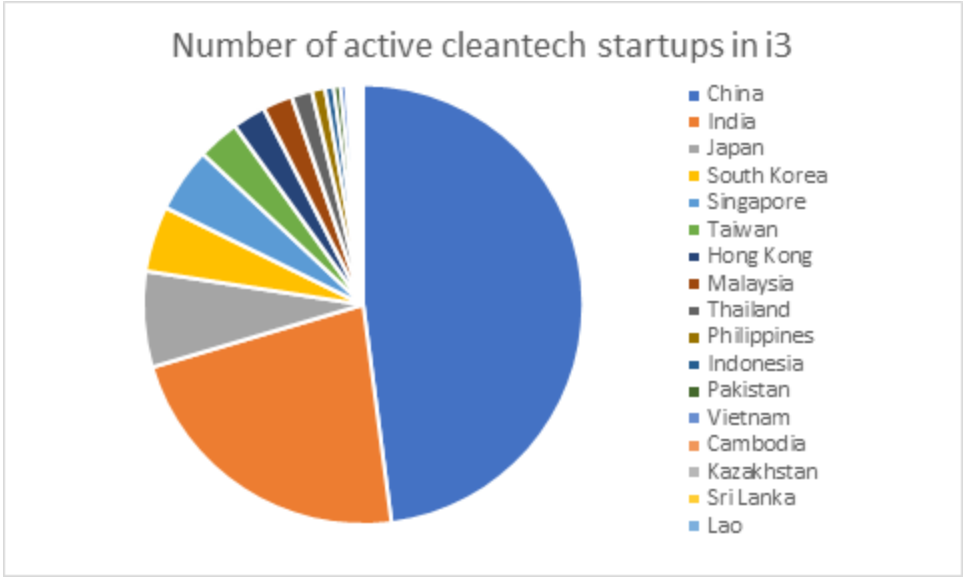


* Does not appear in the GCII, y axis value is an estimation based on Asian GCII countries

Measuring innovation in cleantech across Asia: using a "shadow index"

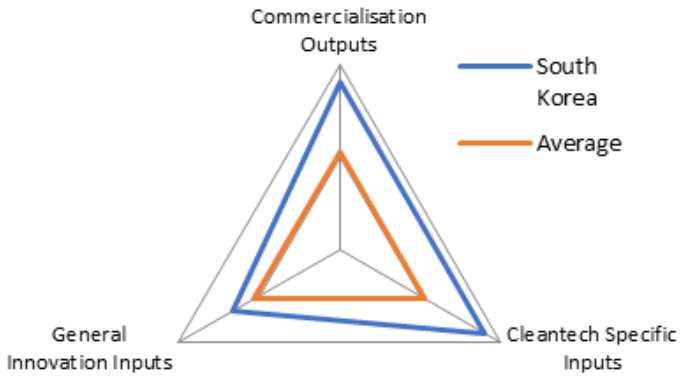
Benchmarking these 20 Asian countries on "evidence of emerging cleantech innovation" is proving a barrier. Does the data absence point to a lack of innovation/entrepreneurial companies (outside of the top few countries shown in the pie chart), or that we have not found the right data set?

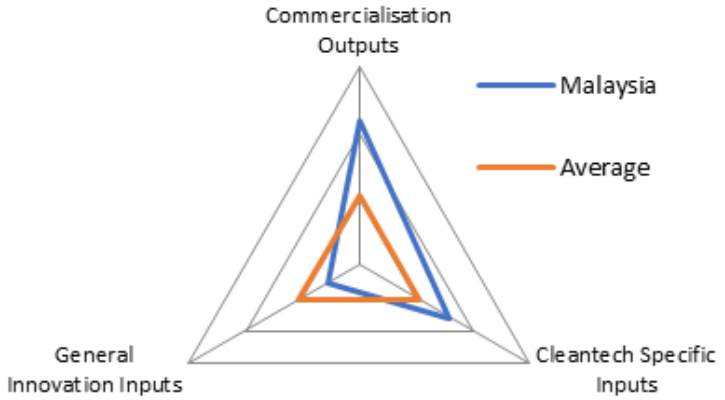


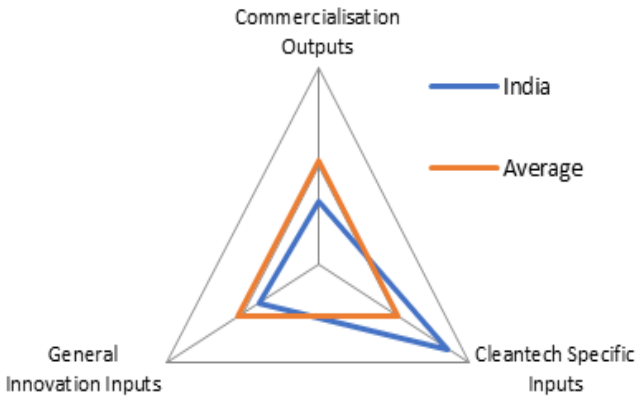


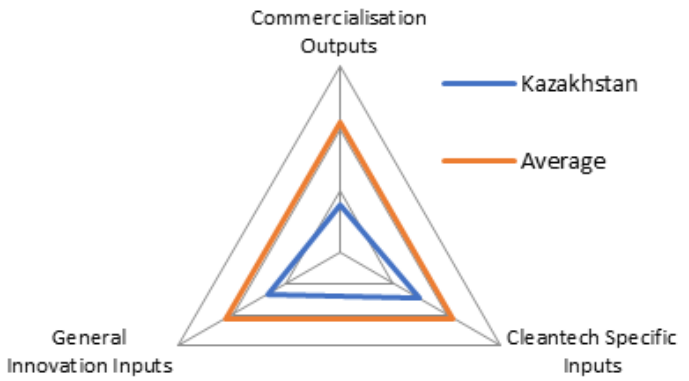
Measuring innovation in cleantech across Asia: using a "shadow index"

Our work is leading us towards the identification of the different situations and challenges different Asian countries seem to face







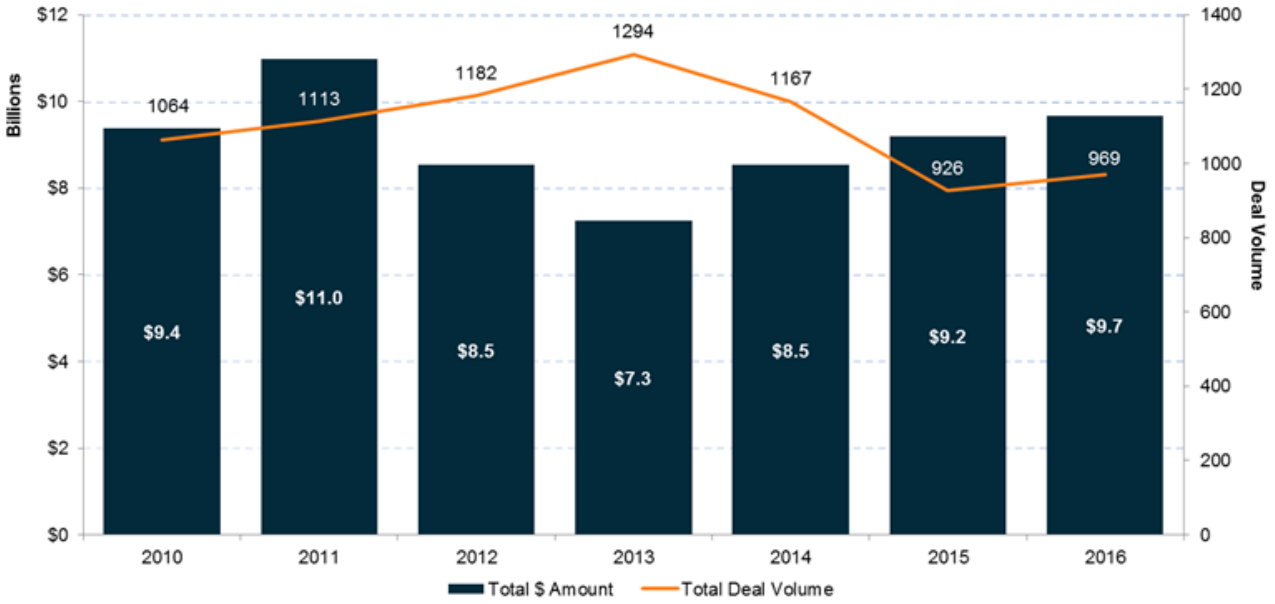


Other "windows" onto the state of cleantech innovation in Asia

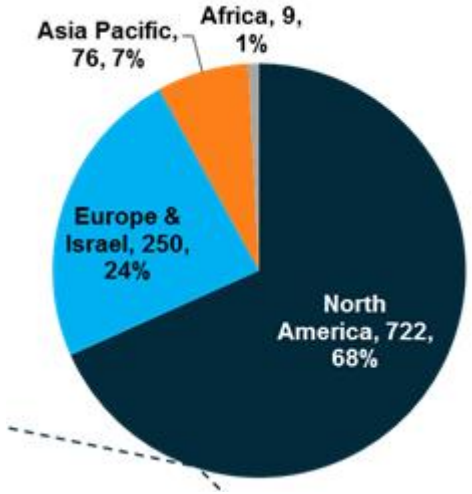
Source: CTG's Quarterly Investment Monitor

1a. Deal volume begins recovery as dollars continue to grow

Dollars (left) and volume (right) of global cleantech venture capital deal activity*



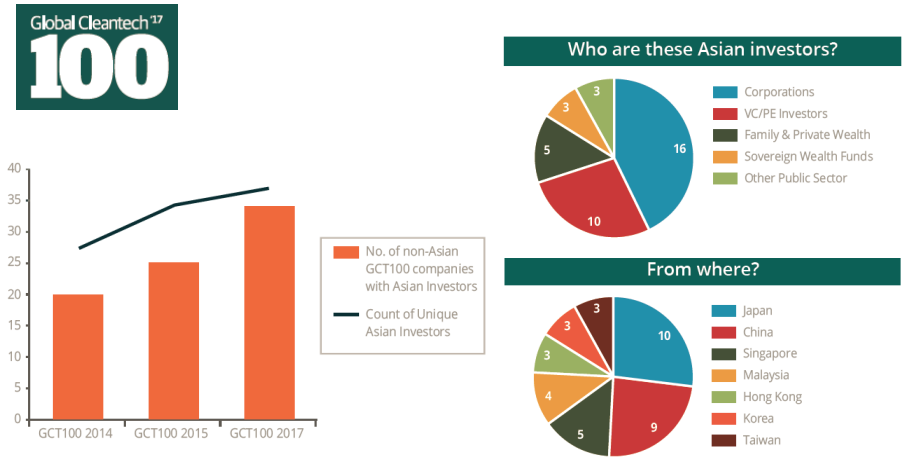
*Excludes outlier deals above $350M and *Mobility Service* deals



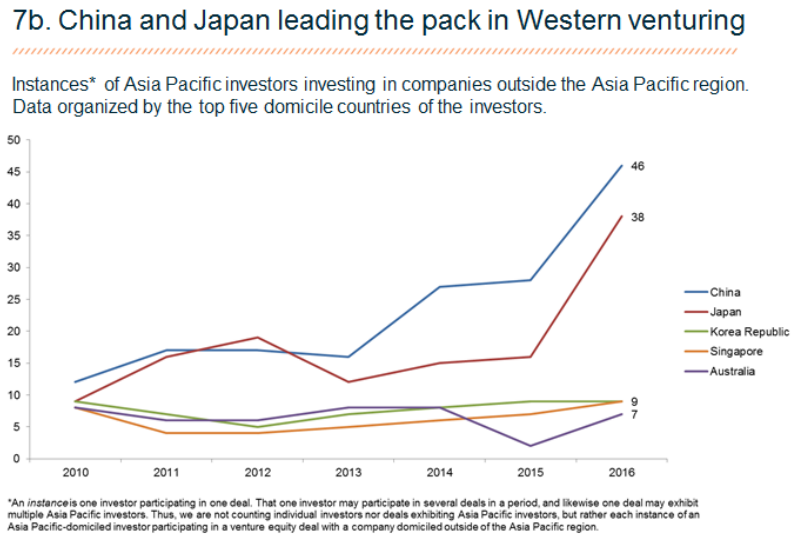
Other "windows" onto the state of cleantech innovation in Asia

There has been a noticeable rise in the presence of Asia-based investors into European and North American companies

Evident in our annual Global Cleantech 100 lists…



…as well as across the whole portfolio



Evident at our annual Cleantech Forums

SCG · Sime Darby · BAOSTEEL · TOKYO GAS

Other “windows” onto the state of cleantech innovation in Asia

Important to recognize the signals in the other direction and the future implications

ORGANICA

Other “windows” onto the state of cleantech innovation in Asia

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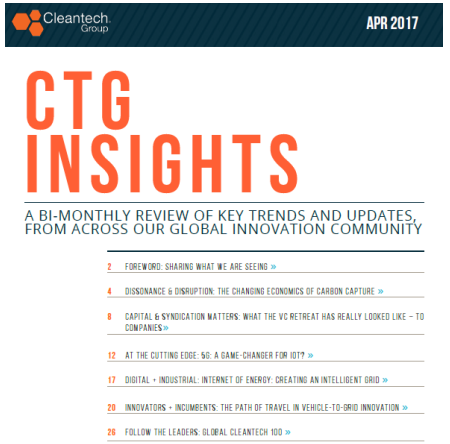
ORGANICA

