Role of Emerging Technologies – based Innovation in Helping Address Climate Change

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Outline

1. Shifting technology trends in mitigating and adopting to climate change
2. Challenges in stimulating innovation and measuring the readiness for destructive technologies
3. Game changers and incentives for accelerated technology diffusion

What Paris Climate Agreement - The Great Technology Transformation ?

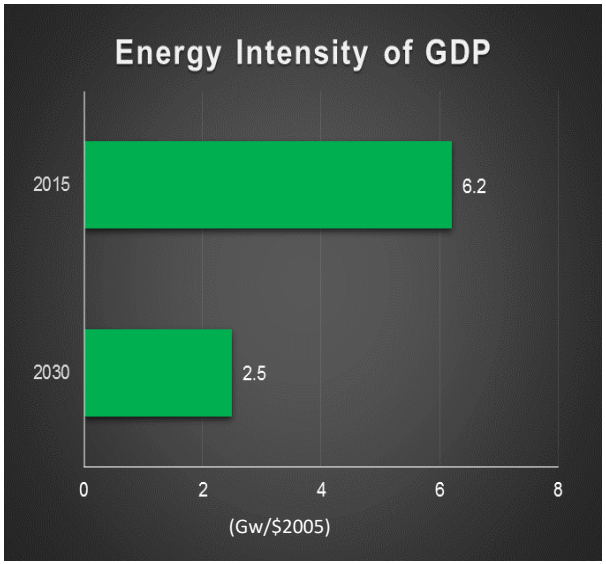
Strategy

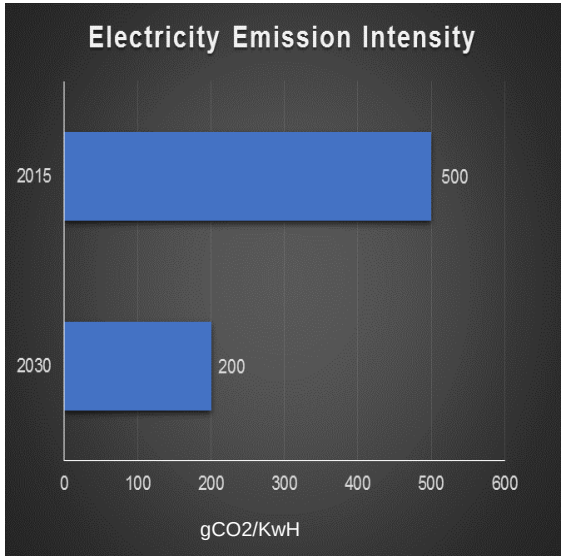
Energy Efficiency

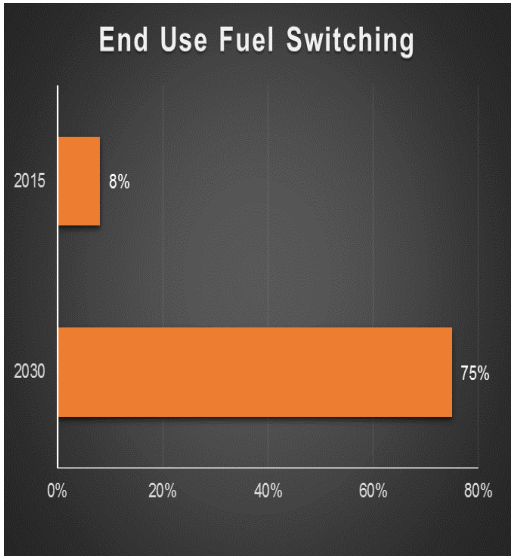
Decarbonization of Electricity

End Use Fuel Switching

Key Metrics of Transformation

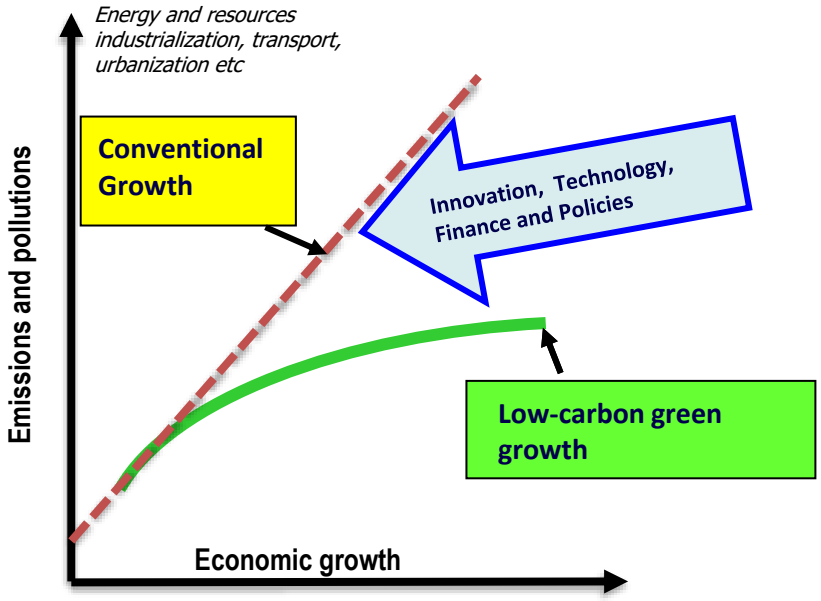






ERIA, 2016

Climate Change Mitigation = Meeting TRIBLE CHALLANGES



Electric vehicles	Hybrid and plug-in hybrid vehicles		Organic Electric Light
Solar power generation	Stationary fuel cells	Heat pumps (including inverter control)	LED lighting
Lithium ion batteries		Nickel hydrogen batteries	Energy-saving home appliances
Green IT (energy-saving IT devices, environmental IT solutions)			Eco-housing
Sodium sulfur (NaS) batteries		Cogeneration	Green logistics
High-efficiency electric motors	High-efficiency boilers	High-efficiency industrial furnaces	High-efficiency reaction processes (membrane separation, catalysts, etc.)
Geothermal power generation	Power generation from waste	Power generation using waste heat	High-efficiency production processes (process improvement) / Super coke oven
Nuclear power generation	High-efficiency thermal power generation (operation and maintenance, clean coal)		Use of biofuels
Modal shift to railways (including bullet train)		Water-related technologies	Hydroelectric power generation (including micro hydroelectric power generation)
Power transmission and distribution	Insurance supporting environment business, assistance and loans forintroduction of environmental facilities, etc.		Soil remediation
Wind power generation	Waste recycling (simplification and speeding up of administrative procedures, etc.)		

