EU-China cooperation in environment & climate,

a stimulus for China going green?[1]

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ABSTRACT

This RESPECT WP attempts to answer the central question of RESPECT on the influence and effectiveness of EU trade policy on NTPOs [non-trade policy objectives, seen as 'values' since the Commission paper 'Trade for All']. The focus is on EU-China trade-related cooperation in environment and climate mitigation policies and technologies over 25 years from 1995 – 2020. This lengthy survey addresses three research questions. First, has there been a process of convergence between the EU and China in the status of environment and climate factors as captured by environment an climate *indicators*? The short answer is that at first all what could be observed was damaging divergence but this has meanwhile turned into an uneven process of convergence, with only recently manifest improvements in some environmental indicators and a firmer attempt to embrace mitigation of GHGs. Second, has there been a process of convergence of policies between the EU and China? Here the short answer is more in policies, over a broader scope and earlier than visible in indicators. However, the contrast between the respective policies is sometimes stark. Third, has the EU systematically and energetically pursued this cooperation with China ? (the answer is yes, shown in great detail) ; and has it been effective in stimulating a process of convergence? (amongst the several factors having influenced China from outside, yes, there are indications that the EU has been able to exercise a positive stimulus in this respect).

Key words: EU-China trade policy ; EU-China cooperation ; environmental policy ; climate mitigation policy ; sustainable development ; sustainable development chapters in FTAs ; clean development mechanism

[1] This is a paper for RESPECT, a H2020 project under grant no. 770680. The paper can further improve once personal interviews can be conducted face-to-face in the European Commission and the EEAS. This has proven impossible, so far, due to COVID-19 and the restrictions imposed.

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1. Purpose and structure

The present paper attempts to answer the central question of RESPECT on the influence and effectiveness of EU trade policy on NTPOs [=non-trade policy objectives, often referred to as 'values'] of trading partners. However, it does that solely in the specific context of EU/China trade and investment strategies, and solely for the environment & climate pillar of sustainable development. In other words, neither for the social & labour pillar of sustainable development [= SD], nor for NTPOs such as human rights or governance. It is submitted that sustainable development - even when focused solely on environment & climate - is nevertheless a very large policy domain that also has several layers of complexity.

Behind the broad aim of the paper lies a hypothesis about a long-run process of convergence between the EU and China with respect to environmental protection and the fight against climate change. For purposes of analysis, the notion of 'a process of convergence' culminates from three related but separate research questions.

The ***first research question*** : *What is the process of convergence between the EU and China in the status of environment and climate factors, as captured by* ***relevant SD indicators***.

The ***second research question*** : *What is the process of convergence in environmental and climate-related* ***policies*** *between the EU and China (if any) over the period 1995 – 2020?*

The ***third research question*** is central to the RESPECT project. *Have EU trade policy and cooperation vis a vis China with respect to sustainable development* ***systematically pursued*** *the NTPOs of environment and climate mitigation since the late 1990s and has this pursuit been* ***effective*** *in supporting a process of convergence?*

The paper is EU trade policy relevant, because SD is recognized as a large part of the NTPOs dealt with in RESPECT, even when focusing "only" on its environment & climate pillar. The proper delineation of SD for the purpose of EU trade policy is far from easy, however, especially not after the adoption globally of the 2030 UN Agenda on Sustainable Development Goals, which are excruciatingly broad and encompassing. This delineation issue is resolved in section 2, based on the notion of 'trade-related SD' as customarily used in recent EU FTAs. These more narrowly defined aspects of SD in special SD chapters of FTAs express the ambitious EU preferences. More precisely, in section 2 these ambitious preferences are stylized on the basis of the SD chapter of the 2018 EU-Japan Economic Partnership Agreement, a so-called 'deep and comprehensive FTA'. However, a brief consistency check is included about the SD chapters in three other recent EU FTAs, those with Vietnam, Mexico and Canada.

It should be realized that China was at first – in the relevant period – a developing country and even today, 25 years later, it is best characterized as an upper-middle-income economy. Can one expect convergence in SD with such an economy today? A priori one should not expect that or at least, if a process of convergence has been set into motion, it is unlikely to be completed and this must be taken into account. One indication of this Chinese position is found in the fact that in the 16 FTAs China has concluded so far, either no SD chapter is incorporated (in most cases) or merely incipient elements of a future SD chapter dependent

on further negotiations which are left completely open (see Pelkmans, Hu et al., 2018, section 2.3). The convergence, as expressed in the answers to the first two research questions, is therefore to be regarded as a process. One should not expect this process to be completed today, except perhaps selectively. Moreover, stylizing EU's ambitious trade-related SD preferences from recent FTAs may be a sound idea in and by itself, but what about trade relations with the many WTO partners not having a FTA with the EU? And China falls into that category. Thus, there are two reasons to be cautious about the 'reading' of EU's trade-related SD preferences from recent EU FTAs: China has no FTA with the EU in the first place [2], and China is not yet a developed country which might be expected to be able to 'afford' such ambitious preferences. In other words, convergence in SD between the EU and China should not be expected so easily and, even if the process is developing, is unlikely to be completed at this stage. Stronger, by adopting the preferences as 'stylized' from the SD chapter of the EPA between Japan and the EU, the ambition is tantamount to the highest one found in any FTA today. It does not stand to reason to expect China to fully pursue such ambitious aims today. Using the SD chapter of recent EU FTAs therefore has the function, and only this function, to sharply define or articulate EU's trade-related SD preferences.Finally, much of the following rests on the initial presumption of the late 1990s that, in SD, China is to converge to the EU 's SD objectives. In 2020, however, or in the coming years, it is not excluded that the EU might wish to converge - in some aspects – to what China has meanwhile shown to be capable of (see e.g. Box 8 in section 7.3).

Before proceeding with the analysis of the process of convergence in environment protection and climate mitigation, section 3 provides succinct economic background to the enormous change China has undergone over 25 years. This background is critical to appreciate the forceful trends in SD-related indicators in China. It includes a brief reminder of the incredible speed of economic growth and – with a lag – development of China. This matters here because rapid and continuous economic growth exerts powerful effects in two opposite directions: helping the reduction of SD problems in environment and climate – irrespective of (EU) trade policies – but at the same time complicating the policy agenda by the negative effects of claiming ever more resources and generating (ceteris paribus) ever higher emissions. With the 'growth addiction' came a number of other related trends characterizing the nature and determinants of economic growth in China. Most if not all of these intensified the several burdens on the environment and climate and only recently, these pressures have weakened or subsided.

The remainder of the paper attempts to create the building blocks for analyzing convergence as a process between the EU and China in trade-related environment protection and climate policies. Section 4 provides a snapshot of China's environment & climate status around the mid-1990s, based on indicators where available and setting out constraints and emerging policies. This should be the starting point for further analysis answering research question 1. Section 5 gives a bird's eye view of 25 years of bilateral and multilateral cooperation of the

[2] China and the EU have built up several instances of fairly 'deep' cooperation in SD, as will be shown. Invariably, what is included in the texts however, are phrases that such arrangements 'do not imply binding legal commitments' for the partners, a clear signal that partners carefully distinguish cooperation, even when 'deep', from FTA-like commitments.

EU and China in trade-related SD, here environment & climate. The EU and China have been active throughout. An overview is provided showing many activities, action plans, projects, joint policy declarations, Dialogues and cooperation for market-driven climate finance and technology transfer. As an illustration, in one extra table and two Boxes more factual and analytical detail is presented for some activities from the overview. In section 6, with the help of indicators it is attempted to answer the first research question, with some caveats. First, fifteen years of Chinese planning on sustainable growth (3 successive Plans) are surveyed, followed by a verification of the Chinese quest for 'green growth' after 2015, both with indicators. A 'deeper dive' is presented in section 6.3 with a greater focus on recent climate-related indicators as well as the state of air and water quality in China, two very problematic issues. This is also true for soil pollution but a fresh determination by Chinese policy-makers is so recent that it has been incorporated in section 7 on today's green policies' panorama in China. Section 6.4 attempts to answer the first research question given the foregoing analysis based on indicators and their explanation.

Sections 7 addresses the second research question. This assessment is more qualitative. Moreover, it is well-known that in China there can be a lot of 'noise' in policy announcements over time, making it problematic to 'read' the genuine policy pursued in earnest. In order to cope with this fact-of-life, section 7 comprises two distinct subsections, together hopefully enabling an appropriate presentation of China's current policy preferences in environmental protection and the mitigation of climate change. Section 7.1 summarizes China's complicated policy journey towards a cleaner and less damaging environment as well as the approach towards a lower burden for the climate before 2030, in the continuous presence of high (but no longer extreme) economic growth. It is attempted to appreciate the early results of a considerable tightening and adaptation of China's policies in the years since 2015, and in particular since 2018, although data limitations make that difficult. Soil, air and water pollution are assessed with newest data and China's commitments under the Paris Agreement are discussed. It is also paying some attention to 'responsible business' in China, in particular whether CSR (corporate social responsibility) can contribute in earnest to achieving a 'greener' China. Section 7.2 takes a different perspective to 'green' policy convergence. The focus is more on 'values', that is, the aims and principles of sustainable development as now routinely incorporated in EU FTAs. The question asked is how these 'values' of SD can be assessed when applied to China. Verifying the inventory of SD-items in FTAs for the case of China should be helpful in appreciating today's policy stance in China, even when the two partners have no FTA at all. Thus, it is possible to assess how far policy convergence has gone between the EU and China with respect to some 30 aspects enumerated in a typical SD chapter. As it turns out, the two approaches in section 7 are complementary.

In section 8 an attempt is made to answer the third research question, a core issue in RESPECT. However, this is intrinsically very difficult indeed. Not nearly all information is public and consultations – frequent and often intense with Chinese authorities and policy-makers – are hardly ever reported with sufficient detail. The bilateral cooperation style is purposely presented or couched in positive and affirmative language, preempting analysis of all relevant facts. Initially China was supported with an overriding development motive,

emphasizing capacity building, but nowadays – in an 'equal' strategic Partnership – differences are rarely articulated and wording is about what binds the partners. Given this somewhat elusive diplomacy, the answer formulated is subject to major caveats. In any event, the answer is affirmative: many indications suggest that the EU has been actively and systematically influencing Chinese SD strategies and specific policies ever since the late 1990s and that China has often responded in a cooperative fashion. Very recently, the first indications appear about China's insistence of a stronger emphasis on some highly specific SD policy instruments. However, our affirmative answer to the third research question is inevitably partial. Indeed, yet another difficulty in answering research question 3 is that there are and have been many other outside influences on China – bilateral, regional, plurilateral (e.g APEC) and multilateral (e.g. MEAs) - not to speak of domestic policy-formulation and severe constraints, over the 25 years covered. One important element stands out: in multilateral SD commitments, China and the EU are very similar indeed, implying that bilateral and multilateral cooperation strongly influence one another as well.

2. Sustainable development as an EU NTPO

In this section, the notion of 'sustainable development' as an EU NTPO in EU trade policy and cooperation is defined (in section 2.1) and its various elements are identified (section 2.2). .

2.1 NTPOs express EU values

In the important EU policy paper "Trade for all, towards a more responsible trade and investment policy" of October 2015 [3] the Commission develops a detailed approach to trade and SD. In the foreword, Commissioner Cecilia Malmstrom speaks about "EU trade policy [being] not just about interests but also about values". Section 4 is called : 'A trade and investment policy based on values'. This value-driven approach can be traced back to the Lisbon treaty (in force since 2009) calling for coherence in all external policies based on values. The NTPOs identified in the RESPECT project almost entirely overlap with the values specified in 'Trade for all' [4]. Nevertheless, the boundaries of NTPOs are not clear in 'Trade for All' because of issue-linkages with 'development' and 'inclusive growth' and even more generally by 'contributing to the newly agreed global sustainable development goals (SDGs) under the 2030 Agenda for Sustainable Development' (p. 7, Introduction). It should be noted that the 17 SDGs are far wider than the notion of SD used thus far in EU trade policy, and comprise numerous aspects which are strictly local or national. Also, the probably well-intended notion of the indivisibility of the 17 SDGs makes it simply impossible to focus on what is usually considered SD in an analytically meaningful way [5]. The present paper will not follow the SDG conceptualisation of sustainable development as it is analytically unworkable. In Annex 1 a numerical illustration is provided why it would be unworkable.

[3] See www.trade.ec.europa.eu/doclib/docs/2015/october/tradoc_153846.pdf

[4] Except for health and safety of products, which is anyway long pursued via TBT and SPS arrangements at the multilateral and bilateral level and, on the import side, by means of the requirements of the internal market.

[5] The very wide scope of this approach might well be caused by the 'development' orientation of the UN agenda. Although anything but 'narrow', the trade approach is far more focused on what is or could be directly or indirectly trade and investment relevant.

Moreover, it is also not necessary for EU trade & investment policy because the officially presented four elements of SD by DG Trade of the Commission – although clearly comprehensive - are far more narrow, focused as they are on being 'trade-related'[6].

2.2 Environmental & climate NTPOs in EU FTAs

When focusing on the environmental / climate and social/labour pillars of SD, a useful guide about meaningful requirements driven by EU trade and investment policy is provided by the SD chapters of recent EU FTAs. Even if there is no FTA treaty with China, one can still deduce the EU's SD preferences and 'values' from EU FTA texts and operationalize them. This paper will do just that and utilize this collection of 'values' as a frame of reference about relevant NTPOs for EU/China trade and investment relations. By definition, this frame of reference provides a good proxy of EU preferences. Of course, for the case of China there is no a priori agreement on these EU preferences in the absence of a FTA. So far, China has often agreed to cooperative and political bilateral commitments, or best endeavours and efforts in joint programmes. However, a good deal of the typical FTA SD chapter concerns references to multilateral agreements already adhered to by *both* the EU and China, as will be shown in detail in section 7.2 – thus, the multilateral obligations are essentially the same in EU FTAs and for China and hence the partners can and do support these MEAs in joint statements.

The SD chapters in FTAs provide an operational inventory of the elements of the relevant NTPOs. In addition, regulatory and technical cooperation and capacity building with EU funding can be seen as supportive influence via EU trade policy (in the form of cooperation) to promote SD. This has frequently been done in EU/China relations, both in the period that China was still a developing country, hence a recipient, and more recently, under an equal partnership, when China was interested in emulation of EU policies or simply learning from the EU or in joint projects for demonstration or technological research.

The operational inventory of SD aspects in EU FTAs can be deduced from existing or negotiated FTAs texts. There are now 14 EU FTAs with SD chapters [7]. The most recent FTA texts best reflect EU SD preferences in environment and climate. We shall proceed as follows. In Table 1 the stylized inventory of these preferences is listed, on the basis of chapter 16 of the Economic Partnership Agreement between the EU and Japan [8]. This listing is not so much a legal exercise but merely a taxonomy of the substance of the SD chapter as far as environment and climate is concerned. Indeed, the wording of similar instances of SD cooperation or commitments can differ between recent EU FTAs, whereas the substance is essentially the same. The purpose here is to identify stylized versions of EU SD preferences

[6] On the European Commission website it is said that "EU trade policy aims to ensure that economic development goes hand in hand with (i) social justice, (ii) respect for human rights, (iii) high labour standards, (iv) high environmental standards" in promoting sustainable development. See https://ec.europa.eu/trade/policy-making/sustainable-development/ last accessed on 20 March 2020. The present paper concentrates on the fourth item.

[7] The EU with Canada, Central America, Colombia, Peru, Ecuador, Georgia, Japan,, Mercosur (negotiated text only), Mexico (provisional negotiated text of upgraded FTA), Moldova, Singapore, South Korea, Ukraine and Vietnam.

[8] Officially the Agreement between the EU and Japan for an Economic Partnership, from August 2018, meanwhile ratified, see www.trade.ec.europa.eu/doclib/2018/august/tradoc_157228.pdf

for trade-related SD, not the pursuit of legal finesse. The last column of Table 1 provides a comparison in shorthand with the EU FTAs with respectively Vietnam, Canada and (the draft FTA text of) Mexico, in order verify that the Japan one is not biased, when using it to identify EU SD preferences.

Table 1

Environment and Climate specifications in the SD chapter of EU/Japan EPA

	subject	**Substance in EPA**	**Similarity M,V,C**
1	Context/objectives	i. Recognition of promoting trade in a way that contributes to sustainable development ii. taking into consideration a range of specified multilateral agreements, Declarations and Agenda's iii. economic and social development and environmental protection are mutually reinforcing components	V, C, M
2	Right to regulate	i. right to regulate for each Party ii. consistent with internationally recognized standards/agreements iii. each Party shall strive to ensure high levels of environmental protection iv . 3 non-regression clauses and one on non-discrimination and no arbitrariness	V, C, M
3	On MEAs	i. re-affirming to effectively implement the MEAs Parties are are party of ii. stress the mutual supportiveness between trade and environment iii. exchange views and information on trade-related environmental matters of mutual interest iv. re-affirm importance/commitments of UNFCCC and the 2015 Paris Agreement v. cooperate to provide the positive contribution of trade to the transition to low-GHG emissions and climate-resilient development	V, C, M (although the Paris Agreement is not mentioned explicitly, there is more general text with similar implications)
4.	Trade and investment favouring SD	i. facilitate/promote trade and investment in environmental goods & services ii. idem, in goods and services of particular relevance to climate change mitigation iii. promote trade under labelling schemes and other voluntary (incl. private) initiatives	V, C, M

5	Biological diversity	i. essentially re-affirming the adherence to CBD (Convention on Biological Diversity) and CITES (endangered species) ii. including labelling schemes and combatting illegal trade iii. detailed implementation provision iv. consult bilaterally on trade in wildlife and natural resource products, the valuation, mapping and assessment of ecosystems, access to genetic resources	V, M (CETA has no separate article on biological diversity, but contains references to it in the 'context' and 'cooperation' articles)
6	Sustainable forestry	i. recognition of role of trade and investment in ensuring the conservation and sustainable management of forests ii. and trade in timber and timber products iii. contribute to combatting illegal logging and related trade	V, C, M
7	Sustainable fishing	i. importance of trade and investment in sustainable use and management of fisheries resources and aquaculture ii. Parties shall comply with various UN and FAO Conventions and Codes, including the implementation of port measures iii. encourage sustainable fisheries measures in RFMOs (incl. effective monitoring, control, and certification schemes) iv. combatting IUU (illegal, unreported and unregulated) fishing, with legal instruments, controls and capacity management, and via RFMOs	V, C, M
8	Scientific information	Parties shall take account of avialable scientific and technical information, international standards and the precautionary approach	V, C, M
9	Transparency and evaluation	i. the pursuit of environment and climate objectives in a transparent manner ii. recognize the importance of sustainability impact assessment	V, C, M (in CETA in ch. 22 on SD in general)
10	Cooperation in SD aspects	i. via international organisations ii. facilitate trade & investment in environmental goods and services iii. on eco-labels, fair and ethical trade schemes iv. corporate social responsibility, based on internationally agreed guidelines	V, C, M (cooperation is sometimes called 'working together')

		v. on low-carbon technologies and energy efficiency vi. biological diversity vii. sustainable forestry viii. sustainable fishing and aquaculture	
11	Consultation and enforcement	i. Committee on Trade and SD ii. consultation requests iii. higher stage of dispute resolution: the Committee iv. last resort: panel of (3) experts	V, C, M (M in separate proposal on enforcement)

Note : V=Vietnam FTA, ch. 15 ; C=CETA, chapters 22 and 24 ; M=Mexico-EU upgraded FTA, still in negotiation stage; used is the EU negotiation proposal of April 2017, see www.trade.ec.europa.eu/doclib/docs/2017/may/trade_tradoc_155528.pdf , with a broad verification in the 'agreement-in-principle' of April 2018, see www.trade.ec.europa.eu/doclib/docs/2018/april/tradoc_156791.pdf , pp. 14/5

The conclusion from Table 1 is clear: it is convenient to stylize 10 items of substance reflecting EU NTPOs in this policy domain and a fairly standardized consultation and (soft) enforcement procedure. The latter (item 11) is not relevant when discussing EU/China trade cooperation as there is no such thing as a FTA. All the 10 items of substance are in principle relevant for EU/China trade cooperation in environment and climate. Although EU/China cooperation on environment and climate might seem to be a bilateral exercise in trade and SD diplomacy, in fact a lot of substance hinges on multilateral actions and (legal and other) commitments. Thus, in Table 1, items 3 (MEAs), 5 (biological diversity) and 6 (sustainable forestry) hinge strongly on MEAs and their implementation in a number of ways. Strictly spoken this is not so for 'sustainable fishing' but the global (e.g. FAO) and regional (RFMOs) governance and policing is just as crucial. That is why – in bilateral cooperation in this domain – the practical overlap in preferences with respect to trade & investment and SD is largely determined by what both partners commit to in multilateral diplomacy. For that reason, section 5 on a survey of bilateral EU/China cooperation in SD begins with the multilateral agreements both parties adhere to (see Table 2).

3. The Chinese growth machine and sustainable development

It is not exaggerated to state that the enormous problems China has in environment and climate are primarily a function of its phenomenal economic growth over 4 decades. A critical qualification is that this was "growth at all costs". It was long an obsession and there is still a "growth at all costs" mindset (OECD [2019] p. 71] today. This mindset is confronted nowadays with ever more and tougher measures of many kinds attempting to mitigate or throttle it, which renders it very difficult to 'read' the policy landscape in China properly. There are many contradictions, also over time. Amongst the numerous policy signals and incentives that e.g. provincial leaders and officials discern, apparently the most powerful success factor still remains high growth despite a wide range of other policy concerns. High economic growth is of cardinal importance both centrally and provincially and this is best

observed when cyclical downturns or negative influences from the world economy hit China. The typical response is to try to stimulate the economy, not so much to keep it from going into recession but merely preventing it from (perhaps only slightly) missing the high growth target by 1 % or 2 % [9]. The upshot is that, in early 2020, China has many more credible measures in place to improve upon its environmental and/or climate policy results than one, let alone two, decades ago, but that, nevertheless, the outcomes are mixed at best.

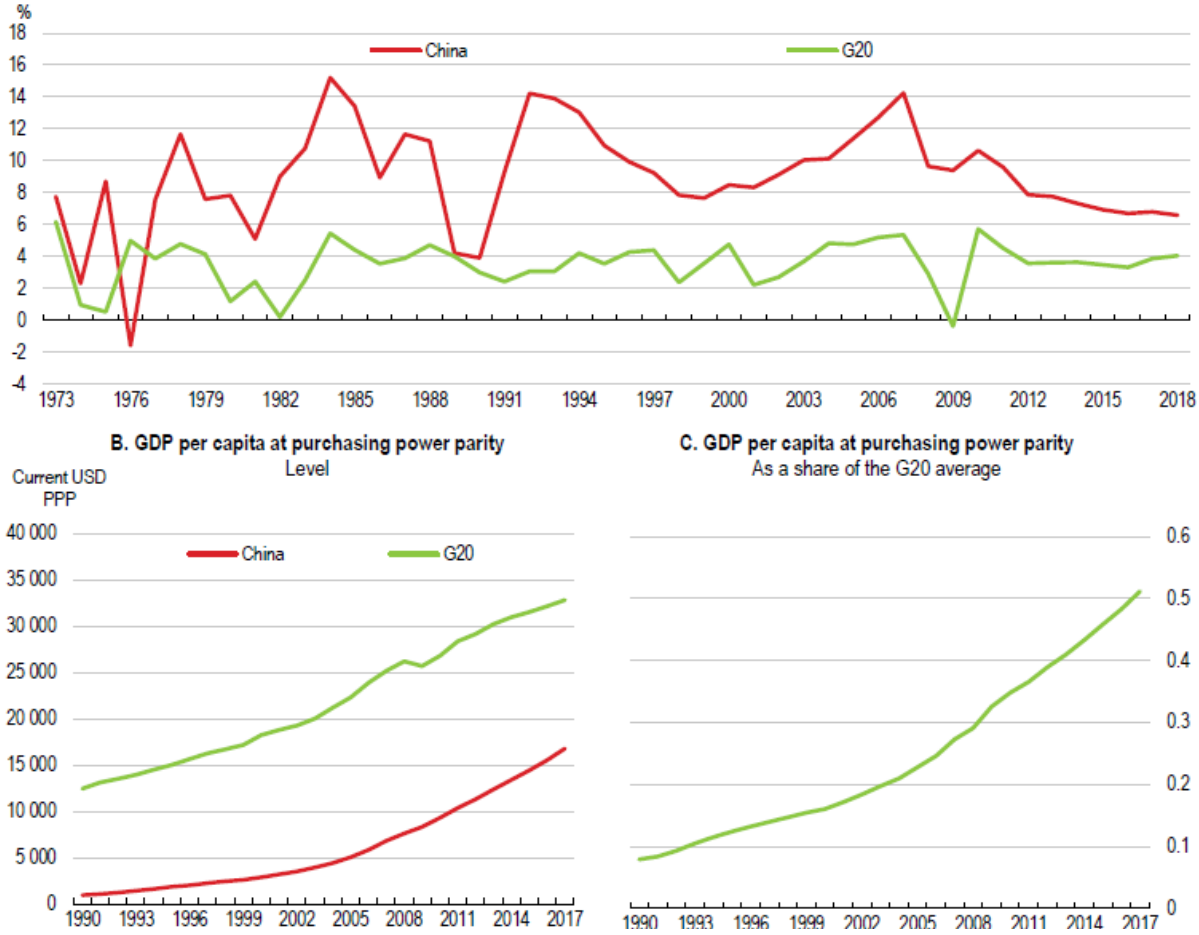
Figure 1 provides the long-run Chinese economic growth rates with three distinct but related indicators over 4 ½ decades. Starting from the late 1970s, the path has been record-breaking. In the 1990s the average annual real economic growth has been around 10 % and only after 2000 economic growth was beginning to level off structurally. Figure 1 depicts real growth which is nevertheless still high.

Figure 1

China's consistently high real economic growth: 1973 – 2018

[source : OECD (2019), p. 13]

[9] This statement is valid before the COVID-19 crisis hit.



But growth has come with huge costs. The environmental (non-climate) 'negatives' with a long-run impact on eco-systems and the economy are mainly seven: water pollution, man-made water shortages, urban air pollution, industrial toxic and hazardous waste, soil erosion, forest and grassland degradation, and habitat destruction and species loss. Although some of these are usually local, several of these costly 'negatives' meanwhile fall under MEAs and hence would potentially be subject to EU/China cooperation and/or discussion under EU trade policy. One might also wonder whether and to what extent bilateral or multilateral trade in goods might not be distorted by a radical neglect of the costs to ecosystems or, indeed, by the avoidance of incurring mitigation or pre-emption costs by Chinese companies exporting goods. In short, competitiveness at the expense of workers, consumers, citizens and nature. This consideration is particularly pertinent given China's pretty extreme reliance on export-led growth for decades.

On the other hand, economic growth also facilitates the improvement of typical environmental indicators, at least potentially. If investment rates are as high as in China ever since the 1980s (far above those in OECD countries), such investments can be channelled towards cleaner production, may encourage greater material efficiency and energy efficiency as well as promote the conservation of scarce resources. High economic growth generates steadily higher incomes and public revenues which can more easily be used for stimulating new environment-friendly technology. Moreover, as in all parts of the world,

affluence can be a great lubricator of adjustment and structural reform which can set in motion a process of greening the economy over time.

With respect to the climate impact of high and continuous economic growth, it is not much different. CO2 emissions are a positive function of growth, but more forcefully so if fossil resources are prominent in energy generation and transport. It is a bit more complicated for other GHGs (ozone ; methane). It also depends what the fossil resources are which are used most. Here China is in a separate class: nowhere in the world is coal used more intensely for energy and heating than in China. The abundance of coal and its very low price has been critical for the decades that China was still a poor developing country, whether for energy generators, industry or households. For transport, oil is mostly imported, i.e. if and to the extent that cars and trucks become more fuel-efficient or indeed electric, the two birds of energy security and lower CO2 emissions can be hit with a single stone. But until the mid-1990s, China had relatively modest car and truck traffic, many city folk were still biking and long journeys were done by train. In other words, it was overwhelmingly coal which caused high CO2 emissions and they were rapidly increasing as well, precisely as a result of very high economic growth. In fact, the non-climate environment issues and CO2 are to some extent interdependent because the use of coal also generated very high emissions of particulates and of SO2 (sulphur dioxide).