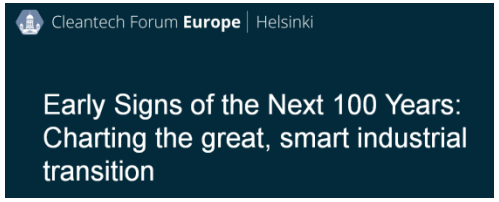
DEEP DIVE WORKSHOP

FROM START UP TO SCALE UP

ASIA CLEAN TECH

5 Global Cleantech Investment Trends





5 June 2017

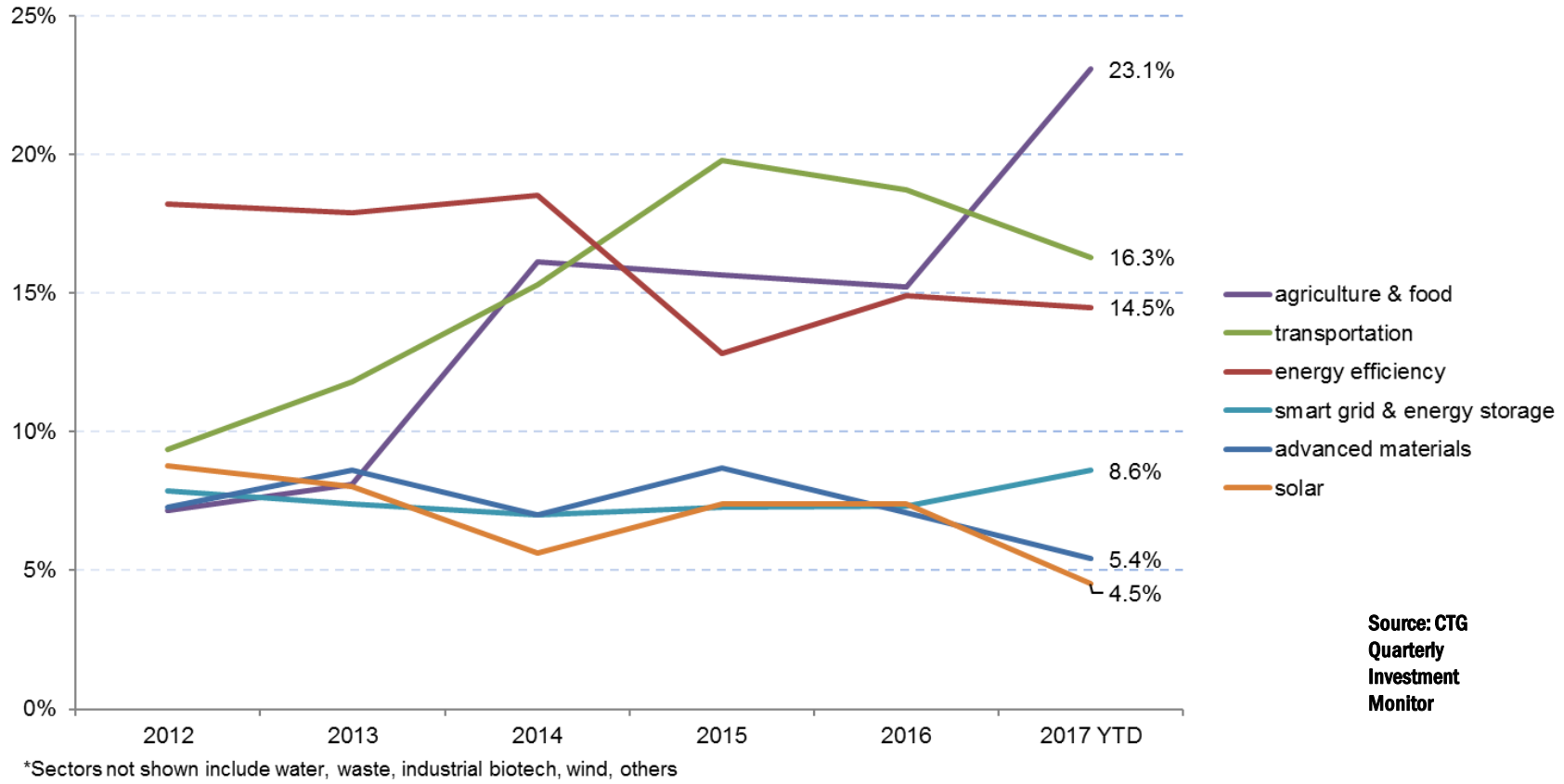
Richard Youngman,
CEO, CTG (Cleantech Group)

@cleantechgroup

Trend 1: Significant and Healthy Diversification has taken place

2016 saw 4 themes - within the "umbrella" cleantech theme - of $1bn each of global venture capital

Percentage share of total global cleantech venture deal volume by sector over time*



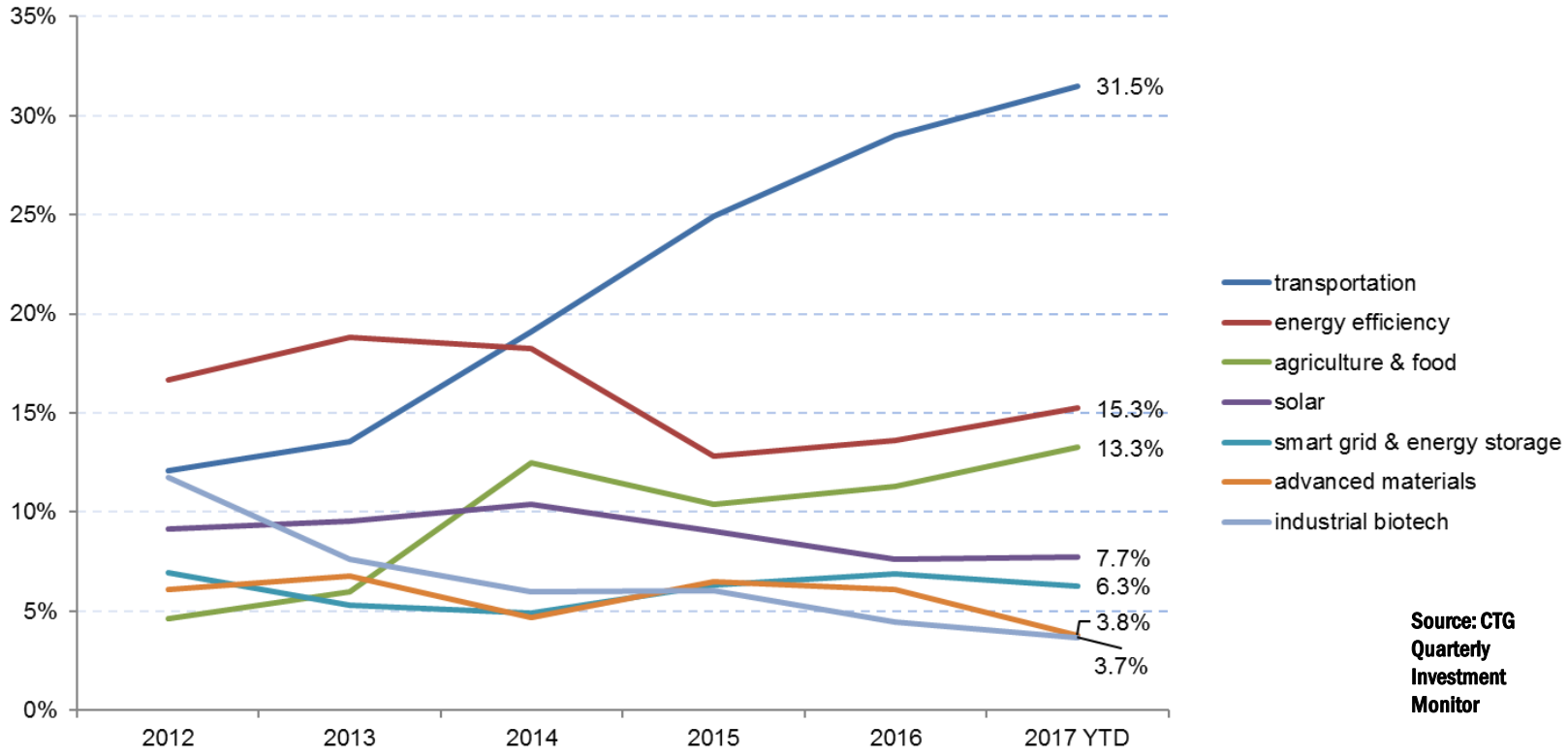
*Sectors not shown include water, waste, industrial biotech, wind, others

Source: CTG Quarterly Investment Monitor

Trend 1: Significant and Healthy Diversification has taken place

Transportation dominates in $ totals (even when stripping out mega deals (>$200m)

Percentage share of total global venture dollars invested by sector over time



Source: CTG Quarterly Investment Monitor

*Excludes outlier deals $200M and above
ǂ Sectors not shown include water, waste, oil & gas, wind, others

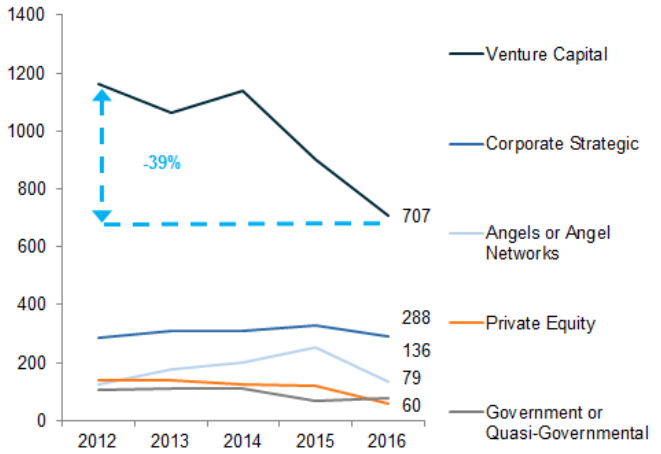
Trend 2 – The Changing Investor Mix

VCs' proportionate participation in cleantech deals has been dropping for 5+ years

4a. Quantifying the drop

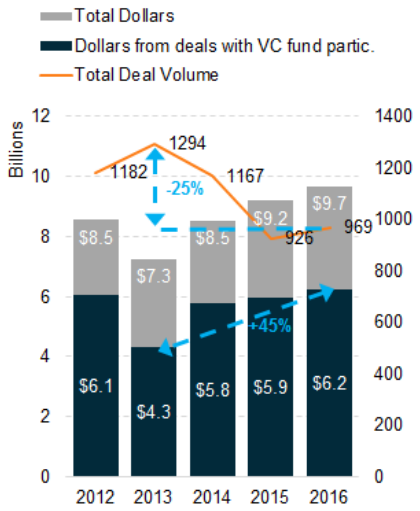
The five-year drop in VC round participations has outpaced the overall venture deal volume drop by 14%. Dollars invested have steadily climbed during that time, though, with dollars from deals that feature VC participation up 45% since 2013.

Count of investments by investor type‡



‡ Excluded types: Accelerators / Incubators, Family Offices / Foundations, Banks, others

Global venture investment*



*Excludes outlier deals above $350M

Source: CTG Quarterly Investment Monitor

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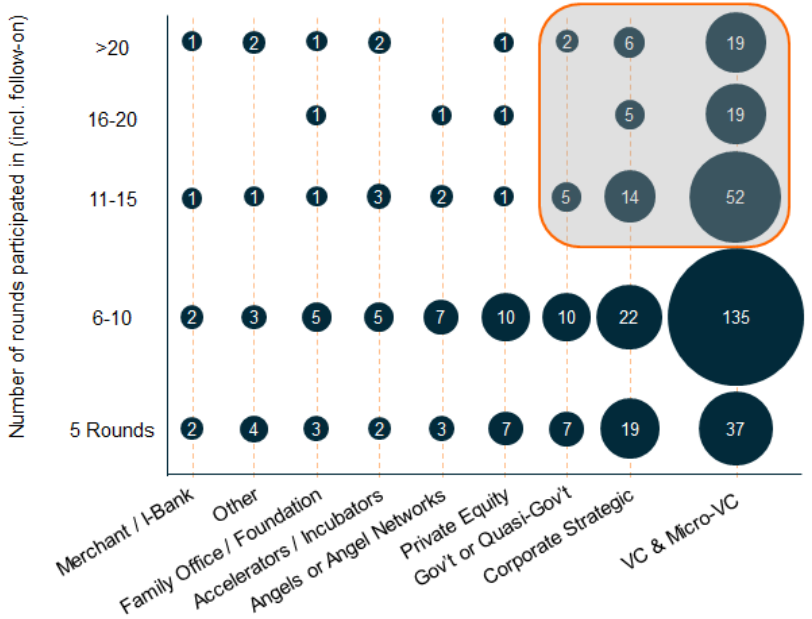
Trend 2 – The Changing Investor Mix

VC's are still participants in 50% of deals. There are relatively few regulars (2+ deals per annum) in cleantech deals; a huge "long tail", making syndication and fundraising challenging.

