



AVaccani&Partners

Management Consultants
M&A Advisors

EMEA Cleantech Opportunities and China – Europe Cooperation

CleanConnect 2017 Conference

Shanghai, November 13, 2017

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About A. Vaccani & Partners

AVP is an independent international management consulting company located in Switzerland, founded 25 years ago

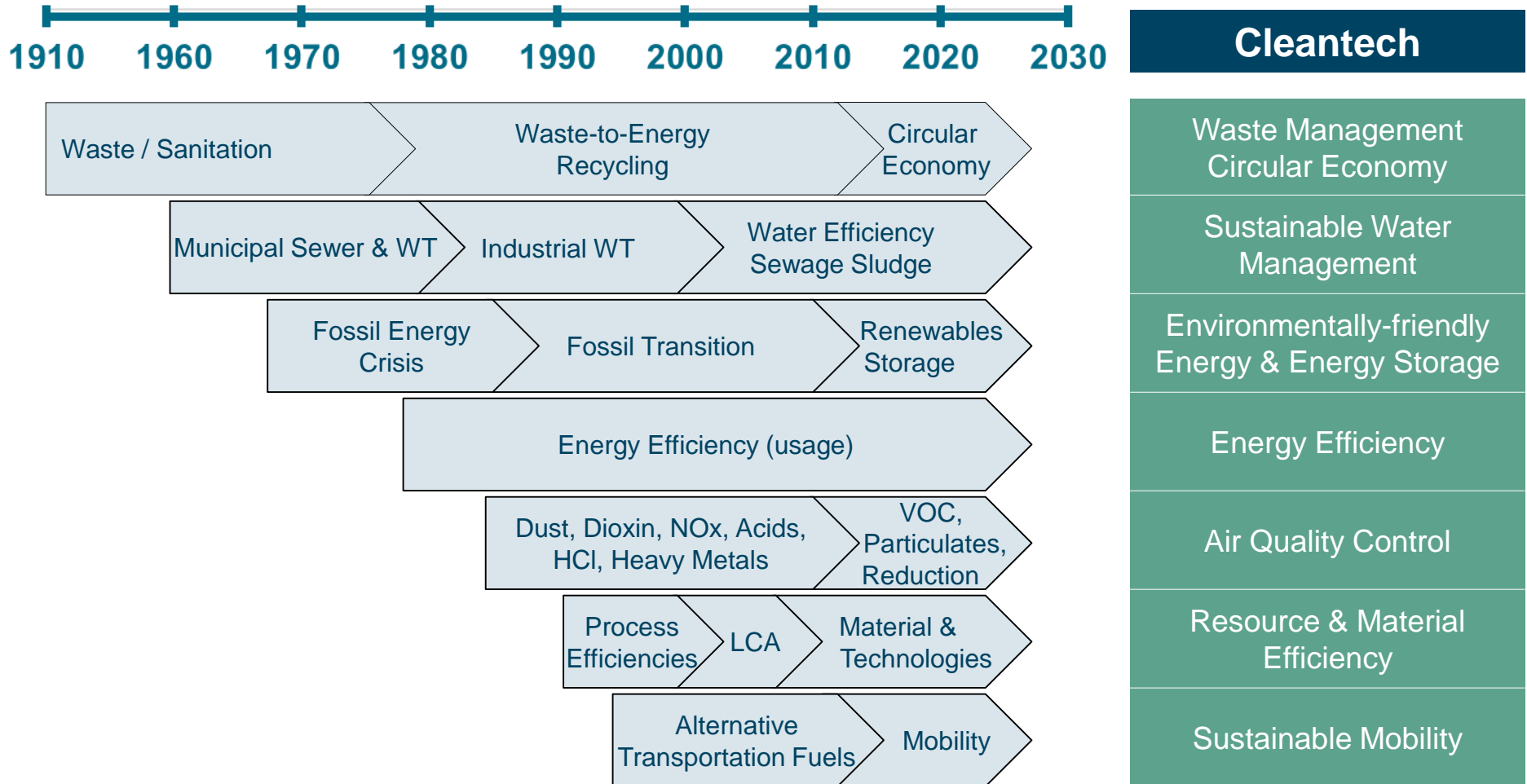
AVP has a well proven and renown track record in Renewable Energy & Environment (RE&E) and a well-qualified practice team



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MS Federal Institute of
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- Domain specialties:
 - Waste/Sustainability
 - Energy
 - Water
- Services
 - Growth Strategy
 - M&A
 - Partnering/Tech Transfer
- Footprint
 - Europe/CIS/Russia
 - North/America
 - China / Asia
- Over 50 Tech Transfer/Partnering transactions in Cleantech space between Europe/US and Asia
- 100 M&A Transactions, mostly cross border, about 50% in Cleantech space, many involving Asian parties
- 60 Market Entry mandates in Cleantech space, mostly into Europe and Asia
- Cooperating with UMORE in all aspects of China – Europe business development