Accelerated Economic growth, Enhanced Energy and Human Security and Reduced Pollutions and Emissions

Technological developments for Industry 4.0 and Low Carbon Economy

Technological developments for Industry 4.0

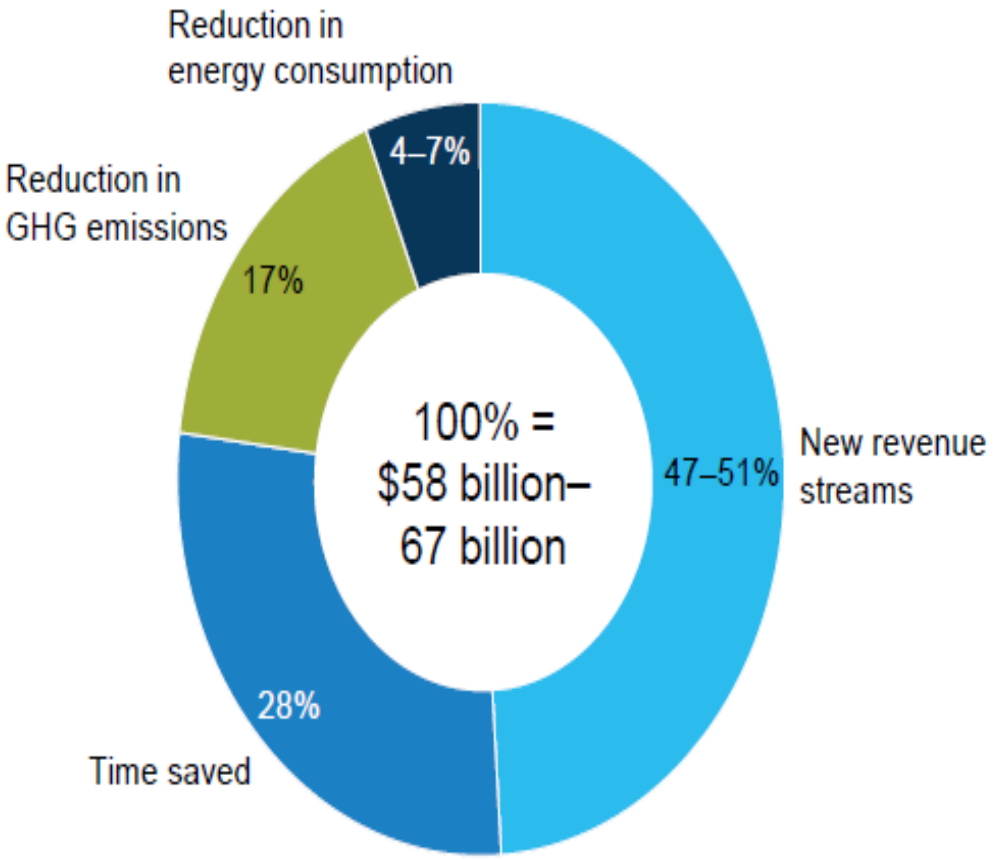
- Information and communication technology
- Cyber-physical systems
- Network communications- Internet of Things (IoT)
- Simulation
- Advanced data analytics
- Robots, augmented reality and intelligent tools for support of human workers

Ten new technologies for Decarbonisation

- Mobile technology
- Machine-to-machine communication
- Cloud computing
- Social media for business
- Big data analytics
- Modular desigingg technology
- Advanced recycling technology
- Life and material science technology
- Trace and return systems
- 3D Printing

What could be the Benefits of an IOT Application at City Level Eg. Mobility sector

Mobility applications can create almost $70 billion in value across Southeast Asia.



Examples

Singapore

- Implemented dynamic congestion pricing through the Electronic Road Pricing system
- Traffic congestion is down by 15% since its introduction in 1990
- Public transit has gone from 45% to 65% of the city's commutes