4c. Most active investor types

Count of investors 2012-2016 by type and activity level*. The three most consistently active types are highlighted



*Activity level indicates the investor has participated in that many rounds, inclusive of follow-on rounds

Source: CTG Quarterly Investment Monitor

Cleantech Group

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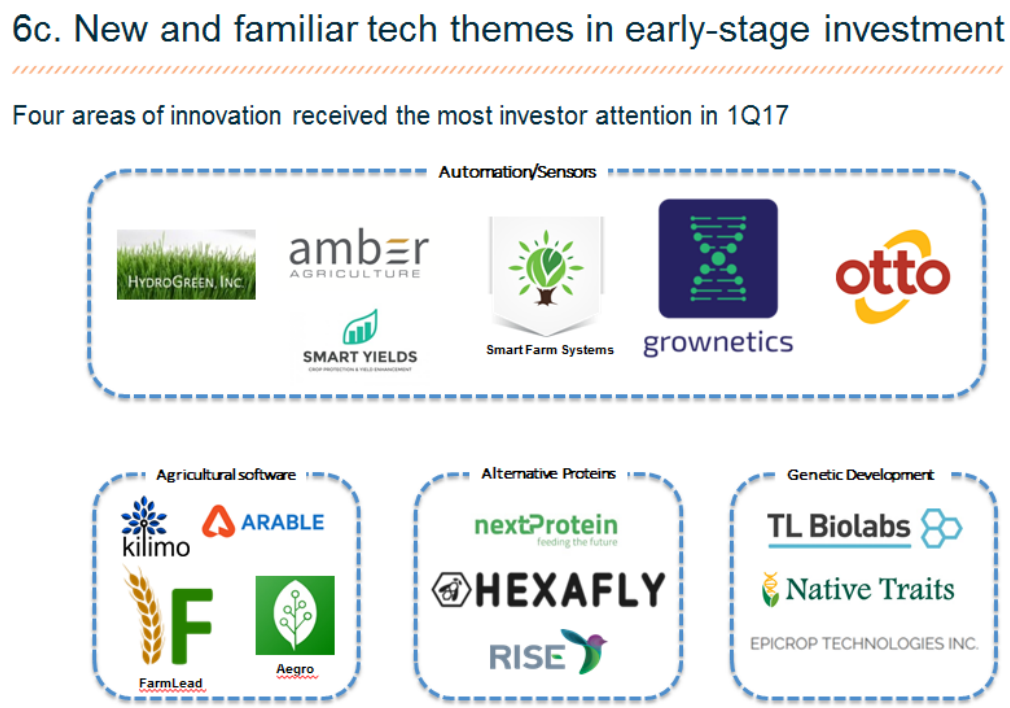
Trend 3: The Rise of Agriculture and Food Investment. It's not all about Energy!

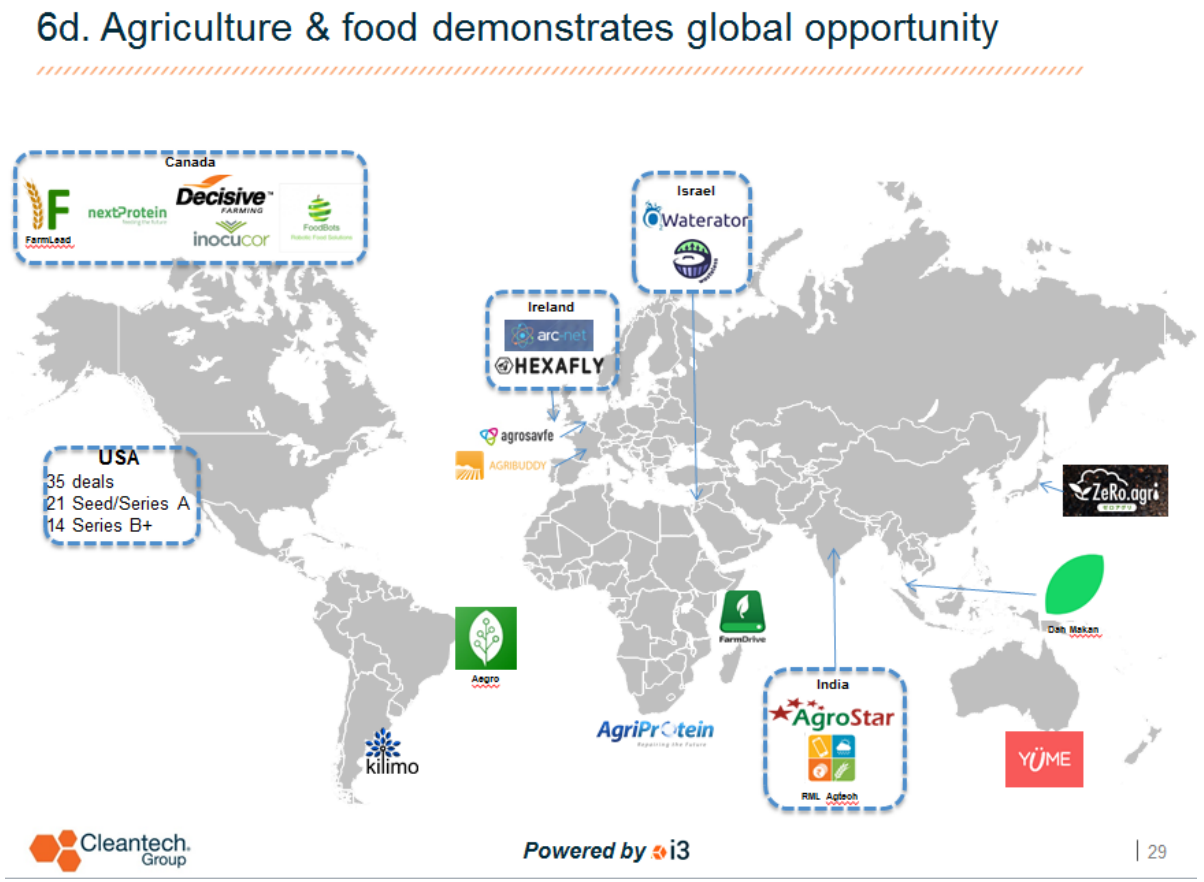
Automation and Data are a key part, but so are sustainable proteins and genetics



Source: CTG Quarterly Investment Monitor

Trend 3: The Rise of Agriculture and Food Investment. It's not all about Energy!

This is very much a global phenomenon



Source: CTG Quarterly Investment Monitor

Trend 4: The Rise of Next Generation Mobility as *the* Hot Investment Theme

Measuring the speed and momentum of change around Mobility

Signals on the “severity” of the potential disruption (threat levels)

Signals of the “urgency” felt by incumbents (response levels)

Measuring the speed and momentum of change around Mobility

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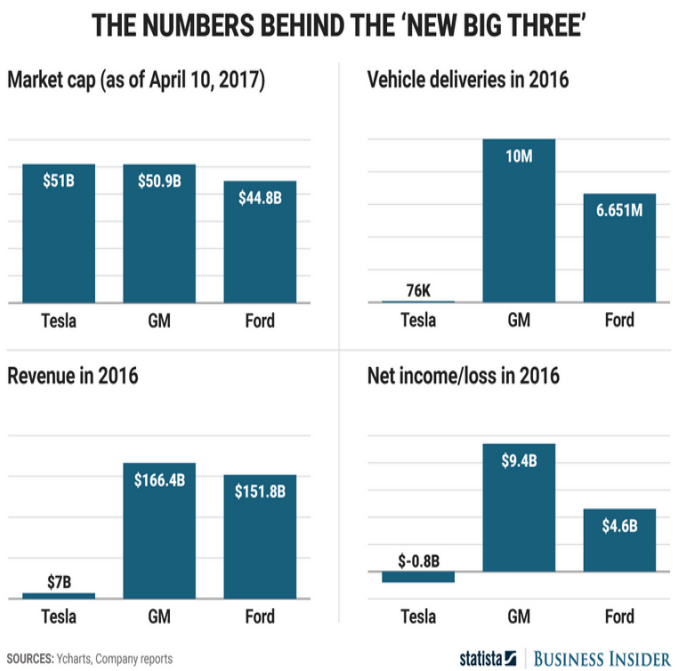

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Measuring the speed and momentum of change around Mobility

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FIVE TOP VALUED AUTOMOTIVE STARTUPS

	Company	WSJ Valuation	Zirra Valuation	Gap Between WSJ and Zirra's Valuation	Team Rating	Momentum Rating	Exit Valuation (M&A or IPO)
1	Uber	$68B	**$52B**	23.53%	9.9	9.9	$69B
2	Didi Chuxing	$33B	**$31.7B**	3.94%	8.6	8.9	$49-50B
3	Lyft	$5.5B	**$5.8B**	-5.45%	9.3	9.8	$8.5B-$8.6B
4	Grabtaxi	$3B	**$4.2B**	-40.00%	8.7	8.8	$6.4B
5	Ola Cabs (ANI TECH)	$5B	**$3.7B-$3.8B**	24.00%	9.3	9.1	$5.4B-$5.5B

Source: zirra.com

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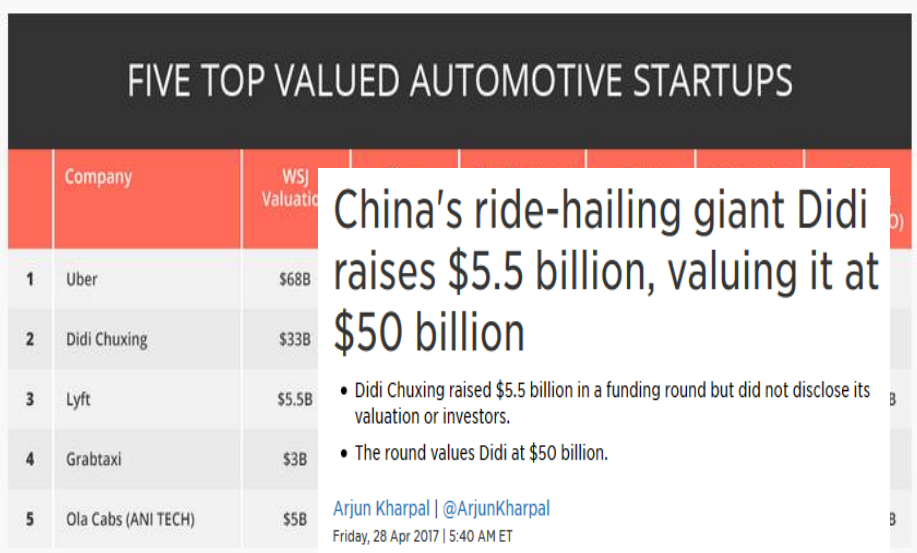

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3	Lyft	$5.5B
4	Grabtaxi	$3B
5	Ola Cabs (ANI TECH)	$5B

China's ride-hailing giant Didi raises $5.5 billion, valuing it at $50 billion

- Didi Chuxing raised $5.5 billion in a funding round but did not disclose its valuation or investors.
- The round values Didi at $50 billion.

Arjun Kharpal | @ArjunKharpal
Friday, 28 Apr 2017 | 5:40 AM ET

CNBC

Source: zirra.com

Signals of the "urgency" felt by incumbents (response levels)

Measuring the speed and momentum of change around Mobility

Signals on the "severity" of the potential disruption (threat levels)

Transport-relevant GCT100 companies with Q1 2017 raises

PROTERRA

chargepoint+

INSTAVOLT

SKELE+ON TECHNOLOGIES

EU "mobility service" companies with Q1 2017 raises

FREIGHTOS The freight network

STARSHIP

EASY MILE

WAYRAY

Signals of the "urgency" felt by incumbents (response levels)

Measuring the speed and momentum of change around Mobility

Signals on the "severity" of the potential disruption (threat levels)

Acquirer	Target (& country)	
intel	Mobileye	Israel
verizon	SkyWard	USA
ENGIE	EVBOX	Netherlands
银亿 中国五百强企业	punch powertrain Gear up for the future	Belgium

Signals of the "urgency" felt by incumbents (response levels)

Fleetmatics

Telogis

Measuring the speed and momentum of change around Mobility

Signals on the "severity" of the potential disruption (threat levels)

Investor	Investee company
Alibaba Group	WAYRAY
Baidu 百度	Velodyne LiDAR, NIO
Tencent 腾讯	NIO, TESLA

Signals of the "urgency" felt by incumbents (response levels)

Measuring the speed and momentum of change around Mobility

Signals on the "severity" of the potential disruption (threat levels)

Signals of the "urgency" felt by incumbents (response levels)

"We see autonomous vehicles as having as significant an impact on society as Ford's moving assembly line did 100 years ago."
Mark Fields, CEO Ford

Measuring the speed and momentum of change around Mobility

Signals on the "severity" of the potential disruption (threat levels)

Signals of the "urgency" felt by incumbents (response levels)

Investor	Investee company
DELPHI	otonomo
Valeo	navya
ALSTOM	EASY MILE
TOTAL	Xee

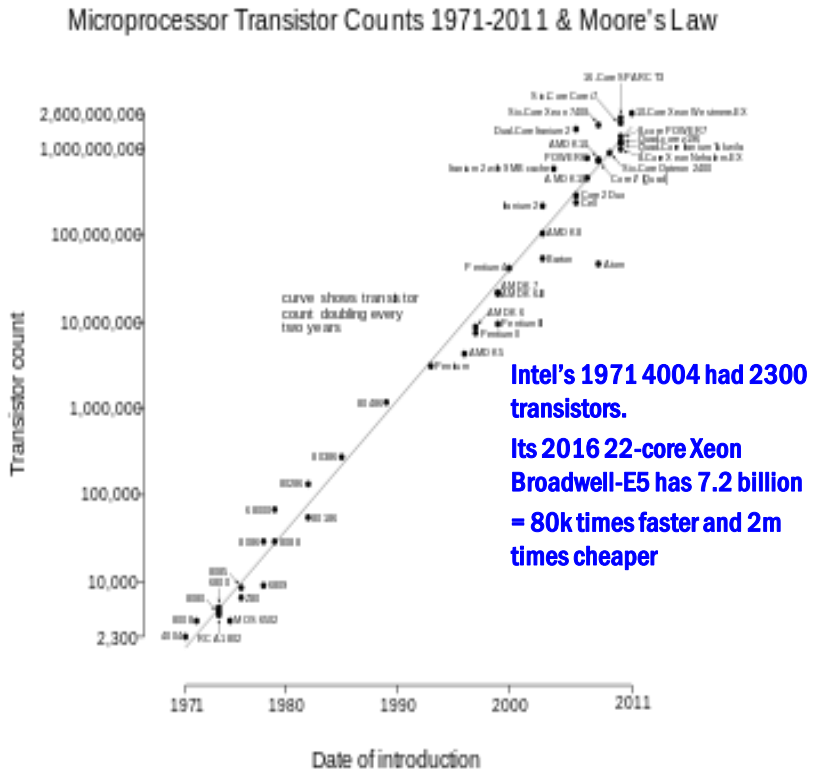
SAFT

Trend 5: Convergence of Technologies

The future of all industries is not only cleaner and more sustainable, but smarter and more automated

1. The Digitalization of Industry > The Internet of Everything

The drive for “All Efficiency” across Industry is enabled by ever-improving ICT technology at ever more affordable prices.