Journey through European Cleantech Markets and Opportunities



1910 1960 1970 1980 1990 2000 2010 2020 2030

Waste / Sanitation

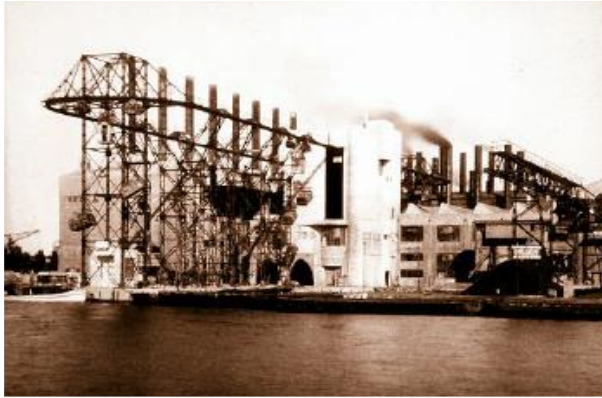
Waste-to-Energy
Recycling

Circular
Economy

Cleantech

Waste Management
Circular Economy

1st Generation 1917 – 1969



Sanitation

2nd AVI Noord: 1969 – 1993



Heat Recovery

3rd AVI West 1993 – present



Advanced Flue Gas Cleaning

Source: AEB

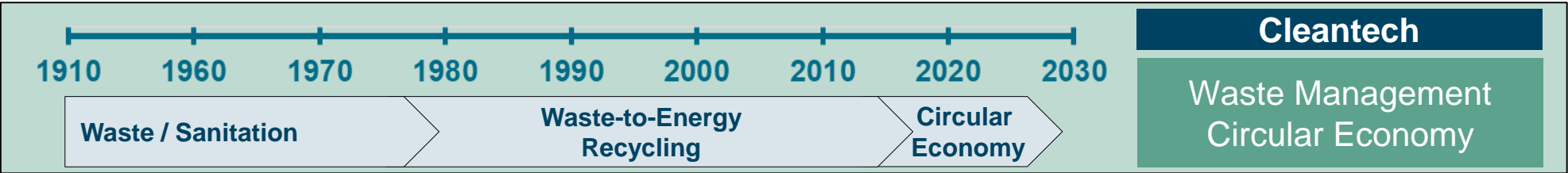
4th WFPP 2007 – present



Waste-fired Power Plant
(highest el. Efficiency world wide > 30%)

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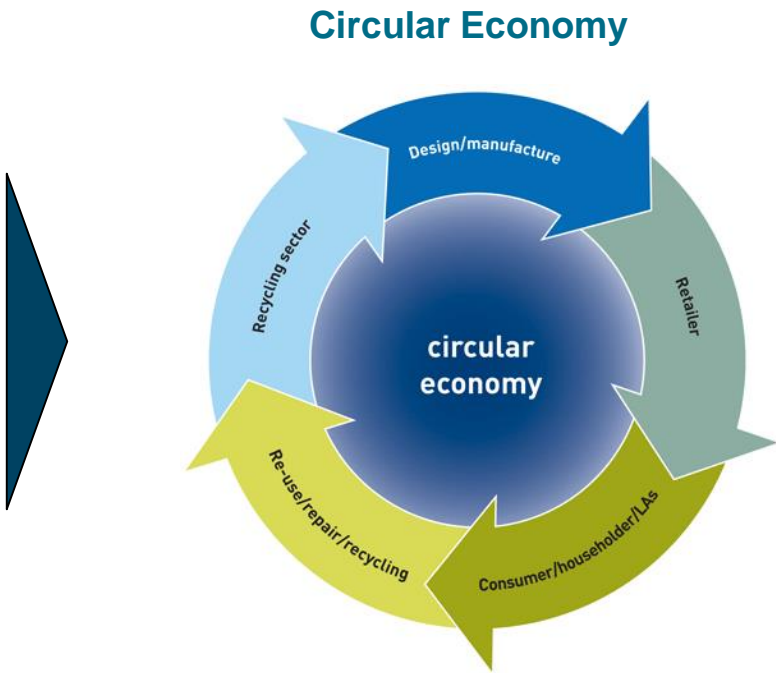
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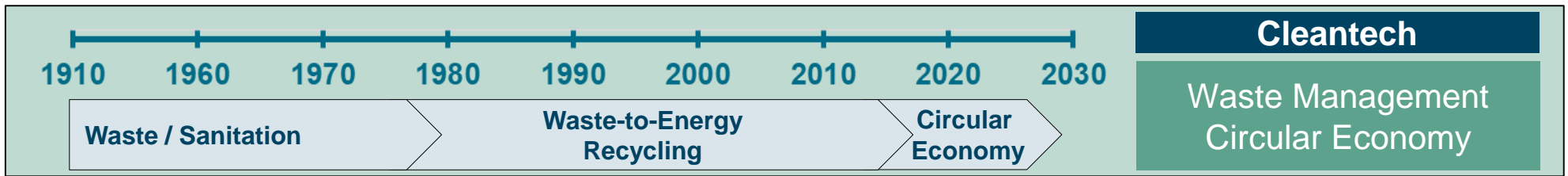