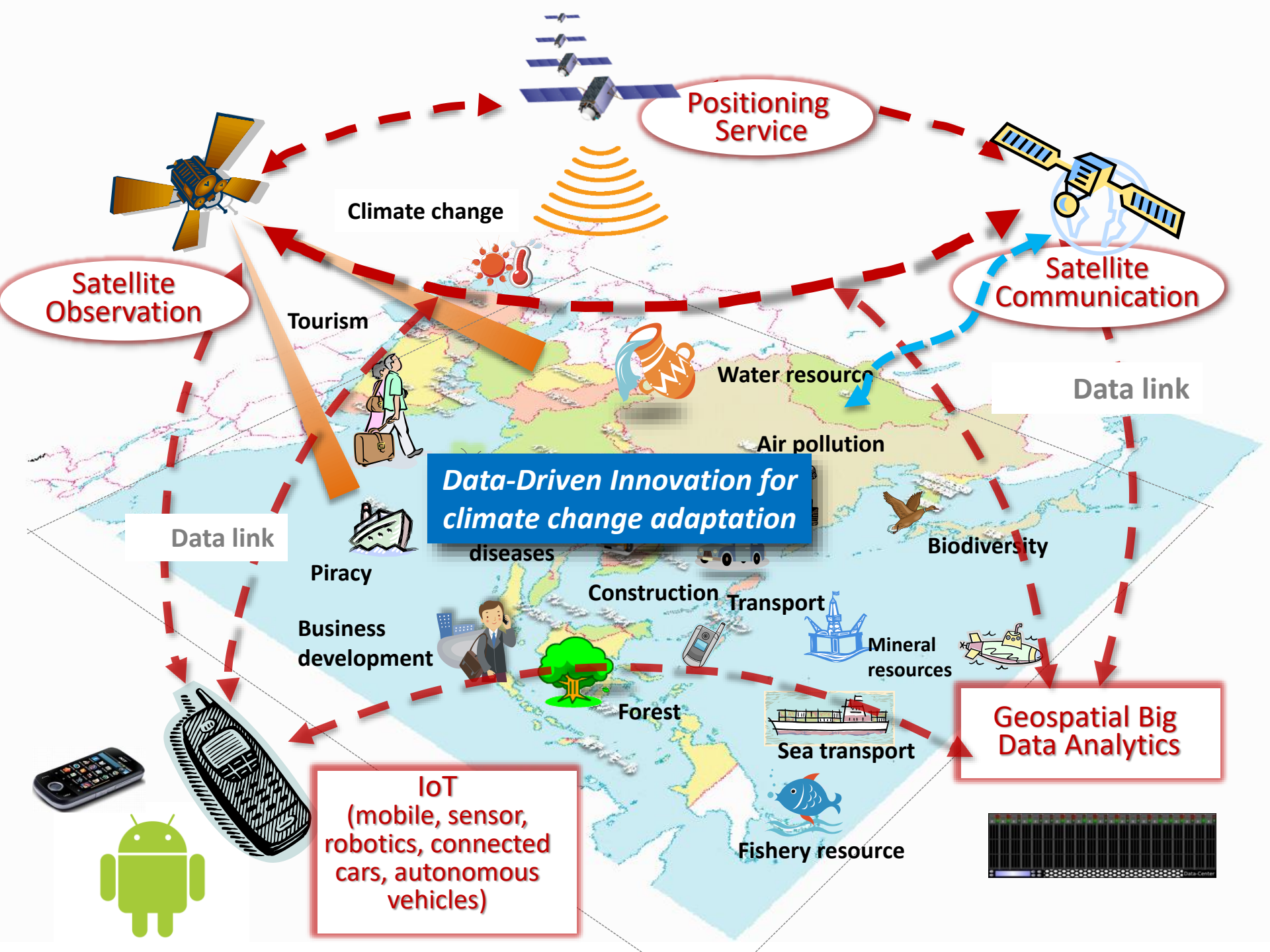
Malaysia

- Grab acquired Uber's Southeast Asia business in 2018. It provides up to 2.5 million rides daily

Indonesia

- Ride-hailing company Go-Jek currently has a fleet of more than a million cars and motorcycles

SourceERIA, 2017


Positioning Service
Satellite Observation
Satellite Communication
Climate change
Tourism
Water resource
Air pollution
Data link
Data-Driven Innovation for climate change adaptation
Data link
Piracy
diseases
Biodiversity
Construction
Transport
Business development
Mineral resources
Forest
Sea transport
Geospatial Big Data Analytics
IoT (mobile, sensor, robotics, connected cars, autonomous vehicles)
Fishery resource

From Data to Intelligence

Instrumentation

Collect a lot of data using sensors, satellites, society etc

Integration

Connect and bring these data from across the sectors

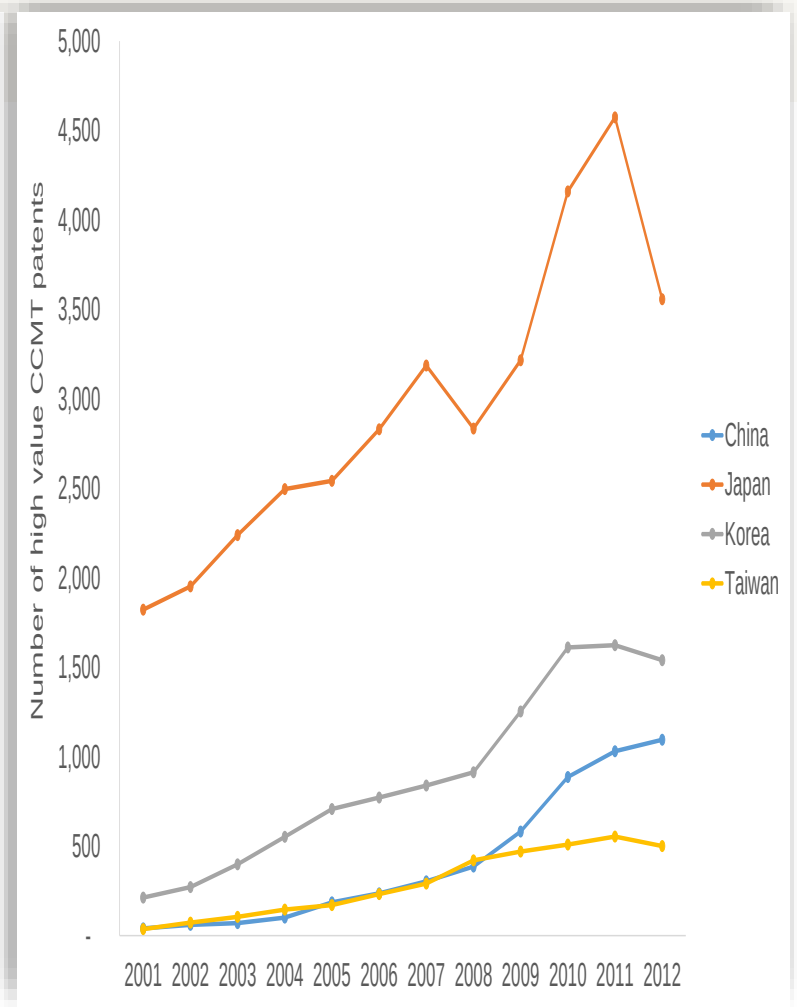
Intelligence

Analyze Integrate data for insights and trends to make smarter decisions

Efficiency, Innovation and Inclusion

To do more with less, through collaboration at scale, to ensure every one benefits