Intel’s 1971 4004 had 2300 transistors.

Its 2016 22-core Xeon Broadwell-E5 has 7.2 billion

= 80k times faster and 2m times cheaper

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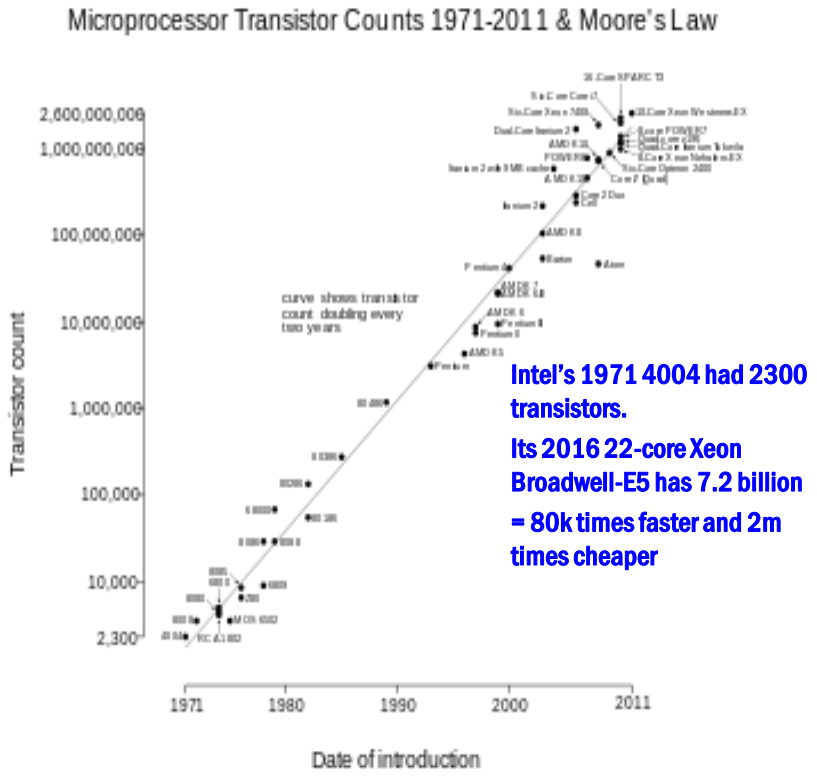

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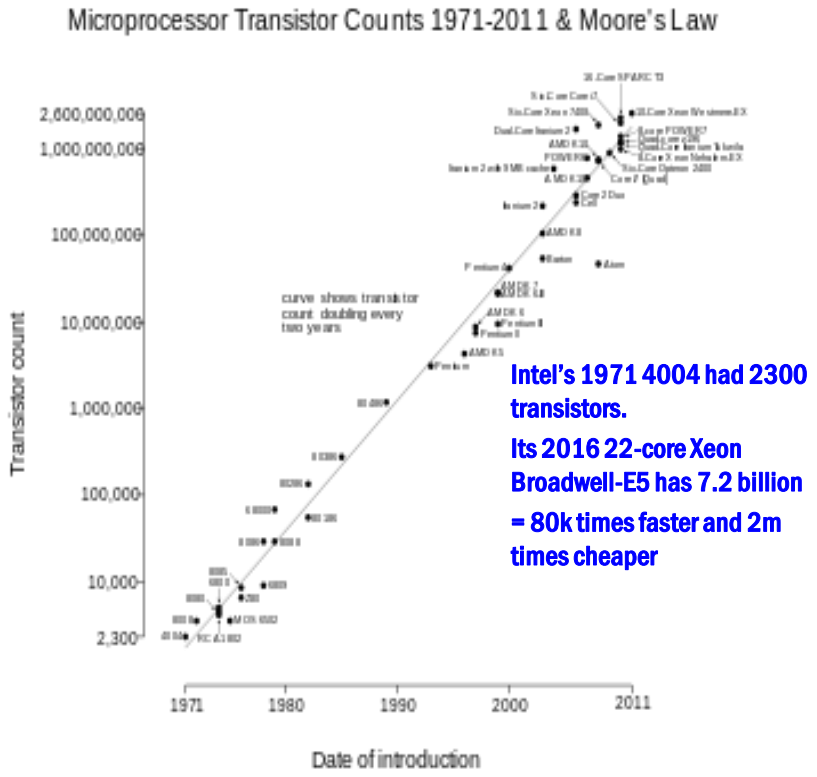

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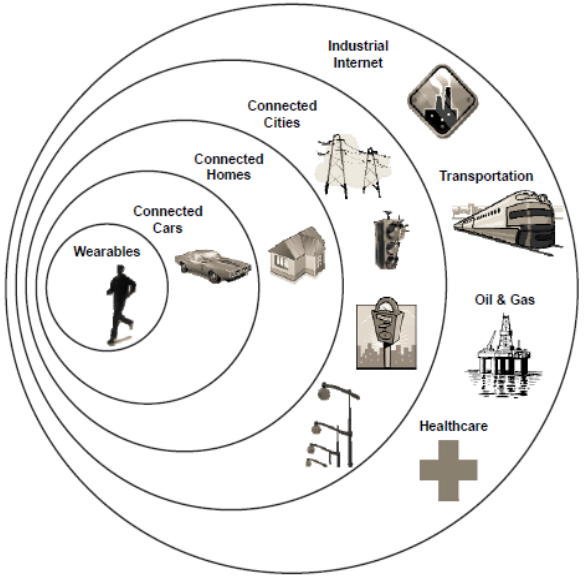
50 billion devices (each with multiple sensors) by 2020?



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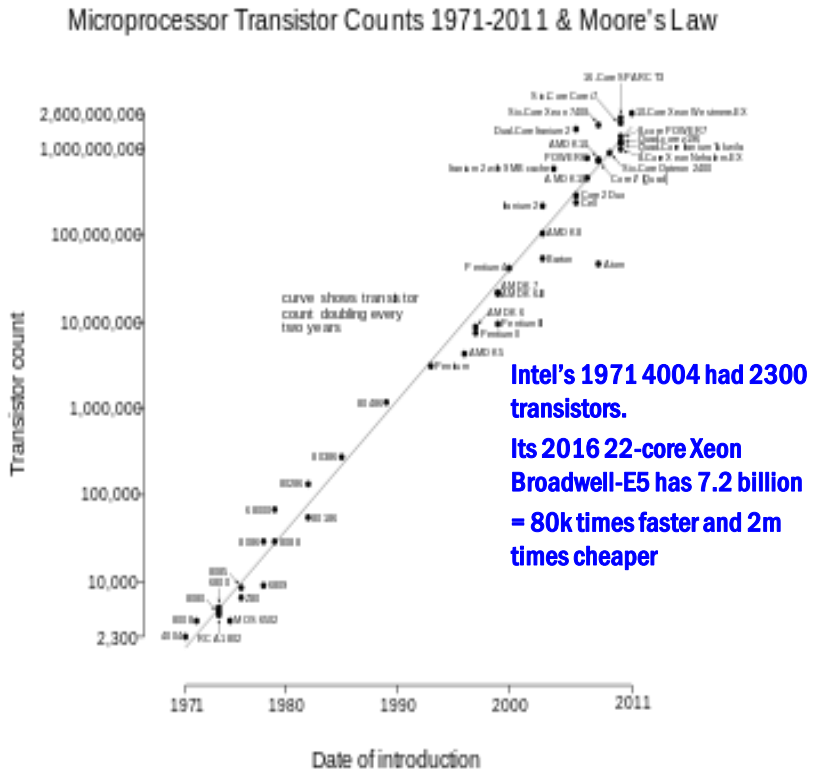

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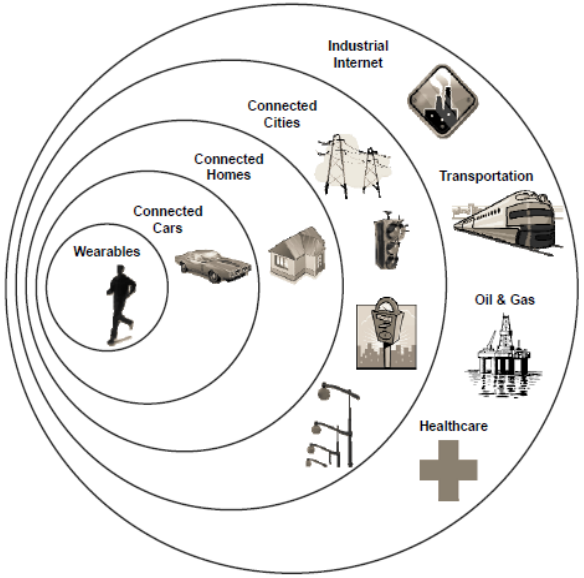

In the past 10 years...

- Processing costs have declined by 60x
- The cost of bandwidth have declined by 40x
- Sensor costs have dropped from $1.30 to $0.60

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The make-up of industrial cleantech innovation has changed - not just due to investors' preferences for capital-light but by what is possible today.

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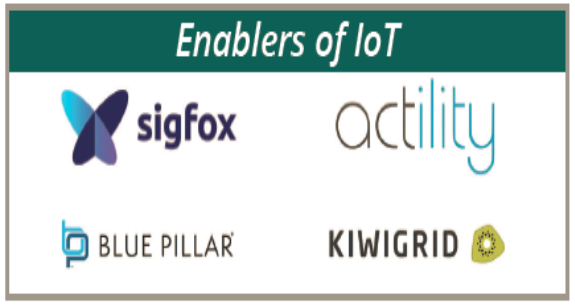

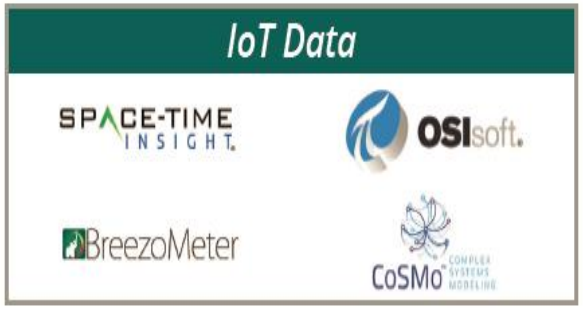

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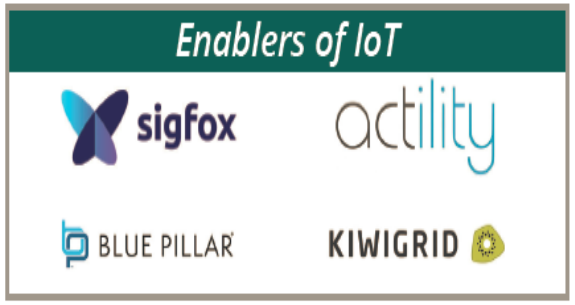

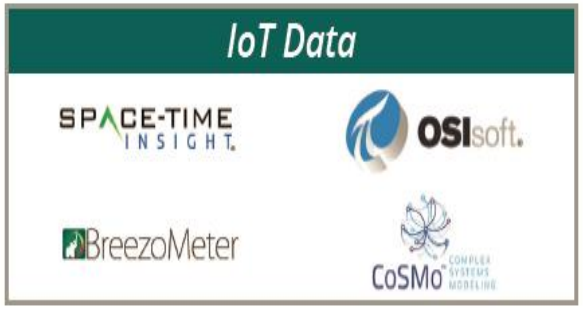

1. The Digitalization of Industry > The Internet of Everything

Industry 4.0 is a challenge the biggest and the oldest are involved in, just as much as the next generation of start-ups.

2. Automation and Autonomy

A multi-decade transition is underway, taking industry from automation towards autonomy.

AUTONOMY FROM START TO FINISH			
LEVEL	CONCEPT	DEFINITION	WHO'S IN CONTROL
0	Human Operation	The operator **controls the machine at all times.**	
1	Automation (Function-specific)	The operator **has overall control of the machine** and is responsible for its safe operation, but can transfer limited control over a specific function (like moving a bucket or blade) to the machine.	
2	Semi-autonomous	The machine accomplishes **a subset of its defined tasks** without operator interaction. The operator performs the remaining tasks.	
3	Autonomous	The machine accomplishes **all its defined tasks** without operator interaction and is responsible for all safety -critical earthmoving functions.	

2. Automation and Autonomy

Transportation, yes, but it is evident to CTG that this drive in the direction of autonomous systems will be across the commercial and industrial landscape.