Osaka, Japan WtE Plant



Amager Bakke WtE Plant, Copenhagen, Denmark



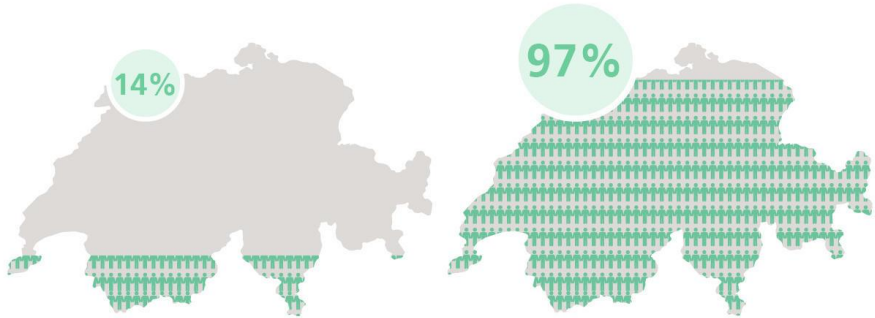
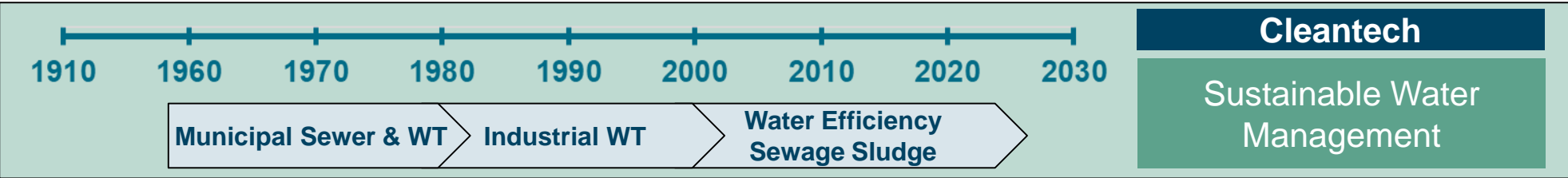


Development Status, Industry Issues

- Business drivers: EU waste directive and national legislation
- World-leading technologies are European
- Duality of markets:
 - a. Highly sophisticated waste management systems with full EfW capacity
 - b. Laggard countries
- Large share of tech and ops companies owned by Asian or US

Upcoming Issues

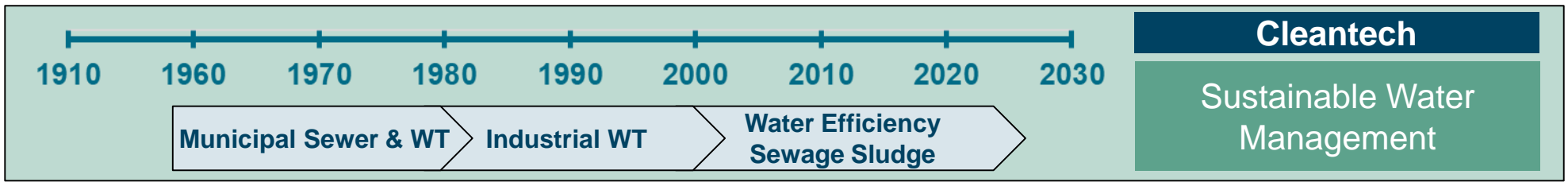
- Circular Economy
- BREF
- Recovery of valuable resources
- Optimization of infrastructure, operational efficiency



Source: swissinfo.ch

By 2005, 97% of the Swiss population were connected to a central sewage system



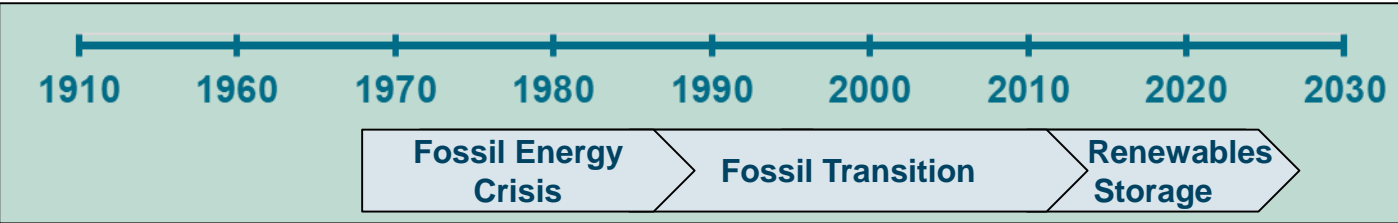


Development Status, Industry Issues

- General water cleaning issues for drinking water and municipal and industrial waste water resolved (“minor optimization on-going”)
- Full range of proven technologies available
- Many innovative “water saving technologies” for all applications (home and industrial)

Upcoming Issues

- Sewage sludge treatment
- Phosphorous recycling
- Phyto pharmaka
- Optimization of infrastructure, operational efficiency