Challenge 1: Nurturing Innovation and connecting to the markets

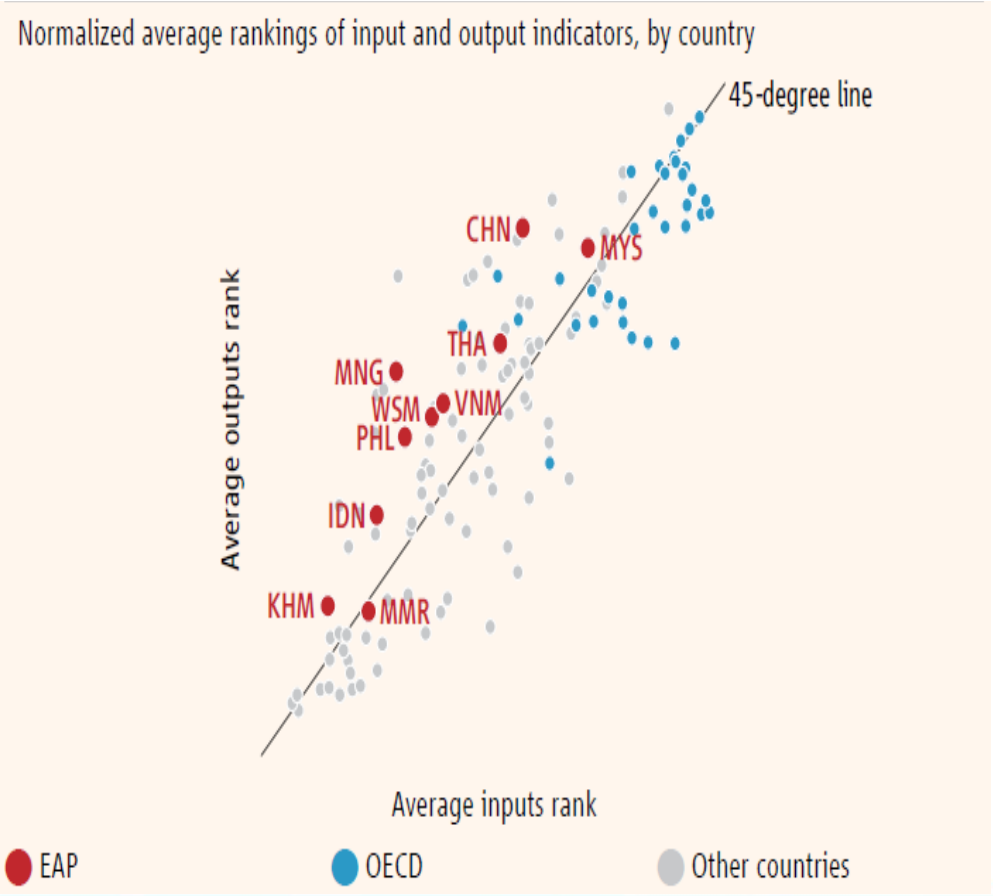


Japan has developed an innovation and export specialisation in multiple key low-carbon energy sectors