Acknowledging that there are two sides to the environmental and climate impact of high economic growth in China, it is still true that the negative effects prevailed in China for two reasons. One is that the rate of growth was so high for so long that – given the mindset of growth-at-all-costs - the very rapid increase of resource use in order to allow that growth easily dominated. The other reason is that China long pretended to go for new technology and (slow) substitution of highly inefficient outmoded capital goods and domestic heating products by modern equipment and methods, without opting for first-best solutions such as energy pricing, taxation of emissions and /or tough enforcement monitored seriously at the central level. New technology and market-driven substitution cannot generate enough reduction of e.g. emissions fast enough in the absence of proper energy pricing and/or taxation (incentivizing such processes) and in the presence of such high economic growth.

This section merely serves as a reminder of the long and exceptional but also reckless economic growth of China, it does not pretend to provide a full economic analysis setting out the drivers of pollution linked to growth. Pollution in China is linked to the unbridled expansion of heavy and chemical industries over decades, as well mining, to the transport and the building sectors, to the extreme version of export-led growth in (initially) low-skilled-labour-intensive goods (manufactured in many special economic zones) and to the rapid further urbanisation driven by a truly massive East-West flow of workers from the Chinese central country-side and the West, not even mentioning the explosive growth in livestock farming and acquaculture. At present, this growth ‘model’ is gradually replaced by a shift to higher-value-added production, to services and agriculture with more responsible use of pesticides and fertilizers.

4. The baseline: China's environment and climate status in the mid-1990s

Assessing the possible EU influence or at least cooperation between the EU and China on the dialogues, programmes, joint initiatives (also multilaterally) and bilateral trade policy discussions on the environmental and climate pillar of SD, it is necessary to establish a 'baseline', similar to the practice of impact assessment. For present purposes, the baseline consists of the status of China in terms of environment and climate in the mid-1990s. There is a double rational for this choice. One is that only by that time, environmental reporting in China began to mature (bei t with omissions still) and climate policies and the underlying data measurement began to be relatively firm (though with exceptions). The other rationale is that it was only in the late 1990s that the EU and China initiated programmes (with a development motive) and Dialogues (with policy and persuasion motives). In section 5 a summary view of the EU/China environmental and climate Dialogues and activities will be provided, knowing the starting point from section 4. In section 6 a bird's-eye view of China's climate and environment status near 2020 will be provided with the help of indicators. Ideally, it should be possible in section 7 to relate the bilateral EU/China activities to the changes in policy and indicators in the 25 years since the mid-1990s.

In the mid-1990s both policies and indicators of environment and climate in China were not yet so easy to 'read' and understand. For that reason, this section 4 relies on 2 authoritative reports by the World Bank, with co-authorship of Chinese specialists [10] and support from China's main environmental agency at the time (NEPA). Below some core indicators on environment and on climate from China of the mid-1990s will be set out. Before doing so, it should be realized that China may have plenty of coal, but limited resources otherwise. A few indicators :

a. China has some 20 % of the world's population but barely 7 % of arable land
b. Agricultural land per capita is only 28 % of the world's average
c. Forests and wilderness (in 1995 [11]) per capita is only 15 % of the world's average
d. Water resources per capita are one-third of the world average
e. In energy resources, it is a major net importer of oil and gas, including LNG (today)

With respect to air pollution, particulates [12] as well as sulphur (SO2), NOx, volatile organic compounds (VOCs) and carbon monoxide are the damaging emissions for humans. In China in the 1990s both industrial boilers (inefficient and with low smokestacks) and small household stoves are genuine culprits: industrial boilers consume 33 % of China's coal and emit an even higher percentage of ground-level pollution in cities ; households consume only 15 % of coal but contribute an amazing 30 % to ground-level pollution. Between 1985

[10] On environment (non-climate), mainly air and water, see World Bank (1997), *Clear water, blue skies, China's environment in the new century*, Washington DC, September, pp. 113 ; and on climate questions, see World Bank (1996), *China: issues and opinions in Greenhouse Gas Emissions Control* (ed. Johnson, Li, Liang & Taylor), WB *Discussion Paper* no. 330, June, pp. 66.

[11] The year matters because China initiated around that time a massive reforestation programme for many years.

[12] Both fine (less than 10 microns) and ultrafine (less than 2.5 microns)

and 1995, particulate concentrations in cities have fallen significantly, but in large cities they are still 4 times the WHO guideline, whereas in smaller cities they are some 3 times the guideline. It is therefore still very unhealthy. As to SO2 the decline is small (in concentation), and in big cities the level is still 2 ½ times the WHO guideline, again far from healthy. When citizens enter home, hence stepping out of the air pollution, they are often worse off because indoor air quality is (especially in winter [13]) miserable. Altogether, citizens suffer disproportionately from respiratory diseases, the leading cause of death in rural areas and the third cause in cities. There is also a serious lead problem (esp. for children) resulting from industrial emissions and from leaded patrol because only one-half of patrol production is unleaded. Negative externalities across China and beyond – so no longer local only – are caused by long-range transport of sulphur, resulting in acid rain, damaging agriculture, ecosystems and materials.

Water pollution in China of 1995 is serious as well. Some 40 % of monitored river sections flowing past cities do not meet minimum quality levels. Water shortages complicate matters further as upstream cities or others often stop the water flow in order to stock water, thereby causing relatively greater pollution downstream. Municipal and industrial wastewater were at first hardly treated; since the early 1990s this is improving for industrial waste of regulated industries but not for municipal wastewater. In agriculture intensive use of nitrogen fertilizer and pesticides are a source of serious water pollution. Pesticides add to this, a problem for birds. Chemical oxygen demand [COD] pollution in water is often originating from larger livestock farms since meat production on farms has enormously increased. About half of the monitored northern China river sections do not even meet the lowest standard for water, making the water even unsuitable for irrigation. Only 8 % is grade 3, that is, the minimum standard for contact with humans !

Furthermore, there are other environmental issues such as environmental degradation in the forms of soil erosion, land degradation, deforestation and desertification, with one study [14] estimating the costs at 5 % of GDP. This compares to a cost of 8 % of Chinese GDP in 1995 for air and water pollution discussed above [15]. Hence, a staggering roughly 13 % of GDP is at stake, and this does not include the costs of CO2 emissions (which are summarized below). In a simulation up to 2020 under a 'business-as-usual' scenario, and taken into account the projected increase in income, the cost of 8 % of GDP rises to a cost of 13 % of GDP. The latter would consist of 600.000 premature deaths per year, 5.5 million cases of chronic bronchitis, more than 5 billion restricted activity days and 20 million cases of respiratory illness each year. Thus, even if human considerations would assume a lower priority, it

[13] Due to combustion of raw coal and wood for cooking and heating. By 1995, Chinese citizens had more and more access to gas for the home and, if coal was still used, with cleaner coal and more efficient briquettes.
[14] Smil (1996) as quoted in the WB (1997) study, p. 23.
[15] It should be noted that, given the still relatively low wages and costs of living in 1995 in China, the estimate of the statistical value of life is only $ 60 000 (and, in the human capital approach, even a mere $ 9000 for urban China). Nevertheless, the total costs are $ 54 bn and $ 20 bn (human capital approach). See World Bank, 1997, op. cit., p. 23. Similar damages would have costs in e.g. Europe amounting to a 20-fold to 25-fold of this amount in US $.

would still be in the Chinese interest to address these huge social and health costs as a major burden on the economy.

When it comes to GHG emissions – primarily CO2 – China in 1990 emitted about half of the US total and of the European total (equal at the time) but far less *per capita* than the US CO2 emissions per capita (only some 12 % ! [16]). But between 1990 and 1995 CO2 emissions in China went up up by nearly 300 mtC, some two- third, and reaching 800 mtC. And a baseline scenario for 2020 arrives at some 2200 mtC under plausible assumptions. If this simulation would be roughly correct, it meant in the late 1990s, that in order to keep the level of *global* CO2 emissions constant at the 1990 level [17], the rest of the world would have to *decrease their emissions by roughly one-third* merely to let the Chinese grow. This inference alone can be seen as a strong encouragement for the EU to engage with China in joint solutions, projects, Dialogues and what not to help and nudge China into a radically different path.

The 2200 mtC simulation in 2020 is a derivative of an astounding increase in coal used, jumping from some 1.3 bn tons of raw coal in 1995 to no less than 3.1 bn tons of raw coal. This must imply, when considering policy in the late 1990s, an expectation of incredible surges of SO2 emissions and of particulates by 2020, if no strategy would be applied. However, the baseline scenario already includes market-induced improvements in energy efficiency over 25 years, *without* any new strategy, primarily due to changes in economic structure. These changes result from a lesser emphasis on heavy industry, more performant equipment when replacing capital goods, the rise of (much less polluting) services in overall GDP and improvement of heating & cooking inside households given higher incomes [18]. These implied improvements ensure that, by 2020, not 10 000 mtce of coal but "only" 3300 mtce of energy use is the model outcome, most of which is coal. Interestingly, a daring simulation of 3 options for reducing GHG emissions by 2020 is presented: high energy efficiency (330 mtC less), alternative energy (i.e. low-carbon intensive fuels and renewables, with the warning that, with the state-of-the-art of 1995, these would be more costly than coal – note that coal at the time was not taxed directly or via emissions (up to 237 mtC less) and afforestation (to be undertaken aggressively for a long period, with 221 mtC less). The upshot would be that GHG emissions would, over 25 years, only slightly less than double. However, all three options are demanding and invite international aid and open trade in environmental goods as much as possible, according to the World Bank team. Thus, there is a development motive for donors but just as much a direct (commercial and climate) interest for e.g. the EU to step in and find effective ways to support if not amplify the Chinese attempts to address these environmental and climate challenges.

Altogether, the baseline around 1995 for the environment and climate is highly problematic and – given the very high growth path China is determined to continue – worrying. In terms of EU / China cooperation, still in its infancy, the divergence between the two in indicators and strategic perspective could hardly be greater.

[16] Over 30 % in the case of the EU (as the EU has much lower emission p.c.).
[17] A standard measuring rod in the UNFCCC employed by all country signatories.
[18] In the simulation, it means that input-output coefficients would alter over time leading to lower energy use

5. A bird's eye view of 25 years of EU/China SD cooperation

5.1 Introduction

The last 25 years of EU/China relations have witnessed an increasing activism in cooperation and other initiatives in environmental and climate issues. The short survey is focused on the multilateral and bilateral approaches. The multilateral approach is about China's and the EU's active participation in UN-related and other multilateral organisations or initiatives – even when the EU and China are or were not deliberately working together directly in these fora, there is presumably a common orientation, but more often than not also similar concrete obligations and detailed specifications of commitments. The bilateral approach began exactly 25 years ago in the first-ever Commission policy paper on EU/China relations [19]. A huge tail of subsequent policy papers, strategy documents, declarations and reports followed ever since. The short survey will stick to the essentials.

5.2 Multilateral policy convergence between the EU and China

China and the EU are both signatories of a range of important Multilateral Environmental Treaties (MEAs). When discussing Table 1, it was noticed that much of bilateral commitments in environment and climate in SD chapters of FTAs, in fact hinges critically on multilateral treaties and active cooperation. Even when China and the EU have no FTA, there is a lot of overlap in codified preferences of the two partners in the multilateral arena. Table 2 provides an overview of no less than 12 MEAs at stake in order to compare the multilateral environmental 'acquis', as it were, between China and the EU in 2019. For all the MEAs in Table 2 there is full formal convergence between the EU and China, in other words, in terms of strategic aims and the ensuing implementation and enforcement (where relevant) of these treaties, China and the EU are in full agreement. The detailed obligations might differ sometimes – as a function of the level of development and other factors – but the strategic convergence over a broad spectrum of environmental policy areas is very clear.

Table 2

Adhering to MEAs: convergence between the EU and China

No.	Treaty/name	Full title(s)	CH ratif.n	EU ratif.n	notes
1	CITES	(Washington) Convention on international trade in endangered species of wild fauna and flora	yes	yes	China has no 'reservations', some EU MS have a few

[19] A long term policy for China Europe relations, COM (1995) 279. There is no web link of this paper. However, it can be found in a reference volume edited by Francis Snyder (ed., 2009, pp. 340 - 369).

2	London Convention on marine pollution	(London) Convention on the prevention of marine pollution by dumping wastes and other matter (linked to IMO) 1996 Amendment to the London Convention	Yes yes	Yes yes	
3	Vienna ozone Convention	Vienna Convention for the protection of the ozone layer	yes	yes	
4	Montreal Protocol	Montreal Protocol on substances that deplete the ozone layer (specifies the concrete regulations for many substances, under the Vienna Convention, see 3 above) The Protocol has undergone nine revisions, including the Kigali Amendment on reductions of HFCs (in force 2019) by 2040 or later	Yes Yes Yes *	Yes Yes yes	China is an art. 5 party, beginning reductions later; very large *illegal* CFC-11 production detected in China in 2018 China in 2nd group of countries (85 % down in 2045)
5	Basel Convention	Basel Convention on the control of transboundary movements of hazardous wastes and their disposal BAN amendment (on a total ban of such shipments including old ships) (in force 2019)	Yes yes	Yes yes	
6	Ramsar Convention	Ramsar Convention on wetlands of international importance, esp. waterfowl habitat	yes	yes	
7	Biodiversity	Convention on Biological Diversity (CBD) **	Yes Yes	Yes Yes	

		Cartagena Protocol on biosafety (supplementary since 2003) Nagoya Protocol (or ABS) on access to generic resources and the fair and equitable sharing of benefits arising from their utilisation	yes	yes	
8	Nuclear safety	Vienna Convention on nuclear safety Joint Convention on the safety of spent fuel management and on the safety of radiactive waste management Convention on early notification of a nuclear accident Convention on assistance in the case of a nuclear accident or a radiological emergency	Yes Yes Yes yes	Yes yes yes yes	Ratified not by EU as such but by Euratom (idem) (idem) (idem)
9	Combatting desertification	(Paris) UN Convention to combat desertification in those countries experiencing serious drought and/or desertification, particularly in Africa (UNCCD)	yes	yes	China and the EU are not only signatories, but also 'partners' providing special support
10	Climate change	UNFCCC, UN Framework Convention on climate change Kyoto Protocol, under the UNFCCC	Yes Yes	Yes Yes	 As developing country in 1997, China was not an Annex 1 country i.e. had lighter and later reduction obligations

		Paris Agreement under the UNFCCC (2015)	yes	yes	effectiveness of 'Paris' hinges critically on the (high) ambitions of NDCs (nationally determined contributions)
11	Stockholm Convention	Stockholm Convention on POPs (persistent organic pollutants)	yes	yes	
12	Rotterdam Convention	Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals in international trade	yes	yes	

Notes : * By 12 July 2020 China had not yet ratified the Kigali Amendment, see https://ozone.unep.org/all-ratifications accessed on 21 July 2020

** All UN members have ratified except the US (a signatory). However, the US has initiated large implementation programmes.

One can argue that the formal convergence of a broad spectrum of treaties and their respective amendments is not so special as the majority of these agreements is ratified by an overwhelming majority of UN countries. What China does in this respect is apparently driven largely, if not entirely, by the importance of the substance of these agreements and by multilateral processes which can only be influenced to a limited degree by EU strategies, and even less by SD aspects of EU trade policy (which is relatively recent). EU's activism in a number of treaty discussions, both during negotiations and after ratification, will also focus on ensuring China's commitments where possible, but a detailed study of how diplomacy fared in each and every case is far beyond the scope of the present contribution.

It is exceedingly rare to find a specification about MEAs as rich as Table 2. The Table is helpful when assessing the multilateral environmental preferences of China and the EU. If and insofar as any future FTA with China would seek to specify references to MEAs as one element of a SD chapter, Table 2 makes immediately clear that such an overall framework for a common multilateral basis is readily available. Without a FTA, as nowadays, it is nevertheless comforting that China's and EU's positions and international commitments overlap so much that the term 'convergence' seems fully justified. However, some of these treaties have pathways of several decades and stretch over numerous items (or 'substances' or other elements) that some actual differences may remain relevant, at least for a while.

When looking at the same MEAs for the EU and China, it is easy to forget that China still enjoyed developing country status in the 1990s and the early 2000s. Thus, although both

the EU and China may have ratified the same treaty, the factual obligations at a certain moment in time might differ significantly. One example is offered by the Kyoto Protocol. China became a leading user of the CDM, the Clean Development Mechanism of the Kyoto Protocol [20], resulting in efficient technology being installed in China paid by EU companies or EU countries stuck with a too high emission level at a certain point in time (see Box 2 in 5.4). Recently, the EU and China have worked closely together in the run-up of the Paris Agreement on climate, which is significant and relevant for decades ahead. Testing how 'deep' these Paris commitments really are was attempted in Katowice and in Madrid. The provisional conclusion is that – when it comes to details of implementation and speed of adjustment – China is more prudent or possibly less credible than the EU, for now. Yet there are still many years to go. But also the EU faces very major challenges in climate strategy and the new Green Deal shows how ambitious it is to be consistent with the full implications of a net-zero-carbon European economy and society (by 2050).

5.3 Bilateral dialogues and cooperation on sustainable development, the early days

Already in 1994, when a general EU/China perspective had yet to be formulated, the EU and China began an energy Dialogue. Also before the 1995 Commission paper (note 19) Member States had already begun funding SD-inspired projects in China, usually from a development perspective. There seems to be little systematic knowledge about this episode. The 1995 COM paper mentions the emergence of a working group (what later would become a policy Dialogue) in the following quote : "The environmental challenge faced by a rapidly developing China has been recognized by the Chinese government in its 'Agenda21' follow-up programme of the [1992] Rio summit , with its accompanying list of specific projects leading to sustainable development. The problems faced by China in the environmental field are partly systemic – a low awareness of the long-term consequences of inaction - , partly technological, and partly that China does not believe that it can afford the costs of high environmental standards. Of critical importance is the need to integrate environmental considerations into other areas of policy, such as economic planning. A new working group has been set up to discuss how the EU can best help Chinese efforts. We need to identify a coherent European contribution in a field where there is multiplicity of signals from the Chinese side." (op. cit., pp. 352/3) The quote shows clearly that the EU intention is borne from development considerations, with China in a donor position. There is no suggestion yet of a genuine common interest or an EU-specific interest.

It would still be another 2 years before the European Commission would publish an ASEM-related paper on environment [21], laying the basis for a proposal to enhance the working group between the EU and China to a Dialogue on 'environment and sustainable development' in the newly framed EU/China partnership of 1998 [22]. For China the Commission proposes to help China to "integrate environmental priorities – such as the prevention of industrial pollution and greenhouse gas emissions, and the conservation of biological diversity – further into national economic policy processes and into development

[20] One of the 'flexibilities' of the Protocol.
[21] COM(1997)490 of 13 October 1997, Europe Asia cooperation in the field of environment
[22] In COM(1998)181 of 25 March 1998, Building a comprehensive partnership with China

schemes at regional and local levels. Where desirable, and in line with the Chinese objective of reducing poverty alleviation, projects should be integrated together." A similar Commission line is followed for energy, helped by the existing energy dialogue. The Commission had also produced a Communication on a Europe-Asia cooperation strategy for energy (again, an ASEM type paper). It says that the EU should help China to develop efficient and clean industries and also establish a presence in its potentially lucrative market for green technology. Top priorities include energy efficiency, developing clean coal technologies, alternative energy sources, notably natural gas. The EU should seek to develop synergies with international financing institutions. The Commission advocates that the EIB (especially for energy) comes in to strengthen funding and expertise. The first conference on EU/China Energy cooperation was held in 1997 and a second one was to follow in 1998.

The 2000 COM implementation report [23] of the new EU/China Partnership is interesting on all the latest of the nearing WTO membership of China, but disappointing about environmental issues. There is talk about a 2 yrs programme (of SEPA?) since 1998 called Programme on Economic Planning and Environmental Protection, supported by the EU in a number of concrete ways, but little detail. The COM paper explicitly refers to the 10th Five Year Plan of China (2001-2005), with a novel policy of sustainable development, in which a great emphasis seems to have been laid on the development of an environmental industry sector, where the EU sees opportunities.

The next implementation report [COM (2001) 265 of 15 May 2001] reflects deepening and widening of cooperation in environment. The bilateral environmental WG is reviewed and an advocacy is made for a 'substantial and separate policy dialogue on environmental issues of mutual interest' with SEPA. Also to promote common interests in the framework of MEAs. Assist China in a range of areas: sustainable forest management, sustainable land-use, land planning and management, water resource management, sustainable energy production & marketing, air pollution and measures to combat climate change. Moreover, to develop cooperation projects on a range of aspects : 7 in total, very broad altogether. Specifically on energy, apart from the 4th EU/China Energy cooperation conference, a new policy dialogue is proposed and a project on how to assist (knowledge transfer to) China in reducing the environmental impact of its energy production and consumption.

Two years later the Commission [24] publishes 'A maturing partnership – shared interests and challenges in EU/China relations' in which a 'strategic partnership' was proposed. This proposal was made in the knowledge that China was to publish its own EU strategy paper in October. The EU strategy paper calls for 'strengthening existing policy dialogues on environment and energy, and complement them by implementing planned cooperation projects on environmental capacity-building and sustainable development. Through the Commission's participation in the China Council for International Cooperation on Environment and Development [CCICED], [it can] help identify priorities for future cooperation in this area'. A telling quote for the purpose of the present paper, a little further, reads that 'with the current shift … away from traditional development projects

[23] See COM (2000)552 of 8 September 2000
[24] See COM (2003) 533 of 10 September 2003

towards *sectoral interventions which are increasingly aligned with EU policies*, a greater degree of involvement of line ministries is required' [*emphasis added*]. During the early days of bilateral SD cooperation, this is a rare admission that the bilateral approach of the EU is shifting from a development perspective towards greater policy or strategic alignment.

In the Chinese 2003 EU strategy paper [25] there is a strong section on environment, quoted here in full : "China-EU communication and cooperation in environmental protection should be stimulated and a mechanism of dialogue between the Chinese and EU environmental ministers launched. Framework documents on environmental cooperation should be formulated and discussions held on the establishment of information network on environmental cooperation. Bilateral cooperation should be strengthened on such issues as environmental legislation and management, climate change, bio-diversity protection, bio-safety management, and trade and environment. Efforts should be made to jointly promote the implementation of the follow-up actions of the World Summit on Sustainable Development in Johannesburg. Non-governmental environmental protection organisations are encouraged to develop mutual exchanges. EU enterprises are encouraged to gain more access to Chinese environmental protection market through fair competition". The shorter section on energy cooperation is linked and reads as follows: "China-EU cooperation will be expanded in such fields as energy structure, clean energy, renewable energy, and energy efficiency and saving. Exchanges on energy development policies will be promoted. Efforts will be made to ensure a successful, EU-China energy conference. The energy WG mechanism will be strengthened. Training on energy technology and cooperation in demonstration projects will be boosted to promote application and transfer of technology".

Shortly after these two strategy papers from both sides, the EU/China summit of 2003 relabeled the strategic partnership into a 'strategic and comprehensive partnership'. PM Wen Jiabao confirmed these heydays in the relationship when calling, in a series of speeches in 2004, for 'vigorously developing' this EU /China comprehensive strategic partnership [26].

In short, the EU and China were clearly and actively engaged in bilateral efforts of an often practical nature to create or bolster capacity in energy and environment, besides almost permanent diplomatic efforts of the two partners to approximate their positions on a range of SD-related issues. The approach also changed from an ad-hoc or patchwork one into a more solid and long-run bilateral relationship – the strategic and comprehensive partnership – which is considered as essential by both, even when in some episodes political irritations arose or the summit would be cancelled. In such troubled episodes, the practical SD-related cooperation remained untouched or even intensified.

5.4 Bilateral cooperation on sustainable development: 2003 – 2019

Although drawing a line between the 'early days' and EU-China SD-related cooperation after mid-2003 is always somewhat arbitrary, the solemn agreement on the political binding of a "strategic and comprehensive partnership" between China and the EU is a sound reason to do so. This partnership has withstood tensions of 'high politics' and embarrassment during

[25] China's EU policy paper, October 2003, in Snyder, 2009, op. cit., pp. 490 – 498.
[26] See Snyder, 2009, op. cit. for his speeches in Brussels, Helsinki, Hanoi and The Hague

the economic and financial crisis of 2009/10. It also has proven to be serious in terms of permanent activity, debates, cooperation and technical programmes. Of course, the present paper cannot and should not go into the numerous details of this relationship, but an attempt will be made to help the reader in appreciating the nature, diversity and intensity of the SD-related elements of the partnership. The critical question remains whether an active and lively partnership does indeed bring about or at least stimulate greater convergence in SD between China and the EU. Conveying what the EU/China partnership in SD-related [27] policies has generated, will be done with the help of Table 3 and Table 4 as well as Boxes 1 and 2. Table 3 simply lists the activities and other highlights in SD over the last 17 years or so, without ensuring that it is exhaustive [28]. Table 4 provides some details of one – indeed major – activity : the 2016-2020 EU-China Roadmap on energy cooperation which overlaps partly with environment and climate.

Table 3

EU-China cooperation on energy/environment/climate: 2003 - 2019

[7 on energy, 10 on environment/climate, 2 sectoral]

(1st) year	Official title	Recent activity	annotation
energy			
1994	EU-China Energy Dialogue	2017	Now part of summit
2005	MoU EU-China Dialogue on energy and transport strategies		(probably split later)
2012	EU-China Joint Statement for enhanced Cooperation on electricity markets		(later submerged in 2016 Roadmap)
2013	EU-China Joint declaration on Energy Security		
2013	EU-China 2020 Strategic Agenda for Cooperation	For 6 years	Very wide spectrum of activities, incl. energy, environment & climate
2016	EU-China Roadmap on energy cooperation	2019	A wide and ambitious agenda on energy supply, energy demand and cross-cutting (see Table 4)

[27] For present purposes, only the environment & climate aspects of SD, not the social elements.
[28] In one sense, it cannot be exhaustive because some initiatives led to bilateral projects which in turn developed sub-projects via delegated management (with several dozens of activities). See also note 29.

2019	Joint Statement on the implementation of the EU-China cooperation on Energy	9 April	Plus annex, interim report
Environment & climate			
2003	EU-China ministerial Dialogue on environmental policy	6th Dialogue, in 2016	
2005	EU-China Joint Statement on climate change (including climate partnership) Established a. China-EU Action Plan on Clean Coal B China-EU Action Plan on industrial cooperation on energy efficiency and renewable energy	Permanent see below	
2006	EU-China CDM Facilitation project		Under the EU/China climate partnership
2010	Joint Statement on Dialogue and cooperation on climate change;		Under the EU/China climate partnership of 2005 (and even established a Climate Change hotline)
2011	EU-China Environmental Governance programme 2011-2015		
2012	EU-China Environmental Sustainability Programme		Supports the attainment of targets in the China 12th five -year Development Plan 2010-2015
2015	EU-China Joint Statement on climate change		Preparing the COP of Paris (Dec 2015)
2018	Joint leaders Statement on climate change and clean energy		
2018	MoU to enhance cooperation on emissions trading	July	Detailed technical support in testing phase of Chinese ETS
2019	Joint statement on the implementation of the EU-China cooperation on energy		Interim report in annex
Forestry & water			
2009	BCM (Bilateral Cooperation mechanism) on Forests and against illegal logging	BCM Workplan	

		in 2018 (8th)	
2010	China-EU water Platform (high level Dialogue)	Nov. 2019, 7th	

Table 3 shows clearly that the EU and China have been active and recently even very active on SD-related issues and technical cooperation over more than one and a half decades [29]. This was found at all levels from the EU-China summit to technical WGs and direct cooperation in China with officials and business where desirable (e.g. for CDM and later for emission trading). The cooperation has been linked to the five year plans of China [30] and to cooperation under international treaties. One can therefore maintain that the partners have undertaken, and on a permanent basis, an intense mode of cooperation with a view to pursue convergence in SD-related strategies, as much as possible. By way of illustration, Box 1 elaborates on the 2005 Climate Partnership which began quite ambitiously and has retained its activity level ever since.