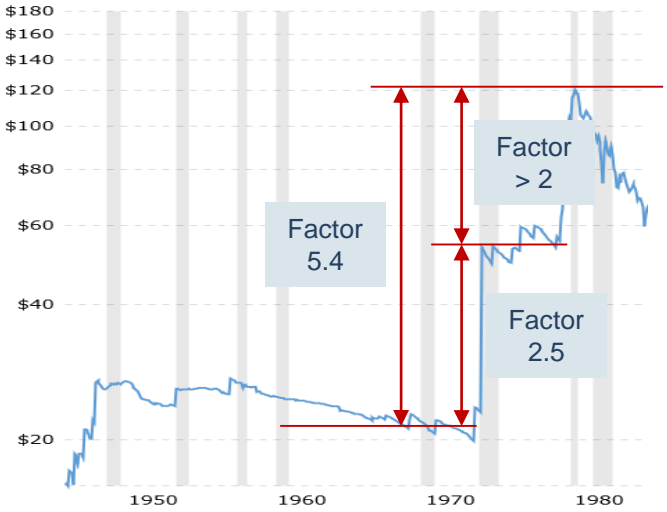
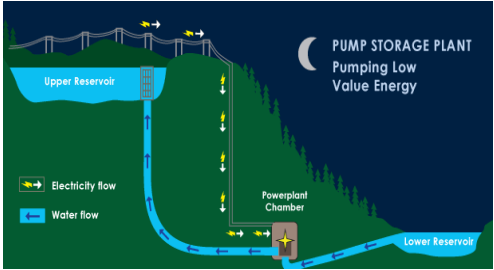
Cleantech

Environmentally-friendly Energy & Energy Storage

Wind



Hydro



Solar



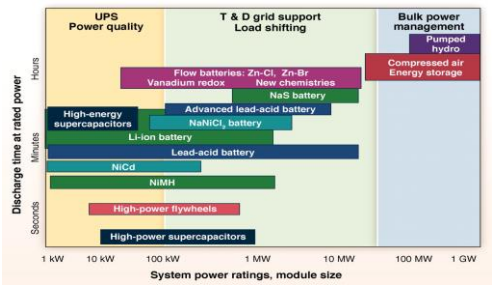
Battery

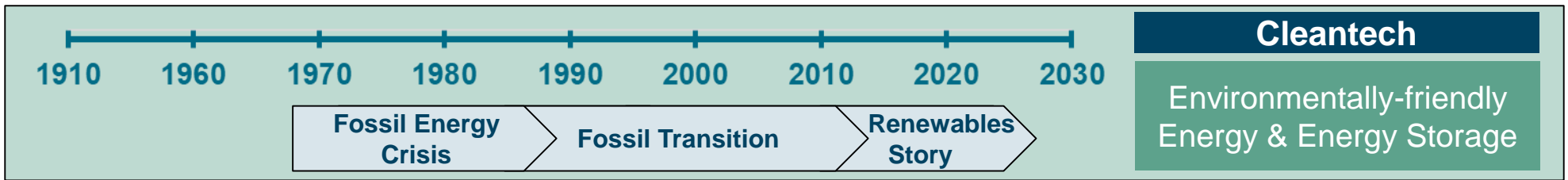


Biomass, Waste



Choices





Development Status, Industry Issues

- Renewable energy introduction well advanced throughout Europe
- Germany – world market leader in promoting an applying renewable energies
- Many leading companies started in Germany/Europe
- With global expansion – transition of manufacturing/development/technology to other regions (e.g. China)
- Steady technology improvements

Upcoming Issues – “Decarbonization” agenda

- Offshore wind
- Storage
- Capacity reserve
- Stabilizing the grid
- Smart grid applications

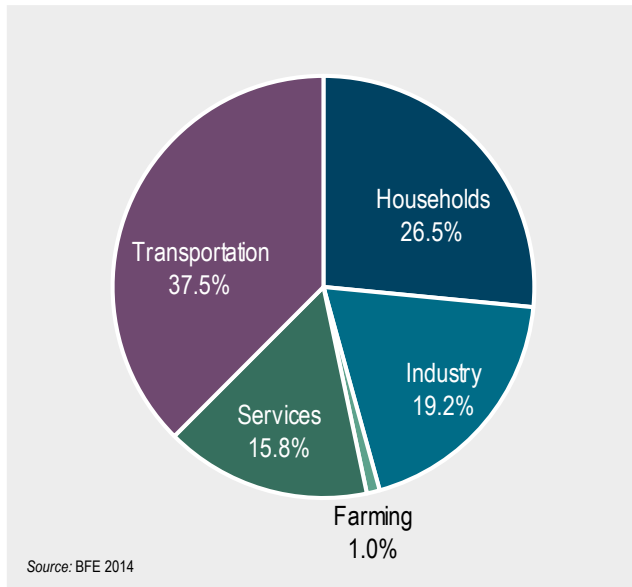
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Energy Efficiency (usage)