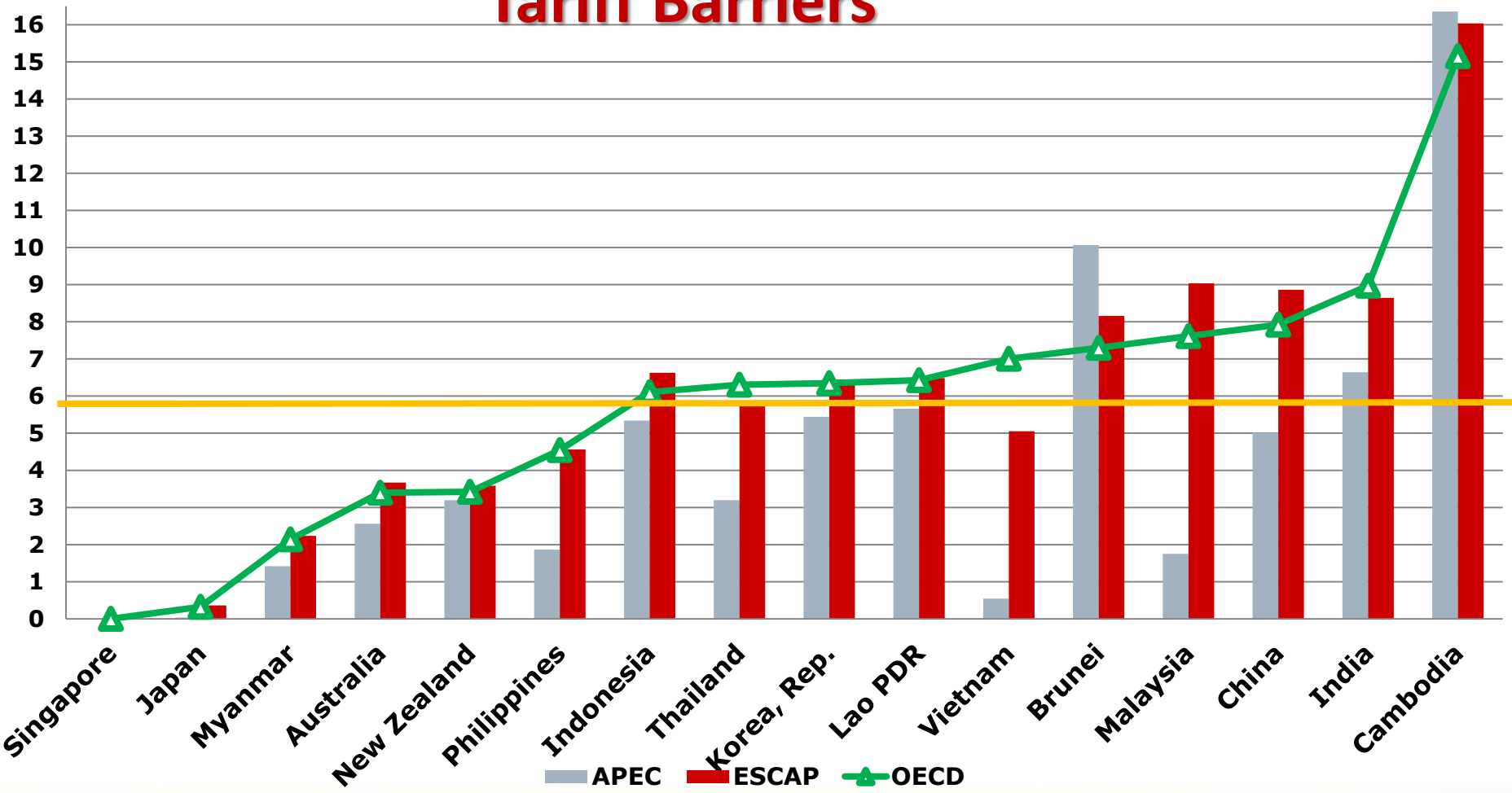
Source: EPO Patstat Database, version 2015, *UNComtrade 2012 data, Personal calculations*

Does developing countries have an efficient innovation systems

- Developing AP has relatively greater innovation efficiency than the rest of developing countries.
- Efficient in converting inputs (R&D, Researchers, IP etc) into high tech exports, trade mark applications and patent applications.
- Lag behind OECD in-terms of level of innovation inputs and outputs



Challange 2: Removing Tariff and Non-Tariff Barriers



Source: ERIA, 2015

Determinants of low carbon - digital technologies

	Extent of impacts of new technology and globalization				*Priorities within 3Cs agenda*		
Sectors (grouped by the common combinations of trends they face)	*Increasing concen-tration of inter-national production*	*Traded*	*Robots/3D printers*	*Use of Services*	*Competitiveness*	*Capabilities*	*Connectedness*
Transportation	High	High	High	High	Yes	Yes[a]	Yes
Electronics	High	High	High	High			
Pharmaceuticals	High	High	High	High			
Electrical machinery	High	High	High	High			
Machinery and equipment	High	High	High	Low[b]			
Manufacturing n.e.c.	High	High	High	Low[b]			
Textiles	High	High	Low	Low	Yes		Yes
Rubber and plastics	Low	Rising	High	Low		Yes	
Fabricated metals	Low	Rising	High	Low			
Food	Low	Low	Low	High	Yes		
Chemicals	Low	Low	Low	High			
Coke and refined petroleum	Low	Low	Low	High			
Wood products	Low	Low	Low	Low			
Paper products	Low	Low	Low	Low			
Basic metals	Low	Low	Low	Low			
Nonmetalic minerals	High	Low	Low	Low			

Challenge 3: Access to Finance

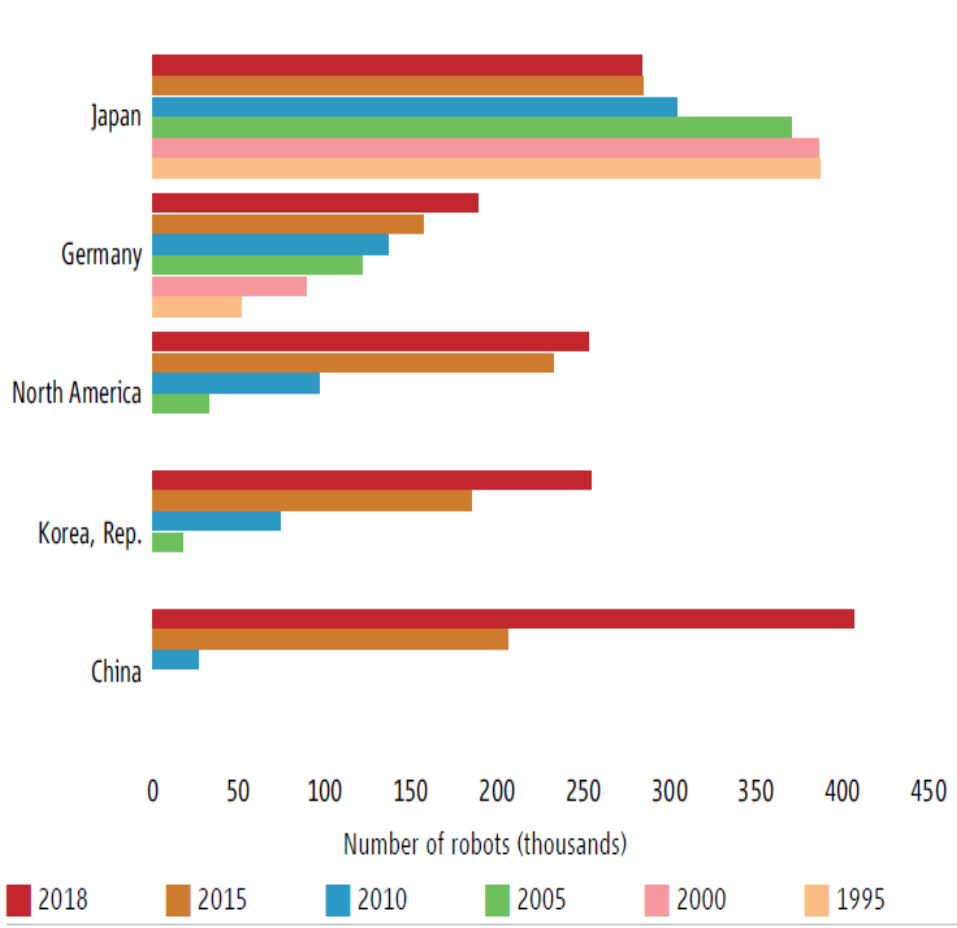
What do you perceive as the biggest obstacles in integrating Renewable Energy into Grid and Financing cross-border Investments (Respondents can choose multiple answers)*