Box 1

The EU/China Partnership on Climate Change, 2005

The 2005 EU/China Partnership on Climate Change is a short but rich document, with a number of off-springs which highlight its scope and ambition. As noted in some detail in section 5.3, it was preceded by various joint activities on climate and environment in the period 1998-2003 (about which little has been published) emerging from the general 'strategic partnership' started in 1998. In 2003 the ministerial Dialogue on environmental policy was initiated and prepared the ground for this pathbreaking Climate Partnership. Textually, it consists of two documents. The Joint Declaration on Climate Change (of 2 September 2005) is annexed to a background Memo [31] explaining the partnership and background. It confirms two China-EU Actions Plans, one on Clean Coal and one on Energy Efficiency and Renewables Energies which had already been agreed in March 2005. More precisely, one concrete cooperation goal is to develop and demonstrate, in China and the EU, advanced 'zero-emissions' coal technology on the basis of carbon capture and storage (CCS) by 2020. Other specific technical cooperation is about methane recovery, hydrogen and power transmission. Moreover, the Partnership also reinforces EU-China cooperation on the Clean Development Mechanism (CDM), one of the 'flexibilities' of the Kyoto Protocol. It foresees a Dialogue on the further development of CDM post-2012 (the third stage of the ETS). The CDM issue is so important between the EU and China that it is

[29] It should be realized that it is not exhaustive. One major example is the EU-China Trade Project II from 2010 to 2016 which aimed to support the Chinese government trade reform and sustainable development agenda. Focussing mainly on customs and regulatory issues (including technical standards as well as SPS), it also dealt with sustainable development under 'cross-cutting issues'. One amongst several of the 400 activities in this massive project is the EU China Low Carbon Economy platform ; also Green Smart Cities was dealt with. See www.euctp.org/index.php/en/project-background.html and its newsletters.

[30] As noted, for the 12th plan explicitly. EU experts are also members of the CCICED, an advisory body appointed by the Chinese government. A recent report (2019) by the CCICED specifies the recommendations for the 14th Plan (2020-2025) : www.iisd.org/sites/default/files/publications/cciced/agm/cciced-progress-report-2019-en.pdf

[31] MEMO/05/209 of 2 Sept 2005, www.ec.europa.eu/clima/sites/files/international/cooperation/clima/docs/joint_deckaraion_ch_eu_en.pdf

analysed more in detail in Box 2. Finally, five research streams will be set up e.g. on vulnerabilities to climate change, on economic impacts of climate change in China, on awareness and on adaptation. Later on the Climate Partnership was intensified with a range of new activities. It was reconfirmed with a Joint Statement on Dialogue and Cooperation on Climate Change in April 2010 and yet another Joint Declaration on Climate Change in June 2015 '.. building on a decade of successful cooperation' preparing the Paris Agreement and agreeing on a host of ongoing and new activities.

A very concrete and market-based off-spring of the Climate Partnership is the promotion and facilitation of business projects in China under CDM. Whereas the rules and registration for CDM projects had been set up by the UNFCCC after Kyoto, China and EU investors have quickly dominated this form of making 'green' finance available. Box 2 elaborates.

Box 2

China and the EU: joint dominance of worldwide CDM

The Clean Development Mechanism (CDM) is one of the two 'flexibilities' of the Kyoto Protocol – the other is Joint Implementation. CDM is a market mechanism helping developing countries, including China at the time, to finance climate mitigation measures in companies, based on explicit and carefully organized requests from developed (i.e. Annex 1) countries which have a problem honouring their CO2 mitigation commitments. In other words, such Annex 1 countries are allowed to purchase CO2 reductions in developing countries. These 'additional' CO2 reductions are brought about typically by investments from Annex 1 countries' companies in these developing countries, in projects yielding CO2 reduction. Such reductions have a price in a kind of world carbon market, with rules imposed by the Executive CDM Board of the UNFCCC. These CERs (Certified Emission Reductions) are supposedly 'additional' to what these developing countries would otherwise have done anyway. This would kill two birds : developing countries reduce CO2 and obtain technologies to do so, which they would otherwise have great difficulty accomplishing without harming economic growth, whilst developed countries can honour their climate commitments, though not entirely at home (but still equally useful to fight climate change as this is a global problem). The EU/China Partnership on Climate Change aimed to encourage EU and Chinese companies to engage in CDM project cooperation (see Box 1).

China was a little slow in starting CDM projects as it designed a national system in which such requests (for investment eligible for later CDM credits) were carefully channeled above a floor price for recognized reductions and subjected to scrutiny of technology transfer (shown by PDDs, project design documents, indicating recognized reductions and the quality of technology transfer [32], for example) and other Chinese interests. The floor price was kept at € 8 for years and was only lowered to € 7 in 2012 [33]. China also imposed a levy on CER revenues and built up a CDM Fund with the revenue, amounting to $ 1 billion by mid-2012 with a view to fund climate-friendly projects in China. The levy varied enormously between 2 % for renewable energy and energy efficiency to 30 % for NO2

[32] Technology transfer may have been an implicit goal in CDM but it was neither an official condition nor properly monitored. One reason for the lack of monitoring is the wide variety of definitions of technology transfer.

[33] Note that carbon for CDM was priced in the range of € 5 - € 13 in the period up to 2012.

destruction projects to as high as 65 % applied to HFC (fluorcarbons) destruction projects as the climate gains here are probably zero. It should also be mentioned that CDM in China was not open to foreign investors, except in Chinese dominated joint ventures. Once in 2005 China took off with CDM, it soon became a great success, at least in numbers of projects and credits ensured. Even more so bilaterally between the EU and China. By April 2012 China had approved 3935 projects. In all the years since 2007 to 2012 China ensured rougly 50 % of the world CDM market in terms of projects, whilst the EU (due to the ETS and its carbon market) exercised roughly half of the world demand for CERs and the EU-China commercial interaction was intense. In China the bulk of CDM projects were executed by SOEs, especially those of larger size. On the demand side, multinational companies were critical but, since China did not allow full ownership of companies in the relevant sectors, the companies heavily emphasized the export to China of equipment rather than the genuine transfer of the technology. In the top-20 list of buyers (worldwide, not only for China), one find aggregators like EcoSecurities, energy generators (f.i. EDF Trading), governments (f.i. Danish ministry of climate) and funds (f.i. Kommunalkredit) [34]. Since the CDM volumes exceeded all expectations, this represented a double success: a greater climate mitigation than expected and a very successful and practical (because market based) EU-China cooperation for fighting climate change, with a fairly balanced economic and sustainability interest between both sides.

There are many studies on CDM and its effects in China. Highlighting just a few features, the CO2 reduction has clearly been non-trivial and a host of other benefits [35] have been identified such as innovative technologies and financial transfers to developing countries, finding untapped mitigation opportunities, selective contributions to technology transfer and the creation of knowledge, institutions and infrastructure that can facilitate further action on climate change. In addition some projects provided significant co-benefits as e.g. identified by Rive & Aunan (2010) for SO2, PM 2.5 and NOx (one-third of the monetized CO2 benefits). However, the drawbacks became ever more apparent. As Cames et al (2016) show in a wide-ranging survey, the elusiveness of additionality is a major problem and so is the uncertainty about emission reductions in actual practice for several reasons. Three problematic type of projects included HFC destruction and N20 credits (industrial gases, these are end-of-pipe technologies, hence not actually lowering the output of these gases, only the emissions), dam construction and super-critical coal-fired power plants. After a learning period, it seems that the industrial gas business discovered how to earn windfall profits by simply augmenting industrial gases production which can then be destroyed financed by CDM. It has been argued that – in so doing – the gases themselves became more profitable than using them for refrigerants or coatings. Thus, the CDM activity exploded: in the year 2008/9 84 % of EU ETS carbon credits were used to finance projects in India and China that destroyed the pollutants [36]. Of course, this was not only a China problem. The sheer scale can be appreciated by the CO2 equivalent of all CDM projects in the world in 2010: all projects other than industrial gases [37] reduced some 1.2 million ton whereas the industrial gases (HFC, N20 and PFC) claimed a CO2 reduction

[34] See Carbon Limits (2011)

[35] Quoted from a study commissioned by DG Clima of the European Commission on 'additionality' by Cames et al (2016), p. 17

[36] EurActiv in 2012, quoting inter alia from Sandbag, a green think-tank, see www.euractiv.com/section/climate-environment/news/europe-votes-to-ban-industrial-gases-credits/

[37] Biomass, geothermal, hydro, solar, tidal, wind, cement, and transport.

equivalent of 1.4 million ton [38]. As a result, the EU terminated CDM for such projects in April 2013.
Both for China and the EU, therefore, the success of this bilateral cooperation was rather short-lived. China intended to move beyond CDM by eventually setting up its own carbon market (ETS Chinese style, although this turned out to take much longer than originally expected) whereas the EU became increasingly unhappy with the factual results of CDM, whether in China or elsewhere. In Europe CDM became more discredited because of several of its features (which were mainly UN-wide, not of EU origin) and because it was felt that the urgency of climate mitigation prompted an overhaul of the obligations of developing countries as well. Indeed, this would happen in 2015 in Paris where China and the EU closely cooperated and helped realize a long-term framework for GHG reduction everywhere, with obligations and time lines (2050) and without the distinction of Annex 1 and non-Annex 1 countries.

In how far the great EU/China cooperation activity has really worked in terms of outcome is another matter [39]. In section 6 a modest and non-rigorous attempt is made to investigate what can be deduced from three successive five-year plans of China between 2000 and 2020, based on indicators, and a series of later policies on a range of environmental and climate aspects.

Before doing so, it is interesting to 'zoom in' on one example of recent EU-China (energy) cooperation, so as to appreciate the intensity of such cooperation. Table 4 summarizes the EU/China Roadmap on energy cooperation of 2016 [40], for this purpose. By means of this Roadmap "China and the EU have a mutual interest and role to promote low-carbon development, protect the environment, address climate change and encourage energy development". The Roadmap distinguishes energy supply, energy demand and cross-cutting issues. Our summary has simplified the Roadmap somewhat.

Table 4

Summary of EU/China Roadmap on energy cooperation 2016-2020

Energy supply	Energy demand	Cross-cutting
renewables	Management methods to keep the energy system in balance	Energy regulation and pricing, build a cooperation platform on energy regulation
Trade & investment, reducing costs	Calculation methods for the appropriate energy mix	Coordination in regulatory policies, both by

[38] Data from the UNFCCC, as in Chatterjee (2011) in a paper wriiten for DG Clima, table 7, p. 14
[39] For a sceptical view, see Farnell & Crookes (2016) but their environmental cases are only few and based on opinions of Commission officials, without specifics. Since reporting is weak and uneven, it is hard to assess.
[40] https://ec.europa.eu/energy/sites/ener/files/documents/FINAL_EU_CHINA_ENERGY_ROADMAP_EN.pdf

		harmonising regulatory grid policies and transparent regulation of oil and gas pipeline infrastructure
Develop distributed generation and CHP (combined heat & power)	Electrical energy demand side management policies ; grid structure design ; cross-border & regional power power transmission grid systems and (more) renewable energy	Share experiences on the reform of energy pricing and support policies; for e.g. renewable energy and natural gas markets
Expand the bio-gas sector	Energy efficiency in 3 applications: appliances, work towards harmonisation of energy labels of appliances/buildings, energy conservation standards for consumer goods, incl. mutual recognition of schemes	Energy and the environment (more) market mechanisms for environmental protection (market for green goods, and inciting cleaner production) - Include energy efficiency in environmental guidelines - Improve trade & investment conditions in energy
Power grids distributed networks and smart grids	Other cooperation on energy efficiency: increase business cooperation in eco-design and circular economy ; market oriented EPC (=energy performance system)	Engage in international energy institutions : support China's involvement ; cooperate in the framework of the Energy Charter Treaty
Fossil fuels, joint platform for supply disruption		
Efficient electricity generation from clean coal and gas		
Nuclear safety		

The Roadmap is quite broad and – in some areas - goes far e.g. 'harmonising grid policies' and cooperation in the framework of 'the Energy Charter Treaty' besides ambitious intentions in energy efficiency with respect to appliances and mutual recognition. Also the improvement of trade and investment conditions in energy might be seen as a move in the right direction.

6. What convergence how far? China's and EU's SD status by indicators

This section provides indicator-based evidence on China's environmental protection and GHGs in the decades following the late 1990s. This will be done in three successive subsections: on 15 years of Chinese environmental planning and its results, on China's emerging 'green growth' since around 2015 and on the most recent facts (indicators) on environment and climate at the outset of what president Xi Jinping has called the 'ecological civilization' in a 'beautiful China'. In Box 4 a short summary of two Sustainable Impact Assessments on EU/China trade policy initiatives is provided, as they give an independent but EU-flavoured perspective on the same question. In section 6.4 there is an attempt to answer the first research question.

6.1. Fifteen years of Chinese planning on sustainable growth

6.1.1. The 10th Environmental Plan 2000 - 2005

From the 10th Chinese Five-Years Environmental Plan 2001 – 2005 (accompanying the overall Development Plan) onwards, China is beginning to be more serious in addressing damaging environmental and climate trends and structures. But it is clearly struggling as a score list in Table 5 shows. Out of 14 major targets [all *non*-CO2 related] of the 10th Plan, 4 were plain failures, but there were also 5 great successes, with other targets roughly met.

Table 5

10th Five-Year Plan, Environmental Protection: achievements 2001-2005

indicator	**Status 2000**	**Target in 2005**	**Realisation 2005**	**Assessment (JP)**
SO2 emissions	1995	1800	2549	Failure/worsening
Smoke & dust	1165	1100	1183	Failure/worsening
Indust. dust	1092	900	911	Roughly on target
COD (waste)	1445	1300	1414	Improvement but still above target
Industrial solid waste	3186	2900	1665	Great success
Re-use rate of industr. water		60 %	75 %	Great success
Industr. SO2	1613	1450	2168	Failure/worsening
Industrial smoke & dust	953	850	949	failure
Ind. COD	705	650	555	Great success
Use rate of industrial solid waste	51.8 %	50 %	56.1 %	success
Air quality of cities (meeting	36.5 %	50 %	54 %	

grade II standards)				
Urban sewerage treatment rate	34.3 %	45 %	52 %	Great success
Green coverage of urban built areas	28.1 %	35 %	33 %	Near-target
% of nature reserves	9.9 %	13 %	15 %	Great success

Note: where absolute figures (instead of %) are shown, one unit refers to 10 000 ton.

In particular, SO2 emissions are worrying given their obstinate upward trend from already much too high levels. In the 11th Plan the lower target is 2295 [x 10 000 t], with a satisfactory realisation of 2268 in 2010, projected to go down to 2086 in 2015. Still, the 2015 target level is roughly 100 *above* the 2000 level, showing how stubborn SO2 emissions are in China. Hence, the strong emphasis in the 12th Five Year Plan to install desulphurization (and indeed also denitrification) of a broad range of large industries. As Box 2 suggests this has often happened via CDM.

6.1.2 The 11th Five Years Environmental Plan 2005 - 2010

The 11 th Five Year Plan for Environmental Protection (2006 – 2010) is a collection of highly targeted projects and specific programmes, including investment, detailed inspections, closure of numerous facilities and tougher regulations. There is much attention for local pollution issues, in particular waste reduction and greater capacity to treat industrial and municipal waste, as well as air and water quality. However, the 11 th Plan is hard to come to grips with as much of the Plan is qualitative, with smart labels (f.i. 2000 'environment-beautiful towns' will be created; Blue Sea initiative in the Bohai Sea ; promote the development of 'Socialist new countryside' !) and preciously few hard targets. It contains a list of 9 'key environmental protection projects' [41], insists on accelerating economic restructuring (with an early emphasis on the circular economy), lists no less than 10 priority areas for environmental Science & Technology innovations and actively promotes the environmental protection industry with another 10 priority areas (ranging from water pollution prevention and control technologies and equipment to 'special reagent and materials' such as membrane materials, etc.). Nowhere is there a table comparable to Table 5 above. A reduced version is provided and this is reproduced in Table 6 below.

[41] Four of these key projects do have hard targets : new addition of 45 million ton capacity for urban waste treatments; additional 24000 ton (per day) of urban garbage disposal ; flue gas desulpherisation capacity for coal fired power plants 'will reach 213 mn kW'; and the 2000 'environment-beautifully' towns.

Table 6

Selected environmental protection indicators during the 11th Plan

no	Indicator in words	Status 2005	Target 2010	change
1	(waste) COD (x 10 000 ton)	1414	1270	-10 %
2	SO2 (x 10 000 ton)	2549	2295	-10 %
3	% of monitored water sections failing to meet Grade V (nat. water standard, V is the worst)	26.1	< 22	-4.1 perc. points
4	% of 7 big waters of China meeting grade II of surface water standard	41	>43	2 perc. points
5	No of days (above 292) when urban air quality exceeds grade II of national air quality standard *	69.4	75	5.6 perc. points

Note : indicator 5 is hard to understand : the 2010 target implies that 75 days should come on top of 292 days of (already grade II) clean skies, but this leads to 367 days a year.

On this admittedly limited score, the 11th Plan is not impressive. Remember first that Table 5 showed that both COD and SO2 *realisation* indicators in 2005 were respectively above and far above the targets set for 2005. For COD in 2010 the target is only just below the former 2005 target under the 10th Plan. For SO2 the 2010 target is still much *above* the realisation in 2000 and even further above the original target in 2005. It seems that economic growth at the time dominated the pursuit of environmental objectives. Indicators 3 and 4 are in the right direction but the pace is slow at best. The reader is also reminded that these 'environmental' plans do not incorporate any policy or targets on climate strategy or GHGs, not even CO2. These are the days that China insisted on differentiated obligations with respect to climate based on the historically accumulated CO2 (or GHGs more generally) originating from developed countries. This idea found its expression in the distinction between Annex 1 and non-Annex 1 (like China) countries under the Kyoto Protocol.

The complexity of comprehending the Plan is increased by the fact that the *overall* 11th Plan ['for National Economic and Social Development'] [42] also comprises a series of instructions about environment and more on the link with the overall economy. One critical indicator is an increase of energy efficiency (defined as energy consumption per unit of GDP) by 20 %. This text is often more straightforward as the following quote (p. 5) illustrates: "Still main difficulties and problems exist in our advancing road. …the productive force is not developed and some endured deep-level development-restricting contradicts still exists: farmland, fresh water, energy and important mineral resources are relatively insufficient, ecological environment is relatively vulnerable, economic structure is irrational, the task to resolve the three dimensial rural issues is very arduous, employment pressure is still great, the

[42] See http://www.gov.cn/english/special/115y_index.htm published by the State Council in 2006.

independent scientific and technological innovation ability is not strong and system and mechanism obstruction affecting the development needs urgent resolution. In the rapid development of the Tenth Five Year Plan period, some new major problems emerged : uncoordinated investment and consumption relationship, blind expansion of some industries, superfluous capacity, slow transformation of economic growth mode, excessive energy resource consumption, aggravated environmental pollution, continuous expansion of the development gap between urban and rural areas and between regions and income difference between some social members and backward development of social causes; …[*it ends with the observation of* , JP] ..the co-existence of strategic opportunity and contradiction..". These frank observations clarify well what the enormous challenges were for China at the time and the realisation that these developments were utterly unsustainable.

In the energy chapter (12), coal is still treated in a lighthearted way insofar as the climate is concerned. It explicitly confirms having "..coal as the basis to realize pluralistic development". The short passage on 'orderly' developing coal calls to "strengthen coal resource exploration… and enhance coal recovery " [43]. The concerns expressed are about the safety of mines and miners (fully justified, was a major problem in China), hence, the closure of 'coal mines without the safe production conditions and with resource and environmental destruction'. No word here about SO2 in and near cities and industrial centres, nor about CO2 when using coal. However, it is followed by a section called "all-out develop renewable energy resources". Coal is still the linchpin of industrial development and heating in the China of 2006 – 2010 and otherwise the solution is looked for in technology and renewables, not in reducing coal exploration nor in taxing coal or the emission arising from using coal.

6.1.3 The 12th Five Years Environmental Plan 2010 - 2015

The tone, detail and ambition of the 12th Five Years Plan (2011-2015) are quite different. The tone is often that of plain instructions or commands or indeed prohibitions. The scope and details of the 12th Five Years Plan for Environmental Protection [44] are impressive. Unlike previous Plans, practically everything is covered and the number of intentions is huge. Although 'all the targets and key tasks of environmental protection identified in the 11th Plan have been achieved', the tone of the 12th Plan is alarming throughout, illustrated best by the introductory page 2 and 3 with a lengthy list of frank admissions of environmental shortcomings and deficiencies as well as deep concerns about China's environmental degradation. The Plan begins with a comparison of 'major' indicators between the 11th and the 12th Plans. Regrettably, Table 7 is not fully comparable with Tables 5 and 6.

Table 7

12th Five year Plan, 2011 – 2015, 'major' environmental indicators

no	Environmental indicator	2010	2015	change
1	COD [x 10 000 ton]	2552	2348	-8 %

[43] In a complex sentence with many aspects placed together, it also invites to 'reduce impact of coal mining on ecological environment', without any further detail.

[44] Guofa 2011 , 42

2	SO2 [x 10 000 ton]	2268	2086	-10 %
3	% of monitored water sections <u>failing</u> to meet (the lowest) Grade V standard	17.7	< 15	-2.7 perc. Point
	% of surface water of the 7 big water systems meeting Grade III standard	55	>60	5 perc. points
4	% of cities (at or above prefecture level) meeting Grade II national air quality standard	72	>80	8 perc. points

Notes : (i) the COD indicator here is not comparable with that in Tables 5 and 6 – above, the amount discharged is an addition from industrial, urban domestic and agricultural sources ; in Table 5 the industrial and domestic-urban waste are split and agricultural COD is not included ; in Table 6 the only indicator of COD in waste is of domestic-urban origin; (ii) in the 12th Plan (but not before), targets for ammonia nitrogen and for NOx are included, both expected to decline by 2015 by 10 %; (iii) the indicators 3 and 4, above, are also not fully comparable with indicators before because the no. of assessment factors will go up from 12 to 21 over the Plan period.

Given the problems with the COD indicator (see Notes), it is somewhat speculative to assess the progress. In Table 5, one observes little progress in urban-domestic COD but yet a major improvement in industrial COD. From the respective Plans it can be understood that agricultural COD has grown (in particular, due to large-scale livestock farms) into a major issue but without disposing of hard data. Assuming that the reduction of industrial COD has continued (as is suggested in texts), the agricultural COD can be 'guesstimated' as roughly 800 – 900 [x 10 000 ton] and it is likely to be costly to reduce this significantly (the 12th Plan proposes a better distribution of such farms and far more solid waste and sewage storage and treatment facilities) . As far as SO2 is concerned, after the failure in 2005 (see Table 5), the 11th Plan target was realised (with a reduction of 11 %) but the 12th Plan expects only an 8 % reduction – this is probably due to the continued increase of the use of coal in China. Coal remains 'shielded' from genuine cuts. This coal addiction has to do with low prices for coal (as negative externalities are not priced in) but increasingly also with the rapidly rising Chinese imports of energy. Shielding coal requires strategic choices comprising (a) structural change (e.g. phasing out outdated production capacity of iron & steel, non-ferrous metals, building materials, chemicals, paper making and dying & tannery), (b) a stronger move to install desulperization and denitrification in the coal sector and an encouragement elsewhere, (c) dust removal facilities in coal-fueled power plants and e.g steel, and (d) a great boost of the renewables sector. The Plan is extremely rich in other aspects that cannot be dealt with here but it is interesting to note e.g. the attention for biodiversity, the more systematic 'whole-process management' of environmental risk, the dramatic clean-up (and liability for) heavy-metals old sites, curbing the high incidence of heavy metals pollution accidents, the strengthening of the legal system and of environment economic policies, and finally the strong encouragement of the environmental protection industry. There is also a short section on international environmental cooperation, re-emphasizing the implementation of international Conventions but otherwise noting solely how risky products

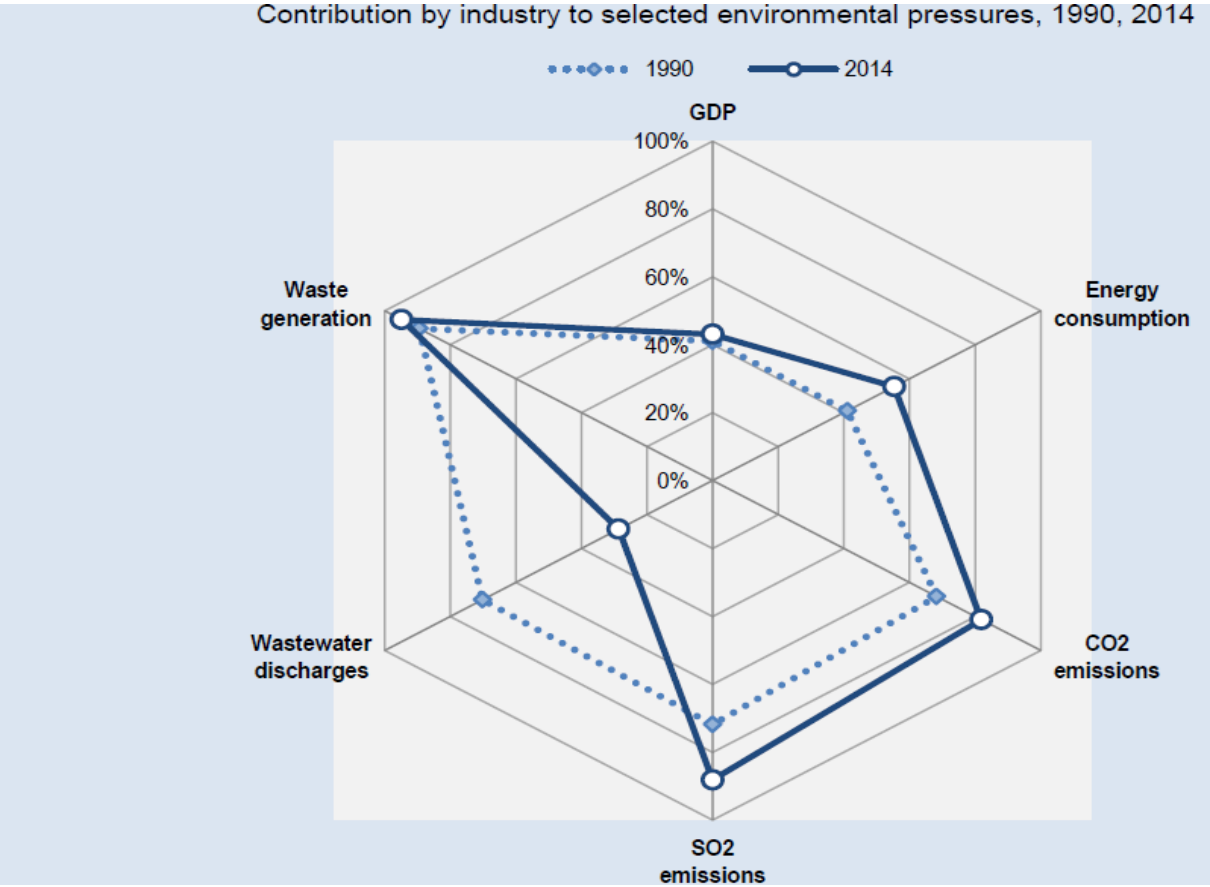
will be stopped from coming in, without any detail on a vision underlying cooperation. Altogether, it would seem to be appropriate to conclude that the 12th Plan signifies a turning point, at least in planning.

6.2 Emerging 'green growth' over two decades ?

In order to obtain an overall view over decades and a series of Five-Year Plans and to be better capable to come to a succinct assessment, the following relies on a recent OECD study produced in cooperation with the DRC (Development Research Centre) of the State Council of China[45]. It facilitates a further reliance on indicators and helps to assume an analytical perspective, unlike the Plans which tend to sum up numerous measures and policy suggestions for operational purposes.