Cleantech

Energy Efficiency

Energy Use by Sector in Switzerland

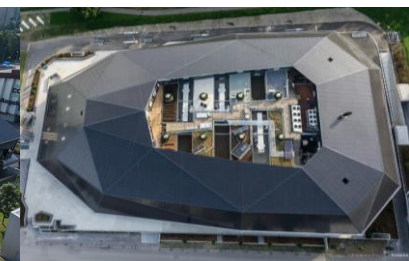


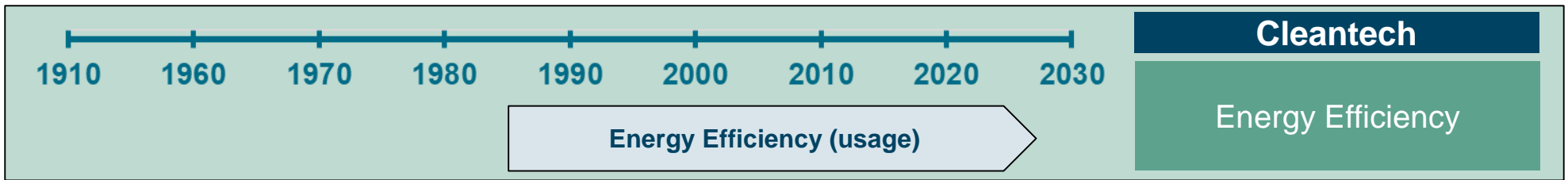
Unterdorfstrasse, Brütten, Switzerland

Completely energy independent rental apartment building



Umwelt Arena – Exhibit platform for sustainability issues





Energy Efficiency – Development Status, Industry Issues

- Highly fragmented sector with many innovative established players as well as very dynamic flow of technology start-ups
- Touching all aspects of daily life
- Switzerland: World market leader for sustainable and self sufficient buildings.
- Several other countries reaching high level of efficiency as well.

Upcoming Issues

- High CAPEX needed for existing infrastructure
- Very low energy prices
- Align “environmental”, private, and industry interests
- Suitable incentives

1910 1960 1970 1980 1990 2000 2010 2020 2030

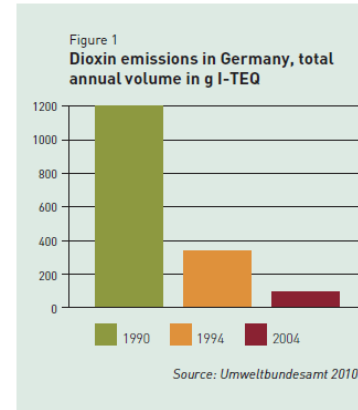
Dust, Dioxin, NOx, Acids,
HCl, Heavy Metals

VOC,
Particulates,
Reduction

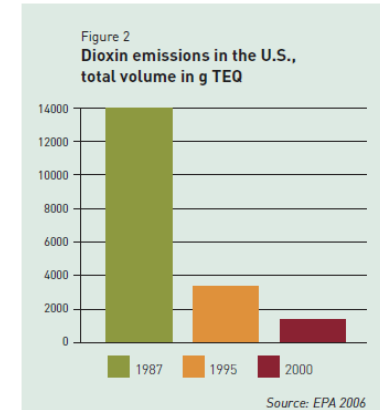
Cleantech

Air Quality Control

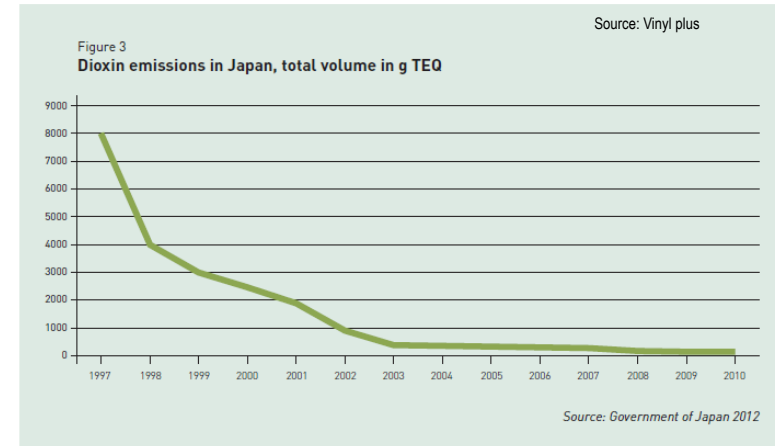
Dioxin leak from Icmesa factory near Seveso, town about 13 miles north of Milan caused death of 3,300 animals upon contact with gas and another 80,000 animals were slaughtered to prevent them from entering the food chain



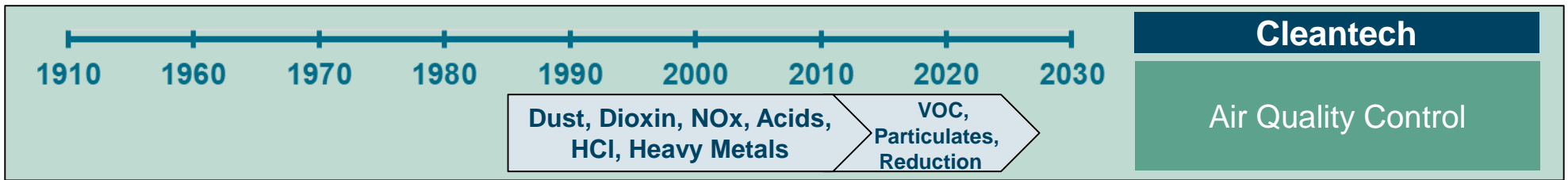
Germany, Europe's largest economy and ranks 4th in manufacturing worldwide, has successfully tackled dioxin emissions.