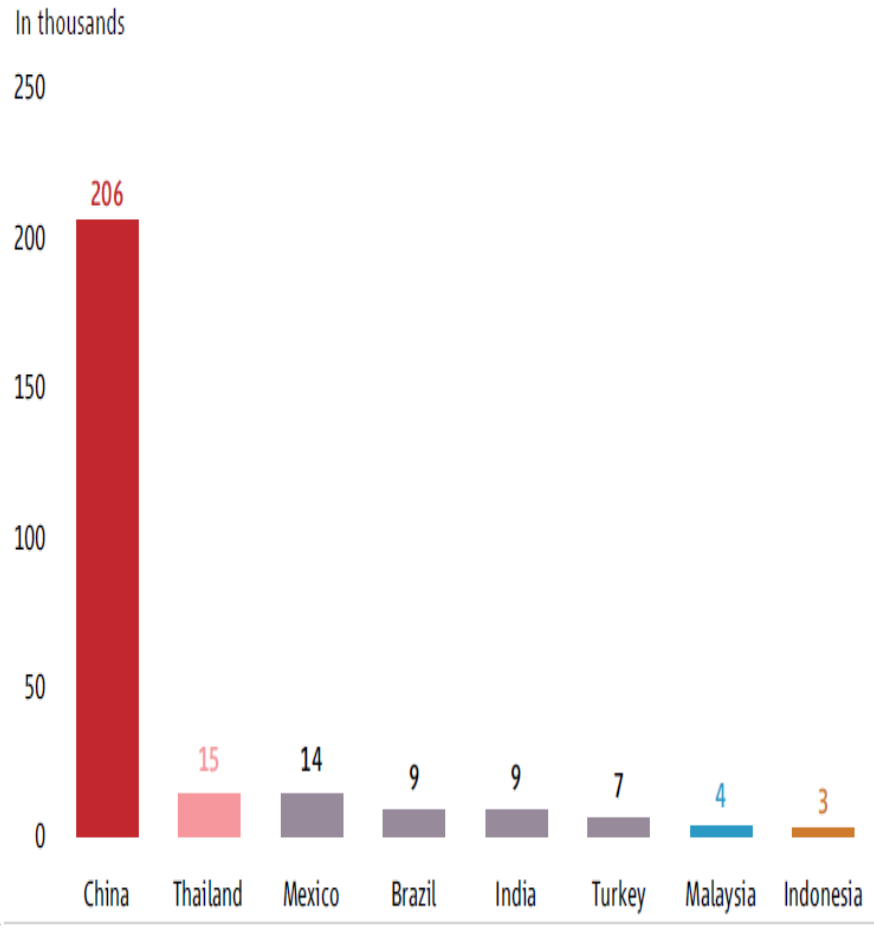
Category	Obstacles	ASEAN	*ASEAN+3*	*ASEAN+6-Mongolia and HK*
Policy	Changing Policies	56%	45%	50%
	Complex Procedures	28%	27%	29%
Institutional	High Initial Investment Cost	50%	45%	50%
	Longer Recovery Periods	50%	45%	46%
	High Collateral Requirements	44%	45%	46%
	Insufficient Credit and Maturity	28%	27%	25%
	Lack of capacity to value assets	17%	14%	13%
Market	Currency Risk	33%	32%	29%
	Insufficient Profits	33%	32%	29%
	Unpredictable Cash Flows	28%	23%	25%
	Non-Favorable Interest Rates	28%	23%	25%
	Rising Interest Rate	28%	23%	21%
	Technology Advancement Risks	22%	18%	17%
	Unstable Consumer Market	11%	9%	13%

Source: ERIA, 2019

*Colors are on a green-red spectrum. Green indicating more support for a response, red indicating less

Readiness of adapting destructive Technologies





Innovation Enhancers Ratings of ASEAN

Country	Higher Education and Training	Goods Market Efficiency	Labour Market Efficiency	Financial Market Development	Technological Readiness	Market Size	Overall Rating
Cambodia	2.8	4.2	4.5	3.9	3.0	3.0	3.6
Indonesia	4.5	4.4	3.7	4.2	3.5	5.7	4.3
Lao PDR	3.2	4.3	4.5	3.8	2.8	2.9	3.6
Malaysia	5.0	5.4	4.9	5.2	4.6	5.0	5.0
Myanmar	2.5	3.6	4.2	2.4	2.2	4.2	3.2
Philippines	4.5	4.2	4.1	4.2	3.9	4.9	4.3
Singapore	6.2	5.7	5.7	5.6	6.2	4.8	5.7
Thailand	4.6	4.7	4.2	4.4	4.2	5.2	4.6
Viet Nam	3.8	4.2	4.4	3.7	3.3	4.8	4.0