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CLEARPATH ROBOTICS™

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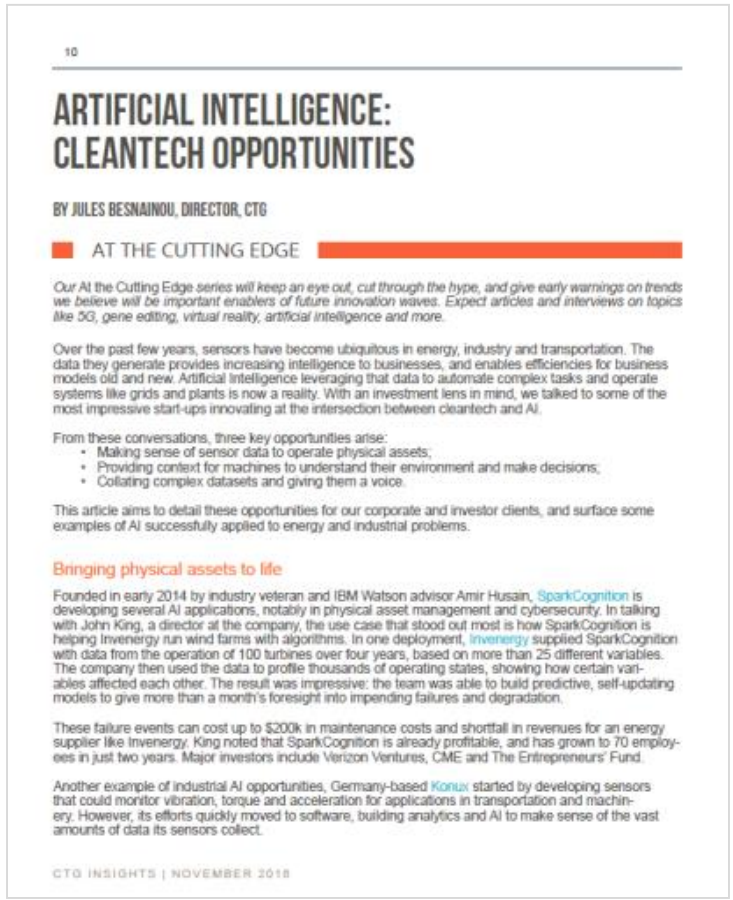
CLEARPATH ROBOTICS™

3. Artificial Intelligence

Imagine how different industrial processes become when you can more effectively predict outcomes



10

ARTIFICIAL INTELLIGENCE: CLEANTECH OPPORTUNITIES

BY JULES BESNAINOU, DIRECTOR, CTG

AT THE CUTTING EDGE

Our AI the Cutting Edge series will keep an eye out, cut through the hype, and give early warnings on trends we believe will be important enablers of future innovation waves. Expect articles and interviews on topics like 5G, gene editing, virtual reality, artificial intelligence and more.

Over the past few years, sensors have become ubiquitous in energy, industry and transportation. The data they generate provides increasing intelligence to businesses, and enables efficiencies for business models old and new. Artificial Intelligence leveraging that data to automate complex tasks and operate systems like grids and plants is now a reality. With an investment lens in mind, we talked to some of the most impressive start-ups innovating at the intersection between cleantech and AI.

From these conversations, three key opportunities arise:

- Making sense of sensor data to operate physical assets;
- Providing context for machines to understand their environment and make decisions;
- Collating complex datasets and giving them a voice.

This article aims to detail these opportunities for our corporate and investor clients, and surface some examples of AI successfully applied to energy and industrial problems.

Bringing physical assets to life

Founded in early 2014 by industry veteran and IBM Watson advisor Amir Husain, SparkCognition is developing several AI applications, notably in physical asset management and cybersecurity. In talking with John King, a director at the company, the use case that stood out most is how SparkCognition is helping Invenergy run wind farms with algorithms. In one deployment, Invenergy supplied SparkCognition with data from the operation of 100 turbines over four years, based on more than 25 different variables. The company then used the data to profile thousands of operating states, showing how certain variables affected each other. The result was impressive: the team was able to build predictive, self-updating models to give more than a month's foresight into impending failures and degradation.

These failure events can cost up to $200k in maintenance costs and shortfall in revenues for an energy supplier like Invenergy. King noted that SparkCognition is already profitable, and has grown to 70 employees in just two years. Major investors include Verizon Ventures, CME and The Entrepreneurs' Fund.

Another example of industrial AI opportunities, Germany-based Konux started by developing sensors that could monitor vibration, torque and acceleration for applications in transportation and machinery. However, its efforts quickly moved to software, building analytics and AI to make sense of the vast amounts of data its sensors collect.

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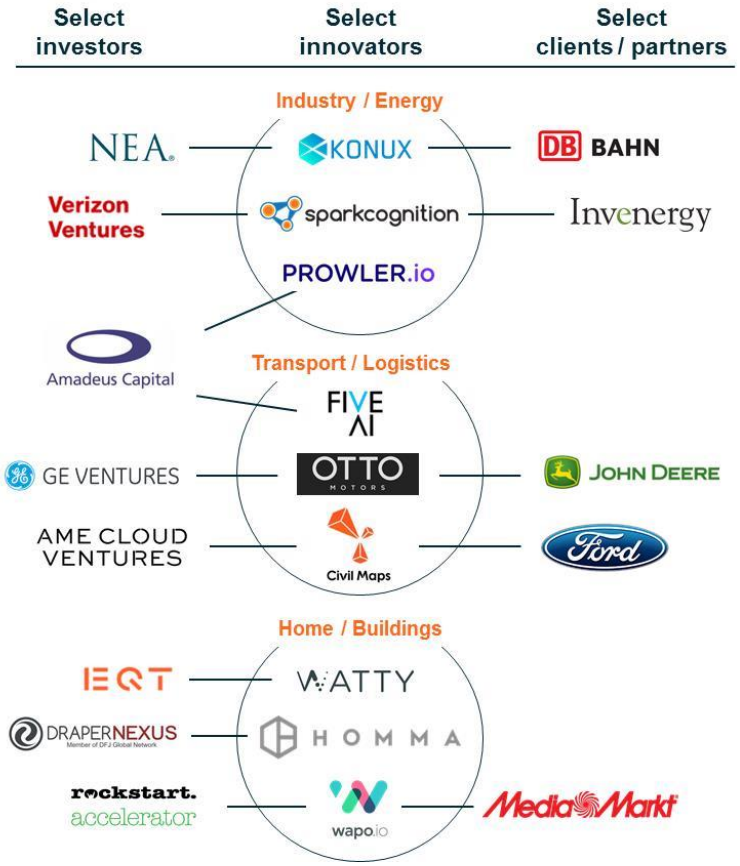

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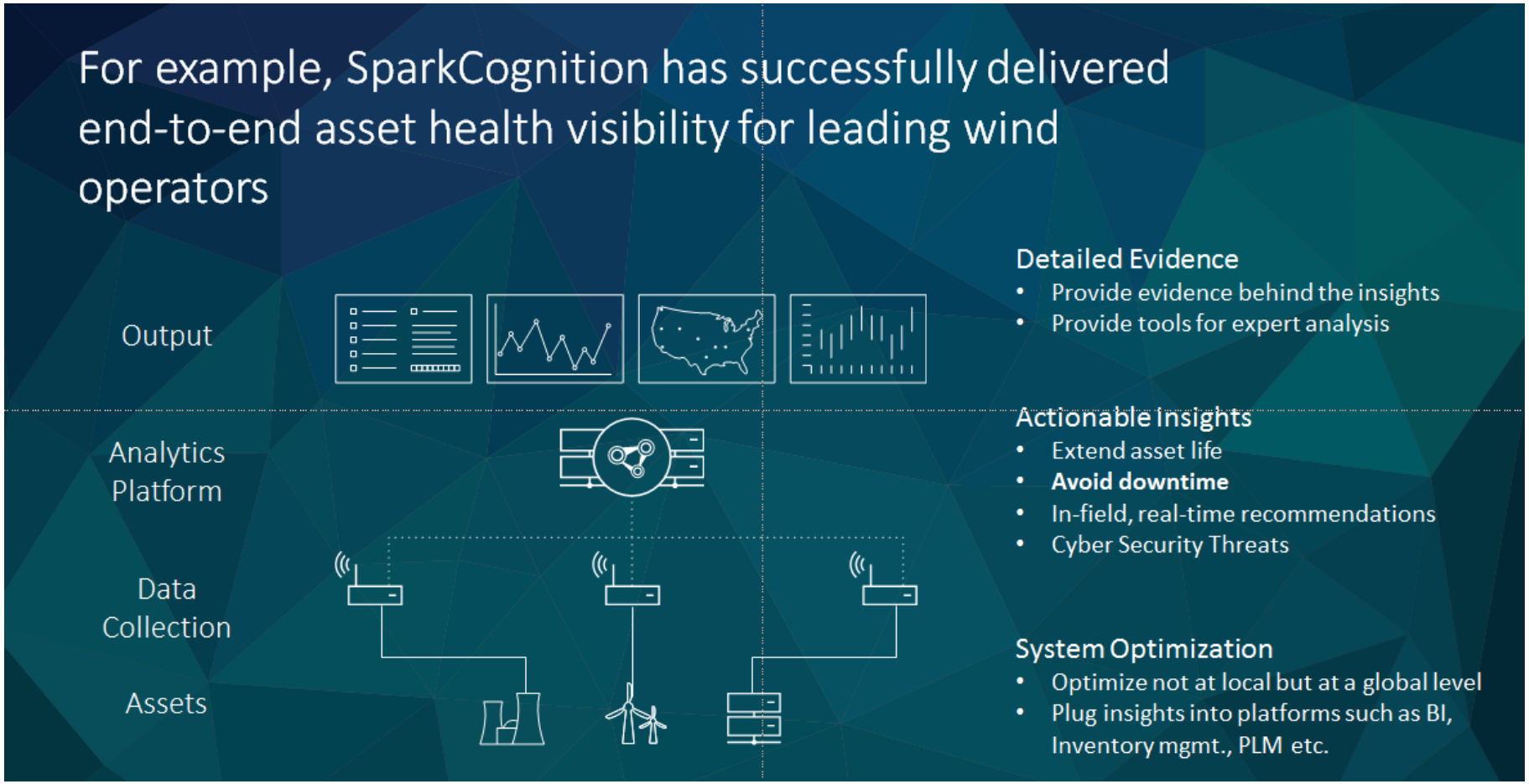
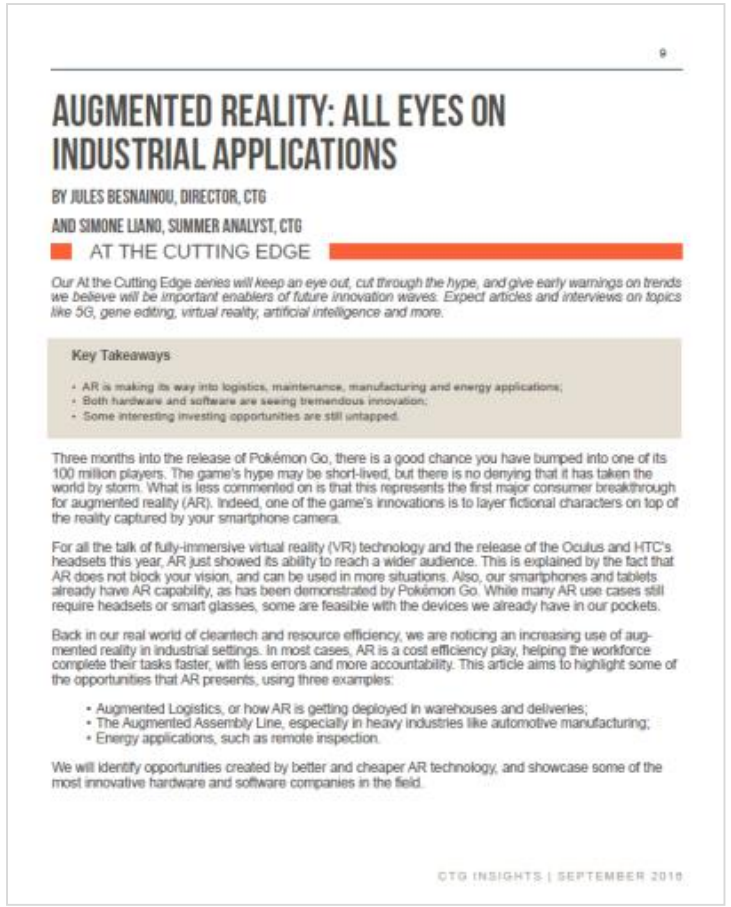


4. Augmented/Virtual Reality

Imagine how much more efficient and safer industrial processes can become when you can support workers in situ



AUGMENTED REALITY: ALL EYES ON INDUSTRIAL APPLICATIONS

BY JULES BESNAINOU, DIRECTOR, CTG

AND SIMONE LIANO, SUMMER ANALYST, CTG

AT THE CUTTING EDGE

Our At the Cutting Edge series will keep an eye out, cut through the hype, and give early warnings on trends we believe will be important enablers of future innovation waves. Expect articles and interviews on topics like 5G, gene editing, virtual reality, artificial intelligence and more.

Key Takeaways

- AR is making its way into logistics, maintenance, manufacturing and energy applications;
- Both hardware and software are seeing tremendous innovation;
- Some interesting investing opportunities are still untapped.

Three months into the release of Pokémon Go, there is a good chance you have bumped into one of its 100 million players. The game's hype may be short-lived, but there is no denying that it has taken the world by storm. What is less commented on is that this represents the first major consumer breakthrough for augmented reality (AR). Indeed, one of the game's innovations is to layer fictional characters on top of the reality captured by your smartphone camera.