Until recently the world's largest economy and manufacturing nation, U.S., dioxin emissions have dropped tremendously since the 1980s.



Between 1997 and 2010, Japan's dioxin emissions plummeted



Development Status, Industry Issues

- General air quality issues resolved (“minor optimization on-going”)
- Tight regulations throughout EU existing and are (mostly) implemented
- Full range of proven technologies available
- Many innovative technologies reducing CAPEX and OPEX, with higher efficiency

Upcoming Issues

- BREF – new EU regulation with comprehensive coverage of all major industries, key Impact
 - Special pollutants, e.g. particulates,
 - VOC, next reduction steps
 - Industrial off-gases (e.g. metals, mining, oil & gas)
 - Utilities and industrial power generation

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Cleantech

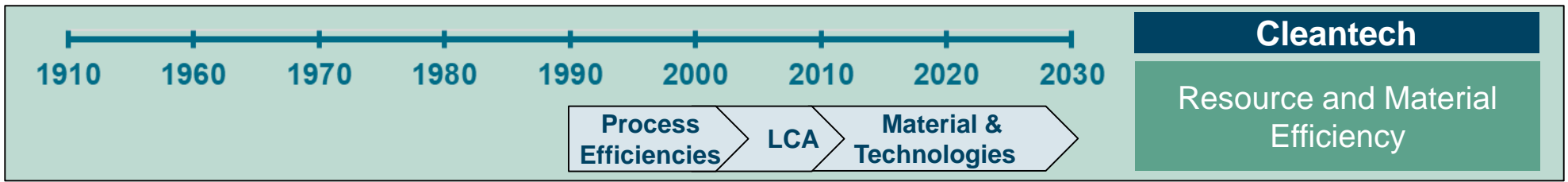
Resource and Material Efficiency



Researchers at ETH Zurich's Department of Architecture (D-ARCH) have developed a concrete floor system that does not require steel reinforcement and is 70% lighter than conventional concrete floors. Production is based on 3D printing

In situ Fabricator





Resource and Material Efficiency

- Material and Resource Efficiency is often closely linked with cost efficiency
- Therefore, very high on “development Agenda” of many leading European companies for over two decades
- Very high level of sophistication achieved

Upcoming Issues

- Continuous improvement
- Game changing materials, processes and technologies
- Main focus of scientific development in universities
- Strong flow of tech spin-offs and start-ups

1910 1960 1970 1980 1990 2000 2010 2020 2030

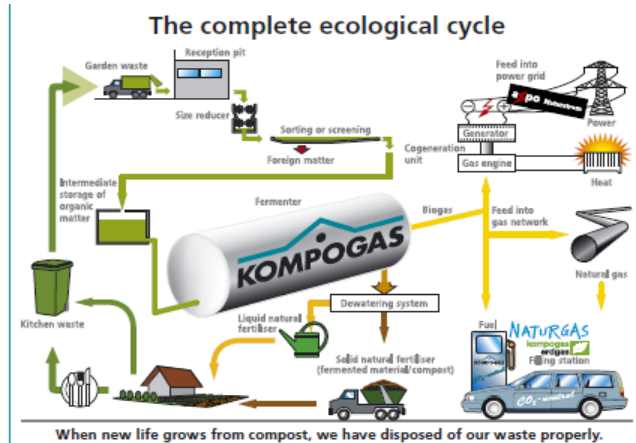
Alternative
Transportation
Fuels

Electro
Mobility

Cleantech

Sustainable Mobility

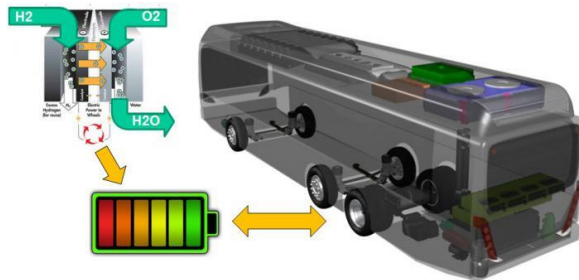
Biogas – well proven



Source: Axpo Kompogas

Fuel Cell – still “in the future”

Fuel Cell – “long-term”