Figure 2

Environmental profile of Chinese industry



Note : source Linster & Yang (2018, p. 13)

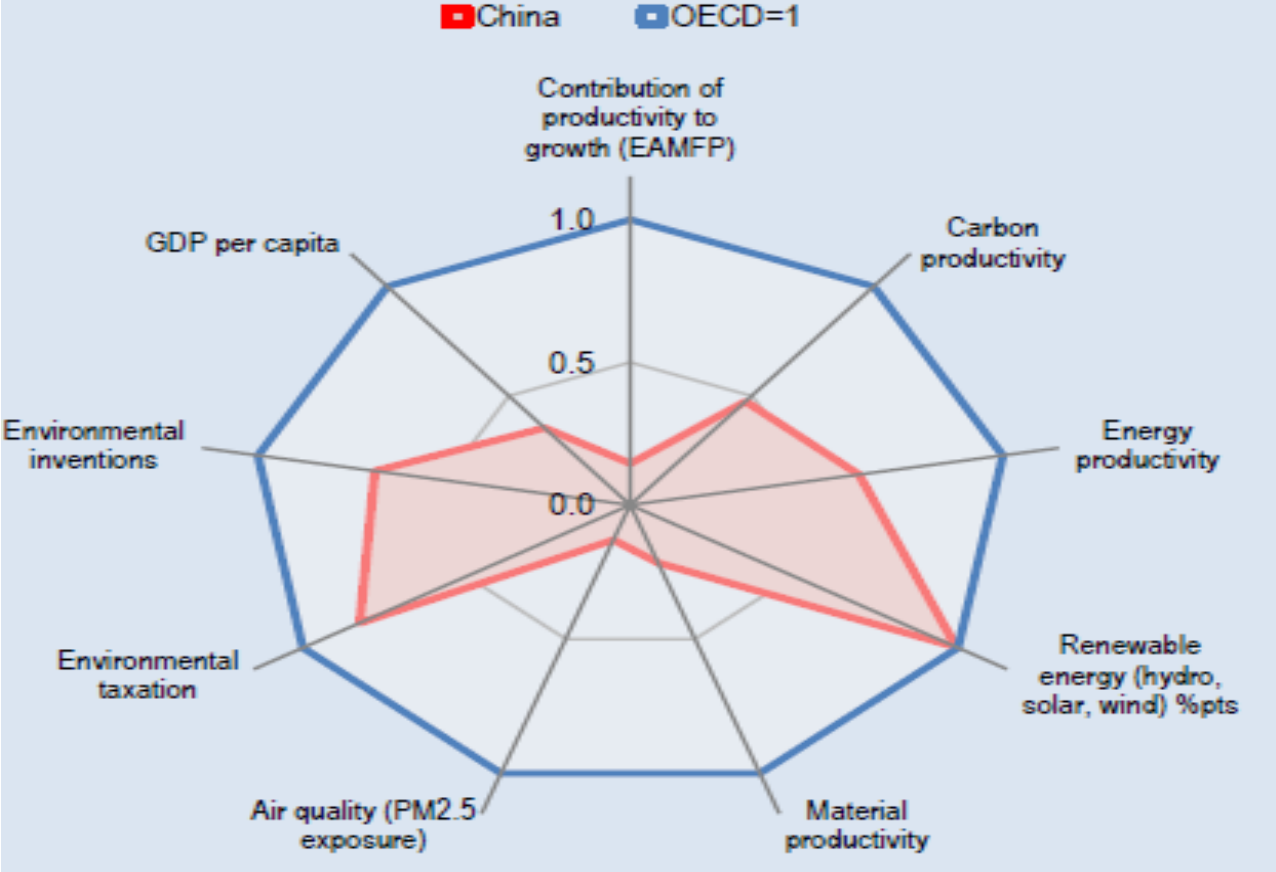
[45] M. Linster & C. Yang (2018), China's progress towards Green Growth: an international perspective, OECD Green Growth Papers no. 2018/05, Paris, see www.oecd.org/env/country-reveiws/PR-China-Green-Growth-Progress-Report-2018.pdf

In Figure 2 some telling long run environmental trends in China are depicted. The focus is on industry [46], long the main culprit of environmental damage by far. One finds that industry was (in 1990) overwhelmingly the principal generator of waste [47] and that is still the case in 2014. It has improved considerably in waste water discharges. With respect to SO2 Figure 2 confirms that industrial SO2 was stubbornly going up, with of course much larger volumes in 2014. The same goes for CO2 emissions, the high share coming from industry still increased and the volumes grew multifold by 2014. Although energy efficiency in China strongly augmented over the 2 ½ decades, the share of industrial energy consumption nevertheless increased, mainly due to very high economic growth. The GDP spoke shows that all this happens with a constant share of industry in GDP (of some 40-plus %) between 1990 and 2014.

A complementary position about China in 2015 with 9 indicators of green growth is provided in Figure 3. Most striking are the productivity indicators. Whereas energy productivity is

Figure 3

China's green growth indicators relative to OECD in 2015



Note : source Linster & Yang, 2018, p. 15

[46] Defined as manufacturing, mining & quarrying and energy.
[47] Even though agricultural waste was not included in the statistics, so the industrial shares are too high

around 60 % of the average OECD level, and carbon productivity at some 45 %, material productivity is only some 23 % and overall productivity about one fifth of the OECD level. The yardstick used here is multi-factor productivity adjusted for negative environmental impacts. A telling illustration is the generation of $ 1000 of GDP: whereas China uses 180 ktoe of primary energy and 1930 kg of materials other than energy, the OECD on average uses only 110 ktoe of primary energy (some 60 %) and only 420 kg of materials (just 23 %); moreoever, the OECD emits 260 kg of CO2 from this energy use and China 540 kg, more than double. China is beginning to transform its growth model, which relied on heavy industry fueled by coal and consuming huge amounts of materials and resources, which some have characterized as 'predatory exploitation'. It is not an exaggeration to conclude that this kind of rapid growth ('at all costs') can only be sustained at the expense of environmental quality. Less noticed is the recent extreme reliance on imports of such resources: according to Linster & Yang, op. cit., China relied for more than half of its supplies of oil, gas, iron ore, copper, lead and zinc on imports in 2011 ; by 2014, China consumed nearly half the world's metals, an extreme dependence that may well backfire and cannot possibly be a long-term solution for a single country when other emerging economies want to develop.

Although energy productivity [48] has steadily improved, it is clearly below that of the BRIIS countries and even more below the OECD average. Thus, efficiency gains should be stepped up and coal must be capped and reduced urgently. The coal cap by 2020 foreseen in the 13th Plan is 4.1 bn tonnes which is unbelievably high (and even higher than the 3.1 bn tonnes obtained in the simulation done on the late 1990s, see section 4). China has long committed to lower its carbon intensity (CO2 emissions per unit of GDP, here 2005 level) by some 60-plus % (in 2030 and by 40 % in 2020) but when GDP rises very fast this measure remains completely unrelated to the negative externalities inside and outside China! The 13th Plan incorporates a cap-and-trade system a la the EU's ETS but the introduction has fallen behind schedule and the scope is limited to the electricity sector.

The inefficiency of materials consumption is extreme and, in turn, this has also led to very large waste flows, even though industrial waste reduction has become more successful recently. In any comparison between countries one must of course correct for the industrial structure of China, as compared to countries with a strong reliance on light industry and services, but the contrast is nevertheless stark. Thus, (non-energy) material productivity of China is comparable to Canada (a resource country, whereas China hardly is one) but only some 7% - 8 % of that in the UK or Japan and some 15 % or so of that in France or Korea !.

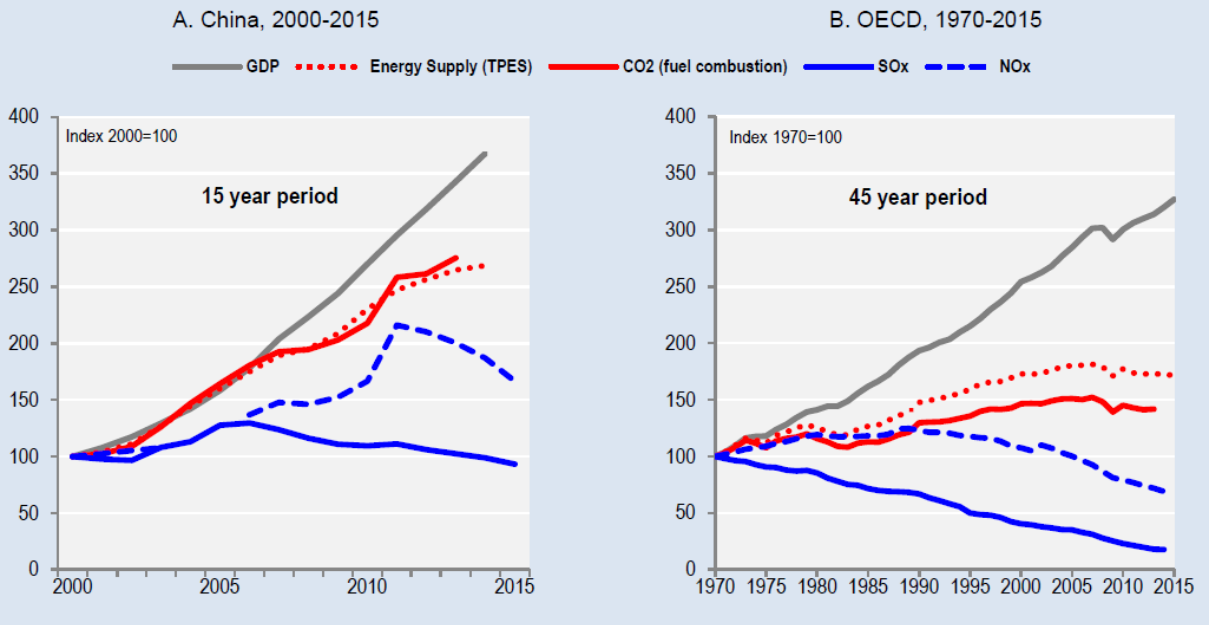
Figure 4 shows that SO2 and CO2 emissions increased in China both absolutely and relatively between 1990 and 2014. Official NOx data is only available as from 2006. The rise of CO2 and SO2 during the 1990s was steep, implying that the situation in 2000 was already problematic. Figure 4 (cf. left side) clarifies the enormous tasks China faces when combining future economic growth and decoupled trends of CO2, NOx and SO2. The high SO2 level of 2000 was only returned to – after a surge – in 2012 and is since slowly declining, thereby

[48] Defined as how much GDP is generated from one unit of energy

beginning to reduce – after a lag – the acid rain problem as well as related problems of air quality.

Figure 4

China and the OECD: Environmental trends and economic growth



Note : source Linster & Yang, op. cit., p. 24

But the trend of NOx is sharply up and the 2015 level is still more than 60 % higher than in 2000. The very rapid increase of CO2 emissions hugs the steeply rising trendline for energy, which is predominantly coal. This trendline is below the GDP trend (so, energy growth and CO2 emission growth are decoupled from GDP growth) but that is little consolation when CO2 emissions, already from high initial levels, continue to increase so rapidly. Section 6.3 will come back to this.

Air quality is another major problem in China. Since 2013 (and even before) China attempts to impose air quality standards based on the WHO (though lower than EU standards) [49]. A high WHO threshold for fine particulates (2.5 PM) is 35 'mu'g/m3, most OECD countries have much lower thresholds, hence, better air quality. In December 2016, however, the levels of PM 2.5 concentration in 30 Chinese cities were a multiple of these thresholds, between almost four times the high WHO threshold to as much as eight times[50]. The health toll in terms of respiratory diseases must be quite high as discussed in section 4. As the studies quoted there relate to work during the 1990s, it is good to know that today's studies suggest a similar or worse adverse impact [51].

[49] For SO2, NO2, PM10, PM2.5, CO and O3.
[50] See Linster & Yang, op. cit., p. 25, Figure 14
[51] A prominent example is provided in a leading survey by Jin, Anderson & Zhang (2016, p. 2). A quote is telling: "The ambient air quality pollution in China has been estimated by the Global Burden of Disease to lead to 1.2 million premature deaths from one year's (2010) exposure in China, and in multiple studies to cause annual economic losses equivalent to between 1 % and 7 % of China's GDP".

But there is good news too [52]. The OECD environmental policy stringency index – indicating strictness of environmental laws - for China has sharply moved upwards since about 2010 and begun to approach OECD levels. However, the index does not measure enforcement. Environmentally related tax revenues have gone up very steeply in 2007/8 and stayed roughly at that level for the following 8 years, close to the OECD revenues as % of GDP. Both appear to be a genuine break with the past: tougher rules and pricing negative externalities had long been called for. Another item of good news is the rapid development of green technologies. Unfortunately, it is hard to 'read' the quality of Chinese patents, unless they are tested by EPO in the EU but the rise of patented inventions in this field in China is around tenfold since 2000. Wind and solar industries are booming and are leading in the world. They already produced some 15 % of Chinese energy in 2015.

6.3 China: the new urgency on SD in indicators

The numerous data about the last two decades shows – for the most part – a damaged environment and a neglect of serious climate policy in China. As Xi Jinping himself notes, sustainability is first of all for the people and it is what Chinese people want. His 'ecological civilization' expresses a new urgency. Also the Paris Agreement and the upcoming Biodiversity conference in Kunming strongly support such a new urgency. The following will therefore accentuate, and add the most recent data to what has been analysed before in this paper. The emphasis will be more on the climate aspects as this has been dramatically neglected in China thus far. The presentation will be divided into a climate-related subsection 6.3.1. and a subsection 6.3.2. on indicators of environmental protection.

6.3.1. *Climate-related indicators*

One source of the newest indicators is Columbia University's Center on Global Energy Policy where David Sandalow collects data on China [53]. The contradictions in China's climate strategy have been discussed at some length before and therefore it is useful to begin with a set of warnings.

There is lingering doubt about China's capacity or willingness of controling coal and CO2. The lingering doubt is underpinned by the newest three basic facts. First, China as the largest CO2 emitter on the globe *added* 2.5 % over 2018 to its CO2 emission. Second, with coal being the central problem in Chinese climate policy [acknowledged by China itself], 2018 saw some 30 GW of new coal-fired power capacity *added* and the first signs for 2019 indicate the same. Third, and often overlooked, Chinese (state-owned) banks continued to lead the world in financing new coal-fired plants all over the world.

On the other hand, an opposite trend can also be observed serving the climate. First, China leads the world in renewable power deployment, and in 2018 added no less than 43 % of the

[52] Idem, pp. 29-31.

[53] D. Sandalow (2019), Guide to Chinese climate policy 2019, September, see www.energypolicy.columbia.edu/sites/default/files/file-uploads/Guide%20to%20Chinese%20Climate%20Policy_2019.pdf . The Figures 5, 6, 7 and 8 above are taken from Sandalow, op. cit.

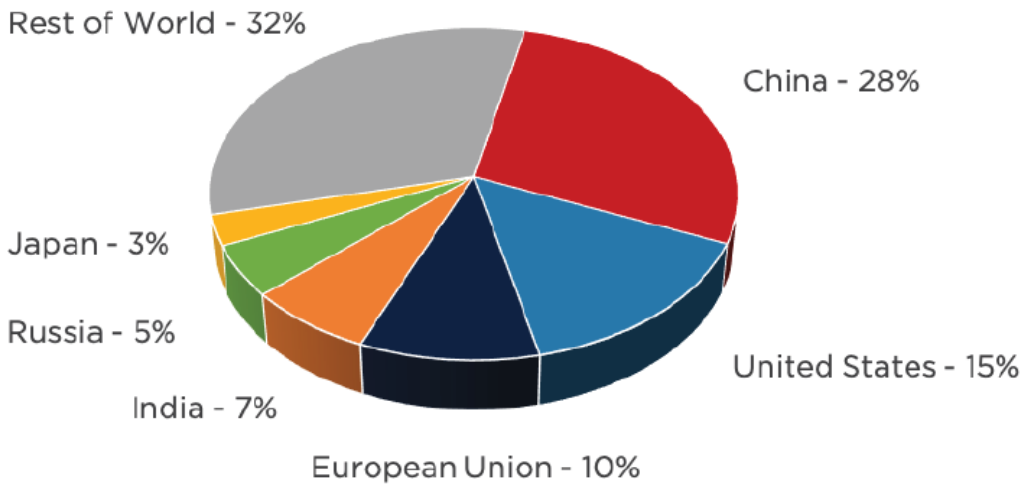
global new capacity. Second, also in electric vehicles China leads the world: some 45 % of all electric cars are found in China and no less than 99 % of electric buses. Third, of the 9 nuclear power plants in the world which recently were for the first time connected to the grid, 7 were in China. Fourth, reforestation and forestation is actively pursued in China since the late 1990s, so much so that a considerably higher share of surface area is now covered by forests: from 16 % of the country in 1999 to more than 22 % in 2015. There are complaints about biodiversity in the newest forests but for the climate it is positive and it also works against floods (e.g. of rivers) and soil erosion.

Thus, the first inference is that selective quotes on China can be misleading, either way.

By far the biggest problem for China and for the rest of the world, hence also the EU, is the combination of coal in China and CO2 emissions. In section 4 the extraordinary role of coal in China has been explained. The consequences have been very worrying indeed. China in 2018 emitted much more in global shares than either its population or its GDP shares: some 28 % of global CO2 emissions (see Figure 5). This compares with a 10 % share of the EU, 15 % for the US and only 7 % for India. Although China is catching up in its cumulative emissions 'stock' since 1750 (13 %), the US (25 %) and the EU (22 %) have emitted much more over time. However, with the present speed and CO2 volumes China will soon arrive at similar amounts, leaving less room for other emerging economies to grow with some CO2. Per capita, China emits only 6.6 ton, with the US 15.7 ton; still, China has already surpassed the EU here (5.7 ton).

Figure 5

CO2 emissions from fossil fuels in 2018

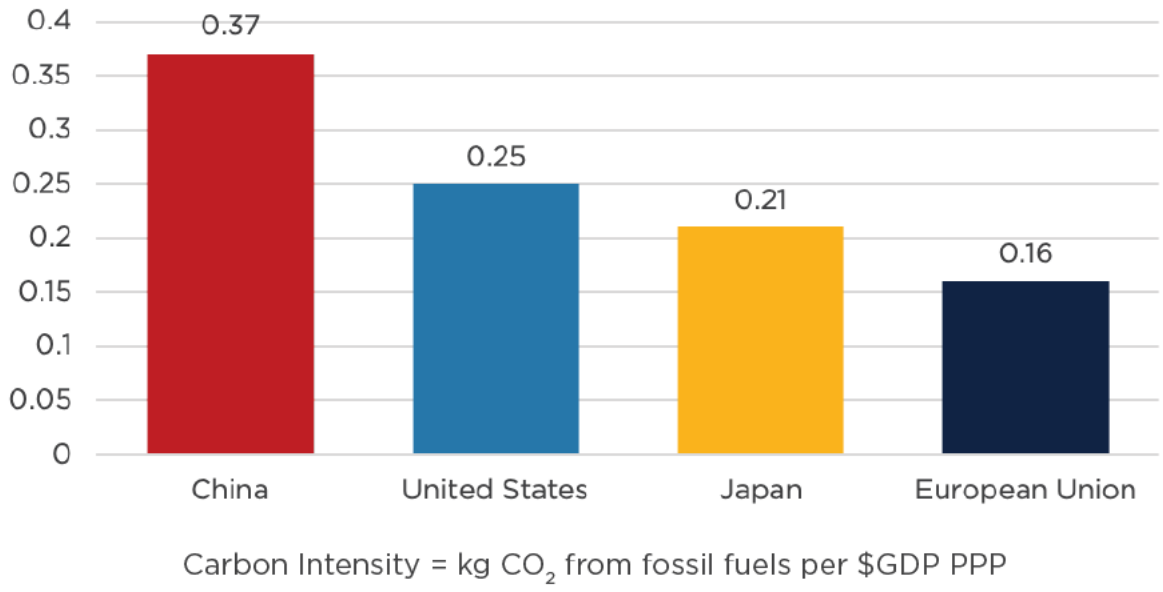


Source : Sandalow, 2019, p. 11

Coal has proven to be crucial for China's growth, so much so that its carbon intensity [CO2 per unit of GDP] is by far the highest in the world: 0.37 (see Figure 6).

Figure 6

Carbon intensity in the world : 2018



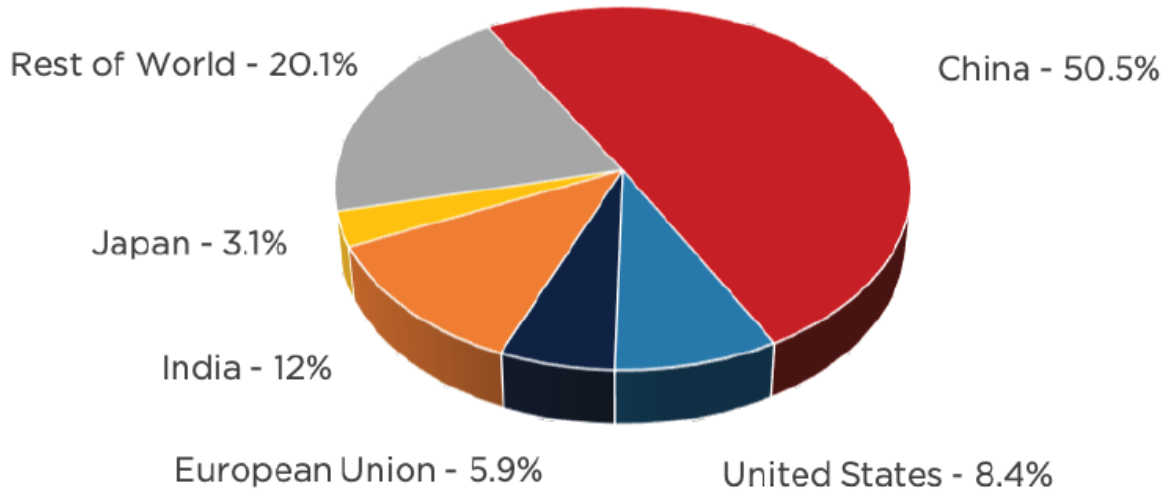
For a long time, China has defended itself with the principle (in the UNFCCC treaty) of 'common but differentiated obligations', implying that developing countries – given their historically low cumulative emissions – cannot be strictly bound when trying to catch up in terms of development with OECD countries. Not only has China rapidly caught up with OECD countries, it also became aware of its own vulnerability for the effects of climate change and the impossibility of maintaining its strategy leaving other developing countries less room for CO2 emissions in the near future. With the Paris agreement, China has finally set a date for its CO2 emission peak in 2030 - more than 3 decades after the EU – with several provinces adamant to peak even before. China presents an interesting argument for this timing: by 2030 China will have a p.c. income of roughly $ 25 000, whereas the US peak occurred when p.c. income was around $ 42k (in 2005) and the Japanese peak at $ 37k in 2007 [54].

Behind the huge CO2 emissions lies the Chinese coal issue. China's incredible and uninterrupted growth hinged – in part - on cheap and massive availability of coal. How unique this 'model' is can be seen in Figure 7.

Figure 7

World coal consumption 2018

[54] All incomes in PPP-2005 US dollars. Incidentally, there are still considerable uncertainties about CO2 emission data from China, for a host of reasons (see Sandalow, op. cit., for a summary on pp. 22-24).

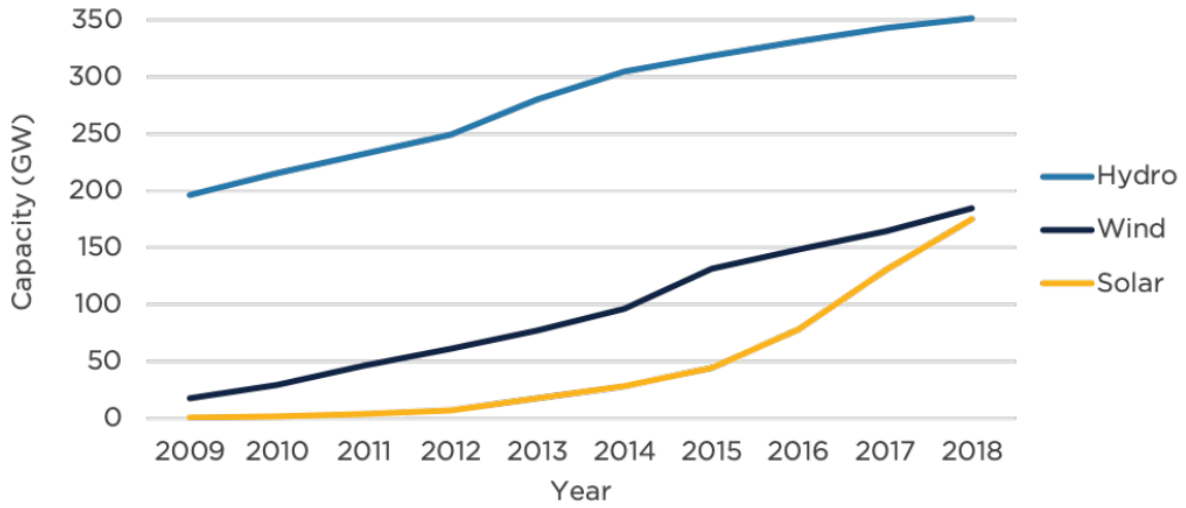


One can appreciate the early decades (say, up to the late 1990s) when the imperative of development was so pressing. But around the time of Chinese ratification of the Kyoto Protocol (in 2002), the awareness and strategic urgency of putting a limit on coal use seemed to be still absent. Indeed, between 2000 and 2013 Chinese use of coal tripled (!!) from an already high level (see section 4). After 2013 there was an unclear pattern of stagnation. Even when 90 % of the 100 largest coal-fired power plants were 'ultra-supercritical' (i.e. highly efficient) the sheer quantity is a primary issue, and so was the reticence about pricing in the negative externalities. Today there are ambiguous signals from China, both about new capacity added and about deliberately scrapping new and planned capacity [55]. What is in the making is domestic carbon trading. For some 7 years China has been experimenting with its own ETS, helped by EU ETS experts. It is supposed to be working nationally in the course of 2020 but both data reliability and (narrow) coverage are still issues. In any event, carbon is priced and this is badly needed. Coal is already taxed locally but how effectve this is is unclear. For all the enormous efforts in renewable energy (including nuclear, 'clean' in CO2 terms) China has undertaken, and the rapid increase in imported LNG, provincial officials still have incentives to approve new capacity (as growth matters most, and coal brings in tax revenue). Renewable energy grows rapidly as Figure 8 shows.

Figure 8

Renewable power capacity in China 2009 – 2018

[55] For details see Sandalow, op. cit., pp. 62-65



The 13th Plan aims at 15 % non-fossil energy in primary energy consumption in 2020 and 20 % in 2030. This is realistic, so it seems. At the same time , a series of other measures are taken about capacity, offshore wind, innovation, reducing curtailment [56] and scaling up distributed solar generation. The old and generous feed-in-tariff system is being dismantled and auctions take its place. Costs have fallen so much that electricity can soon be sold at prices equal to or lower than coal-based power, so grid parity can be pursued.

6.3.2 Air and water quality

Obtaining recent and reliable data on air and water quality is much harder. Of course, there is the additional issue that the measured 'quality' differs between regions and varies over time. It is crucial to realize that many measures to curb coal use for the climate also help in cutting pollution of SO2 and particulates. How hopeless air quality in e.g. big cities was until recently was painfully demonstrated in the week in December 2015 when the Paris treaty was negotiated. A CEPS team (including Weinian Hu and the author) was in Beijing and all records of inimical soot, dust and SO2 were broken; schools had to be closed and all coal-using plants near Beijing were told to stop. In the EPI [57] of 2018 (where the overall ranking of China is 120 out of 180 countries) China occupies place no. 177 (of 180) for air pollution of SO2 and NOx (p. 46). Why China has considerable inhibitions in radically cutting such emissions which are strongly disliked by the people [58] and lead to very large human health costs, is hard to discern. Is it because growth would be a little lower with less massive reliance on coal ? Is it because China already imports so much energy and its import dependence would rise once more ? It is only now that president Xi has changed track and actively promotes 'ecological civilization' precisely because that is what people want. In terms of treaties and of the UN SDGs, the EU might perhaps raise these issues in bilateral

[56] Temporary interruption (hence, curtailment) of electricity flows from renewable sources, as the grids cannot handle them

[57] The EPI [=Environment Protection Indicator] is co-produced by Yale's Environment Institute and the World Economic Forum. It is a composite indicator with 16 sub-indcators, beginning in 2006. The EU/EEA countries typically lead the ranking.