For all the talk of fully-immersive virtual reality (VR) technology and the release of the Oculus and HTC's headsets this year, AR just showed its ability to reach a wider audience. This is explained by the fact that AR does not block your vision, and can be used in more situations. Also, our smartphones and tablets already have AR capability, as has been demonstrated by Pokémon Go. While many AR use cases still require headsets or smart glasses, some are feasible with the devices we already have in our pockets.

Back in our real world of cleantech and resource efficiency, we are noticing an increasing use of augmented reality in industrial settings. In most cases, AR is a cost efficiency play, helping the workforce complete their tasks faster, with less errors and more accountability. This article aims to highlight some of the opportunities that AR presents, using three examples:

- Augmented Logistics, or how AR is getting deployed in warehouses and deliveries;
- The Augmented Assembly Line, especially in heavy industries like automotive manufacturing;
- Energy applications, such as remote inspection.

We will identify opportunities created by better and cheaper AR technology, and showcase some of the most innovative hardware and software companies in the field.

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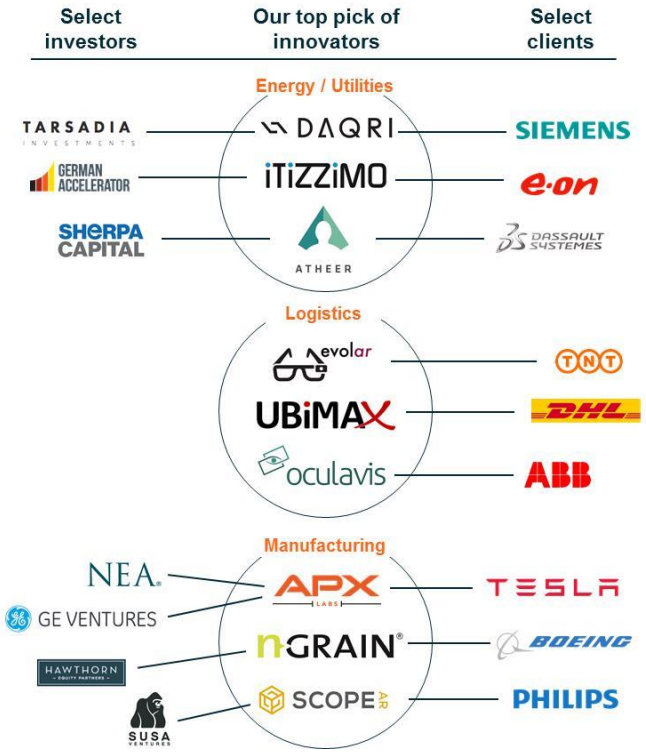

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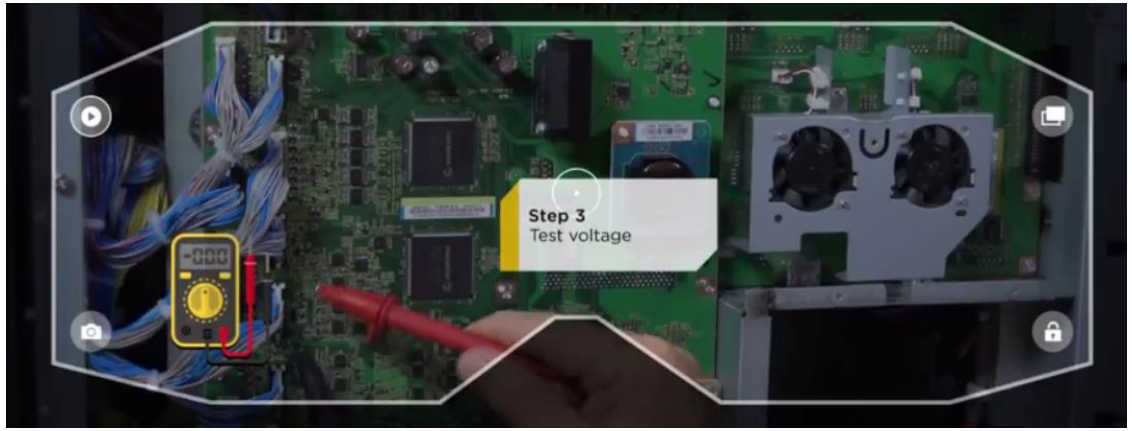
FIELD IT
SUPER TECHNICIANS



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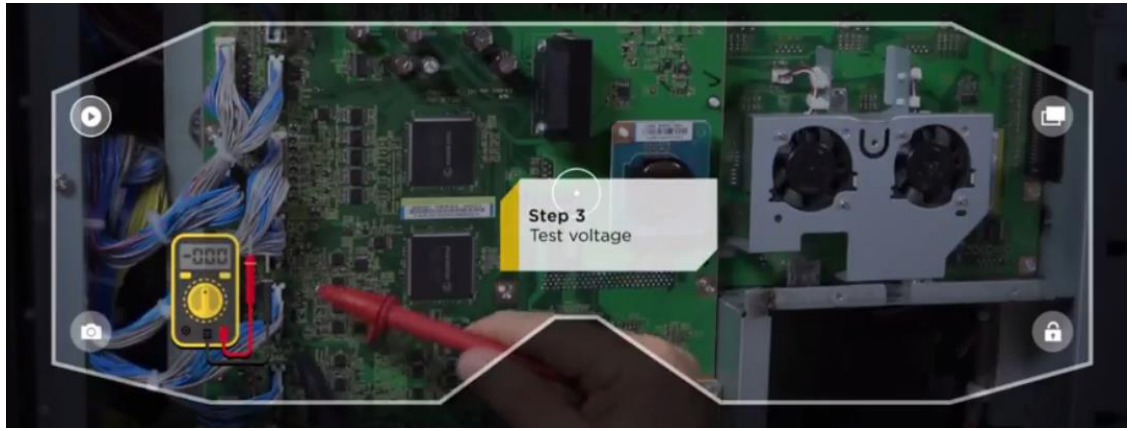
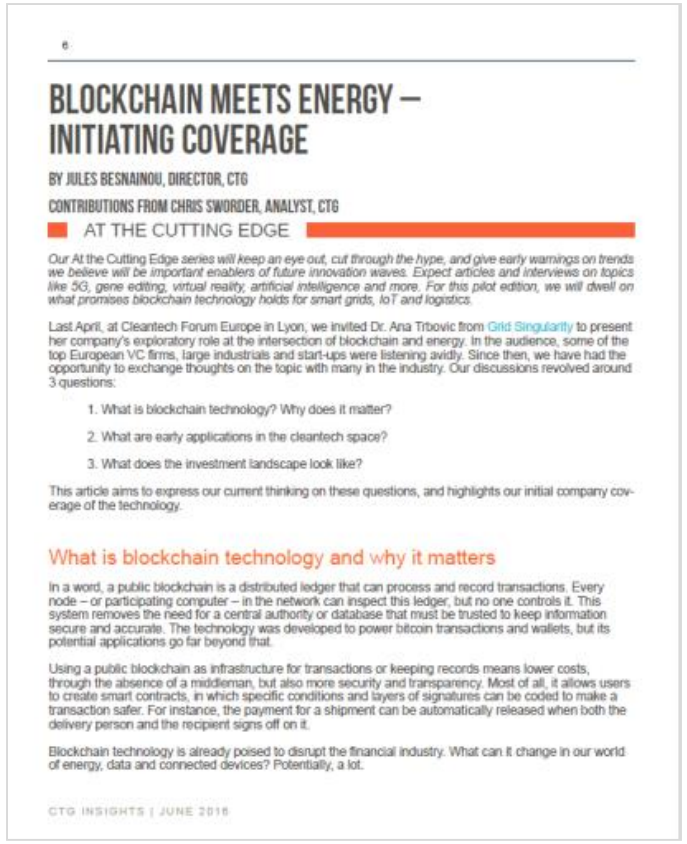
SUPER TECHNICIANS



WAYRAY

5. Blockchain Meets Energy

The world of distributed energy needs a secure, peer to peer, transactional and informational backbone to function at its most powerful



6

BLOCKCHAIN MEETS ENERGY – INITIATING COVERAGE

BY JULES BESNAINOU, DIRECTOR, CTG

CONTRIBUTIONS FROM CHRIS SWORDER, ANALYST, CTG

AT THE CUTTING EDGE

Our At the Cutting Edge series will keep an eye out, cut through the hype, and give early warnings on trends we believe will be important enablers of future innovation waves. Expect articles and interviews on topics like 5G, gene editing, virtual reality, artificial intelligence and more. For this pilot edition, we will dwell on what promises blockchain technology holds for smart grids, IoT and logistics.

Last April, at Cleantech Forum Europe in Lyon, we invited Dr. Ana Trbovic from Grid Singularity to present her company's exploratory role at the intersection of blockchain and energy. In the audience, some of the top European VC firms, large industrials and start-ups were listening avidly. Since then, we have had the opportunity to exchange thoughts on the topic with many in the industry. Our discussions revolved around 3 questions:

1. What is blockchain technology? Why does it matter?
2. What are early applications in the cleantech space?
3. What does the investment landscape look like?

This article aims to express our current thinking on these questions, and highlights our initial company coverage of the technology.

What is blockchain technology and why it matters

In a word, a public blockchain is a distributed ledger that can process and record transactions. Every node – or participating computer – in the network can inspect this ledger, but no one controls it. This system removes the need for a central authority or database that must be trusted to keep information secure and accurate. The technology was developed to power bitcoin transactions and wallets, but its potential applications go far beyond that.

Using a public blockchain as infrastructure for transactions or keeping records means lower costs, through the absence of a middleman, but also more security and transparency. Most of all, it allows users to create smart contracts, in which specific conditions and layers of signatures can be coded to make a transaction safer. For instance, the payment for a shipment can be automatically released when both the delivery person and the recipient signs off on it.

Blockchain technology is already poised to disrupt the financial industry. What can it change in our world of energy, data and connected devices? Potentially, a lot.

CTG INSIGHTS | JUNE 2016

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Thank you for your attention!

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Manila, Philippines • 5–8 June 2017

PANEL
FROM START-UP TO SCALE-UP: Building Cleantech Businesses

Moderators:
Richard Youngman, The Cleantech Group
Qiyong Cao, ADB

Panelists:
Lu Zhengliang, General Manager, Tsingyun Solar
Cody Friesen, Founder & CEO, Zero Mass Water
Ingo Puhl, Co-Founder & Director for Strategy, South Pole Group
Piyush Mathur, Chief Executive Officer, Simpa Networks

启迪清芸
Tustsingyun

Distributed Photovoltaic (PV) and Micro grid solution

- Solution provider of PV-Micro-grid: Power generation by PV, Power storage and regulation by battery, power and energy management by control system
- Remote monitoring system : Solarule
- EPC service: Engineering Procurement and Construction

The PV-micro-grid of Beijing Qiaobo ski hall

- Be highly praised the day before yesterday by APEC delegation

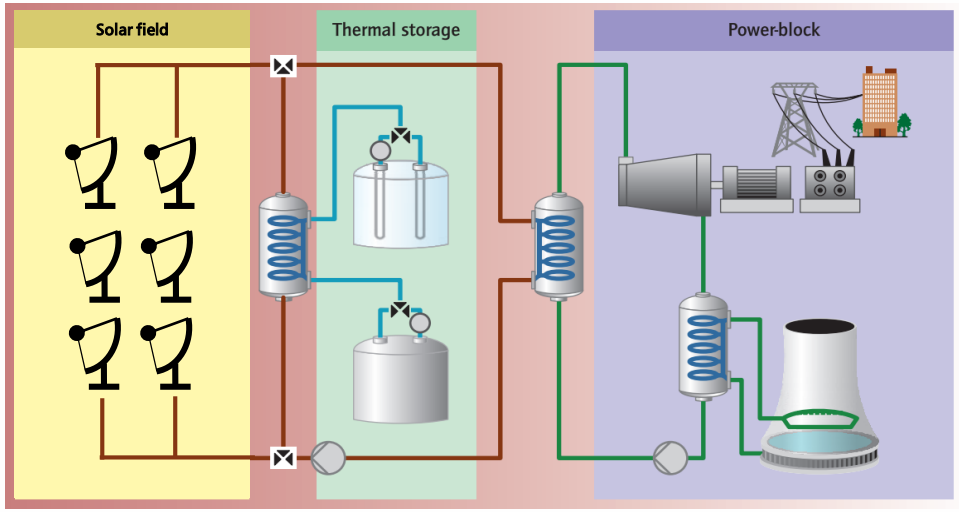
Contact me: Lu Zhengliang (Sweep)

lvzhengliang@tsingyunsolar.com.cn

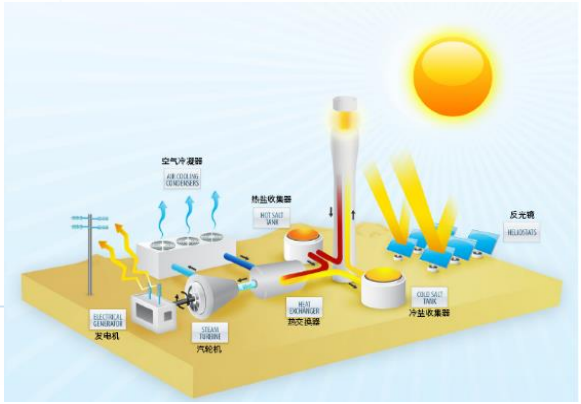
+86-18518089820

Dish-CSP (solar thermal) Solution for Un-electrified region

- High quality, direct connection to grid, provide stability for grid
- Continuous power generation, peak load regulation
- Lower operation cost