Source: Fuelcellbuses.eu



Source: Cleantechnica.com

Electro Mobility - unstoppable



Source: Tesla.com



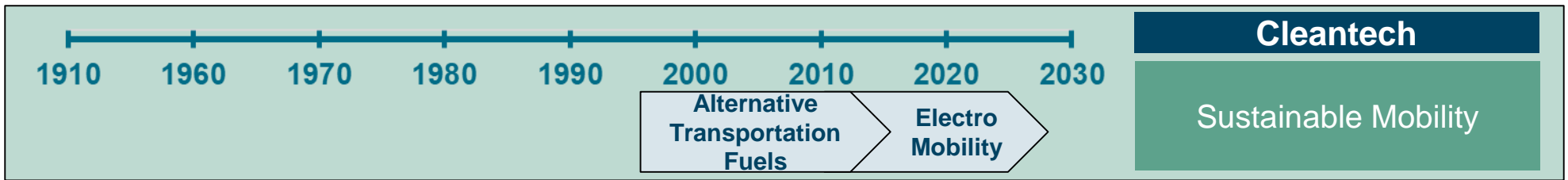
Chery S18/Riich M1 EV



Bikester.ch

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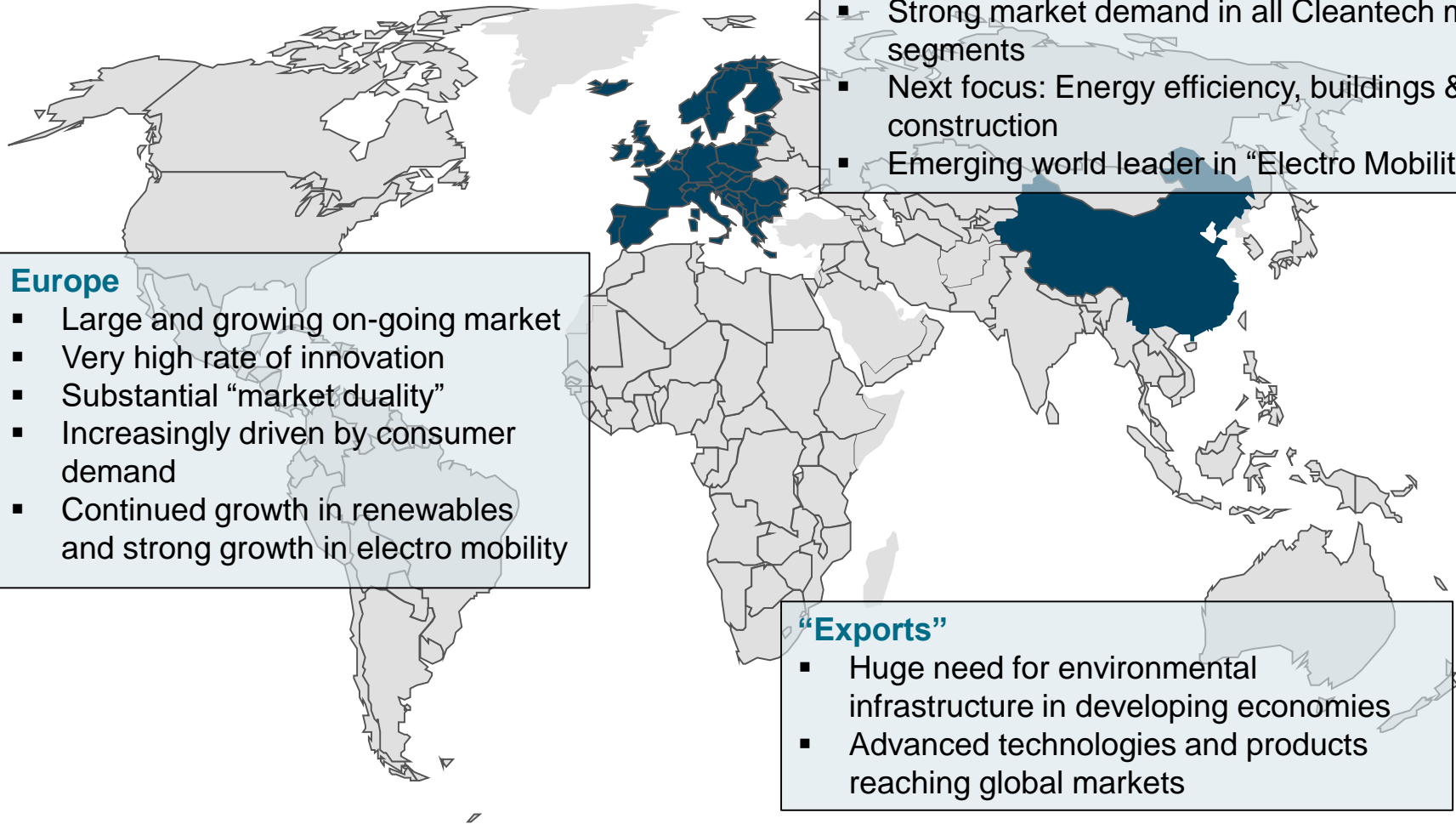
Development Status, Industry Issues

- Early adoption of gas / biogas
- Enormous investment in Fuel Cell technology
- However, European Car Industry taken by surprise by:
 - Worldwide success of Tesla
 - Market dynamic in China and threat by Chinese e-car developers/suppliers
 - Incentives given to e-cars for in certain markets
- Concentrating on setting up charging infrastructure