[58] For polls, see Sandalow

exchange, but it is more than obvious that the overwhelming interests of the Chinese people themselves would be expected to be the guide for Chinese policy-makers and yet it was not really done seriously for a long time. What empirics were noted for the mid-1990s in section 4, can be compared with some indicators for around 2015. The following 5 items are telling:

a. Air pollution contributes to 1.6 million premature deaths (so, particulates and other)
b. Some 500 million residents in Northern China lost more than 2.5 bn years of life expectancy due to air pollution from coal burning
c. Almost 100 bn people suffer from chronic obstructive pulmonary disease, with air pollution suspected to be the leading cause
d. Deaths from cardiovascular and pulmonary disease (in 272 cities) are closely related to very fine particulates (PM 2.5)
e. PM 2.5 and ozone emissions (from 6 sectors) cause roughly 1.1 million premature deaths with a cost of some $ 38 bn per year.

The literature is unanimous about the principal reasons. In a country widely seen as autocratic and with top-down government style (especially via the Party), the surprising reasons are sporadic enforcement, low penalties and weak monitoring. Indeed, if local officials have no explicit incentives, little happens. This fact-of-policy-life in China has deep roots and an attempt to explain this briefly is found in Box 3.

Box 3

Why air pollution policies and regulation in China often lack effectiveness

Complaints about the ineffectiveness of environmental and climate policies in China abound. This may seem surprising in a country with strong top-down characteristics. Based on an extensive analysis in Jin, Anderson & Zhang (2016), a few points can be helpful for a better understanding. There is little doubt that the environmental regulatory system in China is comprehensive. However, implementation and enforcement tend to be weak and questionable. First, Chinese governance is 'departmental-regional' fragmented. Local/regional chief leaders of the Party committee and the government act largely in a promotion-driven fashion. Of the many subcontracted tasks (from Beijing) to the region or city, only economic development in terms of GDP is systematically tracked. Thus, environmental tasks are found more and more but only recently there is tracking, and still not systematically. Hence, apart from temporary actions, implementation problems are inherent in the system. Moreover, EPBs (environmental protection bureaus) are underfunded, understaffed and 'alone', in the sense that until recently no 'integrated' policies were promoted.

Second, China now has some 30 environmental laws with wide coverage. According to Wang (2010), a leading expert, these laws suffer from four deficiencies : low legislative quality, too many principles, the substance is too basic, and the laws are inherently difficult to enforce. Only when a crisis is recognized, China reacts forcefully 'at any costs'. But, more often than not, environmental impact assessment is seen as a nuisance – the informal motto is 'construction, first, and the EIA later'.

Third, Jin et. al (op. cit.) identify four 'flaws' in these laws. Most fundamental is the lack of environmental rights, indeed, there is – amazingly - no ultimate regulatory aim to protect human health and promote societal welfare. There are inefficiencies, like all over the

world, but in China top-down 'campaign-style regulations' bring with them high administrative costs and pollution fees are much too low to be effective. Monitoring capacity is not created – the authors go so far as holding that "..data…on inputs or experiences hardly reflect the real emission situation". Finally, there is a serious credibility issue. 'The costs of breaking environmental laws is strikingly low; legal liability does not work as laws are too vague ; campaign-style regulation comes and goes in haste, with the consequence – due to 'learning'- that such laws are tacitly permitted to be incompletely implemented. The authors plea in favour of environmental-quality-based legislation and implementation, complemented by a health-risk based management scheme, instead of a 'total control' appproach.

The idea that local or all officials respond to the strong wish of citizens to radically do something about air pollution – incentives or no incentives, just having gone out of hand completely – long seemed alien to China. No wonder this is ill-understood in EU countries. Only in 2013 the Chinese government began to significantly toughen policy. The 'Ten Tasks' are often not that much different from intentions in Plans but this time the urgency, enforcement and monitoring are more serious, with hard targets and 'bans' in some instances. Criminal (environmental) cases have been recorded far more than before. For 2020 a 15 % cut in SO2 and NOx is mandatory. The dual benefits with climate measures of course help a lot. However, the State Council went a little too far, however, when announcing [59] 'remarkably improved air quality and much greater sense of happiness for the people..".

Box 4

Other EU analytical views on China's environment and climate status

It is informative to bring in two broad analytical publications, commissioned by the European Commission [60], on the status of environment and climate in China so as to verify the solidity of our conclusions. Both are SIAs on EU/China trade and investment: one on the PCA (then under negotiation) between China and the EU of August 2008 [61]; and one on the CAI [=investment] ongoing negotiations with China [62] of November 2017. What information, additional to sections 6.1 – 6.3, is found concerns environmental impacts of or recommendations on specific sectors. The thrust of both SIA reports on China's policies and environmental indicators is essentially similar to what has been covered in the present paper before. The sectoral information is interesting but much of it goes too much into detail for the purpose of the present paper.
The SIA of 2008 is, unsurprisingly, rather critical about environmental and climate policies and regulation in China. The thrust of the report is that EU-China goods trade, if access would be made easier by the later PCA, would on the whole have a beneficial environmental impact simply because EU goods tend to live up to higher environmental

[59] In the Three Years Action Plan for Blue Sky Defense, June 2018
[60] But explicitly not on behalf of the Commission
[61] See www.SIA-PCA-with-China_2008_Final_trade_140579.pdf by Development Solutions and Emerging Markets Group, project leader : Willem van der Geest.
[62] See www.op.europa.eu/en/publication-detail/-/publication/8222a28c-5335-11e8-be1d-01aa75ed71a1/language-en/format-PDF , November, by ECORYS, TNO and Reichwein China Beijing

standards and environmental services are in short supply in the China of 2008. The Commission's position paper on the SIA [63] goes even further, after first acknowledging the upgrading of SEPA to ministerial level, when it writes that "the implementation of environment policy in China is still in its infancy". The infancy referred to here cannot refer to the lack of relevant laws, as they have been discussed as unsatisfactory and ineffective but surely not in their infancy. Rather, these laws somehow show a lack of results in 2008 in lowering damaging pollution. At the same time the Commission points out that the beginnings of strong export capacity in renewables (e.g. solar panels) and the comparative advantages (in terms of energy efficiency, etc.) of EU industry should form a good basis to deepen technical cooperation to support a deepening of bilateral trade with 'green' benefits as well. This is directly linked to the EU/China Sustainable Trade Task Force (with China's MOFCOM) and to the EU-financed EU-China Trade Project[64]. The Commission notes that it aims at 'progressing through dialogue and cooperation … to make our economic and trade-related endeavours sustainable in the long term'. However, this is followed by a typical negotiation objective of the PCA: 'the promotion of work safety and environmental standards through a successful PCA is a prominent objective of the ongoing negotiations with China' [65].

In the subsection on environmental goods and services trade, one can see the foreshadowing of the WTO Environmental Goods Agreement (negotiations starting 5 years later), with China in the hoped-for plurilateral. However, the EGA negotiation attempt unfortunately failed in December 2016. On agriculture and SPS, a link is made with the relevant Dialogue and on sustainable fisheries and aquaculture, as well as the fight against Illegal, Unreported and Unregulated fishing. It is also interesting that the Commission (and the SIA text too) had set hopes about China joining the GPA and could start incorporating Green (and open) Public Procurement.

The recent RIA on the CAI also has a strong sectoral slant. However, the economic impact – and, as a consequence the environmental and climate impact – is said to be extremely small on FDI stocks of EU firms, based - as the simulation is - on *existing* EU investment in China. The idea that new FDI from the EU would be atttracted by China when the CAI is succcessful is not analysed in the SIA. Given that, in economics, it has proven to be very hard to model FDI and their response to policy changes, one has to be prudent in criticising this result. Nevertheless, in 2015/6 China was leading the OECD FDI Restrictiveness index [66], clearly above all other BRIIS countries and very far above OECD countries. A CAI of any significance is bound to lower – at least, bilaterally – this index in a major way, rendering the SIA results quoted here most improbable. Since the SIA confirms that EU enterprises in China employ much higher environmental standards than Chinese competitors, or suppliers in the value-chain, the CAI should be expected to exercise a direct beneficial impact on China's environmental performance, to the benefit of citizens in China and its neighbours or (for CO2) even the world. The notion that FDI would be

[63] Commission position paper on the Trade SIA of the negotiations of a partnership and Cooperation Agreement between the EU and China, February 2009.

[64] See also Hu & Pelkmans (2020) on EU /China Trade-Related Dialogues, in the framework of RESPECT, for details.

[65] The paragraph ends by a stated conviction that 'only a reformed, open and predictable Chinese economy is sustainable in the long run'.

[66] Meaning that it was the most restrictive of some 60 countries !

attracted by China because firms would see it as a 'pollution haven' is not only unlikely but effectively pre-empted by the SD chapter in the CAI.
Although the SIA observes that e.g. the emission (i.e. carbon) intensity of China has decreased faster than the energy intensity in recent years, the report shows – in more striking ways than the several indicators used in this paper before – that the state of Chinese emissions is still extremely worrying (op. cit., p. 120). If environmental intensities in China and the EU are expressed as the footprint per euro of output [67], the "ratio of the Chinese versus EU intensities equal 11 for CO2, 21 for methane, 11 for nitrous oxide N2O, 15 for nitrous oxide NO, 45 for sulphur oxides (SOx) and 7 for energy". The very idea of convergence between the EU and China is therefore a very tall order, even when the 'ecological civilization' in China has now set in.

The damage caused by widespread water pollution and the problematic quality of drinking water or even water for irrigation is great and widespread. In combination with the structural water shortage the country is suffering from, the challenges for a strategy of remediation of water in China are no less than daunting. A summary of the crucial shortcomings will be provided here but this is done in analytical and policy terms. However, such terms hardly convey an appropriate picture of the practical issues and fears of the citizens confronted with numerous 'black and odorous' waters (in cities), greenish lakes and rivers due to eutrophication, some rural communities refusing to eat the agri-products they produce and sell due to the polluted irrigation water they use, numerous creeks and small rivers ending up in the big rivers in China (like the Yangtze River) which no longer carry water and the anxiety of citizens and workers along big rivers knowing of thousands of unreported sewage outlets spilling straight into the river or lakes. In some areas of China, chronic exposure to water pollution has led to the emergence of hundreds of 'cancer villages', where rates of tumours linked to water pollution far exceed the national average. Even in relatively well-off cities like Shanghai, many citizens filter or boil water because of lack of trust and anxiety about old and leaking water pipe networks. Moreover, the water imbalance inside China is structural and profound, essentially caused by climatic differences of precipitation. But it worsens the problem considerably : Northern China covers 64 % of the territory, 46 % of the population and 60 % of the cultivated areas, yet it has only 19 % of the national water resources [68]. China has attempted to remedy this structural deficit by two huge South-North connections but the flows are so large that there are costly implications for the source areas and it is still not enough, let alone, if urbanisation continues unabated.

An authoritative and independent[69] China Water Assessment by the ADB (2018) identifies seven principal water issues, some of which are interdependent:

a. Water shortage, caused by natural insufficiencies but also low water use efficiency; this shortage is worst in the Hai river area, and in those of the Liao and Yellow rivers.

[67] As is known, the calculation of the 'footprint' is difficult and very demanding in terms of reliable statistics. It is therefore prudent to take these high ratios with a pinch of salt. But even so, they are very high indeed.
[68] ADB (2018), p. xiii
[69] But in cooperation with the Ministry of Water Resources

b. Severe water pollution, caused by untreated pollutant discharge (often having exhausted the assimilative capacity of water bodies); eutrophication of some lakes and reservoirs has not reduced much and groundwater pollution is spreading.
c. Aquatic ecosystem degradation, often in advanced stages, some perhaps beyond the option of restoration
d. Weak water-related disaster mitigation capacity, overburdened by frequent floods and droughts (probably worsened by industrial and infrastructural activities)
e. Low water-use efficiency ; efficiency is improving recently but much needs to be done about leakage rates of city water supply pipeline networks (as high as 15 %), the (too) high water use per unit of industry value-added (as well as by citizens) and low farmland irrigation efficiency
f. Insufficient water services, especially in the management of water supply and wastewater services; only 70 % of surface drinking water meet the national water quality standard; urban wastewater management is poor but rural wastewater collection and treatment is weaker still.
g. Weak water governance, given ineffective water legislation for decades, poor enforcement, little coordination between jurisdictions, limited public involvement in water affairs and – a critical point, too often conveniently ignored – the absence or at best hesitant introduction of price signals or taxation. A lot of water is wasted for the latter reason alone, in a country that already has so little access to water.

One pertinent form of interdependence of these shortcomings is that pollution exacerbates China's water scarcity and its regional inequality, as rigorously shown by Ma, Sun, et al (2020). A first reason is of course that nearly 10 % or so of flows or lakes consists of water of such low quality that it simply cannot be used for anything. Another reason is that parts of other water can only be used for (say) irrigation and constrains flexible solutions.

Altogether, water pollution and overuse are a serious hindrance of development and , worse, a major health issue causing premature deaths of many and illnesses for others. Producing cheap at such health costs is also plainly distortive globally and the same goes when generating such environmental damage.

6.4 Answering the first research question

The first research question is whether China and the EU converge in terms of environment and climate mitigation, in particular by relying on indicators. The relevant period is from 1995 to 2020. The answer to this double query has to start with the initial deterioration in China of practically all indicators of environment and climate. The sharp contrast with the EU in the first decade or 15 years of this period, or for e.g. GHGs even longer, amounts to a clear divergence, not convergence. At least for some years and in the climate realm for most of the period, indicators were worsening despite (1) EU/China cooperation, projects, programmes, transfer of technology (e.g. CDM under Kyoto) and Dialogues, and (2) increasingly firm Chinese policy intentions and strategies. One explanation is paramount :

exceptional economic growth ‘at all costs’, driven by the desire to move the country towards developed economy status and the determination to lift hundreds of millions out of poverty first. Indeed, there was no such thing as ‘linear convergence’ in indicators, not at all. More often than not, the pattern seemed more like a U-curve. Initially divergent trends changed over time in a complicated fashion, dependent on the type of environmental issue. In other words, China began to converge only after first letting both environment and climate issues go out of hand.

This deterioration or slippage differed between aspects and between the two main classes of policy : climate and environment. The by far worst performance was linked to the use of coal. The coal addiction seems to have been a conscious choice, presumably also influenced by industrial pressures as well as regional lobbying. The enormous negative externalities this caused over time, especially for human public health, not to speak of the broader costs to society, were first ignored and later treated with little more than lipservice. When interventionist policy became unavoidable, the options favoured were in the technological domain: end-of-pipe techniques such as filters for denitrification and desulpharization, and the aggressive development of renewables in electricity generation. What was carefully avoided for a long time was both the use of price instruments for coal (say, taxation or an ETS China style) and the quantitative restriction of coal output. As noticed in sections 6.3 and especially 7.1, the end-of-pipe techniques (first avoided because of the costs) have been successful recently, as far as they reach. They will not do for deep further cuts of SO2 and NOx emissions. Moreover, the taboo on taxation and on the rise of coal prices has finally been removed. Forms of pricing of negative externalities and cuts of coal output are bound to be the only truly effective routes to live up to the Paris Agreement commitments in the longer run. Nevertheless, in climate policies, indicators for CO2 and some other GHGs (e.g. ozone) begin to show declining growth but still growth despite the already extremely high level. The peak in CO2 has not been reached yet. China’s insistence that carbon intensity is falling rapidly should be acknowledged but is little consolation when CO2 emissions – already the largest in the world – are still increasing. Water standards slowly begin to improve as well, be it still too selectively. Water pollution has been ignored or belittled for a very long time, although investments in infrastructure and new legislation helped somewhat. Waste is now being addressing more effectively, after serious investments in treatment.

On the other hand, China is very active in sustained reforestation, with strong results, and in the swift expansion in renewables, meanwhile generating 15 % of electricity. In electric vehicles and lithion batteries it has become a world leader. Expansion in nuclear energy also helps to support climate policies.

Therefore, on the basis of the indicators dealt with so far it is premature to conclude that research question 1 can be confirmed, that is, indicators showing convincingly a trend towards convergence between the EU and China. One can observe that China has stopped initially divergent trends and bent them into a converging direction but a firm conclusion would need still more recent data and clear targets for 2020, 2025 or 2030 that are actually

met. The most recent indicators should also be read in conjunction with the transformation of China's strategies and policies, which is what the second research question is about.

7. What convergence how far ? China's environmental and climate policies today

The present section will attempt to answer the second research question on convergence of *policies*, or at least policy preferences in terms of similar aims, and their implementation. In order to do so, a summary of today's China's environmental and climate strategy will be provided in section 7.1, with comments where appropriate and the newest indicators where available. In the light of the complexity of these policy domains, elaboration of specific issues is incorporated in Boxes on respectively soil pollution, sustainable forestry and sustainable fishing. A short section on CSR, that is, what companies actually do by themseves, is found as well. In section 7.2 Table 1 will be used in order to verify (in Table 9 below) where and in how far China would substantially agree today with the key items of the EU's SD 'standard' as reflected in recent EU FTAs. Together these two approaches should enable an informed judgment where and to what extent China has converged with the EU in the environment and climate components of sustainable development as far as trade and investment is concerned.

7.1 China's environmental and climate strategy today

In early 2020 [70] China was waiting for difficult decisions expected to be incorporated in the 14th Environmental Five Year plan 2021-2025. Although there has been some debate and attempts to influence decision-makers, nothing has been published on the new Plan and it remains unclear when the new Plan will be available (probably December 2020). One difference can be noticed: in 2018, due to institutional change , climate and other environmental issues and strategies have been brought under a single ministry MEE : the ministry of ecology and environment. From a functional point of view, this makes sense. Coordination between these two branches of environmental policies is of obvious importance: several pollutants are strongly linked with coal, hence accompany CO2 emissions. There is also the argument that the mighty coal sector might be less able to block hard decisions in a ministry that does not deal with industries as such. Nevertheless, there is a fear that the new ministry will not be able to wield the power that the NDRC had when it dealt with CO2 (although one can have doubts whether this was to the benefit of the environment).

Another aspect that would seem to be pretty certain is stricter enforcement of targets and of amended environmental laws. In section 6.2, it was already noted that the OECD Environmental Stringency Index moved up sharply after 2010 and approached OECD levels. But this index is not about enforcement. Meanwhile, there are many recent examples of conspicuous enforcement set by the government agencies, exemplified strikingly by the placing of thousands of cameras in agricultural areas in order to discipline farmers and detect illegal disposals. Since a few years the Chinese government has also become

[70] Before COVID-19 played up

intolerant of 'dirty' electricity and 'dirty' steel, as inefficient coal-fired power plants and furnaces have been dismantled. Moreover, the tolerance of the Chinese people for extremely bad and damaging air and water quality has reduced as well. There are numerous reports of protests in local or provincial communities, even in Wuhan just before the corona crisis broke out. Nowadays the central government appears to be more dedicated to pursue 'a beautiful China' as a reflection of Xi's 'ecological civilization'. Three wide-ranging, tougher and much more risk-based environmental laws manifest a radical change in addressing the worst pollution in China. First, the Air Pollution Prevention and Control Law of 2015, followed in 2017 by the Water Pollution Prevention and Control Law (see respectively sections 7.1.2. and 7.1.3). Second, in August 2018 the Soil Pollution Prevention and Control Law was enacted, a potentially extremely costly but inevitable undertaking (see section 7.1.1). . All three laws are an improvement over past practices, in particular because the 'polluter pays' principle is followed, more careful surveys are compulsory, and strict environmental liability is incorporated.

7.1.1. Soil pollution in China and the new strategy

Soil pollution has long been the cinderella of Chinese environmental strategies. It is complex and technical to provide a truly satisfactory exposition, which is not the purpose of this RESPECT paper (see FAO [2018] for an authoritative overview of soil pollution). Box 5 explains the core provisions of the 2018 Law on Soil Pollution Prevention and some of its ramifications.

Box 5

A Chinese U-turn in Soil Pollution Prevention and Control

Soil pollution, though less 'visible' or noticeable than air or water pollution, is very severe in China. In different degrees, no less than one fifth of farmland in China is polluted and for the country as a whole it is still some 16 %. Laws supposed to prevent or reduce it were scattered and had little 'teeth'. Enforcement was weak and unsystematic, data was incomplete and of dubious quality. Moreover, potential exposure to soil pollution – often indirect via water or agri-food or delayed by decades – is highly uneven, differing between regions dependent on industrial or mining activities or the type of agriculture, as well as the local availability of water, in itself a major problem in China too. The 2018 law is a genuine U-turn but the costs and who will pay are daunting obstacles, even when enforcement were well-intended. The law went into force in 2019 and it is therefore too early to measure results. One immediate consequence is a massive survey of soil pollution in order to get better, more reliable data with a much more complete coverage of China. The plan is to obtain data from over half a million sites or areas. Data available today originates from 2014 [71], is selective (based on samples) and sometimes indicative but in

[71] For a long period of time, data was barely available. This led to an action by a Beijing lawyer Dong Zheng in 2013 requesting soil pollution data from the environmental minister, including an analysis of the causes and the methods dealing with these problems. This was refused on the grounds that this was a state secret.

many cases very worrying indeed. The main inorganic pollutants are eight heavy metals: cadmium, nickel, arsenic, copper, mercury, lead, chromium and zinc. China has five categories in the current data: below the quality standard, light (pollution), mild, moderate and severe, with 'light' amounting to twice the standard and 'severe' more than 5 times the standard. Cadmium is the worst case with 7 % of Chinese land polluted, nickel 4.8 %, arsenic 2.7 % and e.g. mercury 1.6 %. As noted, the problem is often very local dependent on mining and (or agricultural) industrial activities. This leads to unbelievable extremes such as in Lamping (Hunan province) where the level found near a lead-zinc deposit was hundreds of times the standard. In some areas in Hunan, rice paddies exhibit excess rates of between 2 to 6 times the standard. There are also worrying concentrations in selected places of zinc, lead and chromium. High arsenic content in the soil is attributable to contaminated groundwater, which magnifies the risks.
The three main organic pollutants are much less prevalent with e.g. dichodiphenytrichloroethane (DDT, forbidden since 1983) 'only' polluting 1.9 % of the land. However, a later survey found that as much as 83 % of polluted survey points, exceeding the relevant standard, are organically contaminated.
To understand the meaning of the new law (see Li, Liu, Lin, Liu & Xie, 2019), one should realize that it is based on the 2016 Action Plan (same title) which seeks to build a systematic soil pollution and control management system including this law, actions plans, regulations (with greater detail), risk control rules based on standards and technical guidelines. In addition, the law is to be understood in close relation with several other laws on agriculture, grassland and agricultural product quality. A first premise is 'prevention' based on environmental impact assessment of any new construction initiative. Local governments must intensify supervision over what are called key polluting units. The State Council is held to conduct a massive national survey of soil pollution every 10 years beginning in 2019/2020. A second prominent tool is risk-based management instead of the previous one-size-fits-all approach, imposing remediation of any and all contaminated sites (probably unpayable); so, management instead of automatic and full remediation. Remediation now depends on what category applies to one's land : priority protection, safety utilisation or strict control. A list system has to be set up.
A third principle is the clear definition of responsibility of all parties. The company or farm responsible for the soil pollution is obliged to implement the control and restoration/reduction of soil pollution risks. If that company (etc.) cannot be identified, the responsibility rests on the land-use right holder. The chain of responsibility is such that there is no escape from the clean-up where necessary. The law foresees the setting up of local and provincial funds, meant for agricultural land and for cases of unidentified polluters once upon a time. Targets are set for 2030 : the safe utilization ratio of contaminated agricultural land and contaminated sites should exceed 95 %.
This new and much more serious approach is of great importance for Chinese citizens (e.g. in case of building sites), workers in many cases, farmers and animals, but it has also great significance for the eventual 'safe' reputation of food both directly (e.g. rice, etc.) and via water pollution through leakages. The potential costs of this approach are staggering, one estimate being $ 1.3 trillion merely for the period 2016 – 2020 [72], which is some 10 % of China's GDP ! Insofar as the products produced are or were ending up in China's exports,

However, it did trigger the release in 2014 of selected data by the ministry. Source : Delang (2017). Data mentioned in Box 5 is from the ministry [MEP] as presented in Delang. op. cit.

[72] See https://www.iisd.org/library/financing-models-soil-remediation-china (2018)

either directly as final ones or serving as intermediate ones, with these colossal amounts of money one can pose the query, in earnest, whether such products have not been or are still not artificially cheap, distorting international trade for decades. Whilst the health and consumer protection as well as occupational safety of the Chinese people are of course the prime rational for the clean-up, it is at the same time a powerful argument bilaterally and multilaterally for close cooperation with China to foster convergence on the approaches to fighting soil pollution. Soil pollution in the EU is largely a national competence. It is interesting to observe that the 'screening and intervention values' (technical guidelines) in China have been modified by a close comparison with the Netherlands and the UK (besides the US and Canada). The upshot is that such values are now close to the levels prevailing in the EU (Li et al, 2019, p. 8), demonstrating convergence at the technical level. As usual, enforcement might be the achille heel in China, even with this tougher law. There are reports that local governments have few incentives to impose rigorous enforcement, because a quarter (or even up the half) of the income of provincial capitals is made up from money earned from transfers (i.e. sales) of land. As a result provinces are eager to redevelop the land, without too much regard to careful inspection – let alone, remediation – of polluted land. There are accounts of very incomplete lists of contaminated plots (e.g. Xi'an and Harbin with only one such plot).

7.1.2 Where is China today with air quality ?

China's record for air pollution – with considerable negative health effects for the population – has long been extremely problematic as noted before. A telling illustration, as noted, is the 2019 EPI ranking [73] for air pollution in China being a very poor no. 177 of 180 countries in the index. This extremely low ranking might be subject to two important caveats in this indicator: (i) based on the latest data when the EPI was drafted, may well mean that the data go back to 2016 or even 2015, as such data used to become available only with delay – this matters because new policy action has been undertaken in China following the 2015 Air Pollution Law; (ii) air pollution in the EPI is only measured by SO2 and NOx, two damaging pollutants but there are more (see below). Nevertheless, the miserable ranking demonstrates very well that, at least for a long time, in air pollution China simply did not make policy choices protecting people and the environment. In Figure 4 some first evidence is shown that a break with the past was made. In 2013, in the run-up to drafting the new Air Pollution Law, a 'war on air pollution' was announced, leading the 13th Environmental Five Year Plan (2016-2020) to be more ambitious for air pollution. Although the overall focus was on 6 pollutants, the two prime cases are SO2 and PM 2.5 (very fine particulates).

Myllyvirta (2020) has published the newest data for 2015 – 2019 for the 6 pollutants, based on a very close tracking [74]. Based on national averages, the results are shown in Table 10.

Table 10

Recent air pollution trends in China : 2015 – 2019 (% change)

[73] Environment Performance Index, produced by Yale University and the World Economic Forum, 2019, p.46

[74] The independent CREA (Centre for Research on Energy and Clean Air) in Finland uses data collected on an hourly basis by Chinese agencies and published on government websites. Lauri Myllyvirta leads this CREA work.

PM2.5	PM10	NO2	SO2	CO	Ozone (O3)
-28 %	-27%	-9 %	-56 %	-27 %	+11 %
0 % (winter 19)	-3 % (winter 19)	0 % (winter 19)	-12 % (winter 19)	-6 % (winter 19)	n.a. (winter 19)

Note : unit of measurement 'mu'g/m3 ; national averages; 'winter' refers to October thru December 2019 and the % represent the percentage change comparing these with October- December 2018.