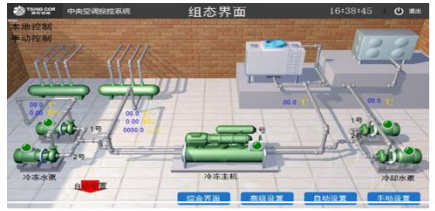
- Light collection set, the dish
- Light-to-heat transformor
- Control system
- Design
- EPC service



- **Looking for partner .**

EcoPM Power-saving management system

for central air conditioner



- Wireless Sensor Networks
- Artificial intelligence algorithm
- Internet cloud services
- For Hospitals, Hotels, Industrial Park Comercial Complex Buildings, etc
- **30% reduction of energy consumption**
- **Looking for agencies.**

ASIA CLEAN ENERGY FORUM 2017

THE FUTURE IS HERE: ACHIEVING UNIVERSAL ACCESS AND CLIMATE TARGETS

Manila, Philippines • 5–8 June 2017

PANEL
BRIDGING THE GAPS – Helping Cleantech Startups Scale Up

ASIA CLEAN TECH

Moderators:
Richard Youngman, The Cleantech Group
Susumu Yoneoka, Energy Specialist (Smart Grids), ADB

Panelists:
Arjit Johri, CIIE/Infuse, India
Xiao Jing, TusStar Incubator, PRC
Hendrik Tiesinga, New Energy Nexus, US
Diletta Doretti, The World Bank/Infodev
Pavel Koktyshev, MOST Business Incubator, Kazakhstan

BUILDING AN ECOSYSTEM FOR CLEANTECH STARTUPS

INFUSE VENTURES

5th June 2017

CHALLENGES IN THE INDIAN CLEANTECH ECOSYSTEM

SECTOR

- Capital Intensive
- Long Gestation Periods
- Low Follow-ons
- Global failures
- Investments in mature businesses

ECOSYSTEM

- Absence of Cleantech Incubators & Accelerators
- No dedicated Cleantech funds
- Lack of ecosystem support for Cleantech startups
- Absence of prototyping grants for validation
- Lack of Cleantech startups

ABOUT INFUSE VENTURES | ECOSYSTEM APPROACH

- Early stage venture capital fund and ecosystem focused on the sustainability and clean energy sector in India.
- Housed at IIM Ahmedabad's Centre for Innovation Incubation and Entrepreneurship.
- Besides providing equity funding to startups, provides mentoring, acceleration guidance, prototyping grants and catalytic debt.

Ideation >> Prototyping / Pilot >> Commercialization

Ideation

Ideation sessions

Sustainability focused accelerators

Validate ideas & make industry connects to chalk clear roadmap

powerstart #NEWMOBILITY

Prototyping / Pilot

Technical assistance and prototyping grants for seed-stage ventures

Low cost catalytic debt to support rural micro grids

Supported by ADB, UNEP, MNRE, Rockefeller & TARA

reSEED SPEED

Commercialization

INFUSE is India's only sustainability focused fund

Investing $100k to $2mn over one or more rounds

Enabling commercialization via strategic partnerships with like minded partners and corporates

INFUSE VENTURES

THREE PRONGED APPROACH

1 MARKET MAKING

Policy Interventions: engagement with MNRE for solar entrepreneur subsidy, enable startup participation in government schemes and setting up geo-cooling policy.

Debt Platform: Partnered with Rockefeller for micro-grid debt initiative and seed funded cKers, positioned as India's Energy Development Finance Corporation.

2 GROUND BREAKING

Acceleration: Through accelerators like power start and new mobility accelerator, Infuse has supported over 40 startups across the sustainability space.

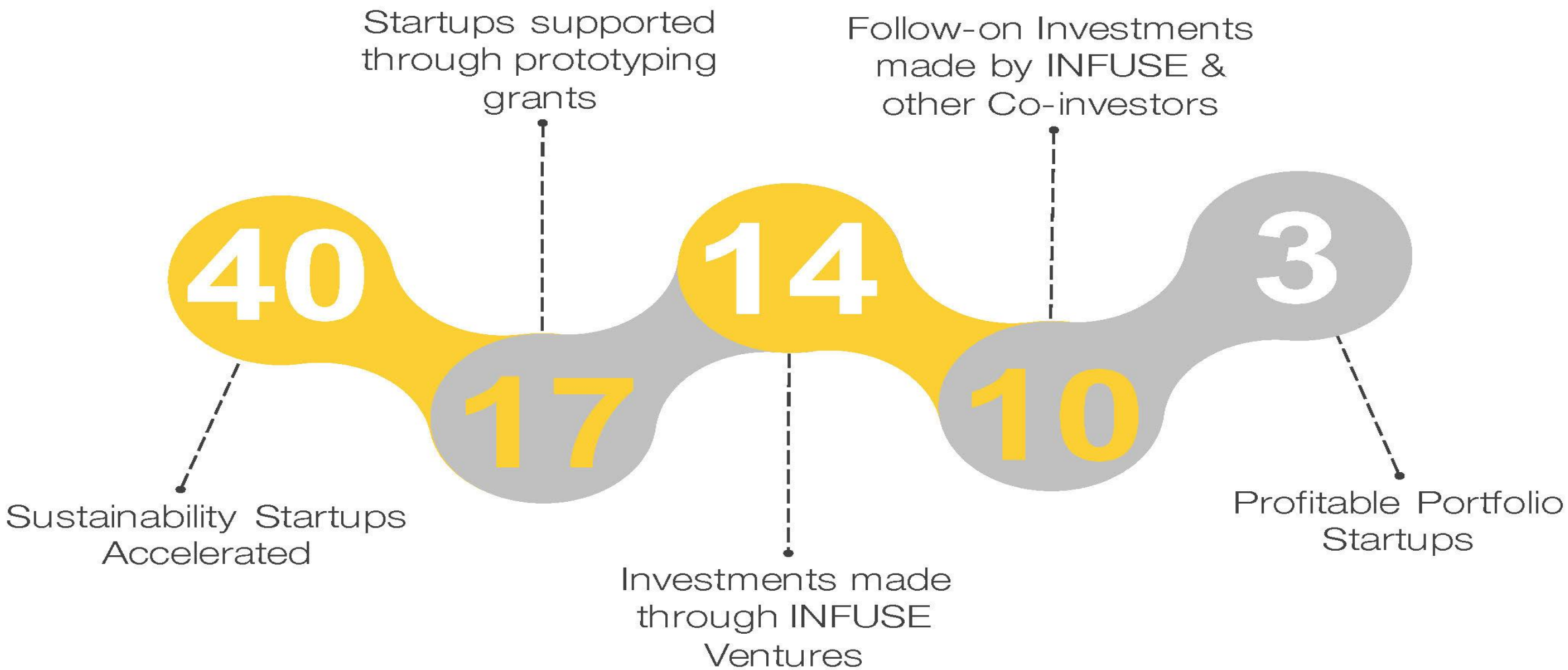
Seed Support: Supported over a dozen seed-stage ideas through grants & invested in 10 startups.

3 CREATING CATEGORY LEADERS

Spectrum of Maturity: Supporting pre-seed startups, Investing seed amounts and making follow-on investments in the promising startups. Engage potential co-investors to share risk.

Strategic Connects: Introducing startups to strategic partners / corporates for exploring synergies through strategic partnerships and possible investment scenarios.

FOCUSSED SUPPORT TO CLEANTECH STARTUPS




TESSOL
Innovation in IoT (Platform)
Altizon
ecolibrium
ezysolare™
SOLAR COST CALCULATOR
Solar Bill of Materials & Cost Calculator
FSC
Presents
IWEF
INDIA WIND ENERGY FORUM 2015
SECURE
Home
THANK YOU
PACEsette
Generating Off-Gri
Solar Solutions
Conventional Power Solutions
Pumping Solutions
Water Solutions
Lighting Solutions
Combo Offers
Rooftop Solar Platform
COMPLETE SOLAR SC
Solar Water Heaters
Solar Home UPS packages
Solar Retrofit Kits
100% Original Products
Zero Installation Charges
GCIP INDIA

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TusStar
启迪之星

TusStar

TUSSTAR INCUBATORS

The largest Incubators in China with strong market layout and network

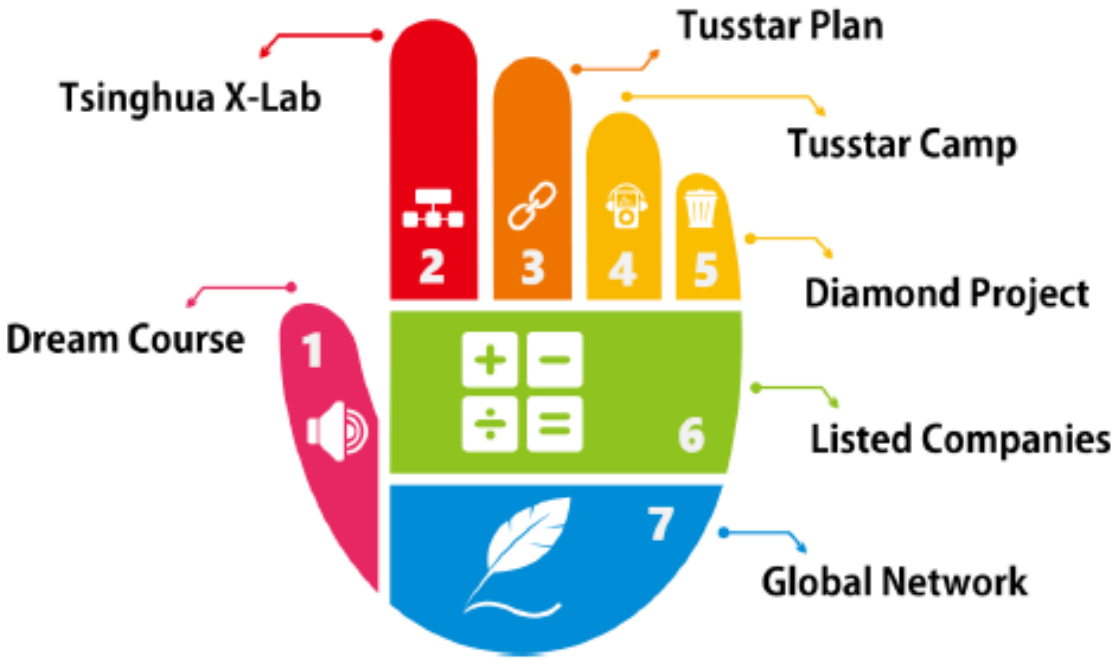
- TusStar was started in 1999
- Nearly **2000** firms graduated and **3000** firms incubating
- Raised **31** listed companies, and other **40** enterprises merged or acquired
- **160** bases around the world, nearly **80** bases within nearly **50** cities in China
- **13** Angel Investment Fund, **1.1** billion assets RMB, invest **300** enterprises within **2** billion, Equity report **20** billion.

INCUBATORS MODE

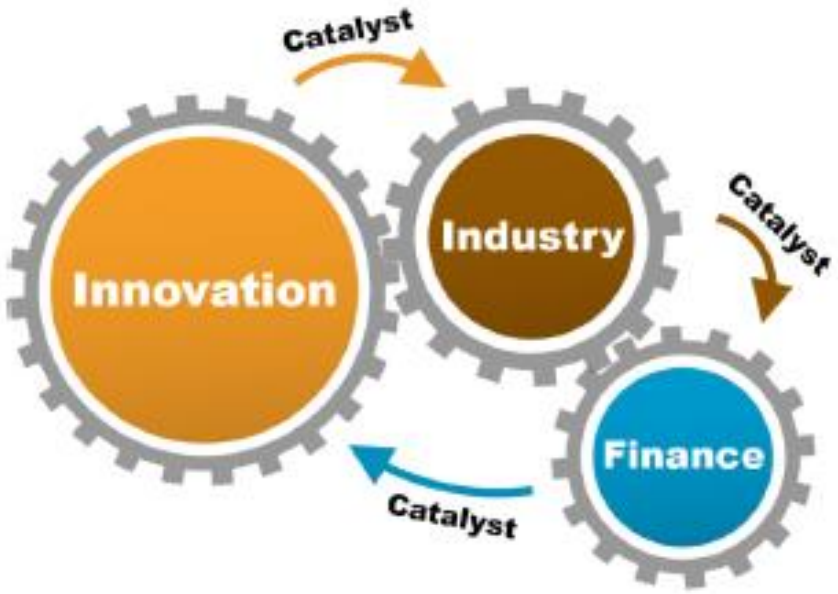
- Leading quaternity business model of

"incubation + angle investment + entrepreneurship training + public platform"

- Leading talents of "7 Steps innovation & entrepreneurship incubation chain"



TusStar
启迪之星



An environmental new energy industrial platform

Solid waste management, solar energy, air and water purification

YADU 亚都 since 1987

启迪桑德 Tus-sound

浦华环保 THUNIP HOLDINGS

清芸阳光

THANKS

TusStar
启迪之星

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FREE ELECTRONS

UTILITY PARTNERS

The utility partners in Free Electrons are leaders in the clean energy transition, covering more than 40 countries, representing over $148 billion in combined net income and access to over 73 million end customers worldwide.

ACCELERATOR PARTNERS

Free Electrons is supported and managed by an alliance of clean energy accelerators and programs.