Opportunities for Regional Cooperation: A combination of Market based and Regulatory Approach will boost Investments and innovations

Regional structures and incentives that could enhance investment environmenta, include:	Rank	Average Ranking From Respondents
Regional carbon price	1	2.68
Regional fund for investing in high risk energy transition projects	2	2.70
Regional Finance Warranty Program	3	3.39
Regional Low-carbon Guarantee fund	4	3.39
Regional regulations on energy financing services	5	4.05
Regional green bonds	6	4.79

Most Significant (1)

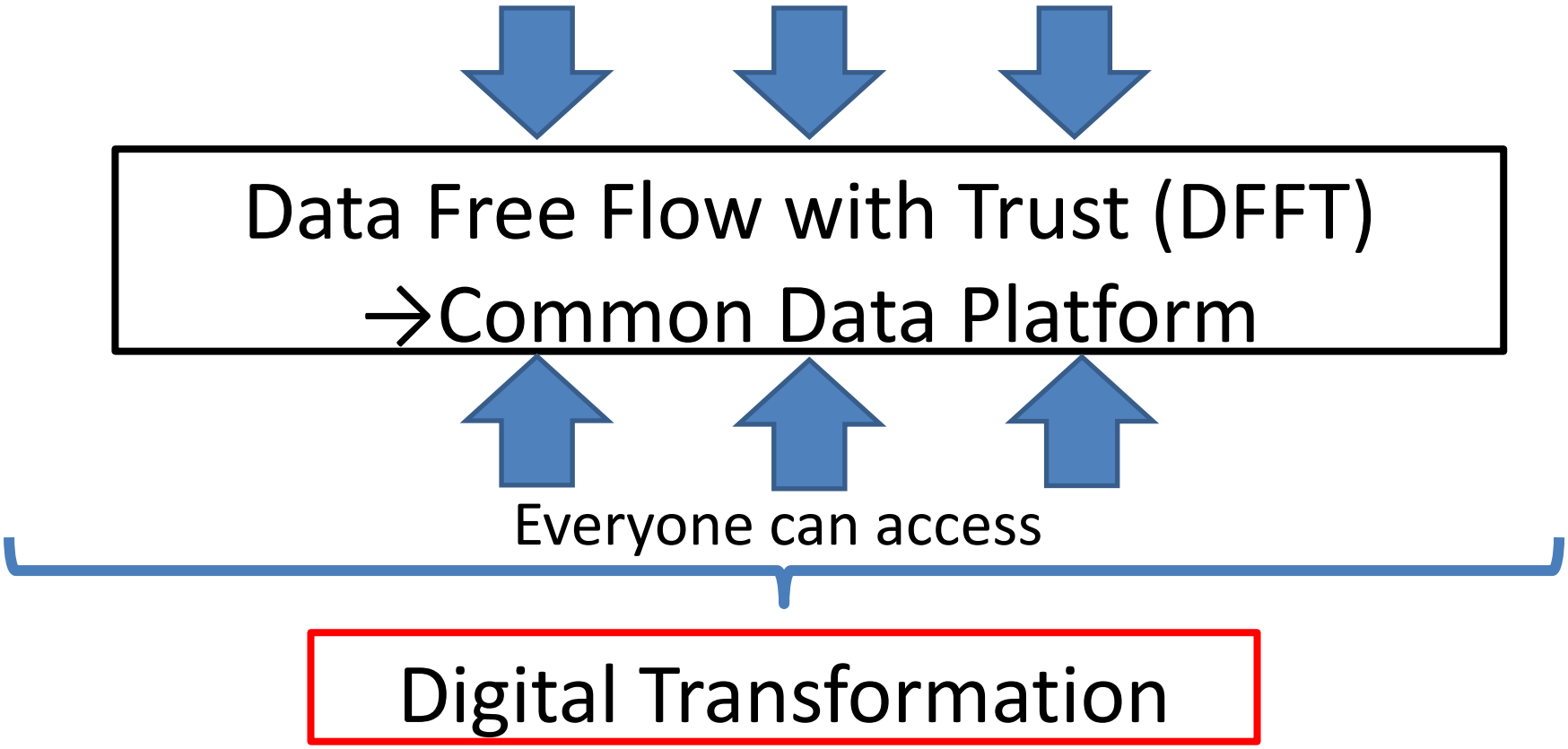
Least Significant (6)

Other responses:
Interconnection of national grids/ cross-border grid development, regional free trade in technologies and services, regional coordination on exchange of knowledge and information, joint-venture investments amongst ASEAN states, removal of foreign investment limit for Renewable Energy projects, asset recycling facilities, job creation, etc.