During the four years of data available, the results are broadly spoken good to very good indeed. The perhaps most inimical pollutant PM2.5 has fallen by 28 % on average and SO2 even with no less than 56 %. Also PM10 and CO have gone down by 27 %. With NO2 the fall is a mere 9 %, so it is still (see Figure 4) considerably above the level in 2000. And ozone has increased with 11 %, which will have to be addressed. But there are two serious caveats with this positive picture. Both caveats have to do with *how* China has tackled this 'war on air pollution'. First, there is evidence of shifting 'pollution havens' inside China. Studying the air pollution at provincial level, it is apparent that there are considerable differences in performance between provinces, often coupled with increases in e.g. provincial steel and coal output in the same period [75] or indeed a shift from winter with less output to summers with higher output [76]. In big regions like greater Shanghai and greater Beijing, coal for heating has been aggressively replaced by natural gas and electricity, and this has led to real cuts in pollutants. However, the rest of China witnessed increasing output of e.g. pig iron and cement but above all non-ferrous metals. Second, China has strongly relied on an 'end-of-pipe' approach and this quickly runs into limits if meanwhile coal remains as important or even augments. In section 6.1 the urge for denitrification and desulpherization filters or equipment was noted. This works for SO2 and PM2.5, but much less effectively or not at all for NO2 and ozone. Moreover, when filters are employed, they have a level-reduction effect once but if coal growth is not controlled or priced/taxed, sooner or later pollution levels will go up again. Rather than capping coal output, China seeks to apply technology as a solution but this runs into considerable limits.

It is reported that (in Beijing) the switch to gas-based heating and electricity was so abrupt and heavy-handed that hundreds of thousands of households were left without heating and gas supply to some industries was more than once interrupted. This is a typical manifestation of costly 'campaign-style' implementation referred to in Box 1. It should also be noted that ozone is dangerous for the lungs (but in different ways that is also true for PM2.5 and NO2) and is a result of industrial, transport and power plant emissions [77], but hard to filter out.

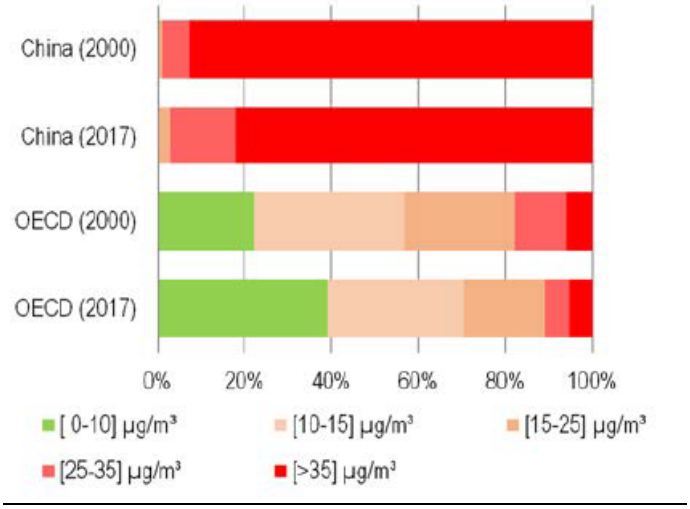
Finally, to put the recent pollution levels in China into perspective, Figure 9 compares PM2.5 levels of 2017 in China with those in the OECD, and shows the progress since 2000. Despite the clear improvement in China, the difference is still enormous. In the EU a level of up to 10 'mu'g/m3 is seen as acceptable given WHO guidelines. Even with the progress reported including 2019, much of China still lives with very-fine-particulates pollution of more than four times the WHO guidelines. The Chinese standard of 35 'mu'g/m3 often used in official

[75] The so-called 'coal bases' are targeted to have coal industry expansion !
[76] Winters show worse performance due to heating, often still on a coal basis. For data, see Myllyvirta, op. cit.
[77] Ground-level ozone pollution is created when NOx and VOCs react in the presence of sunlight.

publications is far above what the WHO recommends and can therefore only serve as an interim mile stone.

Figure 9

PM2.5 levels in China and the OECD, comparing 2000 and 2017



Note: Source OECD (2019, p. 73)

7.1.3 Water pollution and quality in China

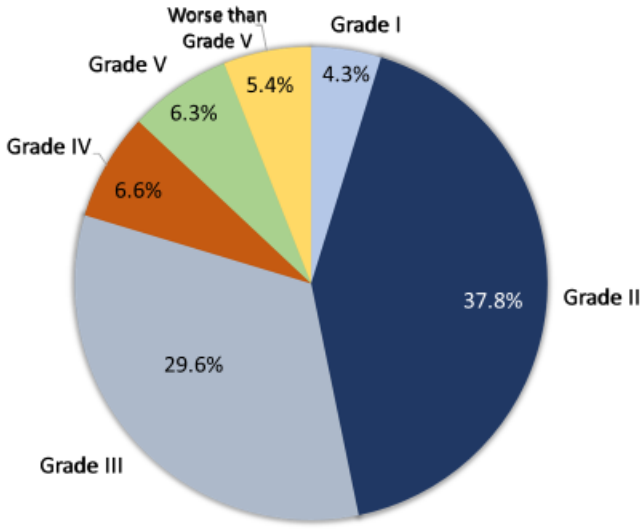
China has a very serious water problem for decades. This problem is in fact a combination of water scarcity (which is most severe in the North), serious water pollution of rivers, lakes and canals in urban areas, drinking water quality due (apart from pollution) to aging underground pipe networks and huge questionmarks about groundwater and deep ground water sources. There were long considerable governance issues, too, in particular for interjurisdictional issues as well as enforcement capacity. As briefly noted before (sections 4 and 6.1), the state of water quality in China was worrying if not worse. The U-turn came in 2013 with the preparation of the 13th Five Year Plan, the 'Water Ten Actions' Plan of 2015 and the period of drafting the 2017 Water Pollution and Control Law. The ADB (2018) water assessment of China is closely associated with the new 'water security' strategy and it recommends five goals: accelerated 'green economy', modernizing water infrastructure, advanced water services, improved aquatic ecosystems protection and rehabilitation, and modernized water governance and management systems. This U-turn alone, if credibly implemented, would bring China much closer to strategic perspectives on water in the light of sustainable development held in the EU. Already in 2013 three so-called 'red lines' targets [78] were set: (i) a cap on total water use (in 2020 a maximum of 670 bcm, in 2030 700 bcm);

[78] ADB (2018), p. 48, Table 20

(ii) hard efficiency targets such as a fairly sharp reduction of water use per $ 1600 of industry value-added by 2020 and even sharper by 2030 [79] and irrigation efficiency going up to 55 % in 2020 and 60 % in 2030 [80]; (iii) a drastic upgrading of water quality via (a) a rising % of water function zones meeting quality standards (from 60 % in 2015, and 80 % in 2020 to 95 % in 2030) [81], (b) a generic requirement for 'all' sources of drinking water to meet set standards [82] by 2020 and (c) all water functions complying with water quality standards by 2030. There are six categories of surface water quality, the distribution of which is shown in Figure 10 for July 2019 [83]. The worst are grade V (not for human consumption, or swimming or even irrigation, perhaps for basic industrial cleaning) and 'worse than grade V' – useless for anything, together some 11.7 % of surface water. Even the 16.6 % of grade IV is restricted in use for health and safety. Drinking water is supplied from grade I and II water, some 42.1 %.

Figure 10

Distribution in China of surface water by water quality, in July 2019



Source : (Statista)

[79] In 2020 65 m3 and in 2030 40 m3.
[80] Irrigation involves very large amounts of water, so this target should reduce scarcity (cet. paribus).
[81] One has to know what standard is referred to here, see further
[82] idem
[83] See www.statista.com/statistics/1064877/china-share-of-surface-water-by-quality

However, as observed in sections 6.1 and 6.2, China did invest in reducing wastewater discharges ever since (say) 2000 (the 10th Plan), especially those from industry. Figure 2 in section 6.2 shows a significant cut in industrial wastewater discharges up to 2014. Offsetting activities such as waste treatment in cities (from citizens, hotels and restaurants) and agricultural discharges at point sources and 'at will' made water quality complaints not go away. Given the initially weak data, a detailed contribution by Ma, Zhao et al (2020) showing the improvement of surface water quality between 2003 and 2017 [84] demonstrates the great strides China has made over one and a half decades. Of the three pollutant concentrations, for better water quality, the concentration of COD and of NH+4-N should structurally decline and that of oxygen increase. The authors find that average site level concentration of COD declined from 9.28 mg per liter in 2003 to 3.44 mg per liter (almost two-third) in 2017, whereas that of NH+4-N declined from 2.7 mg per liter in 2003 to 0.59 mg per liter in 2017 (over three -quarter). As to oxygen, the level of DO increased from 6.94 mg per liter in 2003 to 8.03 mg per liter, an improvement of some 14 %. There is more to water quality than this triple set and there are still many locations with a range of problems. Still, the data shows that the U-turn in water policy since 2013-15 appears more of a strong acceleration than a completely new strategy.

MEE reported both good results and stronger enforcement in January 2020 [85]. Good quality surface water increased 3.9 percentage points compared to 2018 and severely polluted water is down by 3.3 percentage points. MEE announced that no less than 90 % of bodies with black and odorous water will soon be curbed in targeted areas. Enforcement has become more credible: sewage outlets were detected and inspected with sonar, infrared, aerial surveys and on-site inspections. As a result, more than 60 000 sewage outlets were detected along the trunk and branches of the Yangtze river and the Taihu lake, some 30 times (!) those reported by local authorities. Another 19000 were found along the coast of the Bohai sea, some 25 times what was reported. It seems that enforcement is finally taken serious.

The World Bank (2018), whilst being complimentary about the U -turn as discussed and the massive investments undertaken, is nonetheless rather critical about water governance in China. A prominent governance and policy issue is that a lot of water is wasted. Chinese people and many of its firms do not seem to appreciate the value of water as long as the price is too low. Water pricing is still sensitive [86] but critical for pre-empting the wasting of water. The MEE realizes this and even advocates - and experiments with - the trading of water rights. The World Bank notes that other upper-middle-income countries use far less water per unit of value-added. Also for irrigation such countries are far more effective with a unit of water for the land. Similarly the preservation of eco-systems has been dramatically

[84] The authors have used time-series of monthly mean concentrations of COD, NH+4-N and dissolved oxygen (DO) derived from site-level measurements across China as well as 10 major river basins. For other technical and statistical details, see Ma, Zhao et al, op. cit.

[85] See https://news.cgtn.com/news/2020-01-17/China-s-good-surface-water-quality-rose-in-2019-ecology-ministry

[86] Water was free of charge until around 1980.

disregarded. Thus, natural ecological systems such as wetlands [87], coastlines, lakes and riverbanks keep decreasing in size for decades. How drastic the deterioration has been is best illustrated by two examples. One is the lake area in the middle and lower reaches with hydraulic connections to the Yangtze river - of 100 such lakes only two are left ! Another example is near the Hai river basin : the wetlands area has decreased with no less than 83 %. More generally, land affected by soil and water erosion has reached some 31 % of China's total land area. The governance of interjurisdictional water issues is far too weak and uncertain. Better integration across policy areas and between regions or basins is badly needed. "Achieving water quality and pollution discharge standards, for example, depends in part on erosion control, managing fertilizer use in the agricultural sector and rangeland far upstream" (op. cit., p. 6). Another inconsistency is that farmers have long been incentivized to boost yields with subsidies and otherwise, prompting farmers to make ample use of fertilizers and pesticides – a policy which has only recently been modified into a more sustainable direction. Finally, the participation of the wider public and full transparency, especially by strengthening water user associations, is recommended.

One potentially very costly and complex issue is deep groundwater pollution. So far, in China it is often attempted to drill for deep groundwater (typically down to 100 m) precisely so as to avoid surface or shallow groundwater. Even the MEE holds, so far, that deep groundwater is safe. However, in Curell (2017), some disturbing evidence shows otherwise. In scrutinizing 37 deep aquifers for the presence of nitrate [88], only one had nitrate below background levels and several had worryingly high levels of contaminant, besides indications about a range of other pollutants. The author fears that only a fraction of the 4 million wells drilled in Northern China in the 1960s and 1970s are registered . Many of them leak or allow 'bypass flows' from the surface to much deeper levels. The scale of this issue and the costs of remediation may well be comparable with that of soil pollution in countless sites i.e. massive and the liability question might be one way to reduce the problem.

7.1.4 Greenhouse gases: China's early implementation steps of Paris

With respect to climate change mitigation, it is useful to first take note of the policy intentions linked to the Paris Agreement, China's Nationally Determined Contribution (NDC):

a. To peak its CO2 emission by 2030 or earlier
b. To reduce the carbon intensity of GDP by 60 % - 65 % below 2005 levels in 2030
c. Increase the share of non-fossil fuel to 20 % by 2030 (and 15 % by 2020)
d. Increase its forest stock by 4.5 bn m3 in 2030 compared to 2005

Together these four intentions are not consistent with global warming below 2 degrees C, let alone 1.5 degrees [89]. China has finally put a relative cap on coal consumption (58 % share in

[87] The Ramsar Convention (Table 2, item 6) aims to protects wetlands and China has ratified it but it merely applies to 'wetlands of international importance'.
[88] Nitrate is widely measured, easy to detect and highly water soluble.
[89] Similarly, the EU's NDC is also insufficient. Whereas Carbon Tracker assesses China's NDC as 'highly insufficient', the EU is seen as 'insufficient'.

2020 energy consumption), yet lifted a ban on new coal-fired power plants in 2018, leading to a probable increase in CO2 in both 2018 and 2019. The first three targets of the NDC will almost certainly be attained. The peak in CO2 will be reached by several provinces claiming to attain their subtarget in a few years after 2020. However, as shown above, some provinces are 'coal bases', and have also begun to compensate the strict policies in Beijing and Shanghai by higher coal and steel output (e.g. Mongolia, Liaoning and Shanxi). So it is simply too early to tell. Moreover, beyond the peak, how fast will the CO2 emissions decrease ? There have been suggestive remarks by leading Chinese about a further tightening of the coal cuts but the 14th Plan will be the genuine guide [90]. The carbon intensity reduction is largely structurally determined, via embodied technical progress and replacement of outmoded equipment and factories but equally by a rapid rise of non-fossil energy production (which is firmly projected), the third target. China may well have another problem, namely, the other [non-CO2] GHGs such as methane, N2O and HFC. Climate Tracker expects that by 2030 non-CO2 emissions will make up nearly 25 % of China's GHGs (in CO2 equivalent). This issue is also linked with the Kigali Amendment of the ozone protocols (such as Montreal) [91]. The question is therefore what and how much China will do how fast in order to reign in such GHGs.

On forestation, section 6.3.1 already noted that China has successfully increased the area covered with forests to more than 22 % of its land. This has a double motive : against desertification (the large Gobi desert tended to augment) and supporting the mitigation of climate change. The target of reforestation in 2020 in China is 23.04 % of the land, and 26 % by 2035. The target to be made in 2030 will therefore not be a problem, not least because stopping the Gobi desert from incrementing (and with it the occasional sand storms) is a powerful motive and widely supported. The scale of this 50-years reforestation project is truly amazing. There is criticism such as the monoculture generated and the relatively low absorption capacity of CO2 of these new forests.

7.1.5 Can 'responsible business' in China contribute ?

There are many indications in China that it is not just 'the state' long having taken a weak stance on sustainable development whilst paying lipservice since the late 1990s, but equally that Chinese business (including SOEs) exploited the lack of credibility of enforcement in order to avoid the costs of following the rules and intent of environmental laws. This is less true for foreign-owned companies in China used to stricter regimes at home. With the old SOEs in a non-competitive environment long having died out, profit-maximization and/or shareholder value seemed to be the only guidance of business leaders. The idea of 'responsible business' or a voluntary take-up of 'corporate social responsibility' (CSR) was long alien to China.

This is not the place to write the (short) history of CSR in China but the numerous small spontaneous protests from workers or the regional population after accidents revealing a severe disregard of the rules or in anticipation of major infrastructural projects imposed on

[90] Assuming this time that enforcement will be credible and CO2 pricing (in their new ETS) or taxation will do.
[91] See section 5.2, esp. Table 2. Note that the Kigali amendment on HFCs has very long adaptation times (for China up to 2045).

the locals (e.g. the extreme example of the Three Gorges dam is just one amongst many) without any voice for the locals naturally drew the attention of green NGOs. China has tolerated NGOs – especially local ones – although reluctantly. With criticism getting more widespread, president Hu Jintao and the government launched the 'scientific development concept' in 2003 (a better term is 'societal development' or indeed sustainable development) [92]. The promotion of voluntary CSR followed soon and laws were enacted with guidance as well. None of this was bottom-up and business showed no real commitment. It is held that this changed somewhat after the earthquakes in Sichuan in 2008 when business in China rushed to help with equipment or money. However, in her work on China's extractive industries (mining, fisheries and forestry) – easily amongst the worst offenders in terms of environment – Tan-Mullins (2014) finds a lacklustre performance at best, and possibly much less in their FDI or sourcing abroad in e.g. Africa. For one, raising the issues of 'transparency' and 'accountability' is highly sensitive as questions of corruption and bribery are purposefully neglected. This is despite the large majority of extractive firms in e.g. mining being SOEs. Best practice global standards such as the EITI [93] are not adopted in China, probably for this reason [94].

More generally, empirical work on CSR in China is still in its infancy. One inference is clear : it is not widespread in business and SOEs are overrepresented. The latter might be attributed to the tighter government hand in the governance of SOEs [95]. Oliver Rui of the China Europe International Business School has composed a CSR index for Chinese listed companies [96]. Of the 3052 A-share companies listed in 2017 in Shenzhen and Shanghai, only one quarter disclosed CSR reports but many were not detailed and lacked data [97]. Therefore, now the CSR Index only comprises the performance of the top-50. Since 2009 there is an international conference on CSR reporting in China and the Golden Bee report [98] has a detailed analysis of the status after 10 annual conferences. Data confirms more or less the picture from professor Rui: nowadays there are some 2000 CSR reports a year and 399 are rated 'good' [99]. Firms listed on the HK stock exchange (with stricter requirements) score some 25 % better than those listed in Shanghai or Shenzhen. So far, CSR is voluntary but in 2021 the regime will become stricter which should be helpful : ESG level disclosure will become mandatory for some 3000 firms listed (and a few bond issuers).

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[92] It is defined as people-oriented, comprehensive, coordinated and sustainable development which aims to protect the environmental and livelihood security of China's citizenry.
[93] The Extractive Industries Transparency Initiative, see www.eiti.org
[94] Although Tan-Mullins also warns that some adaptation of global standards to China might be wise as otherwise such standards risk to be discredited as the outcome of Western hegemony in the CSR debate.
[95] The board of every SOE has a mandatory seat for a representative of the CCP.
[96] See https://www.ceibs.edu/new-papers-columns/growing-csr-china-first-corporate-social-responsibility-index-chinese-listed March 2018
[97] The author notes that many firms do not go beyond donations to charity, or attempts to conserve nature ; international CSR standards also prescribe disclosure of company operation and management, product quality and innovation, responsibility to employees and diversity in staff. The basic idea is that seven stakeholders are well informed : customers, employees, environment, communities, shareholders, suppliers and government.
[98] See www.csr2.mofcom.gov.cn/article/ckts/sr/201712/20171202687223.shtml 18 Dec. 2018
[99] Following the HongKong ESG Guide (ESG= Environmental, Social and Governance)

Empirical work by Li, Khalili & Cheng (2019) is helpful for acquiring an idea whether CSR can contribute to improve environmental performance of business. The authors use a data set of 839 companies publishing CSR reports between 2006 and 2016 in China. Much of CSR reporting in China is about business projects resulting in environmental and/or social improvements. Of 31 100 projects by these companies, some 23 500 focus on environmental responsibility (esp. air, water, energy, and solid or hazardous waste); the upward trend of the number of projects over the ten years is rather sharp. This would seem to suggest that Chinese business begins to assume environmental responsibility itself, even though in some areas these projects are a consequence of new laws or enforcement. A small group of companies, though mostly large ones, may well become a handmaiden of China's sustainable development. Another interesting empirical finding is that a company will gain a higher revenue when it engages in CSR with many projects which should facilitate the further acceptance of a serious CSR approach amongst Chinese companies. That in turn can contribute to the achievement of sustainable development in a natural way driven by local initiative and respectable business practices.

7.2 An EU FTA sustainable development 'standard' for EU/China trade policy

In section 2 attention was paid to the SD chapter of recent EU FTAs: an inventory of trade-related SD specifications for environment and climate is summarized from the EPA between the EU and Japan, and supported by a check with three other deep EU FTAs (see Table 1) . Table 1 represents EU preferences with respect to NTPOs (in environment and climate policies) in bilateral trade and investment relations. The FTA with Japan is amongst the most ambitious 'deep' FTAs concluded by the EU and indeed in the world. One might call it the "EU trade-related SD standard in environment and climate". This subsection uses this inventory or "EU standard" for a proxy assessment of the trade-related NTPOs in environment and climate on which the EU and China would seem to agree. The inventory is much more about aims, strategic perspectives and policy intentions and not or at best very selectively about indicators. Nevertheless, it is a measurable and verifiable method to understand whether and to what extent *policy* convergence in (trade-related) environment and climate between China and the EU can be observed.

The EU and China do not have a FTA and are also not negotiating one. Referring to Table 1, summarizing the SD chapter in the EPA between the EU and Japan, all items can be discussed except item 11 on consultation and enforcement (as there is no FTA). Table 9 has been structured as in Table 1. References or quotations underpinning or exemplifying confirmations in the fourth column of Table 9 are collected in Annex II.

Table 9

China's degree of convergence with the EU "standard" on sustainable development [100]

no	subject	Items of substance (short)	Reflected in EU/China cooperation
1	Context & objectives	-Trade contributing to SD -Considering specific MEAs, etc. -Econ./soc. development and envir. protection mutually reinforcing	-yes, reference in Annex II -yes, see the survey in Table 2 -yes, reference in Annex II
2	Right to regulate	-Right to regulate for each -International standards/agree.ts -Strive to ensure high levels of environmental protection -3 non-regression clauses + non-discrimination and no arbitrar.ss	-implied by regular caveats -frequently, yes, -very similar indeed, see Annex II -Formally unlikely; but intensive cooperation suggests: yes
3	On MEAs	-Effectively implement MEAs -Trade & environment, mutual supporting -Trade-related environmental matters, exchange views/info -Re-affirm UNFCCC + Paris -Cooperate so that trade is positive for transition to low-GHG emssions	-Yes, MEAs often re-affirmed ; EU and China are convergent in terms of (12) MEAs, see Table 2 -yes, see Annex II -For decades, has been done and intensified between EU and China -Strongly and repeatedly -yes, see Annex II
4	Trade and investment favouring SD	-Facilitate/promote trade & investment in environmental goods & services -Idem, in goods and services good to combat climate change -Promote trade under labelling schemes and private initiatives	-EGA was a plurilateral attempt, with the EU and China, now stuck -EGA attempt can be widened to include this -partial confirmation, see Annex II
5	Biological diversity	-Re-affirm CBD and CITES -Including labelling schemes and combatting illegal trade -Details on implementation -Consult on e.g. wildlife, ecosystems, etc.	-not literally but clearly implied, see Annex II -via multilateral routes -idem
6	Sustainable forestry	-Trade and investment serving sustainable forestry -And timber trade/timber products -Contribute to combat illegal logging	- all 3 items follow directly from the 2009 China-EU BCM (Bilateral Coordination Mechanism) on Forest Law and Governance; see Box 2 on sustainable forestry

[100] On environment and climate policies only

7	Sustainable fishing	-Trade & investment serving sustainable fishing/ acquaculture -Comply with UN & FAO conventions/codes and implement port measures -Encourage sustainable fisheries in RFMOs (and credible controls) -Combatting IUU in many ways	-China has gradually shifted closer to EU positions, both multilaterally (UN and FAO) and bilaterally -in 2018 all aspects (also IUU) included in the Blue Partnership for the Oceans (with China) -elaborated in Box 3
8	Scientific information	-Parties take account of scientific information + precautionary pr.	-no general issue, so far, but 'open science' agreed for Oceans -precautionary principle or approach im- or explicit in MEAs
9	Transparency and evaluation	-Pursuit of SD in transparent way -Sustainability impact ass.t	-transparency can sit uneasily with China's way of governing, though improving - China has environmental IAs but often local; rigour, independence of authors unknown
10	Cooperation in SD aspects	-Cooperation over a wide & open spectrum of SD issues	Yes, the EU/China Dialogues and other bilateral programmes, projects and partnerships testify about this SD cooperation since (say) 2003

Note : the numbers in column 1 refer to the numbers of the rows in Table 1

In evaluating Table 9 it is essential to distinguish the substance from the instrument. Whether the EU and China have, or are getting close to acting on, a similar 'sustainable development standard' is a matter of *substance*, irrespective of having a FTA (the instrument) or not. Nevertheless, substance and instrument are not totally independent, because a FTA is – more often than not – a tool to demonstrate a deeper partnership with benefits of trade and investment but frequently going beyond that. A FTA tends to lead to more and firmer commitments, often in a legal form (hard law) and accepting those is precisely signalling the deeper partnerhip and the credibility of common efforts. For this crucial reason, the comparison with the 'EU standard' in the absence of a FTA is less than perfect. In the following, we shall follow the sequence of 10 items in Table 9.

The context and objectives (item 1) taken from the FTA with Japan would seem to present no problem for China as the first and third sub-items are clearly implied in declarations or summaries of meetings or press releases. On the MEAs, China and the EU are convergent for no less than 12 MEAs and Protocols or later Annexes.

The right-to-regulate (item 2) is an obvious entitlement for any State [101]. In many EU/China cooperative arrangements or partnerships or declarations or Dialogues, one finds caveats

[101] There has been much confusion due to the option of ISDS in TTIP and later in CETA and some sensational arbitration cases. The reaction in the drafting of newer FTAs has been to be explicit in the text about the right-to-regulate.

about the wording being non-binding which removes any lingering doubt. The commitment to apply international standards or agreements is typically followed by China case by case, but after decades of international as well as bilateral cooperation China is firmly woven into webs of international agreements and standards. Striving to ensure high levels of environmental protection is not so easy to assess. In recent speeches of the Chinese leadership, powerful language is employed suggesting full support of high levels of protection. But that is probably best interpreted as aims for the longer run, except for e.g. renewables, electric vehicles and batteries. Thus 'striving' is indeed the appropriate wording. The three non-regression clauses have the purpose of not undermining the high levels of protection. They consist of : (a) 'not encourage trade or investment by relaxing or lowering the level of protection' in environmental and climate laws ; (b) 'not waive or otherwise derogate from those laws and regulations'; (c) not 'fail to effectively enforce'. It is here where a (deep) FTA might well be different than more transactional cooperation because China might not wish to be so constrained in addressing the domestic consequences of SD policies (even when it might agree with the idea). Furthermore, the ban on arbitrary or unjustifiable discrimination or disguised restriction might be difficult for China to formally commit to, again even when it might agree with the idea itself.

If there is one very broad and important area of environmental and climate policy where the EU and China agree fully, it is the commitments to MEAs and their later amendments or extensions (item 3). In fact, a large part of environmental/climate SD is covered by MEAs and it would be a major mistake to focus on EU/China SD cooperation as a predominantly bilateral question. It is more the other way around: much of EU/China bilateral cooperation and wider trade policy with respect to SD in environment and climate is about bilateral accentuation, re-affirmation and practical implementation of the MEAs as well as the working-together in the multilateral environment to accomplish common objectives or targets. There is no doubt that the two partners support all 4 sub-items in item 3 explicitly or implicitly.

Partners in deep FTAs typically consider such FTAs as yet another force to stimulate trade and investment favouring sustainable development (item 4). However, moving from principled agreement of 2 countries to the pluri-lateral (the EGA) or multilateral negotiation environment is not a small step. Thus, on the 3 sub-items of this domain there is unlikely to be discord between the EU and China at the general level but these aims are not nearly concrete and practical enough for an EGA [102] to be accomplished.