NEW ENERGY NEXUS

SWISSNEX san francisco

POWERHOUSE

BETA i

California Clean Energy Fund

ENERGY EXCELERATOR

3 MODULES,
4 COUNTRIES

THE FREE ELECTRONS JOURNEY

MODULE 1

CREATE COMMUNITY, EMPATHIZE
DEFINE ROADMAPS & PILOT PITCHES
MATCH CHALLENGES & SOLUTIONS

IN BETWEEN

EXPLORATION
PILOT AND PROJECT SCOPING
1-ON-1 DEVELOPMENT W/ MENTOR

MODULE 2

PIVOT, ITERATE
CLARIFY PROJECT PILOT SCOPE
IDEATE NEW APPROACHES

IN BETWEEN

TEST PILOT AND
PROJECT SCOPES

MODULE 3

CONTRACTING PILOTS
SCALING AND GROWTH

STARTUP PARTNERS

Hendrik Tiesinga
Program Manager
hendrik@calcef.org

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World Bank's Climate Business Innovation Network

June 5, 2017

Diletta Doretti

SUPPORTED BY WORLD BANK GROUP

infoDev INNOVATION & ENTREPRENEURSHIP

Network Members

The CBIN convenes foundations, investors, government agencies, and intermediaries from across the globe.

Network Activities

CBIN network members participate in annual and bi-annual meetings, connect with regional and international leaders, and receive and provide mentoring and training.

In-Person and Online Networking

3

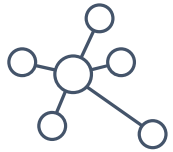
Annual meetings in the US, South Africa, and Kenya

Technical and Business Mentoring and Training

15

Trainings and workshops on incubation

Program for Emerging CIC Members



10

Emerging CIC members

Learning Framework, Measurement Support

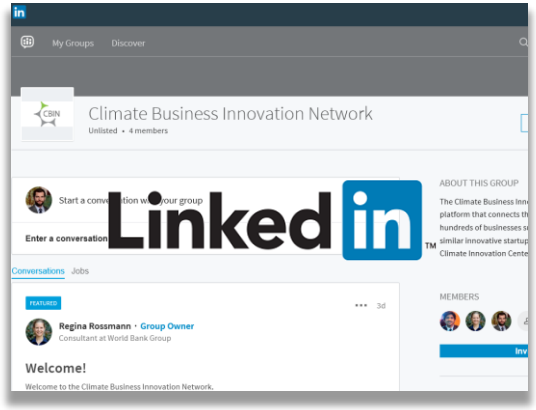
7

Knowledge products produced in addition to quarterly and annual results reporting

Future Offerings

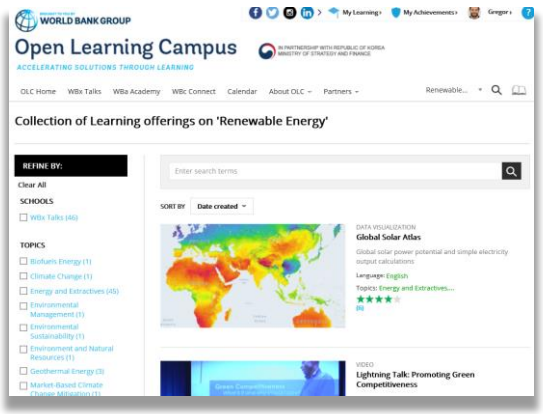
CBIN is currently in the design and pilot phase for several new offerings that will help members serve their startups even better

Building a Global Community



Online Community to facilitate networking, knowledge sharing, and collaboration across the world

Learning opportunities



Exploring innovative ways to deliver up to date content to all members and enable the network to learn together

Mentorship

Enabling every member to build and manage a robust mentorship program for their startups

What We Look for from our Members

The CBIN thrives when members actively participate in its programs, share their lessons learned, and are willing to put in the time to build relationships.

Active Participation

In the mentoring program, conference calls, training activities

Knowledge Exchange

Through webinars, in LinkedIn group, at annual events

Learning

Sharing lessons learned, news, and event announcements

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MOST
БИЗНЕС-ИНКУБАТОР

Chevron

Building public-private partnerships to enhance cleantech startups. Case of Astana city

2015
Launched

3
Batches

800+
Application reviews

50+
Portfolio companies

MOST Business Incubator (Kazakhstan), the country's first private business incubator, supports startups and existing entrepreneurs through education, mentorship, and access to finance. Established in 2011, MOST now has more than 50 portfolio companies and an ambitious expansion strategy supported by strong private and government partnerships.

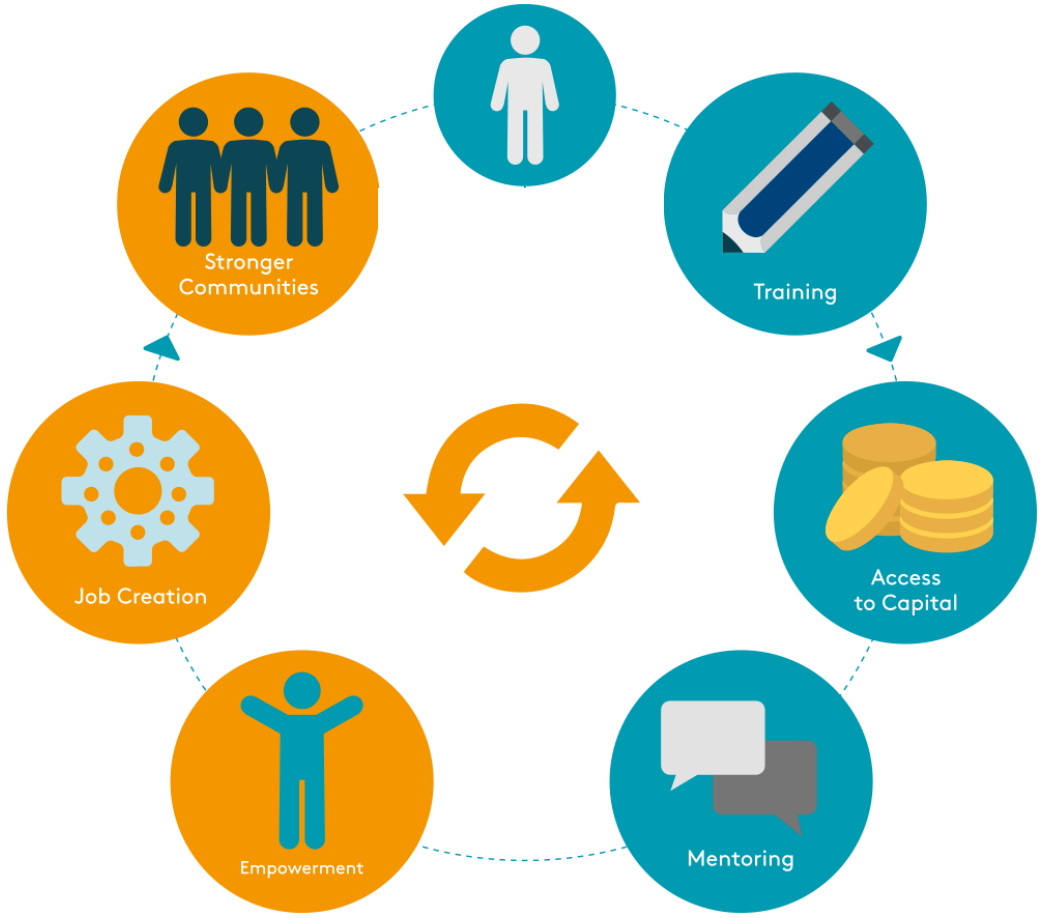
15+
Scaleups

12+
Investments

150
Partnership network

70
Corporates

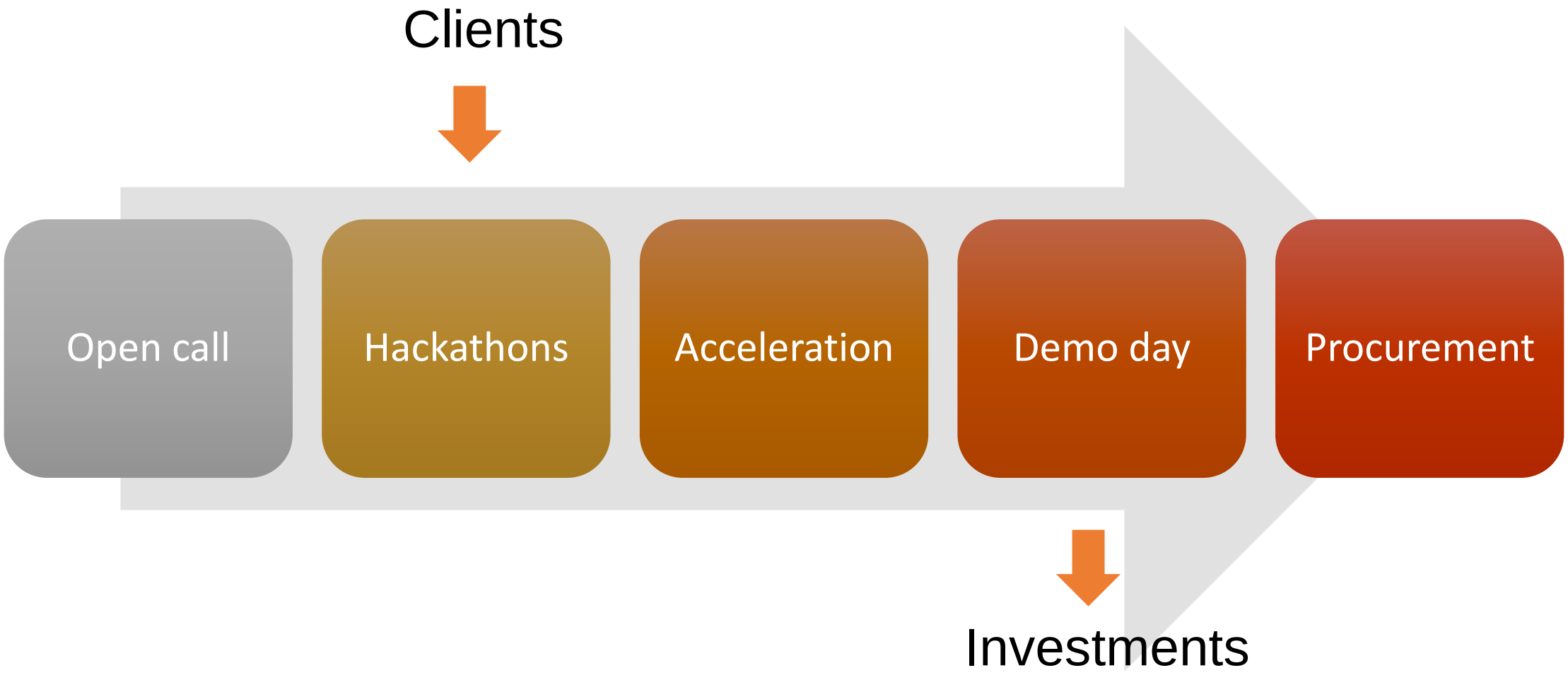
Our approach




seedstarscee
MOST
cee.*


seedstarscee
MOST

ASTANA FUTURE LAB



Thank you!

Pavel Koktyshev
koktyshev@gmail.com
www.most.com.kz

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GROUP DISCUSSION
FROM TALK TO ACTION - Making It Happen

ASIA CLEAN TECH

Facilitators:

HENDRIK TIESINGA
Co-Founder and Program Manager, New Energy Nexus

DANIEL HERSSON
Team Leader, ADB Climate Technology Finance Center

GROUP DISCUSSION

From talk to action
MAKING IT HAPPEN

Facilitators
Hendrik Tiesinga, New Energy Nexus
Daniel Hersson, Asian Development Bank

ADB

GROUP DISCUSSION

- Groups of 8-10 people. Mix it up
- 30min discussion
- 1min feedback

What would it take to create **10,000** strong Asian cleantech start-ups by **2030**?

(15min)

What is your **BEST IDEA** for supporting Asian Cleantech Start-ups?

(15min)

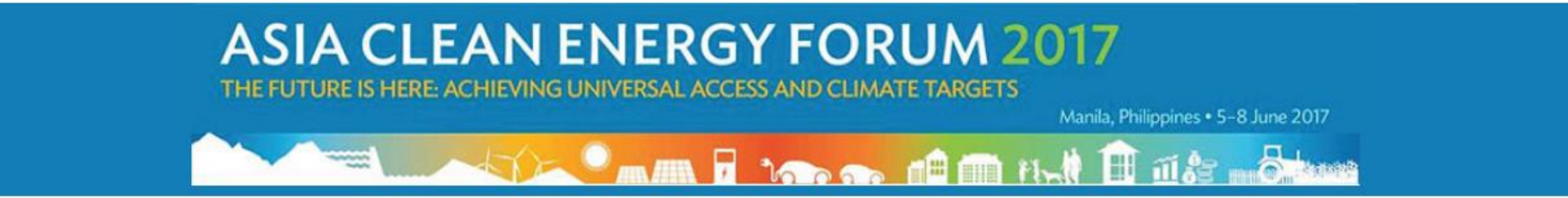
FEEDBACK/PITCH

(1min per group)

FROM START-UP
TO SCALE-UP

what it really takes to scale clean technology

ADB



CLOSING

DAVID ELZINGA
Senior Energy Specialist
Asian Development Bank

ASIA CLEAN TECH

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DEEP DIVE WORKSHOP

FROM START UP TO SCALE UP

ASIA CLEAN TECH

What it really takes to scale clean technology

5 June 2017, Monday, 13:30–17:30

Auditorium C, ADB Headquarters, Manila, Philippines