Upcoming Issues

- Transition of EU / German Car industry
- Import opportunity of “exciting” consumer offerings

Cleantech Market Opportunities



Europe

- Large and growing on-going market
- Very high rate of innovation
- Substantial “market duality”
- Increasingly driven by consumer demand
- Continued growth in renewables and strong growth in electro mobility

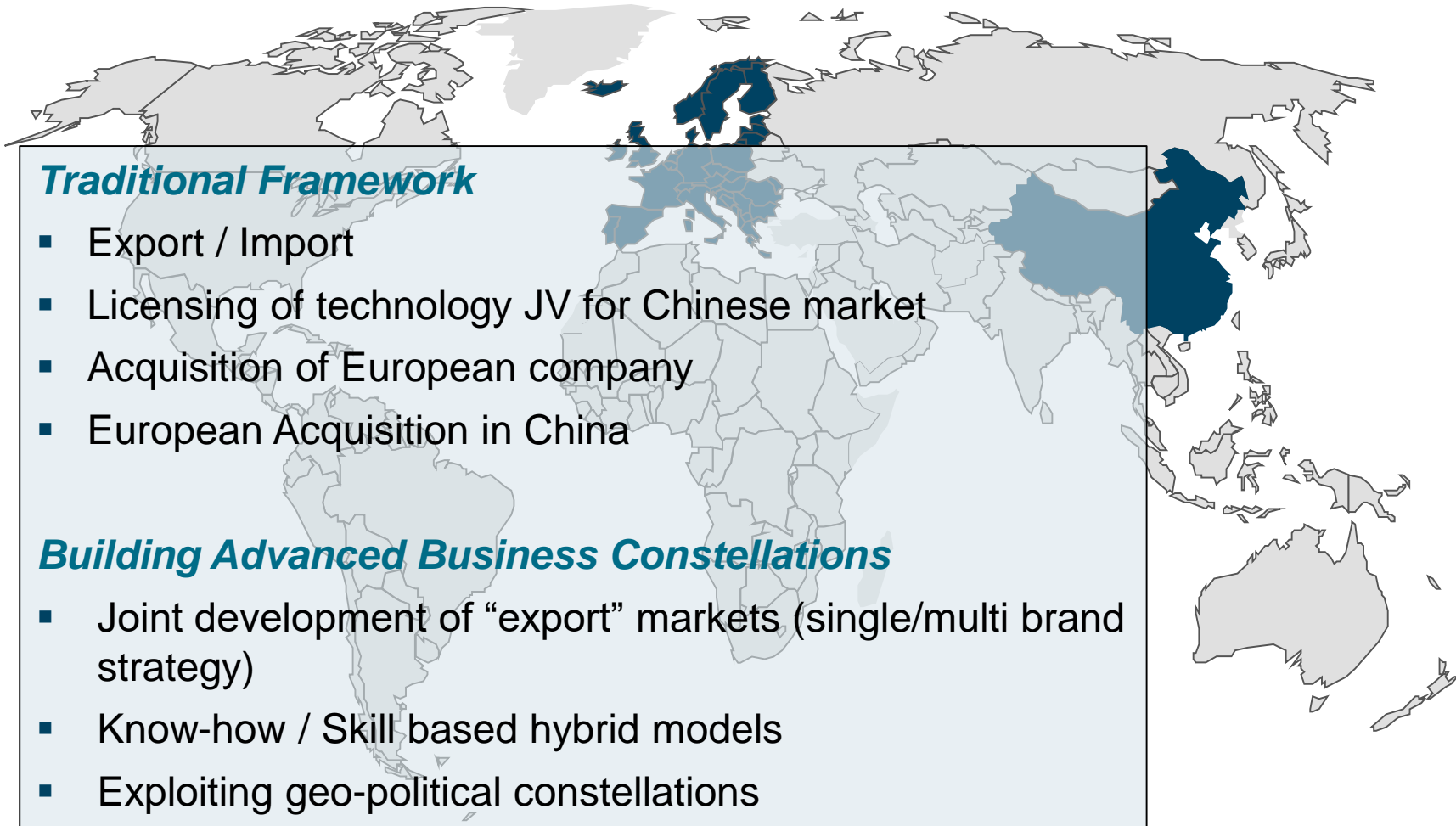
China

- Still significant need in “environmental infrastructure” (waste, air, water, soil)
- Strong market demand in all Cleantech market segments
- Next focus: Energy efficiency, buildings & construction
- Emerging world leader in “Electro Mobility”

“Exports”

- Huge need for environmental infrastructure in developing economies
- Advanced technologies and products reaching global markets

China – Europe Cooperation Models



Traditional Framework

- Export / Import
- Licensing of technology JV for Chinese market
- Acquisition of European company
- European Acquisition in China

Building Advanced Business Constellations

- Joint development of “export” markets (single/multi brand strategy)
- Know-how / Skill based hybrid models
- Exploiting geo-political constellations



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**Thank you for your Attention!
Looking forward to Individual Discussions about
exciting new Business Opportunities**

Shanghai, November 13, 2017

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