China and the EU agree on the main initiatives of biological diversity as well as on the MEAs like CBD and CITES (item 5). Indeed, China is the host of the biodiversity COP conference in Kunming in the autumn of 2020 (now postponed). But China is also a source of demand for dubious or forbidden products, usually based on fake medical or physical convictions. Combatting illegal trade thus implies tough customs and knowledge of informal trade networks. Analogous to fair trade and some other cases, an effective implementation of CITES, for instance, requires investments in and cooperation on wildlife in some countries

[102] The exact list of environmental goods or goods relevant for facilitating the mitigation of climate change [see de Melo and Solleder, 2019] is critical for the practical meaning of this type of commitment. This is complex.

and in the knowledge and conservation of eco-systems. Both CBD and CITES are demanding in implementation which leaves considerable scope to disagree on implementation whilst agreeing on the objectives.

Sustainable forestry (item 6) has long been a subject of deep cooperation (e.g. Indonesia as a frontrunner with the EU) before the subject began to enter FTA texts. China firmly agrees with the three sub-items. The topic is important for reasons of trade and complex to organize domestically in participating countries and internationally. That is why it is elaborated in Box 6.

Box 6

EU/China cooperation on sustainable forestry and timber trade

In 2009 China and the EU established a BCM (Bilateral Coordination Mechanism) on FLEG which stands for Forest Law Enforcement and Governance [103]. The EU participates with the European Commission and interested Member States. The overall objective is to contribute to the reduction of illegal logging and associated trade globally in order to promote sustainable development – environmentally, socially and economically (Art. 2.1). FLEG is inspired by the FLEGT initiative of the EU that has been concluded with several ASEAN countries and some African ones as well. The BCM focuses precisely on China's relations with and imports from such countries, besides China's exports to 'regulated ' countries. It is well-known that local efforts to organize sustainable forestry (e.g. in East Malaysia and Indonesia, etc.) remain ineffective if the demand side (often China) is not addressed firmly as well.

The origin of China's interest is found in the 1998 and later restrictions for its own forests with respect to harvesting. In turn this has triggered a gradual but steady rise in imported forest products. China is a huge importer of timber and related products (pulp & paper, plywood) with $ 51 bn in 2017 and it used to be a formidable exporter as well but has now lost almost one third of its 2007 foreign sales [104]. Although there is worldwide concern about illegal logging and a quest for better governance of trade and certification, the EU FLEGT initiative has been a leading example in this respect. In 2019 there are 15 FLEGT VPA (Voluntary Partnership Agreement) countries which have minimum regulation and certification requirements as a condition for exporting to the EU. This has acted as a standard for quite a few countries and stimulated China to act in a similar fashion. However, the legal and administrative detail and verification are demanding before fully-fledged and reliable licences can become compulsory. Between 2007 and 2017 Chinese timber imports from FLEGT VPA countries increased by 136 % in $ value and is thereby the second biggest importer from VPA countries behind the US, but far ahead of the EU, the import share of which halved in a decade to 16 % in 2017. On the export side, some 52 % of Chinese exports of timber products were bound for regulated markets i.e. only

[103] See www.euflegt.efi.int/documents/10180/23033/2009+EU+China+BCM+Agreement

[104] This is usually attributed to increasing demand from a rising Chinese middle class. China's exports in 2007 were equal to its imports. Source : Briefing, Analysis of China's trade with the EU and VPA countries 2007 – 2017, see EU FLEGT Facility (2019b)

demonstratably legal timber is allowed to come in. Exports to the EU increased by more than 50 % in value but remain stagnant by volume, a sign that consumers have shifted to higher priced goods such as furniture.
A stubborn problem remains that, in the complex flows from countries that export to China first, and subsequently for the processing inside China, before exporting to third countries, guaranteed tracking is extremely difficult. There is no mandated robust chain of custody systems and there are no Chinese import regulations ensuring that all imports are verified as legal. Clearly, this is partly what the annual BCM meetings with China are about. During the 9th meeting in March 2018 a Work Plan was adopted with a host of options to address this issue, e.g. import management measures, the development of the CTLVS (Chinese Timber Legality Verification System), a new monitoring system with guidelines and more incentives for the private sector to adopt responsible purchasing of forestry products. The original BCM agreement also mentions (Art. 3.2) codes of conduct for European or Chinese businesses. Meanwhile, in 2020 China has amended its forest law prohibiting the purchase, transport and processing of illegal wood.
China, the EU and Indonesia (a big exporter to China) have developed a trialogue with respect to FLEGT and the VPAs[105]. This is important as Indonesia is still the only ASEAN country with a fully developed licensing system (since 2016 - EU legal timber imports of € 2 bn in 2018) and since China is by far its biggest client. In the meantime, ASEAN ministers have endorsed an ASEAN Code of Conduct on timber imports in 2019. There are also initiatives on Vietnam – China and China -Myanmar trade in timber, all stimulated by the FLEGT approach. Since a number of the VPA countries is in Africa, and China is once again a major client, a China-Africa-EU trialogue is being set up to help these countries and to level the playing field in the interest of the environment.

Sustainable fisheries (item 7) is perhaps even more demanding than forestry. In fisheries there is a complex web of regional and international organisations as well as private certifiers. In 2020 China agrees with most if not all of the four subsitems as formulated. But in the past its record in IUU has been problematic, if not worse, and its reputation for the arrangements for fishing in African waters is subject to much improvement. For all these reasons the subject is elaborated in Box 7.

Box 7

EU/China cooperation in sustainable fishing

What happened in coal, steel and ceramics in China also happened in fisheries: phenomenal growth rates of catches and even more in aquaculture, such that by 2015 the FAO (2018) estimates China's world share of production being as high as 37.7 % (79.3 mn ton). This is much higher than China's share in the world population or world GDP. There is little doubt that 'growth at all costs' was practiced for several decades, just like in industry, pushed by unemployment in coastal communities, and stimulated by subsidies. The next three economies on the FAO list (Indonesia, India and the EU, together in population nearly double that of China) only generate 18.4 % of world fisheries output,

[105] See for this and other initiatives, EU FLEGT Facility, Annual Report 2018, see www.euflegt.efi.int . In 2020 the Chinese Academy of Forestry recommended the Chinese recognition of Indonesian V-Legal documents, the study underlying this recommendation was co-funded by EU FLEGT.

half of that of China [106]. It is therefore of the greatest importance that the EU and China assume leadership in order to make world fisheries sustainable and – in the process - level the playing field.
However, fisheries is a very complex policy area, not only because of the sovereign waters issue (EEZs, exclusive economic zones) but also because Asian and European fishing boats have become more dependent on Distant-Water-Fleets (DWF), which in turn often require subsidies in order to be profitably operated. There are complications flowing from modern fishing technology (e.g. bottom trawlers destroying bio-diversity), lack of transparancy of bilateral agreements (especially when these are coupled with loans and grants as China routinely does, and, in so doing, creating dependency) to allow DWFs in one's EEZs, depletion of stocks in certain areas, and unreliable data. Although reporting to the FAO is compulsory, a 2012 report for the EP [107] calculated that between 2000 and 2011 inclusive, China had massively underreported its DWF catches : rather than the reported annual average of 368K tonnes, the better estimate turned out to be around 4600K tonnes, some 12 times this reported volume. Over 60 % of this huge amount is caught in African waters, often under murky or confidential contracts with loans attached. Inspections there are weak or simply absent. When in Europe, with strict rules, certification and quotas commonly enforced, the arrangements under the EU common fisheries policy and RFMOs, the governance of sustainable fisheries can already be controversial, it is not hard to appreciate that this sustainability is much more difficult to achieve in other parts of the world, including China. The awareness of Chinese fishermen is known to be low or absent, they basically fish to survive.
EU-China cooperation in fisheries dates back to 2010 when the partners signed a MoU for a High Level Dialogue on an integrated approach to Ocean Affairs, and to the High Level Dialogue on Fisheries. Besides, there is a High Level Dialogue on Law of the Sea and Polar Affairs and, since 2016, an EU-China WG on IUU. In the EU/China Summit (July 2018), cooperation was reinforced through the 'Blue Partnership for the Oceans' [108] which includes sustainable fisheries. The objectives of this Partnership include 'to ensure effective governance for the conservation and sustainable use of the oceans', '..strengthening…ocean governance mechanisms and structures, including in..fisheries' that 'keep oceans clean, healthy, productive and safe', and, finally, enhancing technical coperation in many ways and forms. The 'effective …fighting [of] IUU fishing activities' e.g. by tracking suspected vessels and strengthen effective systems of control, inspection and enforcement is surely the right way to proceed. The Declaration on the Partnership also promotes 'open science and open data'.
Although there are serious sustainability problems in fisheries worldwide, there is also a lot of activity on formal and informal commitments between neighbouring countries, in regions, in catchment areas and multilaterally, and both public and private. EU-China

[106] If one focuses only on catches (not aquaculture), the joint share of the three followers is just over 90 % of the Chinese catches. It is aquaculture which creates the biggest gap.
[107] See www.europarl.europa.eu/meetdoes/2009-2014/documents/pech/dv/chi/china.pdf , The role of China in world fisheries. Note that China Tuna Industry Group revealed formally (in a IPO !) in September 2014 that China had been taking advantage of lax enforcement to exceed catch quotas for bigeye and yellowfin tuna in the Pacific. Interesting enough, this was seen by competitors in China as an incentive to go for private certification with respect to sustainability with e.g. Friends-of-the-Sea and Marine Stewardship Council regarded as credible all over the world.
[108] See https://ec.europa.eu/fisheries/eu-and-china-sign-landmark-partnership-oceans en of 16 July 2018, and the Declaration on the Blue Partnership (with details) is attached

fisheries cooperation has to be understood against several UN-inspired treaties like UNCLOS and UNFSA [109], EU participation in 6 'tuna RFMOs' (RFMO = Regional Fisheries Managment Organisations) and 11 non-tuna RFMOs, giving the EU a unique position to lead on world governance in fisheries. RFMOs can set catch limits, impose technical measures and control obligations. For the EU's own fleet the EU has concluded 18 SFPAs (Sustainable Fisheries Partnership Agreements) for fishing in EEZs of partner countries, but with a regulated and guaranteed environment that does not differ in governance between countries as it is derived from strict EU laws applicable in the EU itself. The EU would ideally want China to conclude such SFPAs based on high [read : EU] standards which do not depend on negotiation strength, agreements which are public and not linked to loans or aid as such. The relevant EU regulation is Reg. 2017/2403 of 12 Dec 2017 on the sustainable management of external fishing fleets.

The problem of fisheries subsidies is very weakly tackled in the WTO [110] and is therefore subject to a reform that is currently negotiated. Clearly, the EU and China can be useful here but China does not have a strict state aids tradition as the EU has for decades. Moreover, the Chinese fleet is so 'oversized' (i.e. kept large, without cutting in earnest) that subsidy disciplines can only mean considerable cuts in vessels and production (esp. DWFs) for years. This is bound to be resisted and alternative employment might have to be sought. The subsidy question is complex because not all fisheries subsidies are automatically distortive nor do they always keep the fleet size. As Bayramoglu, Copeland, Fugazza & Jacques (2019) argue, and as the EU has practiced for a while, it is the combination of subsidy controls and various quota that is optimal for conservation and consistent with incentives for negotiation. In any event, following the mandate of the Buenos Aires 11th WTO ministerial in January 2017, negotiators are expected to secure an agreement in 2020 (by the Kazakstan 12th WTO ministerial, now postponed) eliminating subsidies to IUU fishing and prohibiting certain forms of fisheries subsidies that contribute to overcapacity and overfishing. Of course, this does require adequate and timely reporting about both fisheries catches and subsidies in a fully transparent manner, something that China has failed to do in the WTO for years [111]. But, early December 2019, the chair of the negotiating group ambassador Siantiago Wills expressed his concern about the slowness of progress in the talks [112]. If one remembers that the fisheries subsidy reform was formally begun in 2001 in the framework of the Doha Round, and nothing has been achieved yet, despite the great urge today and the better technical preparation, it is clear that the EU and China do have a great opportunity to assume genuine leadership. China has every incentive given its enormous economic, social and environmental stake and the EU pretends already for years to be in the lead when it comes to global fisheries governance. The EU has indeed a unique position not only as a frontrunner in responsible fisheries rules coupled to controls and given its membership of partnership and RFMOs all over the world, but above all because its leverage is powerful, being the biggest fish importer in the world – it is credible when setting standards. Therefore, the EU-China fisheries cooperation can be decisive bilaterally but also globally.

[109] UNCLOS is UN Convention on the law of the seas, and UNFSA is the UN Fish Stocks Agreement.

[110] In the Agreement on Subsidies and Countervailing Measures.

[111] See e.g. WTO Trade Policy Review China 2018, WT/TPR/S/375 of 6 June, under 'notifications'.

[112] Stronger, he called it a 'serious setback'. The papers submitted so far 'are still not the clean consolidated texts' which were due before the summer. He urges all 'to get out of their comfort zones'. See WTO TN/RL /32 of 11 Dec 2019, retrievable via www.wto.org/english/tratop_e/rulesneg_e/fish_e/fish_e.htm .

Item 8 is about objective, science-based and evidence-based SD approaches. Also international standards should guide national policies. And the precautionary approach may be justified if scientific knowledge is insufficient in the presence of very serious, possibly irreversible damage. Over time China has clearly moved into this direction for environment and climate issues. Science plays a great role in China's domestic debates as well. However, whether China would be ready to subscribe in general to this set of principles is not certain – as before, it might wish to do so in specific agreements and MEAs. In any event, some MEAs incorporate the precautionary 'approach' and this is fully accepted by China.

The notion of transparency (item 9) has become an elementary component of EU FTAs [113] after the 2006 Global Europe strategy began. Compared to several decades ago, China has become much more transparent, with far greater openness about laws and decrees relevant for trade and investment and much more consultation about draft laws and e.g. technical standards. The lingering problem is that this openness does not apply universally for China's actions. These exceptions create suspicion and/or are associated with laws or practices that tend to undermine the reputation of China in the international community. Examples include standard setting in the case of cybersecurity, the late and much too vague reporting on subsidies in the WTO and the dramatic underreporting of DWF fish catches to the FAO a decade ago. Item 9 incorporates the use of sustainability impact assessment, a practice that – if proper evidence-based assessment and functional logic is employed – can be very helpful as an input in domestic decision-making on SD issues. It also helps outsiders to be better informed – it is possible that outsiders, including foreign partners, may help constructively, something that China has long promoted[114] and practiced. However, it is not so clear what the current status is of (as China calls them) environmental impact assessments. A functional (i.e. non-political or non-ideological) impact assessment is surely in the enlighted Chinese interest as well.

Item 10 is about bilateral cooperation in many aspect of sustainable development, as far as climate and other environmental issues are concerned. This is where China and the EU, 'working together', have been very active and both bilaterally between the two but just as often or even more frequently, together in the context of MEAs and other multilateral activities. The present contribution testifies to this [115].

Overall, this survey demonstrates that China *broadly approximates* this "EU standard for trade-related SD in environment and trade". There are definitely some weak points and one or two sub-items where it is difficult to come to a firm conclusion. Nevertheless, of the 30 sub-items, China is convergent in the large majority of instances, and possibly convergent on some additional ones but this would have to be tested. Lest it be forgotten, Table 9 is based on roughly the highest SD standard in FTAs in the world. It underpins the convergence

[113] It is also prominent in US FTAs.
[114] Remember f. i. the longstanding participation of EU experts in the CCICED advising on the preparation of the next Five Year Environmental Plan.
[115] See more generally on EU/China trade-related Dialogues, Hu & Pelkmans (2020)

hypothesis mentioned in the very beginning of this study. This convergence is not complete - the crucial point is that it has already gone far, without having a FTA.

But it also demonstrates rather painfully that, whilst in diplomatic parlance and legal language about aims and principles the two parties nowadays agree to a large extent, most actual indicators about the environment and GHGs in China reflect serious divergences, with trends towards convergence being slow and uneven. In 2020 this is the "*great green paradox*" in environmental relations between China and the EU. This paradox can sow confusion. A steady pursuit of an ambitious green agenda between the two partners should ensure that this 'great green paradox' will soon melt away.

It is particularly here that one should pay attention – indeed, much more attention – to China's own home-grown initiatives of going green. The focus on all traditional indicators is well justified but one might miss out on multiple and daring industrial and technological developments that China itself has gradually engineered and vigorously promoted. Altogether, these initiatives begin to look like a genuine overall 'green' strategy that is geared to future industries, clean energy, new forms of transport and innovative technologies, possibly resulting in a broad support of 'going green' and a zero-carbon economy by 2050. Some basic facts have been mentioned before in this paper, especially the strength of the renewables sector in China, but without entering into the broader perspective of China's long-run strategies and their possible outcome. It is this subject where the EU can and should learn from China, best in cooperative efforts. In a way this is already happening as EU industry is selectively involved in NEVs (new energy vehicles), battery storage technologies, wind turbines and solar panels (both with technology originating from Europe). In all these sectors, China has quickly mastered and developed the technologies involved and exploited scale in the huge Chinese market, resulting in drastic cost cuts. The strategy is reminiscent of the opening up of the Chinese economy after 1978: rather than pushing too much on the correction, transformation or removal of the 'old' [at the time, the SOEs ; here the 'old' is everything coal-based], one can cherish and promote the 'new' over a longer period of time [at the time, the 'new' were private firms ; here, the 'new' consists of all the green technologies and sectors] until they arrive at a critical scale and can contribute in earnest to greening the economy, whilst also enjoying a strong business model. Box 8 elaborates.

Box 8

China as a leader in 'greening' the world ?

Ever since 2015 one reads occasionally about a supposed Chinese leadership in 'greening' the world. This would of course be very good news, above all for Chinese citizens, workers and nature but also for regional and global motives. This stream of publications is not necessarily fake news or 'framing' but it is usually focussed merely on 'clean energy' (especially renewables) and its rapidly increasing application, in China, to the electricity sector, energy storage and bus-fast-rail-car transport. It matters therefore for the environment (e.g. air quality – thereby bound to generate wide support amongst the citizens - and other co-benefits) but particularly for climate mitigation policies. However, as shown in section 6 in detail, many worrying aspects of the state of the environment are not or at best marginally affected by these green industrial policies.

Nevertheless, it is easy to understand the rationales behind this overall strategy. China considers energy security as a top priority and these strategies are an effective (though probably insufficient) response to the huge and seemingly ever increasing import dependency created by China's erstwhile industrial and ['old'] energy policies and other unsatiable resource-intensive business models. This point incorporates the second rationale: China's new economic strategy is to move up the value-added ladder in global value chains, if only to ensure higher productivity as a basis for higher incomes, and to create strong (dominant ?) corporate players on the world market in a range of newer high-value-added industries. Even if China would wish to continue the old mass production and export-reliant economic model, the annual decrease in available intra-Chinese migrant workers (of some 3 million a year) would make this impossible. The determination of a radical turn-around was embolded over time when it turned out that China could swiftly learn from companies and hi-tech from developed countries. All means were solicited, with huge subsidies and state-banks guarantees, purchases of hi-tech in the market [116], joint ventures with foreign hi-tech companies under Chinese control, a switch to a chain of new applied research institutes and SOEs going abroad and conducting targeted take-overs at above-market prices. The Manufacturing China 2025 programme targets 10 sectors including the sectors mentioned above.

In clean energy the results have been amazing and now reach critical mass for making an impact on climate policies and to a modest extent environmental policies. According to UNEP in Frankfurt [117] a mind-boggling $ 758 billion has been invested by China in renewables capacity (without hydro) between 2010 and spring 2029, followed by the US with 'only' $ 356 bn. On NEVs (new energy vehicles) some $ 60 bn national and provincial subsidy has been spent between 2009 and 2016 [118]. No wonder China has now the largest wind and solar capacity in the world (210 GW wind and 200 GW solar) [119].

Finamore (2020, p. 7) adds that China is also the largest producer and deployer of high-speed rail, subways, lithium batteries and electric vehicles. Costs and prices have come down dramatically. In solar equipment the cost reductions have been so large that the biggest anti-dumping case the EU ever ruled (on solar panels from China, with € 22 bn bilateral trade) was terminated halfway through the customary 5 years, because the duties were considered as hindering the green transition. Of course, soft budget constraints eventually harden even in China. In 2019 subsidies to NEVs were curtailed and terminated for some renewables.

The present paper restricts itself to the already very comprehensive bilateral coooperation in environment and climate between the EU and China. Only recently the EU has become much more interested in China's new industrial strategy, but so far mainly from the point of view of (EU) industrial policies and (China's) trade distortions rather than from an environmental and climate point of view. Whilst the irritation in the EU about China's distortive practices and its avoidance of scrutiny under the subsidy code of the WTO is fully understandable, it is nevertheless still worthwhile to intensify the discussion about clean energy and related green strategies with China. With the US sidelined under president Trump, China and the EU should intensify their green cooperation and build

[116] In addition, there is quite some literature on illegal copying or stealing of technology from companies

[117] See www.unenvironment.org/resources/report/global-trends-renewable-energy-investment-2019 in September 2019 (Global trends report)

[118] Kennedy & Qiu (2018)

[119] REN21 (2019), Renewables 2019 Global Status report, Paris, www.Ren21.net/reports/global-status-report

alliances at the global level under their joint leadership, taking into account the active engagement of China with the BRIIS and other developing countries in this respect [120]

One issue that falls outside Tables 1, 2 and 9 is nonetheless quite important for China: transboundary water cooperation. China has neither ratified nor even signed the UN Watercourses Convention [121] as it is of the view that some provisions would amount to interference in the domestic affairs of the country. However, China shares 40 major transboundary watercourses with 16 countries. Legally it assumes mostly a bilateral approach. It is frequently held that in fact China considers many of these transboundary water flows as a domestic issue, which has caused considerable problems in the Mekong river with at least four countries. The Mekong river is downstream in these countries and they complain about significant upstream withholding of water by China, undermining the effectiveness of regional Mekong cooperation, in turn supported by the EU via e.g. the ADB as well as directly. There has been some Chinese interest in the Rhine basin cooperation [122] as a longstanding example (but which goes further than the UN Convention) but this sensitive issue has not, as far as the author knows, been the subject of EU /China cooperation, despite its relevance for sustainable development.

7.3 Answering the second research question

The second research question is about *policy* convergence. It comprises two elements: an assessment whether the EU has systematically pursued the NTPO of environment and climate in bilateral trade policy in a wider sense with China, and a judgment whether these efforts have been effective in supporting a process of policy convergence with China. Considering sections 5 and sections 7.1 and 7.2 there is little doubt that the first part of the research question can be answered in the affirmative. The EU has been active, if not very active, in a myriad of activities at all levels and also in markets, with a view to stimulate a Chinese turn-around to radically improve environmental laws, performance and enforcement as well as to go green for the mitigation of climate change. Equally at multilateral level the EU and China have worked together in global fora to agree on many MEAs ; Table 2 demonstrates that the two partners are signatories of no less than 12 important MEAs, including new Protocols and later annexes; the UN Watercourses Convention is a rare exception where China thus far acts purely bilaterally, with indications that this is to the detriment of some neighbouring countries.

Whether these efforts have been effective in factually stimulating China to become (much) more environmentally friendly and more climate-friendly cannot be rigorously established. Throughout the paper there are numerous indications that much of the cooperation has worked at least to some degree and examples of close cooperation can easily be found. But of course China has – wisely – chosen to cooperate with other countries interested in 'green

[120] See e.g. Kaneti (2020), Li, Wolters & Yang (2017), Wang (2020) and Malcolmson (020).
[121] See UN Watercourses Convention (1997) and Chen, Rieu-Clarke & Wouters (2013)
[122] Thus, in the 6th Ministerial Dialogue on Environmental Policy on 24th May 2016, pollution prevention and control in the Rhine River Basin was extensively discussed.

dialogues' and technical projects as well [123], besides intense collaboration with international economic and environmental organisations with great expertise. When discussing effectiveness, it should not be forgotten that much of the bilateral cooperation that is expected in EU FTAs (in the sustainable development chapters) is brought about as a result of multilateral obligations in MEAs, and precisely there China and the EU have already converged as far as can reasonably be expected. However, as Box 8 reminds us, China long built up its own strategies – initially helped by the EU and in markets by EU companies – in clean energy and related technologies and activities. Especially since the launch of Manufacturing China 2025 and some earlier positioning e.g. in solar panels and wind turbines, China has assumed a strong position in these markets and technologies and this helps the environment and especially climate mitigation. The EU and China should pro-actively exploit their joint importance in greening the world and this should be part of the bilateral and multilateral cooperation in this field.

8. Conclusions

The RESPECT project attempts to answer the question whether EU trade policy in the wider sense can influence and be effective in promoting NTPOs with trading partners. The present paper focuses on one large element of 'sustainable development', an important NTPO, as defined by the European Commission (fn. 6) : the fight against climate change and the protection of the environment. The trade relationship studied is that between China and the EU.

The basic idea of the paper is that one can observe a decades-long, complicated if not tortuous process of convergence between the EU and China in SD (in climate and environment), guided and supported by intense and multi-variate bilateral exchanges, Dialogues, consultation, practical projects, stimulation of green investments in China (via CDM), programmes and direct local collaboration in the implementation of policy inside China. However, this progress in the convergence process is highly uneven over (say) the last 25 years, studied in this work, both in different time periods as well as between different issues of SD, and hence hard to appreciate fully. The paper tries to render this process intelligible. The text shows clearly that the EU has been active, if not very active, ever since the first Commission paper on EU/China relations in 1995, in assisting the development of China , when still a developing country, and in promoting in many ways the direction and intensity of SD policy making directly or indirectly relevant to trade and investment. The process of convergence has been influenced by the EU, no doubt, but there have been many other actors as well as international agencies that have been helpful in this respect. It is therefore impossible to verify the degree of effectiveness of the EU promotion of SD in EU/China trade policy in the wider sense with any rigour. Nevertheless, the paper points to

[123] But nowhere to the same extent as the EU

an abundance of EU-China activities, Dialogues, programmes, projects, common declarations/statements and regular support from the EU-China Summit level over two decades. These common activities have widened considerably in scope and have deepened as well in a number of instances. In several specific policy or expertise issues, the EU has actually supported China directly be it via local collaboration (e.g. emission trading) or China has adopted EU regulatory requirements (e.g. car emission requirements).

First, an operational notion of 'sustainable development' as an EU trade policy aim is defined by a stylized representation of the sustainable development chapter in EU FTAs. Thus, Table 1 comprises 11 items of this EU SD 'standard' which helps to structure the paper in policy terms but it is also convenient in order to evaluate how far China and the EU have, today, converged in terms of SD aims and treaty commitments at the international level (in section 7.2, Table 9). Despite the considerable criticism from the EU about the current state of the environment in China (extensively covered in the paper via indicators in different periods), Table 9 shows that nevertheless a process of convergence has proceeded quite far in terms of ambitions and *strategy*. However, the *results* today are still mixed but gradually improving.

Second, the environmental status of China today and in the mid-1990s (the 25 years studied) hinges critically on the record-high and secular economic growth of China since the early 1980s. There is a brief reminder about this incredible growth in section 3. As is clear from many sources inside and outside China, this supergrowth generated both huge benefits and huge costs. The benefits can be found in the lifting out of poverty of some 850 million Chinese in a few decades as well as providing many of them and their children a serious perspective of opportunities in the near future. This massive lifting out of poverty has often been praised and rightly so; it is a unique achievement. However, there can be no doubt that China pursued growth "at all costs". The present paper does not enter the debate of how this can be explained, in particular once the negative externalities began to cause huge health costs for people and the environment as well as the climate. What is essential is the engine of this supergrowth : a seemingly endless supply of coal and a predominance of – if not overinvestment in - heavy industries (also using coal) beginning with severely outdated factories and technologies, besides a heating system of households equally based at first on (raw) coal. Altogether, it caused about the worst air pollution [124] in the world as recent as 2018. The SO2 also caused acid rain over large parts of China and neighbouring countries, with subsequent damage to forests and grasslands. In addition, a disregard of other natural resources – clean water above all, but also soil – and an apparent fear in companies for reasons of competitiveness, whether private or SOEs, or the rapidly rising number of big livestock farms, to incorporate adequate costs to prevent damage to the environment via untreated waste [125], heavily polluted water flowing into rivers and lakes, poisonous heavy-metal sites (in the soil) and otherwise.