Source: ERIA

International for digitalization

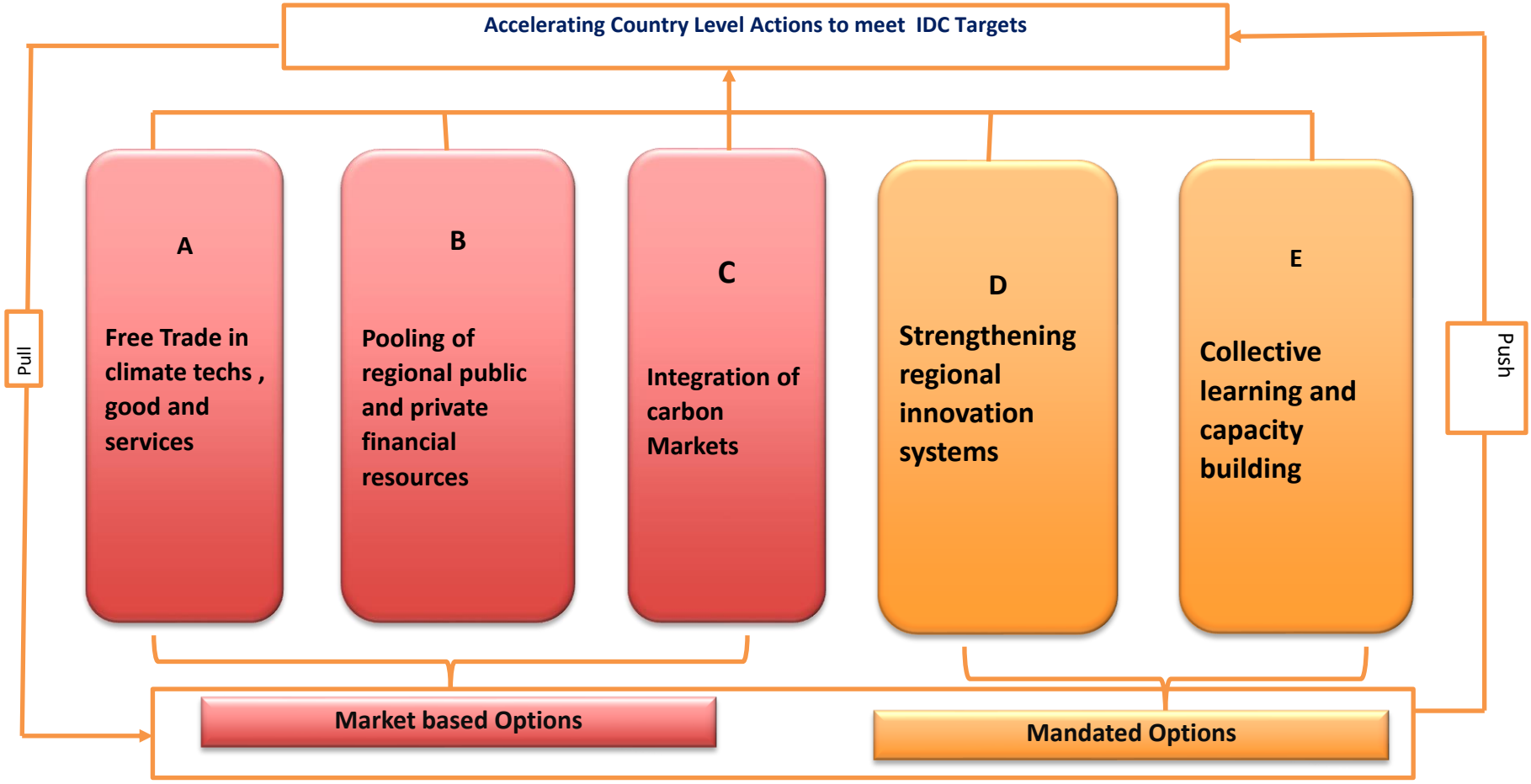
→Mutual benefit ←



Technological Capabilities
Experience of digitalization

Digital Single Market

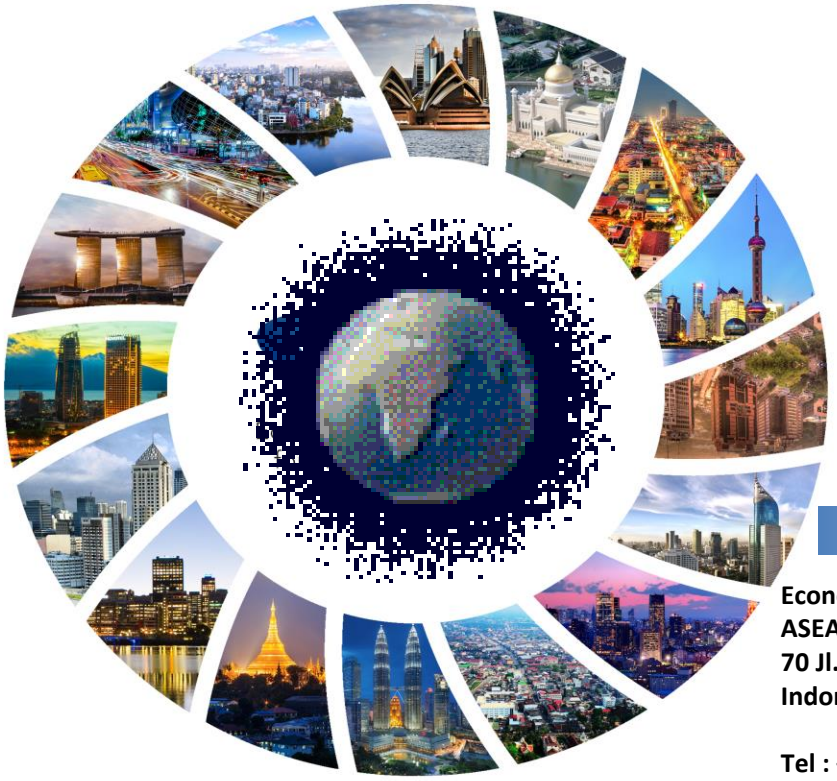
Opportunity: Regional Cooperation Framework for Accelerated Technology Transfer



Source: ERIA, 2015

Summary

- Low-carbon resilient future is possible with available technologies and proven climate and technology policies that drive their development deployment.
- Succeeding in the historic endeavor of integrating digital technologies for climate actions require massive mobilization of private capital. Investors and innovators face different set of policy barriers.
- Policy makers have a major responsivity to act now to harness the potentials of regional cooperation and integration, which will drive better prosperity and reduce the cost of transformation.



ThankYou!

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