[124] According to the EPI ranking of 2018, p. 46 (but only SO2 and NOx).

[125] This refers to the late 1990s and the period up to (say) 2010. Industrial waste is nowadays usually treated but municipal waste much less. However, large livestock farms also cause severe problems to water.

Within the confines of a single paper, it is attempted to make a fact-based 'journey' from the environmental status of China around 1995 – using all relevant indicators available at the time – via a series of China's environmental five-years plans between 2000 and 2015, to what is known at the present stage about China's climate -related issues (mainly CO2, ozone and powerful GHGs) and the non-climate environment qualities of air, water, soil and the forests, again largely based on indicators. After first failing on both accounts for at least a decade or more (for CO2 much longer and more flagrant, as no reduction targets were set in the first place and pricing or non-trivial taxes were not introduced either), a first tightening was initiated towards 2010 (without much effect as yet) and a further one after 2010 (in the 12th plan). At the same time, China was swiftly developing a renewables industry the output of which accelerated after 2010 when it began to matter. Also, an impressive reforestation programme continued throughout which significantly increased the share of land in China covered by forests (from some 15 % in the mid-1990s to over 22 % in 2015), thereby serving several masters, that is, the climate, the anti-floods programme of rivers, and reducing erosion. After 2015 or so, electrical vehicles (cars, scooters [126] and buses) swiftly increased their market share as well.

Third, the paper zooms in on 25 years of ever closer EU/China cooperation – both bilaterally and in multilateral settings – on sustainable development. Provided is a summary of the early period between 1994/5 and 2003 when China and the EU concluded the Strategic and Comprehensive Partnership and, subsequently, a concise survey of bilateral SD cooperation on SD with a total of 19 Dialogues, multi-year programmes (including several projects with hard targets and very many activities), joint statements and common agenda's or roadmaps. With respect to emission trading, the EU and China concluded a MoU in 2018 to enable personal and technical support inside China, following the EU's experience with the ETS. A separate detailed table (4) is dedicated to the ambitious EU/China Roadmap on energy cooperation 2016-2020, even including selected forms of harmonisation. As an illustration of the importance of market-driven incentives in the cooperation, Box 2 is dedicated to how the CDM of the Kyoto Protocol has worked between the EU and China, with both having assumed roughly 50 % of the global CDM market respectively on the demand and supply side, a great but relatively short-lived success.

Fourth, several alternative approaches are utilized in order to establish and assess the environmental and climate status of China today and the nature and progress of the process of convergence with the EU. After a scrutiny of three successive environmental five-years plans (2000 – 2015) and their (partial and selective) success, a number of indicators of 'green growth' for 2015 and later are discussed. The indicators confirm the mixed picture of a worrying status of some important negative externalities, even after considerable policy effort by China, combined with some amazing trends improving the environment and the fight against global warning. The frequent lack of effectiveness of China's initial environmental policies is explained based on recent literature: the laws used to suffer from a range of deficiencies and their pursuit was characterized by 'campaign-style' regulatory implementation, a lack of monitoring and too low incentives (or weak penalties) to abide by

[126] For example, in Shanghai all scooters have to be electric since 2011.

the requirements. However, these former traits of China's environmental strategy have begun to change quite radically. Three crucial and more risk-based laws were enacted between 2015 and 2018 (on water, air and soil), with much tougher enforcement provisions as well as investment in detailed monitoring. These initiatives have already yielded noticeable improvements, yet, some serious problems still remain.

The paper ends with a fairly detailed juxtaposition (in Table 9) of China's confirmed or supposed position on 10 elements of the SD chapters of EU FTAs as summed up in Table 1. On the MEAs referred to (item 5 in Table 1), Table 2 provides a full summary of the ratification by China and the EU respectively of 12 MEAs and subsequent amendments or Annexes or Protocols, as the case may be. The inference from Table 2 is straightforward: China and the EU exhibit full convergence in signing and ratifying treaties. In some of these treaties, the commitments might vary between China and the EU or might have distinct time tables. In other elements of Table 9, there is considerable convergence but also possibly some divergence. Convergence can be found on the commitment to strictly and faithfully implement the Paris Agreement on the climate (but this is a complicated long-run commitment, for which China finds itself with a difficult starting point), the duty to combat 'illegal logging' (where a 11 years long bilateral BCM is active), some elements of sustainable fishing and the 'working together' on trade and SD (including international fora). Where divergence or significant delays are observed, positions can vary but these are few in the environment and climate area. On the other hand, in EU FTAs there is also a clause calling upon the two partners to promote the positive contribution of trade to the transition to a low-carbon economy. Going beyond the general clauses already agreed by the EU and China and in the absence of agreement on the EGA plurilateral, China and the EU could unilaterally lower access barriers for green goods trade, but together and simultaneously. On sustainable forestry, there is a BCM but not yet a bilateral FLEGT treaty. Still, China has tightened its law further and formally forbidden illegal timber trade in its new 2020 law. On sustainable fishing there is basic agreement between the EU and China on IUU and support of FAO instruments but not (yet) on detail ; moreover, the agreements with African countries on its activities of its distant water fleet are rather problematic. China is so far not committing much on 'responsible business', including CSR and sustainable business approaches. Ten years after CSR was recognized as important by the government, only few firms (mostly SOEs) display a genuine CSR policy which may help the environment and the climate. In 2021 however, some 3000 companies will be obliged to publish CSR reports based on the higher CSR standards of the Hong Kong stock exchange, with more transparency on green conduct. The facilitation of environmental goods in trade is closely associated with the EGA which failed, among others things, because of disagreement on the list of goods – partly between China and the EU.

In concluding the paper, succinct answers to the three research questions can be provided

Research question 1: *What is the process of convergence between the EU and China in the status of environment and climate factors, as captured by relevant SD **indicators** ?*

In the period of 25 years studied, one does observe eventual convergence being on the way – though at different points in time for distinct SD factors – but only after periods of major and damaging divergence for citizens' health, workers' health , nature (including water, soil and air), climate as well as for the notion of a level-playing field in world trade and investment, given the severe disregard of the option of mitigating or preventing such market failures.

Research question 2 : *What is the process of convergence in environmental and climate-related **policies** between the EU and China (if any) over the period 1995 – 2020?*

China has undergone tremendous changes in the relevant period, given extremely high and secular economic growth, the successful lifting of over 850 million Chinese out of poverty, the accession to the WTO (with a large impact on domestic reforms) and the increasing financial and strategic capabilities of China's government as wel as its business sector (SOEs and private). Also its external trade has exploded. This incredible trajectory has augmented China's policy capacity and means but at the same time seriously worsened the local environment (in almost all respects) and undermined any attempt of climate mitigation. The many negative externalities initially dominated the gains in capacity and modest policy initiatives in SD. Only much later during these 25 years China succeeded to firm up its domestic SD strategies, their monitoring, credibility and enforcement (and the considerable investments required). The recent improvement of the indicators (in different degrees) can be explained by this firming up of SD strategies in China. However, there has long been significant hesitation to employ first-best instruments such as water and CO2 pricing as well as absolute cuts (e.g. of coal use and output) in cases where intolerable damage was inflicted. And, for a country with strong top-down governance practices, there has long been a surprising tolerance or neglect of large-scale informal, yet illegal or in any event damaging, conduct by numerous farmers, smaller firms and many citizens. Now that enforcement in air, water and soil has much improved, matters are bound to improve as the first signs show. This seems to be more difficult in climate-related policies where e.g for CO2 emissions the peak has still not yet been reached (though forecasted soon; what is not known is how fast CO2 trends will fall later) whilst other GHGs increase their share. At the same time, renewables also rise rapidly with an expected share of 20 % in 2020 and rising further.

Research question 3 : *Has EU trade policy and cooperation vis a vis China with respect to sustainable development **systematically pursued** the NTPOs of environment and climate mitigation since the late 1990s and has this pursuit been **effective** in supporting a process of convergence?*

The initial status of China's environment in the late 1990s and the emerging realisation of the major problem of global warming mitigation via CO2 reduction and controlling other GHGs served as wake-up calls for the EU. The strategic partnership with China (1998) and the strategic and comprehensive partnership (since 2003) created a form of trust and stability, thereby forming the foundation for a steady increase in both the scope and the intensity of environmental and climate mitigation cooperation. With China becoming an upper middle income economy, this cooperation became both more urgent and more feasible. Thus,

initially EU policy and EU/China cooperation in environment and climate was directed at stimulating and improving China's policies in this respect, whilst the facts (indicators) on the ground were still pointing to a rapidly deteriorating status. In other words, a gradual and at first slow emergence of more sound environmental and climate policy in China coincided with worsening practices in the economy, generating pretty extreme negative externalities for citizens and workers, and similarly for nature in many forms. Only when the persistent and wide-ranging EU/China cooperation matured over several channels and topics, and the indicators had become intolerable, policies and enforcement were significantly tightened. This is of course not only and possibly not even primarily due to EU/China SD cooperation but the present paper shows that there cannot be any doubt that the EU has been unfailingly pro-active in SD with China for two decades and has been most responsive to any request or policy interest from China in these fields, whether for support or knowledge transfer or for pursuing common activities or a common pursuit in multilateral settings (a key activity given the many MEAs the two partners share).

References :

Asian Development Bank (2018), Managing water resources for sustainable socioeconomic development, a country water assessment for the P.R. of China, December, see www.adb.org/sites/default/files/institutional-document/473576/country-water-assessment-prc.pdf

Bayramoglu,B, B. Copeland, M.Fugazza & J-F. Jacques (2019), Trade and negotiations on fisheries subsidies, *VOX CEPR Policy portal*, 21 October, see https://voxeu.org/article/trade-and-negotiations-fisheries-subsidies

Cames, M. et al. (2016), How additional is the Clean Development Mechanism?, Berlin, study for DG Clima, see www.ec.europa.eu/clima/sites/clima/files/ets/docs/clean_dev_mechanism_en.pdf

CCICED (2019), Progress on environment and development policies in China and impact of CCICED's policy recommendations (2018-2019), see www.iisd.org/sites/default/files/publications/cciced/agm/cciced-progress-report-2019-en.pdf

Chen, H., A. Rieu-Clarke & P. Wouters (2013), Exploring China's transboundary water treaty practice through the prism of the UN Watercourses Convention, *Water International*, Vol. 38, 2, April, pp. 217 - 230

China State Council (2000), The 10th Five Years Plan for Environmental Protection

China State Council (2003), China-EU policy paper, included in Snyder,ed., pp. 490-498

China State Council (2005), The 11th Five Years Plan for Environmental Protection

China State Council (2006), The 11th Five Years Plan for National Economic and Social Development, see http://www.gov.cn/english/special/115y_index.htm

China State Council (2011), 12th Five Years Plan for Environmental Protection, Guofa 2011, 42

China State Council (2018), Three Years Action Plan for Blue Sky Defense, June, see www.gov.cn/policies/latest_releases/2018/07/03/content_281476207708632.htm

Climate Tracker (2019), China's pledges and targets, see www.climatetracker.org/countries/china/pledges-and-targets/

Curell, M. (2017), China's war on water pollution must tackle causes of deep groundwater pollution, https://glbalwaterforum.org/2017/04/03chinas-war-on-water-pollution-must-tackle-causes-of-deep-groundwater-pollution/

Development Solutions & EMG (2008), Trade Sustainability Impact Assessment (of the negotiations of a Partnership and Cooperation Agreement between the EU and China), August, see www.SIA-PCA-with-China_2008_Final_tradoc_140579.pdf

Ecorys, Oxford Intelligence, TNO & Reichwein China (2017), Sustainability Impact Assessment in support of an Invest

EP(2012), The role of China in world fisheries, see www.europarl.europa.eu/meetdoes/2009-2014/documents/pech/dv/chi/china.pdf

EPI(2019), Environmental Performance Indicator 2019, New Haven and Geneva, see www.epi.envirocenter.yale.edu

EU FLEGT Facility (2019a), Annual report, highlights and insights from 2018, see www.euflegt.efi.int

EU FLEGT Facility (2019b), Briefing: analysis of China's trade with the EU and VPS countries 2007 – 2017, see www.euflegt.efi.int/publications/analysis-of-china-s-trade-with-the-eu-andvpa-countries-2007-2017

EU & China (2009), Bilateral Cooperation Mechanism on FLEG, see www.euflegt.efi.int/documents/10180/23033/2009+EU+China+BCM+Agreement

EU & China (2016), EU/China Roadmap on energy cooperation, see https://ec.europa.eu/energy/sitesener/files/documents/FINAL_EU_CHINA_ENERGY_ROADMAP_EN.pdf

EU & China (2018), Blue Partnership for the Oceans, see https://ec.europa.eu/fisheries/eu-and-china-sign-landmark-partnership-oceans_en_of_16_July_2018

EU & Japan (2018), Agreement between the EU and Japan for an Economic Partnership, August, see www.trade.ec.europa.eu/doclib/2018/august/tradoc_157228.pdf

EU & Mexico (2018), FTA Agreement in principle, April, see www.trade.ec.europa.eu/doclib/2018/april/tradoc_156528.PDF

European Commission, COM (1995)279, A long term policy for China-EU relations, included in Francis, ed., pp. 340-369 fn 15

European Commission, COM (1997)490 of 13 Oct 1997, Europe-Asia cooperation in the field of environment

European Commission, COM (1998)181 of 25 March 1998, Building a comprehensive partnership with China

European Commission, COM (2000)552 of 8 September 2000, Implementation Report (of the partnership)

European Commission COM (2001) 265 of 15 May 2001, Second Implementation Report (of the partnership)

European Commission, COM (2003)533 of 10 September 2003, A maturing partnership – shared interests and challenges in EU/China relations

European Commission, COM (2008) Trade SIA [not 2009 ? not Development Solutioms]

European Commission, COM (2015) , Trade for all, towards a more responsible trade and investment policy, see www.trade.ec.europa.eu/doclib/2015/october/tradoc_153846.pdf

European Commission (2017), EU negotiation proposal of the Sustainable Development chapter of the draft FTA with Mexico, April, see www.trade.ec.europa.eu/doclib/2017/may/trade_tradoc_155528.pdf

European Commission (2020), Sustainable development, website information, https://ec.europa.eu/trade/policy-making/sustainable-development/

FAO (2018), The state of world fisheries and acquaculture 2018, www.fao.org/3/i9540en/i9540en.pdf

Finamor, B. (2020), China's quest for Global Clean Energy Leadership, Rome, *IAI Papers* 20/05, January, see www.iai.it/sites/default/files/iaip2005.pdf

Golden Bee (2017), Research on CSR reporting in China 2017, see www.csr2.mofcom.gov.cn/article/ckts/sr/201712/20171202687223.shtml

Hu, W. (2020), A survey of the EU-China dialogue architecture: premise, structure, functions and case-studies, paper for RESPECT, July

Hu, W. & J. Pelkmans (2020), EU-China Trade-related Dialogues, a first assessment, paper for RESPECT, *EUI Working Paper* RSCAS 2020/46, August, see https://cadmus.eui.eu

Jin, Y., H. Anderson & S. Zhang (2016), Air pollution control policies in China: a retroperspective and prospects, *International Journal of Environmental Research and Public Health*, Vol. 13, 12, December,

Kaneti, M. (2020), China's climate diplomacy 2.0, *The Diplomat*, see https://thediplomat.com/2020/01/chinas-climate-diplomacy-2-0 , 2 January

Li, K., N. Khalili & W. Cheng (2019), Corporate Social Responsibility practices in China: trends, context and impact on company performance, *Sustainability*, vol. 11, 354

Li, L., S. Wolters & F. Yang (2017), China and its climate leadership in a changing world – from passive follower to constructive shaper of the global order, *Discussion Paper*, July, see www.climate-diplomacy.org and www.adelphi.de

Linster, M & C. Young (2018), *China's progress towards Green Growth: an international perpsective*, Paris, OECD Green Growth Papers no. 2018/05, see www.oecd.org/env/country-reviews/PR-China-Green-Grwoth-Progress-Report-2018.pdf

Lui, O. (2018), Growing CSR in China: first CSR index for Chinese listed companies, www.ceibs.edu/new-papers-columns/growing-csr-china-first-corporate-social-responsibility-index-chinese-listed March

Ma, T., S. Sun, G. Fu, J. Hall, Y. Ni, L. He, J. Yi, N. Zhao, Y. Du, T. Pei, W. Cheng, C. Song, C. Fang & C. Zhou (2019), Pollution exarcerbates China's water scarcity and its regional equality, *Nature Communications*, Vol. 11, see https://www.nature.com/articles/s41467-020-14532-5

Ma, T., N. Zhao, Y. Ni, J. Yi, J. Wilson, L. He, Y. Du et al. (2020), China's improving inland surface water quality since 2003, *ScienceAdvances*, Vol. 6, 1, see https://advances.sciencemag.org/content/6/1/eaau3798

Malcolmson, S. (2020), How China became the world's leader in green energy, *Foreign Affairs*, see https://www.foreignaffairs.com/articles/china/2020-02-28/how-china-became-worlds-leader February

Melo, J. de & J.M. Solleder (2019), The role of an Environmental Goods Agreement in the quest to improve the regime complex for Climate Change, Florence, EUI, *RSCAS Working Paper* 2019/55, see www.eui.eu/RCAS/Publications/

Myllyvirla, L. (2020), Air pollution in China 2019, CREA, Helsinki, paper 01/2020, see www.energyandcleanair.org

OECD (2019), *OECD Economic Surveys China*, Paris

Pan, X-C (2018), Research on Xi Jinping's thought of ecological civilization and environment Sustainable Development, 2nd International workshop on renewable energy and development, doi: 1o.1088/1755-1315/153/6/062067

Pelkmans, J., W.Hu, J. Francois et al, (2018), *Tomorrow's Silk Road- assessing an EU-China Free Trade agreement*, London/Washington DC, Rowman & Littlefield International

Rive, N. & K. Aunan (2010), Quantifying the air quality co-benefits of the CDM in China, *Environmental Science and technology*, 44 (11), pp. 4368 - 4375

Sandalow, D. (2019), Guide to Chinese Climate Policy 2019, New York, Columbia University, see www.energypolicy.columbia.edu/sites/default/files/file-uploads/Guide%20to%20Chinese%20Climate%20Policy_2010.pdf

Snyder, F. ed. (2009), *The European Union and China, 1949-2008*, basic documents and commentary, Oxford, Hart Publishing

Tan-Mullins, M. (2014), Successes and failures of CSR mechanisms in Chinese extractive industries, *Journal of Current Chinese Affairs*, December, https://journals.sagepub.com/doi/full/10.1177/186810261404300402

UN Watercourses Convention (1997), Convention on the Law of the Non-Navigational Uses of International Watercourses, GA-Res. 51/229(21 May 1997), available at http://www.un.org/ga/search/view_doc.asp?symbol=A/res/51/229

Wang, Lijun (2010), The changes of China's environmental policies in the latest 30 years, *Procedia Environmental Sciences*, Vol. 2, pp. 1206-1212

Wang, H. (2020), China must drive cooperation on climate change in the new decennium, Beijing, CCG (Center for China and Globalisation), February 1, see www.en.ccg.org.cn

Wen , Jiabao (2004), speeches in Brussels, Helsinki, Hanoi and The Hague, included in Snyder, ed.

World Bank (1996), China: Issues and opinions in Greenhouse Gas Emissions Control, *WB Discussion Paper no. 330*, edited by Johnson, Li, Liang & Taylor, June, Washington DC

World Bank (1997), *Clear water, blue skies, China's environment in the new century*, Washington DC

Worldbank (2018), Watershed, a new era of water governance in China, *Policy Brief*, Washington DC, November, see www.documents.worldbank.org/curated/en/999601541495579766/Policy-Brief.pdf

WTO (2018), *Trade Policy Review China 2018*, Geneva, WTO WT/TPR/S/375 of 6 June

WTO (2019), Interim report on fisheries subsidies negotiations, ambassador S. Wills, December, see www.wto.org/english/tratop_e/rulesneg_e/fish_e.htm

Annex 1 on the SDGs as analytically unworkable for EU trade policy

A simple illustration of why the SDGs as an operationalisation of SD would be unworkable in EU trade policy can be derived from the EPI reports [127]. In the 2018 EPI report, the ten main indicators have been expressly linked to SDGs, both in terms of goals and targets. Table A.1 shows how complicated that is.

Table A.1

Linking the 10 EPI indicators to the SDGs

	EPI indicator	goals	targets
1.	Air quality	5	5
2.	Water pollution	2	7
3.	Heavy metals	3	5
4.	Bio-diversity & habitat	2	5
5.	forests	1	3
6.	Fisheries	5	4
7.	Climate & energy	9	3
8.	Air pollution	(no SDG but 2 likely close links)	
9.	Water resources	6	15
10.	agriculture	1	5

Not counting EPI indicator no.8 (air pollution), this leads to no less than 34 goals and 52 targets. It should be noted that the EPI indicators are not exhaustive, e.g on air pollution there are only 2 included (SO2 and NOx), so the scope is wider still.

Annex II

References or quotations on the elements of EU/ China cooperation specified in Table 9

(numbering follows the numbers in Table 9)

no	subject	Reference to or quotation in EU/China cooperation activity
1	Context & objectives	1.1 In the EU/China Trade Project, Phase II, annual work plan 2011/12 , p. 7, it says : "Tackling climate change and moving towards a low-carbon and energy-efficient economy is a pro-growth agenda as it offers relevant economic and sustainable

[127] See Wendling et al (2018), 2018 Environmental Performing Index, New Haven, Yale Center for environmental law & policy, see https://epi.yale.edu/

		opportunities. These joint objectives are reflected in the significant number of trade dialogues." In the Joint Press Communique of the 2012 EU-China Summit (p. 2) it says that the Summit Leaders "Reaffirmed the importance of trade openness to sustainable growth and development". Also: in the 16 July 2018 Joint Leaders Statement on Climate Change and Clean energy, para. 5 "The EU and China recognize the importance of developing global free trade and investment, and promoting the multilateral rule-based system to allow the full development of the low greenhouse gas emission economy with all its benefits". 1.3 China and the EU both strongly supported the 2001 Doha Ministerial Declaration, para. 6, where it says "We strongly reaffirm our commitment to the objective of sustainable development..[..] ..We are convinced that the aims of upholding and safeguarding an open and non-discriminatory multilateral trading system, and acting for the protection of the environment and the promotion of sustainable development can and must be mutually supportive".
2	Right to regulate	2.3 No literal text repeating this type of phrase but over time EU -China environmental protection has clearly become much more ambitious in scope of areas and in aiming at higher levels. Thus, in the EU-China Summit Joint Statement of 9 April 2019 (p. 1) it says that "the high level of ambition" in the CAI to be concluded in 2020 "will be reflected in .. [..].. the inclusion of provisions on investment and sustainable development". The July 2018 EU-China Leaders Statement on climate change and clean energy is expressing ambition in several ways. In para 1 the "EU and China consider climate action and the clean energy transition an imperative more important than ever". In para 6, after calling the Paris Agreement 'historic', "The EU and China underline their highest political commitment to the effective implementation …. in all its aspects."
3	On MEAs	3.2 see quotation in 1.3 above 3.4 The UNFCCC already in the 2005 Partnership on Climate Change between China and the EU. The Joint Declaration on Climate Change of 2 Sept 2005 begins as follows : "We underline our commitment to the objectives and principles of the UNFCCC and the Kyoto Protocol.." In the July 2018 EU/China Leaders Statement on climate change and clean energy, para 6 states "The EU and China underline their highest political commitment to the effective implementation of the Paris Agreement in all its aspects including inter alia mitigation, adaptation, finance, technology development and transfer, capacity building and transparency of actions and support".

4	Trade and investment favouring SD	4.3 Labelling schemes are discussed and promoted under the EU-China Roadmap on energy cooperation 2016-2020 (see also Table 4) under energy efficiency; work towards harmonizing energy labels of appliances, etc., strengthen cooperation on energy consumption standards (aiming at mutual recognition) and increase business cooperation in e.g. eco-design. Note that China has adopted EU standards for CO2 and NOx emissions of cars in its automotive regulations until recently
5	Biological diversity	5.1 though not literally a re-affirmation, the China-EU 2020 Strategic Agenda for cooperation adopted in the 16th China-EU summit on 23 November 2013 includes the following (p. 6): "Promote … biodiversity .. [..]..implement the Strategic Plan 2011-2020 of the CBD and CITES" In the minutes of the 7th EU-China environmental policy Dialogue (1 April 2019) it reads : "Both agreed to step up cooperation towards achieving the goal of developing an ambitious and realistic post-2020 global diversity framework", for the Biodiversity COP15 of the CBD to be held in Kunming (China – meanwhile postponed from Oct 2020). 5.2 what is discussed by the bilateral is a function of the multilateral approach 5.4 idem
6	Sustainable forestry	- -
7	Sustainable fishing	- -
8	Scientific information	- -
9	Transparancy and evaluation	- -
10	Cooperation SD	- -

The following sources are referred to in the above table.

i. EU China Trade Project Phase II, Annual Workplan 2011 -2012, see www.eucpt.org/jdownloads/EUCTP_Annual_Work_Plan_1.pdf
ii. Joint Press Communique 15th EU-China Summit 2012, see www.consilium.europa.eu/media/26292/132507.pdf
iii. EU-China Leaders' Statement on climate change and clean energy, 16 July 2018, see https://ec.europa,eu/clima/files/news/2018071_statement_en.pdf
iv. The 2001 Doha (WTO) Ministerial Declaration , see https://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_e.htm
v. EU-China Summit Joint statement of 9 April 2019, see www.consilium.europa.eu/media/39020/euchina-joint-statement-9april2019.pdf
vi. Joint Declaration on Climate Change between China and the EU, Annex to Memo/05/298 of 2 Sept 2005, see

www.ec.europa.eu/clima/sites/clima/files/international/cooperation/china/docs/joint_declaration_ch_eu_en.pdf

vii. The EU-China Roadmap on energy cooperation of 2016, see https://ec.europa.eu/energy/sites/ener/files/documents/FINAL_EU_CHINA_ENERGY_ROADMAP_EN.pdf

viii. China-EU Strategic Agenda for Cooperation, adopted at the 16th China -EU Summit of 23 Nov 2013, see https://www.fmprc.gov.cn/mfa_eng/wjdt_665385/2649_665393/t1101804.shtml

ix. minutes, 7th EU-China environmental policy Dialogue of 1 April 2019, see www.ec.europa.eu/info/sites/info/files/7th_eu_china_environmental_policy_dialogue_minutes.pdf

List of Figures, Tables and Boxes

Box 8 China as a leader in ‘greening’ the world?

Glossary

ADB Asian Development Bank

APEC Asia-Pacific Economic Cooperation

ASEM Asia Europe Meeting

BCM Bilateral Coordination Mechanism

CAI Comprehensive Agreement on Investment

CBD Convention on Biological Diversity

CDM Clean Development Mechanism

CITES Convention on International Trade in endangered species of wild fauna and flora

CSR Corporate Social responsibility

DWF Distant Waters Fleet

EEZ Exclusive Economic Zone

EPI Environment Performance Indicator (Yale Environment Centre)

FAO Food and Agriculture Organisation (UN)

FLEG(T) Forest Law Enforcement and Governance (Treaty)

GHGs Greenhouse Gases

IUU Illegal, unreported and unregulated fishing

MEA Multilateral Environmental Agreement

MEE Ministry of Ecology and Environment (China)

NDC Nationally Determined Contributions (following the 2015 Paris treaty)

NTPOs Non-Trade Policy Objectives

PCA Political and Cooperation Agreement

RESPECT H2020 project 'Realizing Europe's Soft Power in External Cooperation and Trade'

RFMO Regional Fisheries Management Organisations

SD Sustainable Development

SFPA Sustainable Fisheries Partnership Agreement

SIA Sustainability Impact Assessment

VPA Voluntary Partnership Agreement (in timber)

WTO World Trade Organisation

UNCLOS UN Convention n the law of the Seas

UNFCCC UN Framework Convention on Climate Change

UNFSA UN Fish Stocks Agreement